



BUFFER PLANTING PLAN

Lot 211 DP 1044292
Pacific Highway Moonee
Petina Park

JUNE 2011

A REPORT PREPARED FOR
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1. INTRODUCTION

1.1 Background

James Warren and Associates have been engaged by Geoff Smyth Consulting to complete a Buffer Planting Plan (BPP) to protect the threatened flora occurring on Lot 211 DP 1044292 Pacific Highway, Moonee (i.e. Petina Park) (**FIGURE 1 & 2**).

A Flora and Fauna Assessment was completed by JWA in July 2007. Subsequent to this, a response report (JWA 2010a) was prepared addressing concerns by the Coffs Harbour City Council (CHCC). In addition, the 7 part tests were re-applied (JWA 2010b).

The CHCC raised further concerns regarding the impacts of the proposed development on the following:

- Endangered Quassia sp. 'Moonee Creek',
- Vulnerable Rusty plum (*Niemeyera whitei*), and
- Land zoned as 7(a) Environmental Protection.

Recent negotiations with CHCC and the NSW Department of Sustainability, Water, Environment, Population and Communities (DSEWPaC) have resulted in amendments to the layout. These amendments will result in the following:

- retention of the fifteen (15) stems of the Endangered Quassia sp. 'Moonee Creek',
- retention of the twenty-one (21) stems of Rusty Plum, and
- no encroachment onto the land zoned as 7(a) by the Bushfire Asset protection Zone (APZ).

FIGURE 3 shows the amended layout and impacts of the proposed development on the existing site vegetation and threatened plants.

All threatened plants, with the exception of one, occur outside the development layout. The Rusty Plum occurring in the proposed Lot 6 (**FIGURE 3**) will be translocated (see **SECTION 5.5.5**).

A BPP will be prepared to protect the threatened plants *in situ*.

1.2 Requirement for Commonwealth Referral

As the layout of the proposed development has been amended, it is now unlikely that there will be any significant impacts pursuant to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (i.e. impacts on the threatened Moonee Quassia). A letter from DSEWPaC dated 11th April 2011 states the following:

"In particular, it is understood that all plants will be retained on-site, and protected by a 10 -15 m vegetated buffer zone, with the exception of one plant on Lot 6¹. Based on this information, it appears that significant impacts on the Moonee Quassia are unlikely to occur."

¹ It should be noted that the plant within the proposed Lot 6 is a Rusty plum (*Niemeyera whitei*).



Legend
 Subject Site



0 100m

SOURCE: Jock Palmer & Associates
 Ref: 03PHOTO.jpg (Rec'd 03.08.04)

SCALE: 1 : 3000 @ A4

JAMES WARREN & ASSOCIATES PTY LIMITED
 Environmental Consultants

CLIENT
 Telpat Pty Ltd
 PROJECT
 Buffer Planting Plan
 Lot 211 DP104492
 Pacific Highway, Moonee Beach, NSW
 Coffs Harbour City Council LGA

FIGURE 1

PREPARED: BW
 DATE: 17 June 2011
 FILE: 04004_Aerial.cdr

TITLE

**AERIAL
 PHOTOGRAPH**



SOURCE: Topographic map 'Moonee Beach'

SCALE: 1 : 30 000 @ A4

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Coffs Harbour City Council LGA

FIGURE 2

PREPARED: BW
DATE: 17 June 2011
FILE: 04004_Locality.cdr

TITLE

**LOCALITY
PLAN**



Correspondence with DSEWPaC is included as **APPENDIX 1**.

1.3 The Subject Site

The subject site occurs at Lot 211 Pacific Highway Moonee and covers an area of approximately 5.749 hectares. A road reserve runs north-south through the western half of the site (**FIGURE 2**).

Much of the central area of the site is relatively flat and has been cleared and is maintained by periodic slashing. Scattered trees occur in this area. The south of the site slopes to a creek flat and is covered by Wet sclerophyll forest with rainforest species along the riparian zone. The slope to the creek flat, in the south west corner, is relatively steeper.

1.4 Soils and Geology

Soils on the Subject site are part of the Newports Creek type, characterised by low, level to gently undulating coastal back barrier floodplains on Pleistocene estuarine sediments. Soils are deep, poorly drained Yellow Podzolics and Humic Gleys (DLWC 1999).

1.5 The Proposed Development

The proposed development consists of a thirty-five (35) lot subdivision as follows (**FIGURE 3**):

- thirty-one residential lots concentrated in northern portion of site;
- possible collector road along the western side of the development (lot 21);
- access road in the north-west corner (lot 22);
- central open space and parking (lot 23);
- 7(a) Environmental Protection Zone (lot 24).

A Bush Fire Risk Management Plan (Hadaway 2011) has been prepared determining that there will be an Asset Protection Zone (APZ) of between 23 m and 42 m from the southern side of the proposed development.

1.6 Threatened Flora

Two (2) Threatened flora species have been recorded on the site as follows:

- Fifteen (15) stems of the Endangered Quassia sp. 'Moonee Creek' (TSC Act 1995; EPBC Act 1999); and
- Twenty one (21) stems of the Vulnerable Rusty plum (*Niemeyera whitei*) (TSC Act 1995).

The locations of these threatened species are shown in **FIGURE 3**.



1.7 Aims and Objectives

The aim of this BPP is to provide guidelines, strategies and methods, for the protection and management of the retained natural environment of the Petina Park subdivision including the threatened Quassias and the Rusty Plums.

Specific objectives for the BPP are to:

- Provide an overview of the site vegetation including threatened plants and weeds;
- Management of weed species by removal of all weeds;
- Identify precise restoration goals;
- Provide guidelines for buffer plantings;
- Provide a schedule of works including details on the timing of all works and who is responsible for implementation of each phase of BPP; and
- Provide specifications for a monitoring and reporting program.

1.8 Restoration Goals

The following is a set of measurable goals to be achieved within the rehabilitation area:

1. No weeds within the buffer planting area.
2. All buffer plantings thriving with the average minimum height of all planted trees to be 1m at year 3 and 1.5 at year 5.
3. Increased number and abundance of native species with obvious indications of natural regeneration.
4. Survival of all individuals of the threatened of the Moonee Quassia and the Rusty plum.
5. Forest canopy approaching closure (i.e. > 80%).

1.9 Buffer Planting Area

The buffer planting area covers the land 2 (a) Residential occurring to the south of the proposed 4 m wide gravel fire trail (**FIGURE 3**).

Land to the south of this area is zoned 7(a) Environmental Protection and will be the subject of a Vegetation Management Plan (VMP).



1.10 APZ Requirements

A Bush Fire Risk Management Plan (Hadaway 2011) has been prepared determining that APZ of between 23 m and 42 m from the southern side of the proposed development (FIGURE 3).

1.11 Timing and Responsibilities

- This BPP will be implemented by Telpat Pty Ltd over a period of 5 years;
- Work will be carried out by the appropriately qualified persons (APPENDIX 2).



2. LITERATURE REVIEW

2.1 Introduction

A buffer is defined by the Macquarie Dictionary as something designed to neutralise the shock of opposing forces. Buffers are used in environmental management to protect areas of environmental value from negative impacts. Buffers are usually defined in spatial terms, as a zone or strip that acts to absorb a negative impact associated with an adjacent land use. Buffer zones or strips are usually, but not necessarily, vegetated. However, a buffer may also be some other form of impediment, such as a fence or area of water. Vegetated buffer zones may be especially planted or may consist of a retained area of existing vegetation.

2.2 Types of Buffers

A buffer may take any of a number of forms, depending upon the nature of the environmental value to be protected, the impacts associated with nearby land use and the interaction between these factors. The management context within which the buffer exists is also an important consideration. Examples of buffers include:

- Riparian buffers
- Vegetated barriers
- Filter strips
- Shelterbelts and windbreaks
- Distance buffers (i.e. open space)
- Restrictive barriers (i.e. fences, impenetrable vegetation, water etc.)

2.3 Purposes of Buffers

2.3.1 *Rationale*

Buffers may be employed for a range of conservation purposes, to protect a specific environmental value (such as water quality in a stream) or a range of values (such as buffering an area of National Park from an urban area). In the majority of cases, buffers are used because of the multiple environmental benefits they provide.

Wetlands or vegetation communities subject to periodic inundation, in particular, can be subjected to a variety of stressors resulting from human actions. Stressors potentially occurring in these environments include:

- Enrichment/eutrophication
- Organic loading and reduced dissolved oxygen
- Contaminant toxicity
- Acidification
- Salinisation
- Sedimentation/burial
- Turbidity/shade



- Vegetation removal
- Thermal alteration
- Dehydration
- Inundation
- Fragmentation of habitat
- Other human presence

Examples of situations where buffers are used to protect specific environmental values are discussed below.

