

# total earth care



# **Biodiversity Management Plan**

William Charlton Village Allambie Heights

Total Earth Care Pty Ltd February 2020



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# William Charlton Village Allambie Heights

### February 2020

Quality Control	© Total Earth Care Pt	y Ltd 2020	
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Approved by:	A McGahey & G Barro	on	
Prepared for:	Allambie Heights Villa	ge	
TEC Job No.	C11661		

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#### **Executive Summary**

Total Earth Care was engaged by Allambie Heights Village to prepare a Biodiversity Management Plan for the proposed independent living development at William Charlton Village, 181 Allambie Rd, Allambie Heights. The lot is a large block which currently consists of a residential aged care facility and associated buildings with an area of managed lawn and planted and remnant trees. The western half of the lot consists of remnant bushland intersected by an access road.

The proposed development includes the construction of two (2) additional buildings containing independent living units, a communal building, associated landscaping, internal access roads, car parking and required Asset Protection Zones (APZs).

A site survey was conducted on the 19<sup>th</sup> February 2020 by two (2) qualified Ecologists. Weed densities have been mapped and management zones allocated.

Mitigation methods and management actions provided in this report have been designed to address current management issues. This report separates the site into five (5) management zones and details management actions and performance criteria for the five (5) years following the construction to ensure that the remnant bushland within the site is maintained. Management actions include weed control, delineation of management zones, fencing no-go zones and management of an Outer Protection Area (OPA).

#### 1 Introduction

#### 1.1 Background

Total Earth Care (TEC) has been commissioned by Allambie Heights Village Ltd to prepare this Biodiversity Management Plan (BMP) for this the independent living development proposal at 181 Allambie Road to support the development application. The site is within the Northern Beaches LGA.

This BMP is written in accordance with the Biodiversity Management Plan Report Guidelines available on the Northern Beaches Council Website titled – "2014 112357 Guideline for preparing a Biodiversity Management Plan April 2014".

Site-specific plans and documents reviewed for this project:

- DA011 Site Plan, by Jackson Teece, dated 19/12/2019;
- L-SD-01 Landscape Concept Plan by Arterra Design Pty Ltd, dated 24/10/2019; and
- Bush Fire Assessment Report by Total Earth Care, dated February 2020.

#### 1.2 Subject Site

The Subject Site (the Site) comprises the area of land likely to be directly or indirectly impacted by future development. The study area comprises the subject site in addition to the surrounding land that may be potentially indirectly affected by the development or affect the development. The locality encompasses a larger area that includes neighbouring properties and includes areas of native biodiversity values nearby. The subject site details are outlined in Table 1 and the boundaries and simplified plans are shown in Map 1. The architectural drawings are provided in Appendix A.

Table 1. Site Details

Property name	William Charlton Village
Site address	181 Allambie Rd
Property identifier (Lot and DP)	DP 752038 lot 2615
Local Government Area	Northern Beaches Council
Zoning	R2 Low Density Residential

#### 1.3 Staff Qualifications

This report has been prepared by suitably qualified personnel. Their qualifications are below:

#### 1.3.1 Andrew McGahey – 35 years experience

- Associate Diploma of Horticulture
- Certificate II in Bushland Regeneration
- Planning for Bush Fire Protection
- White Card (WHS General Construction Induction)
- Senior First Aid Certificate

#### 1.3.2 Gillian Teear – 3 years experience

- Bachelor of Environmental Biology University of Technology Sydney
- White Card (WHS General Construction Induction)
- First Aid and CPR
- Sydney Metropolitan Wildlife Course and Volunteer
- NSW Seabird Rescue First Responders Course
- UNSW Advanced Plant ID Course 2018
- Van Klaphake Eucalyptus ID Course 2018
- Teresa James Cumberland Plain Woodland Plant ID Workshop 2018
- Teresa James Biodiversity Site Assessment Workshop 2018

#### 1.3.3 Georgina Barron – 4 years experience

- Bachelor of Science (Biology) (1st Class Honours) The University of Sydney
   Honours project: Ecological benefits of invasive plants in novel ecosystems: does Lantana provide habitat
   for urban sensitive species?
- White Card (WHS General Construction Induction)
- First Aid and CPR
- Introduction to Animal Research (ITAR), Module 1: Fundamentals of Animal Research
- Introduction to Animal Research (ITAR), Module 3: Wildlife
- WIRES Possum & Glider Course
- WIRES Rescue & Intermediate Care Course

#### 1.4 Relevant Legislation and Planning Instruments

Within the Northern Beaches Council LGA, relevant legislation and policies which apply to this BMP include:

- 10/50 Vegetation Clearing Code of Practice
- Biodiversity Conservation Act 2016 (NSW)
- Biosecurity Act 2015 (NSW)
- Bushfire Environmental Assessment Code 2006
- Environment Protection and Biodiversity Conservation Act 1999 (Cth)
- Environmental Planning and Assessment Act 1979 (NSW)
- Local Government Act 1993 (NSW)
- National Parks and Wildlife Act 1974 (NSW)
- Planning for Bushfire Protection 2006
- Protection of the Environment Operations Act 1999 (NSW)
- Rural Fires Act 1997 (NSW)
- State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
- State Environmental Planning Policy (Exempt and Complying Development Codes)
- State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004
- State Environmental Planning Policy No 19-Bushland in Urban Areas
- State Environmental Planning Policy No 1-Development Standards
- State Environmental Planning Policy No 33-Hazardous and Offensive Development
- State Environmental Planning Policy No 36-Manufactured Home Estates
- State Environmental Planning Policy No 44-Koala Habitat Protection
- State Environmental Planning Policy No 55-Remediation of Land
- State Environmental Planning Policy (Primary Production and Rural Development) 2019

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• State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017: Subject Land

- Warringah Development Control Plan 2011
- Warringah Local Environmental Plan 2011
- Water Management Act 2000 (NSW)

Biodiversity Management Plan William Charlton Village, Allambie Heights

### Title: Impact Area

Map No: 1

Site: William Charlton Village Client: Allambie Heights Village

Date: February 2020

Project No: C11661 Author: G Teear

### Legend

Remaining bushland



Impact Area

15 30

60 Meters

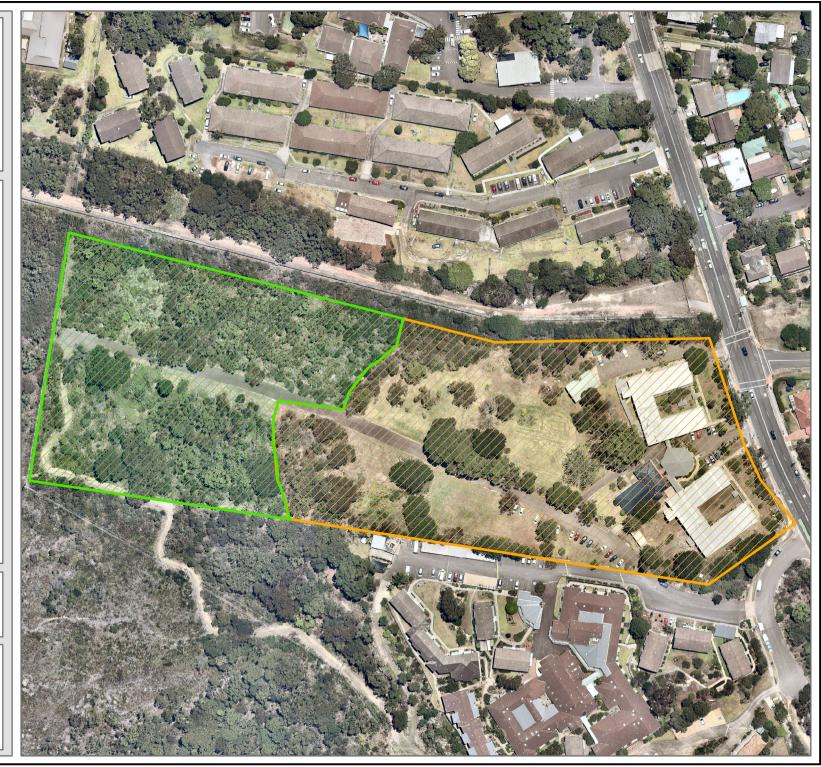


Data Source: Total Earth Care Nearmap



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#### 2 Methods

#### 2.1 Desktop Research

A preliminary desktop study was conducted to assess the likelihood of the study area to support threatened species, populations or threatened ecological communities, or their habitats. All records of threatened species and populations within five (5) kilometres of the subject site (10km locality search) were obtained from the Office of Environment & Heritage (OEH) Wildlife Atlas database (DPIE 2020), and the Federal Environment Department of Environment Protected Matters search tool.

#### 2.2 Site Survey

A diurnal survey was conducted over one (1) day on 19<sup>th</sup> February 2020. Weather conditions were warm and sunny (around 22°C at 9am) with a light wind. The site survey was conducted by Georgina Barron and Gillian Teear. Their qualifications are provided in Section 1.3 of this report.

#### 2.2.1 Botanical Survey

A general botanical survey was conducted with reference to existing vegetation community descriptions and mapping from previous TEC surveys of the site. Threatened flora likely to occur within the locality were surveyed using the NSW Guide to Surveying Threatened Plants (OEH 2016b). Surveys on the subject site were generally random meanders (DEC 2004), but focused on identifying native vegetation and included:

- The identification of native and exotic plant species according to Field Guide to the Native Plants of Sydney (Robinson, 2003), Flora of NSW, Volumes 1-4 (Harden 1992, 1993, 2000, 2002), Weeds of the south-east: an identification guide for Australia (Richardson et al, 2006) and PlantNET (Botanic Gardens Trust, 2008), with reference to recent taxonomic changes;
- Targeted searches for threatened plant species according to the "random meander" method (Cropper 1993);
- The identification and mapping of plant communities based on current site conditions, soils and species list, and previous vegetation mapping including The Native Vegetation of the Sydney Metropolitan Area Version 3.0 (OEH 2016a);
- An assessment of the natural resilience of the vegetation of the site;
- Identification of previous and current factors threatening the ecological function and survival of native vegetation on the site; and
- Determination of appropriate rehabilitation and bush regeneration techniques for the native vegetation of the site.

#### 2.2.2 Fauna Survey

Incidental fauna observations and fauna habitats were recorded as part of the survey effort. This included noting the GPS locations of hollow bearing trees, describing notable habitat features such as termite mounds, target searches for indirect evidence of fauna such as scats and scratchings and brief targeted searches for associated fauna (Triggs 1984).

#### 2.3 Limitations

The diurnal field survey was conducted over one (1) day during February 2020. The flora and fauna field survey was based on the recommendations of Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities - Working Draft (DECC, 2004) with particular reference to the size of the subject site and a relatively homogeneous wider urbanised landscape.

