

# Habitat

i n f o r m a t i o n

i n t e g r a t i o n

i n n o v a t i o n

## CONCEPTUAL REHABILITATION MANAGEMENT PLAN

Gainsborough Greens

Cnr Yawalpah Road and  
Kerkin Road North  
Pimpama Queensland

June 2016

**Habitat Environment  
Management Trading Pty  
Ltd**

ABN 46 147 085 005

PO Box 1141  
NERANG Qld 4211

P: 07 5535 0999  
F: 07 5535 0888

[info@habitat.net.au](mailto:info@habitat.net.au)  
[www.habitat.net.au](http://www.habitat.net.au)



ABN 46 147 085 005



**CERTIFICATE OF APPROVAL FOR ISSUE OF DOCUMENTS**

<b>Document No</b>	6300S_Gainsborough Greens_CRMP_6
<b>Title</b>	Conceptual Rehabilitation Management Plan (CRMP) - Gainsborough Greens, Cnr Yawalpah Rd and Kerkin Rd Nth, Pimpama, Queensland
<b>Client</b>	Mirvac Pacific Pty Ltd
<b>Date of Issue</b>	June 2016

	<b>Name</b>	<b>Signature</b>	<b>Date</b>
Prepared by:	Claire Arthur		06/2016
Reviewed by:	Matt Keys		06/2016
Approved by:	Matt Keys		06/2016

**DOCUMENT STATUS:**

<b>Version</b>	<b>Author</b>	<b>Reviewer</b>	<b>Date</b>
0 (Draft)	Ben Pascoe	Matt Keys	03/2012
1	Ben Pascoe	Matt Keys	04/2012
2	Ben Pascoe	Matt Keys	06/2012
3	Ben Pascoe	Matt Keys	10/2012
4	Ben Pascoe	Matt Keys	11/2012
5	Ben Pascoe	Matt Keys	05/2013
6	Ben Pascoe	Matt Keys	05/2014
7	Claire Arthur	Matt Keys	06/2016

**DISTRIBUTION:**

<b>Attention</b>	<b>Organisation</b>	<b>Comment</b>	<b>Copy Nos.</b>
Richard Laws	Mirvac Pacific Pty Ltd		1-3
Matt Keys	Habitat	Archive	4

**RELEASE STATUS:**

<b>Confidential:</b>	© Copyright Habitat Environment Management (Trading) Pty Ltd
----------------------	--

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
1.1	Intent Statement.....	1
1.2	Location and Site Description .....	1
2.0	ECOLOGICAL VALUES .....	3
2.1	Vegetation Communities .....	3
2.2	Ecologically Significant Areas .....	3
3.0	REVEGETATION AND REHABILITATION.....	5
3.1	Weed removal .....	11
3.2	Revegetation Program .....	11
3.3	Acid Sulfate Soils.....	12
3.4	Habitat Rehabilitation Strategies.....	13
3.5	Creation of Buffers .....	13
3.5.1	Ecologically Significant Areas .....	13
3.5.2	Waterways.....	14
3.6	Habitat Creation.....	15
3.7	Habitat Enhancement.....	19
4.0	Surrounding Rehabilitation Work.....	20
4.1	Hotham Creek .....	20
4.2	Scribbly Gum Forest.....	20
4.3	Melaleuca Wetland .....	21
4.4	Northern Conservation Corridor.....	21
5.0	QUALITY OF OPEN SPACE .....	21
5.1	Establishment Period.....	21
5.2	On Maintenance Period.....	21
5.3	Off Maintenance Period .....	21
6.0	CONCLUSION .....	24
7.0	REFERENCES.....	25

## LIST OF APPENDICES

Appendix A: Master Species Lists .....	A
Appendix B: Weed Control Techniques.....	B

## LIST OF FIGURES

Figure 1: Location of Gainsborough Greens .....	2
Figure 2: Vegetation Communities and Natural Features .....	4
Figure 3: Precinct 6 Rehabilitation Areas.....	7
Figure 4: Linked Residential Areas .....	8
Figure 5: Frog Habitat Rehabilitation Areas.....	9
Figure 6: Koala Habitat Rehabilitation Areas.....	10
Figure 7: Gainsborough Greens Wildlife Corridors .....	17
Figure 8: Focus Area .....	18

## 1.0 INTRODUCTION

Habitat Environment Management Trading Pty Ltd ('Habitat') was engaged by Mirvac Pty Ltd ('the client') to prepare a Conceptual Rehabilitation Management Plan (CRMP) for the Gainsborough Greens development ('the site'). The CRMP demonstrates how fauna movement and habitat will be maximised within Precinct 6 - Golf Course. This CRMP is required to be submitted and approved concurrent with the next development application for residential subdivision of any Precincts (except Precinct 2) in accordance with Condition 15 of the Section 3.1.6 Preliminary Approval.

The CRMP has been prepared to provide the overall rehabilitation intent for Precinct 6. Precinct 6 has been divided into rehabilitation areas which are linked to adjoining residential precincts. Detailed Rehabilitation Management Plans will be required in response to differing site conditions for each residential precinct linked to a rehabilitation area as illustrated in **Figure 4**. It is intended that the CRMP will inform the future detailed Rehabilitation Management Plans.

### 1.1 Intent Statement

Precinct 6 is primarily a golf course and consideration will be given to this along with fauna movement and habitat protection in the ultimate design of the precinct. It is recognised that there are opportunities to enhance the ecological values of the site through the design of the golf course. It is intended that the framework presented within this CRMP will inform detailed Rehabilitation Management Plans for each stage of development to maximise the opportunity for fauna movement and habitat protection.

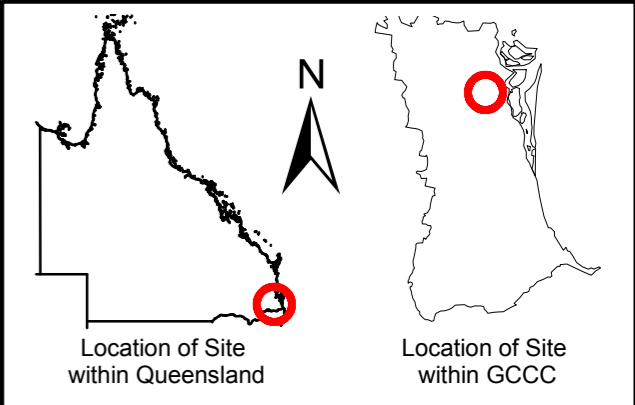
Rehabilitation will generally occur in the following locations:

- Conservation Areas and habitat restoration areas identified within previous plans and approvals;
- proposed Open Space areas;
- between Golf Course fairways;
- within buffers to Ecologically Significant Features;
- within buffers along natural waterways and wetlands; and
- within identified corridors to enhance wildlife movement on a local and regional scale.

The areas of the site subject to rehabilitation are illustrated within the Divisions shown in **Figure 3**.

### 1.2 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. Yawalpah Road runs along the southern boundary of the site, with the eastern and western boundaries bounded by Kerkin Road and Swan Road respectively. The northern boundary of the site is characterised by rural properties. Gainsborough Greens is located west of large intact Habitat systems and conservation reserves. It is intended to ensure that Gainsborough Greens provides a natural extension to these environmentally significant areas. **Figure 1** illustrates the extents of the site.



**Legend**

- Gold Coast City North Cadastre (2006)
- Gainsborough Greens

Figure 1:  
Location of Gainsborough Greens

Client:  
Mirvac Pty Ltd

Address:  
Gainsborough Greens Golf Course  
Yawalpah Road,  
PIMPAMA QLD

Habitat Environment Management uses Regional Ecosystem Data supplied by Environmental Protection Agency (EPA 2005). The data remains the property of the State of Queensland. The state does not warrant that the data does not contain errors and shall not be liable for any loss, damage or injury by any person, corporation agency or client consequent upon the existence of errors in the data. Data used in Habitat Environment Management 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: NearMap, DERM
Drawn: BP	Date: 04.10.2011	
Checked: MK	Job Number: 6300SB	
		PO Box 1141 NERANG QLD 4211 Ph:(07) 5596 3355 Fax:(07) 5578 1623 info@habitat.net.au



## 2.0 ECOLOGICAL VALUES

### 2.1 Vegetation Communities

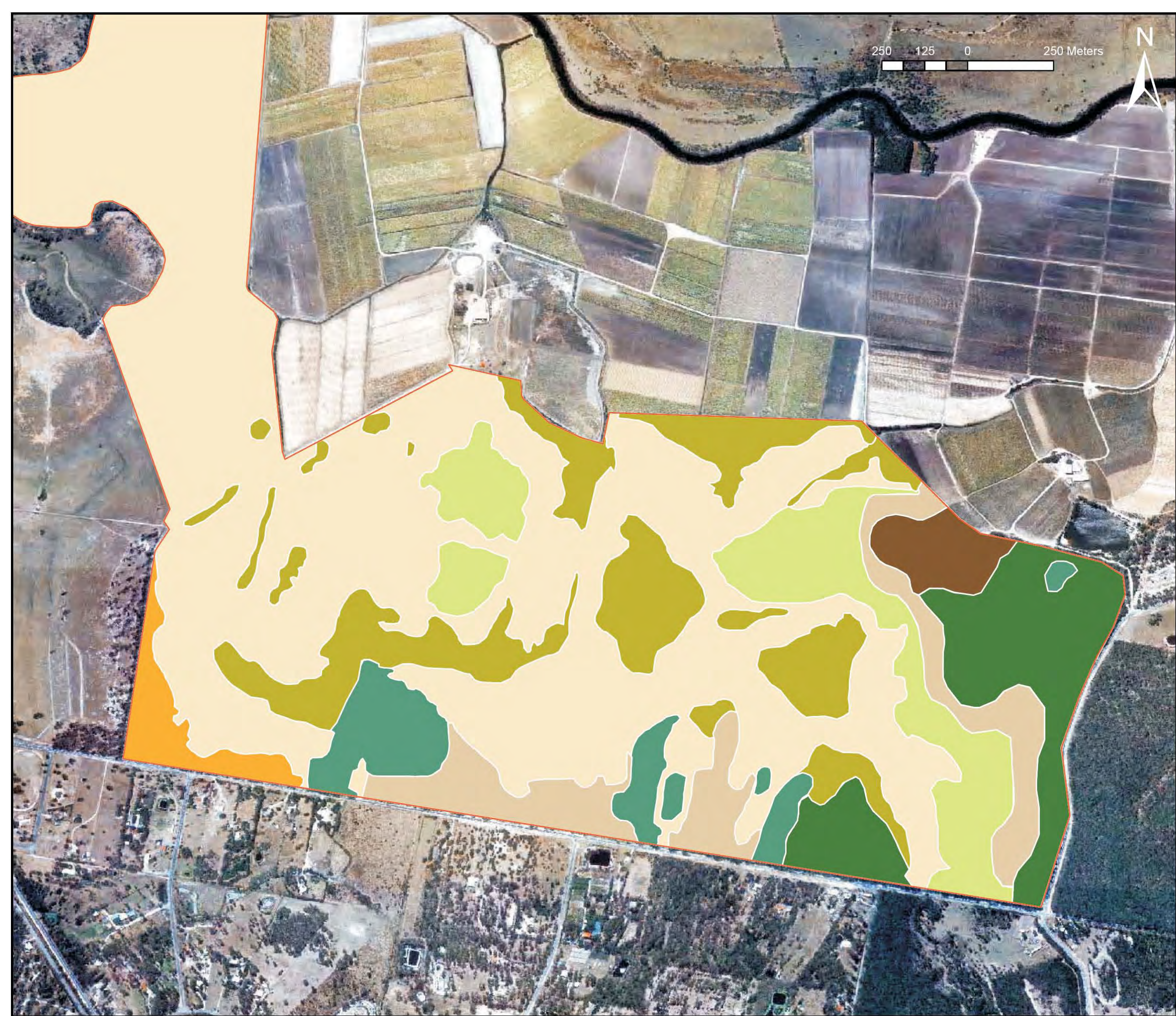
The Integrated Ecological Management Plan prepared by Habitat in March 2007, contains detailed and accurate descriptions of the Vegetation communities within the site. The vegetation communities have been compiled through Aerial Photograph Stereoscope Analysis and through the utilisation of tertiary vegetation survey methods as described by Environmental Protection Agency (Nelder *et al* 2004). With reference to **Figure 2**, the communities are described as;

1. Open Forest of *Eucalyptus racemosa* in association with mosaic of canopy species analogous to RE 12.11.5;
2. Open Forest with mixed canopy *Eucalyptus tindaliae*, *Eucalyptus carnea* *E. siderophloia*, *E. seeana*, *Corymbia intermedia*, *Lophostemon Confertus* and *Eucalyptus microcorys*;
3. Open Forest of *Melaleuca quinquenervia*, *Casuarina glauca* with *Eucalyptus tereticornis* and *Lophostemon suaveolens*;
4. Dry Sclerophyll forest and woodland dominated by *Eucalyptus tereticornis*, *Lophostemon suaveolens*, *Eucalyptus siderophloia* and some *Melaleuca quinquenervia* (quite degraded);
5. Open forest and Scattered Patches of *Casuarina glauca* with slashed/mowed understorey throughout the golf course and scrubby weedy understorey in dense patches;
6. Regrowth area, lower contours contain mainly *Melaleuca quinquenervia*, *Lophostemon suaveolens*, *Casuarina glauca*. Higher contours with *Allocasuarina littoralis*, *Acacia spp*, *Eucalyptus spp.*;
7. Dry Sclerophyll woodland with mixed canopy of *Eucalyptus siderophloia*, *Lophostemon confertus*, *Corymbia citriodora*, *C. intermedia* and *Lophostemon suaveolens*; and
8. Mainly grasslands with scattered acacia, eucalypt and casuarina species with golf course fair ways, exotic gardens and existing infrastructure throughout.

**Appendix A** includes a master species lists for native vegetation occurring within the site.

### 2.2 Ecologically Significant Areas

A number of areas within the Gainsborough Greens development have previously been identified as Ecologically Significant Areas. The Scribbly Gum Forest in the north east portion of the site, the Melaleuca Wetlands in the south western portion of the site, and the Hotham Creek Oxbow Wetlands are to be retained and rehabilitated as part of the overall rehabilitation strategy of the site. These areas are external to Precinct 6 and do not form part of this Conceptual Rehabilitation Management Plan however, for completeness of information, details of their rehabilitation have been included herein.



**Legend**

- Subject Site
- Vegetation Community 1  
Open Forest of *Eucalyptus racemosa* in association with mosaic of canopy species analogous to RE 12.11.5.
- Vegetation Community 2  
Open Forest of with mixed canopy *Eucalyptus tinidiae*, *Eucalyptus carnea*, *E. siderophloia*, *E. seana*, *Corymbia intermedia*, *Lophostemon confertus* and *E. microcorys*
- Vegetation Community 3  
Open Forest of *Melaleuca quinquenervia*, *Casuarina glauca* with *Eucalyptus tereticornis* and *Lophostemon suaveolens*
- Vegetation Community 4  
Dry Sclerophyll forest and woodland dominated by *Eucalyptus tereticornis*, *Lophostemon suaveolens*, *Eucalyptus siderophloia* and some *Melaleuca quinquenervia* (quite degraded)
- Vegetation Community 5  
Open Forest and Scattered Patches of *Casuarina glauca* with slashed/mowed understorey throughout the golf course and scrubby weedy understorey in denser patches.
- Vegetation Community 6  
Regrowth area, lower contours contain mainly *Melaleuca quinquenervia*, *Lophostemon suaveolens*, *Casuarina glauca*. Higher contours with *Allocasuarina littoralis*, *Acacia* spp, *Eucalyptus* spp.
- Vegetation Community 7  
Dry Sclerophyll Woodland with mixed canopy of *Eucalyptus siderophloia*, *Lophostemon confertus*, *Corymbia citrodora*, *Corymbia intermedia* and *Lophostemon suaveolens*
- Vegetation Community 8  
Mainly grasslands with scattered acacia, eucalypt and casuarina species with golf course fair ways, exotic gardens and existing infrastructure throughout

**Figure 2:**  
Vegetation Communities

**Client:**  
Mirvac Pacific Pty Ltd

**Address:**  
Gainsborough Greens Golf Course  
Lot 1 RP226762, Lot 2 RP803861,  
Lot 1 RP55470, Lot 1 RP 48903,  
Lot 2 RP29966, Lot 138 W312339,  
Yawalpah Road, Pimpama, QLD

Data used in Habitat Environment Management 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.

Habitat Environment Management uses Regional Ecosystem Data supplied by Environmental Protection Agency (EPA 2005). The data remains the property of the State of Queensland. The state does not warrant that the data does not contain errors and shall not be liable for any loss, damage or injury by any person, corporation, agency or client consequent upon the existence of errors in the data.