2.3.2 *Protection of Water Quality*

Buffer zones are often used to remove nutrients, sediment and/or contaminants from runoff, especially along the banks of watercourses or margins of wetlands. Riparian buffer zones improve water quality in different ways depending upon the pathway of delivery of water to the buffer (Correll 1997). Groundwater passing through the buffer zone may be cleansed of nitrate and acidity due to a combination of de-nitrification, bio-storage and changes in soil composition (Correll 1997). Overland storm flows entering laterally from uplands may be cleansed of suspended particulates, with adhering nutrients, inorganic toxins and pesticides as well as some dissolved nutrients and toxins (Correll 1997). When a stream is in flood, waters flooding out into the buffer zone may also be cleansed of sediments, nutrients and toxic materials as a result of particulate trapping and binding of materials on leaf litter and soils (Correll 1997). Correll (1997) notes a number of external and internal factors that limit the effectiveness of the functions of a riparian buffer zone. Factors external to the buffer zone include: watershed area and gradient; stream channel morphology, soil mineralogy and texture; bedrock type and depth and climate. Internal factors include: the width and type of vegetation, waterlogging and organic content of soils; hydraulic conductivity; soil nutrient content and geochemistry (Correll 1997).

According to the US Department of Agriculture (NCBC 1999), properly installed, well-maintained buffers can reduce nutrient and pesticide runoff into water bodies by 50% or more, sediment loadings by 75% and pathogen loadings by 60%.

Leishman (1986) has shown that stormwater outlets are significant sources of high nutrient levels. This research also showed that water moving through a vegetated creek bank will drop most of its total phosphorus between 15 and 30 metres away from the pollutant source. The research also showed that water with 600ppm of total phosphorus at a road edge will drop to 250ppm 10 metres down slope of the road edges and to near background level 30metres down slope.

The relationship between pollutant removal and buffer width is nonlinear, with ever greater width required to achieve ever smaller increases in pollutant removal efficiency (Desbonnet *et al* 1994). Desbonnet *et al* (1994) has shown that a 25 metre vegetated buffer will remove 80% of sediment, a 20 metre buffer will remove 70% of Suspend Solids, a 23 metre vegetated buffer will remove 70% of Nitrogen and a 35 metre buffer will remove 70% of Phosphorus. Their research also showed that vegetated buffers of 15-30 metres will protect wetland habitat from low-intensity disturbances whilst a 30-45 metre vegetated buffer will protect wetland habitat from high intensity disturbances. According



to the work of Desbonnet *et al* (1994) vegetated buffer width would need to be increased to 600 metres to achieve 99% sediment and pollutant removal.

Correll (1997) cautions that the efficacy of Riparian Buffer Zones in removing pollutants from surface and groundwater is highly dependent upon hydrology. For effective removal of particulates, dissolved nutrients and toxic materials, surface flow must occur as sheet flow rather than highly focused flows and vegetation in the buffer zone must provide enough friction to surface flows.

Additional benefits of riparian buffer zones include:

- Shading and evaporative cooling of the stream channel (Correll 1997);
- Provision of litter and large woody debris to stream channel communities (Correll 1997).
- Provision of unique habitat to wildlife (Belt *et al* 1992).

2.3.3 *Control of Human Access*

Buffers can be used to restrict access of people to areas of environmental value. Areas of open space provide a distance buffer and can provide a psychological and social restriction on negative human behaviours such as dumping of rubbish or weeds. Buffers can also be designed to provide a physical barrier to access through the use of fencing, impenetrable vegetation, areas of water and so on.

2.3.4 *Control of Animal Access*

Feral fauna species such as Dogs, Cats, Foxes and Cane toads are known to access new areas by utilising man-made and disturbed areas. A well-managed native forested buffer zone will effectively preclude access by these species to the main conservation zone.

2.3.5 *Protection of Significant Plants, Nests etc.*

Buffers may be used to protect a particular feature of environmental value, such as a significant plant or the nest of a significant bird. In this case, the buffer will have a number of purposes, such as restriction of access by humans or pets and reducing visual and aural disturbance to an acceptable level.

2.3.6 *Reduction of Edge Effect*

Three types of edge effects characterise the interface between remnant bushland and other land uses.

1. Abiotic effects are those changes in light, temperature, humidity and wind that occur when a remnant edge is formed by the creation of new surrounding land uses, such as clearing land for grazing or agriculture.
2. Direct biological effects include changes in the number and abundance of species brought about by changed environmental conditions. For example, the spread of



species that adapt well to the altered climatic conditions, and the reduction in recruitment of species that do not prosper.

3. Indirect biological effects are changes in the way species interact, in particular modified patterns of competition, pollination, and the dispersal of seeds (Donatiu 2001).

Edges and canopy gaps in remnant forests are the sites where weed species are able to establish and persist. Lateral light penetration along the edges and increased light levels from canopy gaps can result in the establishment of early successional rainforest trees and weed species (Kooyman 1996).

A vegetated buffer zone can reduce the impacts of edge effect on retained areas of vegetation.

2.3.7 *Visual and Noise Buffers*

Buffers can be used to obscure incompatible scenery, such as areas of housing, from natural areas (Davies & Lane 1995). Vegetated buffers or other physical screens reduce the amount of visual (especially lighting) and noise disturbance to buffered habitats. These forms of disturbance can have a range of detrimental impacts to wildlife, including disruption of foraging, breeding and nesting and increases in stress levels. Distance buffers can be effective in reducing disturbance to wildlife sensitive to human intrusion, such as birds nesting on beaches.

2.3.8 *Spray Drift Buffers*

Marrs *et al* (1993) note an increasing need to protect semi-natural vegetation from the potential effects of herbicide drift. They note that earlier estimates using established perennials suggested zones needed to be 6-10m wide. Marrs *et al* (1993) found that seedlings of some species were affected at greater distances than established plants and, on sites where seedling establishment is an important mechanism for community regeneration, buffer zones may need to be 20m wide.

2.4 **Benefits of a Buffer Zone**

Buffer zones, particularly vegetated buffers, can provide a range of benefits above and beyond the neutralising of the particular impact they were designed for. These values include:

- Providing corridors for wildlife movement (Davies & Lane 1995);
- Provision of habitat for wildlife. Desbonnet *et al* (1994) report that even vegetated buffers of 15m in width have value as habitat, with narrower buffers still providing resting and feeding habitat for a variety of species, particularly birds;
- Providing a transition between upland and lowland habitats (Davies & Lane 1995);
- Provision of a future economic benefit (e.g. timber) (USDA 2000);
- Provision of a visible, tangible example of land stewardship (NCBC 1999);
- Prevention of invasion by exotic plants; and
- Being aesthetically pleasing (Desbonnet *et al* 1994; Lismore City Council undated).



3. EXISTING SITE VEGETATION

A Flora assessment was completed by JWA in 2007. The site comprises of the following:

- Five (5) vegetation communities as follows (**FIGURE 3**):
 - Tall mid-dense forest (*Lophostemon confertus*, *Eucalyptus siderophloia*)
 - Tall sparse forest (*Lophostemon confertus*, Mixed Rainforest sp.)
 - Low dense shrubland (*Lantana camara*, *Senna pendula*)
 - Low grassland (*Paspalum dilatatum*, *Imperata cylindrica*)
 - Mixed plantings (*Casuarina glauca*, *Lophostemon confertus* etc)
- Vegetation Community 1 (i.e. Tall mid-dense forest) is mapped as being of high ecological significance in accordance with the Coffs Harbour City Council Draft Vegetation Management Plan (**FIGURE 3**). NB: Some of these high significance areas do not concur with ground truthed vegetation communities mapped by the JWA survey (JWA 2007).
- One hundred and fifty-four (154) flora species (**APPENDIX 3**).
- Two (2) threatened species (**FIGURE 3**):
 - Moonee quassia (*Quassia* sp. 'Moonee Creek') is classified as Endangered under the Threatened Species Conservation Act (TSC Act 1995) and the Environment Protection and Biodiversity Conservation Act (EPBC Act 1999).
 - Rusty Plum (*Niemeyera whitei*) is classified as Vulnerable under the Threatened Species Conservation Act (TSC Act 1995).
- Weed occurrence and density, on the subject site, is high. Thickets of Lantana occur throughout the communities 1, 2 and 3. Camphor laurel, Winter senna and Sydney golden wattle also occur in abundance. A list of the weed species found on the site is provided below:

