

An Evaluation of Icon Roadside Environments in the Hunter, Central and Lower North Coast Region

A report prepared by the Environment Division of Hunter Councils Inc. on behalf of the Hunter-Central Rivers Catchment Management Authority and NSW Roadside Environment Committee

2007

A project completed by the Hunter
and Central Coast Regional Environmental
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Environment Division of Hunter Councils on behalf of
the NSW Roadside Environment Committee
& Hunter-Central Rivers Catchment Management Authority.

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Vegetation surveys have been completed at 28 `icon' roadside environments in the Hunter, Central and Lower North Coast region.

Vegetation survey work has confirmed the presence of high quality remnant vegetation in roadside environments throughout the region.

Contents

Abbreviations Used in this Report

^{0}C	Degrees Celsius
CCC	Cessnock City Council
CMA	Catchment Management Authority
DSC	Dungog Shire Council
E	east
EEC	Endangered Ecological Community
Fig	Figure
GCC	Gosford City Council
GDA	Geocentric Datum of Australia
GIS	Geographic Information System
GLC	Great Lakes Council
GSC	Gloucester Shire Council
GTCC	Greater Taree City Council
ha	hectare
HCCREMS	Hunter and Central Coast Regional Environmental Management Strategy
Inc.	Incorporated
km	kilometre
L1	First vegetation layer in the lower stratum
L2	Second vegetation layer in the lower stratum
LGA	Local Government Area
LMCC	Lake Macquarie City Council
m	metre
mm	millimetres
M1	First vegetation layer in the middle stratum
M2	Second vegetation layer in the middle stratum
MCC	Maitland City Council
MSC	Muswellbrook Shire Council
N	north
NCC	Newcastle City Council
NRM	Natural Resource Management
NSW	New South Wales
PFC	Percentage Foliage Cover
PSC	Port Stephens Council
REC	NSW Roadside Environment Committee
S	south
SSC	Singleton Shire Council
TSR	Travelling Stock Routes
UH	Upper Hunter Shire Council
W	west
WSC	Wyong Shire Council

1. Background and Context

1.1 'Saving our Corridors' Program – promoting best practice management of linear reserves

Linear reserves are those that are narrow in length and extend over considerable distances across the landscape. They include roadside environments, rail corridors and Travelling Stock Routes (TSRs). These types of reserves have become increasingly important for their biodiversity, social/cultural and economic values as the surrounding landscape has become increasingly degraded by land clearing and other Natural Resource Management (NRM) issues over time. To promote the values and best practice management of linear reserves in NSW, the NSW Roadside Environment Committee commenced implementation of a three year state wide 'Saving our Corridors' program in 2005. This project is funded by the NSW Environmental Trust. The program includes the following components:

1) Evaluating a range of high quality vegetation remnants (icon sites) located in roadside environments and TSRs,
2) Updating and developing roadside and TSR planning instruments and management tools, and
3) Providing accredited training for staff responsible for managing and maintaining roadside environments and TSRs.

To assist with completing the first component of the project, Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS) were engaged to undertake systematic biodiversity assessments of high quality (icon) roadside vegetation at two sites within each of the 14 Local Government Areas in the Hunter, Central and Lower North Coast region. Similar assessments of roadside vegetation have also been commissioned by the Roadside Environment Committee within all other Local Government Areas (LGA) in NSW.

This report provides the background, methodology and results of the roadside vegetation survey work that has been completed by HCCREMS at the 28 icon sites selected and surveyed within the region. The information generated by this survey work has provided important background and context for development of a Regional Roadside Environmental Management Strategy, particularly regarding habitat and other values as well as management issues that are present within high quality roadside remnants in the region. The information generated by the survey work will also be used as a benchmark for on-going monitoring and assessment of these remnants over time to provide an indicator as to the effectiveness of implementation of the Regional Roadside Environment Program. Identification and assessment of these sites will also enable their future use as educational resources that demonstrate the biodiversity values that are inherent in good quality roadside remnants and the kinds of management issues that impact on their long term conservation.

1.2 Roadside environments

1.2.1 Definition

Roadside environments are defined by the NSW Roadside Environment Committee as the area of land '*adjacent to the road and extending to a maximum distance of 20m from the edge of the road surface but specifically excluding areas of private land within this proximity '.* However, in some cases the distance from road edge to the nearest private property boundary may extend up to 100 metres.

1.2.2 Who is responsible for Roadside Environments?

The management of the roadside environment is the responsibility of a variety of organisations including councils, utility/service providers and the Roads and Traffic Authority. The local community, neighbouring land owners and other user groups also play a significant role in the management and use of roadside environments. The multiple management influences and objectives affecting roadside environments are reflected in the diverse range of legislation that impacts on these areas. Examples include the NSW Roads Act, Crown Lands Act and Environmental Planning and Assessment Act.

1.3 Values of roadside environments

Roadside environments criss-cross Australia in their connection of cities, towns and rural villages. However these reserves are not only corridors of land that enable the movement of people, goods and livestock, they also conserve remnant vegetation, contain a range of cultural and heritage values and provide a diverse range of economic, social and environmental services. More specifically these values and services include:

1) **Ecological values** including habitat for threatened and other fauna species, retention of Endangered Ecological Communities (EECs), wildlife corridors, a source of native seed for rehabilitation programs, protecting waterways and acting as buffer zones from strong wind, dust and noise;
2) **Social values** such as conserving Aboriginal and non-Aboriginal heritage, creating visual amenity and providing community recreation zones; and
3) **Economic values** such as providing a refuge for livestock in times of drought, reducing wind and evaporation of crops and pastures.

In addition roadside environments have practical/operational purposes such as stock transportation routes, placement of utilities such as water and sewer mains, electricity and phone lines, stockpiling of materials and recreational rest areas.

1.4 Roadside environment management issues

Despite the value and importance of roadside environments, there remain a number of management issues and challenges that need to be overcome in order to ensure the ongoing conservation and management of these environments and of the environmental services and other values they provide. These management issues and challenges are diverse and incorporate a wide range of stakeholders. They include:

1) Impacts of existing road construction and maintenance practices. Some of the existing management practices that presently impact on the quality and values of roadside environments include the need to clear vegetation to meet road construction and safety standards and to provide utilities and infrastructure in the road reserve, the infestation and spread of environmental and noxious weeds, livestock grazing, mowing and slashing practices, illegal clearing and burning, pollution of waterways caused by road drainage and surface runoff, and restrictions to fish passage caused by road structures. Achieving improved environmental management of roadside environments in the region will require ongoing improvement and adaptation of management practices such as these.
2) Conflicting objectives between stakeholders. There are numerous stakeholders involved in the management and use of roadside environments. These include councils, energy, water and telecommunications providers, Roads and Traffic Authority, community groups (eg Landcare, Wildlife Rescue Groups), adjoining neighbours, Rural Lands Protection Board and the Rural Fire Service. Each of these stakeholder groups has different and often conflicting objectives for management of the road reserve, all of which need to be considered when trying to protect and manage these environments in the long term. In many cases, conflicting objectives even exist within individual organisations.
3) Awareness and capacity. To facilitate improved environmental management of roadsides will require an increased level of awareness of the values and services provided by these environments within councils, the community and other stakeholders involved in their management. This will require the development and provision of information, training and tools and resources to enhance both the capacity and opportunities for improved protocols, practices and outcomes.

1.5 Objectives of this report

The principal objective of this report is to document and evaluate the vegetation condition and biodiversity value of high quality roadside vegetation remnants surveyed within the Hunter, Central and Lower North Coast region under the 'Saving our Corridors' Program. The methodology for selecting and surveying these sites and the results that were obtained are documented in the remainder of this report.

2. Methodology

2.1 Study area

The Hunter, Central and Lower North Coast region is located between latitudes 31 degrees 26 seconds to 33 degrees and 60 seconds south and longitudes 149 degrees and 65 seconds to 152 degrees and 80 seconds east. The study area encompasses the full extent of the 14 HCCREMS member Councils LGA boundaries. These LGA's include Gosford, Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes, Greater Taree, Maitland, Cessnock, Singleton, Gloucester, Dungog, Upper Hunter and Muswellbrook. This represents an area of approximately 3,902,172 ha.

A total of 28 systematic vegetation surveys, comprising two sites within each LGA were completed between 4/10/06 to 30/02/07 (Fig 2.1.1).

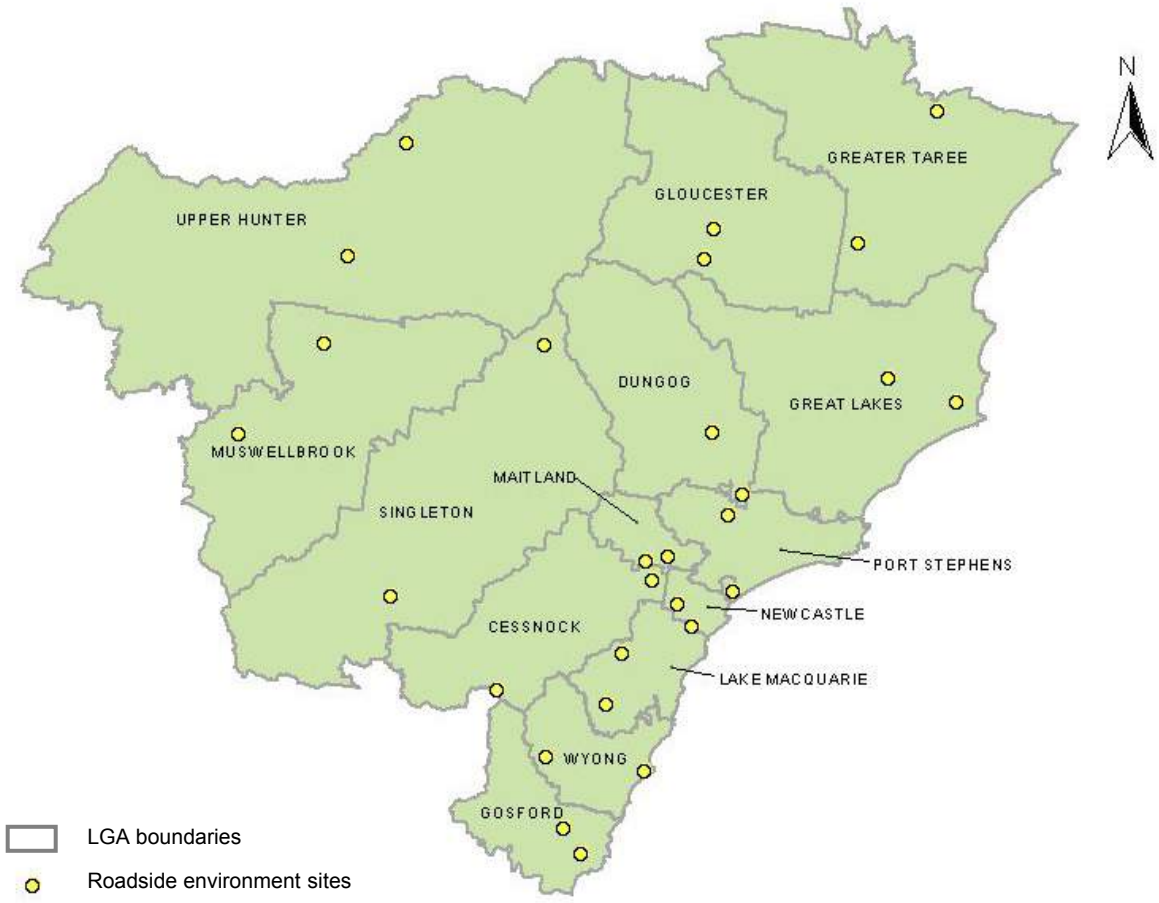

Figure 2.1.1 Map illustrating the location of roadside environment sites within the Hunter Central and Lower North Coast region.

2.1.2 Climate

The Hunter, Central and Lower North Coast region experiences warm wet summers and dry cool winters. South-easterly and north-easterly sea breeze winds are common in the summer months. Whilst in winter the winds are mainly from the west and southwest. In the warmest period the temperature ranges from 26.4 ^{0}C along the coast to 31.1 ^{0}C in the west and 21.8 ^{0}C in the mountain ranges (Fig 2.1.2a). In the coolest period the temperature reaches a low of 6.2 ^{0}C along the coast to and 0.3 ^{0}C out in the west and -1.7 ^{0}C in the mountain ranges (Fig 2.1.2b). Precipitation in the Hunter and Central Coast region varies, from a low annual rainfall in the western regions of the study area (559 to 723mm) to mid range annual rainfall along the coastal fringe (1052 to 1215mm) and high annual rainfall in the mountain regions (1708 to 1871mm)(Fig 2.1.2c).

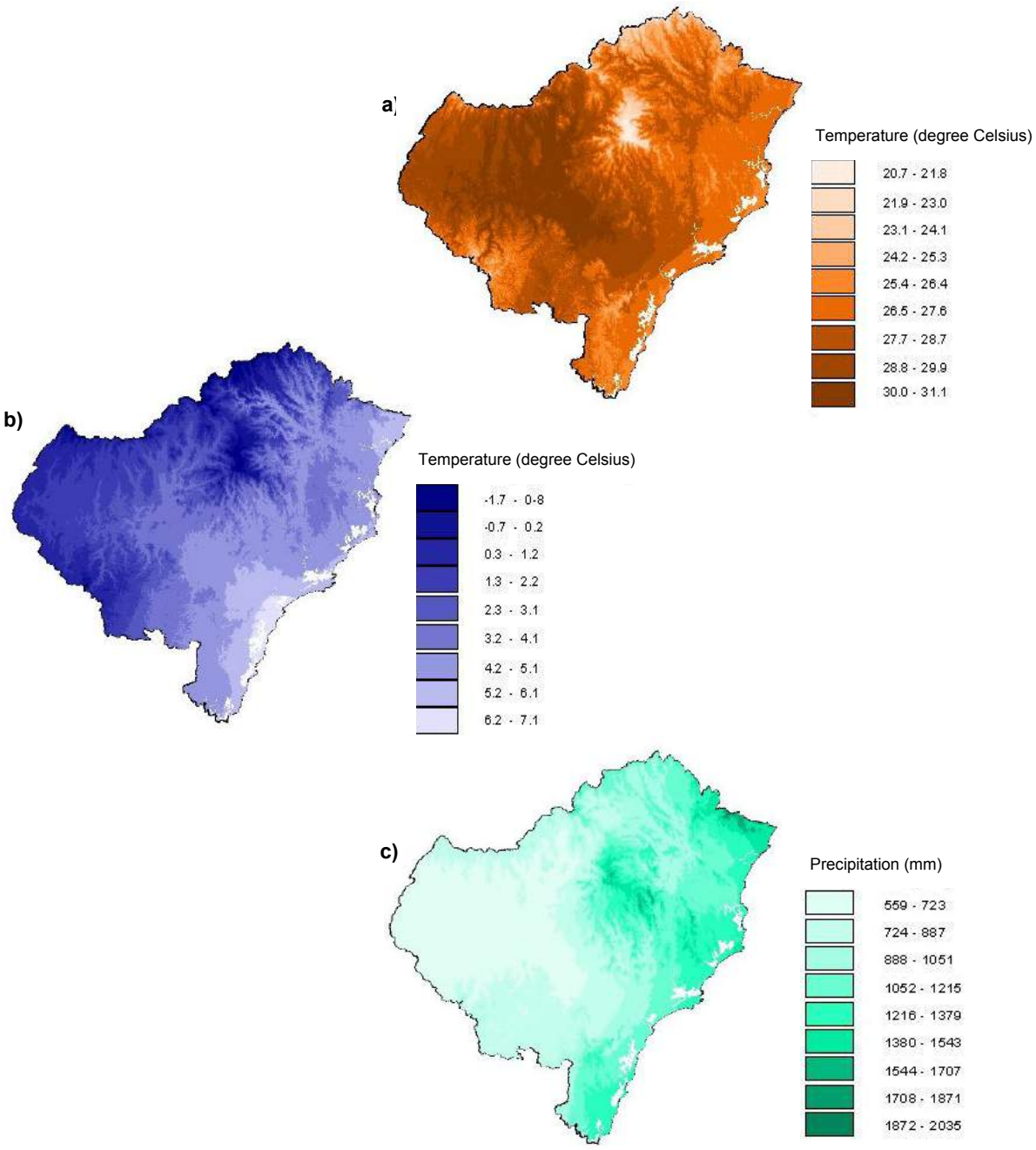

Figure 2.1.2 **Illustrates a) maximum temperature of the warmest period, b) minimum temperature of the coldest period and c) annual precipitation for the Hunter Central and Lower North Coast region (Houlder et al., 2001).**

2.1.3 Soil

The following is a brief overview of the soil types of the Hunter, Central and Lower North Coast region. For a more detailed description refer to Kovac and Lawrie, 1991, Matthei, 1995, McInnes, 1997, and Murphy, 1993.

The soil landscapes in the Hunter and Central Coast region consist of rich alluvial soils on floodplains and terraces and fertile alluvium enriched basalts located in the confines of Barrington Tops. In the mid-Hunter region, podsolic and soloth soils dominate. Dryland salinity does occur in areas of the mid-Hunter region where the water table gradually rises in weathered soils. The Merriwa Plateau consists of black earth soils based on Tertiary basalt flows. Along the eastern fringe infertile sands based on Quaternary sediments display varying degrees of podsolisation. Coastal and estuarine areas conceal acid sulphate soils.

2.1.4 Vegetation

There are many different publications that describe the vegetation communities within the Hunter, Central and Lower North Coast region (Hunter Region Botanic Gardens, 2006, Keith, 2004, Peake, 2006). In this report the vegetation communities were classified according to the Specht system; vegetation height and percentage foliage cover (PFC) of the different stratum. A basic summary of the Specht vegetation communities that were surveyed in this study is provided below (Specht and Specht, 1999).

Closed Forests (also known as rainforests) are located in small, wet pockets. The dense (70 to 100%) upper stratum can range in height from 5 to 40 metres. Common life forms in the vegetation community type include emergent trees, lianas, palms, epiphytic ferns and mosses.

Open Forests (once known as sclerophyll forests) range from temperate to humid climatic zones. The upper stratum dominated by *Eucalypt spp.* has a PFC that can range from 30 to 70%. This vegetation community type is divided into 3 subclasses based on the height of the upper stratum that include:

- Tall Open Forests have a dense understorey and an upper stratum of trees reaching a height of 30 metres.
- Open Forests have an understorey dominated by either heath or grass species depending on the nutrient content of the soil. The trees in the upper stratum range from 10 to 30 metres in height.
- Low Open Forests have an understorey dominated either by heath or grass species depending on the nutrient content of the soil. The trees in the upper stratum reach a height of 5 to 10 metres.

Woodlands exist in the dry areas of subhumid climatic zones. A woodland forest has a PFC that ranges from 10 to 30% and is dominated by *Eucalypt spp., Acacia spp., Allocasuarina spp*. and *Melaleuca spp*. The dominant species in the lower stratum are determined by the soil nutrient status. A woodland forest with a nutrient high soil will be dominated by grass spp. whilst heath spp. will dominate a woodland forest with a low nutrient soil.

Heathlands are located on nutrient-poor soils. The height of this vegetation community can vary from 30cm to 2m and the PFC is dependent on its geographical location. Plant families common to heathlands include Casuarinaceae, Fabaceae and Proteaceae.

Coastal Wetlands Complex is located around the coastline in low-lying areas. Plant species in this environment are salt tolerant as they can be inundated by saltwater at high tide.

2.2 Site selection

The roadside reserves to be surveyed for the project were required by the Roadside Environment Committee to be 'icon' sites. 'Icon sites' are defined as:

> `*sites of regionally significant remnant vegetation in locations that provide opportunities for development of broad community awareness and furthering the engagement of key stakeholders in the development of regional & local roadside vegetation management activities'.*

A total of two 'icon' roadside sites were selected for each LGA. The sites were selected via a three step process, as outlined below:

1) A list of potential 'icon' survey sites was compiled from individual council's local knowledge of their LGA
2) Detailed GIS (Geographic Information System) analysis was conducted to select further potential sites that were of adequate size and width as well as containing a large proportion of vegetation. The GIS site selection process involved the following steps:
   - Creating a road 'corridors' layer for council managed roads within the Hunter, Central and Lower North Coast region,
   - Clipping an extant vegetation layer to the road 'corridors' layer to identify significant patches of vegetation occurring alongside roads, and
   - Ranking each roadside environment according to vegetation patch size to establish a short list of approximately 6 to 12 sites for Step 3.

3) Selection of the final two survey sites for each LGA involved physically inspecting each potential site shortlisted to determine whether it met the criteria of an `icon site' in regard to its vegetation representativeness, diversity, health and condition.

2.3 Vegetation surveys

Linear reserves such as roadside environments tend to encompass a range of vegetation communities due to their long length. To obtain a comprehensive evaluation of roadside environment sites, both systematic and opportunistic types of vegetation surveys were employed.

A systematic vegetation survey records all vascular species, as well as providing a detailed account of vegetation diversity and condition within a small geographical area. This survey method involves using either a 20 x 20 metre or a 50 x 50 metre quadrat depending on the field attribute being assessed. Information on vegetation type, structure and species composition as well as information on site impacts were collected based on a 20 x 20 metre quadrat. Information on canopy growth, vegetation structure and habitat values were collected based on the surrounding 50 x 50 metre area. The quadrat location was chosen to provide the best representation of the roadside environment.

An opportunistic vegetation survey is a plotless survey technique that attempts to identify plant species over an entire site. The opportunistic survey was utilised to record plant species that were not identified from the systematic vegetation survey.

Plant samples or photographs were taken for species unable to be identified in the field for later identification. All species were identified according to the nomenclature used in Flora of NSW (Harden, 1991). For the vegetation structure description the Specht system was used (Specht and Specht, 1999).

In summary, the species lists compiled (based on both systematic and opportunistic surveys) provide a very good representation of species within the road reserves that were surveyed; however do not represent an absolute list because:

1) The systematic vegetation survey sites only represent a small portion of the entire roadside reserve;
2) Adequate material for plant identification could not be obtained for some species that have been subject to grazing and disturbance (especially grass species). As a result they may be underrepresented; and
3) Some species are only evident on a seasonal basis.

2.4 Additional data collected

Additional data on a range of site attributes were also determined using GIS rather than in the field. These attributes included:

- Geology (substrate)
- Locational information (roads, towns etc)
- Area and percentage woody native vegetation
- Habitat connectivity

2.5 Data entry

A Microsoft Access (MS Access) database was used to store and analyse data gathered from the field on field proformas (see Appendix 2) and data obtained from GIS analysis. Spatial representation of this data has since contributed to the development of a Regional Roadside Environment Map and Assessment Tool that will inform the environmental assessment processes of councils in regard to road maintenance and construction works; inform the development and prioritisation of a regional rapid roadside assessment program; and provide an ongoing tool for monitoring and review of implementation of the Regional Program.

3. Summary of Roadside Environment Survey Results

This chapter provides a summary of the biodiversity and other values and management issues that were identified within the 28 roadside environments surveyed under the project. The attributes that were collected and analysed include, reserve size and shape, species diversity, structural complexity, non-living groundcover, canopy complexity, vegetation connectivity, sites of cultural significance and management issues. A comprehensive description of each roadside environment site surveyed is included in Appendix 2.

The 28 roadside environment sites surveyed represented 6 different Specht vegetation classes. Tall open forest was the most common Specht vegetation class surveyed, being sampled at 11 of the 28 roadside sites. Grassy open forests were surveyed at 9 sites and grassy woodlands at 4 sites. The vegetation classes that were least sampled included heath woodlands (2 sites) and heath open forest and coastal wetland complexes which were each surveyed only once during the study (Fig .3.1)

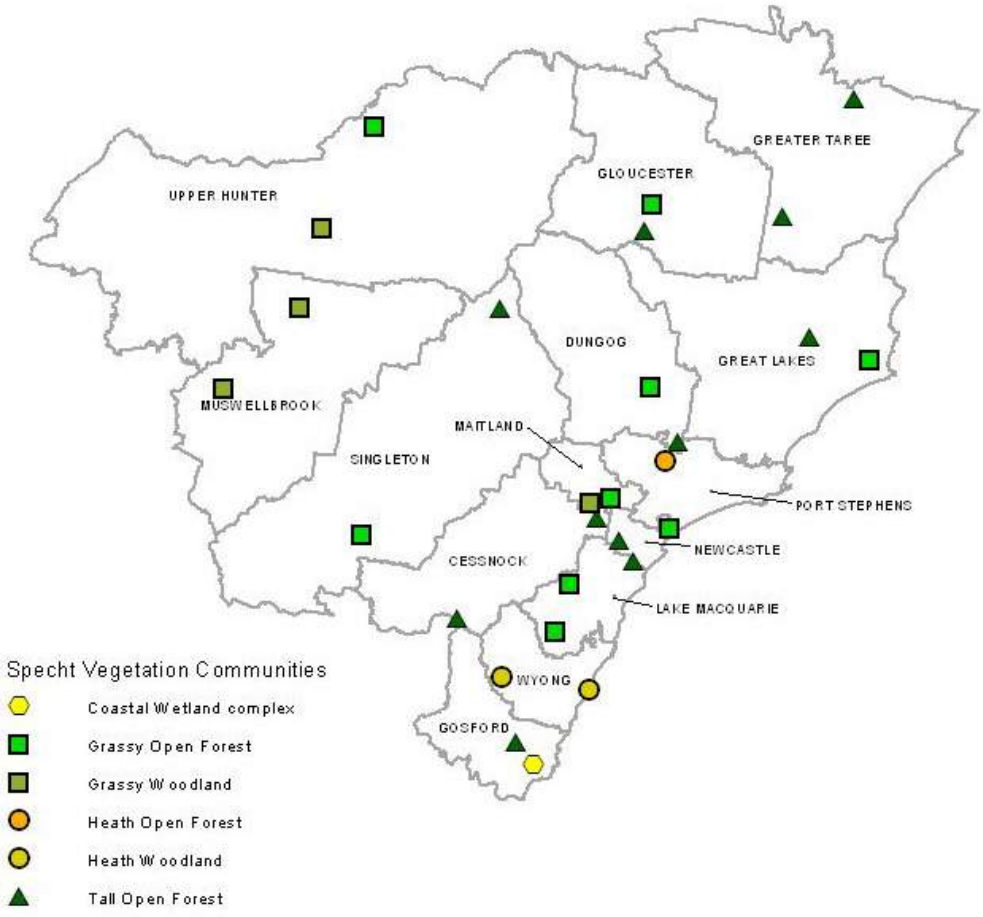

Figure 3.1 Specht vegetation communities surveyed

3.1 Size and shape

Does size and shape matter? The 'theory of island biogeography ' developed by Macarthur and Wilson (1963,1967) states that a large circular size shape reserve will contain more species and be less prone to degradation than a reserve that is small in size and linear in shape (cited in Burgman and Lindemayer, 1998). Small linear reserves have less area to support species and have a larger zone that is exposed to physical change and weed invasion. However that is not to say that small linear reserves such as roadside environments have no conservation value. Kirkpatrick and Gilfedder (1995) found that small linear reserves such as roadside environments harbour endangered plant species (cited in Burgman and Lindemayer 1998). In addition, road reserves act as vegetation corridors or provide a protective buffer zone to significant patches of vegetation located in or beside the roadside reserve.

In general, the roadside environment sites that were surveyed included narrow patches of land that extended over long linear distances. The size of the sites surveyed ranged from 0.42ha at RE-GSC1 to 16.84ha at RE-UH1. The widths of the survey sites were equal to or greater than the NSW Roadside Environment Committee definition of roadside environment of 20 metres. The reserves extended from a length of 130m at RE-GSC1 to 2000m at RE-UH1 and RE-GTCC2 (Table 3.1).

Table 3.1 Size and shape of roadside environment sites

Site Name	Length (m)	Width (m)	Area (ha)
RE-UH1	2000	80	16.84
RE-CCC1	988	80	8.33
RE-GTCC2	2000	40	8.15
RE-PSSC1	990	80	7.98
RE-WSC1	1000	80	7.59
RE-NCC1	1350	55	7.18
RE-LMCC2	880	50	4.87
RE-GSC2	1060	45	4.61
RE-GTCC1	1100	40	4.41
RE-SSC2	750	65	4.05
RE-GLC2	1000	40	3.73
RE-GCC2	1460	25	3.2
RE-SSC1	775	40	3.1
RE-LMCC1	950	30	2.75
RE-PSSC2	1000	30	2.6
RE-WSC2	987	25	2.4
RE-DSC2	1100	25	2.16
RE-MSC1	700	30	2.1
RE-GLC1	1000	25	2.09
RE-MCC1	980	25	1.96
RE-MCC2	420	35	1.79
RE-UH2	670	30	1.76
RE-MSC2	880	20	1.68
RE-CCC2	220	70	1.32
RE-DSC1	230	35	0.84
RE-NCC2	165	43	0.72
RE-GCC1	140	30	0.47
RE-GSC1	130	25	0.42

3.2 Species diversity

A total of 417 plant species from 101 Family and 242 Genus groups were identified from the roadside environment surveys (Appendix 3). This represents approximately 12% of all species identified from systematic surveys carried out by government and commercial organisations within the Hunter, Central and Lower North Coast region. The most common Family groups were Fabaceae, Myrtaceae and Poaceae. *Breynia oblongfolia* was the most common species, located at 18 of the 28 sites (Fig 3.2a).

All roadside environment sites had a higher percentage of native plant species than weed species (Fig 3.2b). The weed species common to most sites was *Lantana camara*, represented at 13 of 28 sites surveyed. Lantana is listed as a key threatening process in Schedule 3 of the *Threatened Species Conservation Act 1995*.

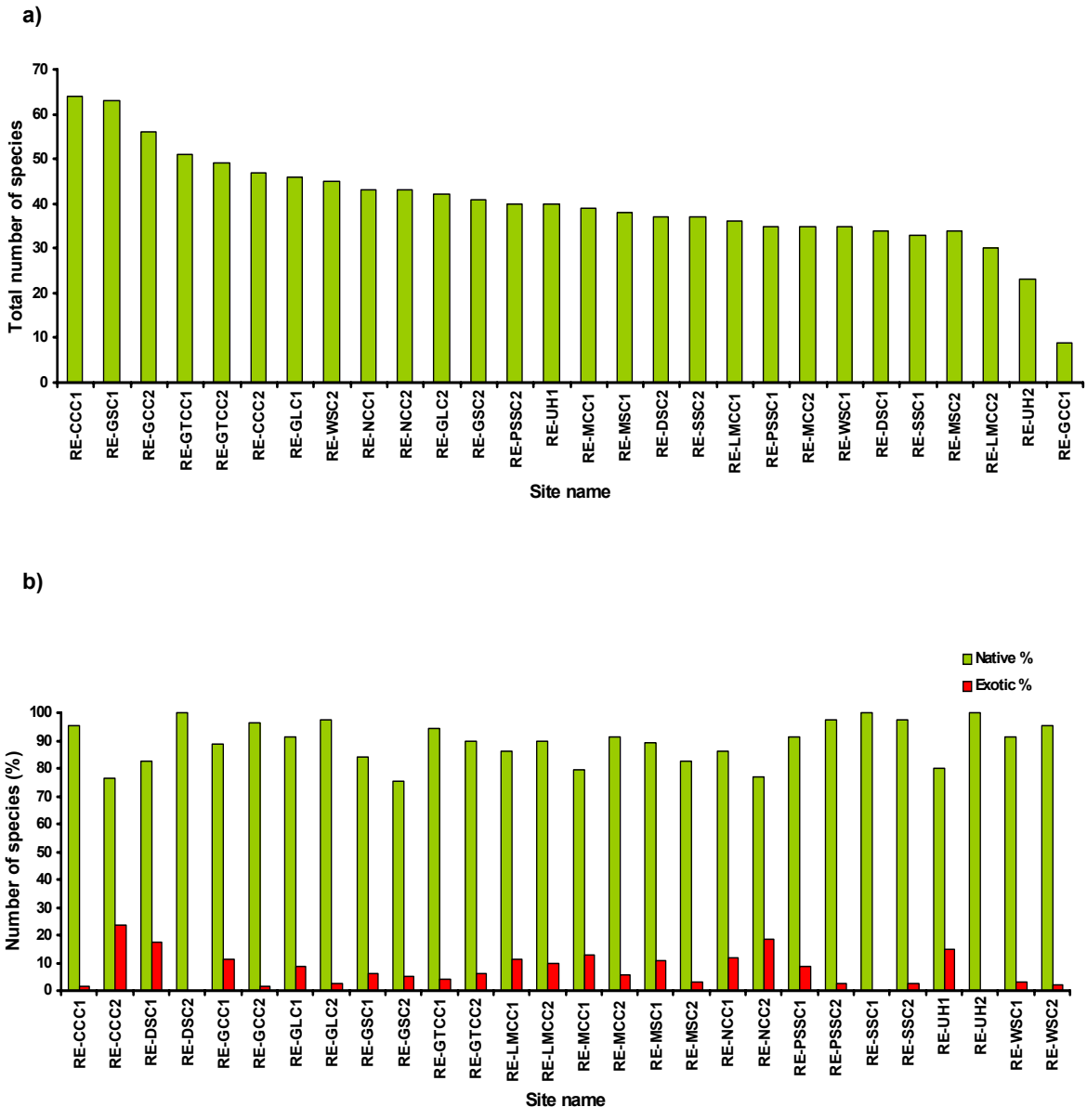

Figure 3.2 **(a) Illustrates the total number of plant species identified and (b) the percentage of native to exotic species identified at each roadside environment survey site.**

3.3 Structural complexity

Structural complexity refers to the number and the height between vegetation strata (Appendix 4). The greater number and distance between each stratum, the higher the structural complexity index for a site. Higher levels of structural complexity indicate that a site has a greater degree of habitat potential due to the greater number and variety of potential habitat niches available for native fauna. A vegetation community with a high structural complexity index would include a rainforest that consists of 2 or 3 stratums of tree species. For example a rainforest with an upper stratum of 60m, middle strata of 15 and 35m and a lower stratum of 5m would have a high structural complexity index of 220. It must be noted that a higher structural complexity index could be obtained as trees in Australia reach a height of approximately 100 metres.

The structural complexity index for the roadside environment sites ranged from 40.5 at RE-GCC1 to 176 at RE-GSC1 (Table 3.3). Sites with a high structural complexity index were Tall Open Forest vegetation communities with an upper and middle stratum of trees. Sites with a low structural complexity index were the Coastal Wetland Complex and Heath Open Forest vegetation communities as they had a low number of strata and a small distance between each stratum

Table 3.3 A summary of the structural complexity at roadside environment sites surveyed.

Site Name	structural complexity	Site Name	structural complexity
RE-GSC1	176	RE-MSC2	98
RE-GLC2	158	RE-WSC1	98
RE-GTCC2	158	RE-LMCC2	96
RE-GTCC1	156	RE-SSC2	94
RE-CCC1	140	RE-DSC1	85.5
RE-DSC2	138.8	RE-GLC1	84
RE-NCC2	138	RE-MCC2	84
RE-GCC2	136	RE-GSC2	79.5
RE-NCC1	117	RE-UH1	79.5
RE-MSC1	106	RE-MCC1	72
RE-UH2	106	RE-PSSC1	72
RE-WSC2	102	RE-LMCC1	55.5
RE-CCC2	100.5	RE-PSSC2	42
RE-SSC1	100.5	RE-GCC1	40.5

3.4 Canopy complexity

Canopy complexity refers to the abundance of small, medium and large hollows as well as the number of bare branches and beyonettes located at each site. This is an important measure as hollows provide shelter and nest sites for many Australian vertebrates and invertebrates (Burgman and Lindemayer 1998), whilst beyonettes and bare branches provide roost and perch sites for birds. Higher levels of canopy complexity indicate that a site has a greater degree of habitat potential due to the greater number and variety of potential nest and roosting sites that are available. The canopy complexity was calculated by applying a numerical value to the canopy abundance score that was gathered in the field (Table 3.4.1).

Table 3.4.1 Calculating canopy complexity

1. Apply rating system to scores

Canopy Abundance Score	Rating
None	0
Few (<5)	1
Many (5-10)	2
Abundant (>10)	3

2 Rating = sum of attributes

3 Determine value from scale eg canopy rating of 3 is low canopy complexity.

Canopy Scale Rating	Canopy Complexity
1 to 3	low
4 to 6	low/moderate
7 to 9	moderate
10 to 12	moderate/high
>12	high

A canopy complexity score was only obtained for 26 of the 28 roadside environment sites surveyed. The canopy complexity for the roadside environments surveyed ranged from low to moderate/high. The majority of sites surveyed recorded the presence of beyonettes and bare branches as common to abundant. The key differences between sites surveyed were the presence of small, medium and large hollows. Of the sites surveyed a total of 5 did not record the presence of small hollows and 7 did not record the presence of medium hollows. Large hollows were only recorded at 12 of the 26 sites surveyed (Table 3.4.2).

Table 3.4.2 A summary of the canopy complexity at roadside environment sites.

