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## REHABILITATION MANAGEMENT PLAN - GAINSBOROUGH GREENS NORTH WEST CONSERVATION PARK

Lot 1 on RP48903

104 Swan Road,  
Pimpama, Queensland

June 2016

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**CERTIFICATE OF APPROVAL FOR ISSUE OF DOCUMENTS**

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<b>Client</b>	Mirvac Pacific Pty Ltd
<b>Date of Issue</b>	June 2016

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## 1.0 INTRODUCTION

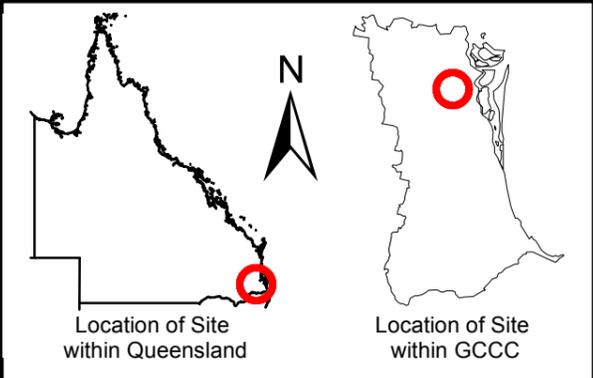
Habitat Environment Management Trading Pty Ltd ('Habitat') was engaged by Mirvac Pacific Pty Ltd ('the Client') to prepare a Rehabilitation Management Plan (RMP) for Lot 1 on RP48903, Gainsborough Greens, North West Conservation Park; Yawalpah Road, Pimpama, Queensland (hereafter referred to as 'the site'). The intent of this plan is to create a significant habitat for Koalas and a broad range of ground dwelling and arboreal mammals, reptiles, birds and amphibians. Species selected will provide a very large feed and refuge resource for the aforementioned. Notably, the creation of this conservation reserve will significantly improve values for Koalas. Habitat has been commissioned to provide the necessary supporting information to demonstrate the appropriate best practice management for rehabilitation and relevant prescriptive measures for the site.

The focus of this report is the rehabilitation of the Gainsborough Greens North West Conservation Park. This plan will provide management guidelines for monitoring of these works during the 5 year Establishment period. As per agreement between Mirvac Pacific Pty Ltd and GCCC Natural Areas Management Unit, the site is to remain in the ownership of Mirvac Pacific Pty Ltd throughout the entire Establishment Period. As such, it's agreed that no Bond of any description will be applied. At the conclusion of the Establishment Period (5 years) and upon successful inspection by GCCC ownership of the site will be transferred to GCCC on behalf of the Crown. Wherever possible, species composition is to reflect Pre-Clearing Regional Ecosystems for the site.

### 1.1 Location and Site Description

Gainsborough Greens is located approximately 2 km east of the Pacific Highway on Yawalpah Road, Pimpama, in the northern Gold Coast region. The North West Conservation Park is located within Lot 1 on RP48903 as illustrated within **Figure 1**. Lot 1 is accessed by Swan Road to the south. It is bounded by the Pimpama River to the north and west and by rural properties of the Gainsborough Greens development to the east and south.

The topography of the site can be described as undulating hills with 5-10% slope and a large, flat area of grazing paddock. Remnant vegetation communities are generally absent within the lot with the exception of a riparian strip adjacent to the Pimpama River and a number of small patches of vegetation. Vegetation communities have structural integrity and a species diversity of predominantly low to moderate conservation values.



- Legend**
- Gold Coast City North Cadastre (2006)
  - Gainsborough Greens
  - Lot 1 on RP48903
  - Development Footprint
  - Open Space

Figure 1:  
Location of Gainsborough Greens

Client:  
Mirvac Pty Ltd

Address:  
Gainsborough Greens Golf Course  
Yawalpah Road,  
PIMPAMA QLD

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## 2.0 ECOLOGICAL VALUES

### 2.1 Vegetation Communities

The Gainsborough Greens development was described as supporting eight vegetation communities within the Integrated Ecological Management Plan prepared by Habitat in March 2007. Two of these vegetation communities are associated with the North West Conservation Area.

Site inspection in October 2011 has found that these communities are still considered to be accurate. With reference to **Appendix C**, two Regional Ecosystems are mapped within this area including RE12.3.5 and RE12.3.8:

#### RE 12.3.5 - *Melaleuca quinquenervia* Open Forest on Coastal Alluvium

*Melaleuca quinquenervia* open-forest to woodland. Understorey depends upon duration of waterlogging; sedges and ferns, especially *Blechnum indicum*, in wetter microhabitats and grasses and shrubs in drier microhabitats. Ground layer species include the grasses *Leersia hexandra* and *Imperata cylindrica*, the sedges/rushes, *Baumea rubiginosa*, *Gahnia sieberiana*, *Lepironia articulata*, *Schoenus brevifolius* and *Schoenus scabripes* and the fern *Lygodium microphyllum*. Other tree species that may be present as scattered individuals or clumps include *Lophostemon suaveolens*, *Eucalyptus robusta*, *E. tereticornis*, *E. bancroftii*, *E. latisinensis*, *Corymbia intermedia*, *Melaleuca salicina*, *Livistona australis*, *Casuarina glauca*, *Endiandra sieberi*. *Melastoma malabathricum* subsp. *malabathricum*, *Glochidion sumatranum* and *Melicope elleryana* are often in understorey. Occurs on Quaternary alluvial plains in coastal areas.

#### RE 12.3.8 - Swamps with *Cyperus* spp., *Schoenoplectus* spp. and *Eleocharis* spp.

Characteristic species include *Cyperus* spp., *Schoenoplectus* spp., *Philydrum lanuginosum*, *Eleocharis* spp., *Leersia hexandra*, *Triglochin procerum*, *Nymphaea* spp., *Nymphoides indica*, *Persicaria* spp., *Phragmites karka*, *Typha* spp. and a wide range of sedges, grasses or forbs. Occurs in freshwater swamps associated with floodplains.

For the purpose of the rehabilitation of vegetation within the site, a breakdown of Rehabilitation Management Areas (RMAs) has been undertaken. This breakdown was based upon similar characteristics present within the existing and proposed state of the site. This breakdown is detailed further in **Section 3.0** of this report.

## 2.2 Fauna Habitat

The Gainsborough Greens eucalypt forest complex provides habitat for a number of native fauna species. Primarily the presence of dense understorey vegetation would increase activity of small mammals and reptiles including Common Striped Skink (*Ctenotustaeniolatus*) and Nobbi Lizard (*Amphibolurusnobby*), which are common within eucalypt forest. In addition to small mammals and reptiles, larger mammals such as Koala (*Phascolarctoscinereus*) and macropod species may utilise these areas.

Numerous ecological assessments have been conducted by Habitat, Chenoweth & Associates, Belleng and many others. These reports have identified observations of a variety of bird species including Noisy Friar Bird (*Philemon citreoreularis*), Red-browed Finch (*Neochmia temporalis*), Yellow-tailed Black-cockatoo (*Calyptorhynchusfunereus*), Whistling Kite (*Haliastursphenurus*) and many more. The flowering shrub layer provides foraging resources for insectivorous and nectivorous species, whilst the high density of small ground dwelling mammals and reptiles provides a food source for predatory birds. Therefore, it is likely that many other bird species occur intermittently within this habitat to forage.

Essential Habitat mapping existing over part of the site for the vulnerable Wallum Froglet (*Crinia tinnula*). This mapping correlates with the Regional Ecosystem 12.3.5 described as *Melaleuca quinquenervia* open forest on coastal alluvium. The Wallum Froglet only inhabits lowland, coastal areas of south east Queensland and northern New South Wales, including the sand islands off the Queensland coast (Fraser, Bribie, Moreton and North Stradbroke Island). Its critical habitat resources can be described as acidic, freshwater swamps which provide important breeding ground sites. Records of the species are most common within Acid paperbark swamps of the wallum country. An independent study was conducted by BAMB (April 2007) which assessed the Essential Habitat Mapping for this species. The results suggested that there is a low potential for species to occur on the site intermittently or permanently, as critical habitat resources are not present on or adjacent to the site.

With specific regard to the North West Conservation Park area, very limited ecological values persist at this time. This is due to both its isolated location, away from existing stands of vegetation and the fact that it has been cleared of almost 100% of its vegetation due to past grazing activities. The ecological values of the site have suffered significantly as a consequence of decades of rural based activities.

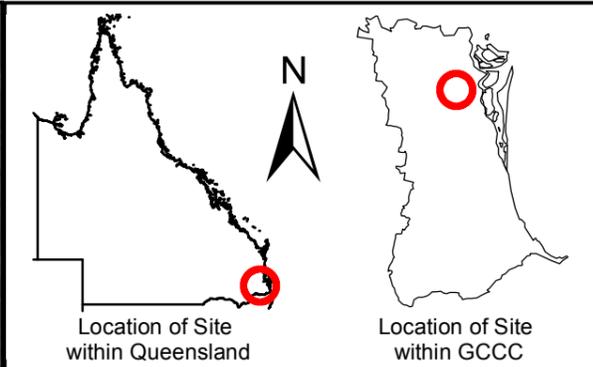
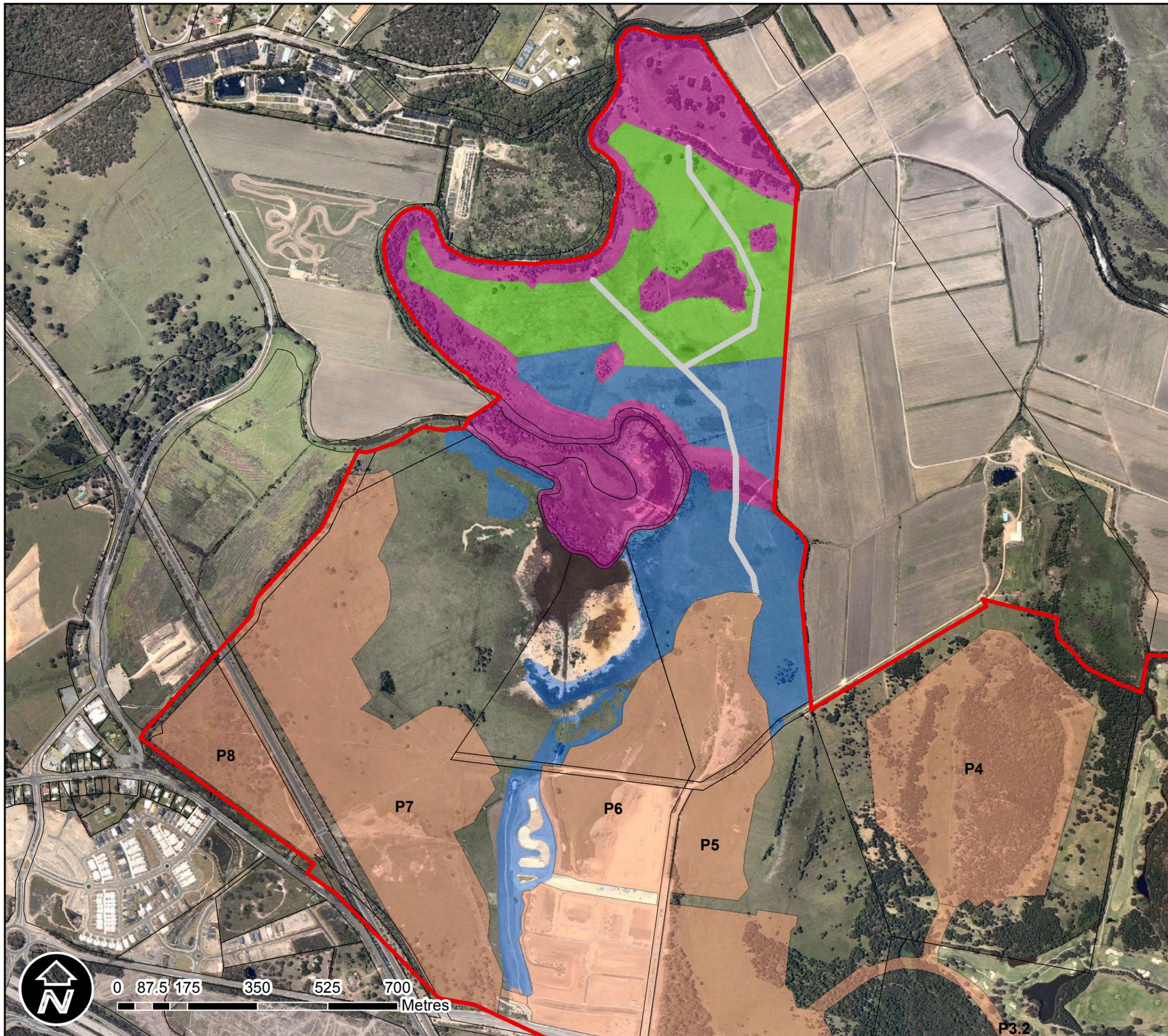
### 3.0 REHABILITATION MANAGEMENT PLAN

This Rehabilitation Management Plan (RMP) has been prepared to govern the proposed rehabilitation works within the North West Conservation Park. The primary function of this RMP is to provide specifications for the protection and enhancement of the biodiversity and habitat functions of vegetation this area with a specific focus on the development of habitat suitable for Koalas. It is intended that no less than 250 Koala Resource Trees should be delivered per hectare in accord with accepted State and Federal standards.