○ <i>Ambrosia artemisiifolia</i>	Annual ragweed
○ <i>Gomphocarpus physocarpus</i>	Balloon cotton bush
○ <i>Ageratum houstonianum</i>	Blue billygoat weed
○ <i>Solanum seafortianum</i>	Brazilian nightshade
○ <i>Cinnamomum camphora</i>	Camphor laurel
○ <i>Bidens pilosa</i>	Cobblers pegs
○ <i>Erythrina x sykesii</i>	Coral tree
○ <i>Ageratina adenophora</i>	Crofton weed
○ <i>Taraxacum officinale</i>	Dandelion
○ <i>Solanum americanum</i>	Glossy nightshade
○ <i>Phytolacca octandra</i>	Inkweed
○ <i>Lantana camara</i>	Lantana
○ <i>Araujia sericifera</i>	Moth vine
○ <i>Sida rhombifolia</i>	Paddy's lucerne
○ <i>Chloris gayana</i>	Rhodes grass
○ <i>Onopordum acanthium</i>	Scotch thistle



Buffer Planting Plan - Petina Park, Moonee

- | | |
|----------------------------------|--------------------------|
| ○ <i>Wedelia trilobata</i> | <i>Singapore daisy</i> |
| ○ <i>Pinus elliotii</i> | <i>Slash pine</i> |
| ○ <i>Schefflera actinophylla</i> | <i>Umbrella tree</i> |
| ○ <i>Andropogon virginicus</i> | <i>Whiskey grass</i> |
| ○ <i>Solanum mauritianum</i> | <i>Wild tobacco tree</i> |
| ○ <i>Senna coluteoides</i> | <i>Winter senna</i> |



4. BUFFER ASSESSMENT

4.1 Potential Development Impacts

An environmental assessment of the Petina Park sub-division was completed by JWA (2007) and cites the following potential impacts from the development of the site:

Flora

- Loss of vegetation for the construction of buildings, access roads, driveways and associated infrastructure.
- Removal/translocation of threatened plant species².
- Disturbance to the site creating opportunities for weeds to colonise.
- A loss of organic material from the site.
- Loss of habitat available for dispersal for plants.
- Disturbance to the Environmental Protection area of the site.
- Increase the risk of fire release into the surrounding bushland.
- Increase risk of erosion and sedimentation entering the creek from earth works.

Fauna

- Loss of habitat for a range of native reptiles, birds and mammals and, to a lesser extent, amphibians.
- Loss of sub-mature eucalypts represents a decrease in the future recruitment of hollows.
- Loss of eucalypts as a food supply for nectarivores.
- Loss of potential grazing area for the local eastern grey kangaroos.
- Death or injury of native animals during vegetation clearance.
- Death or injury of native animals due to the presence of domestic dogs and cats.
- Death or injury of native animals due to an increase in traffic.
- Increase in abundance of introduced disturbance adapted competitors (e.g. Cane toads, Noisy miner, Crow, Pied currawong, Black rat and House mouse).
- Disturbance due to increased light, noise and activity.
- Disturbance to the Environmental Protection area of the site.

Koalas

- Loss of secondary feed trees i.e. Blue gum, Pink bloodwood and Forest oak

The impact of the emended development layout is shown in **FIGURE 3**.

² Amendments to the layout will prevent any impact on threatened plants (see **SECTION 1.1**)



4.2 Objective of the Buffer Plantings

The primary objective of the buffer plantings at Petina Park is to provide protection to the retained threatened species (i.e. Moonee quassia and the Rusty Plum).

In addition, the buffer area will provide protection to the vegetation within the Environmental Protection area to the south and mitigate many of the above listed impacts.

The vegetative buffer will:

- Provide habitat for the recruitment of native flora species.
- Lower the chance of weed species colonising the Environmental Protection area.
- Lower the risk of disturbance to the Environmental Protection area.
- Lower the risk of fire release into the surrounding bushland.
- Lower the risk of erosion and sedimentation entering the creek.
- Provide habitat for a range of native fauna species.
- Reduce the impact of increased light, noise and activity.
- Contribute to reduced fire hazard by planting species with low fire risk (i.e. rainforest species)



5. MANAGEMENT STRATEGIES

5.1 Introduction

The following management strategies will be utilised to provide a quality buffer to the threatened plants and the environmental protection area.

5.2 APZ Requirements

The intersection between the Buffer Plant Area and the APZ will be cleared (**FIGURE 4**). This area predominately consists of degraded exotic vegetation and will be later planted with rainforest species in a manner that conforms to the requirements of the APZ (**SECTION 5.6.3.2**).

5.3 Weed control

Weed control will be completed within the buffer planting area for two reasons:

1. To determine the available space for enhancement plantings (i.e. in addition to identified area); and
2. To promote natural regeneration by alleviating competition pressure on native seedlings created by an abundance of weeds.

A list of the environmental weeds present on the site has been compiled (**SECTION 3**).

Weed control can be divided into two stages primary and secondary weed control.

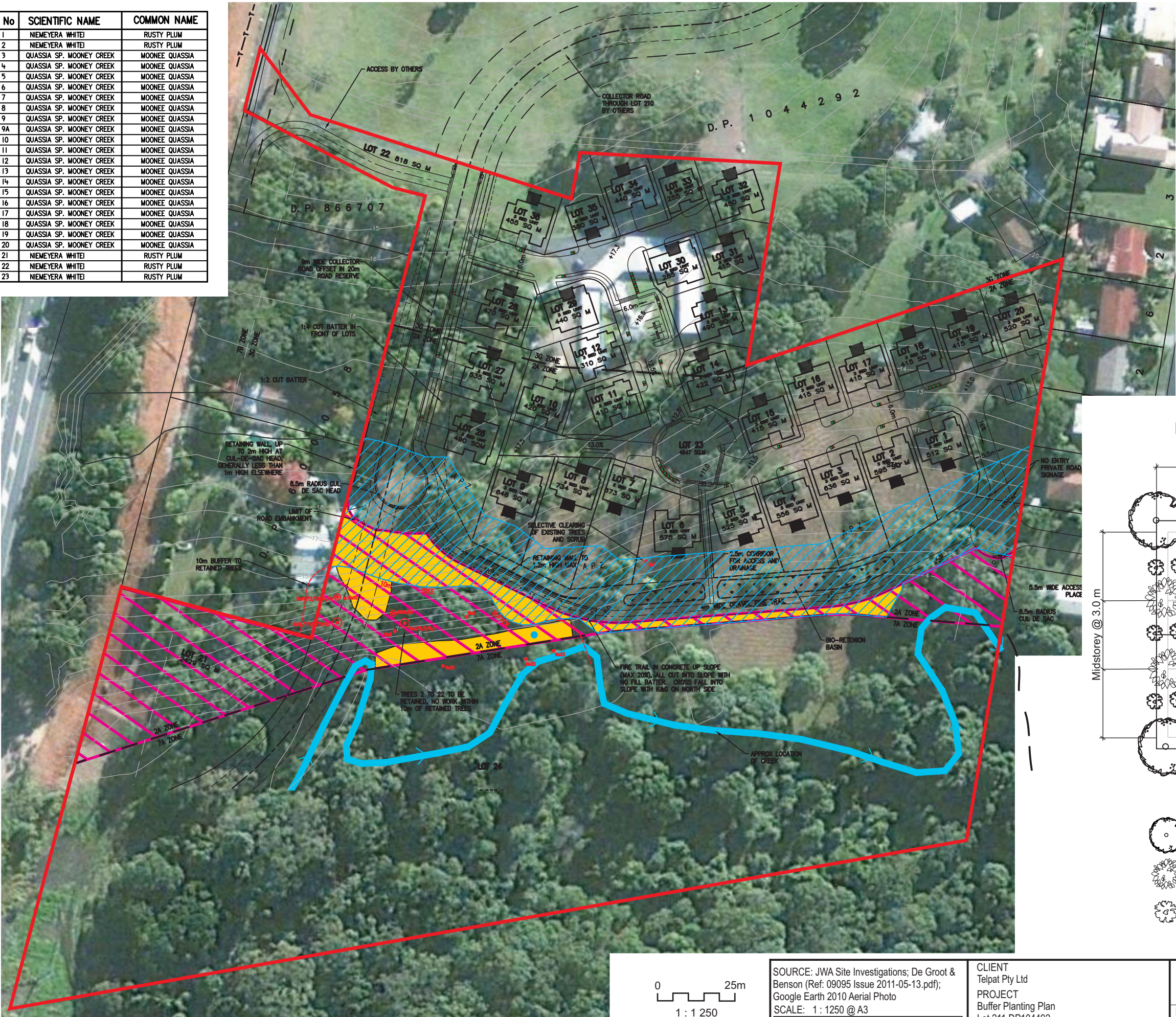
5.4 Primary Weeding

Primary weed control is the initial undertaking of weed removal through a series of targeted methods. Mechanical methods (e.g. hoe/rake, hand pulling and/or slashing), a chemical assault (e.g. Roundup Biactive ©) or a combination of both may be used. The generally accepted method of removal for each weed species is provided (BSRLG 2005) (**APPENDIX 4**).