As stated by the DECC (2004) 'The absence of a species from survey data does not necessarily mean it does not inhabit the survey area. It may simply means that the species was not detected at that time with the survey method adopted and the prevailing seasonal or climatic conditions.' Therefore, the relative brevity of the survey and its timing mean that the full spectrum of flora and fauna species and ecological processes likely to occur on the site cannot be fully quantified or described in this report. These limitations have been partly addressed by identifying potential habitats for fauna species and assessing the potential for these species to occur on the site based on previous records, the type and condition of habitats present, the land use throughout the subject site, surrounds and the landscape context.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to three (3) metres.

#### 3 Site Description

#### 3.1 Identification and description of the site and surrounds

#### 3.1.1 General

The subject site is located in the suburb of Allambie Heights in the Northern Beaches LGA. The site is zoned as R2 Low Density Residential, with RE1 Public Recreation and SP1 Special Activities: Health Services Facilities characterising the surrounding area. The western and southern boundaries of the site are contiguous with the Manly Warringah War Memorial Park, a 375ha passive and active recreational bushland park. The northern boundary adjoins a Sydney Water bushland easement for a water reticulation pipe.

The remnant bushland section of the site has been partially developed by the previous lessee. A sealed road has been built on cut and filled soil through the centre of the site. Three (3) drains have been excavated into solid rock which have created de-facto creeks. In addition to residential dwellings, the site incorporates open lawns, landscaped gardens with exotic and native horticultural species plantings, and some remnant native vegetation.

#### 3.1.2 Soils

The entirety of both the subject site and study area is contained within the Lambert Soil Landscape, as mapped by Chapman et al (1989). It derives from Hawkesbury Sandstone which consists of medium to coarse-grained quartz sandstone with minor shale and laminite lenses. Soils are shallow (<50 cm) discontinuous Earthy Sands (Uc5.11, Uc5.22) and Yellow Earths (Gn2.2) on crests and insides of benches; shallow (<20 cm) Siliceous Sands/Lithosols (Uc1.2) on leading edges; shallow to moderately deep (<150 cm) Leached Sands (Uc2.21), Grey Earths (Gn2.81) and Gleyed Podzolic Soils (Dg4.21) in poorly drained areas; and localised Yellow Podzolic Soils (Dy4.1, Dy5.2) where associated with shale lenses. Typical limitations of the soil include very high soil erosion hazard, rock outcrop, seasonally perched watertables, shallow, highly permeable soil and very low soil fertility (DPIE2013).

The soil in the eastern portion of the site and along the existing road shows a high level of disturbance associated with construction and demolition through excavation and filling. Sealed access ways and formalised drainage lines have also caused some level of soil disturbance outside of excavated areas. Notwithstanding, soils within some of the landscaped areas including lawns and garden beds have retained much of their original structure.

#### 3.1.3 Topography, Aspect and Hydrology

The site is roughly rectangular in shape with the long axis orientated to the east and west. The western half of the site is substantially bushland while the centre is open parkland and the eastern end contains two (2) two-storey residential buildings and a number of smaller service buildings.

The bushland remnant has a south facing aspect and is located on moderately sloping land. The highest point is 134m above sea level (asl) and the lowest point is 117m asl. The median point is 114m asl. It has a 15% grade or 9° slope. The land is evenly benched along the contour from west to east with the steepest possible grade of 5% grade or 3° slope.

A 20m wide sandstone bench extends beyond and along the southern eastern boundary of the bushland interface. At the downslope edge of this bench is a stepped broken scarp of sandstone bedrock that flattens after approximately 20m. This ground then flattens and meets a vehicle access road. The bench has been excavated at its eastern end to create a narrow drain. This excavation is into solid rock and although it creates steeper ground it, does not support vegetation. This wetter gully is the steepest land adjacent to the site and has a 12% slope or 7°.

#### 3.1.4 Riparian Lands and Waterways

Three (3) drainage lines were found on site. All appear to have been cut into sandstone and some areas concreted (See Figure 1). The drainage line at the western end of the site is a continuation of the drainage channel that runs along the northern side of the driveway through the site. The easterly drainage line that crosses the existing driveway would not have occurred naturally in this position within the topography and cannot be considered a creek line or waterway for the purpose of the developable land on site. None of these drainage lines have been mapped by the Office of Water as streams recognised by the Strahler System.

Map 6 shows the location of the drainage lines. A 10m buffer has been included in the map although it is unlikely that such an exclusion zone would be required.

Despite the artificial origin of the ephemeral creek lines, they provide breeding and foraging habitat for fish, amphibians, reptiles and invertebrates. Protection and recovery of riparian vegetation will help to ensure the viability of theses unofficial wildlife corridors. It will allow plant and animal species to access areas of suitable habitat and promote genetic diversity via dispersal vectors supported by these corridors. This process encourages diversity and sustainability within ecosystems.





Figure 1. Drainage lines.

# 3.2 The ecological value of existing bushland and bushland impacted upon by the proposed development.

The bushland portion of the site to the west, is mostly of high quality and is contiguous with the Manly Warringah War Memorial Park. It provides potential foraging sites for a range of threatened species. The bushland's location also provides a buffer between urban development and the reserve. Some of the bushland on the site is mapped on the NSW Biodiversity Values Map under the BC Act 2016. The site is part of the Curl Curl Creek catchment, which is recognised as a waterway of high ecological value in Warringah's Creek Management Study 2004.

#### 3.2.1 Flora Habitat

Three (3) remnant native plant communities are identified on the site (see Map 3). These are:

- PCT 1824 Coastal Sandstone Heath-Mallee (S HL08)
- PCT 1783 Sydney North Exposed Sandstone Woodland (S\_DSF\_11)
- PCT 1250 Swamp Oak-Prickly Tea-tree-Swamp Paperbark Swamp Forest on Coastal Floodplains, Sydney Basin and South East Corner (S\_DSF\_09)

The February survey found that a significant portion of these native plant communities are in good to moderate condition with high levels of natural resilience in some areas (see Figure 2). No threatened flora species or Endangered Ecological Communities (EECs) have been identified on the site.

Areas of high density weeds were identified along the southern edge of the access road that heads west into the bushland part of the site. These are largely associated with the fill batter, below the central access road and drainage line. These areas are shown in Map 5. A number of mature Coral Trees

(Erythrina x sykesii) are located within the managed lawn area and the edges of the bushland area. Other weeds encroaching on bushland includes Morning Glory (Ipomoea indica), dense thickets of Lantana (Lantana camara), Crofton Weed (Ageratina adenophora) and Senna (Senna pendula var. glabrata).

A managed exotic lawn area in the central portion of the site, hosts some isolated native remnant trees from the local plant community, planted native trees and exotic trees.

The land holder obligations under the *Biosecurity Act 2015* are listed in Table 11 and Table 12 of Appendix E. Of the weed species present two (2) are listed as Weeds of National Significance (WONS): Lantana (*Lantana camara*) and Asparagus Fern (*Asparagus aethiopicus*).





Figure 2. Highly resilient bushland within PCT 1250 [left] and PCT 1783 [right].

#### 3.2.2 Fauna Habitat

A total of fifteen (15) native vertebrate fauna species were recorded during the February 2020 survey (see Appendix C). A total of twenty-three (23) native vertebrate fauna species have also previously been recorded on the site or within the study area. Previous fauna surveys by TEC included Anabat recordings, motion sensing cameras and spotlighting. Fauna detected in the previous surveys included six (6) micro bat species and seven species of (7) birds and mammals including Swamp Wallaby (Wallabia bicolor), Brush-tailed Possum (Trichosurus vulpecula), and Sugar Gliders (Petaurus breviceps). Of the species previously recorded in the site and greater study area, five (5) threatened species, which are listed as Vulnerable under the BC Act 2016, were recorded. These are:

- Eastern Pygmy-possum Cercartetus nanus
- Square-tailed Kite Lophoictinia isura
- Little Bentwing-bat Miniopterus australis
- Eastern Bentwing-bat Miniopterus schreibersii oceanensis
- Grey-headed Flying-fox Pteropus poliocephalus (also Vulnerable under the EPBC Act)

During the current survey three (3) Ring-tailed Possum dreys were observed and at least one (1) was observed to be in use (see Figure 3).

A number of exotic species, including rabbits, foxes and rats were also recorded. See Table 10 in Appendix C for the full fauna list from previous recent TEC surveys.

The site does not contain important breeding habitat for threatened species due the lack of suitable caves (for microbats), tree hollows (for Eastern Pygmy-possums) or nesting or colony sites (for Square-tailed Kite and Grey-headed flying foxes). Fauna habitat is mostly associated with the native plant communities on site as a foraging resource. Exposed sandstone boulders and benches in the southern portion of the bushland area can provide smaller cracks and ledges that can be used as habitat by reptiles and other small creatures. Larger caves, and older trees with large hollows are not present on site.

The abundance of Banksias on site provide important foraging habitat for various bird species and the Eastern Pygmy Possum. Formalised drainage lines provide habitat for fish, amphibians, reptiles and invertebrate species. Native and exotic trees, which are going to be cleared in the managed lawn area, may provide opportunistic nectar foraging and perching sites for visiting species.





Figure 3. Small pool on the western boundary of the site [Left] and Ring-tailed Possum drey in use [Right].

#### 3.3 Site Constraints including Significant Environmental Features

As previously discussed the site contains moderate to good quality remnant bushland which provides habitat for several fauna species including threatened species. No threatened plants, communities or threatened species breeding habitats are to be removed by direct clearing for the proposal. The boundary of permanent clearing for the development footprint is contained to the eastern side of the artificial drainage line. Bushland adjacent to the drainage line falls into the Outer Protection Area (OPA) of the APZ for the development. Management of the APZ in proximity to the drainage line will need to consider appropriate erosion control measures.

There are rock outcrops throughout the site with exposed sandstone benches which run east to west on either side of the access road. There are some crevices within the rock outcrops although these were determined to be unsuitable for microbat species due to being accessible by predators such as goannas, foxes and cats. Rock plateaus and boulders are present throughout the site which provide potential habitat for reptiles. Refer to Map 6 for the habitat constraints and features.

#### 3.4 Vegetation Condition and Resilience

The intact bushland is of moderate to good quality being fully structured in most areas and of good resilience. Weeds are present in high densities in areas of historic disturbance associated with the installation of the access road and the areas adjacent to the managed lawn and the two (2) eastern drainage lines. Weed species include Morning Glory (*Ipomoea indica*), dense thickets of Lantana (*Lantana camara*), Crofton Weed (*Ageratina adenophora*) and Senna (*Senna pendula var. glabrata*). These are encroaching on good quality bushland and need to be controlled particularly along the drainage lines to prevent their spread into the areas of resilient bushland downstream. Refer to Map 5 for the weed densities. The weed species present within the site are detailed in Table 2 and the description of the weed zones displayed in Map 5 are provided in Table 3. See Figure 4 to Figure 9 for photos of the condition of the site.