Scale: 1:10000	Paper: A3	
Drawn: JS	Date: 14.03.07	Reference: EPA 2005 NRW 2006
Checked: MK	Date: 14.03.07	Job Number: 30711R

**Habitat**  
ENVIRONMENT MANAGEMENT

3 Nerang Street  
PO Box 1020  
Southport QLD 4215  
Ph:(07) 5532 6767  
Fax:(07) 5532 4747  
Info@habitat.net.au



### 3.0 REVEGETATION AND REHABILITATION

Revegetation works will be conducted across Precinct 6 of the Gainsborough Greens development in accordance with the rehabilitation areas identified in **Figure 3**. Rehabilitation Areas within Precinct 6 are divided into three different intent categories including Wetland Rehabilitation Areas, Golf Course Rehabilitation Areas, and General Rehabilitation Areas. Existing and proposed natural and man-made waterways and permanent water bodies are also shown. It should be noted that **Figure 3** also incorporates Conservation Areas outside of Precinct 6, which have been included to demonstrate how they relate to the works within Precinct 6.

Waterways will be rehabilitated along the banks with suitable riparian vegetation to enhance fauna habitat and provide a buffer to prevent erosion while providing the necessary drainage channels. Wetland Rehabilitation Areas occur in low lying areas surrounding residential areas. These areas will utilise appropriate species to enhance fauna habitat for the Wallum froglet while providing the necessary flood storage for the development. Golf Course Rehabilitation Areas are those areas of the Golf Course playing fields that will be enhanced for fauna habitat and stepping stones through the precinct while maintaining playable fairways. General Rehabilitation Areas occur in areas designated as Precinct 6 but which do not form part of the Golf Course playing fields and will therefore be rehabilitated to create a more natural structure in accordance with the pre-existing Regional Ecosystem.

Rehabilitation will occur on a staged basis in accordance with the Linked Residential Areas identified in **Figure 4**. As each precinct progresses, the corresponding rehabilitation area will be required to be completed by condition of approval of that precinct. Revegetation will be undertaken in accordance with the provisions of this CRMP with further detail to be provided within Detailed Rehabilitation Management Plans submitted with each future application.

In accordance with the Conditions of the Preliminary Approval, the CRMP will be submitted and approved concurrent with the next development application for residential subdivision of any precinct except Precinct 2 which is not subject to the provisions of the Preliminary Approval. Detailed Rehabilitation Management Plans for each divided part of Precinct 6, as shown in **Figure 4**, will be submitted in conjunction with the application for a development permit for the residential subdivision of the Linked Residential Area. All works required by the Detailed Rehabilitation Management Plans will be undertaken and established prior to sealing of the first stage of the subdivision plan for the Linked Residential Area.

Subsequent to detailed site investigations, it has been determined that the overall revegetation and rehabilitation of the Gainsborough Greens Development should focus on the following key objectives:

- Rehabilitation and habitat improvement within existing vegetation in proposed open space areas;
- Re-establishing vegetated buffers to Ecologically Significant Features;
- Re-establishing vegetated buffers along natural waterways and wetlands; and

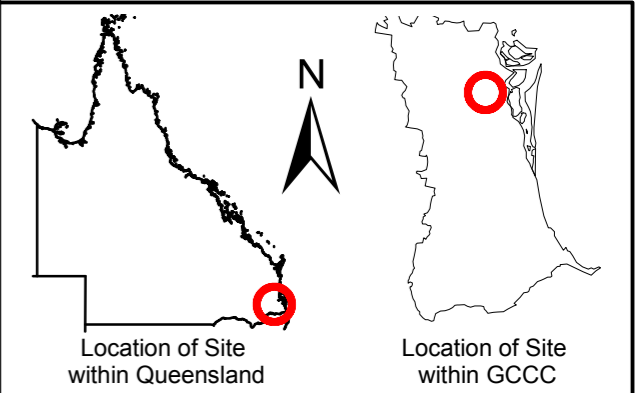
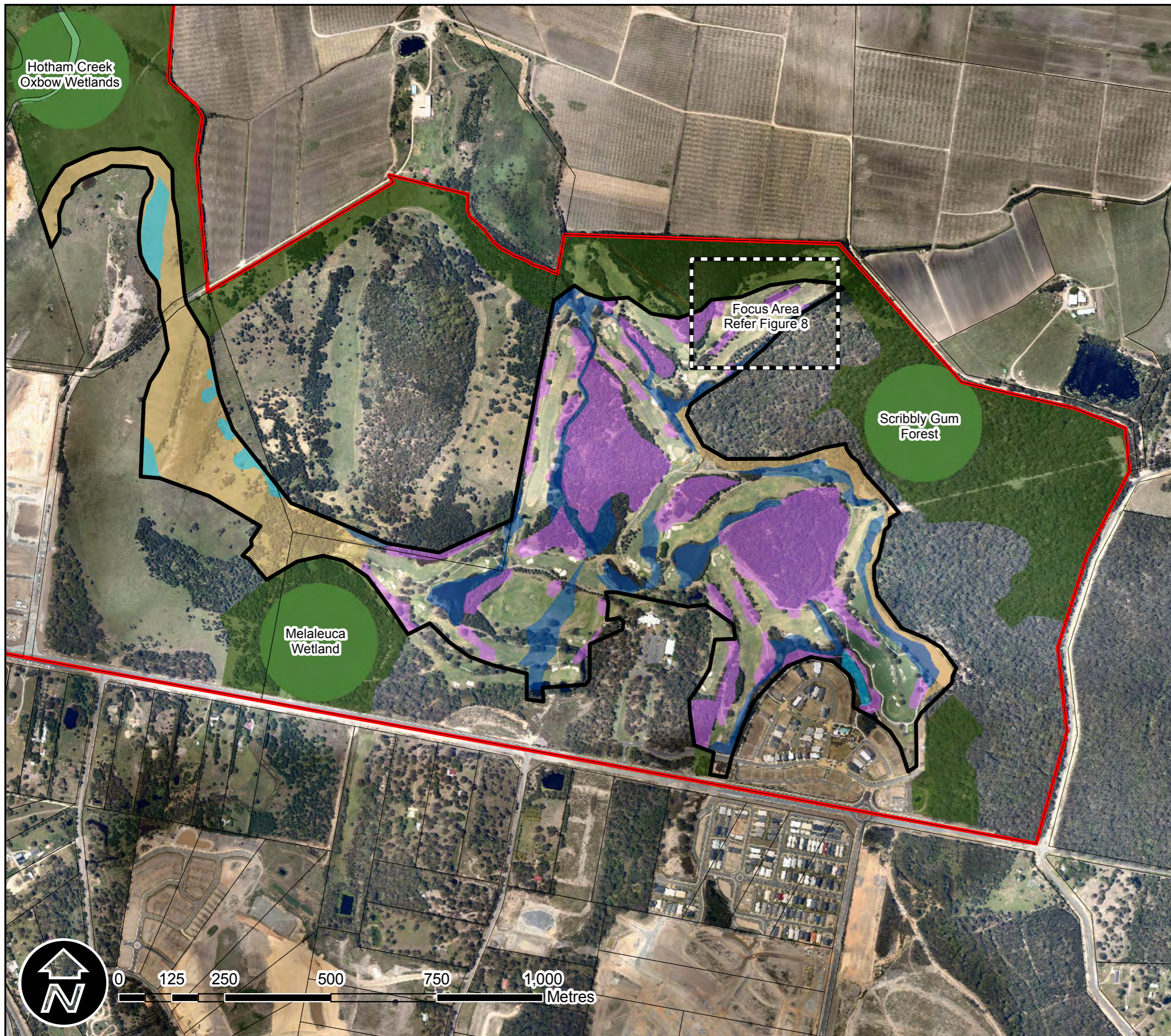
- Establishment of habitat linkages on site to enhance wildlife movement on a local and regional scale.

The rehabilitation program works component of the CRMP should comprise weed removal, natural regeneration, revegetation and an ongoing maintenance regime. Weed removal, natural regeneration and supplementary planting will be focussed on areas of retained vegetation, ie. the remaining areas of *Casuarina glauca* forest. Weed removal, concentrated revegetation and maintenance will be required for creation of additional habitat, wildlife corridors and buffer zones.

In the northern portion of the site, at the pinch point between the Scribbly Gum Forest and the Northern Conservation Corridor, there are proposed to be rehabilitation works to improve the fauna corridor function in this 'Focus Area' (**Figure 3**). This area will incorporate some ground layer planting such as *Lomandra longifolia* under existing trees between fairways to assist small ground dwelling fauna to move and take refuge. Multiple movement opportunities across the waterway are proposed by the use of fallen logs placed across the creek and planting on the golf course side to provide cover. Existing vegetation will be enhanced to reduce exposed areas and effectively widen the pinch point without decreasing golf course function. Additional koala feed trees will be planted at the fringes of existing vegetation to reduce the distance of travel and entice movement across the golf course.

Various areas of rehabilitation and management from previous reports and approvals are incorporated into this CRMP. The identified areas of habitat restoration (inclusive of Essential Habitat, Water Buffer and Possible Offset Areas), as proposed on the *Gainsborough Greens Constraints Mapping Frog Habitat Rehabilitation*, Job number C4564-PP11 Sheet 1 of 1 by THG and dated 3 April 2007 are incorporated within **Figure 5**. The identified areas of habitat restoration (inclusive of high, medium and low value areas of existing habitat and areas suitable for rehabilitation), as proposed on the *Gainsborough Greens Constraint Mapping Koala Habitat Rehabilitation*, Job number C4564-PP12 Sheet 1 of 1 by THG and dated 3 April 2007, are incorporated within **Figure 6**. Management details and recommendations from the approved Acid Sulfate Soils Management Plan are incorporated within **Section 3.3**.

The following sections will discuss the processes required as part of the rehabilitation of Gainsborough Greens including weed removal, revegetation and maintenance, and Acid Sulfate Soils management.



- Legend**
- Gold Coast City North Cadastre (2006)
  - Site Locality
  - Precinct 6 Golf Course
  - Waterways
  - Wetland Rehabilitation Areas
  - Golf Course Rehabilitation Areas
  - General Rehabilitation Areas
  - Conservation Areas

Figure 3:  
Precinct 6 Rehabilitation Areas

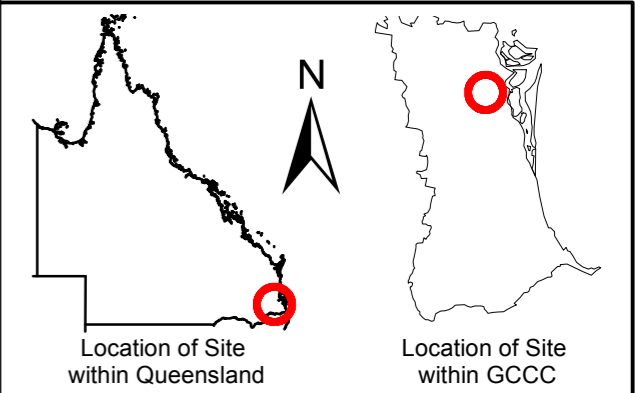
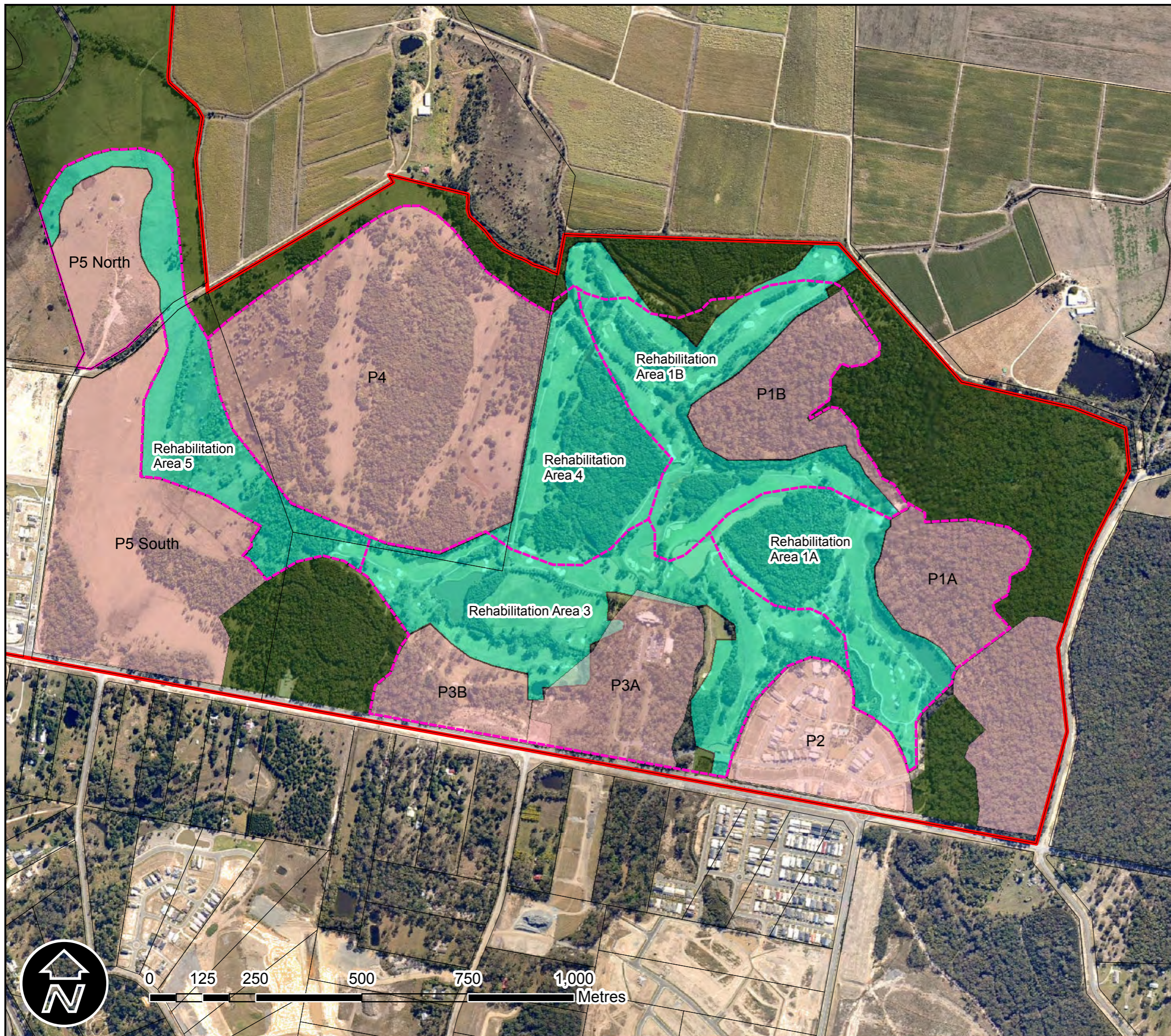
Client:  
Mirvac Pty Ltd

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: October 2012	
Checked: BP	Job Number: 6300S	PO Box 1141 NERANG QLD 4211 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**



- Legend**
- Gold Coast City North Cadastre (2006)
  - Linked Residential Areas
  - Site Locality
  - Residential Precincts
  - Precinct 6 Golf Course
  - Conservation Areas

Figure 4:  
Precinct 6 Rehabilitation - Linked Residential Areas

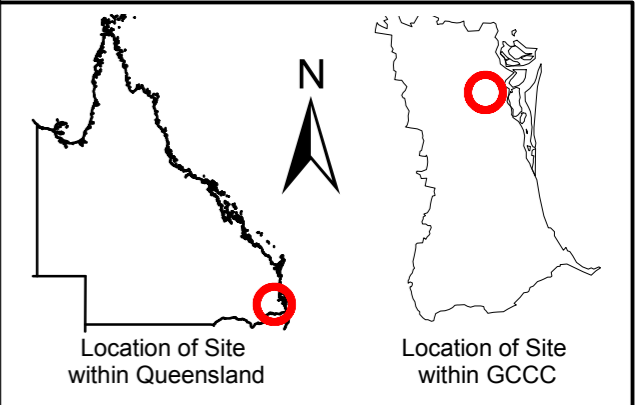
Client:  
Mirvac Pty Ltd

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: BP	Date: May 2014	
Checked: MK	Job Number: 6300S	PO Box 47 BURLEIGH HEADS QLD 4220 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**



- Legend**
- Gold Coast City North Cadastre (2006)
  - Site Locality
  - Precinct 6 Golf Course
  - Essential Habitat (Wallum Froglet)
  - Water Buffer (Wallum Froglet)
  - Possible Offset Areas (Wallum Froglet)

