



Vegetation Management Plan



The NSW Department of Education

The New Primary School at Warnervale
NSW

16 December 2019

Vegetation Management Plan

The New Primary School at Warnervale NSW

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Prepared for:

**THE NSW DEPARTMENT OF EDUCATION
C/- BILLARD LEECE PARTNERSHIP**

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1. INTRODUCTION

1.1 BACKGROUND

Kleinfelder was engaged by Billard Leece Partnership, on behalf of the NSW Department of Education (DoE), to prepare a Vegetation Management Plan (VMP) for Lot 71 DP 7091 Warnervale Road, Warnervale, NSW (hereafter referred to as the 'Subject Site'). DoE are proposing to develop the Subject Site for the New Warnervale Public School (hereafter referred to as the 'proposed development') and have lodged a Development Application (DA) with Central Coast Council (Council).

Kleinfelder prepared a Biodiversity Development Assessment Report (BDAR) to support a DA for proposed development. Following review of the DA, Council issued a submission including a request for further information on how biodiversity values would be managed within the Subject Site. Actions as requested by Council include the following:

- Replacement planting and bush regeneration within the 'biodiversity valued land to be retained' located at the rear of the site in order to revegetate the (existing unauthorised) cleared area would need to be carried out.
- More information is required about the future/long term management of the "avoid" lands. Council would want these to be retained and managed as a corridor in perpetuity.
- Concern is raised regarding the extent of tree removal associated with the proposal. Replacement native tree planting to compensate for the loss of trees along the street front, within the street setback and areas adjacent to the side boundary (within proximity and view of the street) should be investigated and carried out.
- The street trees also provide for a linking corridor of vegetation across Warnervale Road which is being impacted under the proposal. The squirrel glider glides between trees and the species is sensitive to habitat fragmentation when tree gaps exceed its gliding ability.

This VMP has prepared in consideration of the comments from Council. The VMP also describes the key issues, objectives and management guidelines that relate to the management of biodiversity values within the Subject Site.

1.2 SITE DESCRIPTION

The Subject Site is approximately 4.53 ha in area and occurs within the Central Coast Local Government Area (LGA) (**Figure 1**). The northern portion of the allotment is zoned R1 – General Residential, and the southern portion is zoned R2 – Low Density Residential.

The Subject Site is bound by Warnervale Road and residential development to the northwest, a native bushland corridor surrounding Warnervale Oval to the north, partially cleared residential development to the east (on adjoining Lot 72), and by native bushland to the west and south (on adjoining Lots 70 and 73) (**Figure 1**). The majority of the southern and central portions of the Subject Site are comprised of native bushland, with the northernmost portion supporting several buildings and managed grassland.

1.3 PROPOSED DEVELOPMENT

The area to be directly impacted by the proposed development occurs within Part of Lot 71 DP 7091. The proposal will directly impact on 3.58 ha of native vegetation. A total of 0.93 ha of native vegetation will be retained.

The proposed development has been designed to avoid vegetation and species habitat removal, where possible. The location of buildings and infrastructure within the site has been positioned within cleared areas where possible.

1.4 DEFINITIONS

A number of terms and abbreviations are used throughout this VMP. Definitions of these terms are provided in **Table 1**.

Table 1: Definition of terms

Term / Abbreviation	Definition
APZ	Asset protection zone
BC Act	<i>Biodiversity Conservation Act 2016</i>
BCD	Biodiversity Conservation Division of the NSW Department of Planning, Industry and Environment
Bush Regeneration	Defined by the Australian Association of Bush Regenerators (AABR) as the practice of restoring