Site Name	Hollows			Beyonettes	Bare Branches	Canopy Rating	Canopy Complexity
	Sm	Med	Lge				
RE-GTCC1	3	3	1	2	3	12	moderate/high
RE-UH1	3	3	1	2	3	12	moderate/high
RE-GCC2	3	2	1	2	3	11	moderate/high
RE-DSC1	3	2	1	1	2	9	moderate
RE-GLC2	3	1	1	2	2	9	moderate
RE-LMCC2	2	2	1	2	2	9	moderate
RE-CCC1	2	1	1	2	2	8	moderate
RE-GLC1	2	1	0	2	3	8	moderate
RE-MSC1	2	1	0	3	2	8	moderate
RE-NCC2	1	1	1	2	3	8	moderate
RE-SSC1	2	2	1	2	1	8	moderate
RE-UH2	2	2	1	1	2	8	moderate
RE-MSC2	2	1	1	1	2	7	moderate
RE-WSC1	2	1	0	2	2	7	moderate
RE-GSC1	1	1	0	2	2	6	low/moderate
RE-GSC2	0	2	1	2	1	6	low/moderate
RE-LMCC1	1	1	0	2	2	6	low/moderate
RE-PSSC1	0	0	0	3	3	6	low/moderate
RE-SSC2	2	1	0	1	2	6	low/moderate
RE-DSC2	0	0	0	2	3	5	low/moderate
RE-GTCC2	1	0	0	2	2	5	low/moderate
RE-MCC1	1	0	0	2	2	5	low/moderate
RE-NCC1	0	0	0	2	3	5	low/moderate
RE-WSC2	1	1	0	1	2	5	low/moderate
RE-MCC2	1	0	0	1	2	4	low/moderate
RE-GCC1	0	0	0	0	3	3	low
RE-CCC2	*	*	*	*	*	*	N/A
RE-PSSC2	*	*	*	*	*	*	N/A

3.5 Non-living groundcover

The term biodiversity encompasses all the variety that exists in the living and non-living environment. The non-living components are important as they provide habitat and different niches for life. For example, rocks and fallen timber provide suitable shelter and nest sites for small mammals and reptiles whilst the leaf litter provides habitat for many invertebrate species. During the survey effort the field surveyor recorded the presence and percentage cover of leaf litter, rock, fallen timber and bare ground (Appendix 5).

The groundcover at the sites surveyed consisted of a high proportion of vegetation and leaf litter with a mixed scattering of rock, bare ground and fallen timber. Rock and fallen timber were non-living attributes not represented at all sites. Rock was recorded at 11 sites and fallen timber was recorded at 19 of the 28 sites surveyed.

3.6 Growth stage

A forest stand that consists of a mix of regenerating, mature and senescing trees would be considered healthy. Regenerating trees will replace old and dying trees in the future, mature trees are a major seed source and senescing trees provide important habitat for fauna as they contain many hollows, beyonettes and bare branches. Forest growth stage is determined by the relative PFC of the upper stratum for each of the three main growth stages; regeneration, mature and senescing. The relative PFC of each growth stage is converted into a growth stage score (Appendix 6 and 7) to provide an overall description of the stand of trees located at an individual site. Figure 3.6 illustrates the growth stages sampled at roadside environment sites.

The growth stage was determined for 27 of the 28 roadside sites surveyed. Growth stage field data for RE-PSSC2 was not obtained. An evaluation of growth stage at roadside environment sites revealed that 10 sites were in a mature growth stage and 17 sites were in a multi-age growth stage. All of the roadside environment sites contained trees that were regenerating, mature or senescing indicating that they were considerably healthy.

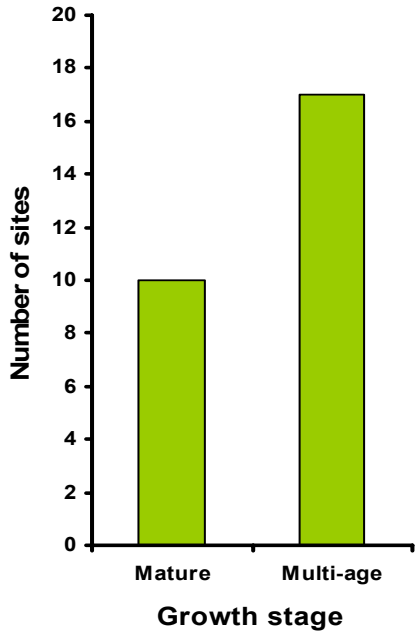

Figure 3.6 **Growth stage surveyed at roadside environment sites.**

3.7 Vegetation connectivity

Burgman and Lindenmayer (1998) describe a natural landscape as one that is fully connected. A human modified landscape often consists of different size patches of remnant vegetation which may or may not be connected to other patches via vegetation corridors. It is assumed that patches of vegetation that retain a high level of connectivity with other patches will maintain a healthy population of native species (Burgman and Lindenmayer (1998). Vegetation connectivity facilitates the movement of animals and dispersal of seeds, promotes the exchange of genes and reduces extinction of local species by allowing immigration. The level of connectivity survey sites had with other patches of vegetation was calculated by estimating the percentage cover of vegetation within a 1 and 5km radius band using GIS ArcView. A connectivity level was not generated for sites that had a higher proportion of water to land cover within the surrounding bands.

The level of connectivity roadside environment sites had with other patches of vegetation was good. A total of 5 roadside environment sites recorded a high level of connectivity within a 1 and 5km radius and a further 7 sites recorded a high level of connectivity within a 1km radius. In addition 4 roadside environment sites recorded a moderate/high level of connectivity within a 1km radius and 11 sites recorded a moderate/high level of connectivity within a 5km radius. Only 2 roadside environment sites had a low level of connectivity within both a 1 and 5 km radius (Fig 3.7).

Table 3.7 A summary of vegetation connectivity roadside environment sites.

Site Name	1km radius	5km radius
RE-CCC1-1	high	high
RE-DSC2-1	high	high
RE-GLC2-1	high	high
RE-LMCC2-1	high	high
RE-MSC1-1	high	high
RE-GSC2-1	high	moderate/high
RE-GTCC1-1	high	moderate/high
RE-PSSC2-1	high	moderate/high
RE-SSC1-1	high	moderate/high
RE-SSC2-1	high	moderate/high
RE-WSC2-1	high	moderate/high
RE-WSC1-1	high	N/A
RE-CCC2-1	moderate/high	moderate/high
RE-GLC1-1	moderate/high	moderate/high
RE-UH1-1	moderate/high	low/moderate
RE-PSSC1-1	moderate/high	N/A
RE-GSC1-1	low/moderate	moderate/high
RE-GCC2-1	low/moderate	low/moderate
RE-UH2-1	low/moderate	low/moderate
RE-MCC1-1	low/moderate	low
RE-MSC2-1	low/moderate	low
RE-NCC1-1	low/moderate	low
RE-LMCC1-1	low	moderate/high
RE-GCC1-1	low	low/moderate
RE-GTCC2-1	low	low/moderate
RE-NCC2-1	low	low/moderate
RE-DSC1-1	low	low
RE-MCC2-1	low	low

3.8 Management issues

Developing an effective conservation strategy for roadside environments involves identifying issues that are impacting upon them. At each site, disturbance types and their severity level was recorded. The information obtained from the field was tabulated and converted into a disturbance level as shown in Table 3.8.1.

Table 3.8.1 Calculations for disturbance value

1. Apply rating system to scores

Disturbance Severity	Rating
No	0
Light	1
Moderate	2
Severe	3
Extreme	4

2 Rating = sum of attributes

3 Determine disturbance level from scale eg disturbance rating of 3 corresponds to a low disturbance level.

Disturbance Scale	Disturbance Level
1 to 6	low
7 to 12	low/moderate
13 to 18	moderate
19 to 24	moderate/high
>30	high

A total of 25 of the 28 roadside environment sites surveyed received a low overall disturbance level. The presence of weed species was the main disturbance type contributing to the final low or low/moderate disturbance level. Weeds were having a severe impact at 6 sites, a moderate impact at 10 sites and a light impact at 10 of the sites surveyed. At most sites surveyed, fire, logging, clearing, grazing, erosion, presence of feral animals, dumping, rubbish and runoff had either no impact or only a light impact thus contributed little to the overall disturbance level (Table 3.8.2).

3.9 Sites of significance

Sites of significance have conservation value as they may contain threatened species, Endangered Ecological Communities (EECs) or evidence of European and Aboriginal cultural heritage.

Two out of the 28 roadside environment sites surveyed were classified as significant. Roadside environment RE-MSC1 contained a cave with Aboriginal hand paintings located approximately 2 metres from the road edge. Evidence of the Great North Road; a road built by convicts in the early 18th century to connect Sydney to Newcastle was recorded at roadside environment RE-CCC1.

Table 3.8.2 A summary of the disturbance level at roadside environment survey sites

Site Name	Disturbance Indicators								Disturbance Rating	Disturbance Level
	Fire	Logging	Clearing	Grazing	Erosion	Ferals	Weeds	Other		
RE-CCC2	1	0	0	0	1	0	3	3 (dumping)	8	low/moderate
RE-UH1	0	0	1	2	1	1	2	1 (rubbish)	8	low/moderate
RE-GSC2	1	1	1	0	1	0	3	0	7	low/moderate
RE-MCC1	0	0	2	0	1	0	2	1 (dumping and rubbish)	6	low
RE-WSC2	1	0	1	0	1	0	2	1 (dumping)	6	low
RE-DSC1	0	0	0	0	1	0	3	1 (rubbish)	5	low
RE-MSC1	0	0	0	1	1	1	2	0	5	low
RE-GLC2	0	1	0	0	0	0	2	1 (rubbish)	4	low
RE-GTCC1	1	0	0	0	0	0	3	0	4	low
RE-LMCC2	1	0	0	0	0	0	2	1 (rubbish)	4	low
RE-NCC2	1	0	0	0	0	0	2	1 (Acacia planting)	4	low
RE-SSC2	1	0	0	0	1	1	1	0	4	low
RE-UH2	0	0	0	0	2	0	1	1 (rubbish)	4	low
RE-CCC1	2	0	0	0	0	0	1	0	3	low
RE-GCC2	2	0	0	0	0	0	1	0	3	low
RE-GLC1	1	0	0	0	0	0	2	0	3	low
RE-GSC1	0	0	0	0	0	0	3	0	3	low
RE-GTCC2	0	0	0	0	0	0	3	0	3	low
RE-MSC2-	0	0	0	0	1	1	1	0	3	low
RE-PSSC1	1	0	1	0	0	0	1	0	3	low
RE-DSC2	1	0	0	0	0	0	0	1 (rubbish)	2	low
RE-GCC1	0	0	0	0	0	0	1	1 (runoff and rubbish)	2	low
RE-LMCC1	0	0	0	0	0	0	2	0	2	low
RE-MCC2	0	0	0	0	0	0	1	1 (garden waste)	2	low
RE-NCC1	0	0	0	0	0	0	2	0	2	low
RE-PSSC2	0	0	0	0	1	0	1	0	2	low
RE-SSC1	1	1	0	0	0	0	0	0	2	low
RE-WSC1	1	0	0	0	0	0	1	0	2	low

4. Conclusion

This study set out to evaluate the environmental values of `icon' roadside environment sites within the Hunter, Central and Lower North Coast region. The information generated by this survey work aimed to:

1) Provide information on the values and management issues facing high quality roadside remnants in the region for consideration during development of a Regional Roadside Environmental Management Strategy for the Hunter, Central and Lower North Coast;
2) Provide a benchmark for on-going monitoring and assessment of high quality roadside vegetation remnants in the region over time; and
3) Identify suitable locations for use as future educational case studies to demonstrate the biodiversity values that are inherent in good quality roadside remnants and the kinds of management issues that impact on their long term conservation.

The site selection process specifically targeted roadside environments that were of high quality i.e. large in size, species diverse, structurally complex, as well as being in good health and condition. Of the 28 roadside environments sites surveyed, all generally met these criteria. In addition, two roadside environment sites contained features of Aboriginal and European cultural heritage significance. These included a cave with Aboriginal hand paintings, and evidence of a road built by convicts in the early 18th century.

Biodiversity takes many forms. It includes variation within the living components such as the number and abundance of plant, animal and insect species, the difference in the physical structure of vegetation and the complexity that exists within the canopy layer. It also includes variation that exists in the non-living components such as rocks, dead logs and leaf litter that gathers on the forest floor. The evaluation process indicated that the roadside environment sites surveyed were generally biodiverse. A total of 417 plants species were recorded, representing 12% of all species identified from previous systematic surveys conducted within the Hunter, Central and Lower North Coast region. Structural and canopy complexity varied between sites. The physical structure of the vegetation was dependent on the vegetation community type present. Tall open forest communities had a high structural complexity index and heath open forest and coastal wetland complexes had a low structural complexity index. All sites surveyed provided habitat in the canopy layer however only five sites contained the presence of large hollows necessary to house large vertebrate species such as yellow bellied gliders. The non-living groundcover at roadside environments provided many niches for vertebrate and invertebrate species as they contained a mix of vegetation, leaf litter, rocks, fallen timber and bare ground.

The health and condition of roadside environment sites was determined by analysing forest stand growth stage and vegetation connectivity as well as identifying disturbance issues impacting on the road reserve. All sites surveyed were either in a multi-age or mature growth stage indicating that all were healthy as they contained a mix of regenerating, mature and senescing trees. The level of connectivity between vegetation on roadside environment sites and patches of vegetation within the surrounding environment was good, with 18 of the 28 sites recording a moderate to high level of connectivity within either a 1 or 5km radius band. In addition, a total of 25 of the 28 roadside environment sites surveyed received a low overall disturbance level. The evaluation process identified that weed invasion was the main factor impacting overall on the health of the roadside environments that were surveyed.

All sites surveyed were either in a multi-age or mature growth stage

5. References

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APPENDICES

Alison Road, Dungog

Appendix 1

Individual Roadside Environment Site Profiles

Please note that on some of the maps included in this Appendix, the location of the roadside site surveyed and the location of the road itself may not completely align. This reflects discrepancies between road network and cadastre data layers, and also the fact that the actual location of the road in the field does not always occur within the designated road reserve corridor.

CESSNOCK – Great North Road

RE-CCC1 (E 325294, N 6337513) roadside environment was adjacent to the Great North Road (Fig 1). The site was located 4.5km NNW of Bucketty Township and the nearest cross road was Bucketty Private Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	High	Low

Site description

The site situated on a 15 degree slope was approximately 988 metres in length and 80 metres in width. The site elevation was 230 metres above sea level.

Vegetation description

RE-CCC1 was a tall open forest with 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer, dominated by *Corymbia gummifera, Eucalyptus punctata, Syncarpia glomulifera* and *Allocasuarina torulosa,* reached a height of 36m and had a PFC of 35%. The middle layers; M1 and M2 had a PFC of 15% each and ranged in height from 0.5 to 5 metres. The dominant species in M1 were *Persoonia levis* and *Persoonia lineari.* The M2 layer was dominated by *Lomatia silaifolia* and *Podolobium ilicifolium.* The ground vegetation layers; L1 and L2 had a PFC of 10% each with a maximum height of 1 and 0.3 metres respectively. The L1 layer was dominated by *Themeda australis* and L2 consisted of a mix of sedge species. A total of 64 plant species were recorded at this site, of which 1 was a weed species and 2 were unable to be identified.

Habitat

The growth stages at this site consisted of 70% mature, 20% regenerating and 10% senescing. The mature and senescing trees consisted of many small hollows and a few medium and large hollows. Many of the trees offered beyonettes and bare branches as perch sites. The ground cover consisted on a mix of rock, leaf litter, fallen timber and bare ground.

Items of significance

This site contained a culvert from the Great North Road that was built by convicts in the early 18th century.

Connectivity

The roadside vegetation at RE-CCC1 had a high level of connectivity to other patches of vegetation within a 1 and 5km radius. To the west of the site was Yengo National Park and to the east was a State forest reserve and vegetation located on private property (Fig 2).

Management Issues

This site had no major management issues. There was evidence of fire and the noxious weed species *Rubus fruiticosus* (Blackberry) was present.

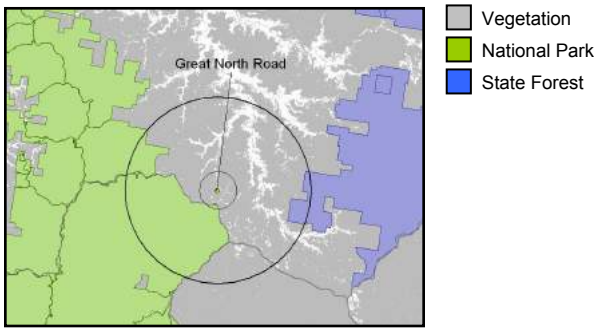


Figure 2 Vegetation connectivity

Figure 3 Site photo

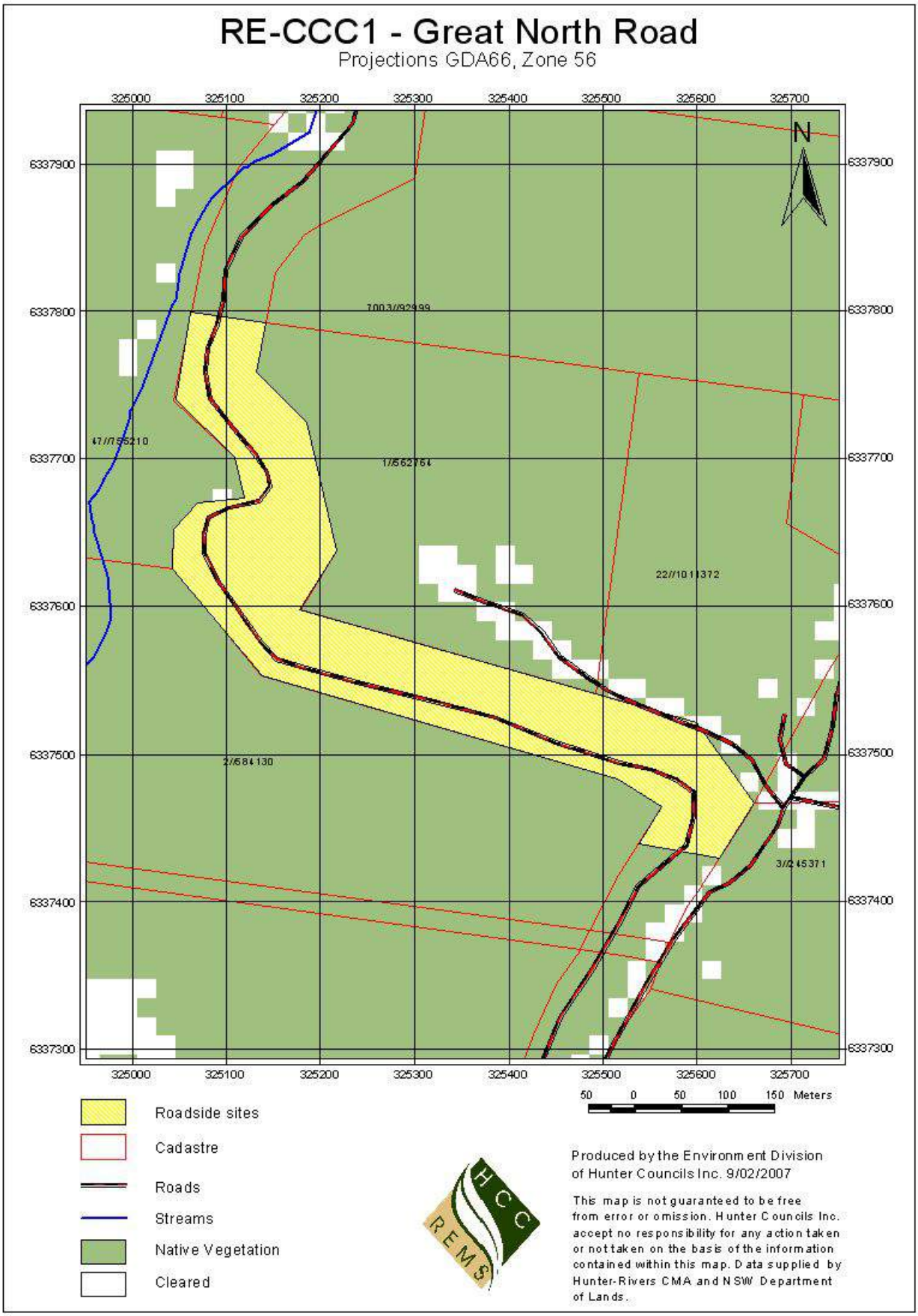


Figure 1 **Map illustrating RE-CCC1, The Great North Road**

CESSNOCK – Black Hill Road

RE-CCC2 (E 367178, N 6367119) roadside environment was adjacent to Black Hill Road (Fig 4). The site was located 2.8km E of Buttai Township and the nearest cross road was John Renshaw Drive.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	N/A	Mod/High	Low/Mod

Site description

The site situated on a 10 degree slope was approximately 220 metres in length and 70 metres in width. The site elevation was 49 metres above sea level.

Vegetation description

RE-CCC2 was a tall open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer was approximately 35 metres in height with a PFC of 45%. The dominate species in the canopy layer included *Eucalyptus eugenioides, Syncarpia glomulifera, Corymbia maculata* and *Melaleuca styphelioides*. The middle layer dominated by *Bursaria spinosa, Breynia oblongifolia* and *Lantana camara,* reached a height of 4 metres and had PFC of 10%. L1 of the ground cover was approximately 1.5 metres in height and had the highest PFC of all the strata at 50%. The L1 layer was dominated by grass species, in particular *Poa labillardieri*. The L2 of the ground layer only represented a PFC of 10% and consisted of a suite of herb species. A total of 47 plant species were recorded at this site, 11 of which were weed species.

Habitat

The majority of trees at 95% were in a mature growth stage. A small proportion of the trees were regenerating at 5% and this site contained no senescing trees. No data on the number of hollows and perch sites was obtained for this site. The ground cover was mainly vegetated but it also contained some leaf litter at 15% and bare soil at 5%.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

The roadside vegetation at RE-CCC2 had a moderate/high level of connectivity to other patches of vegetation within a 1 and 5km radius. The reserve was connected to vegetation on private property, as well as being within a 5km distance from Pambalong and Hexham Swamp Nature Reserve (Fig 5).

Management Issues

The major issues at this site were dumping and weed invasion. *Lantana camara,* a species declared as noxious in NSW was invading the middle strata. A minor erosion issue was noted around the edges of the site and at the head of the gully.

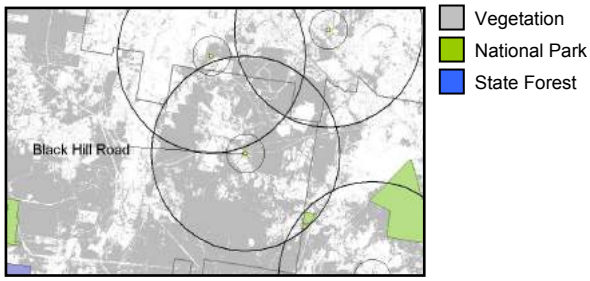


Figure 5 Vegetation connectivity

Figure 6 Site photo

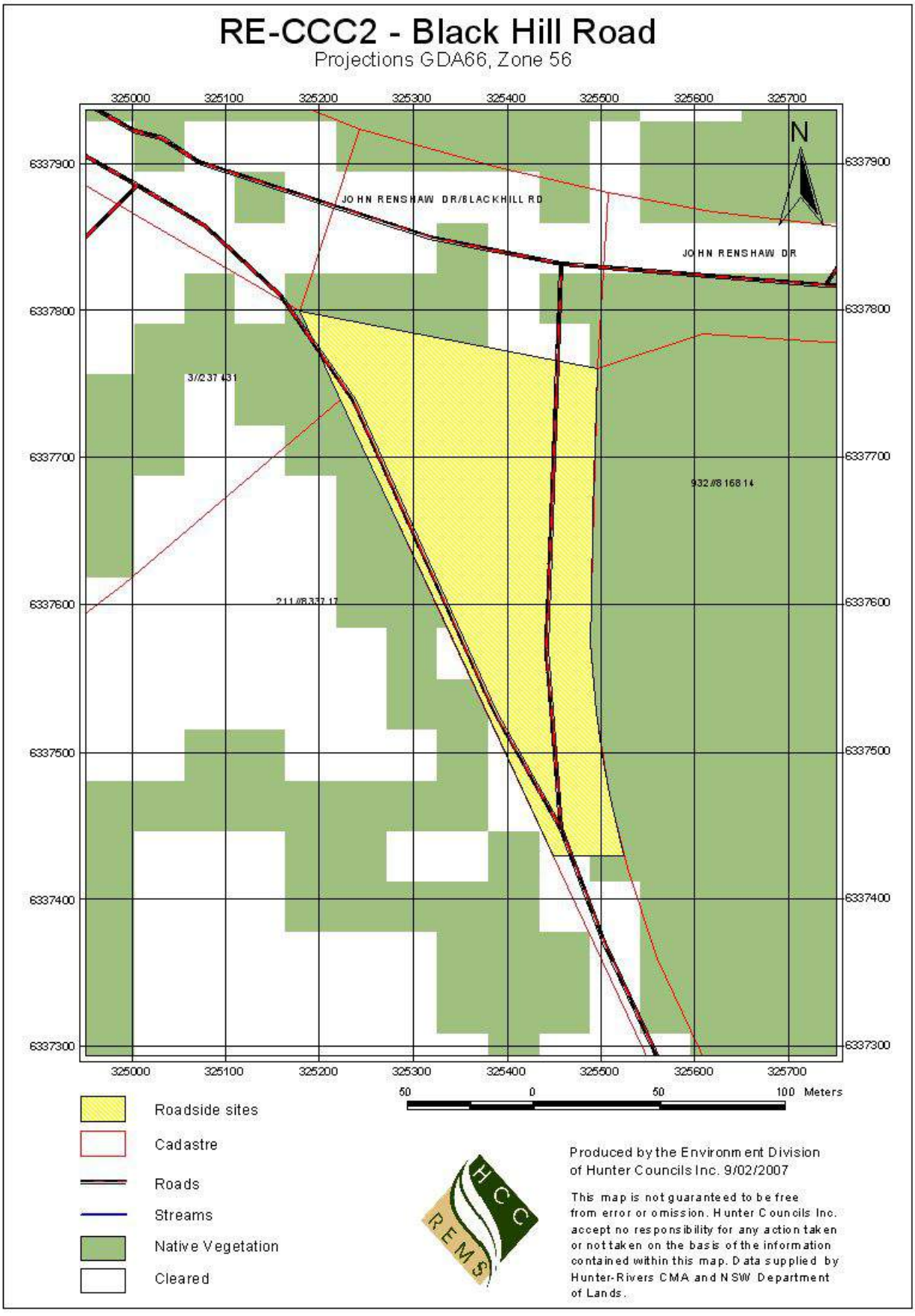


Figure 4 **Map illustrating RE-CCC2, Black Hill Road**

DUNGOG - Alison Road

RE-DSC1 (E 383449, N 6406696) roadside environment was adjacent to Alison Road (Fig 7). The site was located 3.9km SEE of Wirragulla Township and the nearest cross road was Clarence Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	Low	Low

Site description

The site situated on a 20 degree slope was approximately 230 metres in length and 35 metres in width. The site elevation was 34 metres above sea level. The site is immediately adjacent to the Williams River.

Vegetation description

RE-DCS1 was a grassy open forest with 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer had a 60% PFC and reached a height of 30 metres. *Waterhousea floribunda* and *Doryphora sassafras* were the dominant species in the canopy layer. The middle layer at a height of 1.5 to 5 metres and PFC of 35% was dominated by the noxious weed species *Ligustrum sinense* (Narrow leaf privet). The L1 layer was approximately 1.5 metres in height with a PFC of 50% and the L2 layer was approximately 0.3 metres in height with a PFC of 15%. The dominant species in the ground layer were *Doodia caudata var. caudate* and a *Persicaria spp*. A total of 34 plant species were recorded at this site, 6 of which were weed species.

Habitat

Half of the trees at this site were senescing. In addition 30% of the trees were mature and 20% were regenerating. The numbers of small hollows were abundant and there were also many medium size hollows and a few large size hollows. A few of the trees contained beyonettes for perching and there were many bare branches. The ground cover consisted of 30% leaf litter, 10% bryophytes and 5% fallen timber. Bare ground at this site represented 20% of the ground cover.

Connectivity

The roadside vegetation at RE-DSC1 had a low connectivity with other patches of vegetation in the surrounding landscape. However, the roadside vegetation at this site was part of the riparian vegetation corridor along the Williams River (Fig 8).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

Disturbance issues such as weed invasion, erosion and dumping were identified as having a minor impact on the health and condition at RE-DSC1. *Ligustrum sinense* (Narrow leaf privet) and *Lantana camara* (Lantana), both classified as noxious were the two main weed species identified at this site. The close proximity of RE-DSC1 to the Williams River provided a recreational zone for humans to utilize. A minor vehicle track giving easy access to the river was causing erosion. In addition, there was litter gathering along the river bank.

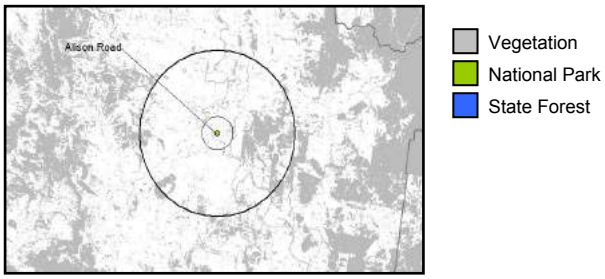


Figure 8 Vegetation connectivity

Figure 9 Site photo

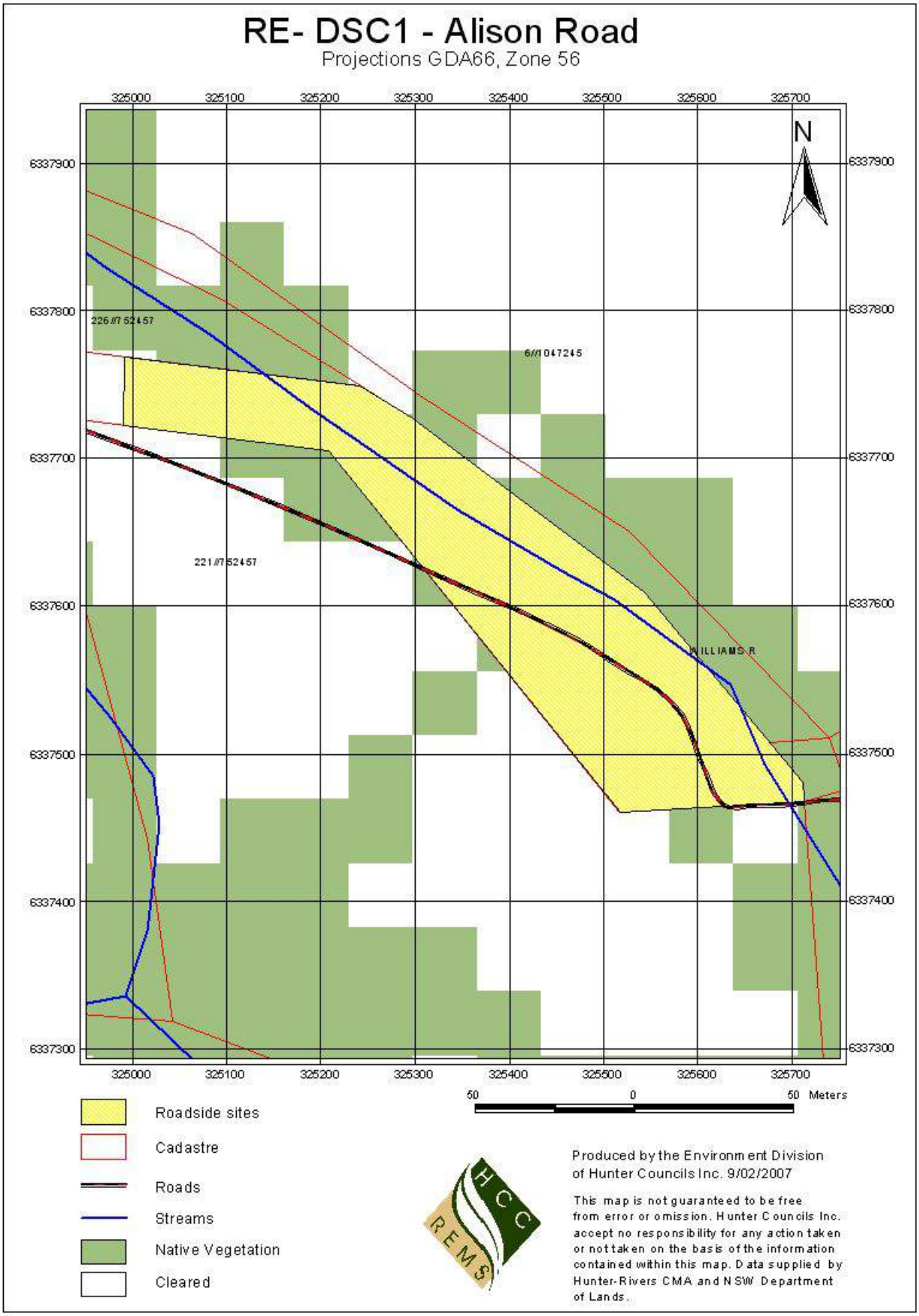
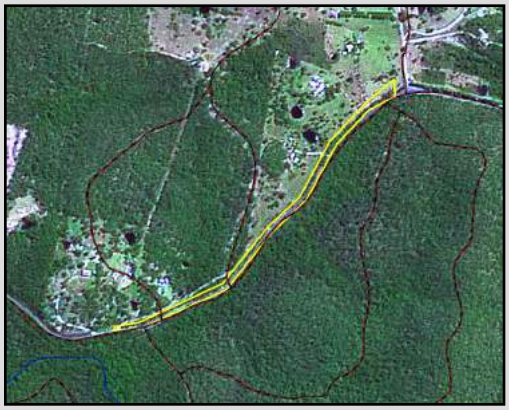


Figure 7 **Map illustrating RE-DSC1, Alison Road**

DUNGOG – Limeburners Creek Road

RE-DSC2 (E 391437, N 6390197) roadside environment was adjacent to the Limeburners Creek Road (Fig 10). The site was located 5.9km SW of Limeburners Creek Township and the nearest cross road was Ten Mile Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	High	Low



Site description

The site situated on a 10 degree slope was approximately 1100 metres in length and 25 metres in width. The site elevation was 68 metres above sea level.

Vegetation description

RE-DSC2 was a tall open forest with 4 stratums; canopy layer, 2 mid layers and a ground vegetation layer. The canopy layer dominated by *Eucalyptus punctata, Angophora costata and, Eucalyptus glogoidea* reached a height of 35m and had a PFC of 35%. The middle layers; M1 and M2 had a PFC of 20% and 40% respectively and the height ranged from 0.3 to 6 metres. The dominate species in the M1 layer were *Glochidion ferdinandii* and *Persoonia linearis.* The M2 layer was dominated by *Hibbertia obtusifolia* and *Gahnia sieberiana*. The ground vegetation layer consisted of a mix of grasses, ferns, sedges and forbs. A total of 37 plant species were recorded at this site, all of which were native species.

Habitat

The majority of trees at 60% were mature and 40% were regenerating. No trees were found in the senescing growth stage. No hollows were recorded at this site however there were many bare branches and beyonettes that would act as perch sites. The majority of the ground cover at 60% was leaf litter. Only 5% of the ground was bare.

Connectivity

The roadside vegetation at this site had a high level of connectivity to other patches of vegetation in the surrounding environment. The site had a high degree of connectivity with vegetation located in Wallaroo Nature Reserve. In addition, the site was connected to patches of vegetation located on private property and State Forest (Fig 11).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

RE-DSC2 was in great condition and only a couple of minor issues were impacting on the site. These included a past fire and some roadside littering.