Figure 5:  
Frog Habitat Rehabilitation Areas

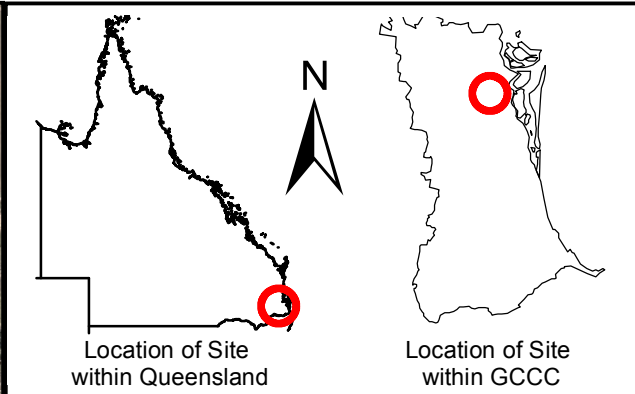
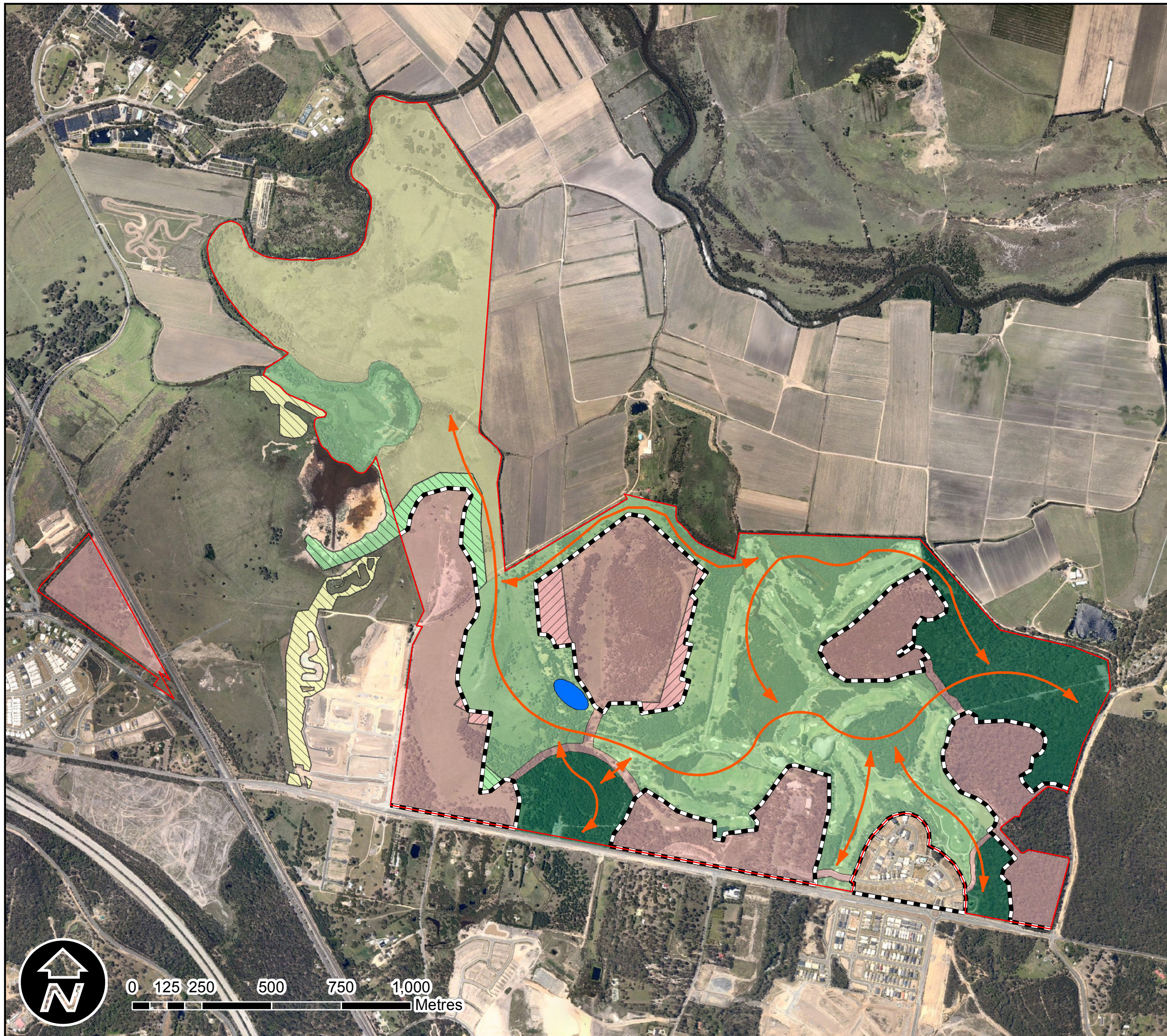
Client:  
Mirvac Pty Ltd

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: June 2012	
Checked: BP	Job Number: 6300S	PO Box 1141 NERANG QLD 4211 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**



**Legend**

- Site Outline
- ↔ Wildlife Corridors
- Koala Exclusion Fencing
- Development Footprint (111.4ha)

**Additional/changed areas of offset**

**Type of Change**

- Additional Development Footprint
- Additional Enhanced Habitat
- Additional New Habitat Created
- Indicative area of additional clearing (1.3ha)

**Koala Habitat Rehabilitation**

- Retained Habitat (40 ha)
- Enhanced Habitat (139.6 ha)
- New Habitat Created (80.9 ha)

Figure 6:  
Koala Habitat Rehabilitation Areas

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: CA	Date: June 2016	
Checked: MK	Job Number: 6300SB	PO Box 47 BURLEIGH HEADS QLD 4220 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**



### 3.1 Weed removal

A number of invasive and environmental weed species occur within the site. **Appendix B** outlines the invasive species to be controlled on the site, together with their status under the *Land Protection (Pest and Stock Route Management) Regulation 2003*, ranked invasiveness according to Queensland Department of Environment and Resource Management (DERM) Environmental Weeds List (2002), and the recommended control techniques.

Due to the large area involved in the Gainsborough Greens project, all weed removal works will be conducted in a staged manner in accordance with this Conceptual Rehabilitation Management Plan and relevant detailed Rehabilitation Management Plans.

### 3.2 Revegetation Program

It is recommended that revegetation be undertaken in disturbed areas, areas where weed removal has resulted in cleared sections of forest, buffers, within Precinct 6 to enhance the existing vegetation on the study site and create additional habitat and linkages.

The CRMP seeks to deliver an ecological outcome whereby the Gainsborough Greens development acts as a valuable reserve for both native flora and fauna. This will be achieved by utilisation of the conservation reserves created within the development footprint, the Golf Course open space and other areas of general rehabilitation. Collectively, these environmental assets will provide a valuable connection to existing natural areas adjacent to the site. The existing natural areas to the east across Kerkin Road and to the north-west beyond Hotham Creek will ultimately retain fauna connectivity through the Gainsborough Greens development.

In consideration of the delivery of this outcome, the following matters form part of the CRMP.

- **Planting Density:** It should be noted that the on-ground planting density will vary according to the extent of existing vegetation retained and areas disturbed by weed removal. This should be determined and supervised by an experienced revegetation contractor at the time of planting. Planting should be undertaken with the objective of emulating the natural structure of the vegetation community being reinstated. Planting densities will generally maintain 1 plant per m<sup>2</sup>. Planting in wetlands should be undertaken with the view of achieving final densities of approximately 55 plants per 100m<sup>2</sup>.

Golf Course plantings within and around existing trees in the 'rough' between fairways will be at no greater than 1 tree per 20 m<sup>2</sup>. It is noted that these 'rough' areas act as a divide between individual fairways. As such, they must remain 'playable' for golfers. Excessive planting in these areas would prevent golfers from playing stray balls from within the 'rough'. Shading and water usage also place constraints on large trees therefore tree densities should remain minimal in these areas. Selected

areas such as the 'Focus Area' will include higher density planting of ground layer species to improve pinch points in the fauna corridor. The golf course is an area free of domestic animals and, once rehabilitated, will provide an excellent refuge opportunity for koalas and other native fauna.

- **Species:** Species used for revegetation works will vary depending on the vegetation community being reinstated. Species endemic to the area will be utilised in all revegetation works. No threatened plant species were located on site. However, propagation material should be collected from locally significant species prior to revegetation. This stock can then be raised and used in revegetation works. The CRMP wishes to ensure that existing floristic diversity is both maintained and wherever possible, enhanced.
- **Stock:** Tube stock is preferable for the majority of species, however for aesthetic reasons, larger stock may be used in more visible areas. Due to the large areas proposed for revegetation. Propagation material should ideally be collected from the local area prior to revegetation. This raised stock can then be used in revegetation works. Alternatively, stock should be sourced from local nurseries or contract grown where required.
- **Preparation and treatment:** After removal of weeds and planting, some revegetated areas may require jute matting - this should be determined by the revegetation contractor. The CRMP expects that wherever practically possible, ground should remain undisturbed to assist with ongoing seed bank self propagation etc. Mulching will be used to retain moisture and prevent weed growth.

### 3.3 Acid Sulfate Soils

Acid Sulfate Soils management should be carried out in accordance with the approved Acid Sulfate Soils Management Plan prepared by Dobos and Associates. Recommendations of the approved plan include:

- Excavations limited in depth in some areas;
- Neutralise acidity on fairways with aglime to promote grass growth and improve appearance;
- Testing and liming whenever a fairway is realigned or improved;
- Specified liming rates and management regimes for each identified cut and fill area;
- 150 mm topsoil harvested and replaced after cut operations and surface dosed with lime;
- Mixing of cut materials to promote dispersion of added aglime;
- Highly affected soils to be used as deep fill if possible;
- Staged excavation to reduce mobilisation of acid sulfate soils;
- Verification testing;
- Recording of lime quantity, dosage rates, timing of lime application, fill source and fill replacement;
- standard earthworks measures including silt fencing and minimising transport of suspended solids;
- Incidental surface water monitoring if these arise during construction including pH, Ec and turbidity
- Contingency plan for flooding of the site; and
- Adaptive strategy involving post-inspection and further liming if indicators present.



Acid Sulfate Soil testing and reporting should be taken into consideration for rehabilitation works in low lying areas such as Wetland Rehabilitation Areas. Rehabilitation works will occur following the necessary Acid Sulfate Soil treatment and will not require additional treatment as a result of rehabilitation works.

### 3.4 Habitat Rehabilitation Strategies

Varied rehabilitation strategies are to be implemented throughout the development to ensure no adverse impacts occur to the ecological and habitat values of the site. The CRMP seeks to provide an overall direction on how this is to be achieved. It is important to ensure that local fauna populations are able to co-exist with the development. Gainsborough Greens significant floristic diversity is complimented by a broad range of arboreal and terrestrial mammals, birds, reptiles and amphibians. Four general rehabilitation strategies have been or will be implemented on this site. These include;

1. Detailed site design works to identify ecological areas including those that require future rehabilitation works;
2. Creation of buffers to areas of environmental or ecological significance;
3. Creation of habitat to supplement those areas where habitat will be lost through development processes such as vegetation clearing; and
4. Enhancement of existing habitat to promote the ecological value and resources that it provides to local fauna to ensure sustainability of existing populations.

The application of these broad strategies is covered in further detail throughout the following sections.

### 3.5 Creation of Buffers

The Gold Coast City Council Planning Scheme requires buffers around natural waterways and ecologically significant areas. Some of these buffers incorporate existing vegetation, whilst other buffers will require revegetation. Buffers will be planted as follows:

#### 3.5.1 Ecologically Significant Areas

Areas considered ecologically significant should be provided with buffers to absorb impacts of surrounding development and edge effects. The following ecologically significant areas occur within Precinct 6 of the Gainsborough Greens Development.

##### Wallum Froglet Habitat

Past fauna studies have indicated that Essential Habitat for the Wallum froglet (*Crinia tinnula*) occurs in various locations on the site, these are illustrated in **Figure 5**. Targeted surveys of the site did not locate the Wallum froglet. Notwithstanding, it is proposed that water bodies within the Golf Course be rehabilitated where possible with a vegetation assemblage to represent that of ideal Wallum froglet habitat. Where appropriate and possible, reeds and sedges will be placed closest to the waterway, progressing to larger wetland species away from the water's edge.

The Wallum froglet is particularly sensitive to pollution and alterations in hydrology. Where frog habitat adjoins golf course or residential areas buffer vegetation will be planted to reduce the impact on this species and other amphibians.

### **Koala Habitat**

Past fauna studies have indicated that Essential Habitat for the Koala (*Phascolarctos cinereus*) occurs in various locations on the site, these are illustrated in **Figure 6**. One female was identified in the North east portion of the site in a previous study by White et al in 2003. Systematic surveys of the site by BAAM in 2006 did not locate any Koalas however evidence of koala visitation (scats) were found beneath 42 trees primarily within the south western portion of the site. It is proposed that essential habitat areas within the Golf Course can be rehabilitated with a vegetation assemblage to represent high value koala habitat.

The Koala is easily stressed by loss of habitat. Where koala habitat adjoins golf course or residential areas buffer vegetation will be planted to reduce the impact on this species and other mammals.

### **3.5.2 Waterways**

The CRMP recognises the significant role that existing waterways serve for both aquatic and terrestrial fauna. It is acknowledged that all waterways within Precinct 6 are man-made. However, these waterways have in many instances become naturalised and serve as valuable habitat. As such, where possible waterways retained on the site will be protected by vegetated buffers. These buffers will aim to:

- stabilise the banks of the waterways;
- provide ongoing seed bank source for native flora;
- protect water quality by absorbing nutrients and pollutants from stormwater run-off; and
- enhance/create riparian habitats.

Within waterway buffers, natural erosion prevention and scour protection will be utilised where possible and engineered solutions will be avoided. In order to minimise the impact to waterways, a transition from stormwater structures to waterways will occur such that increased vegetation and natural energy dispersal methods are utilised within proximity to waterways.

### **Eastern Waterway (Precinct 1)**

This is perhaps the most significant waterway at Gainsborough Greens. The waterway commences at Yawalpah Rd in the south and runs north ending at the north-eastern corner of the site. The CRMP notes the significance of the waterway and the importance of its ongoing care.

A 30m buffer will be required to separate the residential development in Precinct 1 from the waterway bordering the eastern bushland. The rehabilitation of this area will allow, from the bank of waterway, 20 m of rehabilitation including removal of weeds and planting with species taken from the Regional Ecosystem. The next 10 m is required as bushfire setback clearance. On the eastern bank, this buffer will be vegetated with native species, including *Eucalypt spp.*, *Corymbia spp.* and *Lophostemon spp.* A majority of the

vegetation required within the buffer currently exists in the area and will be retained. Due to the necessity for bushfire management in this area, revegetation will focus on re-establishing the canopy and ground layer with managed mid storey. Revegetation densities in this area will generally conform to 1 plant per m<sup>2</sup> with canopy vegetation comprising 1 plant per 20 m<sup>2</sup>. Reference is made to the Vegetation Management Plan - Golf Course Buffer, prepared for Precinct 1, 2 and 3A, by Habitat Environment Management Trading Pty Ltd, dated September 2012. This report details the specific rehabilitation techniques to be undertaken to protect the eastern waterway.

Stormwater detention basins are also planned at various points along the eastern waterway. Initially these will need to be cleared in order to create the stormwater detention devices, however, they will be re-planted as wetlands utilising the species that are already present in the vicinity. Wetland species serve two purposes in managing stormwater: to lessen water flow and absorb excess nutrients and other pollutants. The western bank of the waterway will be revegetated where appropriate; however, it cannot be planted densely due to the presence of a stormwater conveyance path and the proximity of the golf course.

#### **Waterway bordering Precinct 2**

The buffer separating the external residential development footpath in Precinct 2 from the natural waterway along the north-western boundary will remain vegetated. The buffer along the eastern bank (separating the residential development from the waterway) will remain vegetated. This lake is in place to mitigate flooding issues on the site. Species utilised in the rehabilitation include wetland species such as *Allocasuarina app.*, *Melaleuca spp* and some gum trees that are tolerant to high moisture levels including Forest Red Gum (*Eucalyptus tereticornis*) and Swamp Box (*Lophostemon suaveolens*). This rehabilitation has been completed.

### **3.6 Habitat Creation**

Extensive revegetation will be undertaken over the site to compensate for the loss of some of the dry sclerophyll forest in the eastern bushland.

#### **Creation of Northern Wetlands**

Areas of freshwater wetlands will also be created adjacent to precinct 4 in the golf course precinct. These wetlands will be specifically designed to serve their primary purpose in both flood balancing and detention while also serving to act as valuable habitat for a range of frogs, birds, fish, mammals and reptiles. As mentioned earlier in this document, it is the intention to re-create habitat suitable for the Wallum Froglet. The proposed works are still under investigation as part of the overall Open Space Strategy.

#### **Revegetation of Golf Course**

The goal of the revegetation program on the golf course is to create a wildlife corridor from the eastern Scribbly Gum bushland to the large North-West Conservation Park. The CRMP recognises the vital role the golf course will play in facilitating wildlife movement between these two conservation precincts. Consequently, the revegetation of the golf course will be structured to assist in this regard. It is noted that the golf course

also provides a safe, secure 'corridor' for fauna. The golf course is devoid of cars, domestic animals and other threats to native fauna. Fauna enhancement areas will be concentrated in areas less likely to be affected by players and golf ball strikes such as towards the 'Tee-off' and around the 'Green' since the upper-mid section of fairways would generally contain the majority of play in the 'Rough'.