The overall strategy of the revegetation program is to deliver a large, intact forest providing a full range of habitat incorporating groundlayer, midstorey and canopy species. This area will serve as an 'end point' for fauna moving between the eastern conservation areas located in Precinct 1 and through the golf course. It's expected that somewhere in the order of 1.2 Million native plants will be installed in this area (ie 3 plants p/sqm x 400 000 sqm.) It is noted that an average of 1 plant p/sqm is required by GCCC as part of these works and no area larger than 50sqm is to be 'bare' at the conclusion of the 5 year Establishment Period. No less than 90% of the seeded area should have vegetation cover at the conclusion of same period.

A detailed methodology is contained herein proposing both methods and chronology for achieving the above objectives.

Definitions pertaining to Natural Regeneration, Assisted Natural Regeneration, Fabrication and Reconstruction are taken from Gold Coast City Councils Open Space Management Guidelines Version 1: November 2007, Appendix 1, and are included in **Appendix D** of this report.



- Legend**
- Site Locality
  - Gold Coast City North Cadastre (2006)
  - Development Footprint
  - Maintenance Access Track
- Rehabilitation**
- Of Concern Regional Ecosystem RE 12.3.11 (RMA2)
  - Least Concern Regional Ecosystem RE 12.3.5 (RMA2)
  - Naturally Assisted Regeneration - nil earthworks (RMA1)

**Figure 2:  
Gainsborough Greens  
North West Conservation Park  
Rehabilitation Management Areas**

Client:  
Mirvac Pacific Pty Ltd

Address:  
Gainsborough Greens Golf Course  
104 Swan Road,  
PIMPAMA QLD

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## 3.1 Rehabilitation Management Area 1

### 3.1.1 Objectives of RMA1

The objective of RMA 1 is to improve the koala habitat value of the site by implementing weed control and Assisted Natural Regeneration (ANR) practices to create a habitat node suitable for koala movement across the site and adjacent to waterways. ANR practices will involve the eradication of certain weed species and periodic control of others. This will assist the existing natural regeneration which is occurring on-site at present.

### 3.1.2 Description of RMA1

With reference to **Figure 2**, this management area is approximately 15 ha of narrow fringing vegetation located adjacent to existing watercourses and ephemeral water bodies.

### 3.1.3 Rehabilitation Strategy of RMA 1

The rehabilitation strategy for this RMA will consist of selective weed control and follow-up to ensure resilient weeds are managed. Weeds will be given a thorough treatment prior to going On-Establishment and then will continue to be controlled or eradicated over the following 5 Year Establishment period. Habitat elements such as large fallen logs are to remain. Rehabilitation will involve Assisted Natural Regeneration. The following prescriptive measures will be needed for the rehabilitation of this area:

- Selective weed control in ground layer and follow up;
- Protection of existing native regeneration
- 5 Years duration of the above

In essence, this area is to have a mix of eradication and control. It's noted that certain weeds will eventually be shaded out by native vegetation and these weeds do not present a long term management problem. Equally, the varied pasture grasses present will invariably die off as regeneration shades them out of existence. Notwithstanding, there are 6 species of weed which must be eradicated utilising standard techniques. They occur in isolated patches throughout RMA1 and are listed below:

- *Baccharis salicifolia* Groundsel Bush
- *Ipomoea cairica* Mile-a-minute
- *Lantana camara* Lantana
- *Mimosa pudica* Common Sensitive Plant
- *Solanum chrysotrichum* Giant Devils Fig
- *Solanum mauritianum* Wild Tobacco

**Table 1: Invasive Plant Species Recorded on the Site**

<i>Scientific Name</i>	<i>Common Name</i>	<i>Family</i>	<i>Class*</i>	<i>Rank**</i>	<i>Eradicate/ Control</i>	<i>Occurrence</i>
<i>Ageratum houstonianum</i>	Blue Billygoat Weed	Asteraceae		115	Control	Low
<i>Asclepiascurassavica</i>	Red Cotton Bush	Asclepiadaceae		126	Control	Medium
<i>Baccharishalimifolia</i>	Groundsel Bush	Asteraceae	Class 2	2	Eradicate	Medium
<i>Conyzabonariensis</i>	Flax-leaf Fleabane	Asteraceae		185	Control	Low
<i>Gomphocarpusph ysocarpus</i>	Balloon Cotton Bush	Asclepiadaceae		86	Control	High
<i>Ipomoea cairica</i>	Mile-a-minute	Convolvulaceae		28	Eradicate	Low
<i>Lantana camara</i>	Lantana	Verbenaceae	Class 3	1	Eradicate	Low
<i>Mimosa pudicavar. hispida</i>	Common Sensitive Plant	Mimosaceae		102	Eradicate	Low
<i>Onopordumacanthium</i>	Scotch Thistle				Control	Medium
<i>Seneciomadagascariensis</i>	Fireweed	Asteraceae	Class 2	82	Control	Medium
<i>Sidacordifolia</i>	Flannel Weed	Malvaceae			Control	Medium
<i>Sidarthombifolia</i>	Paddy's Lucerne	Malvaceae		153	Control	Medium
<i>Solanum americanum</i>	American Black Nighshade	Solanaceae			Control	Low
<i>Solanum chrysotrichum</i>	Giant Devil's Fig	Solanaceae			Eradicate	Low
<i>Solanum mauritianum</i>	Wild Tobacco	Solanaceae		61	Eradicate	Low
<i>Verbena bonariensis</i>	Purpletop	Verbenaceae			Control	Low

\*according to *Land Protection (Pest and Stock Route Management) Act 2003* (Qld)

\*\*according to DNR&W List of 200 Most Invasive Environmental Weeds in SEQ (June 2002).

### 3.1.4 RMA1 Monitoring and Maintenance

A 5 Year Monitoring and Establishment period shall be undertaken. This shall commence following a successful inspection demonstrating initial eradication of targeted species and demonstrated treatment of controlled species. 5 Monitoring Locations shall be installed and GPS located. These monitoring stations will serve as control points. They are to each have a monthly photographic log undertaken and general notes prepared in relation to on-going changes as a consequence of natural regeneration occurring. These notes and photographic records are to be supplied to GCCC monthly throughout the 5 years Establishment period.

Maintenance is to be undertaken for a period of 5 Years. Maintenance is to consist of ongoing control of targeted weeds and continued eradication of species, as identified above.

GCCC Inspections are as follows:

- Spot Inspections available at all times including seed mixing, seed installation and 5 year Establishment Period
- Formal Inspection at On Establishment date
- Formal Inspection 3 Months post On Establishment Date
- Formal Inspection 6 Months post On Establishment Date
- Formal Inspection 12 Months post On Establishment Date
- Formal Inspection Annually thereafter until conclusion of 5 Year On Establishment period conclusion
- Formal Inspection (final) at Off Establishment date

## **4.0 RMA2 Rehabilitation and Methodology**

### **4.1 Introduction**

The key design emphasis of RMA2 is to deliver a 40 Hectare (approx.) vegetation structure which will prove to be a long term, high quality koala resource area. It is intended to install approximately 16 different known koala food species. In addition, canopy/midstorey and ground layer plants will be installed. Thus creating a complete vegetation community. Two Regional Ecosystems have been identified for the site. Both serve the needs of koalas well and both are suited to the geology of the site.

The proposal is to direct seed native seeds into the ground in accord with the identified areas of treatment. 10kg p/ha of native seed will be installed. This will be sufficient to deliver the desired results for the site. Every reasonable effort will be made to procure local provenance seed. However, it's accepted that due to the size and scale of the project, seed from other areas will be necessary to support the project

### **4.2 Pre-Earthworks Methodology**

#### **4.2.1 Soil Management**

Soil samples are to be taken and analysed from 4 different locations within RMA2. These samples need to be analysed to determine levels of organics, sodium, moisture content, pH and the like. These results will determine what treatment, if any, may be required to be undertaken.

#### **4.2.2 Herbicide Treatment of Pasture**

An initial application of herbicide must be undertaken no more than 2 weeks prior to the commencement of earthworks. Due to the staged nature of the earthworks it's imperative that each treatment be within a fortnight of earthworks being undertaken. This is to ensure a successful kill rate of weeds without allowing time for secondary regeneration to occur prior to earthworks being conducted.

#### **4.2.3 Soil Conditioning**

In the event that lime or similar conditioner is required it must be applied prior to earthworks being undertaken. This will allow for the lime to become properly mixed during the scrape/load/haul process that follows. Soil conditioning is to be consistent with the final approved Acid Sulphate Soil management plan.

### **4.3 Earthworks Methodology**

#### **4.3.1 Staged Removal**

Removal of the top 100mm of topsoil will be undertaken in a staged manner. The 40 hectare area will not be stripped in one action. Rather, stages will be progressively undertaken until the 40 hectare area is complete over a 3 month period. As previously discussed, Habitat will work in concert with the earthworks contractors to ensure that we remain in front of their staged works to ensure that herbicide applications are done prior to topsoil removal.

### 4.3.2 Additional Lime and Gypsum Treatment

Prior to topsoil being reinstated another treatment of lime is proposed to be spread over the exposed ground prior to topsoil being reinstated. This second layer of lime is to further assist with neutralising the soil by lifting its pH level to between 6.5 and 7.5. The Stockpiled topsoil will then be reinstated. If gypsum is required for sodium management, it should be applied at this point in the earthworks program.

### 4.3.3 Fallow Ground and Secondary Weed Regeneration

As each stage of earthworks is completed the ground shall be allowed to lie fallow for 4 weeks. The purpose is to allow for secondary weed regeneration to occur. The initial pre-earthworks herbicide application will not eradicate all weed and seed. The secondary weed regeneration will also serve to act as a temporary cover crop. Flexibility in timing of the second treatment is acceptable. The key is to not allow any weed to form seed. This matter must be managed carefully.

### 4.3.4 Tertiary Weed Regeneration

Due to the staged nature of the second herbicide application there is the opportunity to provide the site with a third and final full treatment to eradicate tertiary weed growth. This should be undertaken no more than 4 days prior to seeding works being undertaken.

## 4.4 Native Seeding and Soil Stabilisation Works

### 4.4.1 Seed Selection and Quantities

Viable native seed is to be procured from the list below (Refer Table 1 and 2.) No less than 10kgs per hectare of native seed is to be applied. Of this 70% is to be canopy species, 20% midstorey and 10% groundcover. In addition, 35 kg per hectare of cover crop seed is to be sown. This cover crop shall be a 50/50 mix of rye and millet. Thus acting as a cover crop for both summer and winter. It's noted that strike rates will be much the same between native and cover crop seed. However, the cover crop seed will grow more quickly. Hence its need to act as a prompt soil stabiliser while also serving to create a micro-climate for the native seedlings to become established. GCCC is to be made aware of date, time and location of all seed mixing preparation. This is to ensure transparency and Quality Assurance in order for GCCC to be able to conduct spot inspections without notice at any time.