#### Table 2. Weed Species Inventory

Family	Scientific Name	Common Name
Agavaceae	Үисса ѕрр.	
Apocynaceae	Nerium oleander	Oleander
Araceae	Zantedeschia aethiopica	Arum Lily
Asparagaceae	Asparagus aethiopicus	Asparagus Fern
Asteraceae	Ageratina adenophora	Crofton Weed
7.030.0000	Conyza spp.	A Fleabane
Convolvulaceae	Ipomoea indica	Morning Glory
Crassulaceae	Bryophyllum delagoense	Mother of millions
Euphorbiaceae	Ricinus communis	Castor Oil Plant
Fabaceae (Caesalpinioideae)	Senna pendula var. glabrata	
Fabaceae (Faboideae)	Erythrina x sykesii	Coral tree
Musaceae	Musa acuminata	Edible banana
Oleaceae	Ligustrum sinense	Small-leaved Privet
Passifloraceae	Passiflora suberosa	Cork Passionfruit
Poaceae	Paspalum quadrifarium	Blue Paspalum
Solanaceae	Solanum chrysotrichum	Devil`s Fig
Joinfaceac	Solanum mauritianum	Wild Tobacco Bush
Verbenaceae	Lantana camara	Lantana

Table 3. Description of Weed Zones

Weed Area	Description
Α	<5% weed cover.
	This weed zone is predominantly undisturbed except for the powerline easement along the western boundary. As a result this patch is made up of good quality bushland that is highly resilient and mostly weed free. This zone is a priority to manage and monitor to prevent the encroachment or establishment of weeds from the neighbouring zones.
В	75-100% weed cover.
	This area lacks canopy species and mostly consists of dense patches of Blue Paspalum ( <i>Paspalum quadrifarium</i> ), Crofton Weed ( <i>Ageratina adenophora</i> ) and scattered Arum Lily ( <i>Zantedeschia aethiopica</i> ).
С	<5% weed cover.
	This area is predominantly, good quality bushland which is highly resilient and mostly weed free. This zone is a priority to manage and monitor to prevent the encroachment or establishment of weeds from the neighbouring zones.
D	50-75% weed cover.
	This weed zone follows a drainage line where there are encroachments of Crofton Weed (Ageratina adenophora), Small-leaved Privet (Ligustrum sinense) and exotic

Mood Area	Description
Weed Area	Description
	ornamental garden species. This zone will be re-landscaped as part of the proposed development.
E	<5% weed cover.
	This area is predominantly, good quality bushland which is highly resilient and mostly weed free. This zone is a priority to manage and monitor to prevent the encroachment or establishment of weeds from the neighbouring zones.
F	25-50% weed cover.
	This area forms a transition between the high density weeds of Zone 4 and the moderate quality bushland. The bushland most consists of intact native strata but is subject to weed encroachment from the high density weed area of Zone G. Lantana ( <i>Lantana camara</i> ) continues down the edge of the track and Blue Paspalum ( <i>Paspalum quadrifarium</i> ) is scattered throughout the zone and along the track. Despite the weed encroachment this area has a good level of resilience.
G	75-100% weed cover.
	Previous disturbance during the construction of the access road has led to dense weed infestations in this area. This area contains dense thickets of Lantana ( <i>Lantana camara</i> ), a mature Coral Tree ( <i>Erythrina × sykesii</i> ), scattered Oleander ( <i>Nerium oleander</i> ), Morning Glory ( <i>Ipomoea indica</i> ) at the western end as well as Wild Tobacco ( <i>Solanum mauritianum</i> ), Giant Devil's Fig ( <i>Solanum chrysotrichum</i> ) and a few small shoots of Asparagus Fern ( <i>Asparagus aethiopicus</i> ).
Н	75-100% weed cover.
	Dense patches of Blue Paspalum ( <i>Paspalum quadrifarium</i> ) are scattered throughout this area. Crofton Weed ( <i>Ageratina adenophora</i> ) follows the drainage line and the edge of bushland areas. Mature Coral Trees ( <i>Erythrina × sykesii</i> ) are present and juvenile Coral Trees ( <i>Erythrina × sykesii</i> ) are becoming scattered in this area. Lantana ( <i>Lantana camara</i> ) and Wild Tobacco ( <i>Solanum mauritianum</i> ) are also encroaching on bushland edges.



Figure 4. North-west corner of Weed Zone G.



Figure 5. Looking east over Weed Zone B.



Figure 6. Looking north over Weed Zone C.



Figure 7. Managed lawn area looking to bushland area.

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Figure 8. Managed lawn area to be developed.



Figure 9. Edge of Weed Zone G and H looking west.

Rev A



Map No: 2

Site: William Charlton Village Client: Allambie Heights Village

Date: February 2020

Project No: C11661 Author: G Teear

### Legend

Outter Protection Zone



Subject Site



APZ

0 15 30 60 Meters

Data Source: Total Earth Care Nearmap



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Title: OEH 2016 Vegetation Mapping

Map No: 3

Site: William Charlton Village Client: Allambie Heights Village

Date: February 2020

Project No: C11661 Author: G Teear

### Legend



Subject Site

#### **Plant Community Type**

S\_DSF09: Coastal Sandstone Gully Forest

S\_DSF11: Sydney North Exposed Sandstone Woodland

Woodland

S\_HL08: Coastal Sandstone

Heath-Mallee

Urban\_E/N: Urban Exotic/Native

Weed\_Ex: Weeds and

Exotics

15 30

60 Meters

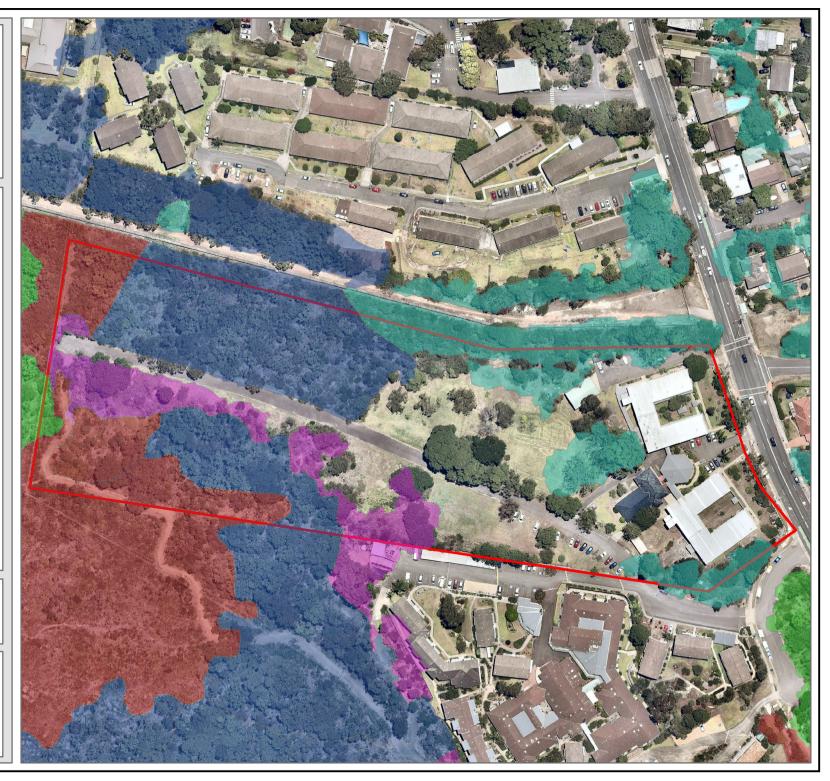
N

Data Source: Total Earth Care Nearmap OEH 2016



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Map No: 4

William Charlton Village Site: Allambie Heights Village Client:

Date: Feb 2020 Project No: C11661

### Legend

Subject site

Study area

Lot

#### **Plant Community Type (PCT)**

PCT 1250: Sydney Peppermint -Smooth-barked Apple - Red Bloodwood

PCT 1783: Red Bloodwood -Scribbly Gum / Old-man Banksia

PCT 1824: Mallee - Banksia -Tea-tree - Hakea

Urban Exotic/Native

Weeds and Exotics

30

60 Meters

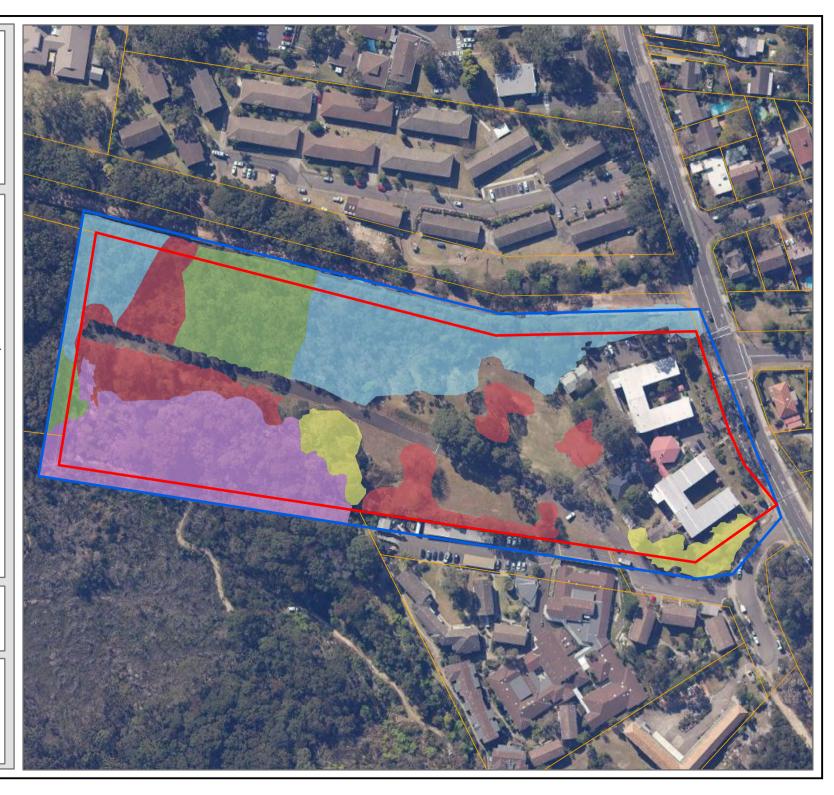


Data Source: Total Earth Care SIX Maps



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Map No: 6

Site: William Charlton Village Client: Allambie Heights Village

Date: February 2020

Project No: C11661 Author: G Teear

### Legend

Subject Site

Drainage lines and 10m buffer

Sanstone Rock Outcrops

15 30 60 Meters

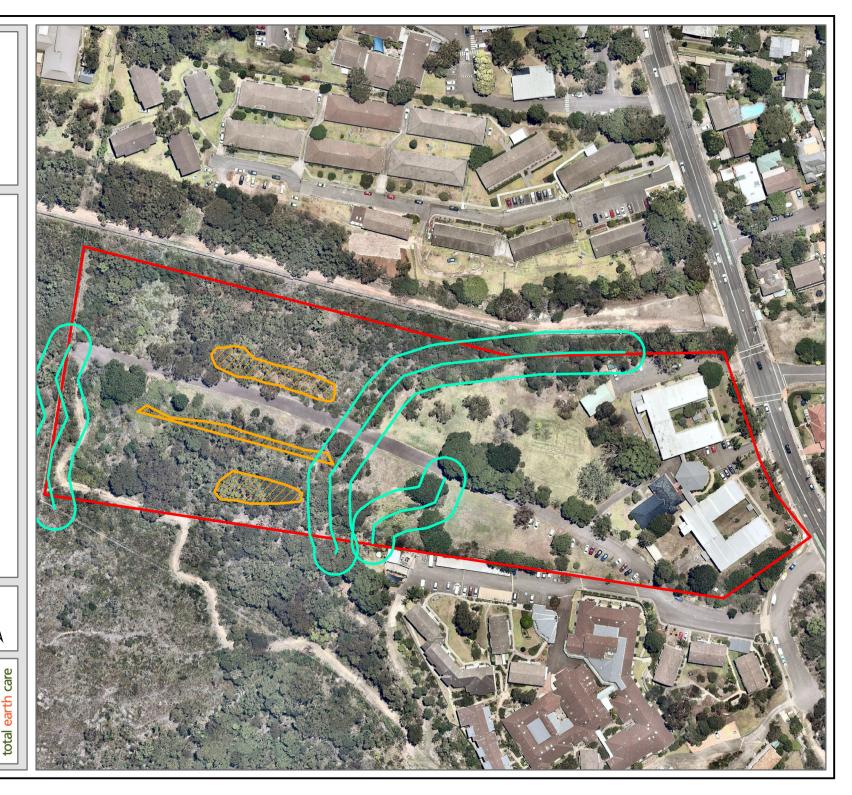
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Data Source: Total Earth Care Nearmap



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2018 1434



#### 4 Identification of Potential Impacts to Biodiversity

#### 4.1 Nature and Extent of Proposed Construction Activities

The proposed development includes the construction of the following:

- Two additional building containing independent living units;
- Communal building;
- Associated landscaping;
- Required APZs;
- Internal access roads; and
- Car parking.

The impact area for the construction of buildings and roads and landscaping is show on Map 1. Landscaping includes the modification and naturalization of the drainage line north of the access road to include boulders and pools.

Most of the vegetation to be cleared is within the areas of managed lawn and includes mature native and exotic tree species and small patches of vegetation predominantly made up of weeds and exotic plant species.

#### 4.2 Nature and Extent of any Bushfire Hazard Asset Protection Zones

The area to be managed as an APZ is shown in Figure 9. The APZ will be managed as an Inner Protection Area (IPA) and an OPA(Australian Bushfire Safety & Planning 2018). The OPA is defined in Map 2 and the remainder of the APZ will form the IPA. Most of the area to be managed as an IPA is already cleared with some mature remnant and planted native trees and patches of weeds and exotic species. Sections of the OPA have a high density of weeds and will therefore benefit from the clearing required for the OPA. Some native ground cover and shrub species may require removal to meet the below requirements for the OPA. Some canopy species may also need to be removed to meet the OPA requirements.

Planning for Bushfire Protection (NSW RFS 2019) states that the following requirements apply when establishing and maintaining an IPA:

#### "Trees:

- canopy cover should be less than 15% (at maturity)
- trees (at maturity) should not touch or overhang the building
- lower limbs should be removed up to a height of 2m above ground
- canopies should be separated by 2 to 5m
- preference should be given to smooth barked and evergreen trees.

#### Shrubs:

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings
- shrubs should not be located under trees
- shrubs should not form more than 10% ground cover
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

#### Grass:

- should be kept mown (as a guide grass should be kept to no more than 100mm in height)
- leaves and vegetation debris should be removed."

Planning for Bushfire Protection (NSW RFS 2019) states that the following requirements apply when establishing and maintaining an OPA:

#### "Trees:

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

#### Shrubs:

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

#### Grass:

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

These APZs are to be managed in a manner that provides as much biodiversity value as possible, within the constraints required for fire protection performance. The measures taken include:

- Weeds to be completely removed and supressed;
- Tree and shrub thinning is required to reduce the canopy cover to 15% or less and the shrub layer to 20% cover or less;
- Retain some larger tree specimens as standing habitat by poisoning rather than felling,
- Retain diversity in groundcover species with grasses and forbs;
- Supplemental planting of low native grasses and ground covers at minimum of 10 per square metres; and
- Use of sandstone and erosion control measures where the APZ is in close proximity to drainage lines.

#### **Nature and Extent of Proposed Operational Activities** 4.3

The nature of the ongoing operational activities include use of the residential buildings, facilities and garden areas by senior residents and their visitors. Road use is likely to be infrequent and as it will be used as a thoroughfare. There are few ongoing impacts foreseen during the operational activities. Potential impacts included increased ongoing human presence closer to the bushland area, including some increased to noise and light.

#### Potential Indirect Impacts to Any Vegetation in Areas Adjoining the Development 4.4

Potential indirect impacts to vegetation include the potential encroachment of exotic plants into bushland by gardening activities. The appropriate selection of landscaping species can minimise this risk.

Increase rate of run-off from hard surfaces of the proposal may alter stream flow rates outside the subject site and lead to increases in sediment or nutrient loads and should be addressed in the Storm Water Management Plan addressing onsite detention measures.

There are potential impacts from erosion and sediment run-off which can be minimised with standard control techniques and must be addressed in the Construction Environment Management Plan (CEMP) which should be prepared prior to works as a requirement of this management plan. See 5.1 for further details.

Biodiversity Management Plan William Charlton Village, Allambie Heights Rev A

#### 5 Impact Mitigation Pre-clearing and During Clearing Works

#### 5.1 Pre-clearing

The following mitigation measures are to be documented in a CEMP and implemented prior to clearing:

- All Environmental Subplans (e.g. Soil & and Water MP, Flora and Fauna MP etc.) within the CEMP must include Scope, Project Compliance Requirements, Project Targets, Control Measures Used, and Monitoring Details.
- Erosion and sediment control must be detailed in an Erosions and Sediment Management
  Plan, including types of control, method of installation, locations, maintenance regime,
  responsibilities, and stockpile storage. These may include, but are not limited to, silt fencing,
  vehicle shake-down, floating silt boom, and stabilisation access for machinery.
- Prior to works commencing a pre-clearance survey must be conducted by a qualified Ecologist
  to determine the presence of any nests, dreys or fauna using hollows. A report of findings for
  any required supervision of clearing works is to be submitted to Council.
- Areas determined not to be cleared must be marked and flagged off as "no-go" zones prior to construction and maintained throughout the works period.
- Any trees marked within "no-go" zones are to be retained and protected. Any impacts to these
  trees have not been assessed in this current report. AS 4970-2009 Protection of trees on
  development sites, is to be followed for all trees to be retained.
- Any trees within close proximity to the works zones must be examined by an arborist prior to works to identify the Tree Protection Zone (TPZ) and the Structural Root Zone (SRZ).
- For APZs:
  - Survey the APZ alignments (OPA, IPA and significant habitat features);
  - Delineate the alignment with bunting;
  - Identify trees for removal or pruning in consultation with fire consultant and ecologist;
  - o Tag all trees which are to be protected; and
  - Protect all trees which are to remain within the APZs in close proximity to the clearing alignment.
- All environmentally sensitive areas must be permanently delineated from clearance areas with fencing and signage. Delineation must allow for passage of native fauna.
- All personnel must undertake environmental site inductions to highlight any and all environmental and ecological constraints within the site.
- Hygiene controls must be implemented for all vehicles and personnel entering the site.
   Phytophthora hygiene controls are provided in Appendix D.
- The bushland area must be permanently delineated from the areas managed as APZs, to assist in defining areas for ongoing fuel reduction management actions. This is to be an indicative boundary and not designed to restrict human or fauna access. A minimum specification consists of a single wire star picket fence or similar. Other posts of similar dimensions could be chosen for aesthetic consideration. Small auger or drilled post holes may be required given the shallow exposed bedrock.

#### 5.2 During Clearing

The following mitigation measures should be implemented and maintained during clearing:

- Erosion and sediment controls should be implemented and maintained as per the Erosions and Sediment Management Plan.
- Areas which are marked and flagged off as "no-go" zones should be maintained during construction.
- Any trees marked within "no-go" zones are to be retained and protected. AS 4970-2009
   Protection of trees on development sites, is to be followed.
- TPZs and the SRZs should be maintained for trees within proximity of the work zones.

• All environmentally sensitive areas must be permanently delineated from impacted areas with fencing and signage. Delineation must allow for passage of native fauna.

- All personnel should undertake environmental site inductions to highlight any and all environmental and ecological constraints within the site.
- Hygiene controls should be implemented for all vehicles and personnel entering the site.
   Phytophthora hygiene controls are provided in Appendix D.
- Felled trees, particularly those with hollows, are be placed within the remnant bushland within the site under the direction of an ecologist.
- Any hollows which are removed should be replaced with nest boxes at a ratio of 2:1 (two nest boxes for every hollow removed). The size of these should be determined by the size of the hollow removed. For example, large hollows should be replaced with large nest boxes at a 2:1 ratio.
- During tree clearing works, a qualified ecologist should be on present on site. If an animal is
  identified and at risk during construction, works should not continue until the animal has been
  rescued. If the animal is injured a qualified carer should be contacted by either ringing Sydney
  Metro Wildlife on 02 9413 4300 or WIRES on 1300 094 737.
- All weed vegetation should be removed from the site for disposal. Weedy vegetation should not be moved or stockpiled in areas of retained vegetation in order to reduce their spread. Ongoing treatment of remaining weeds outside cleared areas is covered in Section 6 of this management plan.

#### 5.3 Construction

The following mitigation measures should be implemented and maintained during construction:

- Erosion and sediment controls should be implemented and maintained as per the Erosions and Sediment Management Plan.
- Areas which are marked and flagged off as "no-go" zones should be maintained during construction.
- Any trees marked within "no-go" zones are to be retained and protected. AS 4970-2009
   Protection of trees on development sites, is to be followed.
- TPZs and the SRZs should be maintained for trees within proximity of the works zones.
- All environmentally sensitive areas must be permanently delineated from construction areas with fencing and signage. Delineation must allow for passage of native fauna.
- All personnel should undertake environmental site inductions to highlight any and all environmental and ecological constraints within the site.
- Hygiene controls should be implemented for all vehicles and personnel entering the site.
   Phytophthora hygiene controls are provided in Appendix D.
- The marking and flagging of the APZ boundaries should be maintained to protect the surrounding remnant intact bushland.