Term / Abbreviation	Definition
	bushland by focussing on reinstating and reinforcing the systems' ongoing natural regeneration processes.
DA	Development Application prepared pursuant to the EP&A Act.
DPIE	The NSW Department of Planning, Industry and Environment
Development	In relation to land, means: The erection of a building on that land; The carrying out of a work in, on, over or under that and; The use of that land or of a building or work on that land; and The subdivision of that land, but does not include any development of a class or description prescribed by the regulations for the purposes of this definition.
Development area	An area of approximately 3.6 ha
Endangered Ecological Community	An ecological community specified in Schedule 2 of the BC Act
Endangered Population.	A population specified in Schedule 1 of the BC Act
EP&A Act	<i>Environmental Planning & Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Proposal	Development of Lot 71 DP 7091 Warnervale Road, Warnervale, NSW for the New Warnervale Public School
Regeneration	Where native vegetation can regenerate itself from an intact root zone and seed bank to a natural state, with associated management (weed control).
Rehabilitation	The vegetation rehabilitation is defined as the return of native vegetation within disturbed areas.
Resilience	The ability of an ecosystem to regenerate naturally and to withstand, or recover from, disturbances such as weed invasion, clearing, or fire.
Restoration	To restore pre-existing indigenous ecosystems and ecological processes, maintaining and developing the capacity of a natural system to self-perpetuate.
Subject site	Lot 71 DP 7091 Warnervale Road, Warnervale, NSW



<p>0 10 20 40 60 80 100 Metres</p> <p>KLEINFELDER Bright People. Right Solutions. www.kleinfelder.com</p>	<p>PROJECT REFERENCE: 20192176</p> <p>DATE DRAWN: 2019/12/13 12:55 Version 1</p> <p>DRAWN BY: GJoyce</p> <p>DATA SOURCE: NSW DFSI - 2017 ADW Johnson - 2019 Nearmap - 2019</p>	<p>Development Site Map</p> <p>NSW Department of Education (c/- Billard Leece Partnership) Vegetation Management Plan New Warnervale Public School Lot 71 DP 7091 Warnervale Rd, Warnervale NSW</p>	<p>FIGURE:</p> <p>1</p>
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2. BIODIVERSITY VALUES

2.1 GEOLOGY AND SOILS

The Subject Site is mapped as occurring on the Gorokan Erosional Soil Landscape on the Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet (Murphy 1993). The Gorokan (gk) soil landscape is described as occurring on undulating low hills on lithic sandstones of the Tuggerah Formation. Soils are moderately deep, and the dominant materials include; loose dark brown loamy sand, yellowish brown hard setting clayey sand, yellowish brown strongly pedal clay and light grey massive clay. This soil landscape occurs over the Narrabeen Group – Clifton Subgroup – Tuggerah Formation geology (Murphy 1993).

2.2 NATIVE VEGETATION

2.2.1 Plant Community Types

The central and southern portions of the Subject Site contain forest vegetation, comprised of two Plant Community Types (PCTs):

- PCT 1590 - Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest and
- PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands.

Approximately 1.14 ha of PCT 1590 occurs within the central-western portion of the Subject Site. All of this vegetation will be removed by the proposed development.

Approximately 2.44 ha of PCT 1619 occurs in the Subject Site. Approximately 0.93 ha of this vegetation will be retained (0.21 ha of regenerating vegetation and 0.72 ha of mature vegetation).

Non-native vegetation is comprised of managed gardens and exotic grasslands (0.30 ha). Cleared areas and existing development (0.65 ha) also occur in the northern portion.

A floristic description of each PCT is presented in **Table 2**. Note that each description is based on the better-quality areas of the Subject Site. A list of all flora species recorded is presented in **Appendix 1**.