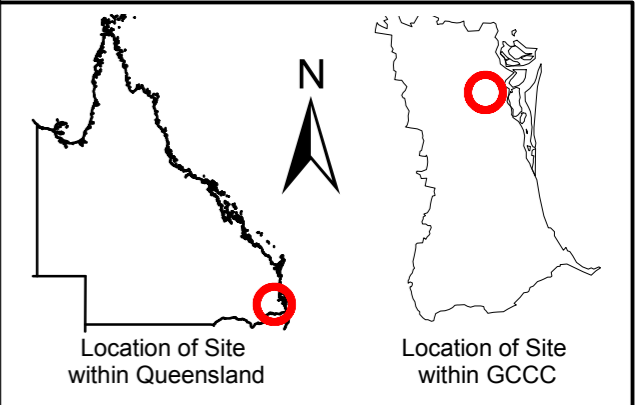
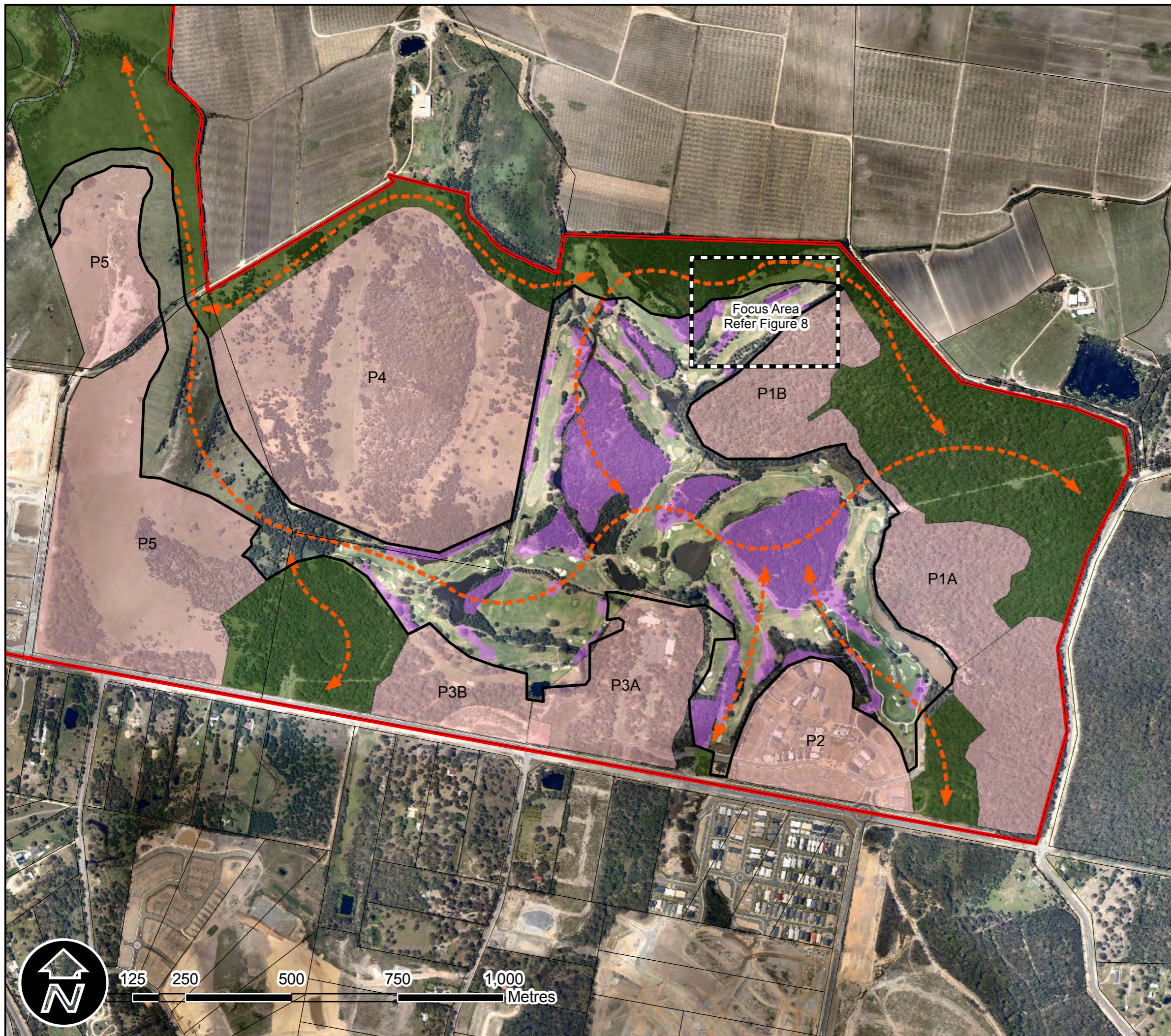
### **Creation of Wildlife Corridor**

While the main emphasis has been placed on the corridor function of the Golf Course, the CRMP recognises other corridor opportunities at Gainsborough Greens. Wildlife corridors are important to facilitate the movement of fauna and flora across natural landscapes that have been divided into small fragments by development, roads and other disturbances. They function to allow genetic exchange between populations and provide access to scattered resources (food and habitat), therefore maintaining larger and healthier populations. It is generally recommended that all new developments consider potential impacts on flora and fauna migration and implement vegetated corridors between core habitats where necessary. **Figure 7** details the wildlife corridor network maintained throughout the Gainsborough Greens development. It is noted that Precinct 6 plays an important role in this corridor function.

A number of entry points will be retained to the eastern bushland. The northern pinch point will be enhanced with rehabilitation works within Precinct 6 to provide additional movement opportunities. This will include fallen logs placed over the waterway with plantings of *Lomandra* on the golf course side of the waterway for cover. Plantings will also occur in and around the existing canopy vegetation in selected locations to provide stepping stones across the fairways for refuge. A number of Koala feed trees will be planted on the far side of the fairway to encourage movement. Reference is made to **Figure 8**.

The waterway is narrow and shallow enough in places to allow Eastern Grey Kangaroo's to cross. Locations where arboreal mammals are able to cross the waterway will be provided via a connecting tree canopy. There are already several places along the waterway where a connecting canopy currently exists and these will be retained. Small ground dwelling mammals are less likely to travel large distances, however, a dry land crossing will be retained in the south of Precinct 1.

The Scribbly Gum forest associated with the eastern bushland and the *Melaleuca* forest on the southern border of the site were identified as core habitat by WBM Oceanics Australia (1993). Gold Coast City Council (GCCC) considers the areas to be ecologically significant due to the presence of significant species and vegetation types. The proposed development will maintain these areas in Conservation Park (dedicated as Public Open Space). The residential and golf course design also allows for a vegetated wildlife corridor linking the two forests.



- Legend**
- Gold Coast City North Cadastre (2006)
  - Site Locality
  - Precinct 6 Golf Course
  - Residential Precincts
  - Fauna Habitat Nodes
  - Conservation Areas
  - Wildlife Corridors

Figure 7: Gainsborough Greens Wildlife Corridors

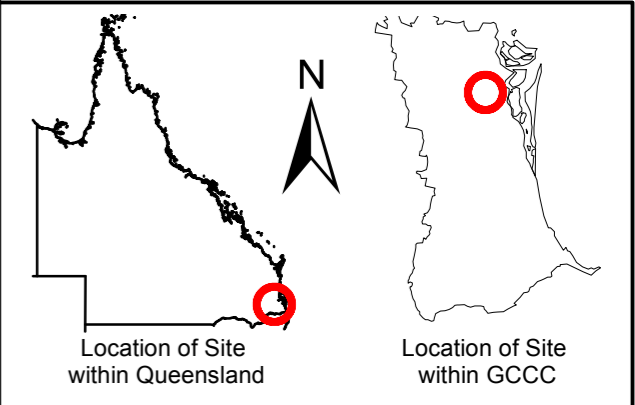
Client:  
Mirvac Pty Ltd

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: BP	Date: October 2012	
Checked: MK	Job Number: 6300S	PO Box 1141 NERANG QLD 4211 Ph:(07) 5535 00999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**



**Legend**

- Gold Coast City North Cadastre (2006)
- Site Locality
- Precinct 6 Golf Course
- Residential Precinct
- Wildlife Movement
- Conservation Areas
- Fauna Habitat Nodes
- Koala Feed Trees
- Lomandra longifolia*
- Fallen Log

Figure 8:  
Focus Area

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: BP	Date: May 2013	
Checked: MK	Job Number: 6300S	PO Box 47 BURLEIGH HEADS QLD 4220 Ph:(07) 5535 0999 Fax:(07) 5535 0888 info@habitat.net.au

**Habitat**

From the fauna exit/entry points in the eastern bushland, the corridor continues in nodes through the golf course fairways and lakes towards the Melaleuca forest. Rehabilitation nodes are shown in **Figure 7** as Golf Course Rehabilitation Areas.

Creating habitat nodes is considered more appropriate than creating strips of vegetation. The nodes are of a shape and size that is less susceptible to edge effects including weed invasion and introduction of predators. It is also suggested in the literature that retaining larger areas of suitable habitat at periodic intervals enhances the effectiveness of otherwise linear corridors (Bennett 1990, Recher et al. 1991). A majority of the fauna on site, which would utilise both the eastern bushland and Melaleuca forest (ie. birds, bats and gliders) will be able to move through these habitat nodes.

### **Fauna Friendly Crossings**

At the fauna exit/entry points proposed for the eastern bushland, a road divides the bushland. This is also the case directly north of the Melaleuca forest. In these areas the road creates a potential barrier to fauna movement. It is proposed that fauna friendly crossings be constructed at key points across the road to allow the safe passage of native animals.

All roads will be signed to warn motorists of the likelihood of encountering native fauna. They will also be speed limited to 40 kph and have 'slow points' (speed bumps or chicanes) to encourage responsible driving and consideration of fauna. The retention of large trees at strategic locations along and through the road, so as tree crowns can touch across roads, will facilitate movement of arboreal species (Andrews 1990).

## **3.7 Habitat Enhancement**

The following initiatives will enhance the value of existing habitat on site as well as create new habitat opportunities:

### **Providing Habitat Opportunities**

- Nest boxes - can be placed within the remaining Eucalypt forest and within fauna habitat nodes within Precinct 6 to increase the density of hollows for nesting opportunities. The nest boxes will be targeted at arboreal mammals and native birds.
- Relocation of ground hollows to areas being retained or open space areas - fallen logs and boulders within areas being cleared will be moved to areas that are being retained and revegetated. This will increase the density of habitat opportunities in these areas.

### **Providing Feeding Opportunities**

- Landscaping with natives - the use of endemic plants (especially nectar and fruit bearing species) in gardens and landscaped areas of the golf course will increase the availability of food for native birds and small mammals.

### **Creation of Aquatic Habitat**

- Improvements to Wallum Froglet habitat.

- Creation of lakes and waterways - The existing network of lakes and waterways will be improved within the golf course with the creation of additional wetlands and streams. These will be revegetated with native vegetation. The vegetation will encourage insects, like dragonflies etc.
- Creation of frog habitat - Lakes will be suitably vegetated to encourage native frogs to visit and breed. Regular monitoring of the lakes will be undertaken to detect breeding of native frogs and control the area for cane toads.
- Stocking of lakes - once stabilised, some of the lakes will be stocked with native fish. Species such as Pacific Blue Eyes (*Pseudomugil signifer*) and Fly-speckled Hardyheads (*Cratercephalus stercusmuscarum*) are more suitable for frog habitat as they are not predatory towards frogs or tadpoles and are effective in controlling mosquito larvae.

## 4.0 Surrounding Rehabilitation Work

Other areas outside the scope of Precinct 6 will undergo rehabilitation as part of the overall rehabilitation strategy of Gainsborough Greens. These areas are mentioned here for information only and area not associated with the rehabilitation of the golf course precinct.

### 4.1 Hotham Creek

As Hotham Creek is identified as a 'Major Linkage' in the GCCC Planning Scheme, a 60m vegetated buffer is proposed on the eastern bank. This buffer will separate the development from Hotham Creek as well as provide a vegetated corridor that will facilitate the movement of native fauna. Currently the creek banks are severely degraded. The revegetation program will create an area of marsh and freshwater wetland bordering the creek. The buffer will extend around the 'oxbow wetlands' associated with Hotham Creek and into a new wetland area created as part of the habitat enhancement of Gainsborough Greens.

### 4.2 Scribbly Gum Forest

This area includes a large parcel of high value remnant forest located to the east of Precinct 1. This area was identified as part of the Preliminary Approval for Conservation and will provide a corridor function through the site. Rehabilitation within this area will consist mainly of Natural Regeneration. It is noted that some areas of this forest are degraded and will require Assisted Natural Regeneration.

The Scribbly Gum Forest is identified as being a significant parcel providing connection from Gainsborough Greens to the large conservation reserves further to the east. Buffers are not possible along the entire western boundary of the Scribbly Gum forest due to the existing creek bordering the bushland and the necessity to create a road network enabling residents to enter and exit Precinct 1. The buffer design should where possible utilise the road as a firebreak for Precinct 1, as opposed to clearing further bushland at the rear of the housing lots bordering the Scribbly Gum forest.



### 4.3 Melaleuca Wetland

This area includes a large parcel of high value remnant forest located to the south of Precinct 4. This area was identified as part of the Preliminary Approval for Conservation and will provide fauna habitat. The revegetation program will include planting of wetland species already present in the vicinity along with weed eradication.

The buffer proposed to protect the Melaleuca wetlands is not currently well vegetated. The revegetation program and the reinstatement of a buffer will mean that the impacts of disturbance on this site will be less evident and the maintenance demands of the Melaleuca wetland will be minimised.

A buffer is also proposed around the waterway running through and bordering the Melaleuca forest in the south of the site. Existing vegetation bordering the waterway will be retained.

On the road providing access to Precinct 4, where required, structures will be created over/in the waterway in order to protect the hydrology and ecology of the waterway and associated Melaleuca wetlands. The road is located as far north as possible in order to further assist buffering of the wetland.

### 4.4 Northern Conservation Corridor

This area is located to the north of the Golf Course precinct. It connects the Scribbly Gum Forest to the Hotham creek area over precinct 4. Rehabilitation in this area will focus on fauna shelter and connectivity.

## 5.0 QUALITY OF OPEN SPACE

### 5.1 Establishment Period

During the 6-month 'Establishment Period' the applicant, and not Council, is responsible and liable for establishing and maintaining open space areas, and for the rectification of defects and for any damage that may occur unless the works in the open space areas may be directly attributable to Council activities.

### 5.2 On Maintenance Period

Following the successful 'Establishment Period' and 'On Maintenance' period, the open space area shall be in accordance with requirements of the *Gold Coast Planning Scheme Policy 11 - Land Development Guidelines*. The following criteria and proposed actions will be undertaken in accordance with Council's guidelines for on and off maintenance inspections.

### 5.3 Off Maintenance Period

This section has been prepared in accordance with the *Landscape Work Code* and *Policy 13 Landscape Strategy (Part 2)* and defines the minimum standard of quality for the open space area. The Landscape Work Code states:

*“Council requires that all open space areas at ‘on’ and ‘off’ maintenance are of a standard that can be easily maintained and will not require additional work to be undertaken to bring these areas up to an acceptable standard by Council at ‘off’ maintenance’.”*

The following table outlines the minimum quality required to achieve ‘off’ maintenance by Council.

**Table 1: Quality of Open Space Areas**

Element	Minimum Standard
Standard and quality of grassed areas	<ul style="list-style-type: none"> <li>• Mowable surfaces are no greater than 1:6 slope and 50 mm surface variation. Grass will be maintained at a length of approximately 100mm.</li> </ul>
Cleaning of any silt deposition	<ul style="list-style-type: none"> <li>• Stormwater outlets, pollution and siltation control devices are operational and functional;</li> <li>• All silt deposits as a consequence of development are to be removed; and</li> <li>• Overland flow paths and swales are low maintenance.</li> </ul>
Standard of any planting areas, including retained vegetation areas, rehabilitation areas including revegetation areas, natural regeneration areas and garden areas.	<ul style="list-style-type: none"> <li>• The rehabilitation program shall comprise weed removal, revegetation and an ongoing maintenance regime;</li> <li>• Removal of all noxious and recognised environmental weeds in accordance with a detailed Rehabilitation Management Plan;</li> <li>• Provision for vehicle exclusion must be made;</li> <li>• Landscape plans, management plans and irrigation plans must be adhered to;</li> <li>• Planting in accordance with this plan including revegetation areas, landscaped areas and grassed areas;</li> <li>• Signs of depreciation shall be limited to deterioration commensurate with moderate use; and</li> <li>• A minimum 90% survival rate of new plantings must be achieved.</li> </ul>

Element	Minimum Standard
Condition of any permanent infrastructure, such as irrigation, on-site sediment and erosion control devices, hard surfacing.	<ul style="list-style-type: none"> <li>• Water supply, maintenance taps, electricity and sewerage will be installed in accordance with Council standards; and</li> <li>• Systems will be established in accordance with Council’s ‘Irrigation System Requirements’; and</li> <li>• Fences, bollards or ‘living bollards’ (appropriate tree species) where feasible will prevent potential hazards and illegal vehicle access.</li> </ul>
Requirements for signage	<ul style="list-style-type: none"> <li>• Regulatory signage shall be provided at the parks primary public access points, and throughout the park as required;</li> <li>• Warning signage must be installed at sites of potential public risk at the park e.g. detention basins;</li> <li>• Directional signage shall be provided at the park’s primary public access point/s and other key points of access in the park (e.g.: entry and exit points);</li> <li>• Where appropriate, signs are to be co-located on the same set of posts; and</li> <li>• Signage shall be mounted below eye level with consideration given to ease of reading from a wheelchair.</li> </ul>
Rubbish and site debris removal.	<ul style="list-style-type: none"> <li>• Removal of all unnatural and construction debris, including rubbish, rocks and rubble greater than 25mm unless retained or relocated for ecological reasons.</li> </ul>
Standard to be achieved with regard to declared plants and recognised environmental weeds.	<ul style="list-style-type: none"> <li>• Removal of environmental and invasive weeds and revegetation, as per recommendations as outlined in this report; and</li> <li>• Chemical and mechanical treatments will be utilised in accordance with a detailed Rehabilitation Management Plan (RMP) to be prepared prior to Operational Works.</li> </ul>
Standard of fire hazard mitigation measures (fire trails and water storage facilities).	<ul style="list-style-type: none"> <li>• The open space area will need to maintain a low fuel load, which is approximately less than 10 tonnes per hectare.</li> </ul>

## 6.0 CONCLUSION

This Conceptual Rehabilitation Management Plan demonstrates how fauna movement and habitat protection will be maximised within Precinct 6 of the Gainsborough Greens development. While the main consideration in the design of Gainsborough Greens is the function of the Golf Course, opportunities have been identified to enhance the ecological values of the site within the Golf Course.