Primary weeding will be undertaken over the site and the following procedures will be followed:

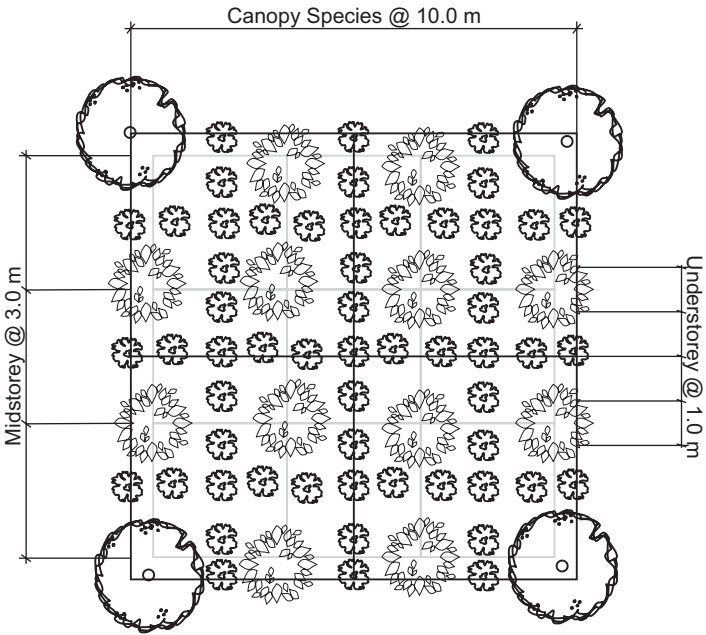
1. **Before any primary weeding commences all native species within treatment areas will be located and clearly marked for retention especially the Moonee Quassia and the Rusty plums;**
2. Where appropriate, primary weeding will be undertaken by hand. This will prevent damage to young regrowth or seedlings.
3. Careful hand weeding is to occur for approximately 50 cm in diameter around the retained native species;

TREE No	SCIENTIFIC NAME	COMMON NAME
No 1	NIEMEYERA WHITEI	RUSTY PLUM
No 2	NIEMEYERA WHITEI	RUSTY PLUM
No 3	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 4	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 5	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 6	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 7	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 8	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 9	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 9A	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 10	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 11	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 12	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 13	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 14	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 15	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 16	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 17	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 18	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 19	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 20	QUASSIA SP. MOONEY CREEK	MOONEE QUASSIA
No 21	NIEMEYERA WHITEI	RUSTY PLUM
No 22	NIEMEYERA WHITEI	RUSTY PLUM
No 23	NIEMEYERA WHITEI	RUSTY PLUM



- Legend**
- Planting patches
 - Buffer Planting Area
 - Asset Protection Zones - to be cleared
 - Location of threatened plants
 - Location of clumps of threatened plants
 - Position for translocated Rusty plum
 - Subject Site

PLANT LAYOUT GUIDE



- LEGEND**
- Canopy Species @ 10.0 metre centres
 - Midstorey @ 3.0 metre centres
 - Understorey @ 1.0 metre centres

0 25m
1 : 1 250

SOURCE: JWA Site Investigations; De Groot & Benson (Ref: 09095 Issue 2011-05-13.pdf); Google Earth 2010 Aerial Photo
SCALE: 1 : 1250 @ A3
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FIGURE 4

PREPARED: BW
DATE: 17 June 2011
FILE: 04004_Buffer.cdr

TITLE
**BUFFER
PLANTING
PATCHES**



4. All genetic material seeds, flowers, underground rhizomes, will be removed and disposed of at an approved green waste facility;
5. Utmost care must be taken when utilizing chemicals to ensure that no drift occurs outside of the treatment area;
6. The glyphosate-based products Roundup Biactive® and Weedmaster 360® will be used to minimise detrimental effects on Tadpoles and frogs.
7. Appropriate removal methods for the major weed species on site are described in **APPENDIX 4**.

All chemical users should be experienced and licensed in accordance with the relevant legislation. Utmost care must be taken when utilising chemicals to ensure that no drift occurs outside of the treatment area. Spraying should not occur on windy days or within 24 hours of predicted rainfall.

Primary weeding should commence at the start of the active growing period (approximately November), or on an as needed basis. Preparation before spraying, in the form of manual clearing weeds from around native plants, must be carried out.

Weed material that does not contain any fertile parts will be mulched and spread on the ground and any weeds that may have fertile parts present will be disposed of at an approved waste disposal facility such as Council landfills or transfer stations.

5.5 Natural Regeneration

Natural regeneration refers to the natural process by which plants replace or re-establish themselves. Natural regeneration can be described as the “regrowth” or “vegetative recovery” which occurs spontaneously, by seed or otherwise, after a stress or disturbance (Petrie 1999; Temple & Bungey 1980). As long as mature and healthy native plants occur on the Subject site, natural regeneration is an option (Petrie 1999).

Natural regeneration is a powerful tool that can be used to re-establish native vegetation. It ensures that the new growth is derived from genetic material (i.e. parents) that currently occupies the site and is adapted to local conditions. Additionally, the chance of outbreeding depression is reduced.

Natural regeneration is already occurring buffer area and within the Environmental protection Zone. This process will be improved by regular weed control (SECTION 4.4.1) as competition for valuable resources such as nutrients, water and light decreases the chance of survival of native seedlings. Weed control will be undertaken in all areas of retained vegetation so that natural regeneration can be facilitated.

5.6 Buffer Plantings

5.6.1 Introduction

This section will outline specific guidelines for planting within the Buffer Planting Area.



5.6.2 *Locations of Plantings*

Buffer plantings will be completed as follows:

1. In areas shown on **FIGURE 4** (i.e. planting patches);
2. In areas where weed control has left significant gaps devoid of vegetation (i.e. this will be at the discretion of the Bush Regenerator after primary weed control.)
3. Planting within the area where the APZ overlaps the Buffer Planting Area (see **FIGURE 4**) will follow specific guidelines as stated in **SECTION 5.5.2** (Planting Methodology).

5.6.3 *Planting Methodology*

5.6.3.1. *General Planting Requirements*

Exact species selection and decisions regarding the location of extra buffer plantings (i.e. in gaps made by weed control) will be made by the Bush Regenerator on completion of vegetation clearing and weed control.

The planting layout is shown in **FIGURE 4** and should have the following spacings:

- Canopy Species: 10 m ;
- Midstorey: 3 m ; and
- Understorey: 1 m.

The following general planting methods will be followed:

- All species to be planted will be sourced from nurseries that can demonstrate plants have been propagated from local stock (within 5-10 km of the site);
- All plants will be sun hardened;
- All trees should be well watered, fertilised and heavily mulched with organic material sourced from on-site (i.e. mulching obtained from cleared native vegetation);
- Tree guards will be used at the discretion of the Bush regenerator;
- Fertiliser and mulch will be reapplied when necessary; and
- All plantings that fail will be replaced.

5.6.3.2. *APZ Planting Requirements*

Plantings within the Buffer Planting Area that overlaps the APZ will follow the requirements of the Bush Fire Risk Management Plan (Hadaway 2011).



- The APZ shall be maintained in such a manner that:
 - minimal fire fuel that could be set alight by bushfire (e.g. long grass, tree branches etc.) is present at ground level;
 - vegetation does not provide a path for the transfer of fire to the development;
 - trees are a minimum of 5 metres away from any building, measured from the edge of the foliage to the roof line or any open balconies;
 - bark chips and the like are not present within 5 metres of any building;
 - any trees present have a minimum canopy separation of 2 metres; and
 - any trees present are not species that retain dead material or deposit excessive amounts of ground fuel in a short time.