Table 2: Plant Community Types within the Subject Site

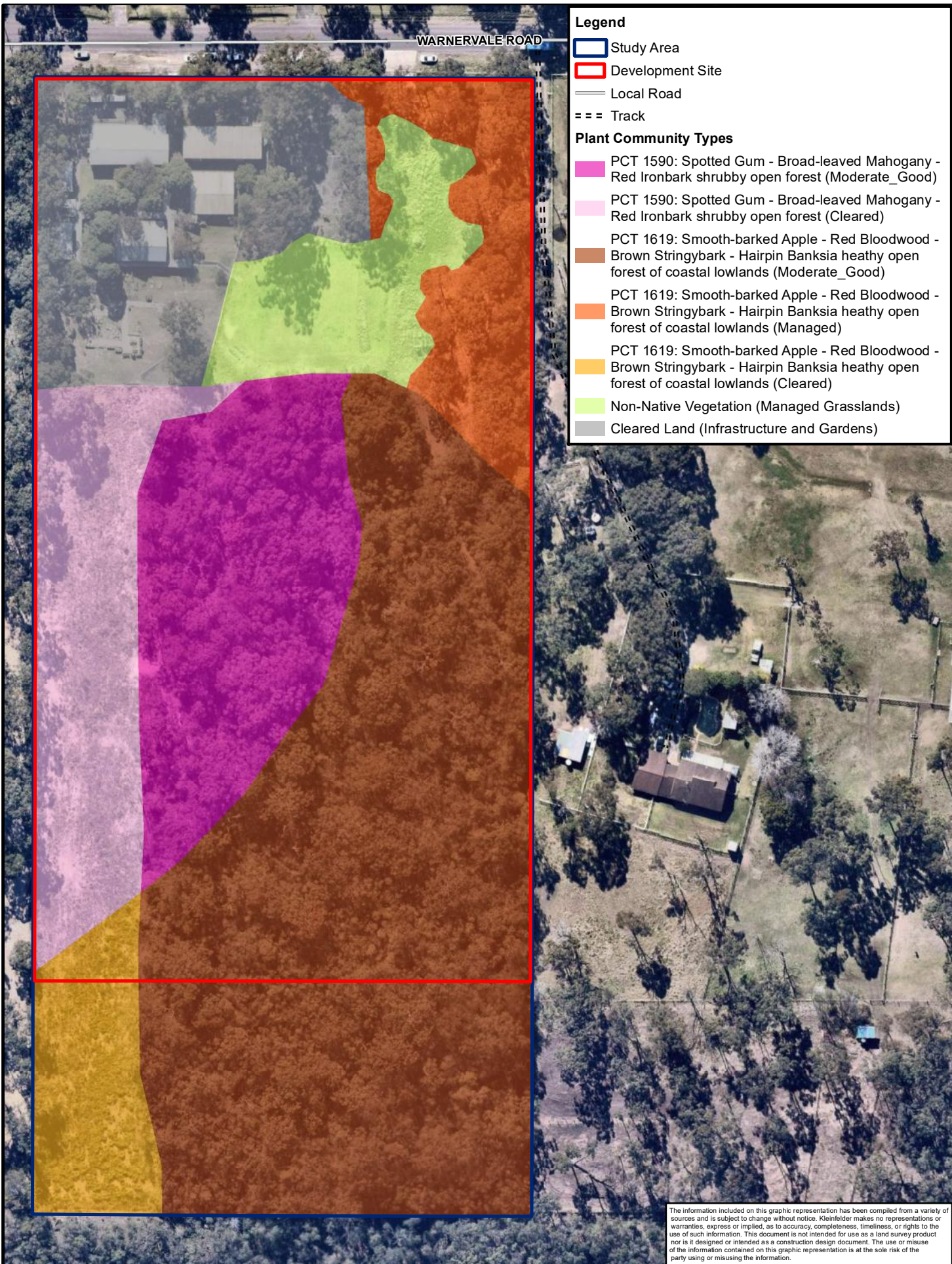
PCT	Floristic Description
PCT 1590: Spotted Gum – Broad-leaved Mahogany – Red Ironbark shrubby open forest	<p>The canopy of this vegetation is dominated by <i>Corymbia maculata</i>, <i>Eucalyptus eugenioides</i> and <i>Eucalyptus fibrosa</i>, with <i>Eucalyptus umbra</i> and <i>Angophora costata</i> also occurring.</p> <p>The midstorey is dominated by a dense layer of <i>Melaleuca nodosa</i> with scattered <i>Allocasuarina littoralis</i> occurring. There is a sparse shrub layer of <i>Pimelea linifolia</i>, <i>Phyllanthus hirtellus</i>, <i>Acacia longifolia</i> subsp. <i>longifolia</i> and <i>Podolobium scandens</i>.</p> <p>The ground layer is dominated by <i>Ptilothrix deusta</i>, <i>Entolasia stricta</i>, <i>Xanthorrhoea latifolia</i>, <i>Gahnia melanocarpa</i>, <i>Themeda triandra</i>, <i>Microlaena stipoides</i> var. <i>stipoides</i>, <i>Lobelia purpurascens</i> and <i>Cassytha pubescens</i>.</p>
PCT 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	<p>The vegetation within the study area was dominated by <i>Angophora costata</i>, <i>Corymbia gummifera</i>, and <i>Eucalyptus capitellata</i>, with <i>Eucalyptus fibrosa</i> and <i>Eucalyptus eugenioides</i> also occurring.</p> <p>The midstorey is dominated by dense layer of <i>Allocasuarina littoralis</i> and <i>Melaleuca nodosa</i>. Scattered <i>Melaleuca decora</i> also occur.</p> <p>The shrub and ground layers are dominated by <i>Ptilothrix deusta</i>, <i>Entolasia stricta</i>, <i>Microlaena stipoides</i> var. <i>stipoides</i>, <i>Gahnia radula</i>, <i>Xanthorrhoea latifolia</i>, <i>Brunoniella australis</i>, <i>Lepidosperma laterale</i>, <i>Lobelia purpurascens</i>, <i>Bossiaea rhombifolia</i> and <i>Persoonia levis</i>.</p> <p>The climber and twining species <i>Parsonsia straminea</i> and <i>Cassytha pubescens</i> also occur. The orchid species <i>Cryptostylis subulata</i> also occurs in large patches within the community.</p> <p>Scattered exotic species occur within the community, including, <i>Ligustrum sinense</i>, <i>Asparagus aethiopicus</i>, <i>Richardia stellaris</i> and <i>Lantana camara</i>.</p>