Revegetation works will be conducted in stages throughout the Gainsborough Greens development. As each stage progresses, revegetation will be undertaken in accordance with a Detailed Rehabilitation Management Plan. Detailed Rehabilitation Management Plans will be submitted to, and approved by, Gold Coast City Council at the time of application for development permit for the first residential subdivision of the linked residential area. Each detailed Rehabilitation Management Plan will be required to meet the intent of this Conceptual Rehabilitation Management Plan. Detailed Rehabilitation Management Plans will include details of how rehabilitation works will take place including objectives for each identified Rehabilitation Management Area, the strategy including approaches to rehabilitation, different rehabilitation techniques such as plant lists, plant spacing for identified Rehabilitation Management Areas and compliance & monitoring requirements.

A series of plans have been prepared to illustrate the Rehabilitation areas and ecologically significant areas of Gainsborough Greens. **Figures 1 and 2** define the site and existing vegetation communities. **Figures 3 and 4** define the rehabilitation areas and which areas are to be linked with which adjoining stage of development for the preparation of future detailed Rehabilitation Management Plans. **Figures 5 and 6** illustrate the areas of habitat restoration identified in previous reports and approvals (inclusive of Essential Habitat, Water Buffer and Possible Offset Areas), as illustrated on Gainsborough Greens Constraints Mapping Frog Habitat and Koala Habitat Rehabilitation by THG. **Figures 7 and 8** identify the proposed corridors and Focus area for corridor enhancement.

## 7.0 REFERENCES

- Andrews, A (1990) *Fragmentation of habitat by roads and utility corridors: a review*. Australian Zoologist, 26(3 & 4): 130 - 40.
- Belleng Pty Ltd (2003) *Environmental Management Plan - Proposed Residential Development Gainsborough Greens*. Belleng Pty Ltd, Bundall.
- Belleng Pty Ltd (2003) *Vegetation Management Plan - Proposed Residential Development Clarkes Property, Yawalpah and Swan Roads, Pimpama*. Belleng Pty Ltd, Bundall.
- Bennett, A.F. (1990) *Habitat Corridors: their role in wildlife management and conservation*. Department of Conservation and Environment, Melbourne, Australia.
- Chenoweth & Associates (1994) *Gainsborough Greens Residential Development - Habitat Values of Eastern Bushland, Independent Assessment of Environmental and Habitat Reports*. Chenoweth & Associates.
- Environment Australia (2000) *Environmental Education for a Sustainable Future - National Action Plan*. Environment Australia, Canberra.
- Gold Coast Native Fauna (2003) *Ecological Site Assessment Level 3 - Proposed Development Gainsborough Greens Golf Course*. Gold Coast Native Flora, Mudgeeraba.
- Gold Coast Native Fauna (2003) *Flora Survey & Report - Proposed Development Gainsborough Greens Golf Course*. Gold Coast Native Flora, Mudgeeraba.
- Recher HF, Kavanagh RP, Shields JM and Lind P (1991) *Ecological association of habitats and bird species during the breeding season in southeastern New South Wales*. Australian Journal of Ecology 16:337-352.
- Tract Consultants Pty Ltd (2003) *Submission to Rheema Developments Pty Ltd - Open Space management Plan, Yawalpah and Kerkin Roads, Pimpama*. Tract Consultants Pty Ltd, Brisbane.
- WBM Oceanics Australia (1993) *Wildlife of Gainsborough Greens and Surrounding Areas*. WBM Oceanics Australia, Spring Hill.
- White D, White D & Power N (2003) *Fauna Survey: Gainsborough Greens and Surrounds*. Belleng Pty Ltd, Southport.

## Appendix A: Master Species Lists

Flora Master Species List

FAMILY	Genus and Species	Common Name
ACANTHACEAE	<i>Brunoniella australis</i>	Blue Trumpet
ACANTHACEAE	<i>Pseuderanthemum variable</i>	Love Flower
ACANTHACEAE	<i>Rostellularia ascendens</i>	no common name
ACANTHACEAE	<i>Thunbergia alata*</i>	Black Eyed Susan
ADIANTACEAE	<i>Adiantum hispidulum</i>	Rough Maidenhair
ADIANTACEAE	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>	Mulga Fern
AMARANTHACEAE	<i>Amaranthus spinosus*</i>	Needle Burr
AMARANTHACEAE	<i>Gomphrena celosioides*</i>	Gomphrena Weed
ANACARDIACEAE	<i>Schinus terebinthifolia*</i>	Broad-leaved Pepper Tree
APIACEAE	<i>Centella asiatica</i>	Pennywort
APIACEAE	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
APIACEAE	<i>Hydrocotyle verticillata</i>	Shield Pennywort
APIACEAE	<i>Platysace ericoides</i>	Heath Platysace
APIACEAE	<i>Trachymene incisa</i>	Wild Parsnip
APOCYNACEAE	<i>Catharanthus roseus*</i>	Pink Periwinkle
APOCYNACEAE	<i>Parsonsia lanceolata</i>	
APOCYNACEAE	<i>Parsonsia straminea</i>	Monkey Rope Vine
ARALIACEAE	<i>Schefflera actinophylla*</i>	Umbrella Tree
ARECACEAE	<i>Livistona australis</i>	Cabbage Tree Palm
ASCLEPIADACEAE	<i>Gomphocarpus fruticosus*</i>	Narrow-leaf Cotton Bush
ASCLEPIADACEAE	<i>Gomphocarpus physocarpus*</i>	Balloon Cotton Bush
ASPARAGACEAE	<i>Protoasparagus aethiopicus *</i>	Asparagus Fern
ASPLENIACEAE	<i>Asplenium australasicum</i>	Bird's Nest Fern
ASTERACEAE	<i>Ageratina adenophora*</i>	Crofton Weed
ASTERACEAE	<i>Ageratina riparia*</i>	Mistflower
ASTERACEAE	<i>Ageratum houstonianum*</i>	Blue Billygoat Weed
ASTERACEAE	<i>Ambrosia artemisiifolia*</i>	Annual Ragweed
ASTERACEAE	<i>Baccharis halimifolia*</i>	Groundsel Bush
ASTERACEAE	<i>Bidens pilosa*</i>	Cobbler's pegs
ASTERACEAE	<i>Bracteantha bracteata</i>	Straw flower
ASTERACEAE	<i>Cassinia subtropica</i>	no common name
ASTERACEAE	<i>Chrysocephalum apiculatum</i>	Yellow Buttons
ASTERACEAE	<i>Cirsium vulgare*</i>	Spear Thistle

FAMILY	Genus and Species	Common Name
ASTERACEAE	<i>Conyza sumatrensis</i> *	Fleabane
ASTERACEAE	<i>Crassocephalum crepidioides</i> *	Thickhead
ASTERACEAE	<i>Emilia sonchifolia</i>	Emilia
ASTERACEAE	<i>Epaltes australis</i>	Epaltes
ASTERACEAE	<i>Erechtites valerianifolia</i> *	Brazilian fireweed
ASTERACEAE	<i>Glossocardia bidens</i>	Native Cobblers pegs
ASTERACEAE	<i>Hypochaeris radicata</i> *	Flatweed
ASTERACEAE	<i>Olearia nernstii</i>	Jagged Daisy Bush
ASTERACEAE	<i>Ozothamnus diosmifolius</i>	Sago Flower
ASTERACEAE	<i>Senecio madagascariensis</i> *	Fireweed
ASTERACEAE	<i>Sonchus oleraceus</i> *	Sow Thistle
ASTERACEAE	<i>Sphagneticola trilobata</i> *	Singapore Daisy
ASTERACEAE	<i>Vittadinia trilobata</i>	Fuzzweed
AVICENNIACEAE	<i>Avicennia marina</i>	Grey Mangrove
BIGNONIACEAE	<i>Jacaranda mimosifolia</i> *	Jacaranda
BIGNONIACEAE	<i>Pandorea pandorana</i>	Wonga Vine
BIGNONIACEAE	<i>Spathodea campanulata</i> *	African Tulip Tree
BLECHNACEAE	<i>Blechnum cartilagineum</i>	Gristle Fern
BLECHNACEAE	<i>Blechnum indicum</i>	Bungwall Fern
BRASSICACEAE	<i>Lepidium sagittulatum</i>	Native Peppercross
CACTACEAE	<i>Opuntia stricta</i> *	Common Prickly Pear
CAESALPINIACEAE	<i>Cassia coluteoides</i> *	Winter Senna
CAMPANULACEAE	<i>Lobelia purpurascens</i>	White Root
CAMPANULACEAE	<i>Wahlenbergia gracilis</i>	Australian Bluebell
CAPRIFOLIACEAE	<i>Lonicera japonica</i> *	Honeysuckle
CARYOPHYLLACEAE	<i>Drymaria cordata</i> ssp. <i>Cordata</i> *	White Snow
CASUARINACEAE	<i>Allocasuarina littoralis</i>	Black She Oak
CASUARINACEAE	<i>Allocasuarina torulosa</i>	Forest Oak
CASUARINACEAE	<i>Casuarina glauca</i>	Swamp Sheoak
COMMELINACEAE	<i>Commelina cyanea</i>	
COMMELINACEAE	<i>Murdannia graminea</i>	Murdannia
CONVOLVULACEAE	<i>Convolvulus erubescens</i>	Australian bindweed
CONVOLVULACEAE	<i>Ipomoea indica</i> *	Blue Morning Glory
CONVOLVULACEAE	<i>Polymeria calycina</i>	bindweed



FAMILY	Genus and Species	Common Name
CUPRESSACEAE	<i>Callitris rhomboidea</i>	Port Jackson Pine
CYPERACEAE	<i>Baumea articulata</i>	Jointed Twigrush
CYPERACEAE	<i>Cyperus brevifolius*</i>	Mullumbimby Couch
CYPERACEAE	<i>Cyperus difformis</i>	Rice Sedge
CYPERACEAE	<i>Cyperus exaltatus</i>	no common name
CYPERACEAE	<i>Cyperus polystachyos</i>	Common Sedge
CYPERACEAE	<i>Eleocharis dulcis</i>	Spike-rush
CYPERACEAE	<i>Fimbristylis dichotoma</i>	Common Fringe-rush
CYPERACEAE	<i>Lepidosperma laterale</i> var. <i>laterale</i>	Variable Sword-sedge
CYPERACEAE	<i>Schoenoplectus mucronatus</i>	Clubrush
DAVALLIACEAE	<i>Davallia pyxidata</i>	Hare's Foot Fern
DAVALLIACEAE	<i>Nephrolepis cordifolia*</i>	Fishbone Fern
DENNSTAEDTIACEAE	<i>Hypolepis muelleri</i>	Harsh Ground fern
DENNSTAEDTIACEAE	<i>Pteridium esculentum</i>	Common Bracken Fern
DILLENIACEAE	<i>Hibbertia vestita</i>	Small-leaf Guinea Bush
ELAEOCARPACEAE	<i>Elaeocarpus obovatus</i>	Hard Quandong
EPACRIDACEAE	<i>Leucopogon juniperinus</i>	Prickly Heath
EUPHORBIACEAE	<i>Breynia oblongifolia</i>	Coffee Bush
EUPHORBIACEAE	<i>Euphorbia heterophylla*</i>	Milk Weed
EUPHORBIACEAE	<i>Excoecaria agallocha</i>	Blind-your-eye mangrove
EUPHORBIACEAE	<i>Glochidion ferdinandi</i>	Cheese Tree
EUPHORBIACEAE	<i>Glochidion sumatranum</i>	Large-leaved Cheese Tree
EUPHORBIACEAE	<i>Macaranga tanarius</i>	Macaranga
EUPHORBIACEAE	<i>Mallotus claoxyloides</i>	Green Kamala
EUPHORBIACEAE	<i>Phyllanthus microcladus</i>	
EUPHORBIACEAE	<i>Phyllanthus pusillifolius</i>	Small leaf Phyllanthus
EUPHORBIACEAE	<i>Ricinocarpos pinifolius</i>	Wedding Bush
FABACEAE	<i>Daviesia ulicifolia</i>	Gorse Bitter-pea
FABACEAE	<i>Desmodium rhytidophyllum</i>	Rusty Tick-trefoil
FABACEAE	<i>Desmodium uncinatum*</i>	Silver-leaved Desmodium
FABACEAE	<i>Glycine clandestina</i>	Twining Glycine
FABACEAE	<i>Gompholobium pinnatum</i>	Wedge Pea
FABACEAE	<i>Hardenbergia violacea</i>	Native Sarsaparilla
FABACEAE	<i>Jacksonia scoparia</i>	Dogwood

FAMILY	Genus and Species	Common Name
FABACEAE	<i>Macroptilium atropurpureum*</i>	Siratro
FABACEAE	<i>Neonotonia wightii*</i>	Glycine
FABACEAE	<i>Pultenaea microphylla</i>	Bush Pea
FABACEAE	<i>Pultenaea retusa</i>	Swamp Pea Bush
FABACEAE	<i>Pultenaea villosa</i>	Hairy pea bush
FABACEAE	<i>Trifolium repens*</i>	White Clover
GOODENIACEAE	<i>Goodenia bellidifolia</i>	Daisy-Leaved Goodenia
GOODENIACEAE	<i>Goodenia rotundifolia</i>	Star Goodenia
GOODENIACEAE	<i>Velleia paradoxa</i>	
GOODENIACEAE	<i>Velleia spathulata</i>	no common name
HYPERICACEAE	<i>Hypericum gramineum</i>	St John's Wort
JUNCACEAE	<i>Juncus usitatus</i>	Common Rush
JUNCAGINACEAE	<i>Triglochin procerum</i>	Water Ribbons
LAMIACEAE	<i>Clerodendrum tomentosum</i>	Native Peach
LAMIACEAE	<i>Plectranthus parviflorus</i>	Common Plectranthus
LAURACEAE	<i>Cassytha glabella</i>	Slender dodder-laurel
LAURACEAE	<i>Cassytha pubescens</i>	Downy dodder-laurel
LAURACEAE	<i>Cinnamomum camphora*</i>	Camphor Laurel
LILIACEAE	<i>Dianella sp</i>	Flax lily
LILIACEAE	<i>Tricoryne elatior</i>	Yellow rush Lilly
LORANTHACEAE	<i>Amyema cambagei</i>	She-oak Mistletoe
LORANTHACEAE	<i>Amyena pendulum spp. longifolium</i>	Mistletoe
MALVACEAE	<i>Hibiscus diversifolius</i>	Swamp Hibiscus
MALVACEAE	<i>Sida cordifolia*</i>	Flannel Weed
MALVACEAE	<i>Sida rhombifolia*</i>	Paddy's Lucerne
MENISPERMACEAE	<i>Stephania aculeata</i>	Prickly Snake Vine
MENYANTHACEAE	<i>Nymphoides indica</i>	Water Snowflake
MIMOSACEAE	<i>Acacia concurrens</i>	Black Wattle
MIMOSACEAE	<i>Acacia disparrima</i>	Hickory Wattle
MIMOSACEAE	<i>Acacia falcata</i>	Sickle-leaf Wattle
MIMOSACEAE	<i>Acacia fimbriata</i>	Brisbane Wattle
MIMOSACEAE	<i>Acacia maidenii</i>	Maiden's Wattle
MIMOSACEAE	<i>Calliandra pulcherrima*</i>	Powder Puff
MIMOSACEAE	<i>Mimosa pudica var. hispida*</i>	Common Sensitive Plant