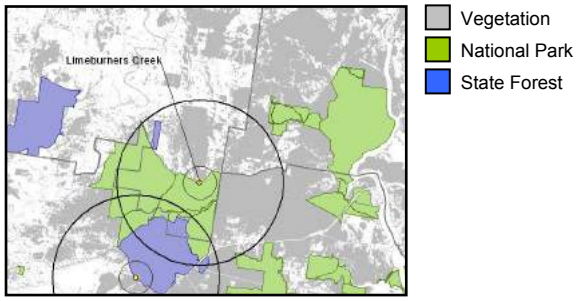


Figure 11 Vegetation connectivity

Figure 12 Site photo

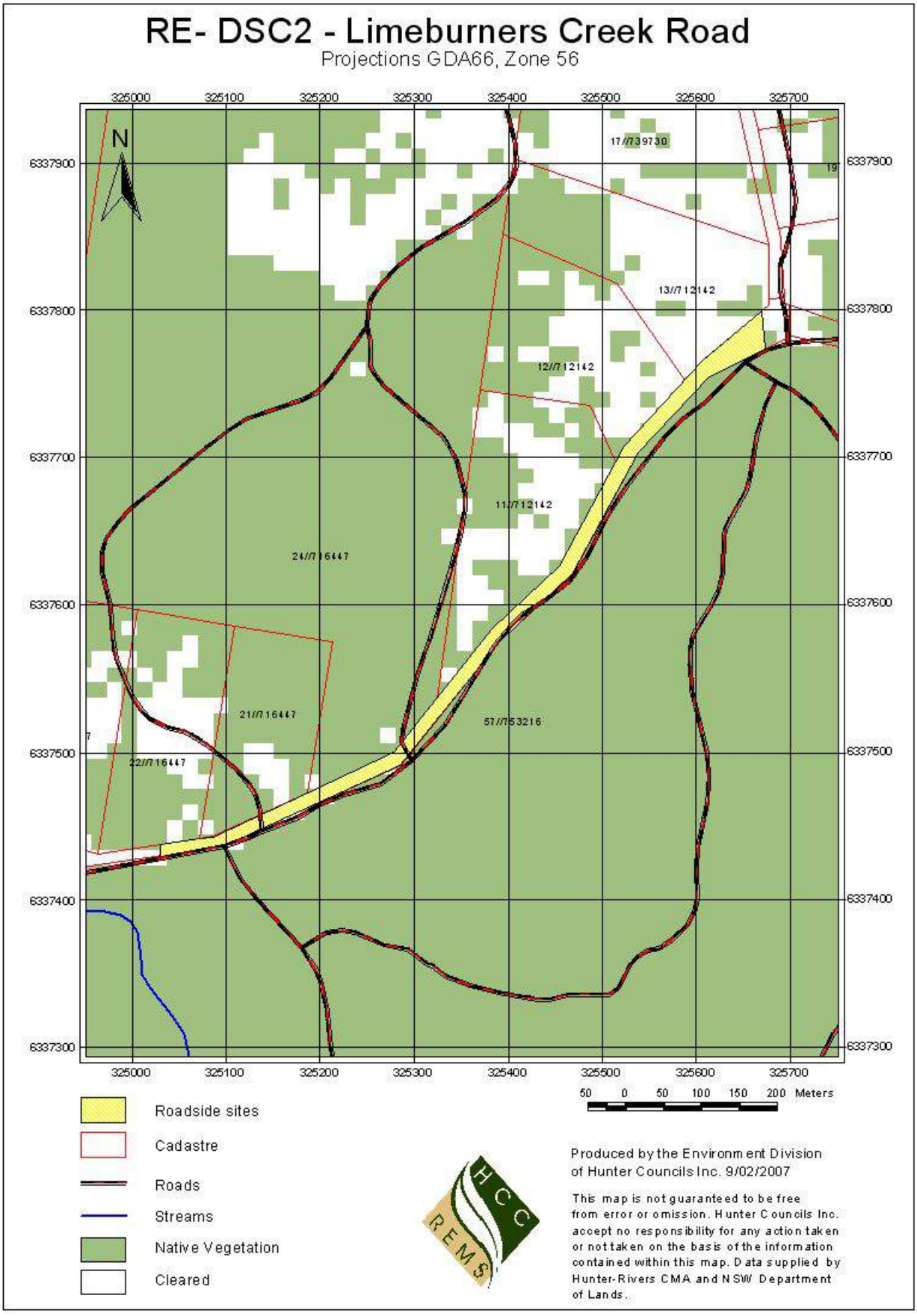


Figure 10 **Map illustrating RE-DSC2, Limeburners Creek Road**

GOSFORD – Pine Avenue

RE-GCC1 (E 348012, N 6293539) roadside environment was adjacent to Pine Avenue (Fig 13). The site was located 0.5km SE of Davistown Township and the nearest cross road was Illawong Close.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low	Low/Mod	Low

Site description

The site situated on flat ground was approximately 140 metres in length and 30 metres in width. The site elevation was 2 metres above sea level.

Vegetation description

RE-GCC1 was a coastal wetland complex consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer dominated by *Casuarina glauca* was approximately 15 metres in height with a PFC of 10%. The middle layer of *Avicennia marina* had a 5% PFC and reached a height of 4 metres. L1 of the ground layer had a PFC of 30% and was dominated by *Juncus kraussii.* L2 of the ground cover was approximately 0.5 metres in height and had the highest PFC of all the strata at 65%. The L2 layer consisted of the following species *Sarcocornia quinqueflora, Bulboshoenus caldwellii, Cynodon dactylon*, and *Fimbristylus ferruginea*. A total of 9 plant species were recorded at this site, with *Juncus effusus* being the only weed species identified.

Habitat

The majority of trees at 70% were regenerating. Thirty percent of the trees were mature and there were no trees senescing. This site contained no hollows however bare branches were abundant. The ground cover was mainly vegetated, however also consisted of 5% leaf litter and 5% bare ground.

Connectivity

The roadside vegetation at RE-GCC1 had a low level of connectivity within a 1km radius and a low/moderate level of connectivity within a 5km radius. This site was situated in amongst urban development and was in close proximity to the Brisbane Waters Estuary. The vegetation at this site was mainly connected to other patches of vegetation located on private property. In addition, several nature reserves and Bouddi National Park were located within 5kms from the site (Fig 14).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

Several management issues were identified at the site. Firstly, the fresh water runoff from the road may allow freshwater plants to invade the saltmarsh community. Secondly, roadside littering was collecting along the reserve edge. Finally, the roadside reserve was in close proximity to residential property, representing a potential source of weeds in the future.

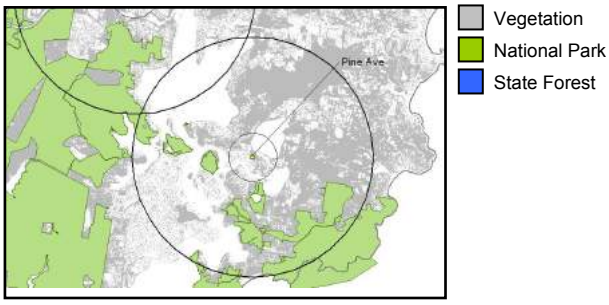


Figure 14 Vegetation connectivity

Figure 15 Site photo

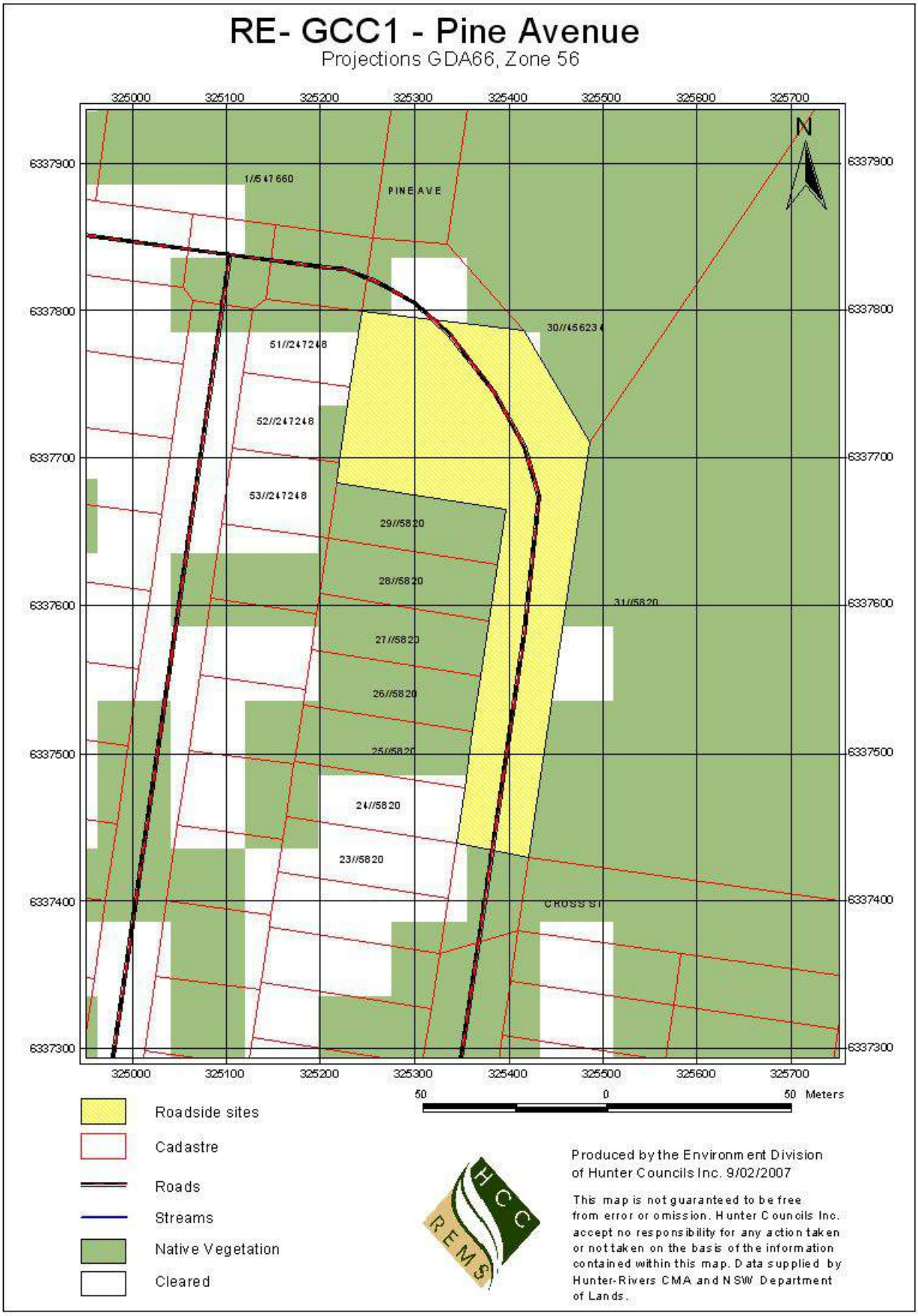


Figure 13 **Map illustrating RE-GCC1, Pine Avenue**

GOSFORD – Debenham Road

RE-GCC2 (E 343114, N 6300321) roadside environment was adjacent to Debenham Road (Fig 16). The site was located 0.2km NE of Kariong Township and the nearest cross road was Dyer Crescent.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod/High	Low/Mod	Low

Site description

The site situated on a 17 degree slope was approximately 1460 metres in length and 25 metres in width. The site elevation was 104 metres above sea level.

Vegetation description

RE-GCC2 was a tall open forest with 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer had a 40% PFC and reached a height of 35 metres. *Corymbia gummifera, Syncarpia glomulifera* and *Allocasuarina torulosa* were the dominant species in the canopy layer. The middle layer; M1 and M2 ranged from a maximum height of 5m to a minimum height of 1m and the PFC was 20% and 30% respectively. M1 layer was dominated by *Persoonia linearis* and the M2 layer was dominated by *Xanthorrhea glauca, Breynia oblongifolia, Platylobium formosum subsp. formosum* and *Leptospermum polygalifolium*. The ground layers were dominated by sedge and forb species. A total of 56 plant species were recorded at this site, of which 1 was a weed species and 1 was unable to be identified.

Habitat

The majority of trees at 70% were mature, 20% were regenerating and 10% were senescing. Small hollows were abundant; medium hollows were common and a few large hollows were present. In addition, bare branches were abundant and there were many beyonettes. The ground cover consisted of 40% leaf litter, 5% fallen timber and 5% rock. There was no exposed ground at this site.

Connectivity

The roadside environment at RE-GCC2 had a low/moderate level of connectivity within a 1 and 5km radius. The vegetation on the reserve was mainly connected to patches of vegetation located on private property. Brisbane Water National Park was located within a 5km radius from survey site (Fig 17).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

Road reserve RE-GCC2 had a low level of disturbance. There was moderate evidence of fire and a vehicle track ran through the reserve.

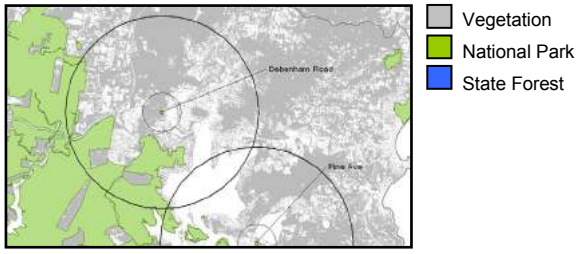


Figure 17 Vegetation connectivity

Figure 18 Site photo

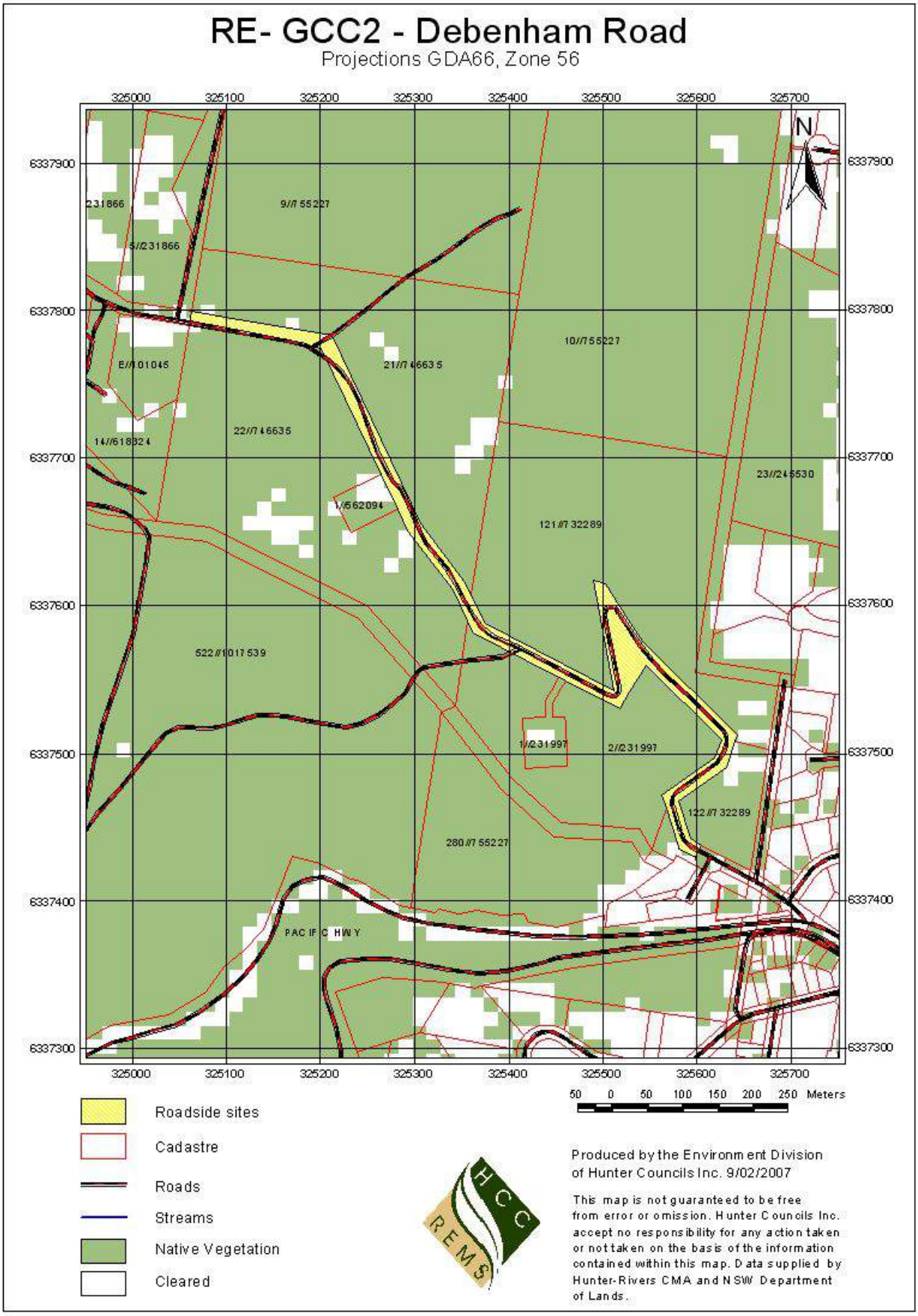


Figure 16 **Map illustrating RE-GCC2, Debenham Road**

GREAT LAKES – Seal Rocks Road

RE-GLC1 (E 449160, N 6414766) roadside environment was adjacent to Seal Rocks Road (Fig 19). The site was located 0.8km SSE of Bungwahl Township and the nearest cross road was Thomas Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod	Mod/High	Low

Site description

The site situated on a 15 degree slope was approximately 1000 metres in length and 25 metres in width. The site elevation was 12 metres above sea level.

Vegetation description

RE-GLC1 was a grassy open forest with 3 stratum; canopy layer, mid layer and a ground vegetation layer. The canopy layer dominated by *Eucalyptus robusta and Allocasuarina torulosa,* reached a height of 30m and had a PFC of 40%. The middle layer was dominated by *Acacia spp.* including, *Acacia longifolia, Acacia falcata* and *Acacia myrtifolia* and reached a height of 10 metres with a PFC of 50%. The ground vegetation layer was dominated by grass species including *Imperata cylindrical, Themeda australis, Entolasia stricta, Panicum simile* and *Dichelachne inequiglumis*. The maximum height of the ground vegetation layer was 2 metres and the PFC was 35%. A total of 46 plant species were recorded at this site, 4 of which were weed species.

Habitat

The majority of trees at 85% were in a mature growth stage and small portion of trees were regenerating at 10% and senescing at 5%. The mature and senescing trees contained many small hollows and a few medium hollows. Many of the trees offered beyonettes, and bare branches were abundant. The ground cover consisted of 45% leaf litter and 5% fallen timber. Approximately 5% of the ground was exposed.

Connectivity

The roadside vegetation at RE-GLC1 has a moderate to high level of connectivity as it was surrounded by Myall Lakes National Park (Fig 20).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

This site had no major management issues however weeds such as Crofton weed, Whisky grass and Quaking grass were prevalent along the road reserve edge. In addition, the noxious weed species *Lantana camara* was noted within close proximity to the survey site. The only other disturbance issue noted was evidence of a previous fire.

Figure 20 Vegetation connectivity

Figure 21 Site photo

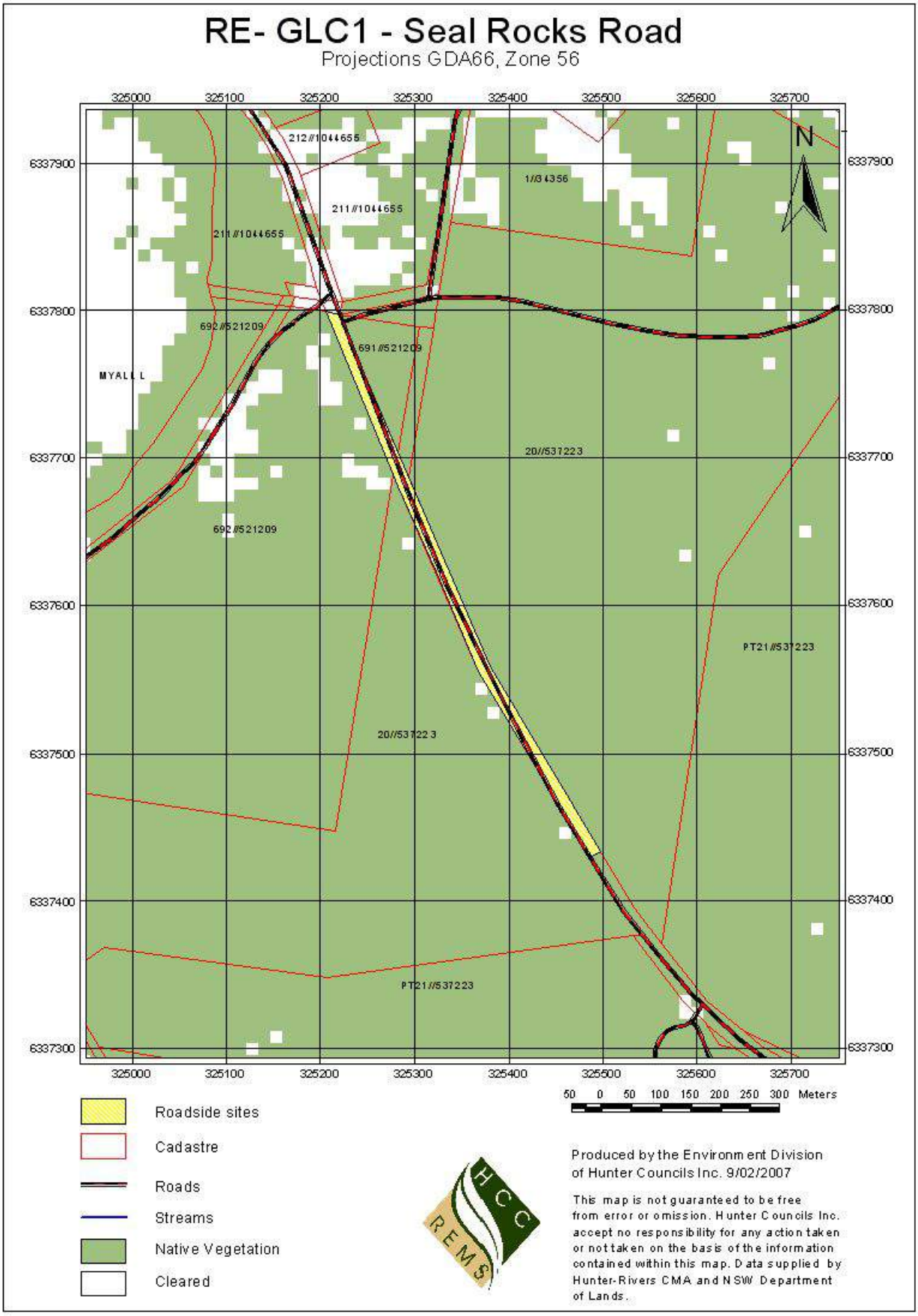


Figure 19 **Map illustrating RE-GLC1, Seals Rock Road**

GREAT LAKES – Old Pacific Highway

RE-GLC2 (E 431015, N 6421515) roadside environment was adjacent to the Old Pacific Highway (Fig 22). The site was located 7.5km NW of Wootton Township and the nearest cross road was Stony Knob Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	High	Low

Site description

The site situated on a 15 degree slope was approximately 1000 metres in length and 40 metres in width. The site elevation was 147 metres above sea level.

Vegetation description

RE-GLC2 was a tall open forest of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Syncarpia glomulifera* and *Eucalyptus propinqua,* reached a height of approximately 40 metres and had a PFC of 55%. The middle layers; M1 and M2 had a PFC of 25% and 15% respectively and ranged in height from 0.5 to 10 metres. M1 was dominated by *Alphitonia excelsa* and *Guioa semiglauca*. The M2 layer was dominated by the noxious weed species *Lantana camara.* The ground vegetation; L1 and L2 only represented a small PFC at 15% and reached a height of 0.5 metres. The L1 layer was dominated by the sedge species *Gahnia aspera* and the L2 layer was dominated by forbs. A total of 42 plant species were recorded at this site and *Lantana camara* was the only weed present within the survey quadrat.

Habitat

Approximately 60% of the trees were regenerating at this site and 40% were mature. No senescing trees were recorded within a 50m radius from the survey site centre point. Small hollows were abundant and a few medium and large hollows were recorded. There were many beyonettes and bare branches at this site. The ground cover consisted mainly of leaf litter at 70% and some fallen timber at 5%.

Connectivity

Connectivity at this site was high. The roadside vegetation at RE-GLC2 was encompassed by the Myall Lakes National Park and the Buladelah State Forest was approximately 1km NW of the site (Fig 23).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

A small amount of roadside littering was recorded at the site however the main management issue was the presence of the noxious weed species *Lantana camara*.

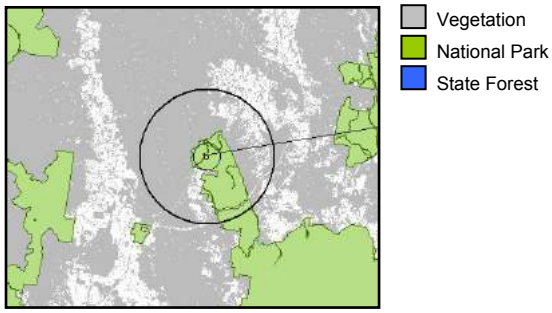


Figure 23 Vegetation connectivity

Figure 24 Site photo

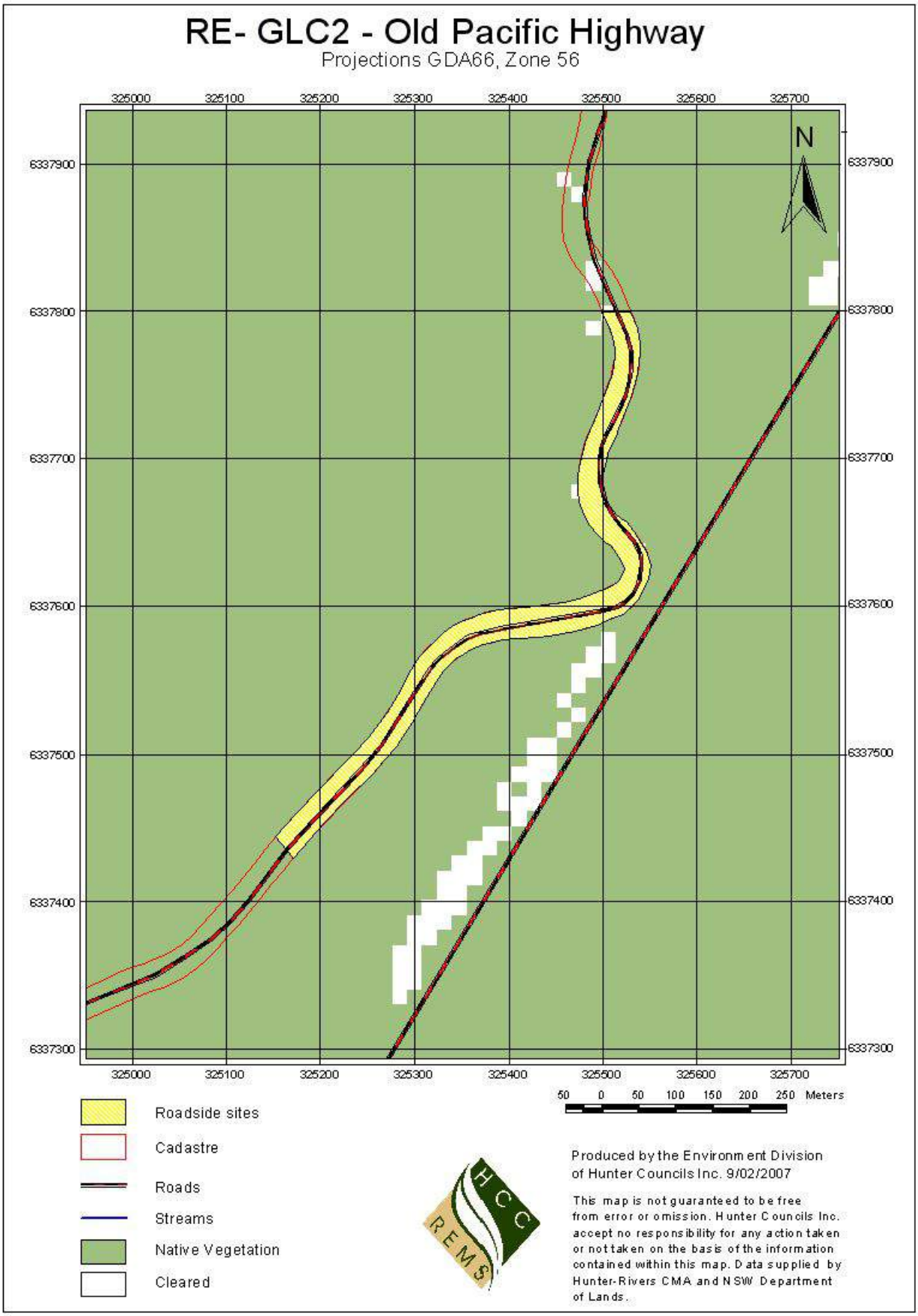


Figure 22 **Map illustrating RE-GLC2, Old Pacific Highway**

GLOUCESTER – Cobark Road

RE-GSC1 (E 381382, N 6453349) roadside environment was adjacent to Cobark Road (Fig 25). The site was located 1.5km NNE of Maudville Township and the nearest cross road was Gloucester River Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Mod	Low

Site description

The site situated on a 10 degree slope was approximately 130 metres in length and 25 metres in width.

Vegetation description

RE-GSC1 was a tall open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus saligna* was approximately 45 metres in height with a PFC of 20%. The middle layers; M1 and M2 had a PFC of 45% and 15% respectively and ranged in height from 1 to 30 metres. The M1 layer was dominated by *Tristaniopsis laurina* and also consisted of *Casuarina cunninghamiana, Alphitonia excelsa* and *Hymenosporum flavum*. The M2 layer was dominated by *Breynia oblongifolia*. The ground layers; L1 and L2 had a high PFC at 50% and 60% respectively. *Lomandra longifolia* was the most common species in the L1 layer. The L2 layer contained a mix of grasses, forbs and ferns and the dominant species were *Commelina cyanea, Adiantum formosum* and *Oplismenus aemulus*. A total of 63 plant species were recorded at this site, of which 4 were weed species and 6 were unable to be identified.

Habitat

The growth stages at this site consisted of 60% mature, 30% regenerating and 10% senescing. There were very few small and medium size hollows and no large hollows were recorded. Beyonettes and bare branches were common. The ground cover consisted mainly of leaf litter at 40% and also contained 5% fallen timber, 5% fungi and 5% bare ground.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

Connectivity at this site was moderate. The roadside reserve was connected to vegetation on private property to the north, east and west. Barrington Tops National Park is located 4.5km SW of the site and Avon River State Forest is 2.5km S of the site (Fig 26).

Management Issues

This site contained a few weed species such as *Ageratina adenophora*, *Bidens pilosa* and *Ehrharta erecta* that require managing. Some erosion and sediment control issues were noted at the bridge crossing

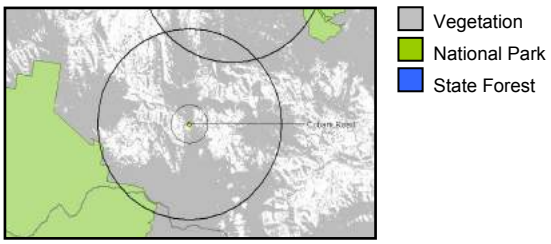


Figure 26 Vegetation connectivity

Figure 27 Site photo

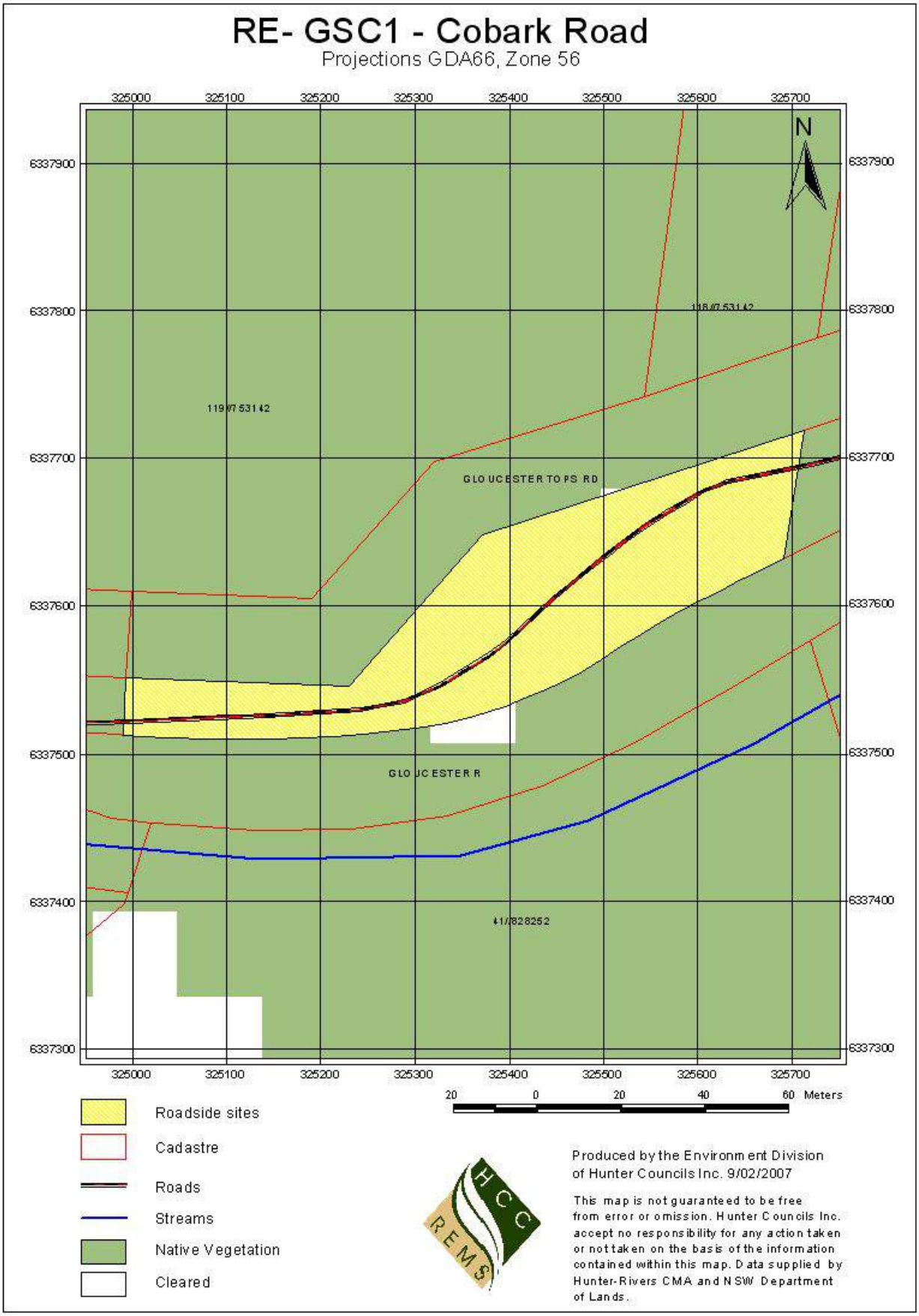


Figure 25 **Map illustrating RE-GSC2, Cobark Road**

GLOUCESTER – Barrington Tops Road

RE-GSC2 (E 383700, N 6461575) roadside environment was adjacent to Barrington Tops Road (Fig 28). The site was located 8.4km SW of Mount Peerless Township and the nearest cross road was Bells Trail.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	High	Low/Mod

Site description

The site situated on a 15 degree slope was approximately 1060 metres in length and 45 metres in width.

Vegetation description

RE-GSC2 was a grassy open forest with 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer had a 30% PFC and reached a height of 27.5 metres. *Eucalyptus punctata* and *Allocasuarina torulosa* were the dominant species in the canopy layer. The middle layer dominated by *Breynia oblongifolia* and *Phyllanthus gunnii* ranged from a maximum height of 2.5m to a minimum height of 1 meter and the PFC was 5%. The ground layer L1 had a high PFC of 60% and was dominated by *Imperata cylindrical.* The L2 layer of the ground cover only represented a PFC of 5% and contained mainly forb and fern species. A total of 42 plant species were recorded at this site, of which 2 were weed species and 8 were unable to be identified.

Habitat

The majority of trees at 75% were in a mature growth stage and small portion of trees were regenerating at 15% and senescing at 10%. Small hollows were not recorded however there were many medium hollows and a few large hollows present. This site also contained many beyonettes and a few bare branches. The ground cover was mainly vegetated but it did also consist of 10% leaf litter, 5% fallen timber, 7% rock and 5% bare ground.

Connectivity

This site had a moderate to high level of connectivity. The roadside vegetation is surrounded by vegetation on private property and Copeland Tops State Conservation Area is located approximately 0.6km E of the site (Fig 29).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

At this site there was minor evidence of fire, logging, clearing, grazing and erosion. The noxious weed species *Ligustrum sinense* (Narrow leaf privet) and *Lantana camara* were also present.