2.2.2 Vegetation Condition (Zone)

The vegetation within the Subject Site exists in various states of condition due to historical vegetation clearing, weed encroachment and general habitat degradation. A summary of information pertaining to impacts (vegetation clearing) of each PCT/ vegetation zone is presented in **Table 3**. The extent of each PCT and vegetation zone is presented in **Figure 2**.

Table 3: Vegetation clearing summary

PCT	Veg Zone	Impact Type			
		APZ	Development Area	No Impact	Grand Total
Cleared Land (Infrastructure and Gardens)	-	-	0.65		0.65
Non-Native Vegetation (Managed Grasslands)	-	-	0.30		0.30
PCT 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Mod/Good	0.04	0.60	-	0.65
PCT 1590: Spotted Gum - Broad-leaved Mahogany - Red Ironbark shrubby open forest	Cleared	0.12	0.37	-	0.49
PCT 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Cleared	-	-	0.21	0.21
	Mod/Good	-	-	0.72	0.72
PCT 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Mod/Good	0.55	0.61	-	1.15
PCT 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Managed		0.32	-	0.32
PCT 1619: Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Banksia heathy open forest of coastal lowlands	Cleared	0.04	-	-	0.04
Total		0.75	2.85	0.93	4.53



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2.3 FAUNA HABITAT

The native vegetation within the Subject Site is continuous with a larger patch of bushland which extends to south-east, south and west. The fauna habitat (predominantly canopy trees and shrubs) is likely to provide foraging habitat for a range of fauna species including birds, arboreal and terrestrial mammals, reptiles, amphibians and invertebrates.

Key habitat features within the Subject Site include hollow-bearing trees which may provide habitat for nesting birds, arboreal mammals, reptiles, amphibians and microbats (Gibbons and Lindenmayer 2003). A total of 29 hollow-bearing trees and dead stags were identified, of which 18 occur within the development area. These habitat trees contain a range of potential hollows sizes.

Information pertaining to each habitat tree including the number and size of each hollow is presented in **Appendix 2**.