FAMILY	Genus and Species	Common Name
MORACEAE	<i>Ficus coronata</i>	Creek Sandpaper Fig
MORACEAE	<i>Ficus obliqua</i>	Small-leaved Fig
MORACEAE	<i>Ficus watkinsiana</i>	Strangler Fig
MORACEAE	<i>Maclura cochinchinensis</i>	Cockspur Thorn
MYOPORACEAE	<i>Myoporum debile</i>	Winter Apple
MYRSINACEAE	<i>Rapanea howittiana</i>	Brush Muttonwood
MYRTACEAE	<i>Angophora leiocarpa</i>	Smoothbark Apple
MYRTACEAE	<i>Angophora woodsiana</i>	Roughbark Apple
MYRTACEAE	<i>Babingtonia similis</i>	Twiggy Baeckea
MYRTACEAE	<i>Baeckea frutescens</i>	Weeping Baeckea
MYRTACEAE	<i>Callistemon salignus</i>	White Bottlebrush
MYRTACEAE	<i>Callistemon viminalis</i>	Weeping Bottlebrush
MYRTACEAE	<i>Corymbia citriodora</i> ssp. <i>variegata</i>	Spotted Gum
MYRTACEAE	<i>Corymbia gummifera</i>	Red Bloodwood
MYRTACEAE	<i>Corymbia intermedia</i>	Pink Bloodwood
MYRTACEAE	<i>Corymbia tessellaris</i>	Moreton Bay Ash
MYRTACEAE	<i>Corymbia torelliana</i> *	Cadaghi
MYRTACEAE	<i>Corymbia trachyphloia</i>	Brown Bloodwood
MYRTACEAE	<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
MYRTACEAE	<i>Eucalyptus fibrosa</i> spp. <i>fibrosa</i>	Broad-leaved Ironbark
MYRTACEAE	<i>Eucalyptus racemosa</i>	Scribbly Gum
MYRTACEAE	<i>Eucalyptus robusta</i>	Swamp Mahogany
MYRTACEAE	<i>Eucalyptus seeana</i>	Fine-leaved Red Gum
MYRTACEAE	<i>Eucalyptus siderophloia</i>	Qld Grey Ironbark
MYRTACEAE	<i>Eucalyptus tereticornis</i>	Qld Blue Gum
MYRTACEAE	<i>Eucalyptus tindaliae</i>	Qld White Mahogany
MYRTACEAE	<i>Lophostemon confertus</i>	Brush Box
MYRTACEAE	<i>Lophostemon suaveolens</i>	Swamp Box
MYRTACEAE	<i>Melaleuca bracteata</i>	River Tea Tree
MYRTACEAE	<i>Melaleuca linariifolia</i>	Snow-in-Summer
MYRTACEAE	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
NYPHAEACEAE	<i>Nymphaea caerulea</i> ssp. <i>*zanzibarensis</i>	Blue Waterlily
NYPHAEACEAE	<i>Nymphaea violacea</i>	Native Waterlily
OCHNACEAE	<i>Ochna serrulata</i> *	Ochna

FAMILY	Genus and Species	Common Name
OLEACEAE	<i>Notelaea longifolia</i>	Long-leaved Mock-olive
ONAGRACEAE	<i>Ludwigia peploides</i>	Water Primrose
ORCHIDACEAE	<i>Cymbidium madidum</i>	an Orchid
ORCHIDACEAE	<i>Cymbidium suave</i>	an Orchid
ORCHIDACEAE	<i>Dipodium punctatum</i>	an Orchid
ORCHIDACEAE	<i>Geodorum densiflorum</i>	Pink Nodding Orchid
OXALIDACEAE	<i>Oxalis corniculata</i>	Yellow Wood Sorrel
PASSIFLORACEAE	<i>Passiflora aurantia</i> var. <i>aurantia</i>	
PASSIFLORACEAE	<i>Passiflora edulis</i> *	Passion Fruit
PASSIFLORACEAE	<i>Passiflora foetida</i> *	Stinking Passion Flower
PASSIFLORACEAE	<i>Passiflora suberosa</i> *	Corky Passion Flower
PHILESIACEAE	<i>Eustrephus latifolius</i>	Wombat Berry
PHILESIACEAE	<i>Geitonoplesium cymosum</i>	Scrambling Lilly
PHILYDRACEAE	<i>Philydrum lanuginosum</i>	Woolly Frogmouth
PHORMIACEAE	<i>Dianella caerulea</i>	Blueberry Lily
PHORMIACEAE	<i>Dianella caerulea</i> var. <i>assera</i>	Blueberry Lily
PHORMIACEAE	<i>Dianella longifolia</i>	Long-leaved Flax Lilly
PHYTOLACCACEAE	<i>Phytolacca octandra</i> *	Inkweed
PINACEAE	<i>Pinus elliottii</i> *	Slash Pine
PITTOSPORACEAE	<i>Pittosporum rhombifolium</i>	Hollywood
PLANTAGINACEAE	<i>Plantago debilis</i>	Shain Plantain
PLANTAGINACEAE	<i>Plantago lanceolata</i> *	Ribwort Plantain
PLUMBAGINACEAE	<i>Plumbago auriculata</i> *	Cape Plumbago
POACEAE	<i>Axonopus affinis</i> *	Narrow-leaved Carpet Grass
POACEAE	<i>Chloris gayana</i> *	Rhodes Grass
POACEAE	<i>Chloris virgatus</i> *	Feathertop Rhodes Grass
POACEAE	<i>Cymbopogon refractus</i>	Barbed Wire Grass
POACEAE	<i>Cynodon dactylon</i>	Common Couch
POACEAE	<i>Danthonia pallida</i>	Silver-top Wallaby Grass
POACEAE	<i>Eleusine indica</i> *	Crowsfoot Grass
POACEAE	<i>Entolasia stricta</i>	Wiry Panic
POACEAE	<i>Imperata cylindrica</i>	Blady Grass
POACEAE	<i>Melinis minutiflora</i> *	Molasses Grass
POACEAE	<i>Melinis repens</i> *	Red Natal Grass



FAMILY	Genus and Species	Common Name
POACEAE	<i>Oplismenus aemulus</i>	Creeping Beard Grass
POACEAE	<i>Panicum maximum</i> *	Guinea Grass
POACEAE	<i>Panicum pygmaeum</i>	
POACEAE	<i>Paspalum dilatatum</i> *	Paspalum Grass
POACEAE	<i>Pennisetum alopecuroides</i> *	Swamp Foxtail
POACEAE	<i>Pennisetum clandestinum</i> *	Kikuyu Grass
POACEAE	<i>Setaria sphacelata</i> *	South African Pigeon Grass
POACEAE	<i>Sorghum halepense</i> *	Johnson Grass
POACEAE	<i>Sporobolus pyramidalis</i> *	Giant Rats Tail Grass
POACEAE	<i>Sporobolus virginicus</i>	Sand Couch
POACEAE	<i>Themeda triandra</i>	Kangaroo Grass
POLYGONACEAE	<i>Persicaria attenuata</i>	Smartweed
POLYGONACEAE	<i>Persicaria decipiens</i>	Smartweed
POLYGONACEAE	<i>Persicaria hydropiper</i>	Water Pepper
POLYGONACEAE	<i>Persicaria strigosum</i>	Spotted Knotweed
POLYPODIACEAE	<i>Pyrrhosia rupestris</i>	Rock Felt Fern
PORTULACACEAE	<i>Portulaca oleracea</i> *	Pigweed
PORTULACACEAE	<i>Portulaca pilosa</i>	Hairy Pigweed
PROTEACEAE	<i>Banksia integrifolia</i>	Coast Banksia
PROTEACEAE	<i>Banksia integrifolia var integrifolia</i>	Coast Banksia
PROTEACEAE	<i>Grevillea robusta</i>	Silky Oak
PROTEACEAE	<i>Hakea florulenta</i>	a Hakea
PROTEACEAE	<i>Persoonia cornifolia</i>	Broad-leaved Geebung
PROTEACEAE	<i>Persoonia virgata</i>	Geebung
RANUNCULACEAE	<i>Ranunculus inundatus</i>	River Buttercup
RHAMNACEAE	<i>Alphitonia excelsa</i>	Red Ash
ROSACEAE	<i>Raphiolepis indica</i> *	Indian Hawthorn
ROSEACEAE	<i>Rubus parvifolius</i>	Native Raspberry
RUBIACEAE	<i>Spermacoce brachystema</i>	no common name
RUTACEAE	<i>Flindersia australis</i>	Qld Teak
RUTACEAE	<i>Murraya paniculata</i> *	Orange Jessamine
SANTALACEAE	<i>Exocarpos cupressiformis</i>	Native Cherry
SAPINDACEAE	<i>Alectryon tomentosus</i>	Hairy Birds Eye
SAPINDACEAE	<i>Cupaniopsis anacardioides</i>	Tuckeroo



FAMILY	Genus and Species	Common Name
SAPINDACEAE	<i>Dodonaea triquetra</i>	Hop Bush
SAPINDACEAE	<i>Harpullia pendula</i>	Tulip Wood
SAPINDACEAE	<i>Jagera pseudorhus</i>	Foambark
SMILACACEAE	<i>Smilax australis</i>	Barbed-Wire Vine
SOLANACEAE	<i>Physalis minima</i> *	Wild Gooseberry
SOLANACEAE	<i>Solanum hispidum</i> *	Giant Devil's Fig
SOLANACEAE	<i>Solanum mauritianum</i> *	Wild Tobacco
SOLANACEAE	<i>Solanum seaforthianum</i> *	Brazilian Nightshade
STYLIDIACEAE	<i>Stylidium graminifolium</i>	Grass Trigger Plant
THYMELIACEAE	<i>Pimelea latifolia</i>	Rice Flower
THYMELIACEAE	<i>Pimelea linifolia</i>	Rice Flower
THYMELIACEAE	<i>Wikstroemia indica</i>	Tie Bush
TYPHACEAE	<i>Phragmites australis</i>	Common Reed
TYPHACEAE	<i>Typha orientalis</i>	Cumbungi
ULMACEAE	<i>Trema tomentosa</i>	Poison Peach
VERBENACEAE	<i>Duranta erecta</i> *	Duranta
VERBENACEAE	<i>Lantana camara</i> *	Lantana
VERBENACEAE	<i>Lantana montevidensis</i> *	Creeping Lantana
VERBENACEAE	<i>Verbena bonariensis</i> *	Purpletop
VIOLACEAE	<i>Hybanthus monopetalus</i>	Lady's Slipper
VIOLACEAE	<i>Hybanthus stellarioides</i>	Spade Flower
VISCACEAE	<i>Notothixos subaureus</i>	Mistletoe
VISCACEAE	<i>Viscum articulatum</i>	
VITACEAE	<i>Cayratia clematidea</i>	Slender Grape
VITACEAE	<i>Cissus opaca</i>	Forest Grape
XANTHORRHOEACEAE	<i>Lomandra brevis</i>	
XANTHORRHOEACEAE	<i>Lomandra confertifolia ssp. pallida</i>	
XANTHORRHOEACEAE	<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat Rush
XANTHORRHOEACEAE	<i>Lomandra longifolia</i>	Mat Rush
XANTHORRHOEACEAE	<i>Lomandra silaifolia</i>	
XANTHORRHOEACEAE	<i>Xanthorrhoea macronema</i>	Bottle-brush Grass Tree
	<i>Artanema fimbriatum</i>	Purple Bells
	<i>Zehneria cunninghamii</i>	



## Appendix B: Weed Control Techniques



<p>Crofton Weed <i>Ageratina adenophora</i></p>	<p>N/A</p>	<p>17</p>	<p>Hand pull, bag and dispose off site at an appropriate facility. Or Spot spray using Glyphosate at 1:100 + Adjuvant + Dye or Metsulfuron Methyl at 1.5g per 10L + Adjuvant + Dye.</p>	<ul style="list-style-type: none"> <li>• a shrubby perennial with woody rootstock and upright branching stems</li> <li>• usually grows 1-2 m high</li> <li>• soft young stems establish roots where they touch the ground</li> <li>• bright-green, trowel-shaped leaves, 50-75 mm long and 25-50 mm broad, with toothed edges</li> <li>• white flowers grow in small, dense heads at the ends of branches</li> <li>• slender, angular, 2 mm seeds are almost black with fine white hairs at the tip</li> </ul>	
<p>Mistflower <i>Ageratina riparia</i></p>	<p>N/A</p>	<p>25</p>	<p>Infestations should be treated when small to prevent establishment</p> <p>A combined approach of different control methods including mechanical, biological, chemical with land management practices is most effective.</p> <p>Glyphosate 360 g/L (e.g. glyphosate 360) 75 ml/15 L.</p>	<ul style="list-style-type: none"> <li>• A low-growing, sprawling perennial herb 40-60cm high</li> <li>• Has stems which produce roots at the joints that touch the ground</li> <li>• Leaves are opposite, mostly 7.5 cm long and 2.5 cm wide, toothed along the edges and tapered at each end</li> <li>• Flowers are small, white with dense heads at the ends of the branches</li> <li>• Seeds are black, slender, angular, 2mm long, with fine white hairs at the tip</li> </ul>	








<p>Blue Billy Goat Weed</p> <p><i>Ageratum houstonianum</i></p>	<p>N/A</p>	<p>115</p>	<p>Hand pull, bag and dispose off site at an appropriate facility. Or</p> <p>Spot spray using Glyphosate at 1:100 + Adjuvant + Dye or Metsulfuron Methyl at 1.5g per 10L + Adjuvant + Dye.</p>	<ul style="list-style-type: none"> <li>• Seedlings – cotyledons leaves are circular to egg shape, 3 mm long by 3.5 mm wide.</li> <li>• Early leaves – are broadly egg-shaped, with lightly serrated margins. The serrations are widely spaced, rounded and shallow. Later leaves have obviously serrated margins and clearly defined veins.</li> <li>• Leaves – are egg shaped to triangular, arranged in opposite pairs along the stems. Leaves are 10 – 100 mm long and 10 - 60 mm wide, borne on stems 5 – 50 mm long. Leaves are mid-green and lightly hairy.</li> <li>• Mature plants – an erect annual or short-lived perennial plant 30 – 100 cm high with hairy stems.</li> <li>• Flowers – are 4 – 5 mm across, pale lavender blue to white. They occur in fluffy clusters on the end of erect or slightly drooping stems.</li> <li>• Fruit – seeds 1 - 3 mm in length, black and topped by a fluffy pappus of 5 white hairs, 1.5 - 3 mm in length which assists the seeds in wind dispersal.</li> </ul>	
<p>Annual Ragweed</p> <p><i>Ambrosia artemisiifolia</i></p>	<p>Class 2</p>		<p>Where feasible, plants can be pulled by hand or Dicamba TM at 1.5 L/100 L</p>	<ul style="list-style-type: none"> <li>• 1-2 m high with slightly rough fern-like, deeply divided with hairy undersides</li> <li>• small, greenish flowers up to 20 cm long in the upper part of the plant</li> <li>• flower spikes appear yellow when mature because of pollen production</li> <li>• male flowers at the top of the spike and females at the base</li> <li>• seeds black, small, top-shaped and rough</li> </ul>	




<p>Asparagus Fern <i>Asparagus aethiopicus</i></p>	<p>Class 3</p>	<p>6</p>	<p>Rhizomes: crown and hang to dry or gouge &amp; paint (G 1:1.5). Stems: wind up and spray, or cut high and low and spray regrowth (G 200mL/10L + S or O, or G 200mL/10L + MM 1.5g/10L + W or O).</p>	<ul style="list-style-type: none"> <li>• This is a spiny shrub with sprawling to pendent stems with fibrous and tuberous roots.</li> <li>• Leaves are bright green, fern-like, with almost needle-like leaflets of up to eight in a cluster.</li> <li>• Flowers are white to pinkish and small.</li> <li>• Fruit is a bright, round, shiny, red berry. Each fruit contains 1 to a few seeds.</li> <li>• underground rhizomes</li> </ul>	
<p>Asparagus ground fern <i>Asparagus aethiopicus cv. Sprengi</i></p>	<p>3</p>	<p>23</p>		<ul style="list-style-type: none"> <li>• underground rhizomes</li> </ul>	



<p>Groundsel</p> <p><i>Baccharis halimifolia</i></p>	<p>N/A</p>	<p>2</p>		<ul style="list-style-type: none"> <li>• Perennial shrub, 1–6 m high, glabrous and ± viscid; stems striate.</li> <li>• Leaves rhombic, elliptic or broad-obovate, 3–7 cm long, 1–4 cm wide, apex acute to obtuse, margins coarsely toothed in upper half, petiolate; upper leaves smaller and entire.</li> <li>• Heads in pedunculate clusters forming terminal panicles, yellowish; female heads 3–5 mm diam., male heads c. 3 mm diam.; involucre bracts 3–5-seriate, glabrous or minutely ciliate towards apex; outer obtuse; inner longer and acute.</li> <li>• Achenes 1–1.7 mm long, glabrous; pappus white, of female florets 10–12 mm long, of male florets 3–4 mm long.</li> </ul>	
<p>Cobbler's Pegs</p> <p><i>Bidens pilosa</i></p>	<p>N/A</p>	<p>110</p>	<p>Plants: hand-pull or spray (G 100mL/10L + S or O).</p>	<ul style="list-style-type: none"> <li>• The leaves are opposite and are divided pinnately into 3-5 leaflets with toothed margins (edge).</li> <li>• The flowerheads (capitula) are white and yellow and 5-15mm in diameter. They are borne on long slender peduncles (stalks) at the end of the stems.</li> <li>• Each flower head has 4 or 5 short, broad, white petals (ray florets) with numerous, yellow disc florets (tubular florets in centre of flowerhead). The outer involucre bracts (a whorl or several whorls of a more or less modified leaves surrounding a flower or an inflorescence) have finely hairy margins (edges) and are shorter than the inner bracts.</li> <li>• The seeds are slender, linear, curved, black and rigid, they are 4 angled 6-12mm long with 2 or 3 barbed awns (stiff bristle).</li> </ul>	