Table 2: Suggested Revegetation Species RE 12.3.11

Botanical Name	Common name	Proposed Function
<b>Canopy Layer</b>		
<i>Eucalyptus tereticornis</i>	Queensland Blue Gum	Koala habitat trees
<i>Eucalyptus siderophloia</i>	Grey Ironbark	
<i>Eucalyptus grandis</i>	Flooded Gum	
<i>Eucalyptus racemosa</i>	Scribbly Gum	
<i>Angophra leiocarpa</i>	Apple Gum	

Botanical Name	Common name	Proposed Function
<i>Corymbia citriodora</i>	Spotted Gum	
<i>Corymbia intermedia</i>	Pink Bloodwood	
<i>Corymbia tessellaris</i>	Carbeen	
<i>Lophostemon suaveolens</i>	Swamp Box	
<i>Eucalyptus exserta</i>	Qld Peppermint Gum	
<i>Corymbia trachyphloia</i>	White Bloodwood	
<i>Melaleuca sp</i>	Paperbark	
<b>Midstorey</b>		
<i>Acacia concurrens</i>	Late-flowering Hickory Wattle	Mid-storey plants to provide increased ecological function and habitat for a range of fauna.
<i>Acacia disparrima</i>	Brush Ironbark	
<i>Acacia maidenii</i>	Maiden's Wattle	
<i>Alphitonia excelsa</i>	Red Ash	
<i>Casuarina glauca</i>	Swamp Oak	
<b>Groundcover and maintenance access</b>		
<i>Lomandralongifolia</i>	Long-leaved Mat-rush	To form an effective ground cover to improve biodiversity, reduce erosion and prevent weed growth without impairing the function of the golf course.
<i>Lomandramultiflora subs. multiflora</i>	Many-flowered Mat-rush	
<i>Imperatacylindrica</i>	Blady Grass	

Table 3: Suggested Revegetation Species RE 12.3.5 (Least Concern)

Botanical Name	Common name	Proposed Function
<b>Canopy Layer</b>		
<i>Eucalyptus robusta</i>	Swamp Mahogany	Koala habitat trees
<i>Eucalyptus tereticornis</i>	Queensland Blue Gum	
<i>Lophostemon suaveolens</i>	Swamp Box	
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	
<i>Eucalyptus bancroftii</i>	Bancroft's Red Gum	
<i>Eucalyptus latisinensis</i>	Bastard Stringybark	
<i>Corymbia intermedia</i>	Pink Bloodwood	
<i>Melaleuca salicina</i>	Willow Bottlebrush	
<i>Livistonaaustralis</i>	Cabbage-tree Palm	
<i>Casuarina glauca</i>	Swamp She-oak	
<i>Endiandrasieberi</i>	Corkwood	

Botanical Name	Common name	Proposed Function
<b>Midstorey</b>		
<i>Melastomamalabathricum</i> subsp. <i>Malabathricum</i>	Malayalam	Mid-storey plants to provide increased ecological function and habitat for a range of fauna.
<i>Glochidionsumatranum</i>	Umbrella Cheese Tree	
<i>Melicopeellryana</i>	Pink Flowered Doughwood	
<i>Ficuscoronata</i>	Creek Sandpaper Fig	
<b>Groundcover and maintenance access</b>		
<i>Leersiahexandra</i>	Swamp Rice Grass	To form an effective ground cover to improve biodiversity, reduce erosion and prevent weed growth without impairing the function of the golf course.
<i>Imperatacylindrica</i>	Blady Grass	
<i>Baumeaarticulata</i>	Jointed twig-rush	
<i>Gahniasieberiana</i>	red-fruit saw-sedge	
<i>Lepironiaarticulata</i>	grey sedge	
<i>Schoenusbrevifolius</i>	Spikey Sedge	
<i>Schoenuscabripes</i>	Rush	

#### 4.4.2 Seeding Technique

Seeding is to be undertaken by drill seeding. A hopper will be filled with relevant seed which is then mixed prior to being directly seeded into the ground. Seeding areas will be conducted in accord with the attached RMA Design (**Figure 2**). The staging of these works will be determined by the staging of the earthworks. A GPS will be attached to the drill seeding machine in order to accurately record site coverage, dates of installation and the like.

#### 4.4.3 Maintenance Access Track

A Maintenance Access Track has been nominally located on **Figure 2**. This track is to be seeded with couch and will be 4 metres in width. The location of the track will be marked on-site and no native seeding is to occur within this corridor.

### 4.5 Monitoring Program

Due to the nature of these works, no maintenance regime is proposed. The entire site will be intensively seeded and simply needs time to grow. Any weeds which may emerge will soon be smothered and shaded by the native seedlings. Notwithstanding, a 12 Month Monitoring Program will be undertaken. 15 Monitoring Plots will be established in varied areas of the site. They will be of 10 metre by 10 metre dimension and will each be staked, numbered and mapped. Monitoring will include the following:

- Photographic Records
- Average height measurements
- 1 metre by 1 Metre stem counts

- 1 metre by 1 Metre native plant identification
- General notes relating to each plot on a monthly basis

#### **4.6 Adaptive Management**

An adaptive management approach is to be employed in respect of the works forming this plan. An adaptive management approach involves an integrated process of monitoring and review of the works program to identify any alterations to the design and maintenance of works that may be required to ensure the objectives of the plan are achieved. This may relate to adapting to changed earthworks programs etc. Equally, ongoing monitoring must be undertaken to identify any possible 'fail areas' - subject to the nature and reason of any failures rectification works will be undertaken to re-establish vegetation. Contingency strategies may include new seeding works and the like.

#### **4.7 Desired Environmental Outcomes - 5 Year Off Establishment**

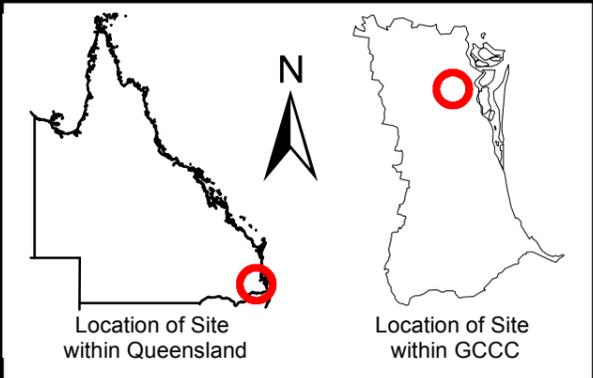
The below points represent the Key Performance Indicators upon which satisfactory approval is to be given at the 5 Year Off Establishment inspection:

- Complete eradication of the 6 weed species previously identified
- Ongoing management and control of other weeds listed (predominately pasture weeds)
- Minimum 90% site coverage of seeded areas with native vegetation
- No individual bare areas greater than 50 sqm within seeded works
- Minimum 250 Koala Resource Trees per hectare
- General canopy height - 3 metres
- Satisfactory delivery of all Monitoring Reports throughout Establishment Period

## 5.0 REFERENCES

- Bean, A.R., Sparshott, K.M., McDonald, W.J.F. and Neldner, V.J. (Eds) (1998). *Forest Ecosystem Mapping and Analysis of South-Eastern Queensland Biogeographic Region. A: Vegetation Survey and Mapping*. Queensland Herbarium, Brisbane.
- Department of Natural Resources and Water (June 2003). *List of the 200 Most Invasive Environmental Weeds in SEQ*. NRM, Brisbane.
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- Environmental Protection Agency (2006). *Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006-2016*. Environmental Protection Agency, Brisbane.
- Environmental Protection Agency (2005) *Wildlife Online*. (Database). Environmental Protection Agency, Brisbane.
- Henderson, R.J.F. (1997) *Queensland Vascular Plants: Names and Distribution*. Queensland Herbarium, Indooroopilly.
- Neldner, V.J, Wilson, B.A., Thompson, E.J., and H.A. Dilleward, (2004) *Methodology for Survey and Mapping of Vegetation Communities and Regional Ecosystems in Queensland*. Queensland Herbarium, Brisbane.
- Ryan, M. (2005). *Wild Plants of Greater Brisbane*. Queensland Museum Publications.
- Sattler and Williams (1999). *The Conservation Status of Queensland Bioregional Ecosystems*. Environmental Protection Agency. Brisbane.

## Appendix A: Plan of Development



- Legend**
- Gold Coast City North Cadastre (2006)
  - Gainsborough Greens
  - Development Footprint
  - Open Space

**Title:**  
**Plan of Development**

**Client:**  
 Mirvac Pty Ltd

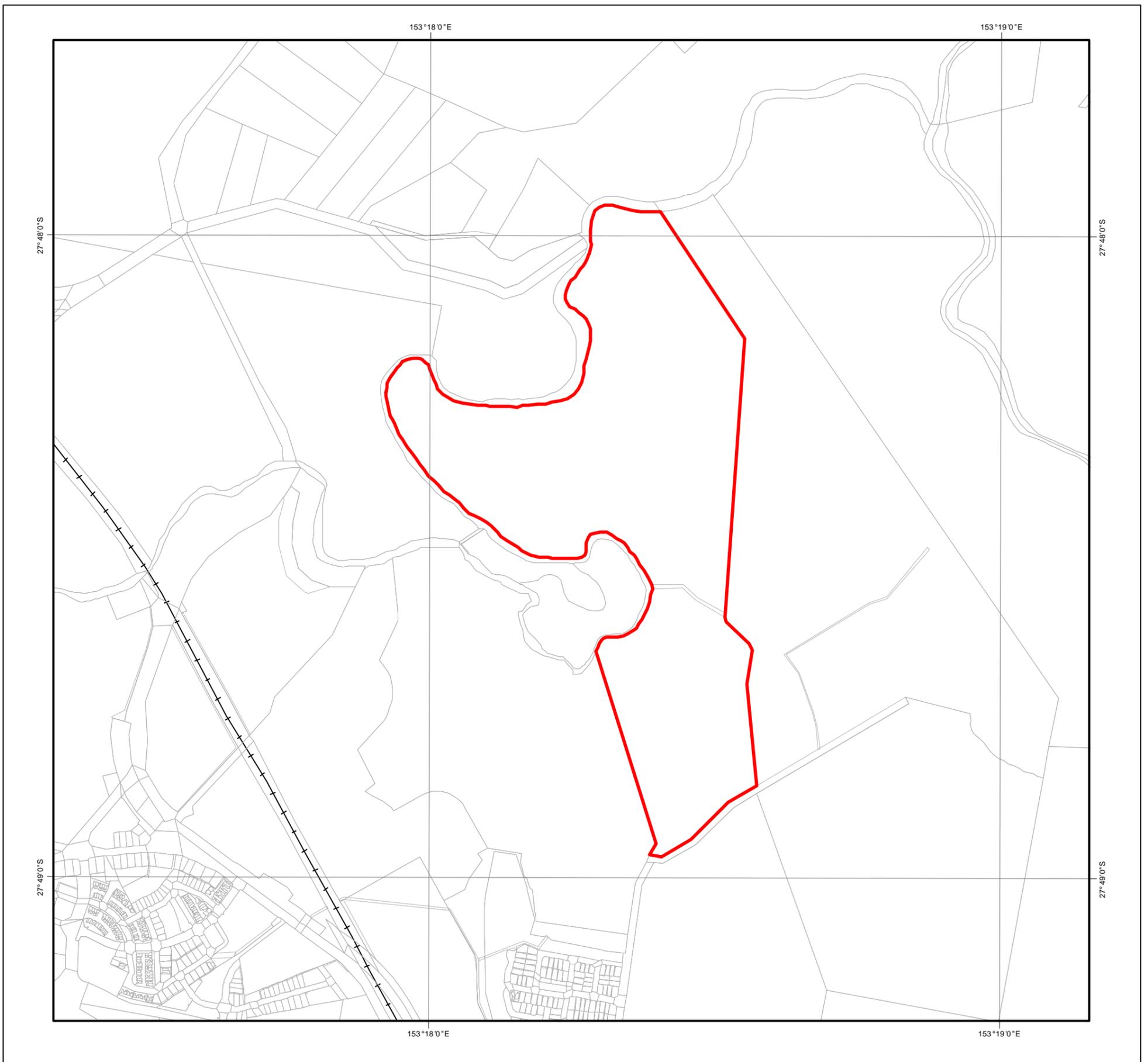
**Address:**  
 Gainsborough Greens Golf Course  
 Yawalpah Road,  
 PIMPAMA QLD

Data used in Habitat Environment Trading Pty Lt Maps is based on or contains data provided by the State of Queensland (Department of Natural Resources and Water 2006). In consideration of the State permitting use of the data, you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.

Scale: As Shown	Paper: A3	Reference: DERM 2006; Near Map 2011
Drawn: HB	Date: April 2014	
Checked: BP	Job Number: 6300SB	PO Box 47 BURLEIGH HEADS QLD 4220 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**

## Appendix B: Flora and Fauna Data Base Searches



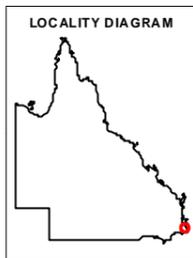
## Map of Referable Wetlands Wetland Protection Areas

Requested By: BEN@HABITAT.NET.AU  
Date: 08 Nov 13 Time: 14.23.38

**Centred on Lot on Plan:  
1 RP48903**



-  Selected Land Parcel
-  Cadastral Boundary
- Wetland Protection Areas**
-  HES Wetland
-  Trigger Area



**Note:**

This map shows the location of wetland protection areas which are defined under the Environmental Protection Regulation 2008.