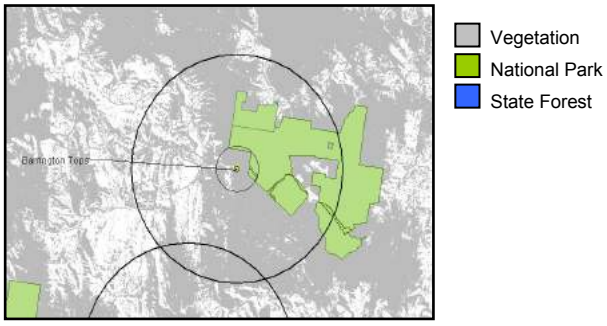


Figure 29 Vegetation connectivity

Figure 30 Site photo

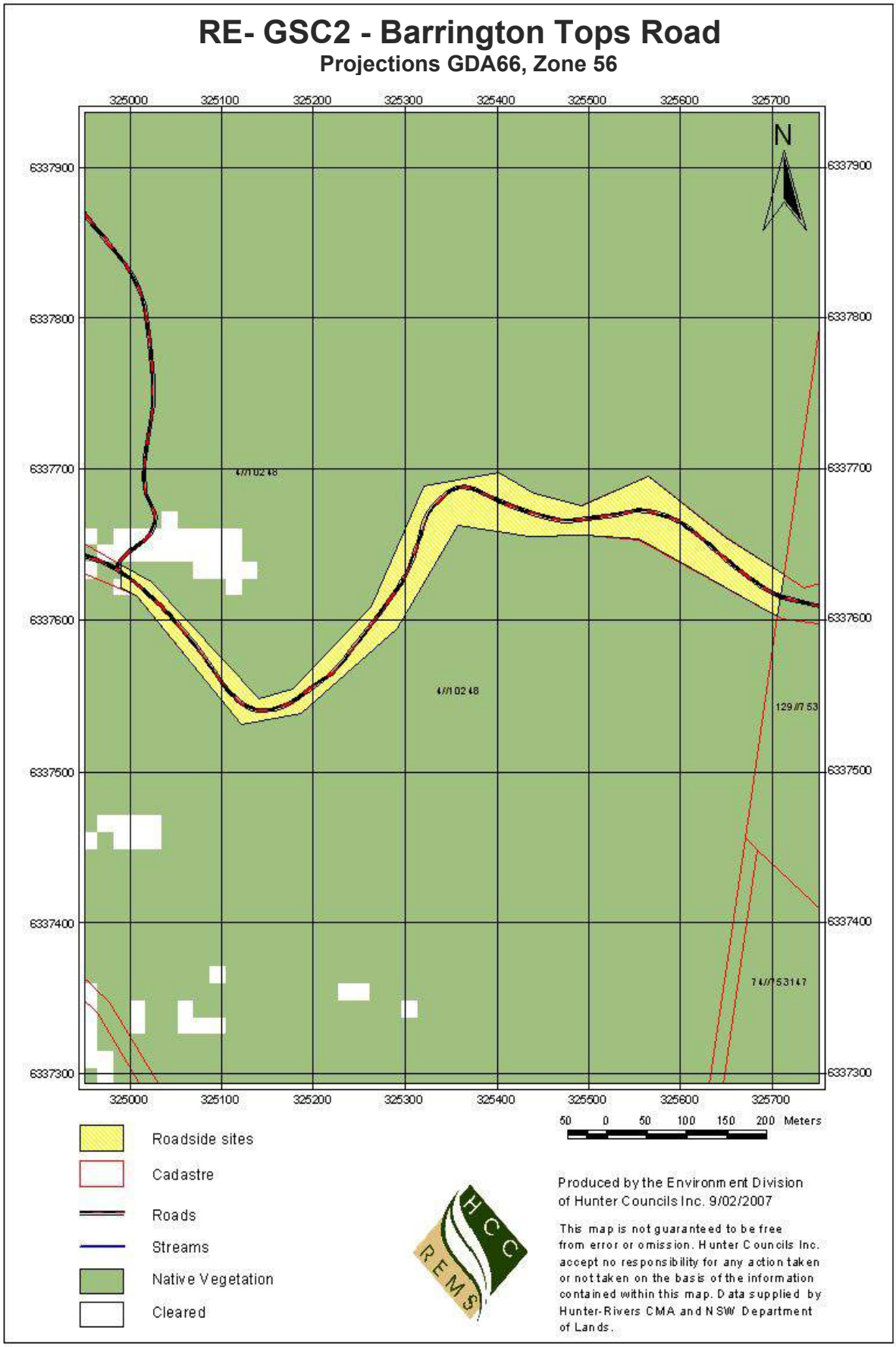


Figure 28 **Map illustrating RE-GSC2, Barrington Tops Road**

GREATER TAREE – Comboyne Road

RE-GTCC1 (E 444199, N 6493052) roadside environment was adjacent to the Comboyne Road (Fig 31). The site was located 5.5km NNE of Killabakh Township and the nearest cross road was Lorne Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod/High	High	Low

Site description

The site situated on a 10 degree slope was approximately 1100 metres in length and 40 metres in width. The site elevation was 258 metres above sea level.

Vegetation description

RE-GTCC1 was a tall open forest with 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer was approximately 40m in height with a PFC of 50%. The canopy layer contained 7 different species; the most dominant were Eucalyptus *acmenoides, Corymbia intermedia, Eucalyptus propinqua, Eucalyptus saligna* and *Eucalyptus microcorys*. The middle layers; M1 and M2 had a PFC of 20% and 25% respectively and the height ranged from 1 to 15 metres. The dominate species in the M1 layer was *Commersonia fraseri* and the noxious weed species *Lantana camara* was dominant in the M2 layer. The ground vegetation layers; L1 and L2 had a PFC of 40% and 5% respectively and the maximum height was 1 metre. The L1 layer consisted of a mix of life forms; grasses, vines, ferns and shrubs. The L2 layer consisted of a variety of forb species. A total of 51 plant species were recorded at this site, of which 2 were weed species and one was unable to be identified. .

Habitat

The majority of trees at 70% were in a mature growth stage and the remaining 30% were regenerating. No trees at this site were senescing. Small and medium size hollows were abundant and there were also a few large hollows. The site contained many beyonettes, and bare branches were abundant. The ground cover consisted mainly of leaf litter at 50% and some fallen timber at 5%.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

The roadside vegetation had moderate to high level connectivity with other vegetated areas. The site was surrounded by vegetation on private property and there were several Nature Reserves within a 1.5 to 4km radius. The closest Nature Reserve is Killabakh which is approximately 1.3km NNW of the site (Fig 32).

Management Issues

This site had minor evidence of a previous fire. The largest threat to this site was the presence of the noxious weed species *Lantana camara*.

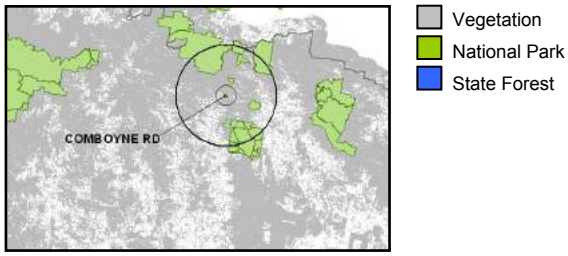


Figure 32 Vegetation connectivity

Figure 33 Site photo

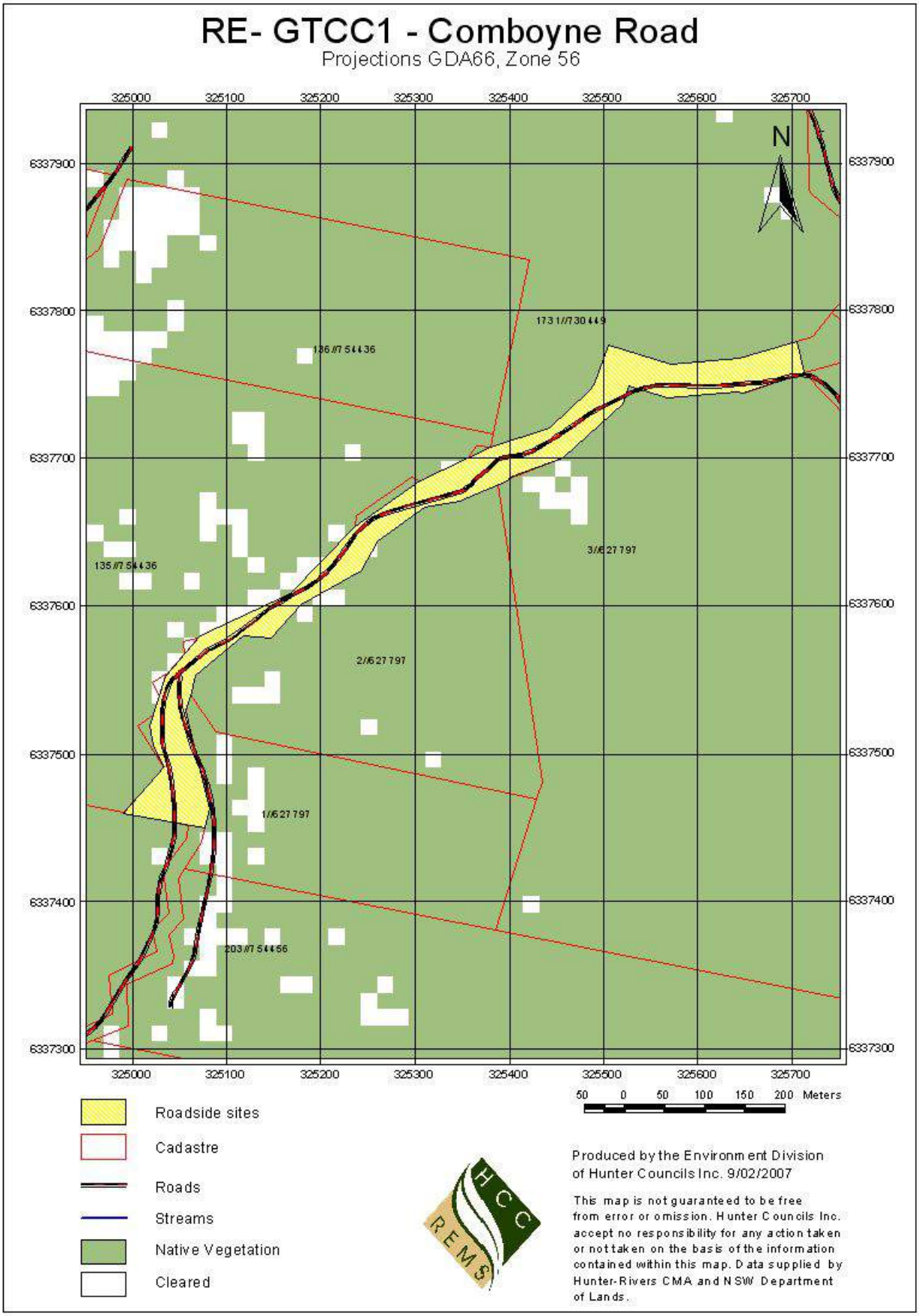
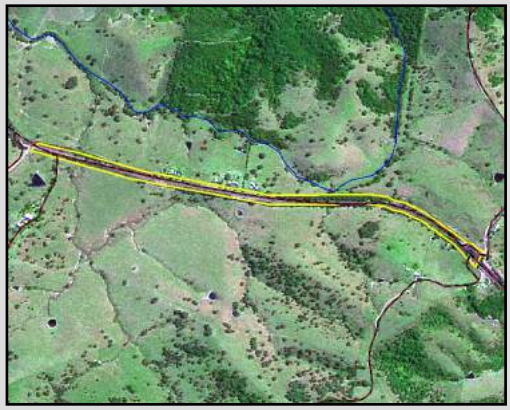


Figure 31 **Map illustrating RE-GTCC1, Comboyne Road**

GREATER TAREE – Buckett's Way

RE-GTCC2 (E 422792, N 6457653) roadside environment was adjacent to Buckett's Way (Fig 34). The site was located 5km W of Belbora Township and the nearest cross road was Gloucester Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Low/Mod	Low



Site description

The site situated on a 12 degree slope was approximately 2000 metres in length and 40 metres in width.

Vegetation description

RE-GTCC2 was a tall open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus spp.* including *Eucalyptus propinqua* and *Eucalyptus acmenioides,* was approximately 40 metres in height with a PFC of 45%. The middle layers; M1 and M2 had a PFC of 10% and 30% respectively and ranged in height from 0.5 to 10 metres. The M1 layer consisted of *Exocarpos cupressiformis, Guioa semiglauca* and *Alphitonia excelsa*. The M2 layer was dominated by the noxious weed species *Lantana camara*. The ground layers; L1 and L2 had a high PFC at 10% and 5% respectively. *Doodia aspera* was the most common species in the L1 layer. The L2 layer contained a mix of grass, forb and fern species. A total of 49 plant species were recorded at this site, of which 4 were weed species and 2 were unable to be identified.

Habitat

The growth stages at this site consisted of 65% mature, 30% regenerating and 5% senescing. There were only a few small size hollows. The site contained many beyonettes and bare branches. The ground cover consisted mainly of leaf litter at 70% and there was also some fallen timber at 5%.

Connectivity

Connectivity at this site was low to moderate. The roadside vegetation at GTCC2 was connected with sparsely scattered vegetation located on private property (Fig 35).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

The main issue at this site was the noxious weed species *Lantana camara* dominating the middle stratum. Also, noted at this site was runoff from the road causing erosion and sedimentation issues in the reserve.

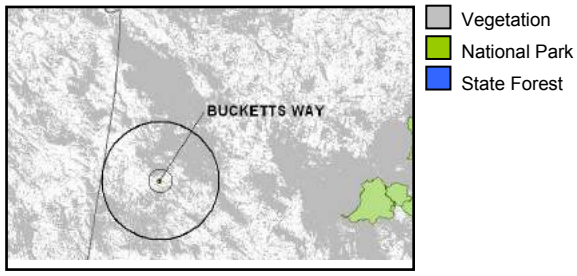


Figure 35 Vegetation connectivity

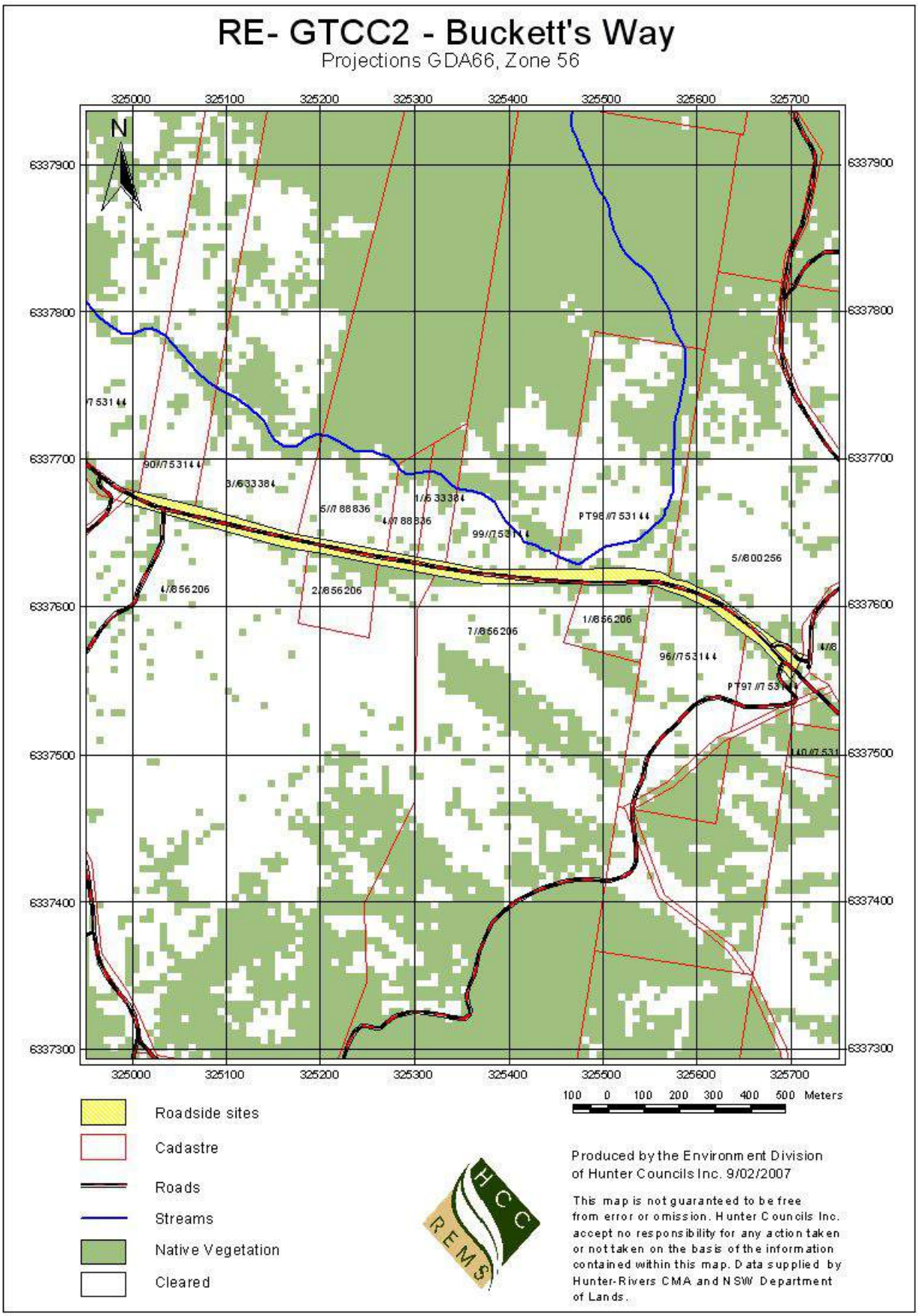
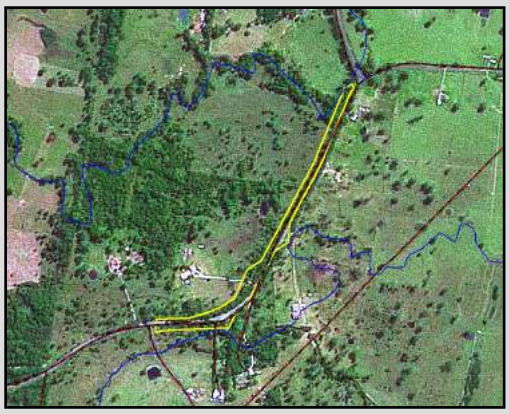


Figure 34 **Map illustrating RE-GTCC2, Buckett's Way**

LAKE MACQUARIE – Mandalong Road

RE-LMCC1 (E 354691, N 6333747) roadside environment was adjacent to Mandalong Road (Fig 37). The site was located 1.8km NEE of Mandalong Township and the nearest cross road was Browns Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Mod	Low



Site description

The site was approximately 950 metres in length and 30 metres in width. The site elevation was 19 metres above sea level.

Vegetation description

RE-LMCC1 was a grassy open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus amplifolia* and *Angophora floribunda*, was approximately 20 metres in height with a PFC of 35%. The middle layer reached a height of 10 metres and had a PFC of 25%. The main species in the middle layer were *Polyscias sambucifolia, Melaleuca linariifolia* and *Parsonsia straminea.* The L1 of the ground layer represented a PFC of 15% and was dominated by grass species such as *Poa labillardieri, Paspalum notatum, Themeda australis* and *Imperata cylindrical.* The L2 of the ground cover was approximately 0.3metres in height and had the highest PFC of all the strata at 60%. The L2 layer consisted mainly of forb species. A total of 36 plant species were recorded at this site, of which 4 were weed species and 1 was unable to be identified.

Habitat

Approximately half of the trees were in a regenerating or mature growth stage and only a small proportion at 10% were senescing. This site contained a few small and medium size hollows. Many of the trees contained beyonettes and bare branches for perch and roost sites. The ground cover consisted of 30% leaf litter and 5% bare ground.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

The level of connectivity for RE-LMCC1 was moderate. The roadside vegetation initially connects up to vegetation on private property which joins up to Olney State Forest and Jilliby State Conservation Area located 1.6km SWW of the site (Fig 38).

Management Issues

The main management issue at this site was the presence of *Rubus fruiticosus* (Blackberry), a declared noxious weed species.

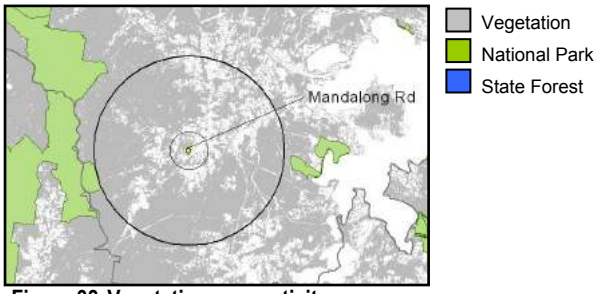


Figure 38 Vegetation connectivity

Figure 39 Site photo

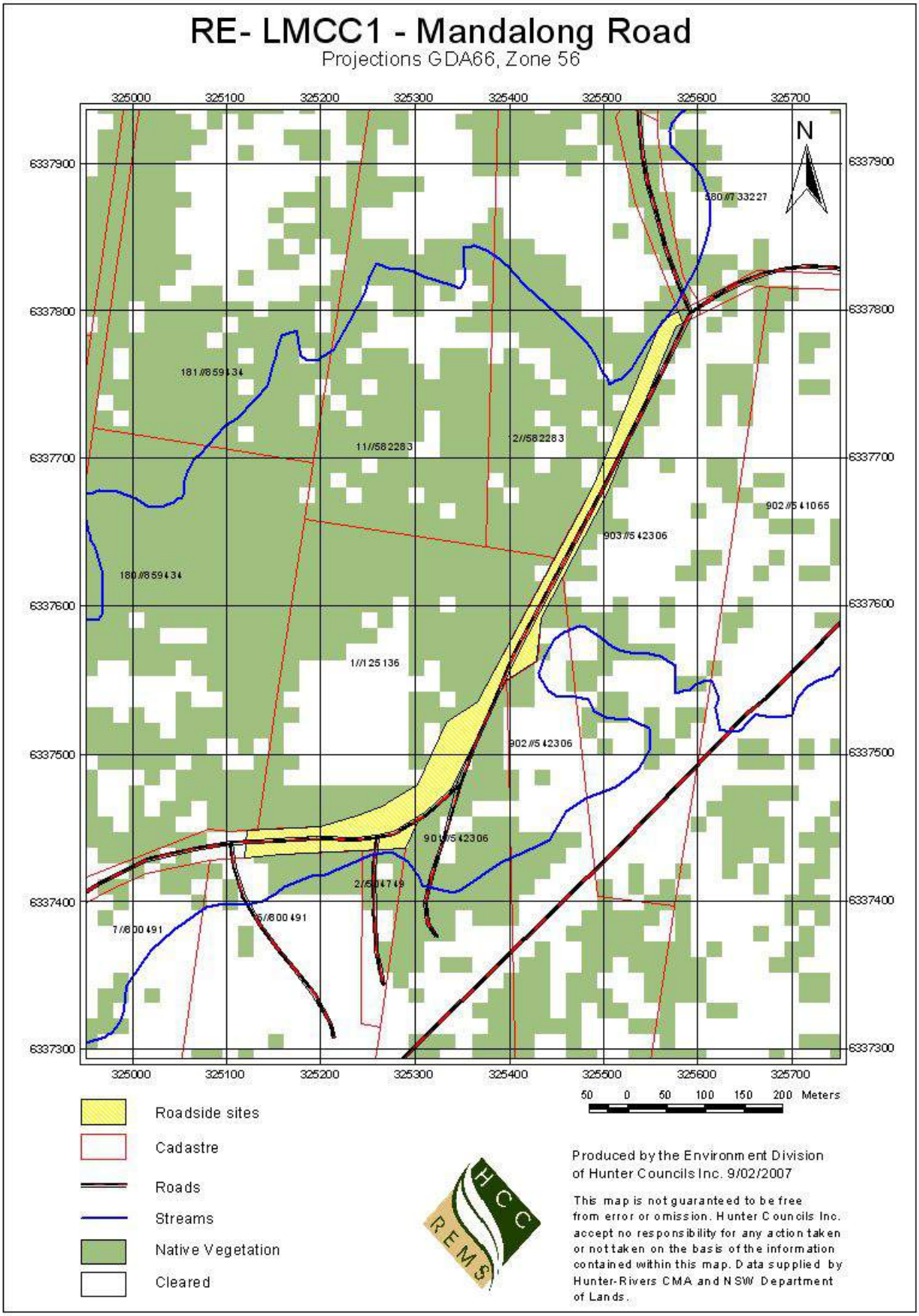
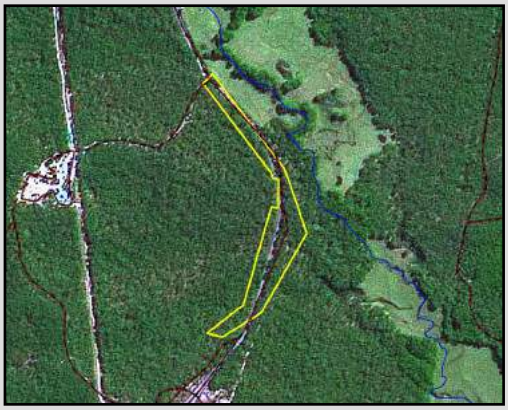


Figure 37 **Map illustrating RE-LMCC1, Mandalong Road**

LAKE MACQUARIE – Freemans Drive

RE-LMCC2 (E 359044, N 6347585) roadside environment was adjacent to Freemans Drive (Fig 40). The site was located 0.2km SWW of Ryhope Township and the nearest cross road was Osland Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	High	Low



Site description

The site was approximately 880 metres in length and 50 metres in width. The site elevation was 64 metres above sea level.

Vegetation description

RE-LMCC2 was a grassy open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus piperita* and *Angophora costata* was approximately 25 metres in height with a PFC of 35%. The middle layers; M1 and M2 had a PFC of 10% and 15% respectively and ranged in height from 1 to 10 metres. The M1 layer was dominated by *Allocasuarina torulosa* and *Leptospermum polygalifolium ssp. crismontanum*. The M2 layer was dominated by shrub species, with *Banksia spinulosa var. collina* being the most common. The ground layers; L1 and L2 had a high PFC at 50% and 10% respectively. Grass species such as *Themeda australis, Anisopogon avenaceus* and *Entolasia stricta* were the most common species in the L1 layer. The L2 layer contained a mix of grasses, forbs and sedges. A total of 30 plant species were recorded at this site, 3 of which were weed species.

Habitat

The growth stages at this site consisted of 50% mature, 45% regenerating and 5% senescing. There were many small and medium size hollows and a few large hollows recorded. Beyonettes and bare branches were common. The ground cover consisted mainly of leaf litter at 40%, and 5% bare ground.

Connectivity

Connectivity at this site was high. The roadside reserve was connected to vegetation on private property to the east of the site and to the west. In addition, the reserve adjoined Awaba State Forest (Fig 41).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

At this site littering was noted along the road reserve edge. In addition, there were a few weeds species present such as *Bidens pilosa, Foeniculum vulgare* and *Sida rhombifolia*.

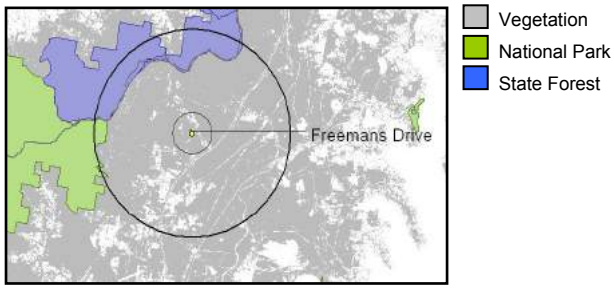


Figure 41 Vegetation connectivity

Figure 42 Site photo

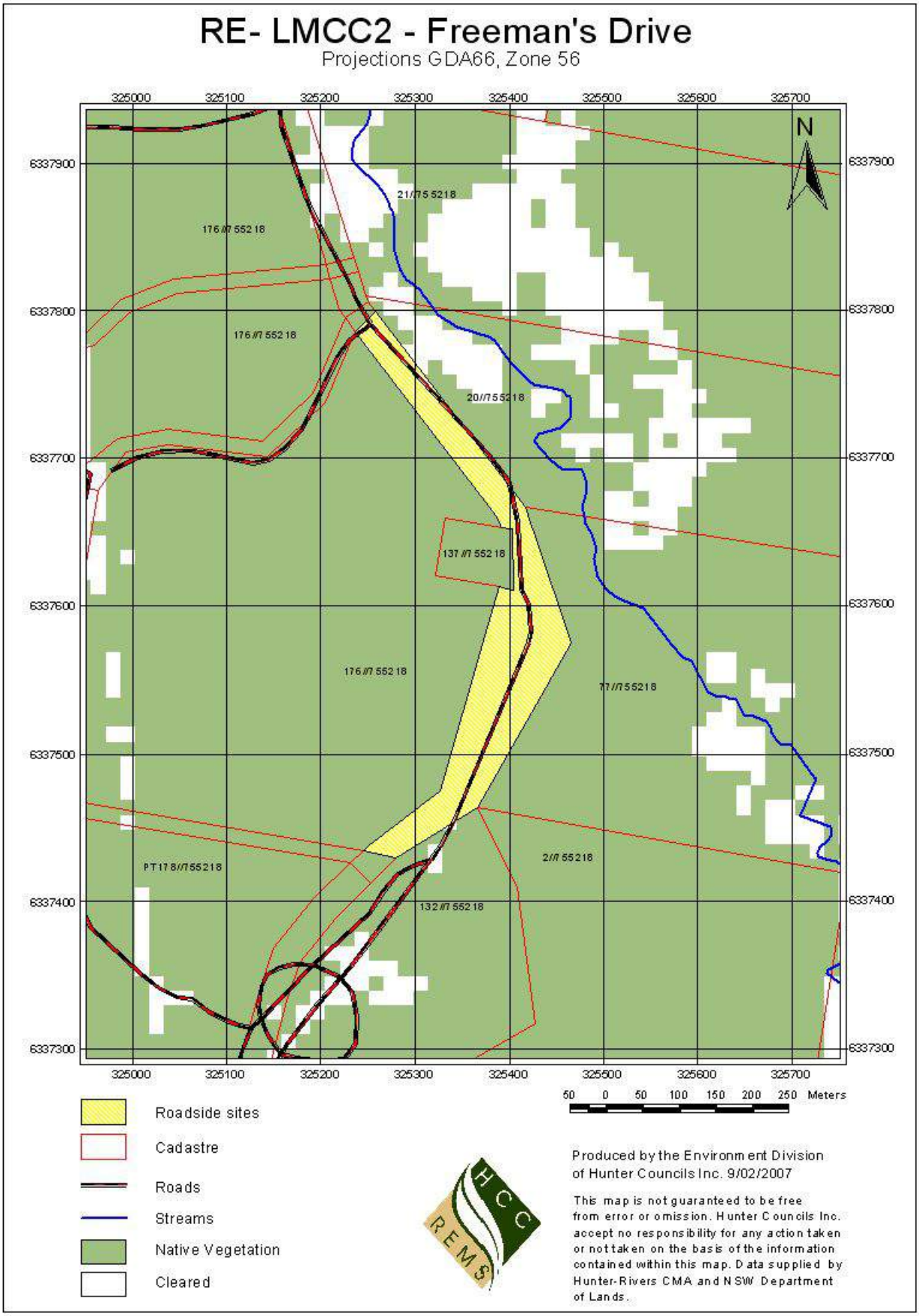


Figure 40 **Map illustrating RE-LMCC2, Freeman's Drive**

MAITLAND – Mt Vincent Road

RE-MCC1 (E 365368, N 6372124) roadside environment was adjacent to Mt Vincent Road (Fig 43). The site was located 0.8km E of Shamrock Hill Township and the nearest cross road was Buttai Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Low/Mod	Low/Mod	Low

Site description

The site was approximately 980 metres in length and 25 metres in width. The site elevation was 29 metres above sea level.

Vegetation description

RE-MCC1 was grassy woodland with 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer dominated by *Corymbia maculata* had a 15% PFC and reached a height of 25 metres. The middle layer with a height of 2.5 metres and PFC of 10% consisted of *Bursaria spinosa, Cassinia cunninghamii* and the noxious weed species *Lantana camara*. The ground layer L1 had a PFC of 10% and was dominated by grass species such as *Austrodanthonia monticola* and *Entolasia stricta.* L2 of the ground layer represented less than 10% PFC and contained mainly forb and sedge species. A total of 39 plant species were recorded at this site, of which 5 were weed species and 3 were unable to be identified.

Habitat

Approximately half the trees were in a mature or regenerating growth stage and 5% of the trees were senescing. There were many small and medium hollows and a few large hollows were noted at this site. Beyonettes and bare branches were common. The ground cover consisted mainly of leaf litter at 40% and there was also 5% bare ground.

Connectivity

This site had a low/moderate level of vegetation connectivity within a 1km radius and a low level of connectivity within a 5km radius. The roadside vegetation was partially surrounded by vegetation on private property (Fig 44).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

This roadside reserve site recorded a low level of disturbance. The main factors that were impacting on the site were weeds, clearing and dumping of rubbish.

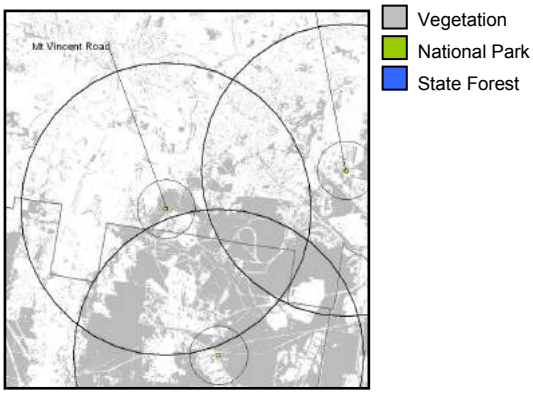


Figure 44 Vegetation connectivity

Figure 45 Site photo

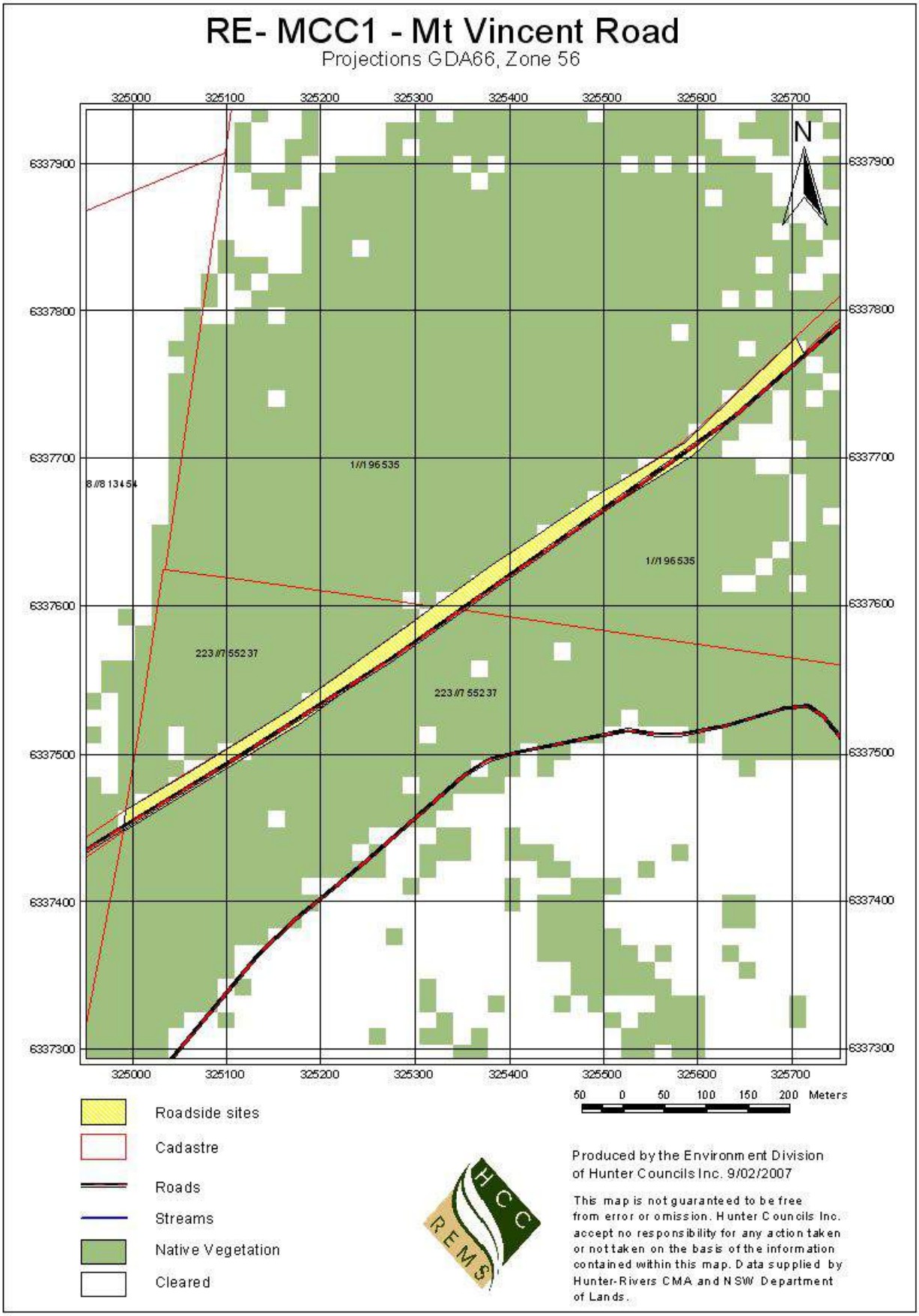
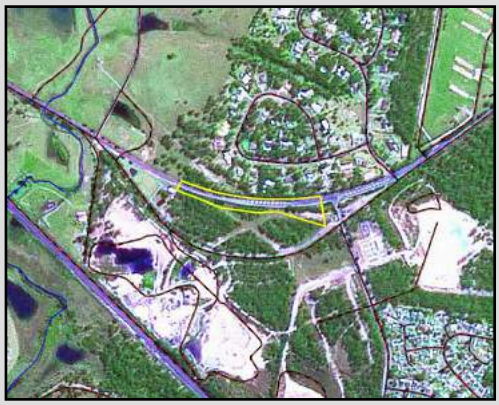


Figure 43 **Map illustrating RE-MCC1, Mt Vincent Road**

MAITLAND – Raymond Terrace Road

RE-MCC2 (E 371580, N 6373443) roadside environment was adjacent to Raymond Terrace Road (Fig 46). The site was located 0.7km NWW of Parkwood Village Township and the nearest cross road was Taylor Avenue.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Low/Mod	Low	Low



Site description

The site situated on a 5 degree slope was approximately 420 metres in length and 35 metres in width.