#### 5.4 Post-construction

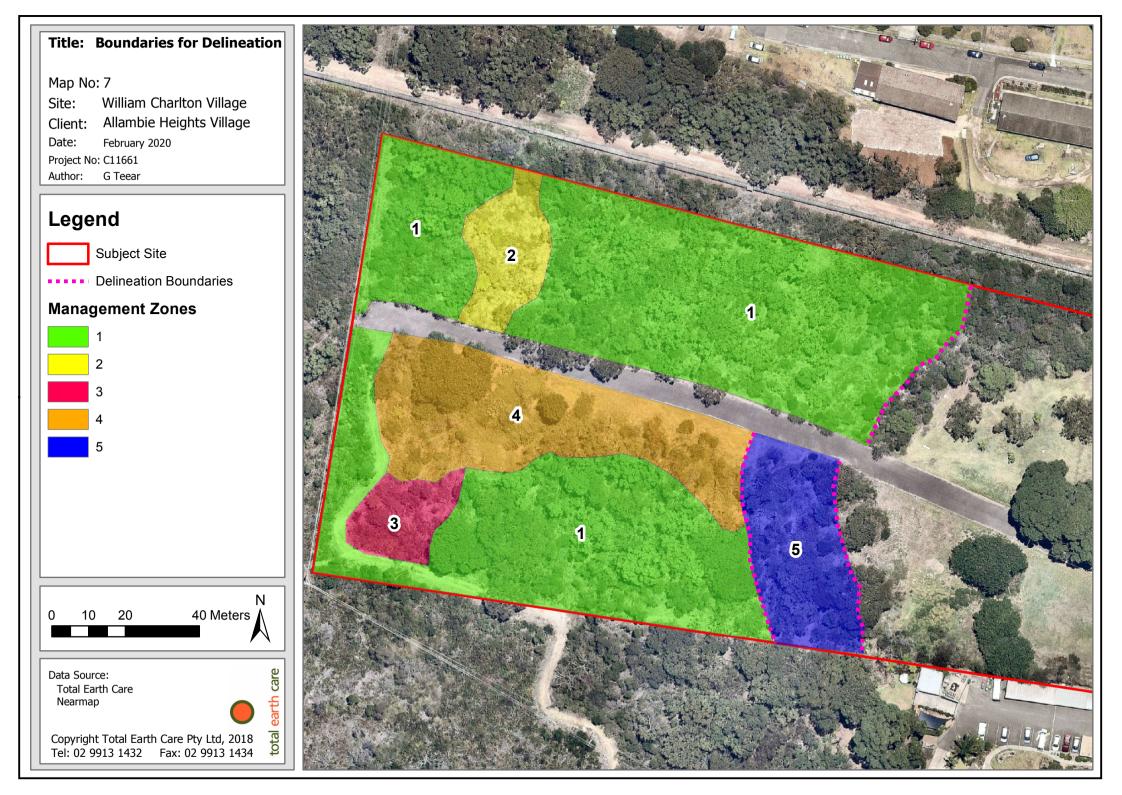
The following mitigation measures should be implemented post construction:

- Bush regeneration within the adjacent remnant bushland is recommended to increase habitat
  quality for native ground cover species and address the existing problem weeds at the edges
  which include but are not limited to: Wild Tobacco (Solanum mauritianum), Morning Glory
  (Ipomoea indica), dense thickets of Lantana (Lantana camara), Crofton Weed (Ageratina
  adenophora) and Senna (Senna pendula var. glabrata). Bush regeneration is also required to
  address new weed infestations that are likely to arise after construction.
- Bush regeneration and management of the retained bushland should be conducted as per the management zones detailed in Section 6 of this report.
- All environmentally sensitive areas must be permanently delineated from the residents' area.
   Delineation must allow for passage of native fauna.

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Landscaping works are to be outside areas of bushland and do not include Environmental Weeds.



### 6 Management of Retained Vegetation and Rehabilitation Areas

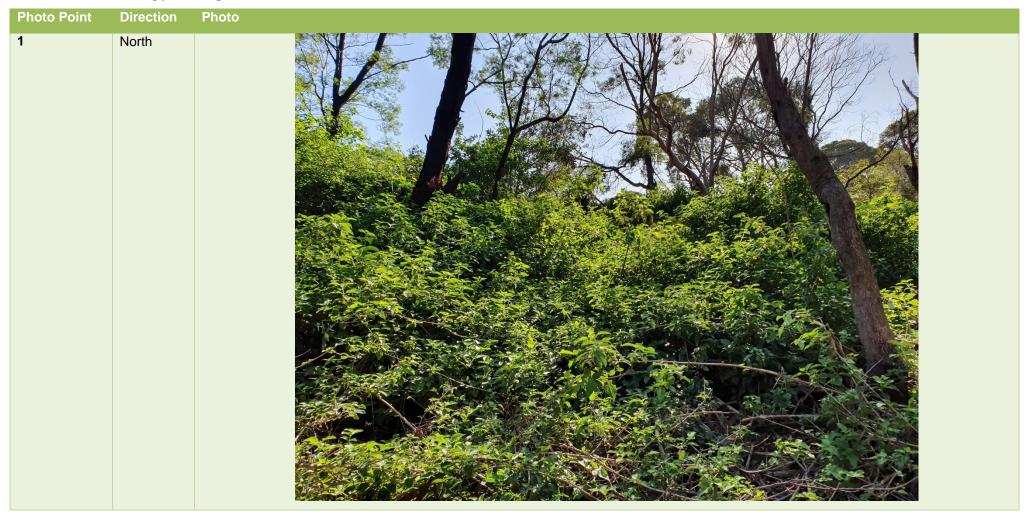
The areas of vegetation to be retained and managed as an OPA following development are described in Table 4 below. The boundaries for these zones are shown in Map 8 with photo-monitoring points for each zone. Photos taken during the February field survey at these photo-monitoring points are provided in Table 5. The management actions, timing, duration and performance indicators for these zones are provided in Table 6. A Gantt Chart with the timing of works is provided in Table 7.

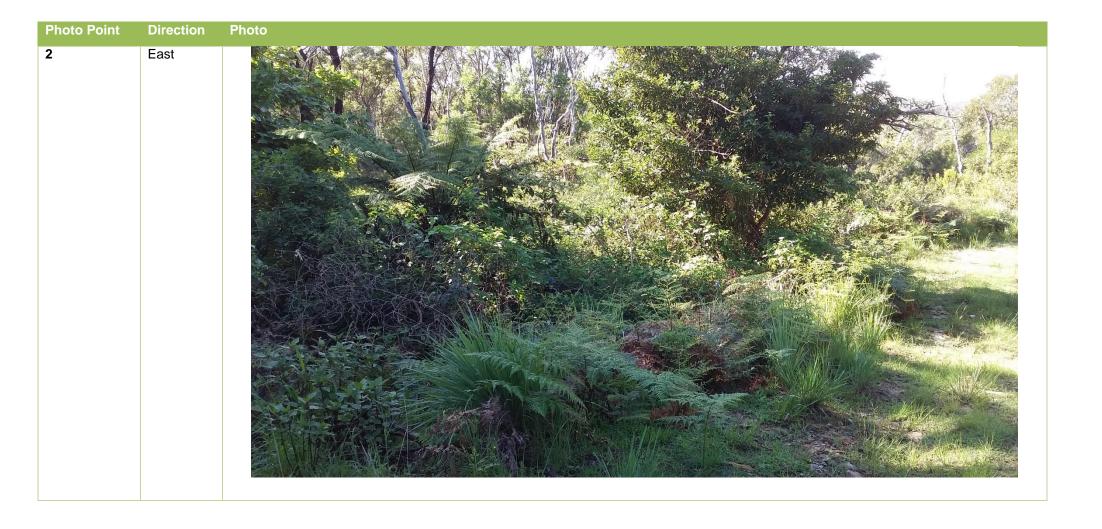
**Table 4. Management Zones** 

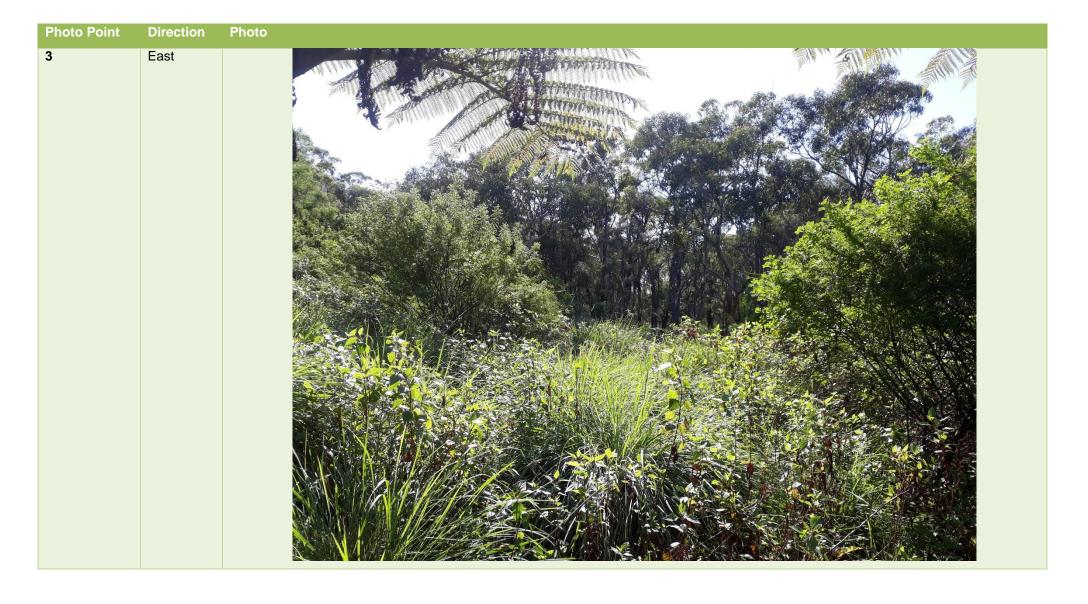
Management Zone	Management Issues
1	This management zone is predominantly undisturbed, good quality bushland that is highly resilient and mostly weed free. This zone is a priority to manage and monitor to prevent the encroachment or establishment of weeds from the neighbouring zones. Small shoots of Asparagus Fern ( <i>Asparagus aethiopicus</i> ) are beginning to emerge near photo-point A at the boundary of this zone. These should be targeted as a priority to prevent further encroachment into the adjacent areas of high quality bushland.
2	This zone lacks canopy species and mostly consists of dense patches of Blue Paspalum ( <i>Paspalum quadrifarium</i> ), Crofton Weed ( <i>Ageratina adenophora</i> ) and scattered Arum Lily ( <i>Zantedeschia aethiopica</i> ). Management efforts in this zone must focus on preventing the spread of weeds into the good quality bush of Zone 1 to the east and west.
3	This area forms a transition between the high density weeds of Zone 4 and the moderate and good quality bushland. Lantana ( <i>Lantana camara</i> ) continues down the edge of the track and Blue Paspalum ( <i>Paspalum quadrifarium</i> ) is scattered throughout the zone and along the track. Management actions should focus on reducing the weed infestation and preventing the spread into the good quality bushland of Zone 1.
4	This zone contains dense thickets of Lantana ( <i>Lantana camara</i> ), a mature Coral Tree ( <i>Erythrina × sykesii</i> ), scattered Oleander ( <i>Nerium oleander</i> ), Morning Glory ( <i>Ipomoea indica</i> ) at the western end, as well as Wild Tobacco ( <i>Solanum mauritianum</i> ), Giant Devil's Fig ( <i>Solanum chrysotrichum</i> ) and a few small shoots of Asparagus Fern ( <i>Asparagus aethiopicus</i> ) in close proximity to photo-point A. Management efforts in this zone must focus on preventing the spread of weeds into the good quality bush of Zone 1. Asparagus Fern ( <i>Asparagus aethiopicus</i> ) should be a priority target as only a small amount of young growth was observed. This can be eradicated easily at this stage before it spreads.
5	This area forms the OPA of the APZ. There is a high density of weeds at the northern part of this zone and along the drainage line including Crofton Weed ( <i>Ageratina adenophora</i> ) and Wild Tobacco ( <i>Solanum mauritianum</i> ). Management actions should focus on the removal of weeds around the drainage line working from upstream areas to downstream areas. Weed management should also prevent the spread of weeds into the good bushland of in Zone 1 and in the western portion of Zone 5. This zone will also be managed as an OPA as per the Planning for Bushfire Protection (NSW RFS 2019) requirements discussed in Section 4.2.