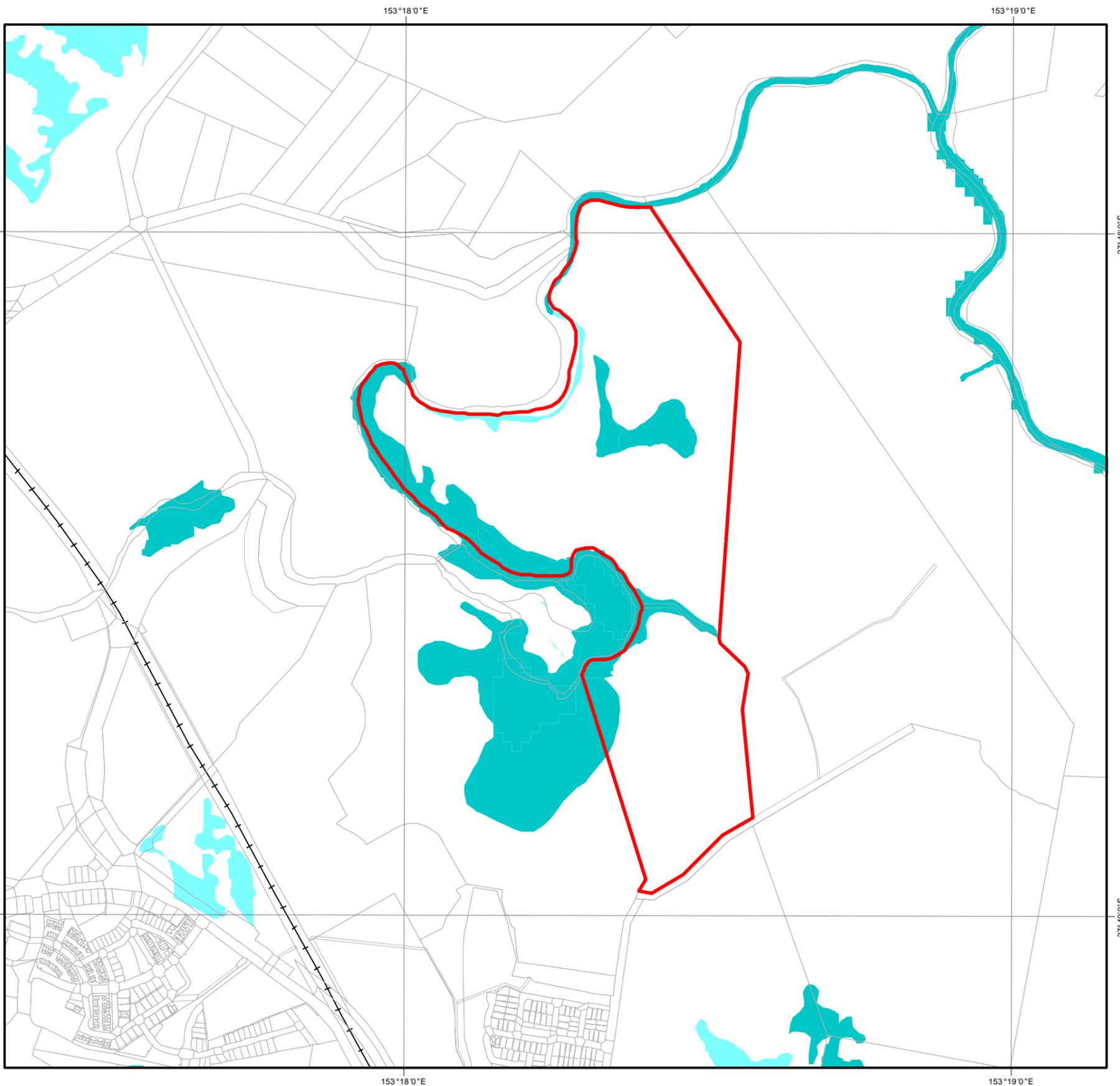
Within wetland protection areas, certain types of development involving high impact earthworks are made assessable under Schedule 3 of the Sustainable Planning Regulation 2009.

The Department of Environment and Heritage Protection has been made a concurrence agency under Schedule 7 of the Sustainable Planning Regulation 2009 for assessable development involving high impact earthworks within wetland protection areas.

The policy outcome and assessment criteria for assessing these applications are described in the State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Heritage Protection at [www.ehp.qld.gov.au](http://www.ehp.qld.gov.au) or email [planning.support@ehp.qld.gov.au](mailto:planning.support@ehp.qld.gov.au).



## Map of Referable Wetlands for the Environmental Protection Act 1994

Requested By: BEN@HABITAT.NET.AU

Date: 08 Nov 13 Time: 14.23.41

Centred on Lot on Plan:  
1 RP48903

-  Selected Land Parcel
-  Cadastral Boundary
-  HES Wetland GBR Catchments
-  HES Wetland
-  GES Wetland



**Note:**

This map shows the location of wetlands on the Map of Referable Wetlands which are defined under the Environmental Protection Regulation 2008.

Wetlands are assessed for ecological significance using the environmental values for wetlands in section 81A of the Environmental Protection Regulation 2008. Wetlands are considered either High Ecological Significance (HES) or of General Ecological Significance (GES) for the purposes of the environmental values.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Heritage Protection at <[www.ehp.qld.gov.au](http://www.ehp.qld.gov.au)> or email <[planning.support@ehp.qld.gov.au](mailto:planning.support@ehp.qld.gov.au)>



This product is projected into GDA 1994 MGA Zone 56

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Queensland  
Government

## Wildlife Online Extract

Search Criteria: Species List for a Specified Point

Species: All

Type: All

Status: All

Records: All

Date: All

Latitude: 27.8177

Longitude: 153.3226

Distance: 2

Email: simon@simsurf.com.au

Date submitted: Tuesday 21 Aug 2012 13:11:52

Date extracted: Tuesday 21 Aug 2012 13:20:02

The number of records retrieved = 295

### **Disclaimer**

As the DERM is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufo	<i>Rhinella marina</i>	cane toad	Y			8
animals	amphibians	Hylidae	<i>Litoria tyleri</i>	southern laughing treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria dentata</i>	bleating treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		2
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		5
animals	amphibians	Hylidae	<i>Litoria gracilentia</i>	graceful treefrog		C		4
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		5
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		6
animals	amphibians	Hylidae	<i>Litoria nasuta</i>	striped rocketfrog		C		4
animals	amphibians	Limnodynastidae	<i>Limnodynastes tasmaniensis</i>	spotted grassfrog		C		1
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		2
animals	amphibians	Limnodynastidae	<i>Limnodynastes peronii</i>	striped marshfrog		C		4
animals	amphibians	Limnodynastidae	<i>Limnodynastes terraereginae</i>	scarlet sided pobblebonk		C		2
animals	amphibians	Myobatrachidae	<i>Pseudophryne raveni</i>	copper backed broodfrog		C		1
animals	amphibians	Myobatrachidae	<i>Pseudophryne major</i>	great brown broodfrog		C		5
animals	amphibians	Myobatrachidae	<i>Crinia signifera</i>	clicking froglet		C		7
animals	amphibians	Myobatrachidae	<i>Crinia tinnula</i>	wallum froglet		V		4
animals	amphibians	Myobatrachidae	<i>Crinia parinsignifera</i>	beeping froglet		C		5
animals	birds	Acanthizidae	<i>Acanthiza pusilla</i>	brown thornbill		C		7
animals	birds	Acanthizidae	<i>Gerygone levigaster</i>	mangrove gerygone		C		5
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		3
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren		C		2
animals	birds	Acanthizidae	<i>Smicromis brevirostris</i>	weebill		C		1
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		2
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		8
animals	birds	Accipitridae	<i>Haliastur indus</i>	brahminy kite		C		19
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		4
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		2
animals	birds	Accipitridae	<i>Pandion cristatus</i>	eastern osprey		C		1
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		3
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		1
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		18
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		C		4
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		1
animals	birds	Acrocephalidae	<i>Acrocephalus australis</i>	Australian reed-warbler		C		2
animals	birds	Aegothelidae	<i>Aegotheles cristatus</i>	Australian owl-nightjar		C		2
animals	birds	Alcedinidae	<i>Ceyx azureus</i>	azure kingfisher		C		1
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		2
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		2
animals	birds	Anatidae	<i>Anas castanea</i>	chestnut teal		C		4
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		18
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		18
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		4
animals	birds	Anseranatidae	<i>Anseranas semipalmata</i>	magpie goose		C		4
animals	birds	Apodidae	<i>Hirundapus caudacutus</i>	white-throated needletail		C		1
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		18

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		2
animals	birds	Ardeidae	<i>Butorides striata</i>	striated heron		C		2
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		2
animals	birds	Ardeidae	<i>Ardea modesta</i>	eastern great egret		C		3
animals	birds	Ardeidae	<i>Ardea ibis</i>	cattle egret		C		12
animals	birds	Ardeidae	<i>Ixobrychus flavicollis</i>	black bittern		C		1
animals	birds	Artamidae	<i>Artamus superciliosus</i>	white-browed woodswallow		C		1
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		2
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		13
animals	birds	Artamidae	<i>Artamus personatus</i>	masked woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		23
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	piebald butcherbird		C		20
animals	birds	Burhinidae	<i>Esacus magnirostris</i>	beach stone-curlew		V		1
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		2
animals	birds	Cacatuidae	<i>Calyptorhynchus lathami</i>	glossy black-cockatoo		V		76
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		4
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		10
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		17
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		3
animals	birds	Campephagidae	<i>Lalage leucomela</i>	varied triller		C		2
animals	birds	Campephagidae	<i>Lalage sueurii</i>	white-winged triller		C		2
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		21
animals	birds	Charadriidae	<i>Charadrius ruficapillus</i>	red-capped plover		C		1
animals	birds	Charadriidae	<i>Elseya melanops</i>	black-fronted dotterel		C		1
animals	birds	Charadriidae	<i>Pluvialis fulva</i>	Pacific golden plover		C		1
animals	birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		NT		3
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		5
animals	birds	Climacteridae	<i>Climacteris picumnus</i>	brown treecreeper		C		1
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		4
animals	birds	Columbidae	<i>Streptopelia chinensis</i>	spotted dove	Y			6
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		20
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		10
animals	birds	Columbidae	<i>Macropygia amboinensis</i>	brown cuckoo-dove		C		1
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		10
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		13
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		25
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	<i>Chalcites lucidus</i>	shining bronze-cuckoo		C		4
animals	birds	Cuculidae	<i>Cacomantis pallidus</i>	pallid cuckoo		C		2
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		9
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		13
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		9
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		7
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		1
animals	birds	Estrildidae	<i>Neochmia temporalis</i>	red-browed finch		C		12
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		20
animals	birds	Eurostopodidae	<i>Eurostopodus mystacalis</i>	white-throated nightjar		C		1
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		2
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		2
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		2
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		19
animals	birds	Halcyonidae	<i>Todiramphus chloris</i>	collared kingfisher		C		1
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		10
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		1
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		16
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		5
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		1
animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		12
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		12
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		15
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		7
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		1
animals	birds	Meliphagidae	<i>Phylidonyris niger</i>	white-cheeked honeyeater		C		3
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		13
animals	birds	Meliphagidae	<i>Melithreptus lunatus</i>	white-naped honeyeater		C		1
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		18
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		13
animals	birds	Meliphagidae	<i>Myzomela sanguinolenta</i>	scarlet honeyeater		C		13
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		1
animals	birds	Meliphagidae	<i>Anthochaera chrysoptera</i>	little wattlebird		C		12
animals	birds	Meliphagidae	<i>Gavicalis fasciogularis</i>	mangrove honeyeater		C		6
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		5
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		2
animals	birds	Meliphagidae	<i>Acanthorhynchus tenuirostris</i>	eastern spinebill		C		4
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		1
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		2
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		17
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		21
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		7
animals	birds	Monarchidae	<i>Symphoricarphus trivirgatus</i>	spectacled monarch		C		1
animals	birds	Monarchidae	<i>Monarcha melanopsis</i>	black-faced monarch		C		2
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		1
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		6
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		7
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		4
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		3
animals	birds	Pachycephalidae	<i>Colluricincla megarhyncha</i>	little shrike-thrush		C		1
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		10
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		16
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		17
animals	birds	Pachycephalidae	<i>Falcunculus frontatus</i>	crested shrike-tit		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		17
animals	birds	Pardalotidae	<i>Pardalotus punctatus</i>	spotted pardalote		C		1
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			1
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		9
animals	birds	Petroicidae	<i>Petroica rosea</i>	rose robin		C		3
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		4
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		2
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		2
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		4
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		3
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		14
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		11
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		6
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		3
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		20
animals	birds	Psittacidae	<i>Platycercus adscitus palliceps</i>	pale-headed rosella (southern form)		C		1
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		20
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		13
animals	birds	Psittacidae	<i>Glossopsitta pusilla</i>	little lorikeet		C		2
animals	birds	Psittacidae	<i>Platycercus eximius</i>	eastern rosella		C		3
animals	birds	Psittacidae	<i>Platycercus elegans</i>	crimson rosella		C		3
animals	birds	Psophodidae	<i>Psophodes olivaceus</i>	eastern whipbird		C		1
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		4
animals	birds	Rallidae	<i>Porphyrio porphyrio</i>	purple swamphen		C		19
animals	birds	Rallidae	<i>Gallirallus philippensis</i>	buff-banded rail		C		5
animals	birds	Recurvirostridae	<i>Himantopus himantopus</i>	black-winged stilt		C		1
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		23
animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		C		1
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		23
animals	birds	Scolopacidae	<i>Tringa brevipes</i>	grey-tailed tattler		C		1
animals	birds	Scolopacidae	<i>Limosa lapponica</i>	bar-tailed godwit		C		2
animals	birds	Scolopacidae	<i>Numenius minutus</i>	little curlew		C		1
animals	birds	Scolopacidae	<i>Tringa nebularia</i>	common greenshank		C		1
animals	birds	Scolopacidae	<i>Numenius phaeopus</i>	whimbrel		C		2
animals	birds	Scolopacidae	<i>Actitis hypoleucos</i>	common sandpiper		C		1
animals	birds	Scolopacidae	<i>Calidris ferruginea</i>	curlew sandpiper		C		1
animals	birds	Scolopacidae	<i>Numenius madagascariensis</i>	eastern curlew		NT		2
animals	birds	Strigidae	<i>Ninox strenua</i>	powerful owl		V		3
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		14
animals	birds	Sturnidae	<i>Sturnus tristis</i>	common myna	Y			1
animals	birds	Sturnidae	<i>Sturnus vulgaris</i>	common starling	Y			1
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		10
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		14
animals	birds	Threskiornithidae	<i>Platalea flavipes</i>	yellow-billed spoonbill		C		5
animals	birds	Threskiornithidae	<i>Platalea regia</i>	royal spoonbill		C		4
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		8