Vegetation description

RE-MCC2 was a grassy open woodland consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer at a height of 22 metres and PFC of 30% was dominated by *Eucalyptus crebra* and *Corymbia maculata*. The middle layers; M1 and M2 had a PFC of 15% and 30% respectively and ranged in height from 1 to 5 metres. The M1 layer consisted of *Acacia falcata, Alphitonia excelsa* and *Allocasuarina torulosa*. The M2 layer was dominated by B*ursaria spinosa.* The ground layers; L1 and L2 had a high PFC at 50% and 10% respectively. The L1 layer was dominated by grass species the most common being *Entolasia stricta.* The L2 layer contained a mix of forbs, sedge and fern species. A total of 35 plant species were recorded at this site, of which 2 were weed species and 1 was unable to be identified.

Habitat

The growth stages at this site consisted of 80% mature, 20% regenerating and no senescing trees. There were only a few small hollows. The site did contain beyonettes however bare branches were common. The ground cover consisted mainly of leaf litter at 40%, some rock at 5% and bare ground at 5%.

Connectivity

Connectivity at this site was low within a 1 and 5km radius. The roadside vegetation at MCC2 was connected to patches of sparsely scatter vegetation on private property. Hexham Swamp Nature Reserve was the nearest protected reserve, located 8km SE from the site (Fig 47).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

MCC2 was in good condition with relatively minor factors impacting on the road reserve. The noxious weed species *Lantana camara* had a light impact on site health. The only other issue noted at this site was the dumping of garden waste within the reserve.

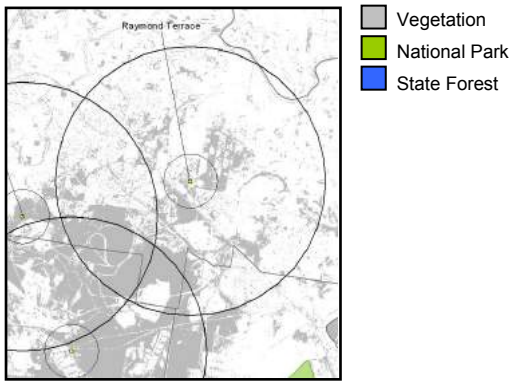


Figure 47 Vegetation connectivity

Figure 48 Site photo

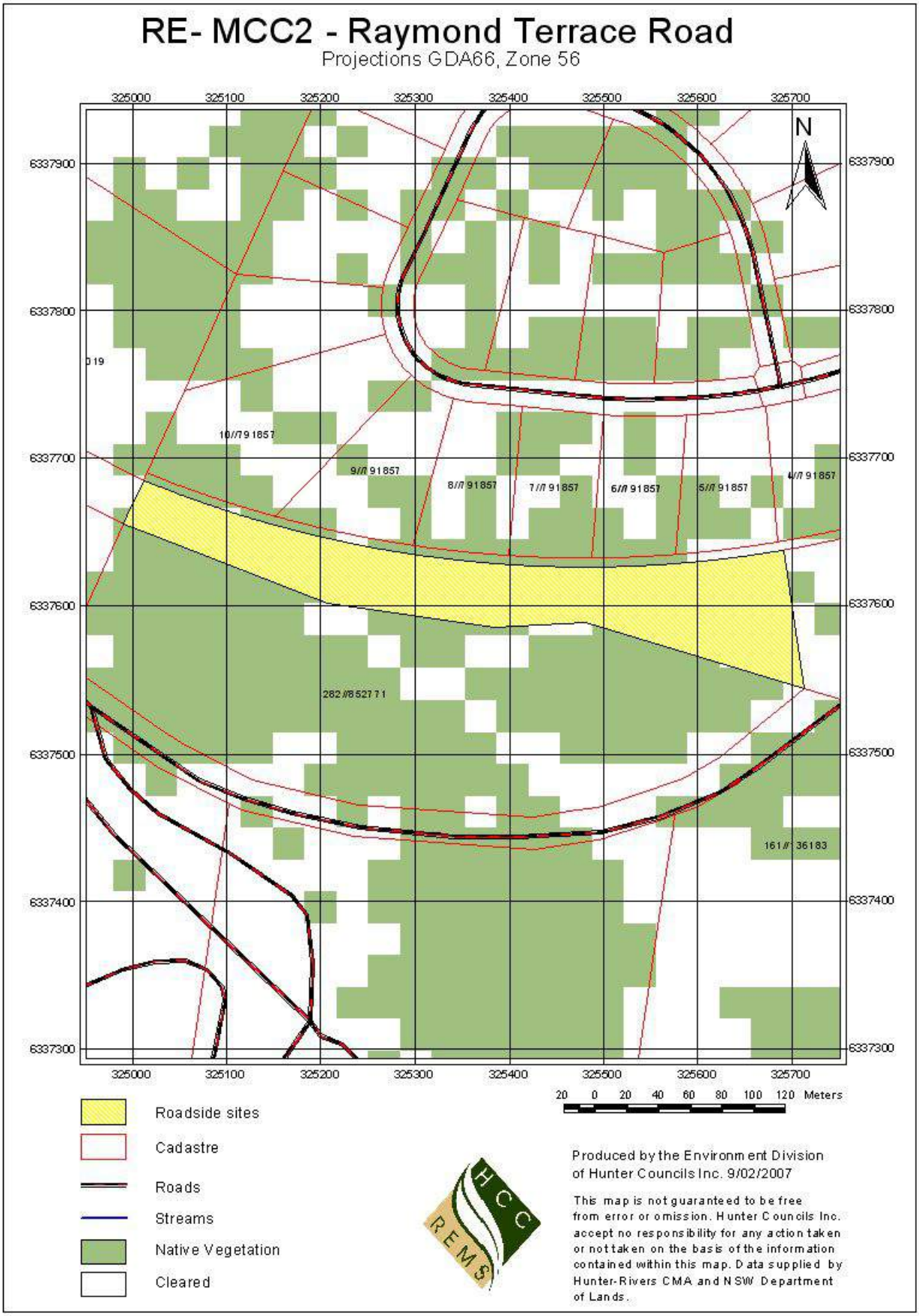
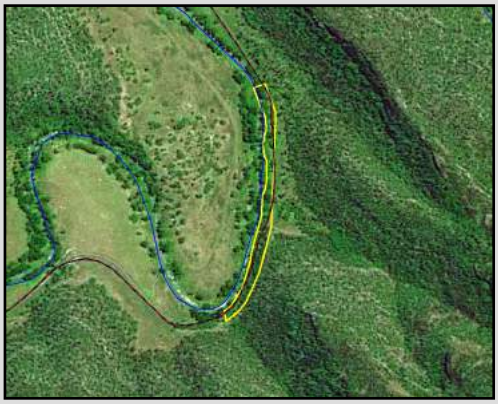


Figure 46 **Map illustrating RE-MCC2, Raymond Terrace Road**

MUSWELLBROOK – Widden Valley Road

RE-MSC1 (E 255372, N 6406218) roadside environment was adjacent to Widden Valley Road (Fig 49). The site was located 1.3km NE of Lower Baramul Township and the nearest cross road was Bylong Valley Way.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod	High	Low



Site description

The site situated on a 10 degree slope was approximately 700 metres in length and 30 metres in width. The site elevation was 179 metres above sea level.

Vegetation description

RE-MSC1 was grassy woodland with 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus nubila* and *Eucalyptus crebra*, reached a height of 27m and had a PFC of 25%. The middle layers; M1 and M2 had a PFC of 15% each and ranged in height from 0.5 to 5 metres. The dominate species in the M1 layer were *Cassinia quinquefaria, Bursaria spinosa* and an *Acacia spp*. The M2 layer consisted of mix of shrub species and vines such as *Clematis glycinoides* and *Platysace lanceolata*. The ground vegetation layers; L1 and L2 had a PFC of 10% each with a maximum height of 0.5 and 0.2 metres respectively. The L1 and L2 layer consisted of a mix of grass, sedge, forb and vine species. A total of 38 plant species were recorded at this site, 4 of which were weed species.

Habitat

The majority of trees at 85% were in a mature growth stage and small portion of trees were regenerating at 10% and senescing at 5%. This site had many small hollows, a few medium size hollows and no large hollows. Beyonettes and bare branches were common. The ground cover consisted of 40% leaf litter, 20% rock and 5% fallen timber.

Items of significance

A cave containing Aboriginal hand painting was located approximately 2 metres from the road edge. This site has been registered with National Parks and Wildlife Service.

Connectivity

The roadside vegetation at RE-MSC1 had a high level of connectivity with other patches of vegetation in the surrounding landscape. The site was surrounded by Wollemi National Park (Fig 50).

Management Issues

This site had no major management issues. Several different weed species were present however only one was listed as noxious (*Opuntia stricta,* Prickly pear). Other issues of note were clearing and grazing by feral animals.

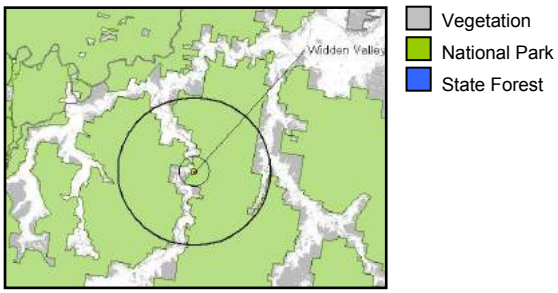


Figure 50 Vegetation connectivity

Figure 51 Site photo

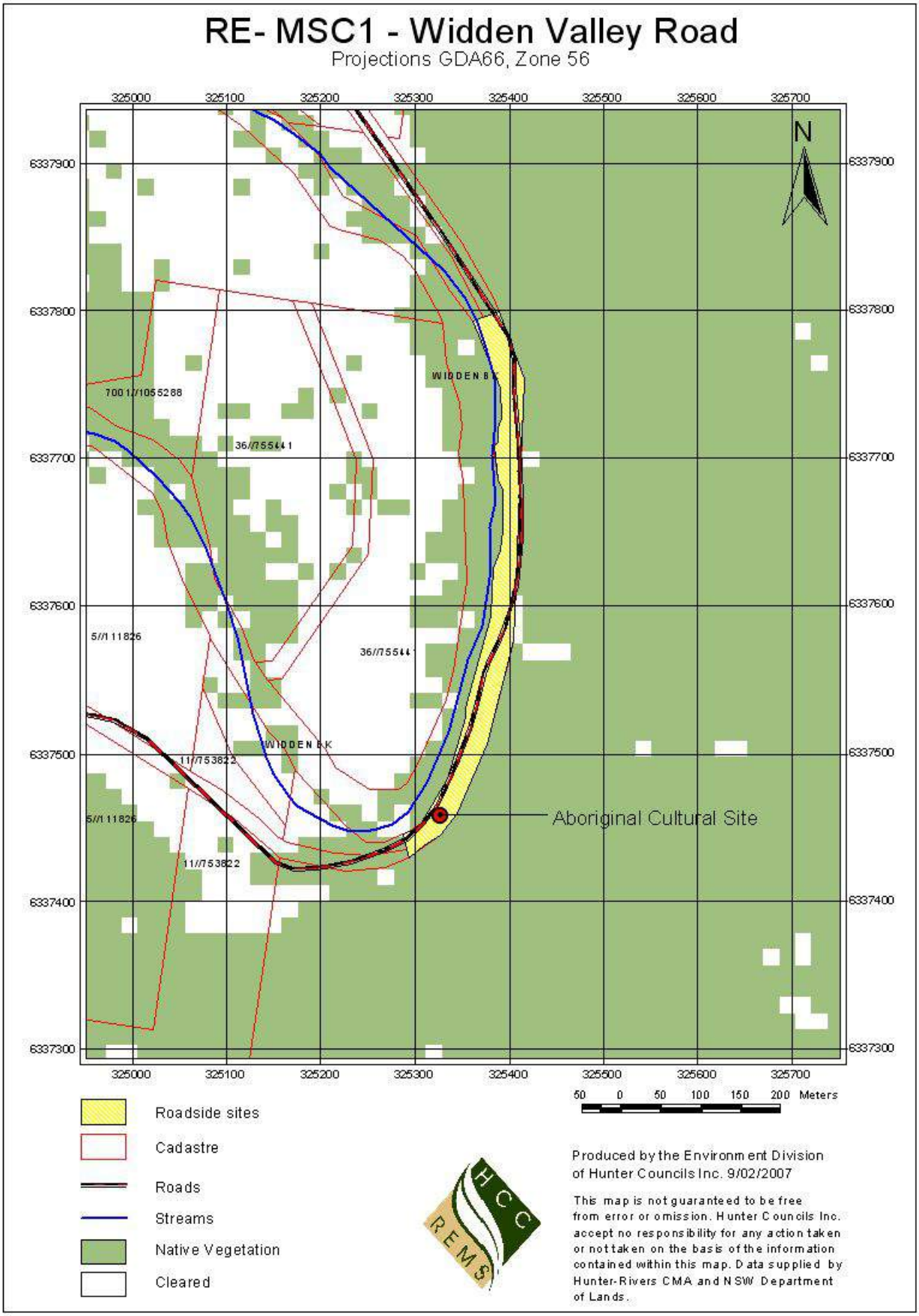


Figure 49 **Map illustrating RE-MSC1, Widden Valley Road**

MUSWELLBROOK – Yarraman Road

RE-MSC2 (E 278406, N 6430735) roadside environment was adjacent to Yarraman Road (Fig 52). The site was located 3.7km NNE of Wybong Township and the nearest cross road was Yarraman Row.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod	Low/Mod	Low

Site description

The site situated on a 10 degree slope was approximately 880 metres in length and 20 metres width. The site elevation was 231 metres above sea level.

Vegetation description

RE-MSC2 was a grassy woodland consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer co dominated by *Eucalyptus crebra* and *Callitris endlicheri,* was approximately 25 metres in height with a PFC of 25%. The middle layers; M1 and M2 had a PFC of 15% and 10% respectively and ranged in height from 0.5 to 5 metres. The M1 layer was dominated by *Notelaea microcarpa* and the M2 layer consisted of a mix of shrub species such as *Acacia ulicifolia* and *Cassinia quinquefaria*. The combined ground vegetation layers of L1 and L2 had a low PFC of 10%. The L1 layer consisted mainly of grass species, including *Aristida ramosa* and *Themeda australis.* Forb species dominated the L2 layer of the ground vegetation. A total of 34 plant species were recorded at this site, of which 1 was a weed species and 5 were unable to be identified.

Habitat

The growth stages at this site consisted of 85% mature, 10% regenerating and 5% senescing. Small hollows were common and medium and large hollows were observed. Perch and roost sites for fauna were present in the form of beyonettes and bare branches. The ground cover consisted of 30% leaf litter, 25% bare ground, 10% fallen timber and 5% rock.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

Vegetation connectivity at RE-MSC2 was low/moderate within a 1km radius and low within a 5km radius. Vegetation within a 5km radius consisted mainly of localised patches of vegetation on private property. The closest reserve was Manobalai Nature Reserve, situated 3.3km NW from the site (Fig 53).

Management Issues

Overall, this roadside site was generally in good condition/health. Rabbits and erosion were having a minor impact on site health. Of concern was the presence of the noxious weed species *Opuntia stricta* (Prickly pear).

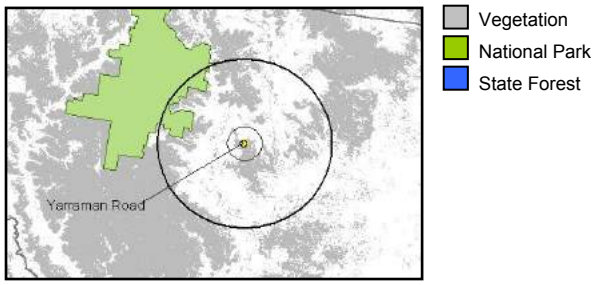


Figure 53 Vegetation connectivity

Figure 54 Site photo

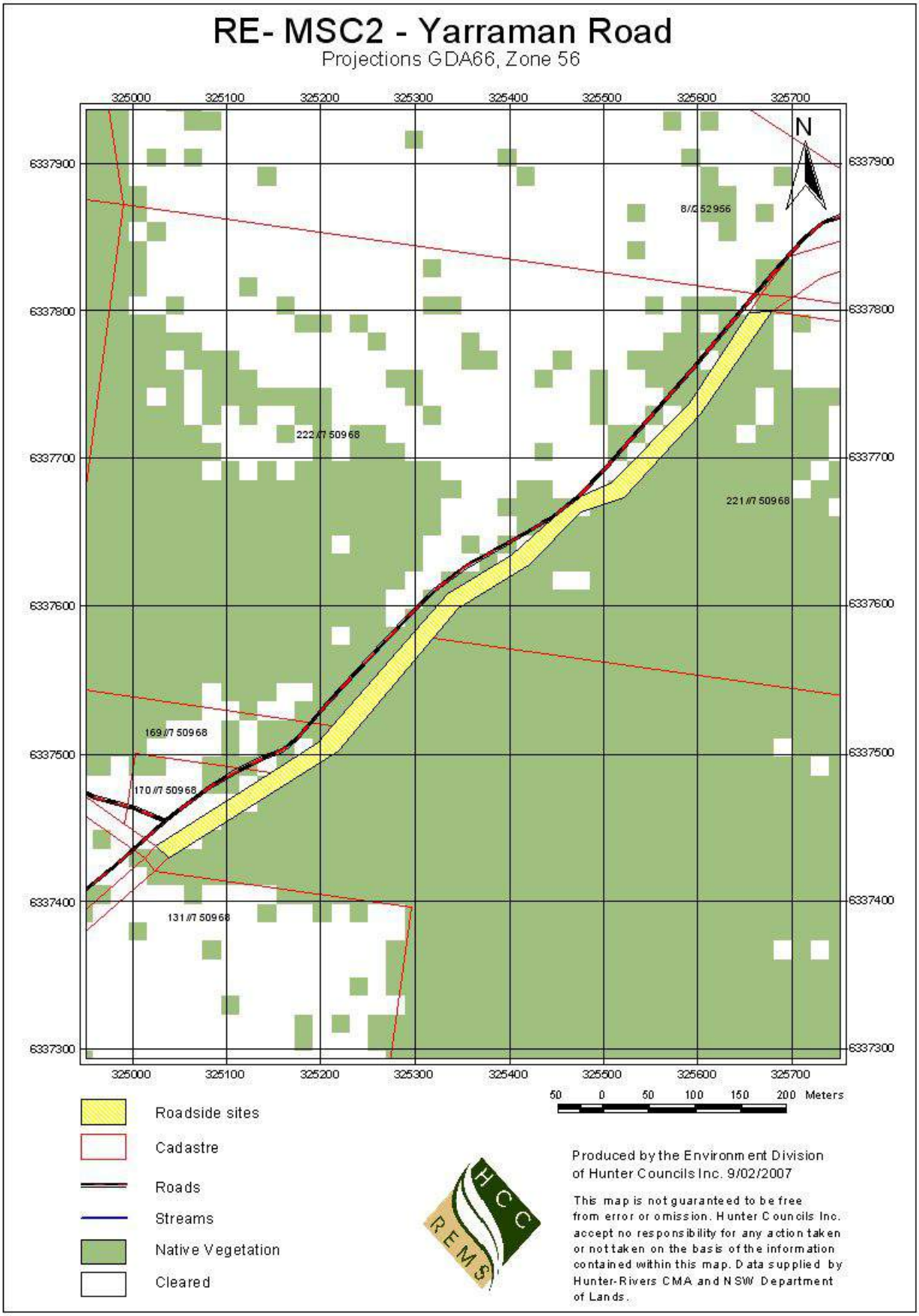


Figure 52 **Map illustrating RE-MSC2, Yarraman Road**

NEWCASTLE – Carnley Avenue

RE-NCC1 (E 378001, N 6354516) roadside environment was adjacent to Carnley Avenue (Fig 55). The site was located 2.3km W of New Lambton Township and the nearest cross road was Aldyth Street.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Low/Mod	Low

Site description

The site situated on a 13 degree slope was approximately 1350 metres in length and 55 metres in width. The site elevation was 64 metres above sea level.

Vegetation description

RE-NCC1 was a tall open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus propinqua, Syncarpia glomulifera* and *Corymbia maculata,* was approximately 40 metres in height and had a 30-70% PFC. The middle layer consisted of *Glochidion ferdinandii*, *Pittosporum undulatum*, *Gymnostachys anceps* and the noxious weed species *Lantana camara*. The ground layer was dominated by the sedge species *Lomandra longifolia* and the fern species *Doodia aspera*. A total of 43 plant species were recorded at this site, of which 5 were weed species and 1 was unable to be identified.

Habitat

The growth stages at this site consisted of 50% mature, 50% regenerating and no senescing trees. No hollows were observed at this site however beyonettes and bare branches were common. The ground cover consisted of 60% leaf litter and 5% fallen timber.

Connectivity

Vegetation connectivity at RE-NCC1 was low/moderate within a 1km radius and low within a 5km radius. The roadside vegetation initially connects to vegetation in Blackbutt Reserve and is then further connected to sparsely scattered vegetation patches on private property. Glenrock State Conservation Area was situated 5km SE from the road reserve (Fig 56).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

The main management issue at this site were weed species. Of particular concern were the presence of *Ligustrum lucidum* (Broad leaf privet), *Ligustrum sinense* (Narrow leaf privet) and *Lantana camara* (Lantana), which are declared noxious under the Noxious Weeds Act 1993.

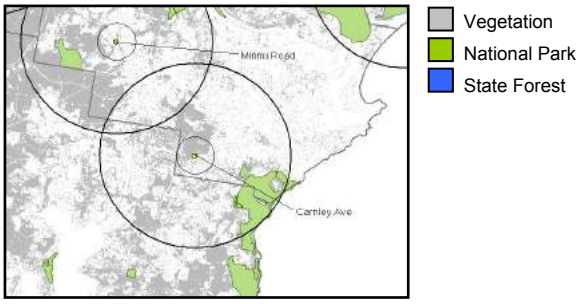


Figure 56 Vegetation connectivity

Figure 57 Site photo

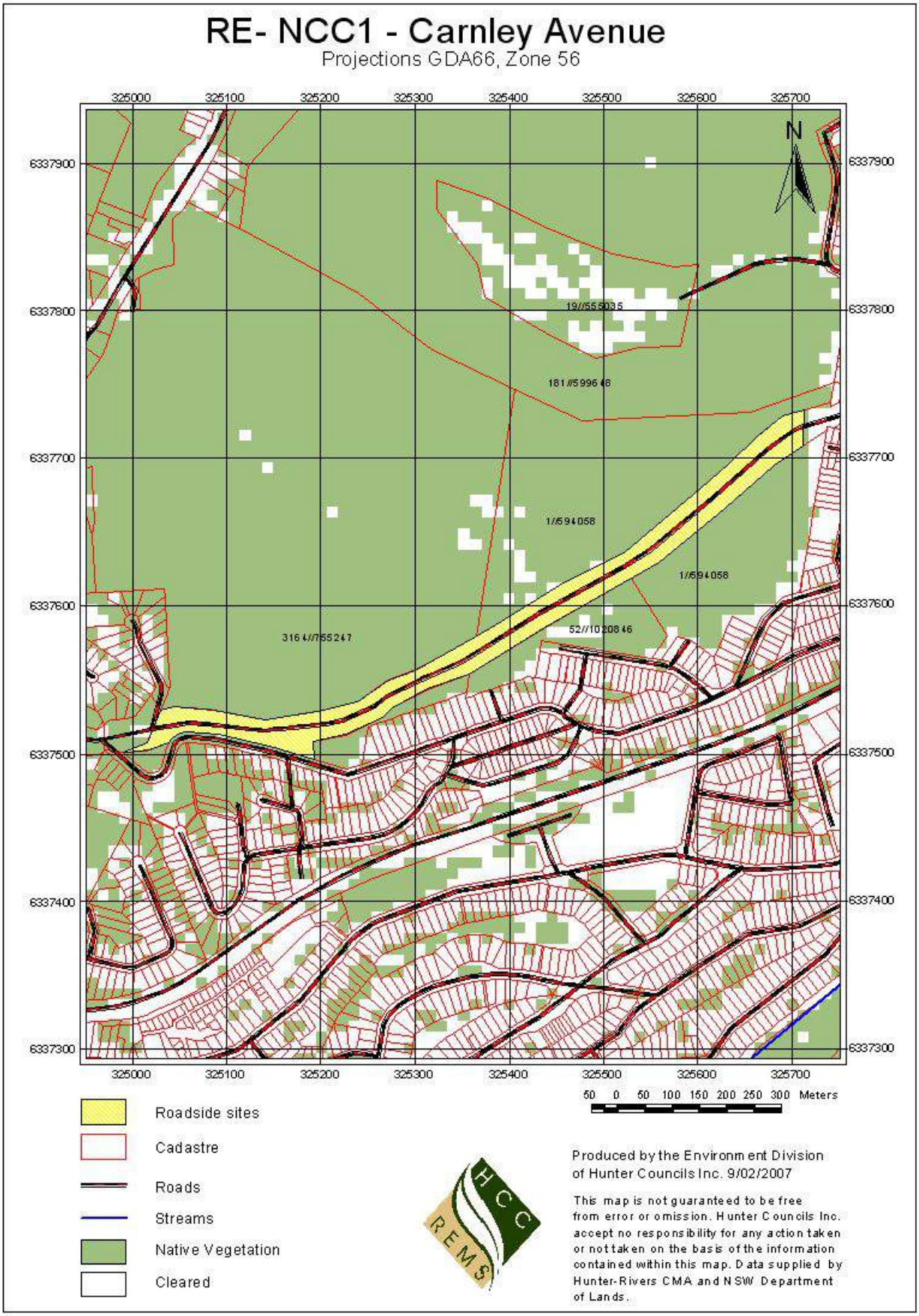


Figure 55 **Map illustrating RE-NCC1, Carnley Avenue**

NEWCASTLE – Minmi Road

RE-NCC2 (E 373905, N 6360694) roadside environment was adjacent to Raymond Terrace Road (Fig 58). The site was located 1.3km W of Maryland Township and the nearest cross road was Warkworth Street.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod	Low/Mod	Low

Site description

The site situated on a 10 degree slope was approximately 165 metres in length and 43 metres in width. The site elevation was 41 metres above sea level.

Vegetation description

RE-NCC2 was a tall open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer at a height of 35 metres and PFC of 30-70% was dominated by *Eucalyptus acmenoides* and *Eucalyptus punctata.* The middle layers; M1 and M2 ranged in height from 0.5 to 6 metres. The M1 layer consisted of *Exocarpos cupressiformis, Acacia falcata* and *Notelaea longifolia*. The M2 layer consisted of a mix of species, including *Bursaria spinosa*, *Cassytha glabella*, *Acacia ulicifolia*, *Breynia oblongifolia* and the noxious weed species *Lantana camara*. The ground layers; L1 and L2 ranged in height from 0.1 to 0.5 metres. The L1 layer was dominated by grass species in particular *Themeda australis*. The L2 layer consisted of a mix of fern, forb, grass and sedge species. A total of 43 plant species were recorded at this site, of which 8 were weed species and 2 were unable to be identified.

Habitat

The growth stages at this site consisted of 90% mature, 5% regenerating and no senescing trees. A few small, medium and large hollows were observed at this site. In addition the canopy layer also contained many beyonettes and bare branches. The ground cover consisted of mix of vegetation and leaf litter.

Connectivity

Vegetation connectivity at this site was low within a 1km and low/moderate within a 5km radius. The roadside vegetation at NCC2 was surrounded by large patches of clear land as well as large patches of intact vegetation located on private property. In addition, Blue Gum Hills Reserve was situated 2km SW and Hexham Swamp Nature Reserve was approximately 2.4km NE from the survey site (Fig 59).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

Weed invasion was the major issue at this roadside environment reserve. The noxious weed species *Lantana camara* (Lantana) were present at this site. In addition, nearby residents have planted an *Acacia spp*. not native to the area along the southern boundary of the reserve.

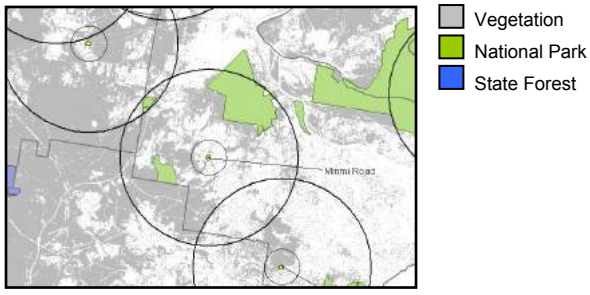


Figure 59 Vegetation connectivity

Figure 60 Site photo

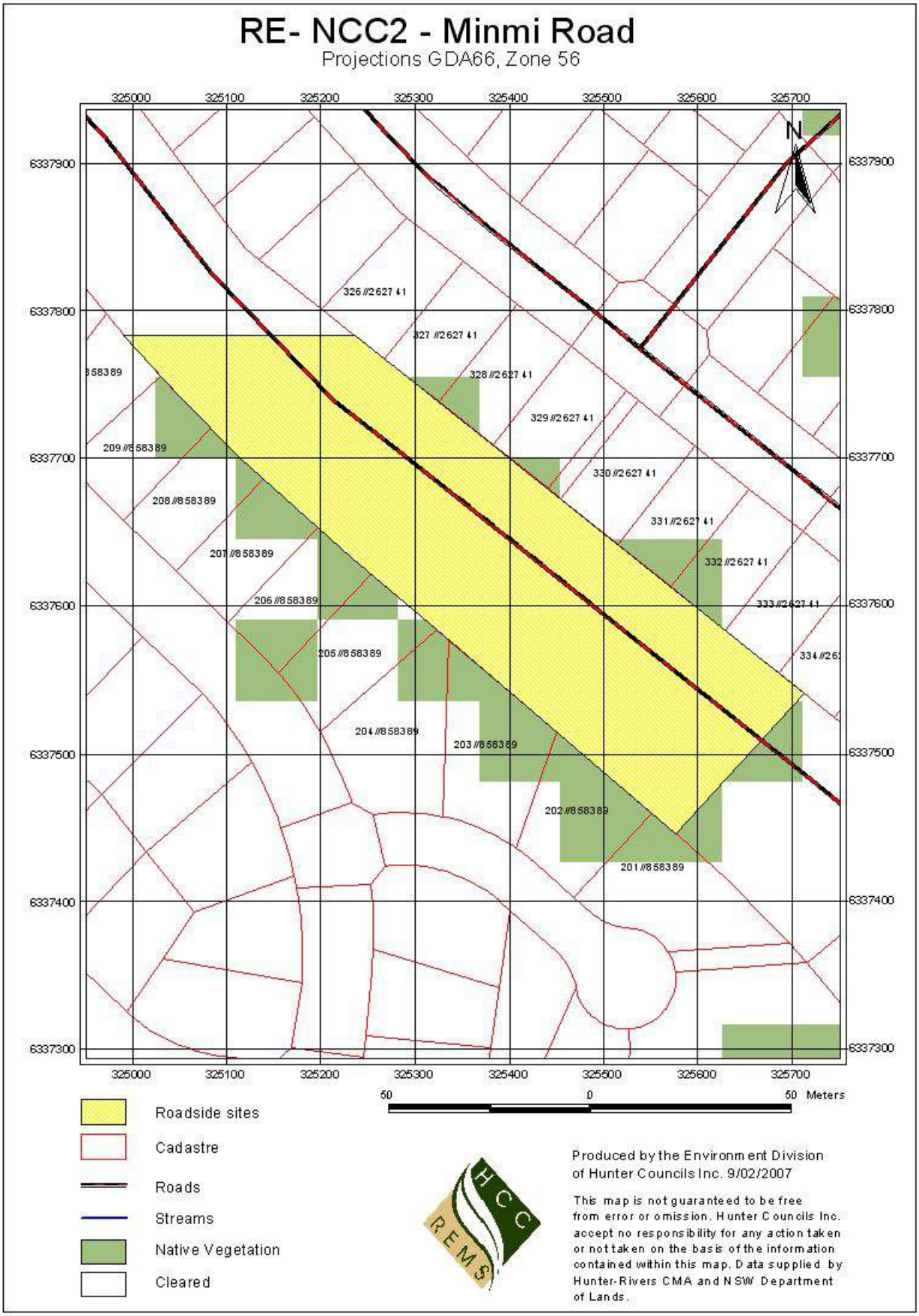
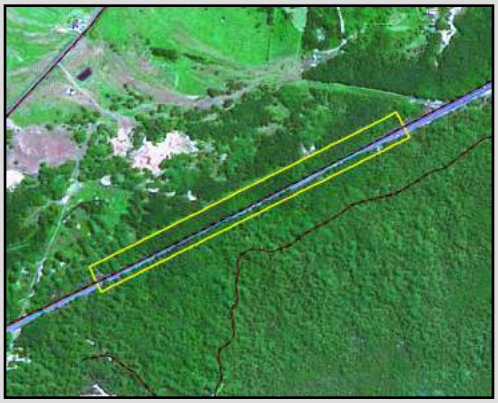


Figure 58 **Map illustrating RE-NCC1, Minmi Road**

PORT STEPHENS – Nelson Bay Road

RE-PSSC1 (E 388974, N 6364263) roadside environment was adjacent to Nelson Bay Road (Fig 61). The site was located 2.9km NE of Fern Bay Township and the nearest cross road was Fullerton Cove Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Low/Mod	Mod/High	Low



Site description

The site situated on flat land was approximately 990 metres in length and 80 metres in width. The site elevation was 16 metres above sea level.

Vegetation description

RE-PSSC1 was a grassy open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Eucalyptus robusta* and *Melaleuca quinquenervia,* was approximately 20 metres in height with a PFC of 45%. The middle layers; M1 and M2 had a PFC of 25% and 5% respectively and ranged in height from 2 to 10 metres. The M1 layer was dominated by *Glochidion ferdinandi* and the M2 layer contained *Maclura cochinchinensis, Breynia oblongifolia* and the noxious weed species *Lantana camara*. The ground layers; L1 and L2 had a PFC of 35% and 10% respectively. *Gahnia spp.* was the most common species in the L1 layer. The L2 layer contained a mix of grass and fern species. A total of 36 plant species were recorded at this site, 3 of which were weed species.

Habitat

The growth stages at this site consisted of 80% mature, 15% regenerating and 5% senescing. No hollows of any size were observed at this roadside environment. However, beyonettes and bare branches were abundant. The ground cover consisted mainly of leaf litter at 50% and also contained 5% fungi and 5% bryophytes.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

Connectivity at this site was moderate to high within a 1km radius. The roadside reserve was connected to vegetation on private property to the east and south. In addition, Kooragang Nature Reserve was located 1.2km to the east and Stockton Bight Reserve was 1.5km south of the reserve (Fig 62).

Management Issues

This road reserve environment had a low level of disturbance. There was minor evidence of fire, clearing and weeds.