5.6.4 Species Selection

In accordance with bush fire hazard requirements, all buffer plantings will consist of rainforest species recorded on the site as follows:

• <i>Archontophoenix cunninghamiana</i>	Bangalow palm
• <i>Polyscias elegans</i>	Celerywood
• <i>Polyscias murrayi</i>	Pencil cedar
• <i>Polyscias sambucifolia</i>	Elderberry panax
• <i>Elaeocarpus obovatus</i>	Hard quandong
• <i>Trochocarpa laurina</i>	Tree heath
• <i>Abrophyllum omans</i>	Native hydrangea
• <i>Breynia oblongifolia</i>	Coffee bush
• <i>Bridelia exaltata</i>	Brush ironbark
• <i>Claoxylon australe</i>	Brittlewood
• <i>Croton verrauxii</i>	Native carscarilla
• <i>Glochidion ferdinandi</i>	Cheese tree
• <i>Scolopia braunii</i>	Flintwood
• <i>Cryptocarya erythroxylon</i>	Pigeonberry ash
• <i>Cryptocarya glaucescens</i>	Jackwood
• <i>Cryptocarya microneura</i>	Murrogun
• <i>Cryptocarya obovata</i>	Pepperberry tree
• <i>Endiandra muelleri</i>	Green-leaved rose walnut
• <i>Neolitsea australiensis</i>	Green bolly gum
• <i>Neolitsea dealbata</i>	White bolly gum
• <i>Pratia purpurascens</i>	Whiteroot
• <i>Dysoxylum fraserianum</i>	Rosewood
• <i>Dysoxylum mollissimum</i>	Red bean
• <i>Synoum glandulosum</i>	Scentless rosewood
• <i>Archidendron grandiflorum</i>	Lace flower tree
• <i>Wilkiea austroqueenslandica</i>	Smooth wilkiea
• <i>Wilkiea huegeliana</i>	Veiny wilkiea
• <i>Ficus coronata</i>	Creek sandpaper fig
• <i>Ficus watkinsiana</i>	Strangler fig
• <i>Embelia australiana</i>	Embelia



• <i>Rapanea variabilis</i>	Muttonwood
• <i>Acmena smithii</i>	Lilly pilly
• <i>Rhodamnia rubescens</i>	Scrub turpentine
• <i>Rhodomyrtus psidioides</i>	Native guava
• <i>Syzygium luehmannii</i>	Riberry
• <i>Syzygium oleosum</i>	Blue lilly pilly
• <i>Notelaea venosa</i>	Smooth mock olive
• <i>Pittosporum revolutum</i>	Hairy pittosporum
• <i>Pittosporum undulatum</i>	Sweet pittosporum
• <i>Alphitonia excelsa</i>	Red ash
• <i>Morinda jasminoides</i>	Morinda
• <i>Psychotria loniceroides</i>	Hairy psychotria
• <i>Acronychia oblongifolia</i>	Common acronychia
• <i>Flindersia schottiana</i>	Cudgerie
• <i>Melicope elleryana</i>	Pink-flowered doughwood
• <i>Sarcomelicope simplicifolia</i>	Big yellow wood
• <i>Cupaniopsis anacardioides</i>	Tuckeroo
• <i>Niemeyera whitei</i>	Rusty Plum
• <i>Elattostachys nervosa</i>	Green tamarind
• <i>Guioa semiglauc</i>	Guioa
• <i>Jagera pseudorhus</i>	Foambark
• <i>Mischocarpus australis</i>	Red pear fruit
• <i>Sarcopteryx stipitata</i>	Steelwood
• <i>Duboisia myoporoides</i>	Duboisia

5.6.5 Translocation of the Rusty Plum in Lot 6

All threatened plants, with the exception of one, occur outside the development layout. The Rusty Plum occurring in the proposed Lot 6 (**FIGURE 3**) will be translocated. This specimen should be translocated to the buffer planting patch (**SECTION 5.5.2**) which runs along the 7(a) boundary at the western end of the Buffer Planting Area (**FIGURE 4**). A Translocation Plan should be completed to guide the translocation process. This plan should follow the “*Guidelines for the Translocation of Threatened Plants in Australia*” (Vallee *et al* 2004).

5.7 Protective Measures

5.7.1 Fencing

Temporary high visibility fencing will be erected along the south edge of the gravel fire trail. This will be replaced by a permanent ‘post and rail’ fence at the completion of primary weeding and planting.

5.7.2 Signage

Signs should be placed along the post and rail fence providing information as to the nature of the enclosed area (i.e. Environmental Protection Area).



5.8 Maintenance

5.8.1 Introduction

This section outlines the maintenance requirements for the buffer planting area as follows:

- Secondary weeding;
- Natural regeneration;
- Buffer plantings; and
- Status of threatened plant species.

5.8.2 Secondary Weeding

Secondary weeding involves the eradication of weeds that have been overlooked or re-shoot after primary treatment. Secondary weeding should occur six (6) weeks after primary weed control and then six (6) monthly for the period of the WARP (5 years). Weed control methods will follow those outlined in **APPENDIX 5**.

5.8.3 Natural Regeneration

Areas that have been identified as naturally regenerating will be diligently weeded (i.e secondary weeding). Monitoring visits will identify and record the occurrence of native seedlings.

5.8.4 Buffer Plantings

Maintenance for the buffer plantings will include the following:

- Ensuring adequate soil nutrient levels by periodic fertilising;
- Ensuring adequate soil moisture levels; and
- Replacing plantings that fail.

5.8.5 APZ Maintenance Requirements

- The APZ shall be maintained in such a manner that:
 - minimal fire fuel that could be set alight by bushfire (e.g. long grass, tree branches etc.) is present at ground level;
 - vegetation does not provide a path for the transfer of fire to the development; and
 - any trees present have a minimum canopy separation of 2 metres.



5.8.6 *Status of Threatened Plant Species*

All significant plant species will be checked during maintenance visits. Weeds around these plants will be diligently controlled by hand weeding within a 50 cm radius.

5.8.7 *Timing of Maintenance*

Maintenance visits will occur:

- Two weeks after primary weed control;
- Two weeks after enhancement plantings;
- Bi-monthly (check on plantings and weeds) for the first year; and
- Six monthly (check on plantings and weeds) for the 2nd, 3rd, 4th and 5th years.



6. MONITORING AND REPORTING

6.1 Introduction

Monitoring is very important in ensuring the continuing success of any vegetation restoration program and will be carried out for the duration of this plan. Monitoring and reporting responsibilities will be undertaken by the Bush Regenerator and will entail bush regeneration monitoring and general monitoring.

6.2 Rehabilitation Monitoring

The Bush regenerator will keep detailed work sheets (**APPENDIX 6**) recording:

- all work completed each day;
- site conditions;
- chemicals used;
- problems encountered; and
- future works required.

6.3 General Monitoring

A monitoring program will be developed and completed by the Bush Regenerator (**APPENDIX 7**). The following methods will be utilised:

- Photo Points
 - Four (4) photos (north, east, south, west) are to be taken at each of the two permanent photo points.
- Entire Work Area
 - The following information will be collected-
 - Damage which may have occurred since the last visit;
 - General check on the plants growing conditions (water, mulch, nutrients/fertiliser);
 - Notification of weeds species present should be recorded and reported to the contracted Bush Regenerator;
 - Loss or erosion of topsoil from re-vegetated areas and along Creek bank;
 - Records of new native volunteer species, their location and number;
 - Increase or decrease in cover of native and weed species within the ground and canopy strata;
 - Flowering and fruiting of native and weed species;
 - Survival rate and condition of planted species;
 - Reasons for their death or failure to thrive; and
 - Fauna observations.

Site visits should occur:

- Six monthly for 1st year; and



- Then annually.

Timing of monitoring reports is detailed in SECTION 8.

6.4 Performance Indicators

Indicators for the success of the rehabilitation program are listed in TABLE 2. Indicators will be checked using data collected at each monitoring visit.

TABLE 2
Performance Indicators for the Success of the vegetation/habitat restoration

Indicator	Achieved yes/no
Nil fruiting of weeds after primary weed control	
Buffer area free of weeds	
90% survival rate for all plantings	
All buffer plantings thriving with the average minimum height of all planted trees to be 1m at year 3 and 1.5 at year 5.	
Increased number and abundance of native species with obvious indications of natural regeneration.	
The survival of all threatened plants species.	
Increased percentage canopy cover by native species	
Rainforest canopy approaching closure (i.e > 80%).	
Closed forest canopy	

6.5 Monitoring Reports

The Bush Regenerator will submit monitoring reports to the CHCC annually.



Monitoring reports should include the following:

- Works undertaken (i.e. A summary of Bush Regenerators daily reports) (**SECTION 6.3**);
- Progress of regeneration/revegetation areas using photos and tables showing the results of the monitoring visits (**SECTION 6.4**);
- The progress of the regeneration areas against the performance indicators listed in **SECTION 6.5**.
- Any problems since the previous inspection (death of a significant number of seedlings, broken fences and, etc) and what effects these issues have had on the regeneration area;
- Success or failure of measures implemented to rectify previously identified problems; and
- Measures to be taken to rectify new problems.



7. ADAPTIVE MANAGEMENT

Adaptive management is an approach that involves learning from management actions, and using those lessons to improve upon the overall plan. The principles of adaptive management have been incorporated into the administration of restoration projects within a variety of governmental authorities and programs (Thom 1997). Comprehensive, long-term monitoring is a component of adaptive management as adaptive management strategies rely on the accumulation of evidence supporting decisions that demand changes in action.

An adaptive management approach involves an integrated process of firstly monitoring, then reviewing and responding to the health and conditions of the plantings, natural regeneration and the status of the weed infestation. Alteration to the design and maintenance of works required, to ensure the objectives of the WARP are achieved, are then made.

Adaptive management strategies that may be required within this WARP are:

- A watering programme; and
- Alteration of weed control methods or timing.