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Tytonidae	<i>Tyto javanica</i>	eastern barn owl		C		2
animals	insects	Nymphalidae	<i>Danaus chrysippus petilia</i>	lesser wanderer				1
animals	insects	Nymphalidae	<i>Acraea andromacha andromacha</i>	glasswing				1
animals	insects	Nymphalidae	<i>Danaus plexippus plexippus</i>	monarch				2
animals	insects	Nymphalidae	<i>Melanitis leda bankia</i>	common evening-brown				1
animals	insects	Nymphalidae	<i>Euploea core corinna</i>	common crow				1
animals	mammals	Acrobatidae	<i>Acrobates pygmaeus</i>	feathertail glider		C		2
animals	mammals	Bovidae	<i>Bos sp.</i>	cattle	Y			1
animals	mammals	Canidae	<i>Vulpes vulpes</i>	red fox	Y			3
animals	mammals	Canidae	<i>Canis lupus familiaris</i>	dog	Y			1
animals	mammals	Dasyuridae	<i>Antechinus flavipes</i>	yellow-footed antechinus		C		6
animals	mammals	Equidae	<i>Equus sp.</i>		Y			1
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			1
animals	mammals	Leporidae	<i>Lepus europaeus</i>	European brown hare	Y			5
animals	mammals	Macropodidae	<i>Macropus sp.</i>					4
animals	mammals	Macropodidae	<i>Wallabia bicolor</i>	swamp wallaby		C		3
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		7
animals	mammals	Macropodidae	<i>Macropus rufogriseus</i>	red-necked wallaby		C		8
animals	mammals	Molossidae	<i>Tadarida australis</i>	white-striped freetail bat		C		1
animals	mammals	Molossidae	<i>Mormopterus sp.</i>					2
animals	mammals	Muridae	<i>Rattus lutreolus</i>	swamp rat		C		2
animals	mammals	Muridae	<i>Xeromys myoides</i>	water mouse		V	V	7
animals	mammals	Muridae	<i>Rattus fuscipes</i>	bush rat		C		1
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat		C		1
animals	mammals	Muridae	<i>Rattus rattus</i>	black rat	Y			3
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			4
animals	mammals	Muridae	<i>Melomys sp.</i>					1
animals	mammals	Peramelidae	<i>Isoodon macrourus</i>	northern brown bandicoot		C		2
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider		C		2
animals	mammals	Petauridae	<i>Petaurus norfolcensis</i>	squirrel glider		C		8
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		5
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus (southeast Queensland bioregion)</i>	koala (southeast Queensland bioregion)		V	V	4
animals	mammals	Pteropodidae	<i>Syconycteris australis</i>	eastern blossom bat		C		4
animals	mammals	Pteropodidae	<i>Pteropus sp.</i>					3
animals	mammals	Pteropodidae	<i>Pteropus alecto</i>	black flying-fox		C		2
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			1
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		C		3
animals	mammals	Vespertilionidae	<i>Nyctophilus gouldi</i>	Gould's long-eared bat		C		1
animals	mammals	Vespertilionidae	<i>Chalinolobus morio</i>	chocolate wattled bat		C		1
animals	mammals	Vespertilionidae	<i>Myotis macropus</i>	large-footed myotis		C		2
animals	mammals	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's wattled bat		C		3
animals	mammals	Vespertilionidae	<i>Chalinolobus nigrogriseus</i>	hoary wattled bat		C		1
animals	mammals	Vespertilionidae	<i>Miniopterus australis</i>	little bent-wing bat		C		1
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		6
animals	reptiles	Agamidae	<i>Intellagama lesueurii</i>	eastern water dragon		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Boidae	<i>Morelia spilota</i>	carpet python		C		4
animals	reptiles	Chelidae	<i>Chelodina expansa</i>	broad-shelled river turtle		C		1
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		4
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		2
animals	reptiles	Colubridae	<i>Dendrelaphis punctulata</i>	common tree snake		C		2
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		4
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		2
animals	reptiles	Elapidae	<i>Cryptophis nigrescens</i>	eastern small-eyed snake		C		2
animals	reptiles	Elapidae	<i>Pseudechis porphyriacus</i>	red-bellied black snake		C		2
animals	reptiles	Scincidae	<i>Lampropholis delicata</i>			C		5
animals	reptiles	Scincidae	<i>Cryptoblepharus pulcher pulcher</i>	elegant snake-eyed skink		C		4
animals	reptiles	Scincidae	<i>Eulamprus tenuis</i>			C		1
animals	reptiles	Scincidae	<i>Ctenotus robustus</i>			C		1
animals	reptiles	Scincidae	<i>Eulamprus martini</i>			C		2
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		4
animals	reptiles	Scincidae	<i>Lampropholis amicula</i>			C		1
animals	reptiles	Scincidae	<i>Anomalopus verreauxii</i>			C		2
animals	reptiles	Varanidae	<i>Varanus varius</i>	lace monitor		C		2
animals	reptiles	Varanidae	<i>Varanus sp.</i>	goanna				2
fungi	sac fungi	Pannariaceae	<i>Pannaria lurida</i>			C		1/1
plants	higher dicots	Araliaceae	<i>Hydrocotyle acutiloba</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Euchiton sphaericus</i>			C		1/1
plants	higher dicots	Balsaminaceae	<i>Impatiens walleriana</i>	balsam	Y			1/1
plants	higher dicots	Fabaceae	<i>Crotalaria goreensis</i>	gambia pea	Y			1/1
plants	higher dicots	Proteaceae	<i>Macadamia integrifolia</i>	macadamia nut		V	V	1/1
plants	higher dicots	Rhizophoraceae	<i>Ceriops tagal</i>	yellow mangrove		C		1/1
plants	higher dicots	Rhizophoraceae	<i>Rhizophora stylosa</i>	spotted mangrove		C		1/1
plants	higher dicots	Rhizophoraceae	<i>Bruguiera gymnorhiza</i>	large-fruited orange mangrove		C		1/1
plants	higher dicots	Thymelaeaceae	<i>Pimelea linifolia subsp. linifolia</i>			C		1/1
plants	liverworts	Metzgeriaceae	<i>Metzgeria</i>			C		1/1
plants	monocots	Juncaginaceae	<i>Triglochin striata</i>	streaked arrowgrass		C		1/1
plants	monocots	Orchidaceae	<i>Acianthus fornicatus</i>	pixie caps		C		1/1
plants	monocots	Orchidaceae	<i>Pterostylis nutans</i>			C		1/1
plants	monocots	Orchidaceae	<i>Caladenia catenata</i>			C		1/1
plants	monocots	Orchidaceae	<i>Corybas barbarae</i>	helmet orchid		C		1/1
plants	monocots	Poaceae	<i>Paspalum conjugatum</i>	sourgrass	Y			1/1
plants	monocots	Poaceae	<i>Paspalum vaginatum</i>	saltwater couch		C		1/1
plants	monocots	Potamogetonaceae	<i>Potamogeton octandrus</i>			C		1/1
plants	mosses	Bartramiaceae	<i>Philonotis slateri</i>			C		1/1
plants	mosses	Bryaceae	<i>Gemmabryum coronatum</i>			C		3/3
plants	mosses	Bryaceae	<i>Rosulabryum billardierei</i>			C		1/1
plants	mosses	Bryophyte	<i>Bryophyte</i>			C		1/1
plants	mosses	Calymperaceae	<i>Syrrhopodon armatus</i>			C		1/1
plants	mosses	Dicranaceae	<i>Holomitrium perichaetiale var. perichaetiale</i>			C		2/2
plants	mosses	Ditrichaceae	<i>Ditrichum difficile</i>			C		1/1
plants	mosses	Fissidentaceae	<i>Fissidens</i>			C		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	mosses	Funariaceae	<i>Funaria hygrometrica</i>			C		1/1
plants	mosses	Hypnaceae	<i>Hypnum cupressiforme</i>			C		2/2
plants	mosses	Hypnaceae	<i>Hypnum sp. (Cairns C.J.Wild AQ733964)</i>			C		1/1
plants	mosses	Hypnaceae	<i>Hypnum sp. (Caboolture J.F.Shirley AQ733970)</i>			C		1/1
plants	mosses	Hypnaceae	<i>Hypnum</i>			C		1/1
plants	mosses	Leucobryaceae	<i>Campylopus pyriformis</i>			C		1/1
plants	mosses	Leucobryaceae	<i>Campylopus introflexus</i>			C		1/1
plants	mosses	Meteoriaceae	<i>Papillaria flexicaulis</i>			C		1/1
plants	mosses	Orthorrhynchiaceae	<i>Orthorrhynchium elegans</i>			C		1/1
plants	mosses	Orthorrhynchiaceae	<i>Orthorrhynchium elegans subsp. cymbifolioides</i>			C		3/3
plants	mosses	Pottiaceae	<i>Weissia sp. (Victoria Park H.Tryon AQ645533)</i>			C		1/1
plants	mosses	Pottiaceae	<i>Weissia</i>			C		1/1
plants	mosses	Pottiaceae	<i>Weissia edentula</i>			C		1/1
plants	mosses	Pottiaceae	<i>Barbula subcalycina</i>			C		2/2
plants	mosses	Ptychomniaceae	<i>Euptychium cuspidatum</i>			C		1/1
plants	mosses	Racopilaceae	<i>Racopilum</i>			C		1/1
plants	mosses	Racopilaceae	<i>Racopilum cuspidigerum var. cuspidigerum</i>			C		1/1
plants	mosses	Sematophyllaceae	<i>Sematophyllum subpinnatum</i>			C		1/1
plants		Braithwaiteaceae	<i>Braithwaitea sulcata</i>			C		1/1
plants		Pylaisiadelphaceae	<i>Wijkia</i>			C		1/1