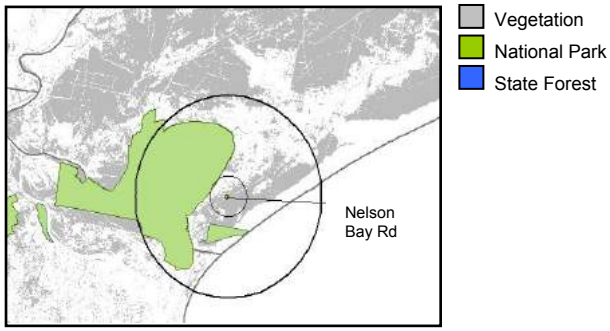


Figure 62 Vegetation connectivity

Figure 63 Site photo

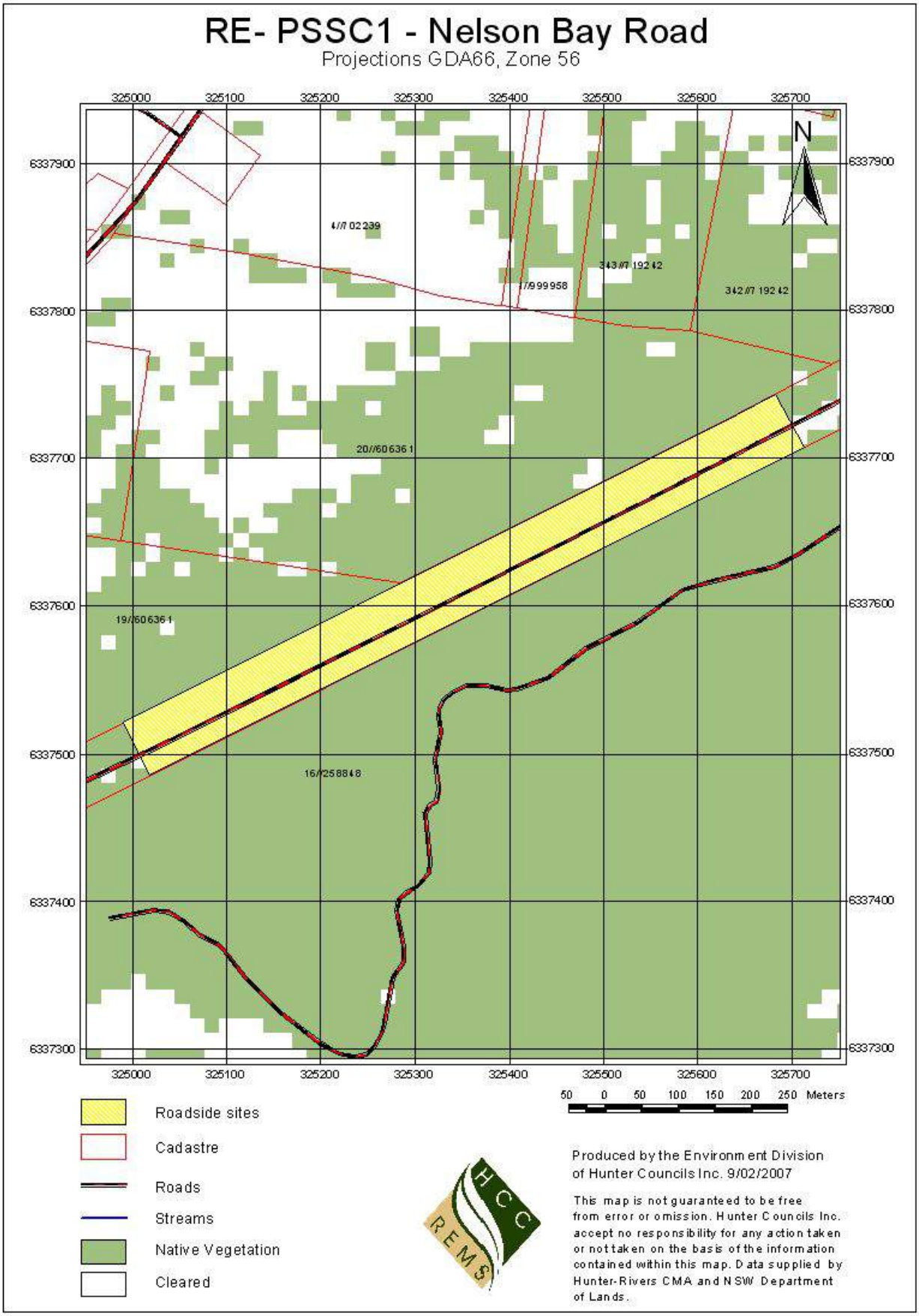
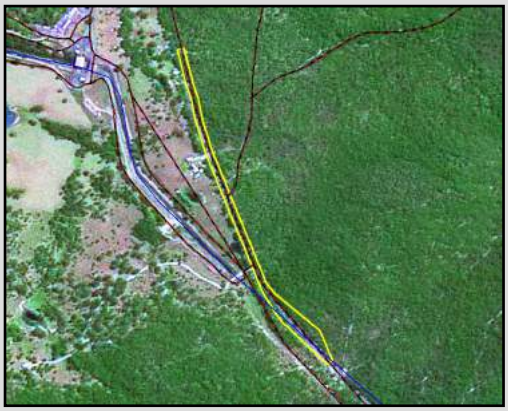


Figure 61 **Map illustrating RE-PSSC1, Nelson Bay Road**

PORT STEPHENS – Italia Road

RE-PSSC2 (E 387589, N 6384465) roadside environment was adjacent to Italia Road (Fig 64). The site was located 3.4km NNW of Ringwood Flat Town Township and the nearest cross road was the Pacific Highway.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
N/A	N/A	Mod/High	Low



Site description

The site was approximately 1000 metres in length and 30 metres in width. The elevation was 51 metres above sea level.

Vegetation description

RE-PSSC2 was a heath open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer dominated by *Corymbia maculata* was approximately 15 metres in height with a PFC of 35%. The middle layer dominated by *Melaleuca nodosa,* reached a height of 3 metres and had a PFC of 20%. L1 of the ground layer had a PFC of 10% and was dominated by *Daviesia ulicifolia* and *Dillwynia retorta*. L2 of the ground cover was approximately 0.3 metres in height and had PFC of 30%. The L2 layer consisted of a mix of grass, fern, sedge and forb species. A total of 39 plant species were recorded at this site, 1 of which was a weed species.

Habitat

The habitat attributes were not collected for this roadside environment site.

Connectivity

The vegetation on roadside environment reserve RE-PSSC2 generally had a moderate to high level of connectivity with other patches of vegetation in the surrounding environment. Vegetation on private property and State Forest provided a high level of vegetation connectivity within a 1km radius. In addition, Wallaroo Natural Reserve was within the confines of the 5km radius band (Fig 65).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

This roadside environment was in very good condition. There were only two minor issues; 1) a track running through the site was causing some erosion and 2) there were some small patches of weeds.

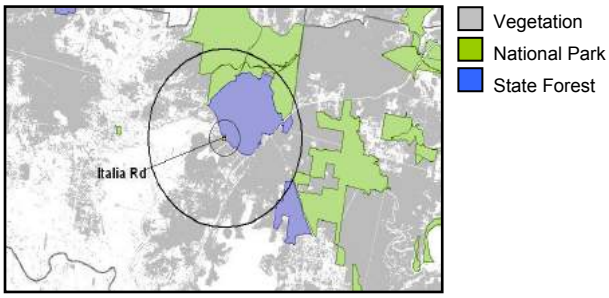


Figure 65 Vegetation connectivity

Figure 66 Site photo

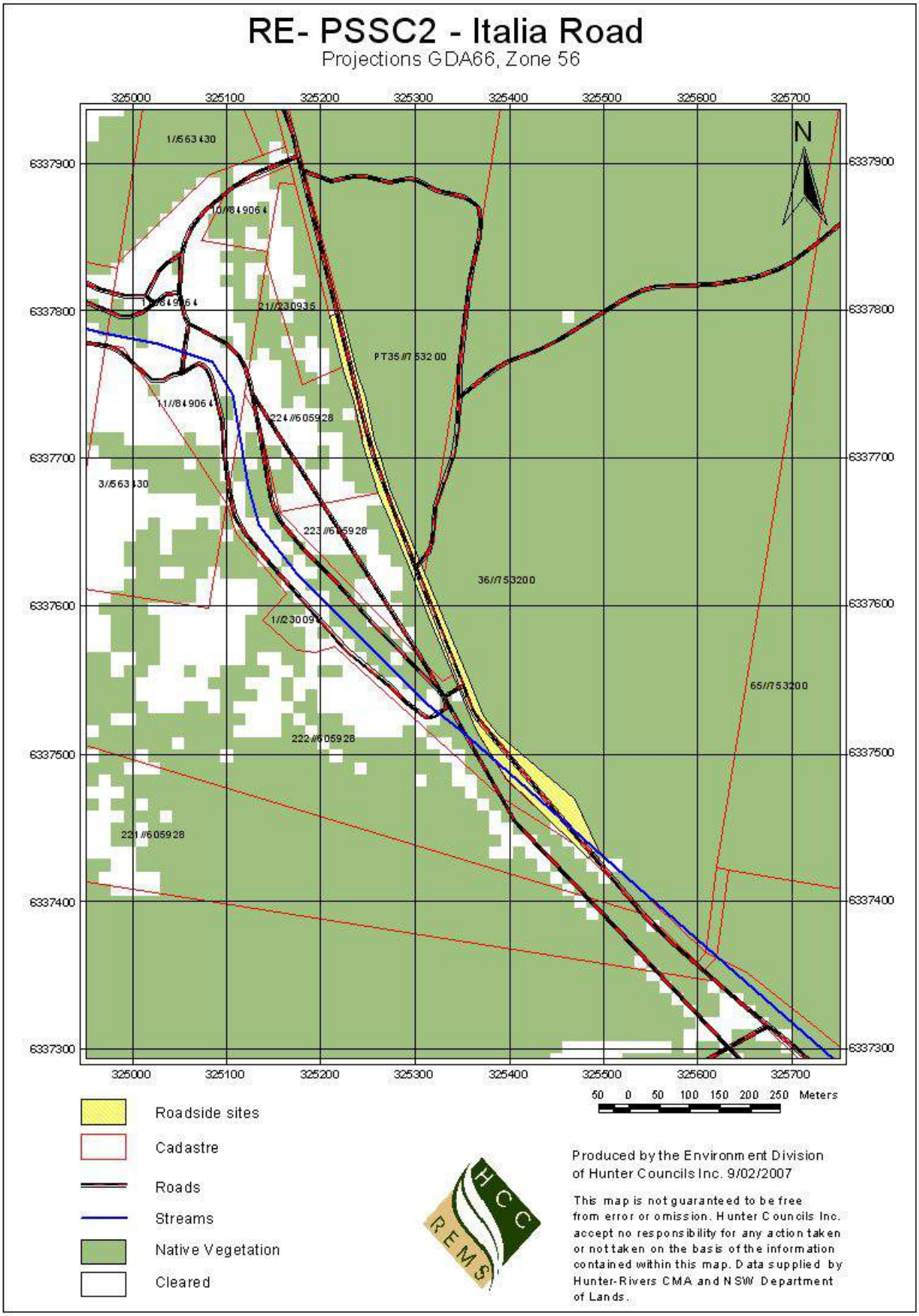
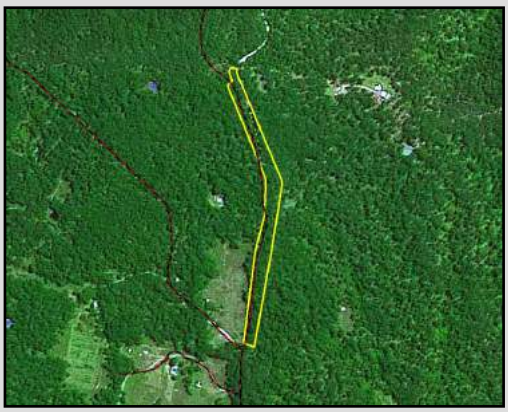


Figure 64 **Map illustrating RE-PSSC2, Italia Road**

SINGLETON – Mt Royal Road

RE-SSC1 (E 338246, N 6430299) roadside environment was adjacent to Mt Royal Road (Fig 67). The site was located 3.4km S of Jump Spur Township and the nearest cross road was Cassells Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	Mod/High	Low



Site description

The site situated on a 5 degree slope, was approximately 775 metres in length and 40 metres in width. The site elevation was 792 metres above sea level.

Vegetation description

RE-SSC1 was a tall open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer co dominated by *Eucalyptus laevopinea and Allocasuarina torulosa,* was approximately 35 metres in height with a PFC of 45%. The middle layer consisting of three shrub species was sparse and reached a height of 5 metres. L1 of the ground layer had a PFC of 40% and was dominated by grass species such as *Imperata cylindrical* and *Entolasia stricta*. The L2 layer of the ground cover had PFC of 10% and consisted of the mix of forb, fern and vine species. A total of 33 plant species were recorded at this site, all of which were native species.

Habitat

The growth stages at this site consisted of 55% mature, 40% regenerating and 5% senescing. RE-SSC1 consisted of a mix of canopy structures. Small and medium size hollows were common and large hollows were present. Beyonettes and bare branches were also present at this site. The ground cover consisted of either vegetation or leaf litter.

Connectivity

The vegetation on roadside environment reserve RE-SSC1 had generally a moderate to high level of connectivity with other patches of vegetation in the surrounding environment. The site had a high degree of connectivity with vegetation located on private property, as well as being connected with Mt Royal National Park (Fig 68).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

This roadside environment was in very good condition with no apparent evidence of clearing, grazing, erosion, feral animals, weeds or dumping. Past logging and fire were the only forms of disturbance noted and they were both recorded as having a low impact on site health.

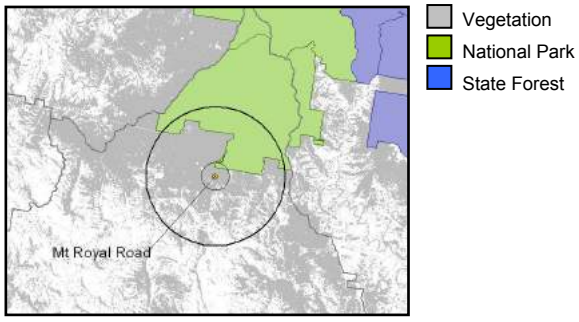


Figure 68 Vegetation connectivity

Figure 69 Site photo

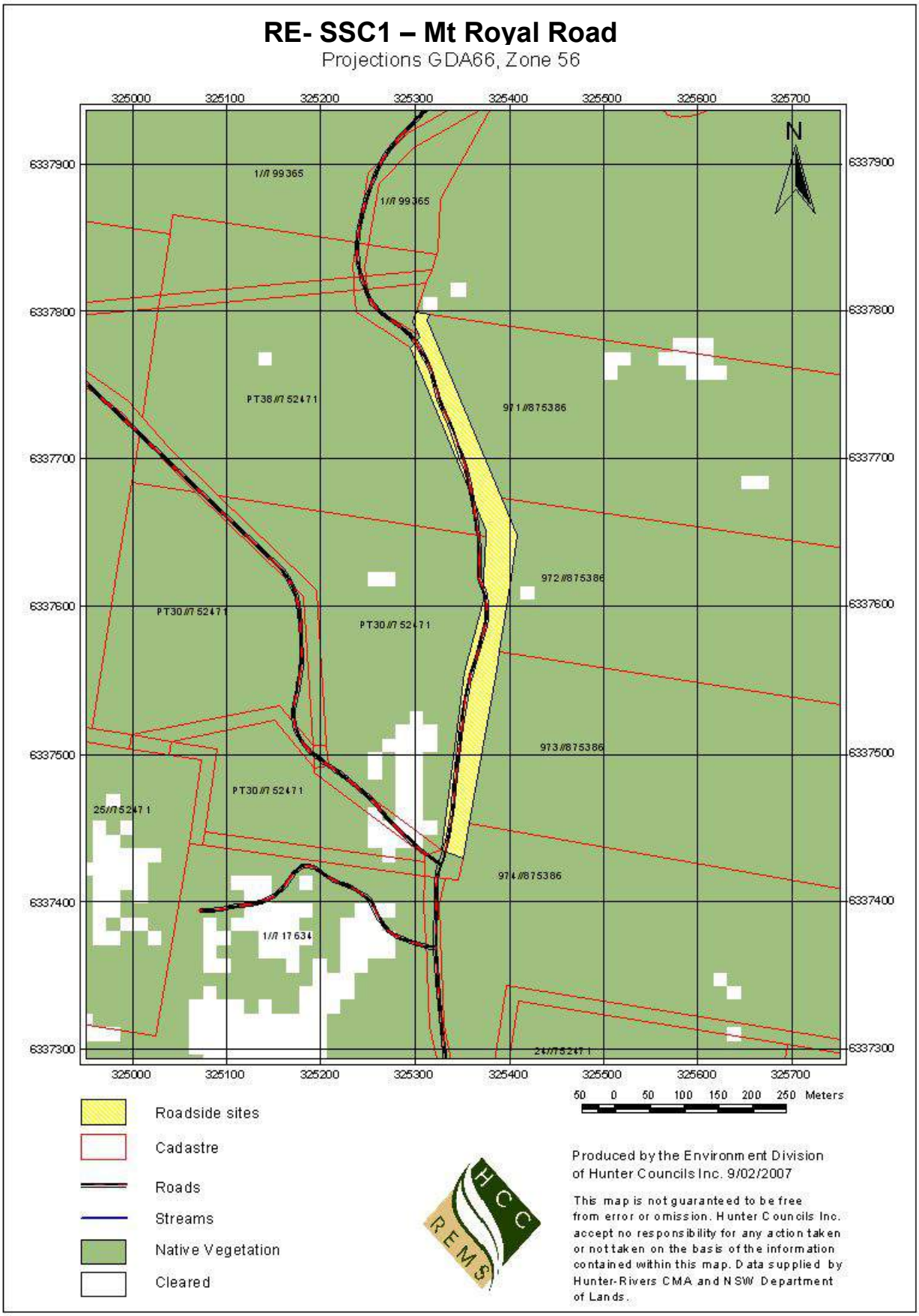


Figure 67 **Map illustrating RE-SSC1, Mt Royal Road**

SINGLETON – Putty Road

RE-SSC2 (E 296758, N 6362782) roadside environment was adjacent to Putty Road (Fig 70). The site was located 2.9km S of Doyle Clearing Township and the nearest cross road was Golden Highway.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Mod/High	Low

Site description

The site situated on a 5 degree slope was approximately 750 metres in length and 65 metres width. The site elevation was 230 metres above sea level.

Vegetation description

RE-SSC2 was a grassy open forest consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer, co dominated by *Angophora bakeri* and *Eucalyptus rossii,* was approximately 25 metres in height and had a PFC of 30%. The middle layers; M1 and M2 had a PFC of 15% each and ranged in height from 1.5 to 8 metres. The M1 layer was dominated by *Casuarina cristata* and the M2 layer contained *Epacris pulchella, Persoonia linearis* and *Bossiaea obcordata*. The ground layers; L1 and L2 had a combined PFC of 20%. The L1 layer contained mainly grass species such as *Themeda australis* and *Poa sieberiana* but also consisted of some sedge species. The L2 layer contained a mix of sedges, shrubs and forbs. A total of 37 plant species were recorded at this site, 1 of which was a weed species.

Habitat

The growth stages at this site consisted of 65% mature, 30% regenerating and 5% senescing. The canopy layer consisted of small and medium size hollows, beyonettes and bare branches. No large hollows were observed within a 50m radius from survey site centre point. The ground cover consisted mainly of leaf litter at 60% and it also contained 5% fallen timber and 5% bare ground.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

Vegetation connectivity at RE-SSC2 was high within a 1km radius and moderate/high within a 5km radius. The vegetation within the reserve was mainly connected to large stretches of vegetation located on private property. In addition, approximately one fifth of the 5km radius band was located within Yengo National Park (Fig 71).

Management Issues

This road reserve environment had a low level of disturbance. Erosion, fire, feral animals and weeds were having a minor impact on the site's health.

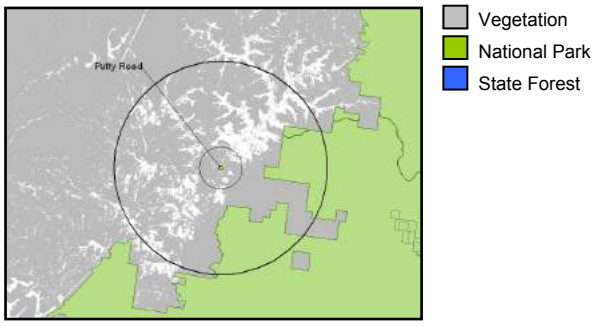


Figure 71 Vegetation connectivity

Figure 72 Site photo

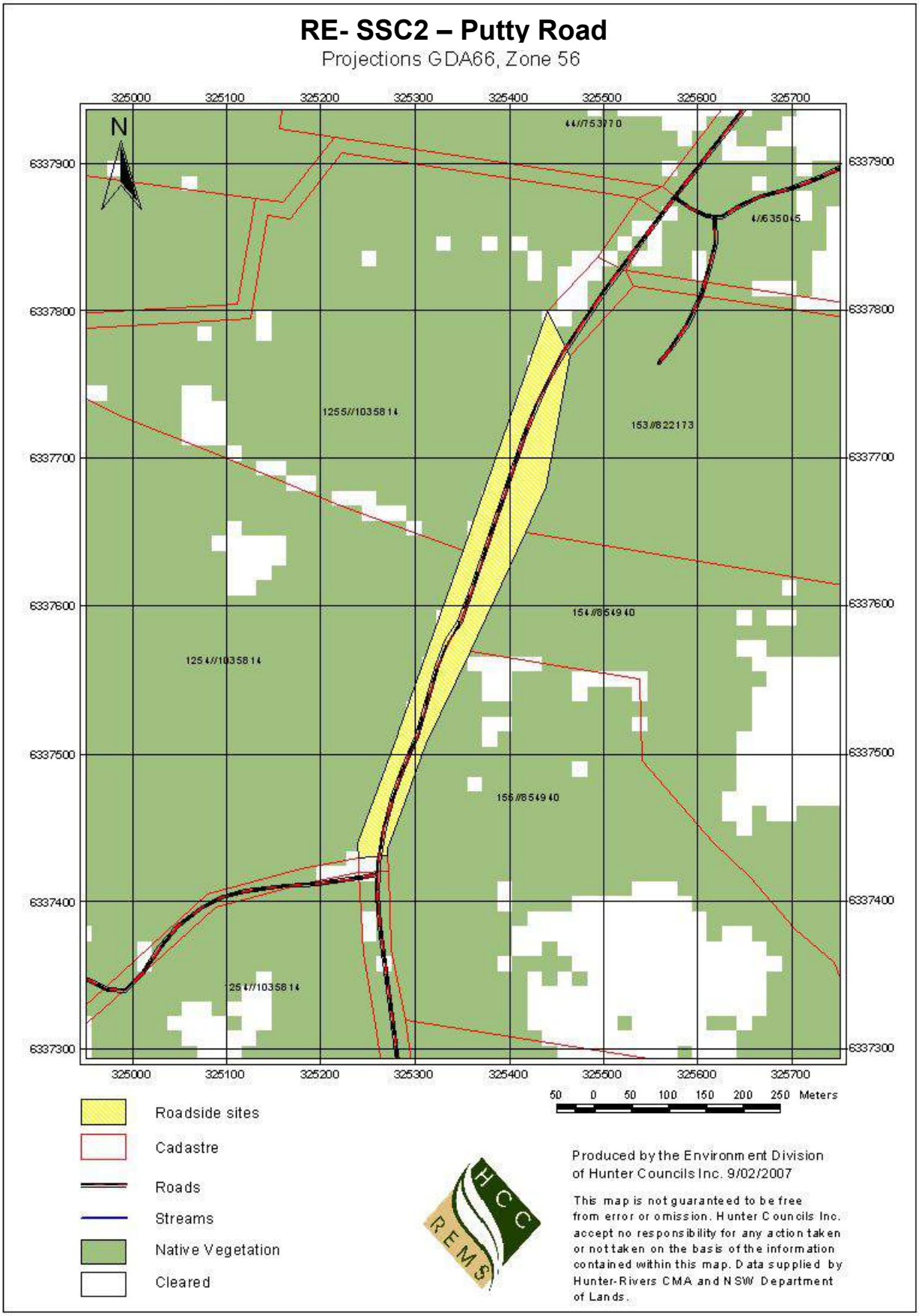
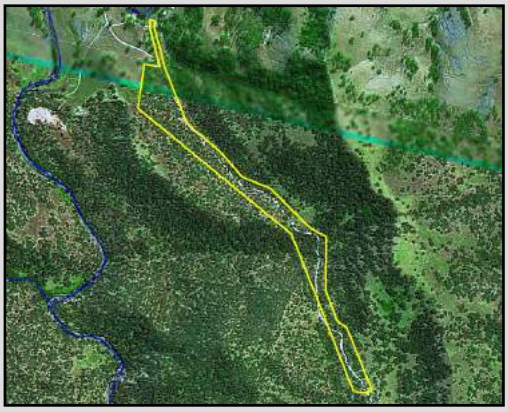


Figure 70 **Map illustrating RE-SSC2, Putty Road**

UPPER HUNTER – Warland's Creek Rd

RE-UH1 (E 300642, N 6484843) roadside environment was adjacent to Warland's Creek Road (Fig 73). The site was located 4.1km N of Blandford Township and the nearest cross road was Timor Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod/High	Mod	Low/Mod



Site description

The site situated on a 15 degree slope, was approximately 2000 metres in length and 80 metres in width. The site elevation was approximately 594 metres above sea level.

Vegetation description

RE-UH1 was a grassy open forest consisting of 4 stratum; canopy layer, a mid layer and 2 ground vegetation layers. The canopy layer co dominated by *Eucalyptus albens* and *Eucalyptus macrorhyncha,* was approximately 30 metres in height and had a PFC of 30%. The middle layer dominated by *Olearia elliptica,* reached a height of 10 metres and had a PFC of 25%. The L1 of the ground layer represented a PFC of 15% and was dominated by the grass species *Aristida vagans.* The L2 of the ground cover had a low PFC of 8%. The L2 layer consisted mainly of forb species but also contained some grass and vine species. A total of 40 plant species were recorded at this site, of which 6 were weed species and 2 were unable to be identified.

Habitat

The majority of trees at 95% were in a mature growth stage and the remaining 5% were either regenerating or senescing. The canopy layer was highly complex and provided a diverse range of niches for fauna to inhabit. Small and medium hollows were abundant and large hollows were present. In addition, many perch and roost sites were evident in the form of beyonettes and bare branches. The ground cover consisted mainly of leaf litter at 30% and it also contained 5% fallen timber, 2% rock and 5% bare ground.

Connectivity

The level of connectivity for RE-UH1 was moderate/high within a 1km radius and low/moderate within a 5km radius. The roadside vegetation at this site was only connected to vegetation on private property within a 5km radius band. The closest National Park was Murrurundi Pass which is located 8.2km W of the site (Fig 74).

Items of significance

There were no cultural features of significance identified at this site.

Management Issues

Disturbance was at a low/moderate level at RE-UH1 roadside environment. Grazing and weed invasion was having a moderate impact on the site. Grazing from livestock reduces tree and shrub recruitment and introduces weed species to the reserve. Weeds, whilst mainly localised to the roadside edge and gully have the potential to spread throughout the reserve. In addition, several noxious weed species were present at this site *Ligustrum lucidum* (Broad leaf privet), *Rubus fruiticosus* (Blackberry) and *Opuntia stricta* (Prickly pear). Other issues having a minor impact on site health were clearing, erosion, feral animals and litter.

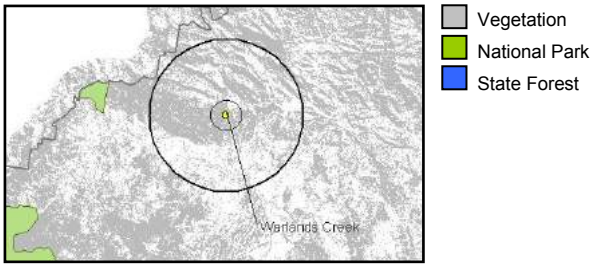


Figure 74 Vegetation connectivity

Figure 75 Site photo

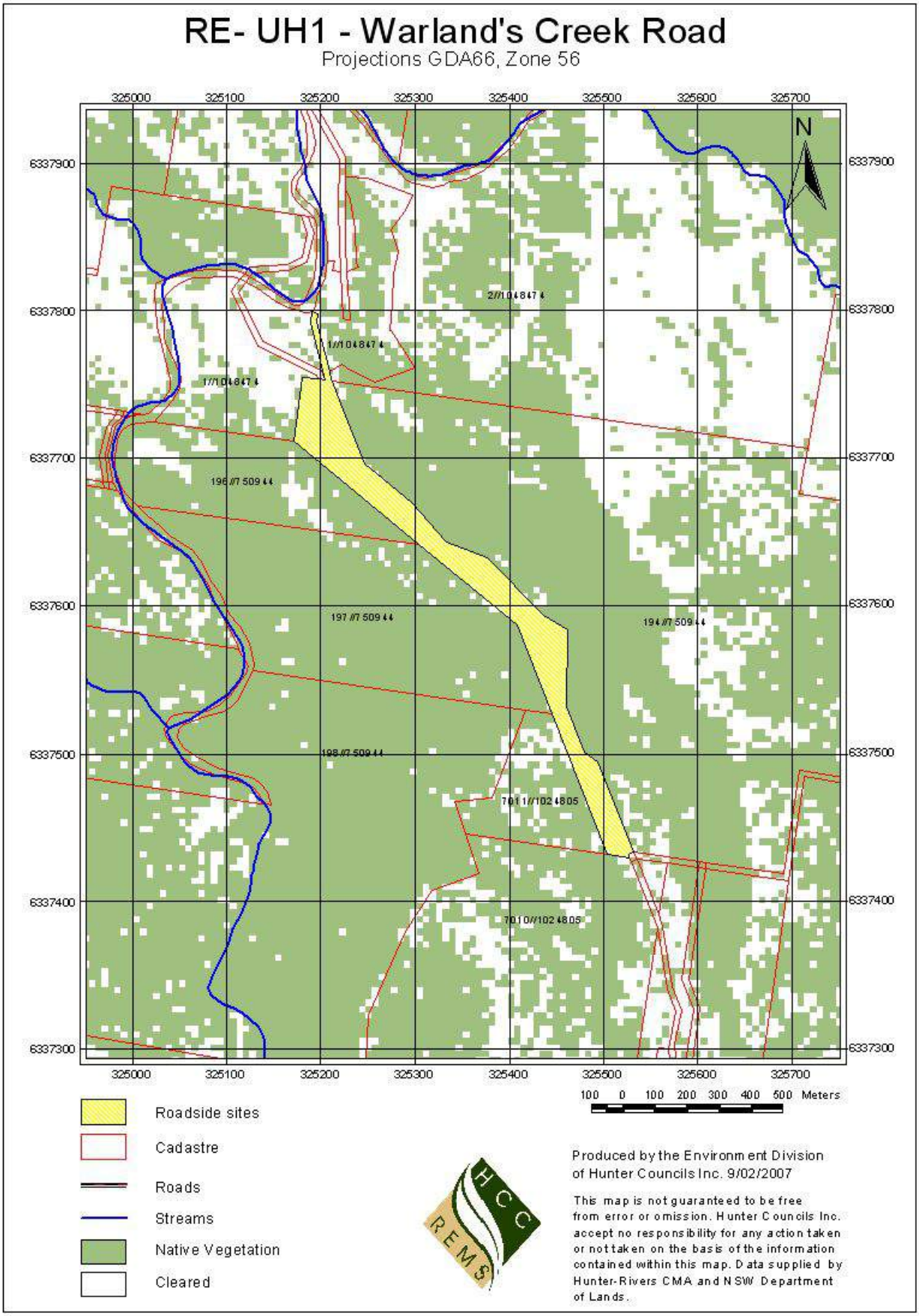
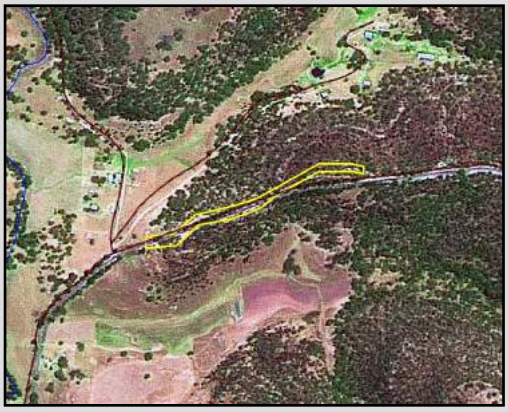


Figure 73 **Map illustrating RE-UH1, Warland's Creek Road**

UPPER HUNTER – Bunnan Road

RE-UH2 (E 284925, N 6454464) roadside environment was adjacent to Bunnan Road (Fig 76). The site was located 1.3km NE of Owens Gap Township and the nearest cross road was Sophia Creek Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Mature	Mod	Low/Mod	Low



Site description

The site, situated on a 15 degree slope was approximately 670 metres in length and 30 metres in width. The site elevation was 423 metres above sea level.

Vegetation description

RE-UH2 was a grassy woodland consisting of 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer, co dominated by *Eucalyptus punctata* and *Callitris endlicheri was* approximately 27 metres in height and had a PFC of 20%. The middle layers; M1 and M2 had a PFC of 10% and 20% respectively and ranged in height from 0.5 to 6 metres. The M1 layer was dominated by *Acacia implexa.* The M2 layer consisted of mix of shrub species, including *Persoonia linearis*, *Podolobium ilicifolium*, *Choretrum candollei* and *Monotoca scoparia*. The ground layers; L1 and L2 had a combined PFC of 25%. The L1 layer was dominated by the grass species *Entolasia stricta*. The L2 layer consisted of a forb species. A total of 23 plant species were recorded at this site, of which 22 were native and 1 was unable to be identified.

Habitat

The growth stages at this site consisted of 80% mature, 15% senescing and 5% regenerating. The canopy layer was highly complex thus providing a diverse range of niches for fauna to inhabit. Small and medium hollows were common and large hollows were present. In addition, bare branches were common and a few beyonettes were observed. The ground cover consisted of 50% rock, 25% bare ground, 20% leaf litter and 5% fallen timber.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

Vegetation connectivity at RE-UH2 was low/moderate within a 1 and 5km radius band. The roadside reserve was surrounded by a mix of cleared land and relatively intact patches of vegetation located on private property. The closest National Park is Towarri which was situated approximately 7.7km NE from survey site (Fig 77).

Management Issues

The road reserve at RE-UH2 was relatively in good condition. Erosion from a track running length ways through the reserve was a having moderate impact on site health. Another issue of minor concern was some limited scattering of general household rubbish.

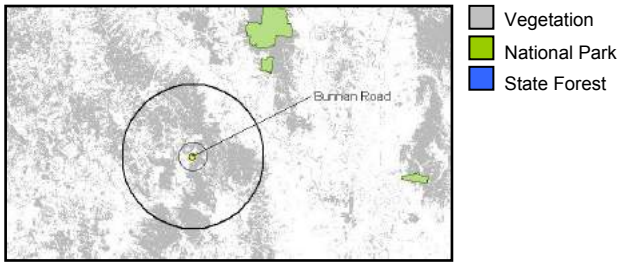


Figure 77 Vegetation connectivity

Figure 78 Site photo

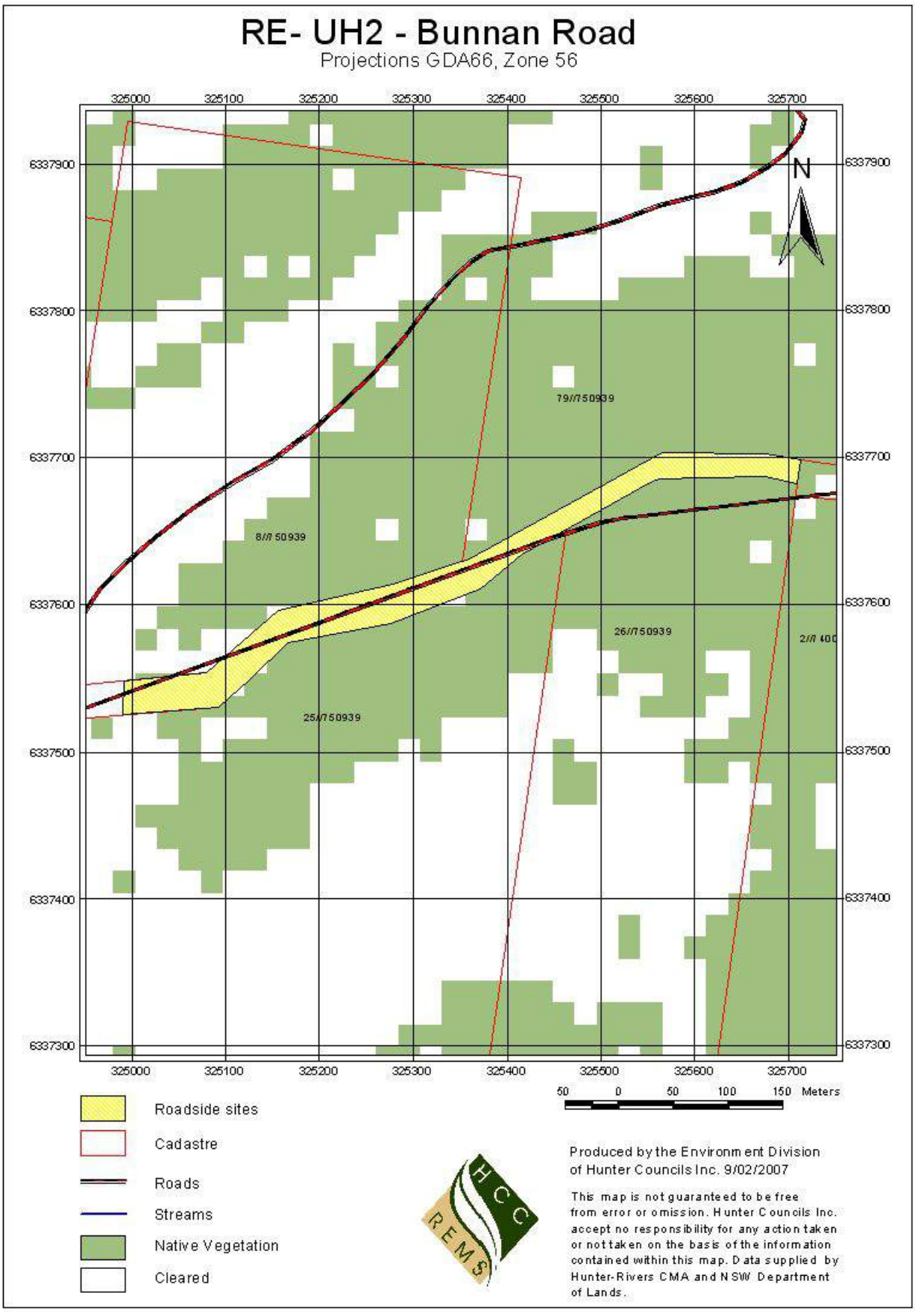


Figure 76 **Map illustrating RE-UH2, Bunnan Road**

WYONG – Wilfred Barret Drive

RE-WSC1 (E 364940, N 6315716) roadside environment was adjacent to the Wilfred Barret Road (Fig 79). The site was located 1.8km SW of Norah Head Township and the nearest cross road was Denison Street.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Mod	High	Low

Site description

The site situated on a flat landscape was approximately 1000 metres in length and 80 metres in width. The site elevation was 27 metres above sea level.