				<ul style="list-style-type: none"> <li>Flowering occurs throughout the year but primarily summer-autumn.</li> </ul>	
Rose periwinkle <i>Catharanthus roseus</i>	N/A	62	<ul style="list-style-type: none"> <li>Plants: hand-pull or spray (G 100 mL/10 L + S or O).</li> </ul>	<ul style="list-style-type: none"> <li>It is an evergreen subshrub or herbaceous plant growing to 1 m tall. The leaves are oval to oblong, 2.5–9 cm long and 1–3.5 cm broad, glossy green, hairless, with a pale midrib and a short petiole 1–1.8 cm long; they are arranged in opposite pairs. The flowers are white to dark pink with a darker red centre, with a basal tube 2.5-3 cm long and a corolla 2–5 cm diameter with five petal-like lobes. The fruit is a pair of follicles 2–4 cm long and 3 mm broad</li> </ul>	
Camphor Laurel <i>Cinnamomum camphora</i>	Class 3	8	<p>Small Seedlings - Hand pull, bag and dispose off site at an appropriate facility. Or Spot spray using a blend of Glyphosate at 1:50 + Metsulfuron Methyl at 1.5g/10L + Adjuvant + Dye.</p> <p>Saplings and Small Trees – Cut and swab with Glyphosate at 1:1.5.</p> <p>Trees – Mechanical removal or stem injection with Glyphosate at 1:1.5</p>	<ul style="list-style-type: none"> <li>a large evergreen tree, growing up to 20 m tall.</li> <li>leaves have a glossy, waxy appearance and smell of camphor when crushed.</li> <li>in spring it produces lush, bright green foliage and masses of small white flowers.</li> <li>spherical fruits are 10 mm across, green at first changing to black when ripe.</li> </ul>	



<p>Fleabane <i>Conyza sumatrensis</i></p>	<p>N/A</p>	<p>174</p>	<p>1 L/ha glyphosate(450g/L) after stem elongation and before flowering in late spring to summer each year when the plants are actively growing</p>	<ul style="list-style-type: none"> <li>An erect stem with branching only towards the top of the plant and branching just below the inflorescence (flowerhead). All the florets are no longer than 1mm long. The bracts around the "flower" do not have any hairs at the apex. It has hairy leaves and red/brown bracts. The pappus is straw coloured. The receptacle (extended tip of the stalk that the flowerhead grows out of) is usually roughly pitted.</li> </ul>	
<p>Mullumbimby Couch <i>Cyperus brevifolius</i></p>	<p></p>	<p>161</p>	<p>This plant spreads easily under quite dense vegetation and does not respond to herbicide. It usually grows in moist locations not suitable for herbicide use and therefore requires hand removal being sure to removal all rhizomes.</p>	<ul style="list-style-type: none"> <li>This is a slender perennial (living greater than 1 season) sedge. Usually around 15cm high however in moist places can grow to 30+ cm high. This plant has very long slender creeping pink/brown rhizomes (underground stems) with roots below every stem.</li> <li>Leaves are shiny green, 1-2mm wide and channeled. Stems, which normally bear only a single inflorescence (flowerhead), are triangular in cross-section and smooth. Rarely, one stem will bear 1 or 2 subsidiary flowerheads as well.</li> </ul>	
<p>Silverleaf Desmodium <i>Desmodium uncinatum</i></p>	<p></p>	<p>64</p>	<p>Hand pull or dig up.</p>	<ul style="list-style-type: none"> <li>Prostrate to scrambling herb with stems to several metres long. Leaf stalk 1.5–6 cm long. Seedpod flattened, 1–3 cm long, 0.15–0.3 cm wide, with 3–10 seeds. Seeds pale brown to tan, elliptic, 3–3.5 mm long.</li> <li>Distinguished by stems with dense to sparse hooked hairs; leaves with three leaflets, leaflets elliptic to ovate 2–10 cm long, 1–6 cm wide, each with a prominent white longitudinal stripe, the central leaflet on a longer stalk than the other two, both surfaces with silky appressed hairs, stipule-like organs (stipels) at the base of each leaflet; flowers pea-like, pink to white, 7–10 mm long; seedpod covered with hooked hairs and</li> </ul>	



				separating into 1-seeded sections which do not open at maturity.	
Sky Flower <i>Duranta erecta</i>	N/A	96	<ul style="list-style-type: none"> <li>▪ Shrubs: CS&amp;P (1:1.5) or spray (G 100 mL/ 10 L + S or O. Trees: CS&amp;P or F/I (G 1:1.5)</li> </ul>	<ul style="list-style-type: none"> <li>• Shrub up to 7 m high. Branches drooping or trailing, unarmed or spiny, sparsely appressed hairy.</li> <li>• Leaves shortly petiolate; lamina ovate, elliptic or obovate, (15-)20–75(-90) mm long, (12-)15–50(-60) mm wide, sparsely appressed hairy, soon becoming subglabrous; base cuneate-attenuate; margin entire or coarsely serrate; apex obtuse, acute or shortly acuminate.</li> <li>• Inflorescence terminal and axillary, 10–30 cm long, racemes many-flowered. Flowers fragrant. Calyx tubular, 3–7 mm long, tube with 5 minute teeth. Corolla mauve, light bluish-purple or white, 9–18 mm long; tube extended beyond calyx; lobes ± equal in length.</li> <li>• Drupes globose, (5-)7–10(-14) mm diam., enclosed by orange fruiting calyx.</li> </ul>	
Crowsfoot grass <i>Eleusine indica</i>	N/A	112		<ul style="list-style-type: none"> <li>• Coarse, tufted annual or perennial to 0.8 m high; culms ascending or prostrate, branching at the base, striate, compressed, up to 8-noded, smooth.</li> <li>•</li> <li>• Leaves with sheath smooth, flattened and keeled, striate, becoming loose, often with tubercle-based hairs to 5 mm long; ligule a rim of short hairs on a short membrane, often ciliate at the sides, 0.5–1 mm long; blade flat or folded, 3–8 mm wide, minutely scabrous on margins, the hairs on the sheath sometimes extending to the blades.</li> <li>•</li> <li>• Spikelets sessile, 3–5 mm long. Glumes unequal, membranous, lower 1.5–3 mm long, narrow ovate, obtuse; upper 2.5–4 mm long, lanceolate or ovate to lanceolate, acute. Lemmas lanceolate, rather acute, 3-nerved, 2.5–4.5 mm long.</li> </ul>	




<p>Balsam, Busy Lizzie</p> <p><i>Impatiens walleriana</i></p>	<p>N/A</p>	<p>142</p>	<ul style="list-style-type: none"> <li>▪ Plants: Spray (G 100 mL/10 L + S or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Glabrous perennial herb to 1 m high, stems ± succulent.</li> <li>• Leaves ovate to broad-ovate, 4–11 cm long, 10–40 mm wide, apex acuminate, margins coarsely toothed, glabrous; petiole 10–40 mm long, with scattered stalked glands.</li> <li>• Flowers mostly pink to red or white, usually 2 or 3 together, peduncles 2–5 cm long; pedicels 10–30 mm long. Lowermost sepal c. 10 mm long, whitish, spur c. 20 mm long; lateral sepals c. 5 mm long, green. Petals 10–20 mm long; uppermost petal largest, keeled; lateral petals fused towards base.</li> <li>• Capsule swollen in the middle, c. 15 mm long.</li> </ul>	
<p>Five-leaf Morning Glory</p> <p><i>Ipomoea cairica</i></p>	<p>N/A</p>	<p>28</p>	<p>Vines and runners: hand pull, roll-up and hang to dry, CS&amp;P (G 1:1.5) the larger stems, roots and nodes. Spray regrowth and ground layer infestations (G 100mL/10L + MM 1.5g/10L + W or O)</p>	<ul style="list-style-type: none"> <li>• a vigorous grower, developing into a thick, covering mat of vegetation, sometimes climbing 4-5 m into the canopy</li> <li>• deeply divided leaves with 5-7 lobes</li> <li>• funnel-shaped lavender flowers with a deeper-coloured throat</li> </ul>	
<p>Jacaranda</p> <p><i>Jacaranda mimosifolia</i></p>	<p>N/A</p>	<p>156</p>	<ul style="list-style-type: none"> <li>▪ Seedlings: hand-pull or spray (G 200 mL/10 L + S or O). Saplings CS&amp;P (G 1:1.5) Trees: F/I (G1:1.5)</li> </ul>	<ul style="list-style-type: none"> <li>• Tree to 15 m high, deciduous in early spring.</li> <li>• Leaves bipinnate, 15–30; pinnae 13–31, 5 -10 cm long; pinnules 3–12 mm long x 1–4 mm wide, sessile, narrow-elliptic, papery, apex acute to acuminate, margin slightly revolute.</li> <li>• Inflorescence a terminal panicle, calyx narrow-campanulate, corolla tubular campanulate, blue-purple with a white throat, pubescent on the outside, 2–3 cm long, 0.8–1 cm wide.</li> <li>• Fruit a woody, orbicular compressed, red-brown, capsule, 3–6 cm long/wide, splitting in two, apex with a mucronate point; seeds surrounded with a</li> </ul>	



				membranous wing.	
Lantana <i>Lantana camara</i>	Class 3	1	Hand prune into 50cm sections then scrape and paint with Glyphosate at 1:1.5 or Spot spray re-growth with Glyphosate at 1:50 +Adjuvant + Dye.	<ul style="list-style-type: none"> <li>• stems are square with small, recurved prickles</li> <li>• leaves are bright green, about 6 cm long, with roundtoothed edges and grow opposite one another along the stem</li> <li>• flowers vary in colour from pale cream to yellow, white, pink, orange, red, lilac and purple, about 2.5 cm in diameter</li> <li>• fruits are glossy, rounded, fleshy, purplish-black when ripe</li> </ul>	
Creeping lantana <i>Lantana montedensis</i>	3	18	<ul style="list-style-type: none"> <li>▪ size, density and geographic location of infestations are important considerations before choosing which control methods to use</li> <li>▪ a combined approach of different control methods including mechanical, chemical, fire and biological with land management practices is most effective</li> <li>▪ see the lantana fact sheet and WONS Lantana Best Practice Manual for further information</li> </ul>	<ul style="list-style-type: none"> <li>• stems are square with small, recurved prickles</li> <li>• leaves are bright green, about 6 cm long, with roundtoothed edges and grow opposite one another along the stem</li> <li>• flowers vary in colour from pale cream to yellow, white, pink, orange, red, lilac and purple, about 2.5 cm in diameter</li> <li>• fruits are glossy, rounded, fleshy, purplish-black when ripe</li> <li>•</li> <li>•</li> </ul>	







<p>Japanese Honeysuckle <i>Lonicera japonica</i></p>	<p>N/A</p>	<p>49</p>	<ul style="list-style-type: none"> <li>▪ Vines and runners: cut high and low, and hand-pull, roll-up and hand to dry, and/or CS&amp;P (G 1:1.5) larger stems, roots and nodes. Spray seedlings and regrowth (G 100 mL/10 L + S or O, or G 100mL/10 L + MM 1.5 g/10 L + W or O or MM 1 – 2g/10 L + W or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Climber or scrambling shrub, usually 7–10 m high, semideciduous, young stems pubescent.</li> <li>• Leaves opposite with a prominent ridge between opposite petioles; lamina ovate to oblong-ovate, 3–8 cm long, 1–4 cm wide, apex short-acuminate to obtuse, base rounded, margins entire, both surfaces sparsely hairy but upper surface glabrescent with age; petiole 3–10 mm long.</li> <li>• Flowers paired; peduncle 5–50 mm long, bracts 5–20 mm long, green. Flowers white, often purplish outside, turning yellowish, fragrant. Corolla 20–30 cm long.</li> <li>• Fruit ovoid, 6–10 mm long, shiny black.</li> </ul>	
<p>Siratro <i>Macroptilium atropurpureum</i></p>	<p>N/A</p>	<p>51</p>	<p>Can be hand-pulled, chipped or mowed</p> <p>Use a brush-cutter to clear tangled growth</p> <p>A combined approach of different control methods including chemical, manual and mechanical with land management practices is most effective.</p> <p>Glufosinate ammonia (200 g/L)</p> <p>15–45 mL per 15 L. Spray when actively growing.</p> <p>Treatments may need to be repeated if regrowth occurs.</p>	<ul style="list-style-type: none"> <li>• Has bright-green leaves, 2-7 cm long, silky hairs on the underside, with three broad leaflets</li> <li>• Flowers are dark red-purple, borne on long spikes</li> <li>• Pods are narrow, 5-10 cm long</li> </ul>	



<p>Molasses Grass <i>Melinis minutiflora</i></p>	<p>N/A</p>	<p>38</p>	<p>Foliar spray with Glyphosate at a rate of 1:100 + Dye.</p>	<ul style="list-style-type: none"> <li>• a perennial mat grass which is easily spread</li> <li>• stems are branched, up to 90 cm long</li> <li>• foliage is sticky with a strong molasses-like odour</li> <li>• reddish leaf blades can be up to 30 cm long</li> <li>• purplish slender flower heads are 10#20 cm in length</li> </ul>	
<p>Common Sensitive Plant <i>Mimosa pudica</i></p>	<p>N/A</p>	<p>102</p>	<p>Fluroxypyr/Starane 200 1.5 L/ha  Do not disturb plants before spraying. Legumes present at time of spraying will be killed.</p>	<ul style="list-style-type: none"> <li>• A low, sprawling, perennial plant growing about 15-45 cm high</li> <li>• Reddish-brown or purple round, often woody stems with short curved prickles</li> <li>• Dark-green, feathery, fern-like leaves, divided into one or more pairs or segments near the end of each leaf stalk</li> <li>• Segments divided into 10-25 pairs of leaflets which close up when disturbed or injured</li> <li>• Pale pink or purplish pink flowers in fluffy balls, 1 cm across</li> <li>• Flowers on short stalks in leaf forks, developing into clusters of seed pods</li> <li>• Seed pods 2-3 cm long with stiff bristles along edges and 1-5 seeds.</li> <li>• Seeds flattened, small and 3 mm in diameter</li> </ul>	



<p>Orange Jessamine <i>Murraya Paniculata</i></p>	<p>N/A</p>	<p>139</p>	<ul style="list-style-type: none"> <li>▪ Seedlings: hand-pull or spray (G 200 mL/10 L + S or O). Saplings: CS&amp;P (G 1:1.5). Trees: F/I (G 1:1.5)</li> </ul>	<ul style="list-style-type: none"> <li>• Bushy shrub or small tree up to 4 m high, glabrous, or young branches and petioles minutely pubescent.</li> <li>• Leaves with rachis 6–11.5 cm long; leaflets narrow-elliptic to ± ovate or obovate, 1.5–6 cm long, 1.2–3 cm wide, apex abruptly and obtusely acuminate, base cuneate, margins entire to obscurely crenate; Inflorescences terminal or upper axillary cymes of up to 8 flowers.</li> <li>• Petals oblong-obovate, c. 10 mm long, white.</li> <li>• Berry ovoid to ellipsoid, c. 10 mm long, bright red, shiny.</li> </ul>	
<p>Glycine <i>Neonotonia wightii</i></p>	<p>N/A</p>	<p>19</p>	<ul style="list-style-type: none"> <li>▪ brush-cutter or similar tool may be required to clear away plant material</li> <li>▪ a combined approach of different control methods including herbicide, mechanical and manual with land management practice is most effective</li> <li>▪ see the glycine fact sheet for further information</li> </ul>	<ul style="list-style-type: none"> <li>• a perennial twining vine with a woody base and vigorous growth habit</li> <li>• has inconspicuous creamy flowers in later autumn</li> <li>• prolific bean-like seed pods up to 3.5 cm long that contain rectangular-shaped seeds</li> <li>• leaves have three dark-green, broadly egg-shaped leaflets</li> <li>• leaflets are up to 15 cm long, 12 cm wide and are sometimes hairy</li> <li>•</li> </ul>	
<p>Blue lotus, Blue Waterlily <i>Nymphaea caerulea ssp. zanzibarensis</i></p>		<p>66</p>		<ul style="list-style-type: none"> <li>• The leaves are broadly rounded, 25–40 cm across, with a notch at the leaf stem. The flowers are 10–15 cm in diameter</li> </ul>	