Table 5. Photo-monitoring point images







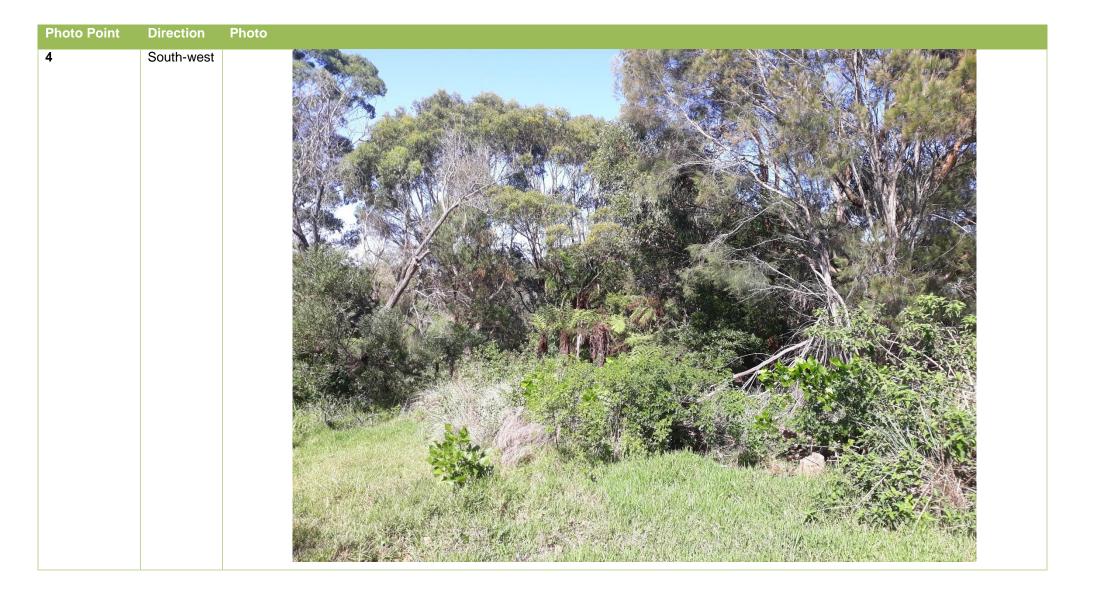


Table 6. Schedule of Works

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
Site Meeting, Induction and WH&S	All zones	Project meeting with client, construction contractors and bush regeneration contractor	Meeting on site with all concerned parties prior to commencement of works.  Induction, including environmental inductions undertaken.  Review and implementation of site specific WH&S and CEMP.  Discussion, review and induction for protocols for prevention of pathogen and weed spread.	Pre- construction	Half a (0.5) day	Property Owner and Contractors	WH&S documentation Inductions, including environmental inductions completed by all staff Wash down area designated All staff inducted into work site safety and protocols
Baseline Survey	All zones	Begin establishment of baseline monitoring photo-points. Begin baseline weed mapping of all zones.	Establish baseline monitoring photo points and weed density mapping for each management zone.  Conduct weed density mapping. An overall assessment of the density of weeds on site is to be conducted by an ecologist or qualified bush regenerator	Start of BMP implementation	One (1) day	Ecologist or qualified Bush Regeneration Contractorr	Baseline photo points, signs of dieback in vegetation and weed densities established, to be collated into first progress report (at 6 months from implementation of BMP)

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
Pre-clearance survey	Construction zone and OPA	Pre-clearance survey for active nest, dreys and any fauna that could be injured.	A qualified ecologist experienced in handling fauna is required to do a preclearance survey before any trees or vegetation are removed. If any nests or hollows are identified an ecologist must supervise the clearing.	Prior to clearing	One (1) day	Ecologist	Pre-clearance letter report.
Fence of "no- go" zones	Zones 1 and 4	Protection of conservation areas.	Zones 1 and 4 must be fenced off as "no-go" zones prior to construction. High-vis flagging is recommended to flag off the "no-go" zones.  No equipment or fill is to be stored in these areas. Machinery or construction contractors must not enter the "no-go" areas.	Pre- construction and maintained until post construction	One (1) day	Construction Constructor	Photos provided in monitoring report and flagging maintained throughout the construction period.
Permanent delineation between the OPA and bushland areas	Zone 1, 4 and 5	Delineation of conservation areas from OPA	Zones 1 and 4 must be permanently delineated from the APZ area to provide a clear management line.  As a minimum, a 3 strand wire fence with post at 2-5 m intervals must be installed.  Other fencing options can be used provided they are fauna friendly (no	During construction and must be maintained indefinitely.	Two (2) to three (3) days	Construction Contractor	Photos provided in monitoring report. Fence maintained and functional for the life of the BMP.

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
			barbed wire and allow fauna to pass through).				
Sediment Fencing	Zones 1, 5 and the construction area	Installation of sediment fencing and maintenance of existing sediment fencing	slope of any earthworks and above drainage lines.  Specifications included in Appendix F.  Sand bags must be used in the access		One (1) day, two (2) staff	Construction Contractor or Bush Regeneration Contractor	No sediment flow into bushland or drainage lines.  Sediment fence functional throughout the period of construction.  Performance of fence noted in monitoring BMP reporting.
Identify trees for APZ Clearing	Zone 5 (OPA)	Identify trees for removal	Bushfire consultant and ecologist to determine the trees required for removal within the OPA.	Prior to APZ clearing (within two (2) weeks of clearing)	One (1) day with ecologist and fire consultant	Bush Fire consultant and Ecologist	Trees to be removed and retained clearly marked.
Initial Weed Control	Zones 1 and 2 to the north of access road	Weed Control	Weed treatment including hand removal, cut and paint and herbicide spraying where relevant. Treat woody weeds in situ. See Appendix E for species specific treatment techniques.	Prior to or during construction work	Two (2) days, team of four (4)	Bush Regeneration Contractor	Before and after monitoring photographs. Waste and weed propagules removed off-site.
Initial Weed Control	Zones 1 to 4 south of access road.	Primary Weed Control	Control weeds working outwards from the centre of Zone 1 towards other zone boundaries. Treat woody weeds in situ. See Appendix E for species specific treatment techniques.	Prior to or during construction work	Two (2) days, team of four (4)	Bush Regeneration Contractor	Before and after monitoring photographs. Waste and weed propagules removed off-site.

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
Secondary Weed control	All zones	Secondary Weed Control	Secondary weed treatment including hand removal, cut and paint and herbicide spraying where relevant. See Appendix E for species specific treatment techniques.	Six (6) months after initial weed control	Two (2) days, team of four (4)	Bush Regeneration Contractor	Before and after monitoring photographs. Waste and weed propagules removed off-site.
Year 1 maintenance	All Zones	Weed Maintenance	Minimum four (4) visits.  Maintenance works to prevent reestablishment of weeds.  Weed control methods that can be undertaken include hand weeding and spraying if necessary.  Maintenance of APZ following RFS specifications for an OPA as outlined in Section 4.2.	First visit six (6) months after the secondary weed control. At least two (2) visits during the spring and summer months to target the flush of annual species.	One (1) day, team of four (4) each visit	Qualified Bush Regeneration Contractor	Reduce weeds to less than 15% cover within Year 1.  APZ meets RFS specifications for maintenance of an OPA.
Year 2 maintenance	All Zones	Maintenance weeding	Minimum of two (2) annual maintenance visit.  Maintenance works to prevent reestablishment of weeds.  Weed control methods which can be undertaken include hand weeding and spraying if necessary.  Maintenance of APZ following RFS specifications for an OPA as outlined in Section 4.2.	During the spring and summer months to target the flush of annual species.	One (1) day, team of four (4) each visit	Qualified Bush Regeneration Contractor	Reduce weeds to less than 10% cover within Year 2.  APZ meets RFS specifications for maintenance of an OPA.

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
Year 3 maintenance	All Zones	Maintenance weeding	Minimum of two (2) annual maintenance visits.  Maintenance works to prevent reestablishment of weeds.  Weed control methods which can be undertaken include hand weeding and spraying if necessary.  Maintenance of APZ following RFS specifications for an OPA as outlined in Section 4.2.	During the spring and summer months to target the flush of annual species.	One (1) day, team of four (4) each visit	Qualified Bush Regeneration Contractor	Maintain weeds to less than 5% cover within Year 3.  APZ meets RFS specifications for maintenance of an OPA.
Year 4 maintenance	All Zones	Maintenance weeding	Minimum of two (2) annual maintenance visits.  Maintenance works to prevent reestablishment of weeds.  Weed control methods which can be undertaken include hand weeding and spraying if necessary.  Maintenance of APZ following RFS specifications for an OPA as outlined in Section 4.2.	During the spring and summer months to target the flush of annual species.	One (1) day, team of four (4) each visit	Qualified Bush Regeneration Contractor	Maintain weeds to less than 5% cover within Year 4.  APZ meets RFS specifications for maintenance of an OPA.
Year 5 maintenance	All Zones	Maintenance weeding	Minimum of two (2) annual maintenance visits.  Maintenance works to prevent reestablishment of weeds.  Weed control methods that can be undertaken include hand weeding and spraying if necessary.	During the summer months to target the flush of annual species.	One (1) day, team of four (4) each visit	Qualified Bush Regeneration Contractor	Maintain weeds to less than 5% cover within in Year 5.