Vegetation description

RE-WSC1 was heath woodland with 5 stratum; canopy layer, 2 mid layers and 2 ground vegetation layers. The canopy layer dominated by *Corymbia gummifera* and *Angophora costata,* reached a height of 26m and had a PFC of 30%. The middle layers; M1 and M2 had a PFC of 10% each and ranged in height from 2 to 8 metres. The dominate species in M1 was *Banksia serrata* and the M2 layer was co-dominated by *Brachyloma daphnoides* and *Persoonia lanceolata.* The ground vegetation layers; L1 and L2 had a very high PFC of 90%. The L1 layer was dominated by *Pteridium esculentum and Macrozamia communis. Tetratheca thymifolia* dominated the L2 layer however it also consisted of several different sedge species such as *Dianella longifolia* and *Lomandra multifloramix*.. A total of 35 species were recorded at this site, of which 1 was a weed and 2 were unable to be identified.

Habitat

The majority of trees at 70% were in a mature growth stage and a small portion of trees were regenerating a 25% and senescing at 5%. Small hollows, bare branches and beyonettes were common in this roadside reserve. A few medium hollows were observed however no large hollows were present. The ground cover consisted of 60% leaf litter and 10% fallen timber.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

The roadside vegetation at RE-WSC1 had a high level of connectivity within a 1km radius. It was directly surrounded by Wyrrabalong National Park (Fig 80).

Management Issues

This roadside environment site was in very good condition. There was minor evidence of a past fire and a couple of weed species were present.

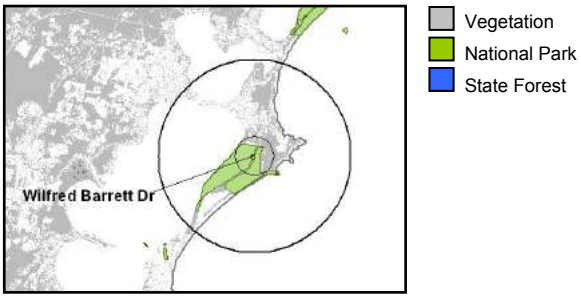


Figure 80 Vegetation connectivity

Figure 81 Site photo

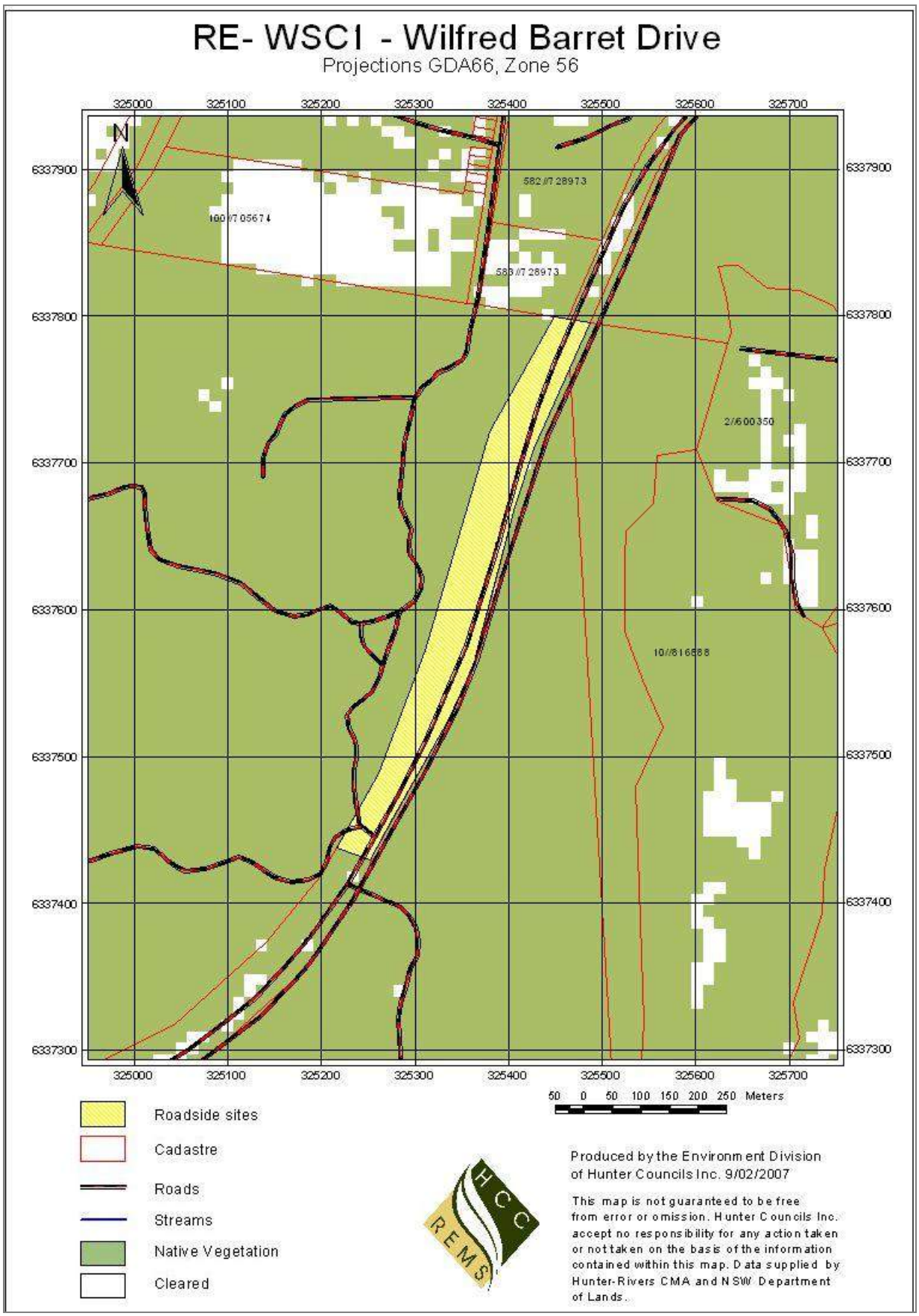


Figure 79 **Map illustrating RE-WSC1, Wilfred Barret Drive**

WYONG – Forest Road

RE-WSC2 (E 338452, N 6319582) roadside environment was adjacent to Forest Road (Fig 82). The site was located 5.1km SSW of Yarramalong Township and the nearest cross road was Bumble Hill Road.

Growth Stage	Canopy Complexity	Connectivity	Disturbance
Multi Age	Low/Mod	Mod/High	Low

Site description

The site situated on flat land was approximately 987 metres in length and 25 metres in width. The site elevation was 321 metres above sea level.

Vegetation description

RE-WSC2 was heath woodland consisting of 4 stratum; canopy layer, 2 mid layer and ground vegetation layer. The canopy layer was approximately 26 metres in height with a PFC of 20%. The dominate species in the canopy layer were *Eucalyptus haemastoma* and *Eucalyptus sieberi.* The middle layers; M1 and M2 had a high PFC and ranged in height from 0.5 to 4 metres. The M1 layer was dominated by *Leptospermum polygalifolium* and *Acacia linifolia* and the M2 layer contained *Isopogon anemonifolius, Lambertia formosa, Conospermum longifolium* and *Xanthorrhoea minor.* The ground cover was approximately 0.5 metres in height and had PFC of 50%. This layer contained a mix of sedge, ferns, forbs and grasses species. A total of 45 plant species were recorded at this site, of which 1 was a weed and 1 was unable to be identified.

Habitat

The forest stand at RE-WSC2 was multi-aged, containing a mix of mature (50%), regenerating (45%) and senescing trees (5%). There was a few small and medium size hollows, as well as a few beyonettes. Bare branches were common. No large hollows were noted at this site. The ground cover consisted of 40% leaf litter, 5% rock, 5% fallen timber and 5% bare ground.

Items of significance

There were no cultural features of significance identified at this site.

Connectivity

The roadside vegetation at RE-WSC2 had a high level of connectivity within a 1km radius and a moderate/high level of connectivity within a 5km radius. The vegetation within the roadside reserve was connected to patches of vegetation on surrounding private property, as well as vegetation situated within Jilliby State Conservation Area (Fig 83).

Management Issues

RE-WSC2 had a low disturbance level. Weed invasion had a moderate impact on this site, and of particular concern was the presence of the noxious weed *Opuntia stricta* (prickly pear). Other issues such as clearing, erosion and dumping were having a minor impact on site health.

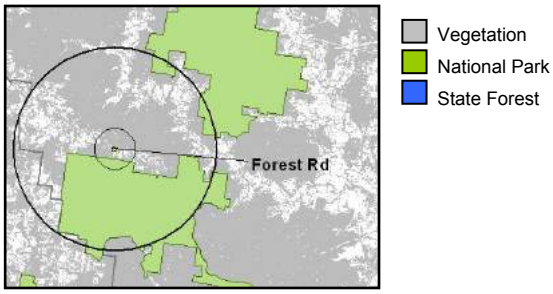


Figure 83 Vegetation connectivity

Figure 84 Site photo

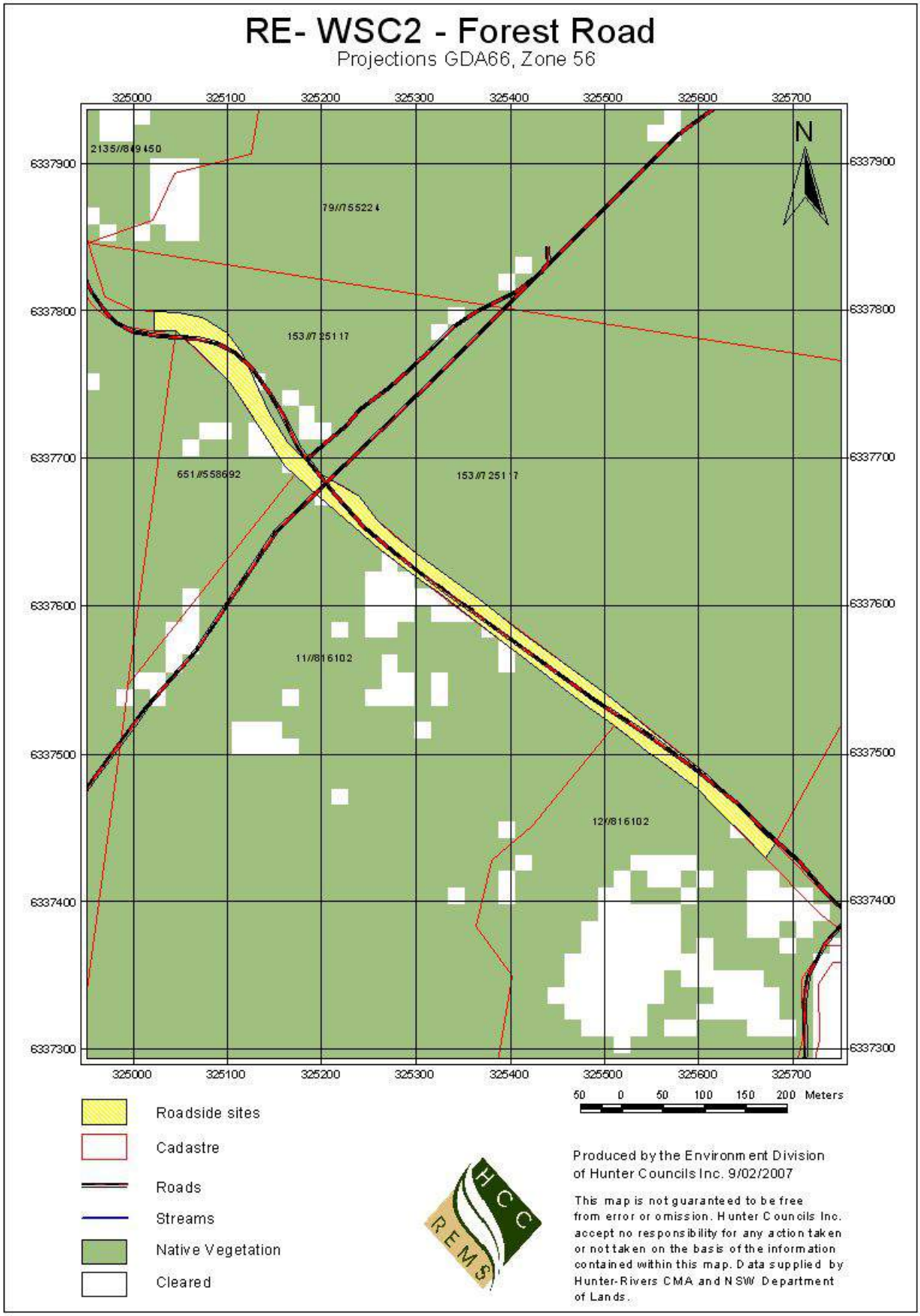


Figure 82 **Map illustrating RE-WSC2, Forest Road**

Appendix 2

Field Proforma

Hunter Central Coast

SYSTEMATIC VEGETATION SURVEYS

Regional Biodiversity Conservation Strategy Stage 3 Surve

Field Survey Proforma
February 2005

Plot Identification

Recorder's Name		**Plot ID**	
Quadrat Dimensions		**Date**	
Quadrat Orientation		**Target Site**	
Site Photograph		**Photo Ref.**	

Location Details (AGD66 AMG)

Map Sheet Name		**AMG Zone**	
AMG (GPS)	East:	North:	+ / - (metres):
AMG (Topo)	East:	North:	+ / - (metres):
Location Descript.			
Tenure / Name			

Site Attributes

Description								
				Slope				
Aspect				**Elevation**				
Land Use				**Drainage**				
Soil Description				**Geology**				
Topoposition	Morphoterrain			Element			Pattern	
Horizon Azimuth	N	NE	E	SE	S	SW	W	NW

Disturbance Indicators Severity: 0 – No evidence 1 – Light 2 – Moderate 3 – Severe 4 - Extreme

Type	Severity	Evidence
Fire		Epicormic ☐ Scar ☐ Coppice ☐ Charcoal ☐ Leaf Scorch ☐ Ht _____(m) Charred ☐ Ht _____(m)
Logging		**Stumps** (None / Few / Many) **Age** (Old / Recent) **Snig Tracks / Log Dumps** (Present / Absent)
Clearing		
Grazing		
Erosion		
Ferals		
Other		
Adjacent Vegetation		**Habitat Linkages** (Good / Poor / None)
Overall Condition		

Vegetation Structure

Structural Formation (eg. Woodland)																
Stratum	Form	Min ht (m)	Max ht (m)	% cover	Sp 1	%	Sp 2	%	Sp 3	%	Sp 4	%	Sp 5	%	Sp 6	%
1/																
2/																
3/																
4/																
5/																
6/																

Stratum Code: **E** (Emergent), **T** (tallest), **M** (middle), **L** (ground veg <1m). M1, M2, L1, L2 etc. if more than 1 layer in these strata

Form: **T** (tree), **M** (mallee tree), **S** (shrub), **Y** (mallee shrub), **Z** (heath shrub), **C** (chenopod shrub), **G** (tussock grass), **H** (hummock grass),
D (sod grass), **V** (sedge), **R** (rush), **E** (fern), **F** (forb), **L** (vine), **A** (cycad), **P** (palm), **X** (xanthorrhoea), **U** (samphire shrub).

Canopy Growth Stage and Structure (upper phytosynthetic envelope) within a **50x50m** quadrat comprising the systematic site

Growth Stage (100%)	Regenerating %	Mature %	Senescent %	# standing dead trees
Tree Hollows	Small (<10cm diam)	Med. (10-20cm diam.)	Large (>20cm diam)	
Perch Sites	Beyonettes	Bare branches	Other (specify)	
Bark Types	Smooth	Stringy	Box	Ironbark
	Tesselated	Papery	Corky	Other:

Abundance Score: None Few (<5) Many (5-10) Abundant (>10)

Non-Vascular Groundcover

%rock	**%bare ground**	**%fungi**	**%lichen**	**%bryophytes** (moss, liverworts, cryptogams)	**% litter**	**% fallen timber** (>25mm diam)

Site Profile / Sketch

Floristics

ID		Date	Data Entered			
No	**Field Name**	**Botanical Name**	**C/A**	**Strata**	**Form**	**Specimen**

Cover/Abundance Scores

1 <5% (rare or few individuals, 3 or less individuals)
2 <5% (uncommon, more than 3 sparsely scattered or localised)
3 <5% (common, consistent throughout plot)
4a <5% (very abundant, many individuals throughout plot)
4b 5-25%
5 25-50%
6 50-75%
7 75-100%

Additional Pages Attached YES / NO

Page ………. of ……… pages

Floristics (….continued)

ID		Date	Data Entered			
No	**Field Name**	**Botanical Name**	**C/A**	**Strata**	**Form**	**Specimen**

Cover/Abundance Scores

1 <5% (rare or few individuals, 3 or less individuals)
2 <5% (uncommon, more than 3 sparsely scattered or localised)
3 <5% (common, consistent throughout plot)
4a <5% (very abundant, many individuals throughout plot)
4b 5-25%
5 25-50%
6 50-75%
7 75-100%

Additional Pages Attached YES / NO

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Appendix 3

Plant Species List for Roadside Environments

Site	Scientific Name	Common Name	Exotic
RE-CCC1	Acacia leucoclada		No
	Acacia linifolia	Flax-leaved Wattle	No
	Acacia myrtifolia	Red-stemmed Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Allocasuarina torulosa	Forest Oak	No
	Angophora bakeri	Narrow-leaved Apple	No
	Anisopogon avenaceus	Oat Speargrass	No
	Austrodanthonia monticola		No
	Austrostipa pubescens		No
	Banksia spinulosa var. collina		No
	Billardiera scandens	Appleberry	No
	Cassinia aureonitens		No
	Cassytha glabella		No
	Caustis flexuosa	Curly Wig	No
	Comesperma ericinum		No
	Conospermum longifolium		No
	Corymbia gummifera	Red Bloodwood	No
	Dianella caerulea		No
	Dianella longifolia		No
	Dillwynia elegans		No
	Dodonaea triquetra		No
	Entolasia stricta	Wiry Panic	No
	Epacris microphylla		No
	Eucalyptus eximia		No
	Eucalyptus piperita	Sydney Peppermint	No
	Eucalyptus punctata	Grey Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos cupressiformis	Native Cherry	No
	Exocarpos strictus	Dwarf Cherry	No
	Gompholobium virgatum	Leafy Wedge Pea	No
	Goodenia heterophylla		No
	Grevillea arenaria		No
	Hakea sericea		No
	Hibbertia vestita		No
	Hovea linearis		No
	Hybanthus monopetalus	Slender Violet-bush	No
	Hymenanthera dentata	Tree Violet	No
	Lepidosperma laterale		No
	Leptospermum trinervium		No
	Leucopogon parviflorus	Coastal Beard-heath	No
	Lindsaea microphylla	Lacy Wedge Fern	No
	Lomandra obliqua		No
	Lomatia silaifolia	Crinkle Bush	No
	Marsdenia suaveolens	Scented Marsdenia	No

Site	Scientific Name	Common Name	Exotic
	Pandorea pandorana	Wonga Wonga Vine	No
	Patersonia sericea		No
	Persoonia levis	Broad-leaved Geebung	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Platylobium formosum subsp. formosum		No
	Platysace lanceolata		No
	Poa labillardieri	Tussock	No
	Podolobium ilicifolium	Prickly Shaggy Pea	No
	Pomaderris intermedia		No
	Rubus fruiticosus	Blackberry complex	Yes
	Smilax australis	Sarsaparilla	No
	Stylidium productum		No
	Syncarpia glomulifera	Turpentine	No
	Telopea speciosissima	Waratah	No
	Themeda australis	Kangaroo Grass	No
	Thysanotus tuberosus	Common Fringe-lily	No
	Xanthorrhoea media		No
	Xylomelum pyriforme		No
	Unknown Species 1		N/A
	Unknown Species 2		N/A
RE-CCC2	Adiantum aethiopicum	Common Maidenhair	No
	Allocasuarina torulosa	Forest Oak	No
	Arthropodium milleflorum	Vanilla Lily	No
	Breynia oblongifolia	Coffee Bush	No
	Bryophyllum pinnatum	Resurrection Plant	Yes
	Bursaria spinosa	Native Blackthorn	No
	Carex appressa		No
	Cassinia quinquefaria		No
	Cayratia clematidea	Slender Grape	No
	Chloris spp.		No
	Clematis glycinoides	Headache Vine	No
	Clerodendrum tomentosum		No
	Commelina cyanea	Native Wandering Jew	No
	Corymbia maculata		No
	Cynodon dactylon	Common Couch	No
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Desmodium gunnii		No
	Dichondra repens	Kidney Weed	No
	Echinopogon ovatus	Forest Hedgehog Grass	No
	Ehrharta erecta	Panic Veldtgrass	Yes
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Eucalyptus eugenioides	Thin-leaved Stringybark	No
	Eustrephus latifolius	Wombat Berry	No
	Glochidion ferdinandii		No
	Glycine clandestina		No

Site	Scientific Name	Common Name	Exotic
	Hardenbergia violacea	False Sarsaparilla	No
	Juncus acuminatus		Yes
	Lantana camara	Lantana	Yes
	Lomandra filiformis	Wattle Matt-rush	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melaleuca styphelioides	Prickly-leaved Tea Tree	No
	Onopordum acanthium		Yes
	Pandorea pandorana	Wonga Wonga Vine	No
	Parsonsia straminea	Common Silkpod	No
	Paspalum dilatatum	Paspalum	Yes
	Plectranthus parviflorus		No
	Poa labillardieri	Tussock	No
	Polyscias sambucifolia	Elderberry Panax	No
	Pratia purpurascens	Whiteroot	No
	Pultenaea cunninghamii		No
	Senecio madagascariensis	Fireweed	Yes
	Sida rhombifolia	Paddy's Lucerne	Yes
	Sonchus oleraceus	Common Sowthistle	Yes
	Syncarpia glomulifera	Turpentine	No
	Themeda australis	Kangaroo Grass	No
	Tradescantia fluminensis	Wandering Jew	Yes
	Verbena brasiliensis		Yes
RE-DSC1	Acacia longissima	Narrow-leaved Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Adiantum hispidulum	Rough Maidenhair	No
	Blechnum cartilagineum	Gristle Fern	No
	Breynia oblongifolia	Coffee Bush	No
	Casuarina cunninghamiana	River Oak	No
	Cissus antarctica	Water Vine	No
	Clerodendrum tomentosum		No
	Conyza bonariensis	Flaxleaf Fleabane	Yes
	Cryptocarya obovata	Pepperberry	No
	Cynodon dactylon	Common Couch	No
	Cyperus tetraphyllus		No
	Doodia caudata var. caudata		No
	Doryphora sassafras	Sassafras	No
	Ficus coronata	Creek Sandpaper Fig	No
	Lantana camara	Lantana	Yes
	Ligustrum sinense	Small-leaved Privet	Yes
	Lindsaea dimorpha		No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Lophostemon confertus	Brush Box	No
	Marsdenia spp.		No
	Morinda jasminoides		No
	Oplismenus aemulus		No

Site	Scientific Name	Common Name	Exotic
	Pandorea pandorana	Wonga Wonga Vine	No
	Pararchidendron pruinosum		No
	Pellaea falcata	Sickle Fern	No
	Persicaria spp.		No
	Pittosporum revolutum	Rough Fruit Pittosporum	No
	Sida rhombifolia	Paddy's Lucerne	Yes
	Smilax australis	Sarsaparilla	No
	Solanum mauritianum	Wild Tobacco Bush	Yes
	Syzygium australe	Brush Cherry	No
	Tradescantia fluminensis	Wandering Jew	Yes
	Waterhousea floribunda	Weeping Lilly Pilly	No
RE-DSC2	Acacia leiocalyx		No
	Acacia leucoclada		No
	Acacia ulicifolia	Prickly Moses	No
	Allocasuarina torulosa	Forest Oak	No
	Angophora costata	Sydney Red/Rusty Gum	No
	Aristida ramosa		No
	Aristida vagans	Threeawn Speargrass	No
	Breynia oblongifolia	Coffee Bush	No
	Bursaria spinosa	Native Blackthorn	No
	Callistemon salignus	Willow Bottlebrush	No
	Cassytha glabella		No
	Cymbopogon refractus	Barbed Wire Grass	No
	Dianella caerulea		No
	Dianella longifolia		No
	Dichondra repens	Kidney Weed	No
	Dillwynia retorta		No
	Entolasia stricta	Wiry Panic	No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus globoidea	White Stringybark	No
	Eucalyptus punctata	Grey Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Gahnia sieberiana		No
	Glochidion ferdinandii		No
	Hardenbergia violacea	False Sarsaparilla	No
	Hibbertia obtusifolia		No
	Imperata cylindrica		No
	Lepidosperma laterale		No
	Leptospermum polygalifolium		No
	Leucopogon virgatus		No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melaleuca linariifolia		No
	Pandorea pandorana	Wonga Wonga Vine	No
	Persoonia linearis	Narrow-leaved Geebung	No

Site	Scientific Name	Common Name	Exotic
	Platylobium formosum		No
	Pteridium esculentum	Bracken	No
	Pultenaea retusa		No
RE-GCC1	Avicennia marina		No
	Bulboschoenus caldwellii		No
	Casuarina glauca	Swamp Oak	No
	Cynodon dactylon	Common Couch	No
	Einadia hastata	Berry Saltbush	No
	Fimbristylis ferruginea		No
	Juncus effusus		Yes
	Sarcocornia quinqueflora		No
	Suaeda australis		No
RE-GCC2	Acacia linifolia	Flax-leaved Wattle	No
	Acacia longifolia		No
	Acacia ulicifolia	Prickly Moses	No
	Actinotus helianthi	Flannel Flower	No
	Allocasuarina torulosa	Forest Oak	No
	Alphitonia excelsa	Red Ash	No
	Angophora costata	Sydney Red/Rusty Gum	No
	Anisopogon avenaceus	Oat Speargrass	No
	Banksia spinulosa var. collina		No
	Billardiera scandens	Appleberry	No
	Bossiaea obcordata		No
	Breynia oblongifolia	Coffee Bush	No
	Cassytha glabella		No
	Caustis flexuosa	Curly Wig	No
	Ceratopetalum gummiferum	Christmas Bush	No
	Correa reflexa	Native Fuschia	No
	Corymbia gummifera	Red Bloodwood	No
	Dianella longifolia		No
	Dillwynia rudis		No
	Doryanthes excelsa	Gymea/Giant Lily	No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus acmenioides		No
	Eucalyptus piperita	Sydney Peppermint	No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos strictus	Dwarf Cherry	No
	Glochidion ferdinandii		No
	Glycine clandestina		No
	Gompholobium virgatum	Leafy Wedge Pea	No
	Gompholobium virgatum	Leafy Wedge Pea	No
	Grevillea buxifolia	Grey Spider Flower	No
	Grevillea sericea subsp. sericea		No
	Hibbertia empetrifolia		No
	Hibbertia scandens	Climbing Guinea Flower	No

Site	Scientific Name	Common Name	Exotic
	Hybanthus monopetalus	Slender Violet-bush	No
	Lantana camara	Lantana	Yes
	Lepidosperma spp.		No
	Leptospermum polygalifolium		No
	Livistona australis	Cabbage Palm	No
	Livistona australis	Cabbage Palm	No
	Lomandra spp.		No
	Notelaea longifolia	Large Mock-olive	No
	Persoonia lanceolata		No
	Persoonia levis	Broad-leaved Geebung	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Phyllanthus hirtellus		No
	Pimelea linifolia subsp. linifolia		No
	Platylobium formosum subsp. formosum		No
	Poa labillardieri	Tussock	No
	Pteridium esculentum	Bracken	No
	Smilax australis	Sarsaparilla	No
	Stephania japonica		No
	Syncarpia glomulifera	Turpentine	No
	Themeda australis	Kangaroo Grass	No
	Xanthorrhoea glauca subsp. glauca		No
	Xanthosia pilosa		No
	Unknown Species 1		N/A
RE-GLC1	Acacia falcata		No
	Acacia longifolia		No
	Acacia myrtifolia	Red-stemmed Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Ageratina adenophora	Crofton Weed	Yes
	Allocasuarina torulosa	Forest Oak	No
	Andropogon virginicus	Whisky Grass	Yes
	Blechnum cartilagineum	Gristle Fern	No
	Breynia oblongifolia	Coffee Bush	No
	Briza maxima	Quaking Grass	Yes
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Dichelachne inaequiglumis		No
	Echinopogon caespitosus		No
	Echinopogon spp.		No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus pilularis	Blackbutt	No
	Eucalyptus propinqua	Small-fruited Grey Gum	No
	Eucalyptus robusta	Swamp Mahogany	No
	Eucalyptus siderophloia	Grey Ironbark	No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos cupressiformis	Native Cherry	No
	Gahnia aspera		No

Site	Scientific Name	Common Name	Exotic
	Geitonoplesium cymosum	Scrambling Lily	No
	Glochidion ferdinandii		No
	Goodenia rotundifolia		No
	Hardenbergia violacea	False Sarsaparilla	No
	Hibbertia scandens	Climbing Guinea Flower	No
	Imperata cylindrica		No
	Kennedia rubicunda	Red Kennedy Pea	No
	Lantana camara	Lantana	Yes
	Lepidosperma spp.		No
	Leucopogon virgatus		No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melaleuca quinquenervia	Paperbark	No
	Pandorea pandorana	Wonga Wonga Vine	No
	Panicum simile	Two-colour Panic	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Pimelea linifolia subsp. linifolia		No
	Polyscias sambucifolia	Elderberry Panax	No
	Pteridium esculentum	Bracken	No
	Pultenaea linophylla		No
	Smilax australis	Sarsaparilla	No
	Themeda australis	Kangaroo Grass	No
	Viola hederacea	Ivy-leaved Violet	No
RE-GLC2	Acacia irrorata	Green Wattle	No
	Acacia longissima	Narrow-leaved Wattle	No
	Allocasuarina torulosa	Forest Oak	No
	Alphitonia excelsa	Red Ash	No
	Blechnum cartilagineum	Gristle Fern	No
	Breynia oblongifolia	Coffee Bush	No
	Caldcluvia paniculosa	Soft Corkwood	No
	Cayratia clematidea	Slender Grape	No
	Cissus antarctica	Water Vine	No
	Citriobatus pauciflorus	Orange Thorn	No
	Clematis fawcettii		No
	Clerodendrum tomentosum		No
	Corymbia intermedia	Pink Bloodwood	No
	Cryptocarya rigida	Forest Maple	No
	Desmodium spp.		No
	Dioscorea transversa	Native Yam	No
	Elattostachys nervosa	Green Tamarind	No
	Eucalyptus acmenioides		No
	Eucalyptus paniculata	Grey Ironbark	No
	Eucalyptus propinqua	Small-fruited Grey Gum	No
	Eupomatia laurina	Bolwarra	No

Site	Scientific Name	Common Name	Exotic
	Eustrephus latifolius	Wombat Berry	No
	Gahnia aspera		No
	Geitonoplesium cymosum	Scrambling Lily	No
	Guioa semiglauca		No
	Gymnostachys anceps	Settler's Flax	No
	Kreysigia multiflora		No
	Lantana camara	Lantana	Yes
	Leucopogon virgatus		No
	Lophostemon confertus	Brush Box	No
	Marsdenia flavescens	Hairy Milk Vine	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Pellaea falcata	Sickle Fern	No
	Phyllanthus gunnii		No
	Pittosporum revolutum	Rough Fruit Pittosporum	No
	Pseuderanthemum variabile	Pastel Flower	No
	Pteridium esculentum	Bracken	No
	Rhodamnia rubescens	Scrub Turpentine	No
	Schizomeria ovata	Crabapple	No
	Smilax glyciphylla	Sweet Sarsparilla	No
	Stephania japonica		No
	Syncarpia glomulifera	Turpentine	No
RE-GSC1	Acacia implexa	Hickory Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Adiantum formosum	Giant Maidenhair	No
	Ageratina adenophora	Crofton Weed	Yes
	Allocasuarina torulosa	Forest Oak	No
	Alphitonia excelsa	Red Ash	No
	Aphanopetalum resinosum	Gum Vine	No
	Asplenium australasicum		No
	Backhousia myrtifolia	Grey Myrtle	No
	Bidens pilosa	Cobbler's Pegs	Yes
	Breynia oblongifolia	Coffee Bush	No
	Calochlaena dubia	Common Ground Fern	No
	Capparis arborea		No
	Casuarina cunninghamiana	River Oak	No
	Cayratia clematidea	Slender Grape	No
	Cissus antarctica	Water Vine	No
	Citriobatus pauciflorus	Orange Thorn	No
	Clematis glycinoides	Headache Vine	No
	Commelina spp.		No
	Dendrobium speciosum	Rock Lily	No
	Dendrocnide excelsa	Giant Stinging Tree	No
	Dianella spp.		No
	Dichondra repens	Kidney Weed	No
	Diploglottis australis	Native Tamarind	No

Site	Scientific Name	Common Name	Exotic
	Doodia aspera	Prickly Rasp Fern	No
	Ehrharta erecta	Panic Veldtgrass	Yes
	Eucalyptus saligna	Sydney Blue Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos cupressiformis	Native Cherry	No
	Geitonoplesium cymosum	Scrambling Lily	No
	Geranium solanderi var. solanderi		No
	Grevillea robusta	Silky Oak	No
	Hibbertia dentata	Twining Guinea Flower	No
	Hibiscus heterophyllus		No
	Hymenanthera dentata	Tree Violet	No
	Hymenosporum flavum	Native Frangipani	No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Lomandra spp.		No
	Oplismenus aemulus		No
	Oxalis spp.		No
	Pandorea pandorana	Wonga Wonga Vine	No
	Parsonsia straminea	Common Silkpod	No
	Pellaea falcata	Sickle Fern	No
	Platycerium bifurcatum	Elkhorn	No
	Plectorrhiza tridentata	Tangle Orchid	No
	Plectranthus parviflorus		No
	Podocarpus elatus	Plum Pine	No
	Pyrrosia rupestris	Rock Felt Fern	No
	Rubus hillii	Molucca Ramble	No
	Rubus parvifolius	Native Raspberry	No
	Smilax glyciphylla	Sweet Sarsparilla	No
	Stephania japonica		No
	Swainsona galegifolia	Smooth Darling Pea	No
	Tradescantia fluminensis	Wandering Jew	Yes
	Trema tomentosa		No
	Tristaniopsis laurina	Kanuka	No
	Viola hederacea	Ivy-leaved Violet	No
	Unknown Species 1		
	Unknown Species 2		
	Unknown Species 3		
	Unknown Species 4		
	Unknown Species 5		
	Unknown Species 6		
RE-GSC2	Adiantum aethiopicum	Common Maidenhair	No
	Allocasuarina torulosa	Forest Oak	No
	Brachychiton populneus	Kurrajong	No
	Brachycome multifida		No
	Breynia oblongifolia	Coffee Bush	No
	Cayratia clematidea	Slender Grape	No

Site	Scientific Name	Common Name	Exotic
	Cissus antarctica	Water Vine	No
	Citriobatus pauciflorus	Orange Thorn	No
	Clematis glycinoides	Headache Vine	No
	Dianella longifolia		No
	Dianella tasmanica		No
	Dichondra repens	Kidney Weed	No
	Eucalyptus acmenioides		No
	Eucalyptus melliodora	Yellow Box	No
	Eucalyptus punctata	Grey Gum	No
	Geitonoplesium cymosum	Scrambling Lily	No
	Glycine clandestina		No
	Glycine clandestina		No
	Hibbertia scandens	Climbing Guinea Flower	No
	Imperata cylindrical	Blady grass	Yes
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Oplismenus aemulus		No
	Pellaea falcata	Sickle Fern	No
	Phyllanthus gunnii		No
	Plectranthus parviflorus		No
	Poa sieberiana		No
	Pratia purpurascens	Whiteroot	No
	Rapanea variabilis	Muttonwood	No
	Rubus parvifolius	Native Raspberry	No
	Smilax australis	Sarsaparilla	No
	Trema tomentosa		No
	Trifolium spp.		Yes
	Viola hederacea	Ivy-leaved Violet	No
	Unknown Species 1		N/A
	Unknown Species 2		N/A
	Unknown Species 3		N/A
	Unknown Species 4		N/A
	Unknown Species 5		N/A
	Unknown Species 6		N/A
	Unknown Species 7		N/A
	Unknown Species 8	Ivy-leaved Violet	N/A
RE-GTCC1	Acacia maidenii	Maiden's Wattle	No
	Adiantum hispidulum	Rough Maidenhair	No
	Allocasuarina torulosa	Forest Oak	No
	Alphitonia excelsa	Red Ash	No
	Alpinia caerulea	Native Ginger	No
	Amyema spp.		No
	Brachychiton acerifolius	Illawarra Flame Tree	No
	Breynia oblongifolia	Coffee Bush	No
	Cissus antarctica	Water Vine	No
	Cissus hypoglauca	Giant Water Vine	No