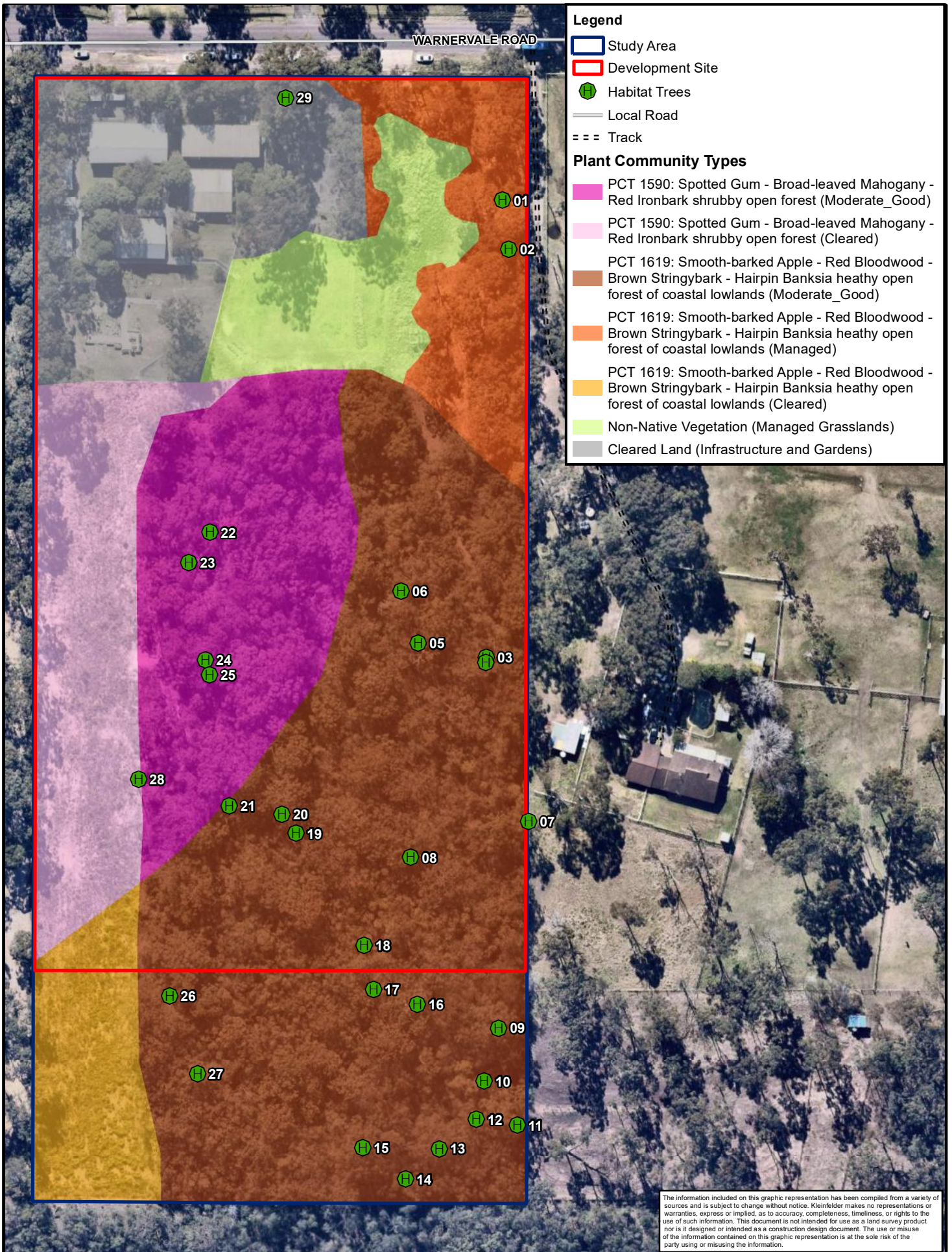
2.4 THREATENED FAUNA SPECIES

No threatened species were identified within the Subject Site; however, habitat was identified for several species. The habitat requirements of each of these species is presented in **Table 4**.