Management Action	Management Zones	Task	Specifications	Timing	Estimated Duration	Responsibility	Performance Indicators/ deliverables
			Maintenance of APZ following RFS specifications for an OPA as outlined in Section 4.2.				
Monitoring and Reporting	All Zones	Conduct annual monitoring, surveys and progress reports	Assess and present progress and monitoring reports on a six-monthly basis to Council to show whether Key Performance Indicators (KPIs) have been satisfactorily met to Council guidelines.	Every six (6) months	All years	Property Owner, Ecological Consultant or qualified Bush Regeneration Contractor	Weeds are to be reduced to less than 15% cover within Year 1, less than 10% in year 2 and to less than 5% by Year 5.
Final Monitoring Report	All Zones	Conduct final monitoring, surveys and progress report.	Assess and present a final report to Council to show whether KPIs have been satisfactorily met to Council guidelines	End of Year 5 after practical completion	All years	Property Owner, Ecological Consultant or qualified Bush Regeneration Contractor	Weeds to be reduced to less than 10% cover within Year 1 less than 10% in year 2 and to less than 5% by Year 5.

February 20

## Table 7. Implementation Schedule

Managana		Construction		n					(	OPE	RAT	ION /	MAI	INT	ENA	NCE							
Management Zone	ACTION		Stage		YEAR 1			YEA	4R 2		YE	AR	3		YEA	R 4		Υ	EAF	₹5	Responsibility		
20110		1	2	3	4	1	2 3	3 4	. 1	2	3	4	1 2	2 3	4	1	2	3	4	1	2	3 4	
All Zones	Site Meeting & Inductions - address WH&S issues																						Property Owner/Project Manager
1,4 and 5	Permanent delineation between the OPA and bushland areas																						Property Owner/Construction contractor
Zone 5	Identify trees for APZ clearing																						Fire Consultant and Ecologist
1,4 and 5	Fence of "no-go" zones																						Property Owner/Project Manager
5 and Construction area	Preclearance Survey																						Ecologist
1, 5 and Construction area	Install sediment fencing																						Property Owner/Construction contractor
	Baseline Survey																						Bush Regenerator or Ecologist
	Initial Weed Control - Zones 1 and 2 to the north of access road																						Bush Regenerator
	Initial Weed Control - Zones 1 to 4 south of access road																						Bush Regenerator
	Secondary Weed Control																						Bush Regenerator
All Zones	Year 1 Maintenance					x2		x2	2														Bush Regenerator
All Zones	Year 2 Maintenance																						Bush Regenerator
	Year 3 Maintenance																						Bush Regenerator
	Year 4 Maintenance																						Bush Regenerator
	Year 5 Maintenance																						Bush Regenerator
	Monitoring Reports																						Bush Regenerator or Ecologist

Rev A

#### 7 Monitoring Guidelines

A program of monitoring and inspection is to be carried out by a qualified bushland management consultant (qualified ecologist or bush regeneration supervisor) to ensure the measures outlined in this BMP are implemented and that performance criteria have been satisfied. The monitoring programme will commence prior to any works to gather baseline data and will continue for the duration of the maintenance period.

The monitoring programme will involve:

- Assessment of weed control works and native regeneration success via permanent repeatable
  photographic monitoring points, and surveys of whole management zones by a suitably qualified
  person (ecologist or bush regeneration supervisor) to measure percentage cover of native and
  exotic species for each zone. Monitoring point locations are shown in Map 8;
- Mapping of weed densities per zone for the site to assess the progress of the works towards the final requirement of maximum <5% weed cover;</li>
- Assessment of evidence of herbivory, and recommendations to counteract;
- Assessment of evidence of erosion, and recommendations to mitigate;
- Recommendations for corrective measures and/or specific vegetation management required; and,
- Provision of regular reports outlining data collected and tracking of works towards final KPIs.

Monitoring events and reporting are to follow the following schedule:

- Baseline Survey Prior to commencement of bushland management works. No report required, but this information must be added to initial progress report;
- Surveys and Progress Report at Six (6) Monthly Intervals— following every 6 months of management activities. Report to include baseline from previous report, commencement and continuation of works, and survey results;
- Final monitoring report after five (5) years from practical completion is required which will report
  as to whether KPIs have been achieved, and if not, include recommendation on further works
  required.

All reports should be prepared by suitably qualified professionals and submitted to Council. Council defines a qualified person for supervision of on ground bush regeneration works such as weed removal, bush regeneration and revegetation as having:

• A minimum two years supervising experience of on–ground bush regeneration work and TAFE Certificate III in Conservation and Land Management - Natural Area Restoration or equivalent.

And for undertaking the bush regeneration works:

 A minimum of a TAFE Certificate II in Conservation and Land Management-Natural Area Restoration or equivalent.

Biodiversity Management Plan William Charlton Village, Allambie Heights

### **8 Corrective Actions**

Based on the monitoring report results corrective actions must be implemented where performance targets are not on track. Table 8 details corrective actions for potential management issues which may be identified during the monitoring stage. Corrective actions must be provided in the monitoring reports when required:

Table 8. Potential management issues and corrective actions

Management Issue	Corrective Action
Weed cover exceeding targets by 10% or more.	Increase weed control visits by a qualified bush regenerator. Frequency of visits to be determined by a qualified ecologist or bush regenerator to meet KPl's.
Ineffective sediment fencing or in disrepair	Repair existing fencing. Add additional fencing where required to ensure no sediment is entering drainage lines, bushland or stormwater.
Destabilisation after weed removal work	If the slope in management Zone 4 becomes destabilised after weed removal it should be stabilised using the following methods:  - Installation of coir logs and/or jute matting depending on the extent and level of erosion potential.  - Planting of local provenance tube stock plant species and watering.  Plant survival rates must be maintained at 80% and in filled with additional plants if required.

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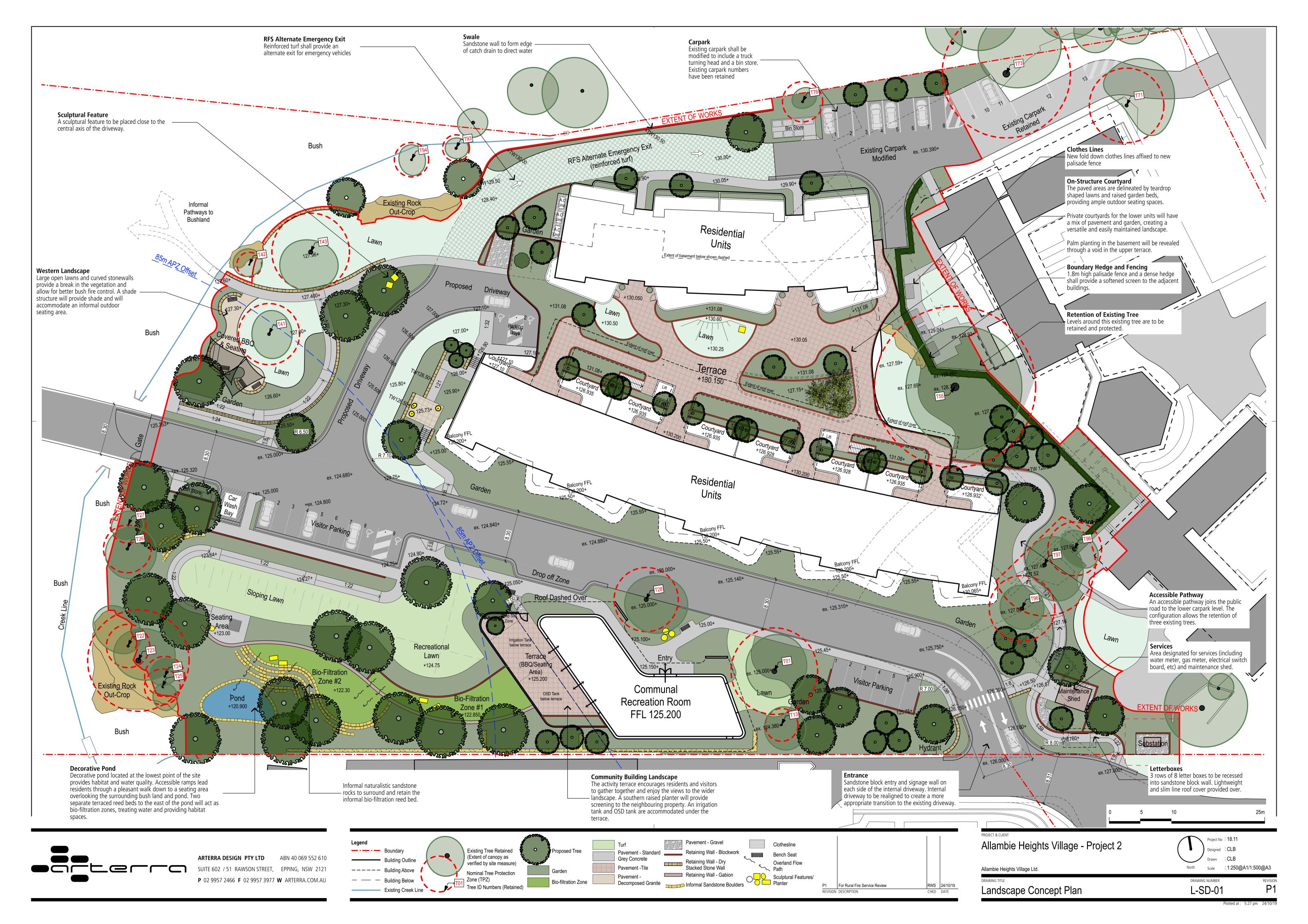
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# **Appendix A. Proposed Plans**



# Appendix B. Landscape Plans



## **Appendix C. Fauna Species Lists**

Table 9. Fauna species observed during February 2020 survey.

Family	Scientific Name	Common Name	Exotic	BC Status	EPBC Status
Alcedinidae	Dacelo novaeguineae	Laughing Kookaburra		Р	
Cacatuidae	Cacatua galerita	Sulphur-crested Cockatoo		Р	
Corvidae	Corvus coronoides	Australian Raven		Р	
Estrildidae	Neochmia temporalis	Red-browed Finch		Р	
Leporidae	Oryctolagus cuniculus	Rabbit	*		
	Acanthorhynchus tenuirostris	Eastern Spinebill		Р	
	Anthochaera chrysoptera	Little Wattlebird		Р	
	Manorina melanocephala	Noisy Miner		Р	
Meliphagidae	Meliphaga lewinii	Lewin's Honeyeater		Р	
	Phylidonyris niger	White-cheeked Honeyeater		Р	
	Phylidonyris novaehollandiae	New Holland Honeyeater		Р	
Pseudocheiridae	Pseudocheirus peregrinus	Common Ringtail Possum		Р	
Psittacidae	Trichoglossus haematodus	Rainbow Lorikeet		Р	
Psophodidae	Psophodes olivaceus	Eastern Whipbird		Р	
Pycnonotidae	Pycnonotus jocosus	Red-whiskered Bulbul	*		

Table 10. Fauna species observed during previous TEC surveys.