Before the implementation of any adaptive management strategy a brief report is be provided to the CHCC detailing the proposed management actions and the predicted outcomes. These will be determined on the basis of information from the reports provided by the Bush Regenerator. Ballina Shire Council must then approve the adaptive management techniques in writing prior to implementation.



8. REHABILITATION WORKS TIMELINE

A schedule for weed control, compensatory planting, maintenance and monitoring tasks is planned over 5 years (**TABLE 3**).

TABLE 3
PLAN OF ACTION OVER FOR ALL VEGETATION MANAGEMENT TASKS

TASK	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Protective measures	- All threatened species located and clearly marked. - Temporary high visibility fencing to be erected before rehabilitation work is commenced. - Replaced by a permanent 'post and rail' fence at the completion of primary weeding and planting.				
Primary weeding	As soon as this plan is approved.				
Buffer plantings	Between 2 and 6 weeks after primary weeding				



Buffer Planting Plan - Petina Park, Moonee

Maintenance (buffer plantings)	• 2 weeks after buffer plantings • then bi-monthly for 1st year (i.e. 7 events) • Replacement planting (as necessary)	6 monthly (i.e. visits) Replacement planting (as necessary)	
Secondary Weeding	• 2 weeks after primary weeding then bi-monthly for 1st year (i.e. 7 events) • Weed control as necessary	6 monthly (i.e. 8 events) Weed control as necessary	
Bush Regenerators Monitoring	All activities should be documented for inclusion in the Monitoring reports.		
Monitoring	• ~ 3 monitoring visits in 1st year	Yearly (i.e. 4 monitoring visits)	
Monitoring reports	• ~ 2 reports in 1st year	Yearly	
Adaptive management	Ongoing		
Final Monitoring Report			End of 5 year plan



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APPENDIX 1

CORRESPONDENCE WITH DECCW

From: Burdon, Tess <Tess.Burdon@environment.gov.au>
Sent: Tuesday, 12 April 2011 10:28 AM
Subject: RE: Petina Park [SEC=UNCLASSIFIED]
Attachments: SEWPaC letter_11 April 2011.pdf

Mr Warren

Please find attached a scanned letter regarding the proposed Petina Park residential development at Moonee Beach, NSW. The original has been posted today.

Please note that this advice is intended to be for your general information only and does not constitute legal or other professional advice. The only way to achieve legal certainty about whether the EPBC Act applies to your proposed development is to refer the action to the Minister for the Environment for a formal decision under the EPBC Act.

If you have any questions about the matters raised in the letter, please contact me.

Sincerely,

Tess Burdon (nee Ward)
Senior Compliance Officer
Compliance and Enforcement Branch
Department of Sustainability, Environment, Water, Populations and Communities
p - 02 6274 1841
f - 02 6274 1607
e - tess.burdon@environment.gov.au

From: Administration [mailto:accounts@jwarren.com.au]
Sent: Thursday, 7 April 2011 3:58 PM
To: Burdon, Tess
Subject: Petina Park

Good Afternoon Tess,

Please find attached sketch of proposed amendments of the layout plan for the Petina Park subdivision. You will note the following:

1. the deletion of Lot 25
2. the contraction of the cul-de-sac
3. the relocated fire trail
4. the 10m vegetated buffer for all Quassias except tree no.1
5. Quassia no.1 will be conserved in the rear portion of Lot 6

--
Regards
James Warren
Per:
Tanya Nicolia
Office Manager
JAMES WARREN & ASSOCIATES PTY LTD
PO Box 1465, Ballina NSW 2478
accounts@jwarren.com.au

IMPORTANT NOTICE



Buffer Planting Plan - Petina Park, Moonee



Australian Government

Department of Sustainability, Environment, Water, Population and Communities

Contact Officer: Tess Burdon
Telephone: 02 6274 1841 **Facsimile:** 02 6274 1607

James Warren
James Warren and Associates Pty Ltd
PO Box 1465
Ballina NSW 2478

Dear Mr Warren

Thank you for your recent correspondence and conversations with Ms Tess Burdon of this department, and for providing the amended subdivision plan for the proposed "Petina Park" residential development at Moonee Beach. I am writing to provide further information about the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), and how it might apply to this proposal.

As discussed in our letter of 17 February 2011, the EPBC Act protects matters of natural environmental significance, including listed threatened species and ecological communities, among others. The Act requires any person proposing to take an action that is likely to have a significant impact on a matter of national environmental significance refer their proposal to the Commonwealth Minister for the Environment for assessment and approval. Substantial penalties apply to a person who takes such an action without approval. These penalties include criminal and civil penalties of up to seven years imprisonment and \$5.5 million respectively, as well as administrative remedies.

Not all actions affecting matters protected by the EPBC Act will have a significant impact and require approval. The department has examined the proposed subdivision plan for the "Petina Park" residential development to be undertaken by Telpat Pty Ltd. It is the department's understanding that the proposal has been amended to reduce encroachment on the local population of Endangered Moonee Quassia. In particular, it is understood that all plants will be retained on-site, and protected by a 10-15 m vegetated buffer zone, with the exception of one plant on Lot 6. Based on this information, it appears that significant impacts on the Moonee Quassia are unlikely to occur.

This advice is intended to be for your general information only and does not constitute legal or other professional advice. Our conclusions are based upon the information supplied by you in your telephone call and email 8 April 2011. The Commonwealth will not accept liability for any loss or damage that you may suffer, either directly or indirectly, arising out of your use of the advice we are providing. Before acting on the advice, you should obtain your own legal or other professional advice.



GPO Box 787 Canberra ACT 2601 Telephone 02 6274 1111 Facsimile 02 6274 1666
www.environment.gov.au





Buffer Planting Plan - Petina Park, Moonee

You must further note that this advice must not be construed in any way as Australian Government approval of your proposed development or a decision about its EPBC Act status. The only way to achieve legal certainty about whether the offence provisions apply to the action is to refer it under the EPBC Act for a formal decision by the Commonwealth Environment Minister. If you do not refer the action under the EPBC Act the offence provisions and the provisions that allow third parties to seek injunctions may still apply.

Should you have any queries about the matters raised in this letter please call the contact officer, Tess Burdon on 02 6274 1841. Alternatively, if you would like to discuss referral of a project, please contact the department on 1800 803 772.

Yours sincerely

Dr Jan Klaver
Director
EPBC Act Compliance Section - NSW

11 April 2011



APPENDIX 2- PERSONNEL

The qualifications required by personnel engaged to carry out specific duties within this VRP are outlined below:

(1) Weeding and Plantings

Primary weed control and the secondary weed control (maintenance) will be completed by a qualified Bush Regenerator or Regeneration Team. The contracted Bush Regenerator will hold a s132 Scientific Licence issued by the Department of Environment and Climate Change (DECC) to work with Threatened Plant Species.

All bush regeneration workers will hold a TAFE Accredited Certificate 2 in Bushland Conservation & Management (Bush Regeneration Certificate) (or equivalent experience) and will be experienced in up-to-date techniques for Vegetation Management.

All chemical users should be experienced and licensed in accordance with the relevant legislation.

(2) Monitoring

An overall monitoring plan will be developed and implemented by an appropriately qualified Bush Regeneration Team Leader.



APPENDIX 3

PLANT SPECIES LIST

Grouping and Family	Botanical Name	Common Name
Adiantaceae	<i>Adiantum aethiopicum</i>	Common maidenhair
Blechnaceae	<i>Blechnum indicum</i>	Swamp water fern
Blechnaceae	<i>Doodia aspera</i>	Prickly rasp fern
Blechnaceae	<i>Doodia media</i>	Common rasp fern
Cyatheaceae	<i>Cyathea</i> spp.	
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken fern
Lindsaeaceae	<i>Lindsaea</i> spp.	
Pinaceae	<i>Pinus elliotii</i> *	Slash pine
	<i>Monstera deliciosa</i>	
Arecaceae	<i>Archontophoenix cunninghamiana</i>	Bangalow palm
Arecaceae	<i>Cocos nucifera</i>	Cocos palm
Asparagaceae	<i>Asparagus</i> sp.	Ground asparagus fern
Asteliaceae	<i>Cordyline rubra</i>	Red fruited palm lily
Commelinaceae	<i>Commelina cyanea</i>	Native wandering jew
Cyperaceae	<i>Gahnia</i> spp.	Saw sedge
Dioscoraceae	<i>Dioscorea transversa</i>	Native yam
Flagellariaceae	<i>Flagellaria indica</i>	Whip vine
Juncaceae	<i>Juncus</i> spp.	
Lomandraceae	<i>Lomandra hystrix</i>	Matrush
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed matrush
Lomandraceae	<i>Lomandra obliqua</i>	
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat berry
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling lily
Phormiaceae	<i>Dianella caerulea</i>	Blue flax lily
Phormiaceae	<i>Dianella revoluta</i>	
Poaceae	<i>Andropogon virginicus</i> *	Whiskey grass
Poaceae	<i>Chloris gayana</i> *	Rhodes grass
Poaceae	<i>Echinopogon</i> sp.	
Poaceae	<i>Entolasia</i> sp.	
Poaceae	<i>Imperata cylindrica</i>	Blady grass
Poaceae	<i>Oplismenus imbecillis</i>	Basket grass
Poaceae	<i>Paspalum dilatatum</i>	Broad leaved paspalum
Poaceae	<i>Sporobolus africanus</i>	Parramatta grass
Ripogonaceae	<i>Ripogonum discolor</i>	Prickly supplejack
Ripogonaceae	<i>Ripogonum</i> sp.	Supplejack
Smilacaceae	<i>Smilax australis</i>	Austral sarsparilla
Apiaceae	<i>Centella asiatica</i>	Pennywort (Gotu kola)
Apocynaceae	<i>Melodinus australis</i>	Southern melodinus
Apocynaceae	<i>Tabernaemontana pandacaqui</i>	Banana bush
Araliaceae	<i>Polyscias elegans</i>	Celerywood
Araliaceae	<i>Polyscias murrayi</i>	Pencil cedar