Site	Scientific Name	Common Name	Exotic
	Commersonia fraseri	Brush Kurrajong	No
	Corymbia intermedia	Pink Bloodwood	No
	Cyperus enervis		No
	Desmodium gunnii		No
	Dianella tasmanica		No
	Diploglottis australis	Native Tamarind	No
	Doodia aspera	Prickly Rasp Fern	No
	Eucalyptus acmenioides		No
	Eucalyptus microcorys	Tallowwood	No
	Eucalyptus propinqua	Small-fruited Grey Gum	No
	Eucalyptus saligna	Sydney Blue Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Gahnia aspera		No
	Geitonoplesium cymosum	Scrambling Lily	No
	Glycine tabacina		No
	Hibbertia scandens	Climbing Guinea Flower	No
	Hibiscus heterophyllus		No
	Hypolepis muelleri	Harsh Ground Fern	No
	Imperata cylindrica		No
	Indigofera australis		No
	Kreysigia multiflora		No
	Lantana camara	Lantana	Yes
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Lophostemon confertus	Brush Box	No
	Maclura cochinchinensis	Cockspur Thorn	No
	Mallotus philippensis	Red Kamala	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melia azedarach var. australasica		No
	Oplismenus imbecillis		No
	Oxalis pes-caprae	Soursob	Yes
	Pandorea pandorana	Wonga Wonga Vine	No
	Phyllanthus gunnii		No
	Pteridium esculentum	Bracken	No
	Rubus hillii	Molucca Ramble	No
	Smilax australis	Sarsaparilla	No
	Stephania japonica		No
	Syncarpia glomulifera	Turpentine	No
	Synoum glandulosum	Scentless Rosewood	No
	Synoum glandulosum	Scentless Rosewood	No
	Trochocarpa laurina	Tree Heath	No
	Unknown Species 1		N/A
RE-GTCC2	Abutilon oxycarpum	Flannel Weed	No
	Acacia irrorata	Green Wattle	No
	Acacia maidenii	Maiden's Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No

Site	Scientific Name	Common Name	Exotic
	Alphitonia excelsa	Red Ash	No
	Arachniodes aristata		No
	Asplenium australasicum		No
	Breynia oblongifolia	Coffee Bush	No
	Cayratia clematidea	Slender Grape	No
	Commelina cyanea	Native Wandering Jew	No
	Cyperus spp.		No
	Delairea odorata	Cape Ivy	Yes
	Dendrobium speciosum	Rock Lily	No
	Desmodium gunnii		No
	Dichondra repens	Kidney Weed	No
	Doodia aspera	Prickly Rasp Fern	No
	Eucalyptus acmenioides		No
	Eucalyptus propinqua	Small-fruited Grey Gum	No
	Eucalyptus spp.		No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos cupressiformis	Native Cherry	No
	Gahnia aspera		No
	Geitonoplesium cymosum	Scrambling Lily	No
	Guioa semiglauca		No
	Lantana camara	Lantana	Yes
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Maclura cochinchinensis	Cockspur Thorn	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melaleuca groveana		No
	Melaleuca styphelioides	Prickly-leaved Tea Tree	No
	Notelaea venosa	Veined Mock-olive	No
	Oplismenus imbecillis		No
	Oxalis pes-caprae	Soursob	Yes
	Pandorea pandorana	Wonga Wonga Vine	No
	Parsonsia straminea	Common Silkpod	No
	Passiflora edulis	Common Passionfruit	Yes
	Pellaea falcata	Sickle Fern	No
	Pellaea paradoxa		No
	Phyllanthus gunnii		No
	Pittosporum revolutum	Rough Fruit Pittosporum	No
	Platycerium bifurcatum	Elkhorn	No
	Plectorrhiza tridentata	Tangle Orchid	No
	Plectranthus parviflorus		No
	Poa labillardieri	Tussock	No
	Pyrrosia rupestris	Rock Felt Fern	No
	Rubus parvifolius	Native Raspberry	No
	Smilax australis	Sarsaparilla	No
	Unknown Species 1		N/A
	Unknown Species 2		N/A

Site	Scientific Name	Common Name	Exotic
RE-LMCC1	Acacia irrorata subsp. irrorata	Green Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Angophora floribunda	Rough-barked Apple	No
	Carex appressa		No
	Clematis glycinoides	Headache Vine	No
	Commelina cyanea	Native Wandering Jew	No
	Dianella revoluta		No
	Dichondra repens	Kidney Weed	No
	Eucalyptus amplifolia	Cabbage Gum	No
	Gahnia aspera		No
	Geitonoplesium cymosum	Scrambling Lily	No
	Glycine clandestina		No
	Glycine clandestina		No
	Hardenbergia violacea	False Sarsaparilla	No
	Imperata cylindrica		No
	Juncus usitatus		No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Melaleuca biconvexa		No
	Melaleuca linariifolia		No
	Oplismenus undulatifolius		No
	Pandorea pandorana	Wonga Wonga Vine	No
	Parsonsia straminea	Common Silkpod	No
	Paspalum notatum	Bahia Grass	Yes
	Pittosporum revolutum	Rough Fruit Pittosporum	No
	Plantago lanceolata	Lamb's Tongues	Yes
	Poa labillardieri	Tussock	No
	Polyscias sambucifolia	Elderberry Panax	No
	Pratia purpurascens	Whiteroot	No
	Rubus fruiticosus	Blackberry complex	Yes
	Sida rhombifolia	Paddy's Lucerne	Yes
	Themeda australis	Kangaroo Grass	No
	Typha orientalis	Broad-leaved Cumbungi	No
	Veronica plebeia	Trailing Speedwell	No
	Viola hederacea	Ivy-leaved Violet	No
	Vittadinia cuneata	Fuzzweed	No
	Unknown Species 1		N/A
RE-LMCC2	Acacia longifolia var. longifolia		No
	Acacia ulicifolia	Prickly Moses	No
	Allocasuarina torulosa	Forest Oak	No
	Angophora costata	Sydney Red/Rusty Gum	No
	Anisopogon avenaceus	Oat Speargrass	No
	Aristida vagans	Threeawn Speargrass	No
	Banksia spinulosa var. collina		No
	Bidens pilosa	Cobbler's Pegs	Yes
	Breynia oblongifolia	Coffee Bush	No

Site	Scientific Name	Common Name	Exotic
	Chloris spp.		No
	Echinopogon caespitosus		No
	Entolasia stricta	Wiry Panic	No
	Epacris microphylla		No
	Eucalyptus piperita	Sydney Peppermint	No
	Foeniculum vulgare	Fennel	Yes
	Gahnia sieberiana		No
	Glochidion ferdinandii		No
	Imperata cylindrica		No
	Leptospermum polygalifolium		No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Lomandra obliqua		No
	Persoonia levis	Broad-leaved Geebung	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Poa labillardieri	Tussock	No
	Polyscias sambucifolia	Elderberry Panax	No
	Pratia purpurascens	Whiteroot	No
	Pteridium esculentum	Bracken	No
	Sida rhombifolia	Paddy's Lucerne	Yes
	Themeda australis	Kangaroo Grass	No
	Viola hederacea	Ivy-leaved Violet	No
RE-MCC1	Acacia linifolia	Flax-leaved Wattle	No
	Aristida ramosa		No
	Austrodanthonia monticola		No
	Bursaria spinosa	Native Blackthorn	No
	Cassinia cunninghamii		No
	Cheilanthes sieberi		No
	Clematis glycinoides	Headache Vine	No
	Corymbia maculata		No
	Cynodon dactylon	Common Couch	No
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Dendrophthoe vitellina		No
	Dianella caerulea		No
	Dianella revoluta		No
	Dichondra repens	Kidney Weed	No
	Entolasia stricta	Wiry Panic	No
	Eremophila debilis	Amulla	No
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Glycine clandestina		No
	Glycine tabacina		No
	Goodenia rotundifolia		No
	Hardenbergia violacea	False Sarsaparilla	No
	Hibbertia obtusifolia		No
	Lantana camara	Lantana	Yes
	Lepidosperma laterale		No

Site	Scientific Name	Common Name	Exotic
	Lomandra multiflora		No
	Lomandra multiflora		No
	Melinus repens	Red Natal Grass	Yes
	Ozothamnus diosmifolius	White Dogwood	No
	Pennisetum clandestinum	Kikuyu Grass	Yes
	Pomax umbellata		No
	Pomax umbellata		No
	Pratia purpurascens	Whiteroot	No
	Pultenaea cunninghamii		No
	Senecio madagascariensis	Fireweed	Yes
	Sida rhombifolia	Paddy's Lucerne	Yes
	Trachymene incisa subsp. incisa		No
	Unknown Species 1		N/A
	Unknown Species 2		N/A
	Unknown Species 3		N/A
RE-MCC2	Acacia falcata		No
	Acacia fimbriata	Fringed Wattle	No
	Acacia linifolia	Flax-leaved Wattle	No
	Allocasuarina torulosa	Forest Oak	No
	Alphitonia excelsa	Red Ash	No
	Austrodanthonia monticola		No
	Austrostipa verticillata		No
	Boronia polygalifolia		No
	Breynia oblongifolia	Coffee Bush	No
	Bursaria spinosa	Native Blackthorn	No
	Cassinia cunninghamii		No
	Cheilanthes sieberi		No
	Chrysocephalum semipapposum	Clustered Everlasting	No
	Corymbia maculata		No
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Dendrophthoe vitellina		No
	Dianella longifolia		No
	Dianella revoluta		No
	Dichondra repens	Kidney Weed	No
	Dillwynia retorta		No
	Echinopogon ovatus	Forest Hedgehog Grass	No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Eucalyptus globoidea	White Stringybark	No
	Eucalyptus punctata	Grey Gum	No
	Glycine clandestina		No
	Goodenia rotundifolia		No
	Hardenbergia violacea	False Sarsaparilla	No
	Lantana camara	Lantana	Yes
	Lepidosperma laterale		No

Site	Scientific Name	Common Name	Exotic
	Lomandra multiflora		No
	Plantago lanceolata	Lamb's Tongues	Yes
	Pratia purpurascens	Whiteroot	No
	Themeda australis	Kangaroo Grass	No
	Unknown Species 1		N/A
RE-MSC1	Acacia falcata		No
	Acacia spp.		No
	Acacia spp.		No
	Allocasuarina torulosa	Forest Oak	No
	Aristida ramosa		No
	Aristida ramosa		No
	Austrostipa verticillata		No
	Bursaria spinosa	Native Blackthorn	No
	Capsella bursa-pastoris	Shepherd's Purse	Yes
	Cassinia quinquefaria		No
	Cayratia clematidea	Slender Grape	No
	Clematis glycinoides	Headache Vine	No
	Dianella caerulea		No
	Dichondra repens	Kidney Weed	No
	Einadia trigonos	Fishweed	No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Eucalyptus melliodora	Yellow Box	No
	Eucalyptus nubila	Blue-leaved Ironbark	No
	Exocarpos strictus	Dwarf Cherry	No
	Gahnia aspera		No
	Glycine clandestina		No
	Hovea lanceolata		No
	Indigofera australis		No
	Lepidosperma laterale		No
	Macrozamia communis		No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Notelaea longifolia	Large Mock-olive	No
	Notelaea microcarpa	Native Olive	No
	Opuntia stricta		Yes
	Oxalis pes-caprae	Soursob	Yes
	Persoonia linearis	Narrow-leaved Geebung	No
	Phyllanthus gunnii		No
	Platysace lanceolata		No
	Sida rhombifolia	Paddy's Lucerne	Yes
	Solanum campanulatum		No
	Trema tomentosa		No
	Wahlenbergia communis	Tufted Bluebell	No
RE-MSC2	Acacia spp. 1		No
	Acacia spp. 2		No

Site	Scientific Name	Common Name	Exotic
	Acacia ulicifolia	Prickly Moses	No
	Allocasuarina gymnanthera		No
	Amyema spp.		No
	Aristida ramosa		No
	Callitris endlicheri	Black Cypress Pine	No
	Canthium odoratum	Shiny-leaved Canthium	No
	Cassinia quinquefaria		No
	Chrysocephalum apiculatum	Common Everlasting, Yellow But	No
	Corymbia maculata		No
	Einadia trigonos	Fishweed	No
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Euphorbia spp.		No
	Gahnia aspera		No
	Grevillea floribunda	Seven Dwarfs Grevillea	No
	Hardenbergia violacea	False Sarsaparilla	No
	Hovea lanceolata		No
	Lepidosperma laterale		No
	Leucopogon parviflorus	Coastal Beard-heath	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Notelaea longifolia	Large Mock-olive	No
	Notelaea microcarpa	Native Olive	No
	Opuntia stricta		Yes
	Persoonia linearis	Narrow-leaved Geebung	No
	Podolobium ilicifolium	Prickly Shaggy Pea	No
	Themeda australis	Kangaroo Grass	No
	Wahlenbergia spp.		No
	Xanthorrhoea johnsonii		No
	Unknown Species 1		N/A
	Unknown Species 2		N/A
	Unknown Species 3		N/A
	Unknown Species 4		N/A
	Unknown Species 5		N/A
RE-NCC1	Adiantum aethiopicum	Common Maidenhair	No
	Allocasuarina torulosa	Forest Oak	No
	Angophora floribunda	Rough-barked Apple	No
	Blechnum cartilagineum	Gristle Fern	No
	Breynia oblongifolia	Coffee Bush	No
	Cassytha glabella		No
	Cissus antarctica	Water Vine	No
	Corymbia maculata		No
	Dianella longifolia		No
	Dioscorea transversa	Native Yam	No
	Diplazium australe		No
	Dodonaea triquetra		No
	Doodia aspera	Prickly Rasp Fern	No

Site	Scientific Name	Common Name	Exotic
	Entolasia stricta	Wiry Panic	No
	Eucalyptus acmenioides		No
	Eucalyptus paniculata	Grey Ironbark	No
	Eucalyptus propinqua	Small-fruited Grey Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Gahnia sieberiana		No
	Geitonoplesium cymosum	Scrambling Lily	No
	Glochidion ferdinandii		No
	Gymnostachys anceps	Settler's Flax	No
	Hibbertia obtusifolia		No
	Lantana camara	Lantana	Yes
	Lepidosperma urophorum		No
	Leucopogon lanceolatus		No
	Ligustrum lucidum	Large-leaved Privet	Yes
	Ligustrum sinense	Small-leaved Privet	Yes
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Notelaea longifolia	Large Mock-olive	No
	Ochna serrulata	Mickey Mouse Plant	Yes
	Oplismenus undulatifolius		No
	Parsonsia straminea	Common Silkpod	No
	Pittosporum undulatum	Sweet Pittosporum	No
	Poa labillardieri	Tussock	No
	Polyscias sambucifolia	Elderberry Panax	No
	Smilax glyciphylla	Sweet Sarsparilla	No
	Stenotaphrum secundatum	Buffalo Grass	Yes
	Stephania japonica		No
	Syncarpia glomulifera	Turpentine	No
	Tristaniopsis laurina	Kanuka	No
	Zieria smithii	Sandfly Zieria	No
	Unknown Species 1		N/A
RE-NCC2	Acacia falcata		No
	Acacia stricta	Straight Wattle	No
	Acacia ulicifolia	Prickly Moses	No
	Bidens pilosa	Cobbler's Pegs	Yes
	Billardiera scandens	Appleberry	No
	Breynia oblongifolia	Coffee Bush	No
	Bursaria spinosa	Native Blackthorn	No
	Cassytha glabella		No
	Cheilanthes sieberi		No
	Corymbia maculata		No
	Cotoneaster glaucophyllus		Yes
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Dianella longifolia		No
	Echinopogon caespitosus		No
	Entolasia stricta	Wiry Panic	No

Site	Scientific Name	Common Name	Exotic
	Entolasia stricta	Wiry Panic	No
	Eucalyptus acmenioides		No
	Eucalyptus crebra	Narrow-leaved Ironbark	No
	Eucalyptus punctata	Grey Gum	No
	Eustrephus latifolius	Wombat Berry	No
	Exocarpos cupressiformis	Native Cherry	No
	Geitonoplesium cymosum	Scrambling Lily	No
	Glochidion ferdinandii		No
	Glycine clandestina		No
	Hardenbergia violacea	False Sarsaparilla	No
	Imperata cylindrica		No
	Lantana camara	Lantana	Yes
	Lomandra filiformis	Wattle Matt-rush	No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Notelaea longifolia	Large Mock-olive	No
	Pandorea pandorana	Wonga Wonga Vine	No
	Panicum capillare var. capillare	Witchgrass	Yes
	Plantago lanceolata	Lamb's Tongues	Yes
	Poa labillardieri	Tussock	No
	Polyscias sambucifolia	Elderberry Panax	No
	Pseuderanthemum variabile	Pastel Flower	No
	Senecio madagascariensis	Fireweed	Yes
	Sida rhombifolia	Paddy's Lucerne	Yes
	Themeda australis	Kangaroo Grass	No
	Verbena bonariensis	Purpletop	Yes
	Unknown Species 1		N/A
	Unknown Species 2		N/A
RE-PSSC1	Acacia longifolia		No
	Acacia spp.		No
	Alocasia brisbanensis	Cunjevoi	No
	Alphitonia excelsa	Red Ash	No
	Blechnum spp.		No
	Breynia oblongifolia	Coffee Bush	No
	Cassinia uncata	Sticky Cassinia	No
	Cassytha pubescens		No
	Casuarina glauca	Swamp Oak	No
	Caustis flexuosa	Curly Wig	No
	Clematis glycinoides	Headache Vine	No
	Commelina cyanea	Native Wandering Jew	No
	Culcita dubia		No
	Dianella revoluta		No
	Doodia aspera	Prickly Rasp Fern	No
	Eucalyptus robusta	Swamp Mahogany	No
	Gahnia spp.		No

Site	Scientific Name	Common Name	Exotic
	Glochidion ferdinandii		No
	Hibbertia scandens	Climbing Guinea Flower	No
	Hibbertia scandens	Climbing Guinea Flower	No
	Kennedia rubicunda	Red Kennedy Pea	No
	Lantana camara	Lantana	Yes
	Livistona australis	Cabbage Palm	No
	Maclura cochinchinensis	Cockspur Thorn	No
	Melaleuca quinquenervia	Paperbark	No
	Omalanthus populifolius	Bleeding Heart, Native Poplar	No
	Oplismenus aemulus		No
	Pandorea pandorana	Wonga Wonga Vine	No
	Parsonsia straminea	Common Silkpod	No
	Pennisetum clandestinum	Kikuyu Grass	Yes
	Pteridium esculentum	Bracken	No
	Stephania japonica		No
	Verbena officinalis	Common Verbena	Yes
	Viola hederacea	Ivy-leaved Violet	No
	Zieria smithii	Sandfly Zieria	No
RE-PSSC2	Acacia falcata		No
	Ajuga australis	Austral Bugle	No
	Billardiera scandens	Appleberry	No
	Boronia polygalifolia		No
	Brachycome multifida		No
	Brachyloma daphnoides		No
	Breynia oblongifolia	Coffee Bush	No
	Burchardia umbellata	Milkmaids	No
	Bursaria spinosa	Native Blackthorn	No
	Cassinia cunninghamii		No
	Cheilanthes sieberi		No
	Chrysocephalum apiculatum	Common Everlasting, Yellow But	No
	Corymbia maculata		No
	Daviesia ulicifolia	Gorse Bitter Pea	No
	Dendrophthoe vitellina		No
	Dianella caerulea		No
	Dianella longifolia		No
	Dillwynia retorta		No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus eugenioides	Thin-leaved Stringybark	No
	Eucalyptus fibrosa	Red Ironbark	No
	Exocarpos cupressiformis	Native Cherry	No
	Geitonoplesium cymosum	Scrambling Lily	No
	Grevillea parviflora subsp. parviflora		No
	Hibbertia pedunculata		No
	Lantana camara	Lantana	Yes
	Lepidosperma spp.		No

Site	Scientific Name	Common Name	Exotic
	Lomandra multiflora		No
	Maytenus silvestris	Narrow-leaved Orangebark	No
	Melaleuca nodosa		No
	Mirbelia rubiifolia		No
	Ozothamnus diosmifolius	White Dogwood	No
	Poa labillardieri	Tussock	No
	Poa sieberiana		No
	Pratia purpurascens	Whiteroot	No
	Pultenaea euchila		No
	Pultenaea villosa		No
	Stylidium graminifolium	Grass Triggerplant	No
	Themeda australis	Kangaroo Grass	No
RE-SSC1	Acacia floribunda	White Sally	No
	Allocasuarina torulosa	Forest Oak	No
	Brachycome microcarpa		No
	Breynia oblongifolia	Coffee Bush	No
	Clematis glycinoides	Headache Vine	No
	Desmodium gunnii		No
	Dianella tasmanica		No
	Dichondra repens	Kidney Weed	No
	Doodia aspera	Prickly Rasp Fern	No
	Echinopogon caespitosus		No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus laevopinea	Silver-top Stringybark	No
	Eucalyptus saligna	Sydney Blue Gum	No
	Euchiton involucratus	Star Cudweed	No
	Eustrephus latifolius	Wombat Berry	No
	Gahnia melanocarpa		No
	Geranium solanderi	Native Geranium	No
	Glycine clandestina		No
	Hardenbergia violacea	False Sarsaparilla	No
	Hibbertia scandens	Climbing Guinea Flower	No
	Imperata cylindrica		No
	Kennedia rubicunda	Red Kennedy Pea	No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Pandorea pandorana	Wonga Wonga Vine	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Pittosporum undulatum	Sweet Pittosporum	No
	Plantago gaudichaudii		No
	Poa labillardieri	Tussock	No
	Pratia purpurascens	Whiteroot	No
	Pteridium esculentum	Bracken	No
	Rubus parvifolius	Native Raspberry	No
	Solanum spp.		No
	Viola hederacea		No

Site	Scientific Name	Common Name	Exotic
RE-SSC2	Acacia spp.		No
	Angophora bakeri	Narrow-leaved Apple	No
	Aristida ramosa		No
	Billardiera scandens	Appleberry	No
	Bossiaea ensata		No
	Bossiaea obcordata		No
	Cassytha glabella		No
	Casuarina cristata	Belah	No
	Dianella revoluta		No
	Echinopogon caespitosus		No
	Entolasia stricta	Wiry Panic	No
	Epacris pulchella		No
	Eucalyptus punctata	Grey Gum	No
	Eucalyptus rossii	Inland Scribbly Gum	No
	Exocarpos aphyllus	Leafless Ballart	No
	Exocarpos cupressiformis	Native Cherry	No
	Gahnia aspera		No
	Glycine clandestina		No
	Hovea linearis		No
	Hypochaeris radicata	Catsear	Yes
	Lepidosperma laterale		No
	Lepidosperma laterale		No
	Lomandra filiformis	Wattle Matt-rush	No
	Lomandra obliqua		No
	Monotoca elliptica		No
	Notelaea venosa	Veined Mock-olive	No
	Ozothamnus diosmifolius	White Dogwood	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Phyllanthus hirtellus		No
	Pimelea linifolia subsp. linifolia		No
	Poa labillardieri	Tussock	No
	Poa sieberiana		No
	Podolobium ilicifolium	Prickly Shaggy Pea	No
	Pomax umbellata		No
	Pratia purpurascens	Whiteroot	No
	Themeda australis	Kangaroo Grass	No
	Xanthosia atkinsoniana		No
RE-UH1	Acacia dawsonii	Poverty Wattle	No
	Acacia implexa	Hickory Wattle	No
	Adiantum aethiopicum	Common Maidenhair	No
	Angophora floribunda	Rough-barked Apple	No
	Aristida ramosa		No
	Aristida vagans	Threeawn Speargrass	No
	Cassinia quinquefaria		No
	Cheilanthes sieberi		No

Site	Scientific Name	Common Name	Exotic
	Clematis glycinoides	Headache Vine	No
	Desmodium brachypodum	Large Tick-trefoil	No
	Desmodium varians	Slender Tick-trefoil	No
	Dichondra repens	Kidney Weed	No
	Echinopogon caespitosus var. cunninghamii		No
	Erodium moschatum	Musky Crowfoot	Yes
	Eucalyptus albens	White Box	No
	Eucalyptus macrorhyncha		No
	Eucalyptus melliodora	Yellow Box	No
	Euchiton involucratus	Star Cudweed	No
	Eustrephus latifolius	Wombat Berry	No
	Geranium solanderi	Native Geranium	No
	Glycine tabacina		No
	Indigofera coronillifolia		No
	Ligustrum lucidum	Large-leaved Privet	Yes
	Lindsaea dimorpha		No
	Lomandra filiformis	Wattle Matt-rush	No
	Notelaea microcarpa var. microcarpa		No
	Olearia elliptica	Sticky Daisy Bush	No
	Onopordum acanthium		Yes
	Opuntia stricta		Yes
	Pandorea pandorana	Wonga Wonga Vine	No
	Pellaea falcata	Sickle Fern	No
	Poa sieberiana		No
	Pteridium esculentum	Bracken	No
	Rosa rubiginosa	Sweet Briar	Yes
	Rubus fruiticosus	Blackberry complex	Yes
	Rubus parvifolius	Native Raspberry	No
	Schinus areira	Pepper Tree	Yes
	Wahlenbergia communis	Tufted Bluebell	No
	Unknown Species 1		N/A
	Unknown Species 2		N/A
RE-UH2	Acacia implexa	Hickory Wattle	No
	Acacia piligera		No
	Allocasuarina torulosa	Forest Oak	No
	Amyema miquelii		No
	Amyema quandang var. quandang		No
	Aristida vagans	Threeawn Speargrass	No
	Austrodanthonia monticola		No
	Callitris endlicheri	Black Cypress Pine	No
	Cassinia quinquefaria		No
	Cheilanthes sieberi		No
	Choretrum candollei	White Sour Bush	No
	Entolasia stricta	Wiry Panic	No
	Eucalyptus crebra	Narrow-leaved Ironbark	No

Site	Scientific Name	Common Name	Exotic
	Eucalyptus punctata	Grey Gum	No
	Exocarpos strictus	Dwarf Cherry	No
	Gahnia aspera		No
	Hardenbergia violacea	False Sarsaparilla	No
	Hovea lanceolata		No
	Lepidosperma laterale		No
	Leucopogon parviflorus	Coastal Beard-heath	No
	Persoonia linearis	Narrow-leaved Geebung	No
	Podolobium ilicifolium	Prickly Shaggy Pea	No
	Unknown Species 1		N/A
RE-WSC1	Acacia sophorae	Coastal Wattle	No
	Acacia suaveolens	Sweet Wattle	No
	Acacia ulicifolia	Prickly Moses	No
	Actinotus helianthi	Flannel Flower	No
	Angophora costata	Sydney Red/Rusty Gum	No
	Banksia serrata		No
	Billardiera scandens	Appleberry	No
	Bossiaea ensata		No
	Brachyloma daphnoides		No
	Breynia oblongifolia	Coffee Bush	No
	Cassytha pubescens		No
	Chrysanthemoides monilifera subsp. rotundata	Bitou Bush	Yes
	Correa reflexa var. speciosa		No
	Corymbia gummifera	Red Bloodwood	No
	Dianella longifolia		No
	Dillwynia retorta		No
	Glycine clandestina		No
	Gompholobium huegelii	Pale Wedge Pea	No
	Goodenia heterophylla		No
	Lepidosperma laterale		No
	Leucopogon parviflorus	Coastal Beard-heath	No
	Lomandra longifolia	Spiny-headed Mat-rush	No
	Lomandra multiflora		No
	Macrozamia communis		No
	Pellaea paradoxa		No
	Persoonia lanceolata		No
	Persoonia levis	Broad-leaved Geebung	No
	Platysace lanceolata		No
	Pteridium esculentum	Bracken	No
	Ricinocarpos pinifolius	Wedding Bush	No
	Stephania japonica		No
	Tetratheca thymifolia	Black-eyed Susan	No
	Xanthorrhoea latifolia subsp. latifolia		No
	Unknown Species 1		N/A
	Unknown Species 2		N/A

Site	Scientific Name	Common Name	Exotic
RE-WSC2	Acacia linifolia	Flax-leaved Wattle	No
	Acacia myrtifolia	Red-stemmed Wattle	No
	Acacia oxycedrus	Spike Wattle	No
	Acacia suaveolens	Sweet Wattle	No
	Actinotus minor	Lesser Flannel Flower	No
	Adiantum aethiopicum	Common Maidenhair	No
	Anisopogon avenaceus	Oat Speargrass	No
	Aristida vagans	Threeawn Speargrass	No
	Banksia serrata		No
	Billardiera scandens	Appleberry	No
	Bossiaea obcordata		No
	Comesperma ericinum		No
	Conospermum longifolium		No
	Cryptostylis erecta	Tartan Tongue Orchid	No
	Daviesia alata		No
	Entolasia stricta	Wiry Panic	No
	Epacris microphylla		No
	Eucalyptus eugenioides	Thin-leaved Stringybark	No
	Eucalyptus haemastoma	Broad-leaved Scribbly Gum	No
	Eucalyptus sieberi	Silvertop Ash	No
	Grevillea buxifolia subsp. ecorniculata		No
	Haemodorum planifolium		No
	Hakea laevipes subsp. laevipes		No
	Hakea sericea		No
	Isopogon anemonifolius		No
	Lambertia formosa	Mountain Devil	No
	Lepidosperma laterale		No
	Leptospermum polygalifolium		No
	Lomandra multiflora		No
	Lomandra obliqua		No
	Lomatia silaifolia	Crinkle Bush	No
	Opuntia stricta		Yes
	Patersonia longifolia		No
	Persoonia isophylla		No
	Persoonia levis	Broad-leaved Geebung	No
	Petrophile pulchella		No
	Pimelea linifolia		No
	Pteridium esculentum	Bracken	No
	Pultenaea subspicata		No
	Styphelia laeta subsp. latifolia		No
	Telopea speciosissima	Waratah	No
	Xanthorrhoea minor		No
	Xanthosia pilosa		No
	Xylomelum pyriforme		No
	Unknown Species 1		N/A

Appendix 4

Structural complexity index

Structural Complexity Index

The structural complexity index is considered to represent the complexity in terms of height between each strata (Fig 1). The greater the distance between each strata, the higher the structural complexity index for any given site.

a = height of tallest strata
b = height of middle layer 1
c = height of middle layer 2
d = height of ground layer 1
p = the number of strata at each site (excluding ground cover)

$$a - b = x$$
$$b - c = y$$
$$c - d = z$$
$$(x + y + z) * p$$

Using the above equation sites with only an understorey were not identified as being different from sites with only a ground cover. Sites with an understorey only were assigned a structural complexity of 1.

Figure 1: Strata used to derive structural complexity

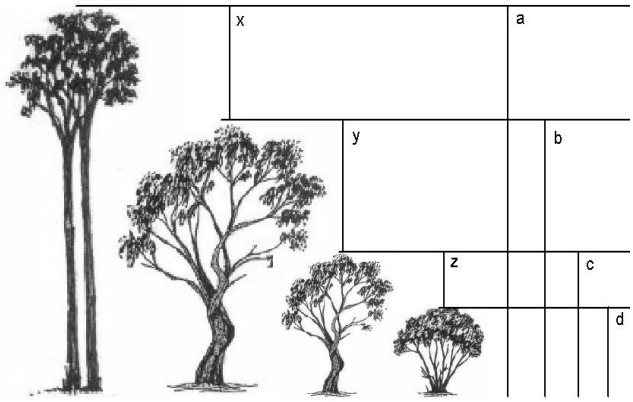

Table 1: Structural complexity index for each site surveyed

PlotID	Stratum	Height	x	y	z	p	structural complexity index
RE-CCC1	T	36	31	3	1	4	140
RE-CCC2	T	35	31	4	-1.5	3	100.5
RE-DSC1	T	30	25	5	-1.5	3	85.5
RE-DSC2	T	35	29	4	1.7	4	138.8
RE-GCC1	T	15	10	5	-1.5	3	40.5
RE-GCC2	T	35	30	3	1	4	136
RE-GLC1	T	30	20	10	-2	3	84
RE-GLC2	T	40	30	7	2.5	4	158
RE-GSC1	T	45	15	27	2	4	176
RE-GSC2	T	27.5	25	2.5	-1	3	79.5
RE-GTCC1	T	40	25	12	2	4	156
RE-GTCC2	T	40	30	7	2.5	4	158
RE-LMCC1	T	20	10	10	-1.5	3	55.5
RE-LMCC2	T	25	15	8	1	4	96
RE-MCC1	T	25	22.5	2.5	-1	3	72
RE-MCC2	T	22	17	2.5	1.5	4	84
RE-MSC1	T	27	22	3	1.5	4	106
RE-MSC2	T	25	20	3	1.5	4	98
RE-NCC1	T	40	30	10	-1	3	117
RE-NCC2	T	35	29	4	1.5	4	138
RE-PSSC1	T	20	10	7	1	4	72

RE-PSSC2	T	15	12	3	-1	3	42
RE-SCC1	T	35	30	5	-1.5	3	100.5
RE-SCC2	T	25	17	5	1.5	4	94
RE-UH1	T	27	24	3	-0.5	3	79.5
RE-UH2	T	27	21	3	2.5	4	106
RE-WSC1	T	26	18	2	4.5	4	98
RE-WSC2	T	26	22	3.5	0	4	102

Appendix 5

Non-living ground cover data

A summary of the non-living ground cover data.

Site Name	%Rock	%Bare	%Fungi	%Lichen	%Bryophytes	%Litter	%FallenTimber
RE-CCC1	10	5	0	0	0	25	5
RE-CCC2	0	5	0	0	0	15	0
RE-DSC1	0	20	0	0	10	30	5
RE-DSC2	0	5	0	0	0	60	0
RE-GCC1	0	5	0	0	0	5	0
RE-GCC2	5	0	0	0	0	40	5
RE-GLC1	0	5	0	0	5	45	5
RE-GLC2	0	0	0	0	0	70	5
RE-GSC1	0	5	5	0	0	40	5
RE-GSC2	7	5	0	0	0	10	5
RE-GTCC1	0	0	0	0	0	50	5
RE-GTCC2	0	0	0	0	0	70	5
RE-LMCC1	0	5	0	0	0	30	0
RE-LMCC2	0	5	0	0	0	40	0
RE-MCC1	5	10	5	0	0	50	0
RE-MCC2	5	5	0	0	0	40	5
RE-MSC1	20	20	0	0	0	40	5
RE-MSC2	5	25	0	0	0	30	10
RE-NCC1	0	0	0	0	0	60	5
RE-NCC2	0	0	0	0	0	25	0
RE-PSSC1	0	0	5	0	5	50	0
RE-PSSC2	5	7	0	0	4	15	5
RE-SSC1	0	0	0	0	0	50	0
RE-SSC2	0	5	0	0	0	60	5
RE-UH1	2	5	0	0	0	30	5
RE-UH2	50	25	0	0	0	20	5
RE-WSC1	0	0	0	0	0	60	10
RE-WSC2	5	5	0	0	0	40	5

Appendix 6

Growth stage rule set

The rule set that was applied to the data to determine the growth stage for a stand of trees.

Regeneration (%)	Mature (%)	Senescence (%)	Growth Stage Score	Description
>=95			1	Re-growth
>=80			2	Young
	>=80		3	Mature
<80	<80	<80	4	Multi Age
		>=80	5	Over Mature
		>=95	6	Dying

Appendix 7

Growth stage data

A summary of the growth stage data.

PlotID	Regen%	Mature%	Senescent%	Growth Stage Score	Description
RE-CCC1	20	70	10	4	Multi Age
RE-CCC2	5	95	0	3	Mature
RE-DSC1	20	30	50	4	Multi Age
RE-DSC2	40	60	0	4	Multi Age
RE-GCC1	70	30	0	4	Multi Age
RE-GCC2	20	70	10	4	Multi Age
RE-GLC1	10	85	5	3	Mature
RE-GLC2	60	40	0	4	Multi Age
RE-GSC1	30	60	10	4	Multi Age
RE-GSC2	15	75	10	4	Multi Age
RE-GTCC1	30	70	0	4	Multi Age
RE-GTCC2	30	65	5	4	Multi Age
RE-LMCC1	50	40	10	4	Multi Age
RE-LMCC2	45	50	5	4	Multi Age
RE-MCC1	5	90	0	3	Mature
RE-MCC2	20	80	0	3	Mature
RE-MSC1	10	85	5	3	Mature
RE-MSC2	10	85	5	3	Mature
RE-NCC1	50	50	0	4	Multi Age
RE-NCC2	5	90	0	3	Mature
RE-PSSC1	15	80	5	3	Mature
RE-PSSC2					
RE-SCC1	40	55	5	4	Multi Age
RE-SCC2	30	65	5	4	Multi Age
RE-UH1	3	95	2	3	Mature
RE-UH2	5	80	15	3	Mature
RE-WSC1	25	70	5	4	Multi Age
RE-WSC2	45	50	5	4	Multi Age