<p>Mickey Mouse Plant <i>Ochna serrulata</i></p>	<p>N/A</p>	<p>22</p>	<p>Hand pulling can be most effective method of control for young seedlings.</p> <p>Take care not to break the tap root.</p> <p>Larger plants may need to be grubbed out with a mattock.</p> <p>Cut stump glyphosate (360 g/L) Apply undiluted</p>	<ul style="list-style-type: none"> <li>• Small, erect, woody shrub up to about 1.5 m tall</li> <li>• Has an angled tap root that is easily broken when hand pulled</li> <li>• Leaves are up to 5 cm long, narrow and glossy with serrated margins</li> <li>• Flowers are bright yellow with five petals</li> <li>• Fruits are initially green, turning glossy black in summer.</li> </ul>	
<p>Common prickly pear <i>Opuntia stricta</i></p>	<p>1</p>	<p>111</p>	<ul style="list-style-type: none"> <li>▪ nine established insects and one mite biological control agents established in Queensland</li> <li>▪ fire is an effective control method for dense prickly pear infestations</li> <li>▪ a combined approach of different control methods including biological, mechanical and herbicide integrated with land management practices is most effective</li> <li>▪ see the prickly pear identification and control fact sheet (below) for further information</li> </ul>	<ul style="list-style-type: none"> <li>• leafless succulent shrub</li> <li>• spiny and pear-shaped fruit</li> <li>• stems divided into segments (pads or joints)</li> <li>• flowers large and vary from yellow, orange, red, pink, purple to white seen during spring</li> <li>• fruits varying from red, purple, orange, yellow to green</li> </ul>	



<p>Paspalum <i>Paspalum dilatatum</i></p>	<p>N/A</p>	<p>73</p>	<p>Plants: hand-pull or dig-up. Spray (G 100mL/10L + S or O).</p>	<ul style="list-style-type: none"> <li>• This is a tufted perennial (living for longer than 1 growing season) growing from a solid, hairy base or 'crown'. This is a tall, erect grass to about 2m high.</li> <li>• Lower sheaths of leaves are hairy. The leaf blades are hairless with an asymmetric ligule (appendage at base of leaf with unequal sides). The leaf blade is angled along the midrib, and is long and narrow, bright green, sparsely long-hairy around where it meets the stem.</li> <li>• Inflorescence (a group of flowers) usually has 3 to 7 spike-like racemes (groups of flowers on a stem) but could be up to 11. Each raceme is usually less than 5 cm long (but can be up to 12cm long) and usually at almost right-angles from the stem. Flowers in summer to autumn.</li> <li>• The seed heads have paired seeds lined up in 4 rows. Seeds are brown when mature and fringed with fine hairs and may feel sticky.</li> </ul>	
<p>Edible Passionfruit <i>Passiflora edulis</i></p>	<p>N/A</p>	<p>193</p>	<ul style="list-style-type: none"> <li>▪ Vines: hand-pull or CS&amp;P (1:1.5). Spray: (G 200 mL/10 L + S or O, or G 200 mL/10 L + MM 1.5 g/10 L + W or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Glabrous climber.</li> <li>• Leaves usually deeply 3-lobed, occasionally unlobed on young plants; lamina 6–15 cm long, glossy green, regularly toothed; petiole 2–4 cm long, with 2 raised glands near apex; stipules linear, c. 10 mm long, not persistent.</li> <li>• Flowers 6–7 cm diam., white tinged with purple.</li> <li>• Berry ovoid, 30–40 mm diam., purple; edible.</li> </ul>	



<p>Stinking Passionflower <i>Passiflora foetida</i></p>	<p>N/A</p>	<p>70</p>	<p>Vines: hand-pull or CS&amp;P (G 1:1.5). Spray: (G 200mL/10L + S or O, or G 200mL/10L + MM 1.5g/10L + W or O).</p>	<ul style="list-style-type: none"> <li>• Distinguished by presence of tendrils; plants hairy often with yellowish hairs on stems; leaves that are mostly 3-lobed and glandular hairy; leaf stalk without glands; flowers solitary, 3–5 cm wide, white to pale purple, on a stalk with 3 finely divided bracts 2–4 cm long; foetid smell.</li> </ul>	
<p>Corky Passionfruit <i>Passiflora suberosa</i></p>	<p>N/A</p>	<p>37</p>	<ul style="list-style-type: none"> <li>▪ Stems: CS&amp;P (G 1:1.5). Seedlings and regrowth: hand-pull or spray (G 200mL + S or O, or G 200mL/10 L + MM 1.5g/10 L W or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Slender vine, with older stems becoming corky.</li> <li>• Leaves usually deeply and acutely lobed, sometimes unlobed, lamina 3–10 cm long; petiole 0.5–2 cm long, with 2 glands near middle; stipules usually 4–6 mm long.</li> <li>• Flowers c. 15 mm diam., pale greenish; petals absent.</li> <li>• Berry globose, c. 15 mm diam., purple-black.</li> </ul>	



<p>Swamp foxtail <i>Pennisetum alopecuroides</i></p>	<p>N/A</p>	<p>95</p>		<ul style="list-style-type: none"> <li>• Tufted perennial to 1 m high.</li> <li>• Leaves with ligule densely shortly ciliate; blade flat to involute, to 6 mm wide, margins hairy, scabrous on the nerves.</li> <li>• Panicle spike-like, cylindrical, dense, 7–20 cm long, involucre spreading, bristles 10–45, unequal, inner 2–5 times longer than spikelets; outer finer, about as long as spikelet. Spikelets solitary, rarely paired, 6–8 mm long. Lower glume 1–1.25 mm long, nerveless; upper 30–50% spikelet length, 5–7-nerved. Lower lemma sterile, as long as spikelet, 7-nerved; palea suppressed. Upper lemma bisexual, similar to lower lemma, 5–7-nerved; palea shorter than lemma.</li> </ul>	
<p>Inkweed <i>Phytolacca octandra</i></p>	<p>N/A</p>	<p>125</p>	<ul style="list-style-type: none"> <li>▪ Plants: hand-pull or crown, CS&amp;P (G 1:1.5). Spray (G 100 mL/10 L + S or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Herb 1–2 m high, often woody at base, stems and inflorescences green to pinkish, glabrous.</li> <li>• Leaves elliptic to ovate or lanceolate, 5–16 cm long, 1–7 cm wide, margins entire, glabrous; petiole 10–40 mm long.</li> <li>• Stalk of inflorescence 1–2 cm long; pedicels in fruiting stage 2–3 mm long, shorter than the fruit. Stamens mostly 7 or 8, all inserted on the outer margin of the disc. Carpels mostly 8.</li> <li>• Fruit depressed-globose, 4–6 mm diam., red turning to black when ripe; to 8-lobed and 8-seeded.</li> </ul>	




<p>Slash pine <i>Pinus Elliottii</i></p>	<p>N/A</p>	<p>44</p>	<ul style="list-style-type: none"> <li>▪ Seedlings: hand-pull or spray (G 200 mL/10 L + S or O). Saplings and trees: cut close to ground or ring-bark or F/I (G 1:1.5) ensuring thick bark is penetrated.</li> </ul>	<ul style="list-style-type: none"> <li>• Tall tree with horizontal branches high on the trunk; bark reddish, shedding in thin scales.</li> <li>• Shoots glaucous, branchlets orange-brown; buds not resinous.</li> <li>• Leaves 20–30 cm long, leaf sheath 1–2 cm long. Female cones subterminal, shortly stalked, symmetrical, reflexed, ± ovoid, 10–13 cm long, 5–7 cm wide; not persistent, dehiscent at maturity; cone scales reddish brown, the exposed part swollen, ending in a minute prickle; seeds black, wing 2.5–3 cm long.</li> </ul>	
<p>Indian hawthorn <i>Raphiolepis indica</i></p>	<p>N/A</p>	<p>101</p>	<ul style="list-style-type: none"> <li>▪ Stems: C&amp;P (G 1:1.5). Regrowth: Spray (G 200 mL/10 L + S or O).</li> </ul>	<ul style="list-style-type: none"> <li>• Shrub 1–1.5 m high.</li> <li>• Leaves ± ovate to elliptic or obovate, 3–7 cm long, 5–30 mm wide, glabrous or at first pubescent, sharply toothed; petiole c. 10 mm long.</li> <li>• Flowers c. 10 mm diam. Sepals not persistent, often red. Petals white tinged with pink. Pome ± globose, 5–10 mm diam., bluish; seeds 1 or 2.</li> </ul>	




<p>Broad-leaved Pepper Tree</p> <p><i>Schinus terebinthifolia</i></p>	<p>Class 3</p>	<p>9</p>	<p>Seedlings: hand-pull or spray (G 200mL/10L + S or O). Saplings: CS&amp;P (G 1:1.5). Trees: F/I (G 1:1.5).</p>	<ul style="list-style-type: none"> <li>• large spreading trees up to 10 m high and broad</li> <li>• leaves consist of 5-9 dark-green leaflets</li> <li>• small whitish flowers grow at the end of branches</li> <li>• bunches of glossy round red fruits 6 mm across</li> <li>• not all trees bear fruit</li> </ul>	
<p>Fireweed</p> <p><i>Senecio madagascariensis</i></p>	<p>Class 2</p>	<p>82</p>	<p>Tricopyr™ (300 g/L) + picloram™ (100 g/L) + aminopyralid™ (10 g/L) at 350 ml/100 L</p>	<ul style="list-style-type: none"> <li>• The leaves are alternate, narrow-lanceolate to elliptic or oblanceolate. They are generally bright green and glabrous (smooth) and have margins that are lobed, serrate (asymmetrical teeth) or entire. The broader and longer leaves are stem claspings and fleshy and are 2-7cm long and 3-10mm wide but 18 occasionally reach 8-10cm in length on vigorous and older plants. The stem is glabrous (smooth).</li> <li>• The flowerheads (capitula) are small, yellow and daisy-like and are from 1-2cm in diameter and can number from 2-200 per plant. The inflorescence is a loose corymb (all the flowerheads are at the same level even though their stalks arise at different levels). The flowerheads are made up of tubular (disc) florets and ray florets. The flowerhead has a fairly constant number of bracts (phyllaries) 20-21 in one row and of the same length. The number of ray florets is usually 13. Flowering occurs mainly from April to September.</li> </ul>	

<p>South African Pigeon Grass <i>Setaria sphacelata</i></p>	<p>N/A</p>	<p>85</p>	<p>Plants: hand-pull or dig up. Spray (G 100mL/10L + S or O).</p>	<ul style="list-style-type: none"> <li>Perennial tussock to 2 m tall, with short rhizomes. Leaves bluish grey-green, leaf blades soft, glabrous, to 50 cm long and up to about 1 cm wide. Lower parts of culms and the basal leaf-sheaths flattened. Inflorescence a tightly contracted panicle producing a false spike, 7-25 cm long and about 8 mm wide (excluding the dense, radiating golden-yellow bristles); stigmata purple or white. Seeds average about 1.5 million/kg.</li> </ul>	
<p>Paddy's Lucerne <i>Sida rhombifolia</i></p>	<p>N/A</p>	<p>153</p>	<p>Plants: hand-pull or spray (G 100mL/10L + S or O).</p>	<ul style="list-style-type: none"> <li>In the fruit, the mericarps (fruitlets) are hard and often indehiscent (not opening to release the seed) with a wide back and honeycombed or reticulate sides.</li> <li>The mericarps have 2 erect minutely barbed awns.</li> </ul>	

<p>Giant devils fig <i>Solanum hispidum</i></p>	<p>N/A</p>	<p>135</p>	<ul style="list-style-type: none"> <li>▪ Seedlings: hand-pull or spray (G 200 mL/10 L + S or O). Saplings CS&amp;P (G 1:1.5). Trees: F/I (G 1:1.5)</li> </ul>	<ul style="list-style-type: none"> <li>• Tall shrub 3–4 m high, densely hairy with stellate hairs (young stems and petioles rusty-hairy); prickles usually sparse, 3–9 mm long, to 5 mm wide at base and slightly recurved.</li> <li>• Leaves broadly ovate, 17–30 (-40) cm long, 12–20 (-30) cm wide, lamina oblique at base, deeply lobed, discoloured, more densely hairy below; petiole usually 3–7 cm long.</li> <li>• Inflorescences branched, up to 50-flowered; peduncle 1–2 cm long to first fork; pedicels 10–15 mm long. Calyx 7–10 mm long; lobes 6–8 mm long. Corolla stellate, deeply incised, 30–45 mm diam., white.</li> <li>• Berry 10–15 mm diam., yellow or orange-yellow.</li> </ul>	
<p>Tobacco Bush <i>Solanum mauritianum</i></p>	<p>N/A</p>	<p>61</p>	<p>Seedlings: hand-pull or spray (G 200mL/10L + S or O). Shrubs CS&amp;P (G 1:1.5) or F/I (G 1:1.5).</p>	<ul style="list-style-type: none"> <li>• This is a perennial shrub or small tree which is grey-green with open canopy. Hairs are star-shaped with radiating branches to densely intertwined hairs. Stems are much branched with no prickles.</li> <li>• Leaves are long, narrow, discoloured, elliptic with entire and lobed margins. The upper surface is green and pubescent while the lower surface greyish with densely intertwined hairs with 1 or 2 small sessile leaves in axil except on smaller twigs.</li> <li>• Inflorescences (a group of flowers) are numerous in clusters at the ends of branches with velvety grey stalks. Flowers are violet and tiny in Autumn to Spring.</li> <li>• Fruit is a berry which is dull yellow when mature, green when immature.</li> </ul>	

<p>Brazilian Nightshade <i>Solanum seaforthianum</i></p>	<p>N/A</p>	<p>55</p>	<p>Vines: CS&amp;P (G 1:1.5). Regrowth and seedlings: hand-pull or spray (G 200mL/10L + S or O, or G 200mL/10L + MM 1.5g/10L + W or O).</p>	<ul style="list-style-type: none"> <li>• The flowers occur in pendant clusters. Flowers are star-shaped, 2–3cm in diameter, blue to purple, with a tuft of yellow stamens in the centre.</li> <li>• The leaves are alternating on the stem, 13cm long and 11cm wide, and deeply divided into three to nine irregularly shaped segments.</li> <li>• Fruit are globular, succulent, shiny berries, bright red to scarlet when ripe, about 1cm in diameter with numerous seeds inside.</li> </ul>	
<p>African Tulip Tree <i>Spathodea campanulata</i></p>	<p>Class 3</p>	<p>190</p>	<p>Seedlings: spray (G 200mL/10L + S or O). Saplings: CS&amp;P (G 1:1.5). Trees: F/I (G 1:1.5).</p>	<ul style="list-style-type: none"> <li>• grows very quickly up to a height of 24 m</li> <li>• has broadly oval-shaped leaves which are strongly veined, bronze when young, and a deep glossy green when mature</li> <li>• produces large flat clusters of velvety, bronze-green buds and large orange-red flowers with yellow frilly edges</li> <li>• has reddish-brown seed capsules that can be up to 20 cm in length</li> </ul>	
<p>Singapore Daisy <i>Sphagneticola trilobata</i></p>	<p>Class 3</p>	<p>16</p>	<p>Plants: hand-pull or spray (G 100mL/10L + S or O).</p>	<ul style="list-style-type: none"> <li>• leaves are lush, glossy green, usually 3-lobed and in pairs along the stem</li> <li>• flowers are yellow to orange-yellow, daisy-like, 2 cm wide, on short stalks above the leaves</li> <li>• variable amounts of seeds are produced</li> </ul>	

<p>Giant rat's tail grass</p> <p><i>Sporobolus pyramids and S. natalensis</i></p>	<p>2</p>	<p>24</p>	<ul style="list-style-type: none"> <li>▪ maintaining vigorous dense pastures best form of prevention</li> <li>▪ clean machinery and vehicles thoroughly after working in infested areas</li> <li>▪ a combined approach of different control methods including herbicides and mechanical with land management practices is most effective</li> <li>▪ see 'Giant rat's tail grass and other weedy Sporobolus species fact sheet' for further information</li> </ul>	<ul style="list-style-type: none"> <li>• very similar in appearance to other Sporobolusgrasses</li> <li>• grows to a height of 0.6-1.7 m</li> <li>• seed head is up to 45 cm long and 3 cm wide</li> <li>• seed heads change shape from a 'rat's tail' when young to an elongated pyramid shape when mature</li> <li>• unlike Parramatta grass and giant Parramatta grass, GRT does not develop sooty spike on its seed heads</li> <li>•</li> </ul>	
<p>Sky flower or blue thunbergia</p> <p><i>Thunbergia grandiflora</i></p>	<p>2</p>	<p>79</p>	<ul style="list-style-type: none"> <li>▪ Vines: CS&amp;P (G 1:1.5). Spray: (G 200 mL/10 L + S or O).</li> </ul>	<ul style="list-style-type: none"> <li>• vigorous perennial twining vine</li> <li>• leaves are choko-like up to 15 cm long and 10 cm wide with pointed tip</li> <li>• flowers are trumpet-shaped and have a short, broad tube, white on the outside, yellowish inside expanding to five rounded pale lavender-blue petals, up to 8 cm long and 6-8 cm wide</li> <li>• seed pods are cone-shaped, 3-5 cm long with a rounded base</li> <li>• seeds are flat, up to 1 cm long covered in brown scales</li> <li>• has a tuberous root system, some being as large as 70 kg</li> </ul>	