Buffer Planting Plan - Petina Park, Moonee

Grouping and Family	Botanical Name	Common Name
Araliaceae	<i>Polyscias sambucifolia</i>	Elderberry panax
Araliaceae	<i>Schefflera actinophylla</i> *	Umbrella tree
Asclepiadaceae	<i>Araujia sericifera</i> *	Moth vine
Asclepiadaceae	<i>Gomphocarpus physocarpus</i> *	Balloon cotton bush
Asteraceae	<i>Ageratina adenophora</i> *	Crofton weed
Asteraceae	<i>Ageratum houstonianum</i> *	Blue billygoat weed
Asteraceae	<i>Ambrosia artemisiifolia</i> *	Annual ragweed
Asteraceae	<i>Bidens pilosa</i> *	Cobblers pegs
Asteraceae	<i>Onopordum acanthium</i> *	Scotch thistle
Asteraceae	<i>Sigesbeckia orientalis</i>	Indian Weed
Asteraceae	<i>Taraxacum officinale</i> *	Dandelion
Asteraceae	<i>Tithonia</i> spp.	Japanese sunflower
Asteraceae	<i>Wedelia trilobata</i> *	Singapore daisy
Bignoniaceae	<i>Pandorea baileyana</i>	Large-leaved wonga vine
Bignoniaceae	<i>Pandorea jasminoides</i>	Bower vine
Caesalpiniaceae	<i>Senna coluteoides</i> *	Winter senna
Capparaceae	<i>Capparis arborea</i>	Capparis
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest oak
Casuarinaceae	<i>Casuarina glauca</i>	Swamp oak
Celastraceae	<i>Hedraianthera porphyropetala</i>	Hedraianthera
Cunoniaceae	<i>Aphanopetalum resinosum</i>	Gum vine
Dilleniaceae	<i>Hibbertia scandens</i>	Climbing guinea flower
Elaeocarpaceae	<i>Elaeocarpus obovatus</i>	Hard quandong
Epacridaceae	<i>Trochocarpa laurina</i>	Tree heath
Escalloniaceae	<i>Abrophyllum omans</i>	Native hydrangea
Euphorbiaceae	<i>Breynia oblongifolia</i>	Coffee bush
Euphorbiaceae	<i>Bridelia exaltata</i>	Brush ironbark
Euphorbiaceae	<i>Claoxylon australe</i>	Brittlewood
Euphorbiaceae	<i>Croton verrauxii</i>	Native carscarilla
Euphorbiaceae	<i>Glochidion ferdinandi</i> var. <i>ferdinandi</i>	Cheese tree
Fabaceae	<i>Erythrina x sykesii</i> *	Coral tree
Flacourtiaceae	<i>Scolopia braunii</i>	Flintwood
Lauraceae	<i>Cinnamomum camphora</i> *	Camphor laurel
Lauraceae	<i>Cryptocarya erythroxylon</i>	Pigeonberry ash
Lauraceae	<i>Cryptocarya glaucescens</i>	Jackwood
Lauraceae	<i>Cryptocarya microneura</i>	Murrogun
Lauraceae	<i>Cryptocarya obovata</i>	Pepperberry tree
Lauraceae	<i>Endiandra muelleri</i>	Green-leaved rose walnut
Lauraceae	<i>Neolitsea australiensis</i>	Green bolly gum
Lauraceae	<i>Neolitsea dealbata</i>	White bolly gum
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's lucerne
Meliaceae	<i>Dysoxylum fraserianum</i>	Rosewood
Meliaceae	<i>Dysoxylum mollissimum</i> ssp. <i>Molle</i>	Red bean



Buffer Planting Plan - Petina Park, Moonee

Grouping and Family	Botanical Name	Common Name
Meliaceae	<i>Synoum glandulosum</i> subsp. <i>Glandulosum</i>	Scentless rosewood
Meliaceae	<i>Toona ciliata</i>	Red cedar
Menispermaceae	<i>Stephania aculeata</i>	Prickly snake vine
Menispermaceae	<i>Stephania japonica</i>	Snake vine
Mimosaceae	<i>Acacia floribunda</i>	Gossamer wattle (White sally)
Mimosaceae	<i>Acacia longifolia</i>	Sydney golden wattle
Mimosaceae	<i>Acacia melanoxylon</i>	Blackwood wattle
Mimosaceae	<i>Acacia obtusifolia</i>	
Mimosaceae	<i>Archidendron grandiflorum</i>	Lace flower tree
Monimiaceae	<i>Wilkiea austroqueenslandica</i>	Smooth wilkiea
Monimiaceae	<i>Wilkiea huegeliana</i>	Veiny wilkiea
Moraceae	<i>Ficus coronata</i>	Creek sandpaper fig
Moraceae	<i>Ficus watkinsiana</i>	Strangler fig
Moraceae	<i>Maclura cochinchinensis</i>	Cockspur
Moraceae	<i>Trophis scandens</i>	Burney vine
Myrsinaceae	<i>Embelia australiana</i>	Embelia
Myrsinaceae	<i>Rapanea variabilis</i>	Muttonwood
Myrtaceae	<i>Acmena smithii</i>	Lilly pilly
Myrtaceae	<i>Callistemon citrinus</i>	Crimson bottlebrush
Myrtaceae	<i>Callistemon salignus</i>	Willow bottlebrush
Myrtaceae	<i>Corymbia gummiifera</i>	Red bloodwood
Myrtaceae	<i>Corymbia intermedia</i>	Pink bloodwood
Myrtaceae	<i>Eucalyptus saligna</i>	Sydney Blue Gum
Myrtaceae	<i>Eucalyptus siderophloia</i>	Northern grey ironbark
Myrtaceae	<i>Lophostemon confertus</i>	Brushbox
Myrtaceae	<i>Melaleuca bracteata</i>	
Myrtaceae	<i>Melaleuca quinquenervia</i>	Broad-leaved paperbark
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub turpentine
Myrtaceae	<i>Rhodomyrtus psidiodes</i>	Native guava
Myrtaceae	<i>Syzygium luehmannii</i>	Riberry
Myrtaceae	<i>Syzygium oleosum</i>	Blue lilly pilly
Myrtaceae	<i>Tristaniopsis laurina</i>	Water gum
Ochnaceae	<i>Ochna serrulata</i>	Mickey-mouse plant
Oleaceae	<i>Notelaea longifolia</i>	Large mock olive
Oleaceae	<i>Notelaea ovata</i>	
Oleaceae	<i>Notelaea venosa</i>	Smooth mock olive
Passifloraceae	<i>Passiflora</i> sp.	Wild passionfruit
Passifloraceae	<i>Passiflora subpeltata</i>	White passionflower
Phytolacaceae	<i>Phytolacca octandra</i> *	Inkweed
Pittosporaceae	<i>Pittosporum revolutum</i>	Hairy pittosporum
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet pittosporum
Rhamnaceae	<i>Alphitonia excelsa</i>	Red ash
Rosaceae	<i>Rubus parvifolius</i>	Native raspberry
Rubiaceae	<i>Morinda acutifolia</i>	
Rubiaceae	<i>Morinda jasminoides</i>	Morinda