#### CODES

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

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

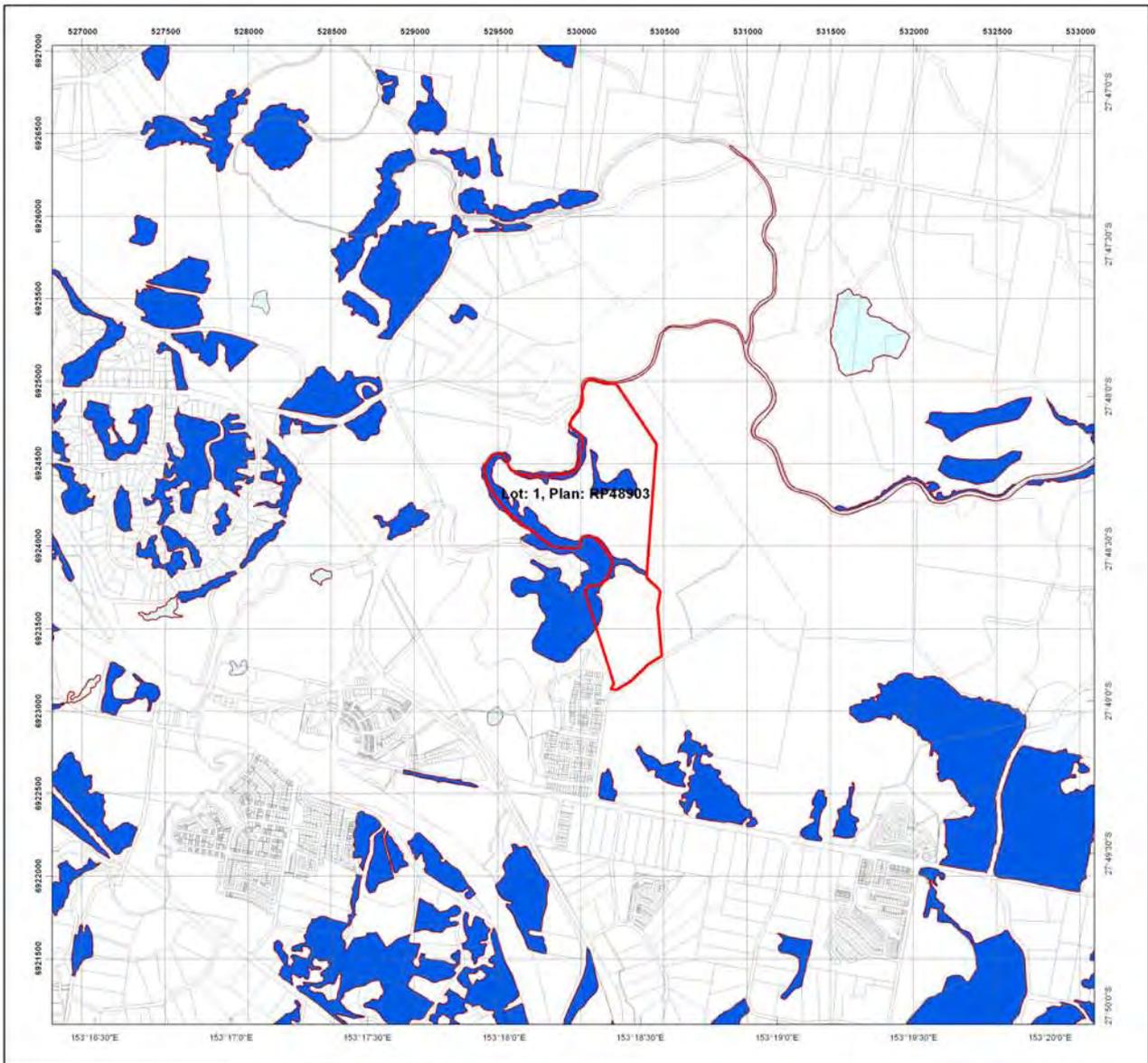
A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.

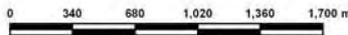
## Appendix C: Regional Ecosystems



### Regulated Vegetation Management Map

**Legend**

- Lot and Plan
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Vegetation not regulated under the VMA)
- Water
- Area not categorised
- Cadastral line
- Property boundaries shown are provided as a locational aid only



This product is projected into:  
GDA 1994 MGA Zone 56

**Disclaimer:**

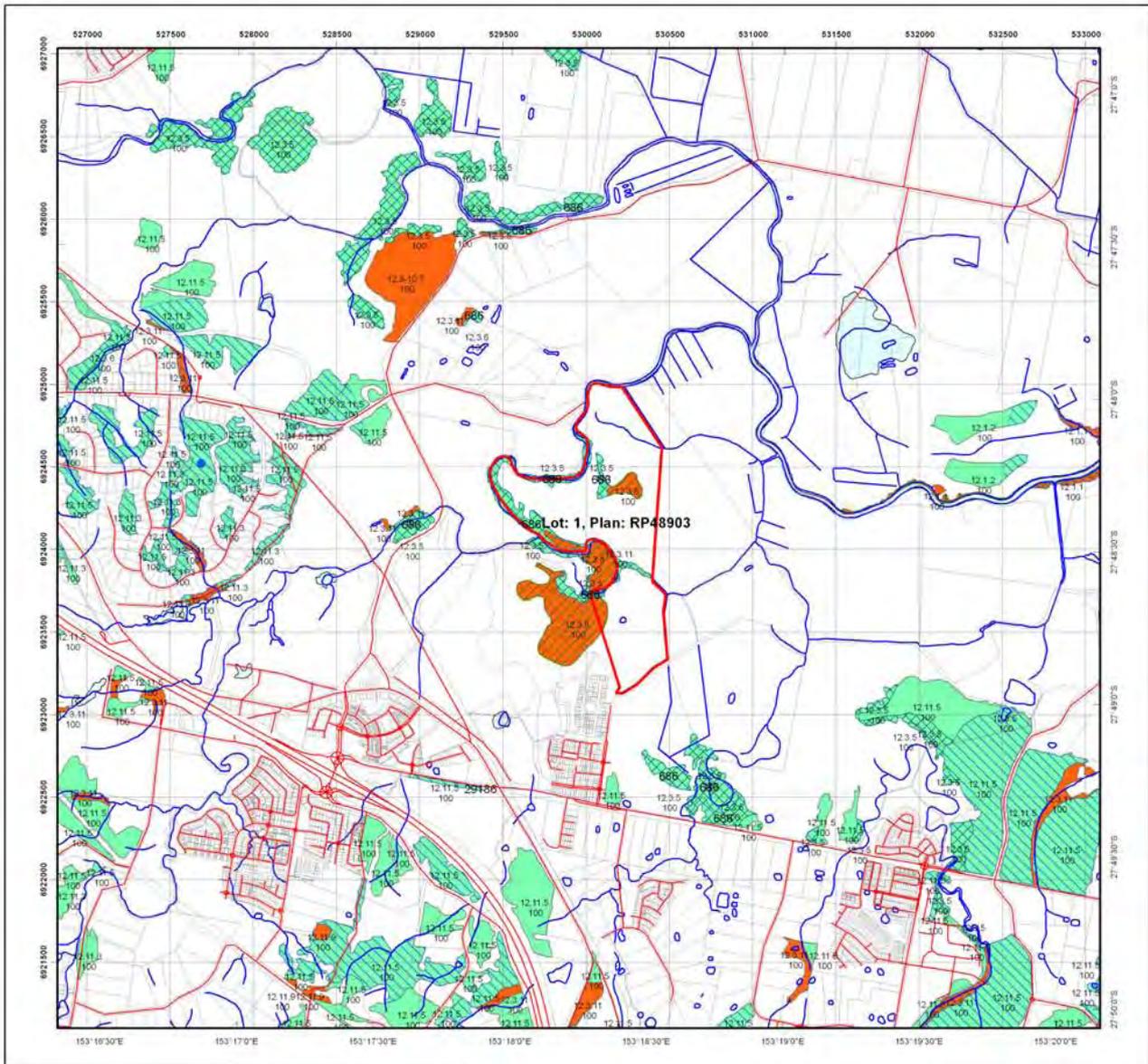
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: [www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au) or contact the Department of Natural Resources and Mines.

Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at <http://www.information.qld.gov.au/>

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.

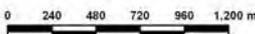
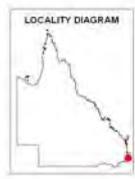




### Vegetation Management Supporting Map

**Legend**

- Lot and Plan
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH  
These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI  
These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map  
(Stream order shown as black number against stream where available)
- Roads
- © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
- Property boundaries shown as provided as a locational aid only



This product is projected into:  
GDA 1994 MGA Zone 56

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

**Disclaimer:**  
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: [www.dnrm.qld.gov.au](http://www.dnrm.qld.gov.au) or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at <http://www.information.qld.gov.au/>



## Vegetation Management Act 1999 - Extract from the essential habitat database - version 4.0

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s or on and within 2.2 km of an identified coordinate on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (<http://www.dnrm.qld.gov.au>) has more information on how the layer is applied under the State Development Assessment Provisions - Module 8: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

- that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or
- in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

**Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Species Information - (no results)**

**Essential habitat in Category A and B (Remnant vegetation species record) areas:1100m Regional Ecosystems Information - (no results)**

**Essential habitat in Category A and B (Remnant vegetation) areas:1100m Species Information**

Label	Scientific Name	Common Name	NCA Status	Vegetation Community	Altitude	Soils	Position in Landscape
686	<i>Crinia tinnula</i>	Wallum Froglet	V	Vegetation community is a mandatory essential habitat factor for this species. Permanent to ephemeral acidic (pH 4.3 - 5.2), soft freshwater in Melaleuca (e.g. <i>M. quinquenervia</i> ) swamps, sedge/land, wet and dry heathland (e.g. <i>Banksia robur</i> , <i>Xanthorrhoea</i> ) and wallum ( <i>Banksia aemula</i> shrubland/woodland) areas coastal lowlands on sand or sandstone, occasionally in adjacent open forest/woodland (e.g. <i>Eucalyptus racemosa</i> , <i>Corymbia citriodora</i> ) with heathy understorey; known to persist in small remnants (<10ha); may be found well away from water.	Sea level to 200m.	Sandy and sandy-alluvial substrates.	None
29186	<i>Phascolarctos cinereus</i> (southeast Queensland bioregion)	Koala	V	Open eucalypt forest and woodland that has: a) multiple strata layers containing <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> or <i>Melaleuca</i> trees that—at 1.3 metres above the ground—have a diameter both greater and less than 30 centimetres; and b) at least 1 of the following species: <i>Eucalyptus tereticornis</i> , <i>E. fibrosa</i> , <i>E. propinqua</i> ; <i>E. umbra</i> , <i>E. grandis</i> , <i>E. microcorys</i> , <i>E. tindaliae</i> , <i>E. resinifera</i> , <i>E. populnea</i> , <i>E. robusta</i> , <i>E. nigra</i> , <i>E. racemosa</i> , <i>E. crebra</i> , <i>E. exserta</i> , <i>E. seeana</i> , <i>Lophostemon confertus</i> , <i>L. suaveolens</i> , <i>Melaleuca quinquenervia</i> .	Sea level to 1000m.	no soil information	None

**Essential habitat in Category A and B (Remnant vegetation) areas:1100m Regional Ecosystems Information**

Label	Regional Ecosystem (this is a mandatory essential habitat factor, unless otherwise stated)
686	12.2.5, 12.2.7, 12.2.9, 12.2.10, 12.2.12, 12.2.15, 12.3.4, 12.3.5, 12.3.6, 12.3.12, 12.3.14, 12.5.10. These regional ecosystems are not a mandatory essential habitat factor for this species.
29186	12.3.3, 12.3.4, 12.3.6, 12.3.7, 12.3.10, 12.3.11, 12.5.2, 12.5.3, 12.6.14, 12.9-10.4, 12.9-10.7, 12.9-10.17, 12.11.5, 12.11.18, 12.12.12

**Essential habitat in Category C (High value regrowth vegetation) areas:1100m Species Information - (no results)**

**Essential habitat in Category C (High value regrowth vegetation) areas:1100m Regional Ecosystems Information - (no results)**

## **Appendix D: Definitions for Rehabilitation**

(excerpt taken from Appendix 1 of *'Guidelines for the Preparation of Open Space Management Plans  
Version 1: November 2007* prepared by Gold Coast City Council)