Common name	Scientific name	BC Act status	EPBC Act status
Red Wattlebird	Anthochaera carunculata	Р	
White-striped Free-tail Bat	Austronomus australis	Р	
Eastern Pygmy-possum	Cercartetus nanus	V	
Gould's Wattled Bat	Chalinolobus gouldii	Р	
Large-eared Pied Bat	Chalinolobus morio	Р	
Common Eastern Froglet	Crinia signifera	Р	
Kookaburra	Dacelo novaeguineae		
Australian Magpie	Gymnorhina tibicen	Р	
Striped marsh frog	Limnodynastes peronii	Р	
Square-tailed Kite	Lophoictinia isura	V	
Noisy Miner	Manorina melanocephala	Р	
Common Dwarf Skink	Menetia greyii	Р	
Little Bentwing-bat	Miniopterus australis	V	
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	V	

Common name	Scientific name	BC Act status	EPBC Act status
Rabbit	Oryctolagus cuniculus		
Yabby (in Southern creek)	Parastacidae family		
Sugar Glider	Petaurus breviceps	Р	
Common Ringtail Possum	Pseudocheirus peregrinus	Р	
Grey-headed Flying-fox	Pteropus poliocephalus	V	V
Black Rat	Rattus rattus		
Pied Currawong	Strepera graculina	Р	
Rainbow Lorikeet	Trichoglossus haematodus	Р	
Common Brushtail Possum	Trichosurus vulpecula	Р	
Large Forest Bat	Vespadelus darlingtoni	Р	
Little Forest Bat	Vespadelus vulturnus	Р	
Fox	Vulpes vulpes	U	
Swamp Wallaby	Wallabia bicolor	Р	

# Appendix D. Phytophthora Hygiene Protocols

Task	Action
Timing	When possible/practical, the development should be completed in dry soil conditions and postponed following significant rainfall. Working in dry soil conditions will reduce the need for cleaning vehicles and equipment.
	If it is necessary to work in wet or damp areas then greater attention will need to be spent on vehicle and equipment cleaning.
Staff	Contractors and staff involved in the development are to be made aware that fungus has / has not been recorded on site, and provided with information regarding management protocols and its threat to native vegetation.
	Alterations to drainage that may result in the spread of <i>Phytophthora</i> into new areas are to be avoided as highest priority.
Drainage and Water	Water used during construction should be minimised. When water is necessary, it should be from a reticulated mains system, bore supply or sterilised source. Surface water collected from infected areas should not be used.
	Water draining from the site should not to enter bushland areas.  The use of water for dust suppression should be kept to a minimum.
	Plants used in landscaping should be purchased from a nursery with accreditation from the Nursery Industry Association, or from a nursery with excellent hygiene conditions. Species selected for landscaping should preferably be resistant to <i>Phytophthora cinnamomi</i> .
Landscaping	Any gravel/sand/topsoil to be bought onto site should be purchased from a Nursery Industry Association accredited supplier, or should be certified (through testing) to be free of <i>Phytophthora cinnamomi</i> .
and Bush Regeneration	Any infected soil/sand/gravel/vegetation moved on the site, or removed from the site should be stored at in area that is also infected with <i>Phytophthora cinnamomi</i> , or a site where the pathogen will not have any impact. Storage of gravel/sand/topsoil on site should preferably be on a dry well drained surface.
	Construction materials such as pipes, rocks, timber, bricks etc, should be free of mud and soil when arriving at the site.
	Staff should not enter infected areas unless necessary, movement within these areas should be kept to a minimum.
	All machinery, vehicles and equipment should arrive at the site free of uncontained mud and soil, particularly on tyres, mudflaps and the underbody.
	Vehicles and machinery exiting the site to be free of all uncontained mud and soil, particularly on the tyres, mudflaps and the underbody.
Vehicles and	Minimise the amount of water used. Try to remove soil and mud when it is dry (a stiff brush or stick maybe useful).
Machinery	Cleaning will be easier and more effective if it is completed at a depot or a permanent/designated cleaning area (it is acceptable for vehicles and machinery to be taken to a cleaning facility on sealed roads). If cleaning is to occur in the field select a site with a hard, well-drained surface (eg. a road) that is well away from remnant vegetation. If possible, wash down in an area that is close to the area you have been operating in. Wash down on ramps if possible. Do not allow mud and wash-down effluent to drain into bushland. Do not drive through wash-down effluent.
	Try to remove as much mud and soil as possible when it is dry with a stiff brush or stick. Minimise the amount of water used to initially clean footwear and tools.
Footwear and Tools	Footwear and tools should be scrubbed with a sterile solution (see below).  All mud and soil should be collected (including in liquid) and removed in a bag or bucket.  This material is to be disposed of at a site that is already infected with Cinnamon Fungus, or a site that contains no bushland.
Sterilising	Equipment can be sterilised by soaking in a disinfectant such as bleach (containing sodium hypochlorite). The bleach should be diluted (1 part bleach to 10 parts water), soak the tools for a few minutes, and then rinse. Alternatively methylated spirits can also be used for sterilising small hand tools and footwear in the field. A spray bottle containing methylated spirits can be used to cover all surfaces, allowing time for it to soak into all soil material (a couple of minutes is sufficient).
	A sterile water solution suitable for spraying down vehicles and machinery can be made by mixing 6mL of sodium hypochlorite (eg. pool chlorine or bleach) to every 10L of water.

## Appendix E. Weed Species listed as a Biosecurity Risk

Table 11. Categories of Management under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022 under the NSW Biosecurity Act 2015

Category	Management Action
Prevention (Prevent)	To prevent the weed species arriving and establishing in the Region.
Eradication (Eliminate)	To permanently remove the species and its propagules from the Region, OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.
Containment (Minimise)	To prevent the ongoing spread of the species in all or part of the Region.
Asset Protection (Manage)	To prevent the spread of weeds to key sites/ assets of high economic, environmental and social value, or to reduce their impact on these sites if spread.
GBD (General Biosecurity Duty)	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable."
RRM (Regional Recommended Measure)	Specific details for each species included in table.
PoD (Prohibition on Dealings)	Must not be imported into the State or sold.
B Zone (Biosecurity Zone)	Specific details for each species included in table.
PM (Prohibited Matter)	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

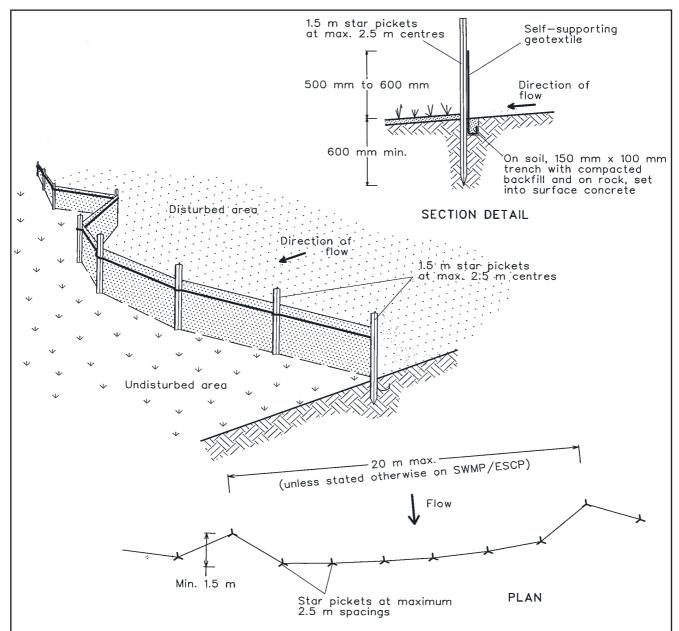
Table 12. Biosecurity Risk & Management Actions

Common Name	Botanical Name	WONS	State Priority Weed- Mgmt. Actions	Regional Priority Weeds- Mgmt. Actions	Other Regional Weeds- Asset/value at risk	Duties for Priority Weeds of Greater Sydney	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
Crofton Weed	Ageratina adenophora				Environment, Agriculture		Hand removal, brush cut and foliar sprayed with Glyphosate	Glyphosate 360g/L	M	1/100
Asparagus Fern	Asparagus aethiopicus	Yes	Asset Protection			PoD	Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl	Glyphosate 360g/L & Metsulfuron- Methyl 600 g/kg	M & B	1/100 & 1g/10L
Mother of Millions	Bryophyllum delagoense				Environment, Agriculture, Human health		Hand pulled or spot sprayed with Starane Advance	Fluroxypyr 333 g/L present as meptyl ester	I	0.36/100
Coral Tree, Common Coral Tree	Erythrina x sykesii				Environment		<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	Glyphosate 360g/L	M	Neat
Morning Glory / Blue Morning Glory	Ipomoea indica				Environment, Human health		Small single specimens hand pulled, skirting larger vines scraping and painting with neat Glyphosate	Glyphosate 360g/L	M	Neat
Lantana	Lantana camara	Yes	Asset Protection			PoD	Cut and paint, sprayed or splattered with Glyphosate	Glyphosate 360g/L	M	Neat
Small Leaf Privet	Ligustrum sinense				Environment, Human health		<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	Glyphosate 360g/L	M	Neat

Common Name	Botanical Name	WONS	State Priority Weed- Mgmt. Actions	Regional Priority Weeds- Mgmt. Actions	Other Regional Weeds- Asset/value at risk	Duties for Priority Weeds of Greater Sydney	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
Tussock Paspalum, Blue Grass	Paspalum quadrifarium				Environment		Hand pulled or brush cut and foliar sprayed with Glyphosate	Glyphosate 360g/L	M	1/50
Corky Passionflower	Passiflora suberosa				Environment		Hand remove small individuals, spot spray or scrap and paint with neat Glyphosate	Glyphosate 360g/L	M	1/100 & Neat
Castor Oil Plant	Ricinus communis						Hand pulled and cut & painted with neat Glyphosate	Glyphosate 360g/L	M	Neat
Senna / Cassia	Senna pendula				Environment		Small individuals hand removed, larger plants cut and painted with neat Glyphosate	Glyphosate 360g/L	M	Neat
Giant Devil's Fig	Solanum chrysotrichum			Prevention		RRM: Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should				

Common Name	Botanical Name	WONS	State Priority Weed- Mgmt. Actions	Regional Priority Weeds- Mgmt. Actions	Other Regional Weeds- Asset/value at risk	Duties for Priority Weeds of Greater Sydney	Weeding Technique	Herbicide Application	Herbicide Group	Ratio
						not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.				
Tobacco Bush/ Wild Tobacco	Solanum mauritianum				Environment, Agriculture		Cut & paint with Glyphosate	Glyphosate 360g/L	M	Neat
Arum Lily	Zantedeschia aethiopica				Human health, Environment		Physical removal of whole plant and rhizome or cut and paint with Neat Glyphosate	Glyphosate 360g/L	M	Neat

# Appendix F. Sediment Fence Specifications (Landcom 2004)



### **Construction Notes**

- Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
- 2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
- 3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
- 4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
- 5. Join sections of fabric at a support post with a 150-mm overlap.
- 6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

## SEDIMENT FENCE

**SD 6-8**