Buffer Planting Plan - Petina Park, Moonee

Grouping and Family	Botanical Name	Common Name
Rubiaceae	<i>Psychotria loniceroides</i>	Hairy psychotria
Rutaceae	<i>Acronychia oblongifolia</i>	Common acronychia
Rutaceae	<i>Flindersia schottiana</i>	Cudgerie
Rutaceae	<i>Melicope elleryana</i> (formerly <i>Pink euodia</i>)	Pink-flowered doughwood
Rutaceae	<i>Sarcomelicope simplicifolia</i> subsp. <i>Simplicifolia</i>	Big yellow wood
Sapindaceae	<i>Cupaniopsis anacardioides</i>	Tuckeroo
Sapotaceae	<i>Niemeyera whitei</i>	Rusty Plum
Sapindaceae	<i>Elattostachys nervosa</i>	Green tamarind
Sapindaceae	<i>Guioa semiglauc</i>	Guioa
Sapindaceae	<i>Jagera pseudorhus</i>	Foambark
Sapindaceae	<i>Mischocarpus australis</i>	Red pear fruit
Sapindaceae	<i>Sarcopteryx stipitata</i>	Steelwood
Simaroubaceae	<i>Quassia</i> sp. 'Moonee Creek'	Moonee Quassia
Solanaceae	<i>Duboisia myoporoides</i>	Duboisia
Solanaceae	<i>Solanum capsicoides</i>	Devil's apple
Solanaceae	<i>Solanum mauritianum</i> *	Wild tobacco tree
Solanaceae	<i>Solanum americanum</i> *	Glossy nightshade
Solanaceae	<i>Solanum seaforthianum</i> *	Brazilian nightshade
Verbenaceae	<i>Clerodendrum floribundum</i>	Smooth clerodendrum
Verbenaceae	<i>Lantana camara</i> *	Lantana
Violaceae	<i>Viola hederacea</i> subsp. <i>Hederacea</i>	Native violet
Vitaceae	<i>Cayratia clematidea</i>	Slender grape
Vitaceae	<i>Cissus antarctica</i>	Water vine
Vitaceae	<i>Cissus hypoglauca</i>	Five-leaf water vine
Vitaceae	<i>Cissus sterculiifolia</i>	

* Introduced Species

Threatened species area shown in bold



APPENDIX 4

WEED REMOVAL METHODS

		Control Method
<i>Ageratina adenophora</i> *	Crofton weed	Plants: hand-pull and hang to dry or spray (G 100 mL/10 L + S or 0, or MM 1-2 g/10 L + W or 0).
<i>Ageratum houstonianum</i>	Blue billygoat weed	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Ambrosia artemisiifolia</i> *	Annual ragweed	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Ardisia crenata</i>	Coral berry	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Baccharis halimifolia</i> *	Groundsel	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Bidens pilosa</i>	Cobblers pegs	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Chloris gayana</i>	Rhodes grass	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Cinnamomum camphora</i>	Camphor laurel	Seedlings: hand-pull or spray (G 200 mL/10 L + S or 0, or G 200 mL/10 L + MM 1.5 g/10 L + W or 0). Saplings: CS&P (G 1:1.5). Trees: F/I (G 1:1.5) or CS&P (G 1:1.5).
<i>Conyza albida</i>	Fleabane	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Gomphocarpus physocarpus</i>	Balloon cotton bush	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Lantana camara</i> *	Lantana	Seedlings: hand-pull or CS&P (G 1:1.5). Shrubs: spray or cut down and spray regrowth (G 200 mL/10 L + S)
<i>Ligustrum sinense</i> *	Small-leaved privet	Seedlings: hand-pull or spray (G 200 mL/10 L + S or 0, or G 200 mL/10 L + MM 1.5 g/10 L + W or 0, or MM 1-2 g/10 L + W or 0). Saplings: CS&P or C&P (G 1:1.5). Trees: F/I (G 1:1.5).
<i>Murraya paniculata</i>	Mock orange	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Ochna serrulata</i>	Mickey mouse plant	Stems: CS&P or S&P or F/I (G 1:1.5). Seedlings and regrowth: spray (G 200 mL/10 L + S or 0, or G 200 mL/10 L + MM 1.5 g/10 L + W or 0, or MM 1-2 g/10 L + W or 0)
<i>Onopordum acanthium</i>	Scotch thistle	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Paspalum dilatatum</i>	Paspalum	Plants: hand-pull or dig up. Spray (G 100 mL/10 L + S or 0)



Buffer Planting Plan - Petina Park, Moonee

<i>Passiflora subpeltata</i>	White passionflower	Vines: hand-pull or CS&P (G 1:1.5). Seedlings and regrowth: Spray: (G 200 mL/10 L + Sor0, or G 200 mL/10 L + MM 1.5 g/10 L + W or 0)
<i>Pennisetum clandestinum</i> *	Kikuyu	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Schefflera actinophylla</i>	Umbrella tree	Seedlings: hand-pull and hang to dry or spray (G 200 mL/10 L + S or 0, or G 200 mL/10 L + MM 1.5 g/10 L + W or 0). Trees: CS&P and cut and stack branches above the ground to dry or F/I (G 1:1.5).
<i>Senna var. glabrata</i>	Winter senna	Seedlings: hand-pull or spray (G 200 mL/10 L + S or G 200 mL/10 L + MM 1.5 g/10 L + W or 0, or MM 1-2 g/10 L + W or 0). Shrubs: CS&P (G 1:1.5). Trees: C, S and P or F/I (G 1:1.5). Collect and bag seed pods
<i>Senna X floribunda</i>	Smooth senna	Seedlings: hand-pull or spray (G 200 mL/10 L + S or G 200 mL/10 L + MM 1.5 g/10 L + W or 0, or MM 1-2 g/10 L + W or 0). Shrubs: CS&P (G 1:1.5). Trees: C, S and P or F/I (G 1:1.5). Collect and bag seed pods
<i>Setaria sphacelata</i>	Pigeon grass	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Sporobolus africanus</i>	Parramatta grass	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).
<i>Verbena bonariensis</i>	Purple top	Plants: spray or hand-pull and spray regrowth (G 100 mL/10 L + S or 0).

Abbreviations

* = introduced species (non-native)

CS&P = cut, scrape and paint

S&P = scrape and paint

C&P = cut and paint

F/I = frill/stem-inject/spear or drill

Numbers in brackets are G = glyphosate, MM = metsulfuronmethyl dilution ratios

S = surfactant, e.g. LI 700W = wetting agent, e.g. Agral, Pulse

0 denotes use of spray adjuvant, e.g. Codacide, Protec Plus

APPENDIX 5

Bush Regenerator's Daily Work Record

Daily Work Record - BPP - Petina Park, Moonee.

Name.....

Date

MZ

Site Name / Location _____ Date _____ Time _____ to _____

Team / Staff _____

Growing conditions		Temperature / Humidity		Weather conditions			Wind direction / Speed	
Zone(s) / Work locations		Hours	Weeds treated				Method	New T.S. encountered / Location
Chemicals used / Rates / Totals								Notes and comments
Equipment used	Round-up	Associate	Herbicide	Pulse		Water	Number mixed	
Daily Chemical Totals								

APPENDIX 6 - MONITORING AND EVALUATION FORM

Assessor..... Date..... MZ..... Weather..... General Conditions	Progress on Weed Control																				
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;"></th> <th style="width: 15%;">Existing Natives</th> <th style="width: 15%;">Volunteer Natives</th> <th style="width: 15%;">Weeds</th> <th style="width: 15%;">Plantings</th> </tr> </thead> <tbody> <tr> <td>Canopy Height</td> <td>.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>% Cover Canopy</td> <td>.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>% Cover Ground</td> <td>.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> </tbody> </table>		Existing Natives	Volunteer Natives	Weeds	Plantings	Canopy Height					% Cover Canopy					% Cover Ground					Progress on Enhancement Plantings
	Existing Natives	Volunteer Natives	Weeds	Plantings																	
Canopy Height																					
% Cover Canopy																					
% Cover Ground																					
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Photos (Photo #)</th> <th style="width: 15%;">North</th> <th style="width: 15%;">South</th> <th style="width: 15%;">East</th> <th style="width: 15%;">West</th> </tr> </thead> <tbody> <tr> <td>Point 1</td> <td>.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>Point 2</td> <td>.....</td> <td>.....</td> <td>.....</td> <td>.....</td> </tr> </tbody> </table>	Photos (Photo #)	North	South	East	West	Point 1					Point 2					Progress on Natural Regeneration					
Photos (Photo #)	North	South	East	West																	
Point 1																					
Point 2																					
Summary of Management Works.....	Damage to Site																				
	Adaptive Management Strategies																				
	Requirements for on Going Maintenance																				

Existing Natives					Volunteer Natives				
Species	Stratum	Stems (#)	Height (cm)	Cover (%)	Species	Stratum	Stems (#)	Height (cm)	Cover (%)
Enhancement Plantings					Exotics				
Species	Stratum	Stems (#)	Height (cm)	Cover (%)	Species	Stratum	Stems (#)	Height (cm)	Cover (%)