**Table 1:** Detailed description of rehabilitation approaches.

Natural Regeneration	Assisted Natural Regeneration
<p>Applies:</p> <ul style="list-style-type: none"> <li>☞ To relatively large, intact and weed-free areas of native vegetation.</li> <li>☞ Where the native plants are healthy and capable of regenerating without human intervention.</li> <li>☞ When native plant seed is stored in the soil or will be able to reach the site from nearby natural areas, by birds or other animals, wind or water.</li> <li>☞ Where the plant community has a high potential for recovery after any short-lived disturbance, such as a fire or cyclonic winds.</li> <li>☞ When preventative action is all that is required to avert on-going disturbance, e.g. erection of fencing to prevent intrusion by cattle.</li> <li>☞ Planting in such sites can work against the aims of restoration by interfering with natural regeneration.</li> </ul> <p>☼ The re-establishing plant community will be similar in structure, composition and diversity to the original vegetation.</p>	<p>Applies:</p> <ul style="list-style-type: none"> <li>☞ To natural areas where the native plant community is largely healthy and functioning.</li> <li>☞ When native plant seed is still stored in the soil or will be able to reach the site from nearby natural areas, by birds or other animals, wind or water.</li> <li>☞ Where the natural regeneration processes (seedling germination, root suckering, etc.) are being inhibited by external factors, such as weed invasion, soil compaction, cattle grazing, mechanical slashing, etc.</li> <li>☞ When limited human intervention, such as weed removal, minor amelioration of soil conditions, erection of fencing, cessation of slashing, etc. will be enough to trigger the recovery processes through natural regeneration.</li> <li>☞ When the major component is weed control.</li> <li>☞ Planting in such sites can work against the aims of restoration by interfering with natural regeneration.</li> </ul> <p>☼ The re-establishing plant community will be similar in structure, composition and diversity to the original vegetation.</p>
Reconstruction	Fabrication (Type Conversion)
<p>Applies:</p> <ul style="list-style-type: none"> <li>☞ Where the site is highly degraded or altered</li> <li>☞ When the degree of disturbance has been so great and long-standing that the pre-existing native plant community cannot recover by natural means.</li> <li>☞ To sites such as areas of fill, sites affected by stormwater flow, and areas that have been drastically cleared, either mechanically or by stock even though there may be a few remaining native trees or shrubs.</li> <li>☞ When a greater degree of human intervention is required, such as weed removal, cessation of grazing and/or slashing, amelioration of soil conditions such as importation of soils, drainage works or reshaping of the landscape.</li> <li>☞ When a major component is the importation of native species through planting.</li> </ul> <p>☼ The re-establishing planted community should be similar to the original vegetation in structure, composition and diversity.</p>	<p>Applies:</p> <ul style="list-style-type: none"> <li>☞ Where site conditions have been irreversibly changed.</li> <li>☞ When it is not possible to restore the original native plant community.</li> <li>☞ Where a better-adapted local plant community can be planted that will function within the changed conditions.</li> <li>☞ In situations such as the construction of a wetland plant community to mitigate increased urban stormwater run-off.</li> </ul> <p><b>N.B.</b> Revegetation (planting) is the major component in a fabrication program.</p> <p>☼ The re-establishing planted community should be similar to a naturally occurring plant community of the same type e.g. freshwater wetlands in structure, composition and diversity.</p> <p><i>Sometimes a combination of approaches is required. For example, when remnant native vegetation is surrounded by cleared and degraded lands, an assisted natural regeneration approach is appropriate for the remnant and a reconstruction approach for the surrounding lands. If increased stormwater run-off is a threat to the recovery of these areas, it may be necessary to establish a wetland plant community (fabrication) that will slow run-off and increase nutrient uptake, thus improving the quality of water entering a natural area.</i></p>

## Appendix E: Weed Control Techniques - Appendix C of SEQ Ecological Restoration Framework Manual

# APPENDIX C

## CONTROL TECHNIQUES AND HERBICIDE APPLICATION RATES FOR PARTICULAR WEED SPECIES

## DISCLOSURE

At the time of publication the following chemicals and techniques are registered for use and are commonly utilised. Other chemicals and techniques are used in the ecological restoration industry. Laws and best practice techniques change over time and as such it is best to check with your local government as to the current preferred approach.

Under label or off-label permits 11463 and 9868. Permit 9868 requires that persons who can use the product under the permit are "All persons who are trained in the use and handling of agricultural chemicals and who are performing weed control as part of a bush regeneration/restoration project". Operators are legally obliged to read the label before using any herbicides. If the species you wish to treat is not on the label it will be

necessary to read the off label permit. Always consult the ecological restoration plan for the projects.

Additional useful references include the Weeds of Southern Queensland (Dight et al., 2011) and PUBCRIS (<http://services.apvma.gov.au/PubcrisWebClient/welcome.do>).

HERBICIDE (+ E.G. TRADE NAME)	PRINCIPLE USES	ECOTOXICOLOGY	GROUP	SCHEDULE	UPTAKE AND RESIDUAL AFFECT
Glyphosate 360gl (Weedmaster® or Roundup Biactive®)	Non- selective weed control	Full Aquatic registration (in <b>most formulations</b> ),	M	5	Absorbed through the leaf via spraying and through the cambium when applying techniques such as stem injection and cut, scrape and paint. Extremely short-lived and rapidly immobilised (both in soil and water). Degraded within hours in most environments
2,4-D 625 gl amine (Amicide 625)	Selective of broad-leaved weeds in native grasses (limited effect on deep rooted dicots, legumes etc.)	Aquatically registered formulations <b>available</b>	I	5	Mainly absorbed through leaves and stems. Fairly immobile and relatively short-lived in the soil. (degraded within days in most environments)
Fluroxypyr 333gl (Starane advance)	Selective broad-leaf control (particularly effective on undersown legumes weeds)	N (demonstrated toxicity to aquatic organisms)	I	NS	Absorbed through the leaves. Relatively short-lived in the soil though highly persistent in water
Metsulfuron Methyl (Brush-off, Ally, Associate)®	Selective of broad-leaved weeds but also able to control a variety of monocots when applied at higher rates especially Liliaceae and Commelinaceae. Lower rates do affect monocots.	N (demonstrated toxicity to aquatic organisms)	B (potential resistance rotate with other herbicides)	NS	Mainly leaf absorbed. May persist for 3-6 months in the soil profile.
Metsulfuron + Glyphosate	Non-selective weed control and used with particular weeds or combination of weeds.	N (demonstrated toxicity to aquatic organisms)	MB (potential resistance rotate with other herbicides)	5	Mainly leaf absorbed, may persist for 3-6 months in the soil profile.
2,2-DPA	Grass (monocot) selective herbicide suitable for targeting dense weedy grass infestations amongst desirable native vegetation.	Yes (limited)	J	NS	Leaf and root absorbed
<b>* Aquatic reg indicates that formulations of this herbicide may carry and aquatic registration, some formulations do not and individuals should check PUBCRIS prior to assuming they have an aquatically registered formulation. Addition of non-aquatically re...</b>					
Gly	Glyphosate eg. Weedmaster Duo®, Roundup Biactive®				
MM	Metsulfuron methyl eg. Brushhoff®, Brushkiller®, Associate®				
S	Surfactant eg. LI700®, Prosil®, Pulse®				
A	Spray Adjuvant eg. Agral®, Protec®, Codacide®				
D	Colour Marking Dye eg. Herbi (red or blue) Liquid Dye®				

COMMON NAME	SCIENTIFIC NAME	APPLICATION METHOD	CHEMICAL	RATE	ADJUVANT	SURFACTANT	COMMENTS
<b>TREES</b>							
Chinese Celtis	<i>Celtis sinensis</i>	Stem Inject	Glyphosate	1:1.5 Gly:water			
		Cut, Scrape and Paint	Glyphosate	1:1.5 Gly:water			
		Basal Bark (saplings) spot-spray	Fluroxypyr	210ml:10L diesel			
			Glyphosate	200ml:10L water + A + D			
Camphor Laurel	<i>Cinnamomum camphora</i>	Stem Inject	Glyphosate + Metsulfuron Methyl	200mL Gly + 1.5g MM in 10L water + S + A			
		Cut, Scrape and Paint	Glyphosate	1:1.5 Gly:water			
		Basal Bark (saplings)	Fluroxypyr	210ml:10L diesel			
		Spot spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + D			
Cadaghi	<i>Corymbia torelliana</i>	Cut, Scrape and Paint	Glyphosate	200ml:10L water + A + D			
		Stem Inject	Glyphosate	1:1.5 Gly:water			
		Basal Bark (saplings)	Fluroxypyr	210ml:10L diesel			
		Spot spray	Glyphosate	100ml Gly: 10L water + A + D			
Loquat	<i>Eriobotrya japonica</i>	Basal Bark(sapling)	Fluroxypyr	210ml:10L diesel			
		Spot spray	Glyphosate	200ml Gly:10L water +			
		Cut Scrape and Paint	Glyphosate	1:1.5 Gly:water			
		Stem Inject	Glyphosate	1:1.5 Gly:water			
Cockscomb Coral Tree and Coral Tree	<i>Erythrina crista-galli</i> and <i>E. x sykesii</i>	Spot spray	Glyphosate	200ml Gly:10L water + S+A			
		Basal Bark (sapling)	Fluroxypyr	210ml/10L diesel			
		Cut Scrape and Paint	Glyphosate	1:1.5 Gly:water			
		Stem Inject	Glyphosate	1:1.5 Gly:water			
Brazilian cherry	<i>Eugenia uniflora</i>	Cut Scrape and Paint	Glyphosate	neat (undiluted)			
		Stem Inject	Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly:1.5 water			
		Spot Spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + S + D			
		Cut Scrape and Paint	Glyphosate	1:1.5 Gly:water			
Golden Rain Tree	<i>Koeleria elegans; paniculata</i>	Stem Inject	Glyphosate	1:1.5 Gly:water			
		Basal Bark (sapling)	Fluroxypyr	210ml:10L diesel			
		Spot spray	Glyphosate	100ml Gly:10L water + A + D			
		Spot Spray	Glyphosate	200ml Gly:10L water + S+D			
Privet (Large and Small leaved)	<i>Ligustrum lucidum</i> and <i>L.sinense</i>		Metsulfuron methyl	1.5g MM:10L water + A + D			
			Fluroxypyr	30ml:10L water +			
		Cut Scrape and Paint	Glyphosate	1:1.5 Gly:water			
		Stem Inject	Glyphosate	1:1.5 Gly:water			
		Basal Bark (sapling)	Fluroxypyr	210ml:10L diesel			

Mulberry	<i>Morus</i> spp.	Spot Spray Cut Scrape and Paint Stem Inject Basal Bark (Juvenile) Spot Spray Stem Inject Spot Spray	Glyphosate Glyphosate Glyphosate Fluroxypyr Glyphosate Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl	200ml Gly:10L water + S + D 1 Gly:1.5 water 1 Gly:1.5 water 210ml:10L diesel 200ml Gly:10L water + S + D 1g MM added to 1 Gly:1.5 water 200ml Gly + 1.5g MM in 10L water + S + D		
Canary Island Date Palm Guava	<i>Phoenix canariensis</i> <i>Psidium guajava</i>	Cut Scrape and Paint Stem Inject Spot Spray	Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly:1.5 water 1g MM added to 1 Gly:1.5 water 200ml Gly + 1.5g MM in 10L water + A + D 1 Gly:1.5 water 1 Gly:1.5 water (do not stem inject when in flower)		
Umbrella Tree	<i>Schefflera actinophylla</i>	Cut Scrape and Paint Stem Inject	Glyphosate Glyphosate			
Broad-leaf Pepper Tree	<i>Schinus terebinthifolius</i>	Spot Spray	Glyphosate Glyphosate + Metsulfuron Methyl Fluroxypyr	200ml:10L water + S + A 200ml Gly + 1.5g MM in 10L water + S + A 30ml:10L water		
Giant Devils Fig and Wild Tobacco	<i>Solanum chrysotrichum</i> and <i>S. mauritianum</i>	Cut Scrape and Paint Basal Bark (sapling) Stem Inject Spot Spray Cut Scrape and Paint Basal Bark (Juvenile/Mature) Stem Inject	Glyphosate Fluroxypyr Glyphosate Glyphosate Fluroxypyr Glyphosate Fluroxypyr	1 Gly:1.5 water 210ml:10L diesel 1 Gly:1.5 water 150ml Gly:10L water + A + D 30ml/10L water 1 Gly:1.5 water 210ml/10L diesel		
African tulip tree	<i>Spathodea campanulata</i>	Spot Spray Cut Scrape and Paint Stem Inject	Glyphosate Glyphosate Glyphosate	1 Gly:1.5 water 200ml Gly + 1.5g MM in 10L water + A + D 1 Gly:1.5 water 1 Gly:1.5 water		
Cocos palm	<i>Syagrus romanzoffiana</i>	Stem Inject Spot Spray	Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly:1.5 water 200ml Gly + 1.5g MM in 10L water + A + D		
Yellow Bells	<i>Tecoma stans</i>	Cut Scrape and Paint Basal Bark Spot Spray Stem Inject	Glyphosate Fluroxypyr Glyphosate Glyphosate	1 Gly:1.5 water 210ml/10L diesel 150ml Gly: 10L water + A + D 1 Gly:1.5 water		
Tipuana	<i>Tipuana tipu</i>	Cut Scrape and Paint Stem Inject	Glyphosate Glyphosate	1 Gly:1.5 water 1 Gly:1.5 water		

GRASSES						
Creeping Bamboo/ Clumping Bamboo	<i>Arundinaria spp./ Bambusa spp.</i>	Cut and spray (re- growth/seedling)	Glyphosate 2,2-DPA	100ml Gly: 10L water + D 150g:10L water		
		Cut stump and fill segment	Glyphosate	1 Gly:1.5 water		
Broad-leaved carpet grass, Narrow-leaved carpet grass, Para grass, Mosman River grass , Pangola grass, Guinea grass, Rhodes grass, Molasses grass, Sour grass, Paspalum, Bahia grass, Vasey grass, Broad-leaf paspalum, Kikuyu grass, Bana grass, Elephant grass	<i>Axonopus compressus, A. fissifolius, Brachiaria mutica, Cenchrus echinatus, Chloris gayana, Digitaria eriantha, Megathyrsus maximus, Melinis minutiflora, Paspalum conjugatum, P. dilatatum, P. notatum , P. urvillei, P. wettsteinii , Pennisetum clandestini</i>	Spot Spray	Glyphosate	100ml Gly:10L water + D		
Herbs						
Agave/Century plant	<i>Agave americana</i>	Cut Scrape and Paint	Glyphosate	1 Gly:1.5 water		
		Stem Inject	Glyphosate	1g MM added to 1 Gly:1.5 water		
Crofton weed	<i>Ageratina adenophora</i>	Spot Spray	Glyphosate	100ml Gly:10L water + D		
Mistflower	<i>Ageratina riparia</i>	Spot Spray	Metsulfuron methyl	1/2 - 1g MM: 10L water + D		
			Glyphosate	100ml Gly:10L water + D		
Blue billy-goat weed	<i>Ageratum houstonianum</i>	Spot Spray	Metsulfuron methyl	100ml Gly:10L water + D		
			Glyphosate	1g MM: 10L water + D		
Ragweed	<i>Ambrosia artemisiifolia</i>	Spot Spray	Fluroxypyr	30ml/10L water		
			2-4-D	30ml/10L water		
			Glyphosate	100ml gly:10L water + A + D		
			Metsulfuron methyl	1.5g MM: 10L water + A + D		
Cobblers pegs	<i>Bidens pilosa var. pilosa</i>	Spot Spray	Fluroxypyr	30ml/10L water		
			2, 4-D	30ml/10L water		
			Glyphosate	100ml Gly: 10L water + A + D		
			Metsulfuron methyl	1g MM: 10L water + A + D		
Mother of Millions; Live Leaf Plant; Resurrection Plant	<i>Bryophyllum delagoense; Pinnatum Bryophyllum delagoense</i>	Spot Spray	2, 4-D	50ml/10L water		
			Metsulfuron methyl	1.5g MM:10L water + S + D		
Purple/Green Succulent, Inch Plant	<i>Callisia fragran; repens</i>	Spot Spray	Fluroxypyr	90ml/10L water		
			Metsulfuron methyl	1.5g MM:10L water + S + D		
			Glyphosate	200ml Gly:10L water + A + D		
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		

Hairy Commelina; Trad (wandering Jew); Purple Succulent; Striped Trad	<i>Commelina benghalensis</i> ; <i>Tradescantia fluminensis</i> / <i>albiflora</i> ; <i>Tradescantia pillida</i> ; <i>Zebra</i> <i>pendula</i> syn <i>Tradescantia zebrina</i>	Spot Spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
			Glyphosate	200ml Gly:10L water + A + D		
			Metsulfuron methyl	1.5g MM: 10L water + S + D		
			Fluroxypyr	90ml/10L water		
Glory lilly	<i>Gloriosa superba</i>	Foliar Spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
Polka dot plant	<i>Hypoestes phylllostachya</i>	Spot Spray	Metsulfuron methyl	1.5g MM:10L water + S + D		
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
Fish bone fern	<i>Nephrolepis cordifolia</i>	Spot Spray	Metsulfuron methyl	1g MM: 10L + A/S + D		
Coral berry	<i>Rivinia humilis</i>	Spot Spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
			Glyphosate	100ml Gly: 10L water + A + D		
Mother-in-law's tongue	<i>Sansevieria trifasciata</i>	Spot Spray	Glyphosate + Metsulfuron Methyl	100ml Gly + 1.5g MM in 10L water + A + D		
Flannel Weed	<i>Sida cordifolia</i>	Spot Spray	Fluroxypyr	200ml Gly + 1.5g MM in 10L water + A + D		
Ground Asparagus	<i>Asparagus aethiopicus</i>	Spot Spray	Metsulfuron Methyl	60ml/10L water		
Singapore Daisy	<i>Sphagneticola trilobata</i>	Spot Spray	Glyphosate + Metsulfuron Methyl	1.5g MM : 10L water + A + D		
			Metsulfuron methyl	200ml Gly + 1.5g MM in 10L water + A/S + D		
			Glyphosate + Metsulfuron Methyl	1.5g MM in 10L water + A + D		
<b>SHRUBS</b>						
Groundsel bush	<i>Baccharis halimifolia</i>	Spot Spray	2,4-D	40ml/10L water		
			Glyphosate	200ml Gly:10L water + A + D		
			Glyphosate	1 Gly:1.5 water		
			Glyphosate	1 Gly:1.5 water		
Green cestrum	<i>Cestrum parqui</i>	Spot Spray	Glyphosate	200ml Gly:10L water + A + D		
			Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
			Glyphosate	200ml Gly:10L water + A + D		
Duranta	<i>Duranta erecta</i>	Overall Spray (re-growth/seedling)	Glyphosate	1 Gly:1.5 water		
			Glyphosate	1 Gly:1.5 water		
			Glyphosate	1 Gly:1.5 water		
Lantana	<i>Lantana camara</i>	Spot Spray	Glyphosate	40ml/10L (spring, summer)-60ml/10L water (Autumn, Winter)		
			Fluroxypyr	100ml Gly:10L water + D		
			Glyphosate	100ml Gly:10L water + D		
			Glyphosate	200ml Gly:10L water + A + D		
Splatter Gun		Splatter Gun	Glyphosate	1 Gly:9 water		

Leucaena	<i>Leucaena leucocephala</i>	Cut Scrape and Paint Spot Spray	Glyphosate Fluroxypyr	1 Gly:1.5 water 30ml/10L water			
<b>HERBS</b>							
Murraya	<i>Murraya paniculata</i>	Spot Spray Cut Scrape and Paint Stem Inject	Glyphosate Glyphosate Glyphosate	200ml Gly:10L water + A + D 1 Gly:1.5 water 1 Gly:1.5 water			
Mickey mouse bush	<i>Ochna serrulata</i>	Basal Bark Spot Spray Spot Spray Scrape (lightly) and Paint - juvenile	Fluroxypyr Fluroxypyr Glyphosate + Metsulfuron Methyl Glyphosate	210ml/10L diesel 30ml/10L water 200ml Gly + 1.5g MM in 10L water + A/S + D neat (undiluted)			
Prickly pear	<i>Opuntia Spp.</i>	Cut Drill and Fill - mature Spot Spray Cut Scrape and Paint in horizontal cuts across flat stems	Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl Glyphosate + Metsulfuron Methyl	1g MM added to 1 Gly:1.5 water 100ml Gly + 1.5g MM in 10L water + A + D 1g MM added to 1 Gly:1.5 water			
Castor Oil Plant	<i>Ricinus communis</i>	Spot Spray	2,4-D Glyphosate	45ml/10L water 100ml/ 10L water			
Easter Cassia/ Winter Senna	<i>Senna pendula var. glabrata</i>	Cut Scrape and Paint Stem Inject Spot Spray Cut and Paint	Glyphosate Glyphosate Glyphosate Glyphosate	1g MM added to 1 Gly:1.5 water 1g MM added to 1 Gly:1.5 water 200ml Gly:10L water + A + D 1 Gly:1.5 water			
Smooth senna	<i>Senna septemtrionalis</i>	Stem Inject (Mature) Spot Spray Cut and Paint Stem Inject	Glyphosate Glyphosate Glyphosate Glyphosate	1 Gly:1.5 water 1 Gly:1.5 water 200ml Gly:10L water + A + D 1 Gly:1.5 water			
Yellow Oleander	<i>Thevetia peruviana</i>	Basal Bark Spot Spray Cut Scrape and Paint Stem Inject	Fluroxypyr Glyphosate Glyphosate Glyphosate	210ml/10L Diesel 200ml Gly:10L water + A + D 1 Gly:1.5 water 1 Gly:1.5 water			
<b>VINES</b>							
Madeira Vine	<i>Anredera cordifolia</i>	Spot Spray Spot Spray Scrape and Paint (mature vines)	Fluroxypyr Glyphosate + Metsulfuron Methyl Glyphosate	30ml/10L water 200ml Gly + 1.5g MM in 10L water + A/S + D Scrape as much stem as possible in 1m lengths on alternate sides. Gouge and paint ground tubers. Scrape and paint roots			
Moth vine	<i>Araujia sericiflora</i>	Spot Spray Cut Scrape and Paint	Glyphosate + Metsulfuron Methyl Glyphosate (aerial)	200ml Gly + 1.5g MM in 10L water + A + D 1 Gly:1.5 water			

Dutchman's pipe	<i>Aristolochia elegans</i>	Spot Spray	Glyphosate + Metsulfuron Methyl	200ml Gly + 1.5g MM in 10L water + A + D		
Climbing Asparagus	<i>Asparagus africanus; plumosus</i>	Cut Scrape and Paint Basal Bark Spot Spray	Glyphosate Fluroxypyr Glyphosate	1 Gly:1.5 water 210ml/ 10L diesel 200ml Gly:10L water + A + D		
Balloon Vine	<i>Cardiospermum grandiflorum</i>	Cut Scrape and Paint Spot Spray	Glyphosate Glyphosate	1 Gly:1.5 water 100ml Gly:10L water + D		
Green/ Silver-leaf desmodium; Siratro; Horesgram; Glycine	<i>Desmodium intortum; Macropitilium atropurpureum; Macrotyloma uniflorum; Neonotonia wightii</i>	Spot Spray	Glyphosate 2,4-D	200ml Gly:10L water + A + D 40ml/10L water		
Moon flower; Mile-a-minute; Morning Glory; Blue Morning Glory	<i>Ipomoea alba; I. cairica; I. indica and I.purpurea</i>	Spot Spray	Glyphosate + Metsulfuron Methyl 2, 4-D	100ml Gly + 1.5g MM in 10L water + A + D 30ml/10L water		
Creeping Lantana	<i>Lantana montevidensis</i>	Cut Scrape and Paint Spot Spray	Glyphosate 2,4-D	1 Gly:1.5 water 40ml/10L water		
Cat's Claw Creeper	<i>Macfadyena unguis-cati</i>	Spot Spray	Glyphosate + Metsulfuron Methyl Metsulfuron methyl	100ml Gly + 1.5g MM in 10L water + A + D 1.5g MM : 10L water + A + D		
Edible passionfruit; Stinking Passionflower; Corky Passionfruit; White Passionfruit	<i>Passiflora edulis; foetida; suberosa; subpeltata</i>	Spot Spray	Glyphosate Glyphosate	100ml Gly : 10L water + S + D 100ml Gly + 1g MM:10L water + A + D		
Kudzu	<i>Pueraria lobata</i>	Cut Scrape and Paint Spot Spray	Glyphosate Glyphosate + Metsulfuron Methyl Fluroxypyr	1 Gly:1.5 water 100ml Gly + 1.5g MM in 10L water + A + D 30ml/10L water		
Climbing nightshade	<i>Solanum seaforthianum</i>	Gouge and Paint tubers Stem Inject Spot Spray	Glyphosate Glyphosate + Metsulfuron Methyl Fluroxypyr	1 Gly:1.5 water 1/1 (g) + 1g (MM) Per Litre of water 30ml/10L water		
Black eyed susan	<i>Thunbergia alata</i>	Cut Scrape and Paint Spot Spray Basal Bark Cut Scrape and Paint	Glyphosate Glyphosate Glyphosate Metsulfuron methyl Fluroxypyr Glyphosate	100ml Gly : 10L water + A + D 1 Gly:1.5 water 30ml/10L water 200mL in 10L water 1.5g in 10L water 210ml/ 10L diesel 1 Gly:1.5 water		