Table 4: Threatened Species habitat within the Subject Site

Threatened Species	Habitat Characteristics
Eastern Bentwing-bat <i>Miniopterus orianae</i> subsp. <i>oceanensis</i>	Forages in forested habitats. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. The Subject Site contains foraging and roosting habitat (hollow-bearing trees) for this species which is nocturnal and preys on insects. No caves or other forms of breeding habitat are present.
Glossy Black-Cockatoo <i>Calyptrorhynchus lathami</i>	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak, Forest She-oak, or Drooping She-oak occur. The Subject Site contains foraging habitat for this species including feed tree species such as Black She-oak (<i>Allocasuarina littoralis</i>). A detailed inspection of large hollows within the Subject Site identified no individuals breeding.
Grey-headed Flying-fox <i>Pteropus poliocephalus</i>	Occurs across a wide range of habitat types along the eastern seaboard of Australia, depending on food availability. Fruit from myrtaceous trees and rainforest trees form the major components of their diet.

Threatened Species	Habitat Characteristics
	<p>The vegetation within the Subject Site is dominated by <i>Eucalyptus</i> sp., <i>Angophora</i> sp. and <i>Corymbia</i> sp. These trees provide foraging resources for the Grey-headed Flying Fox (GHFF) including nectar and pollen.</p> <p>No GHFF camps occur within the Subject Site. The habitat therefore represents foraging habitat rather than breeding habitat.</p>
<p>Little Bentwing-bat <i>Miniopterus australis</i></p>	<p>Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally, found in well-timbered areas.</p> <p>The Subject Site contains foraging and roosting habitat (hollow-bearing trees) for this species which is nocturnal and preys on insects. No caves or other forms of breeding habitat are present.</p>
<p>Squirrel Glider <i>Petaurus norfolcensis</i></p>	<p>Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Dens and breeds in hollow-bearing trees.</p> <p>The vegetation within the Subject Site is dominated by <i>Eucalyptus</i> sp., <i>Angophora</i> sp. and <i>Corymbia</i> sp. These trees provide foraging resources for the Squirrel Glider including nectar, sap, pollen, insects and other small prey.</p> <p>The canopy vegetation within the Subject Site has been identified as an important habitat corridor for the Squirrel Glider. Due to the large number of historical records of Squirrel Gliders within the locality and high connectivity of the vegetation, the Squirrel Glider has been identified as a target species for which habitat values within the Subject Site are to be improved via implementation of this VMP.</p>
<p>Swift Parrot <i>Lathamus discolor</i></p>	<p>This migratory species has been recorded on the mainland from a variety of habitat types including dry and wet sclerophyll forest, forested wetlands, coastal swamp forests and heathlands.</p> <p>The vegetation within the Subject Site is dominated by <i>Eucalyptus</i> sp., <i>Angophora</i> sp. and <i>Corymbia</i> sp. These trees provide foraging resources for the Swift Parrot including nectar, pollen and insects such as Psyllids.</p>



<p>Metres</p> <p>0 5 10 20 30 40 50</p> <p></p>	<p>PROJECT REFERENCE: 20192176</p> <p>DATE DRAWN: 2019/12/13 13:03 Version 1</p>	<p>Habitat Trees</p>	<p>FIGURE:</p> <p>3</p>
<p></p> <p>KLEINFELDER</p> <p>Bright People. Right Solutions.</p> <p>www.kleinfelder.com</p>	<p>DRAWN BY: GJoyce</p> <p>DATA SOURCE:</p> <p>NSW DFSI - 2017</p> <p>ADW Johnson - 2019</p> <p>Nearmap - 2019</p>		

3. MANAGEMENT ISSUES AND OBJECTIVES

3.1 EROSION AND SEDIMENT CONTROL

3.1.1 Key Issues

Construction activities such as vegetation clearing and excavation may disturb the soil profile and create bare areas. These areas are more prone to erosion the movement of sediment. Runoff can carry this sediment to other environments where it can cause pollution. Disturbed soils are also more favourable for weed establishment.

3.1.2 Management Objective

The objective of erosion and sediment control is to contain soil and sediment within the development area and prevent these materials from leaving the Subject Site.

3.2 VEGETATION PROTECTION

3.2.1 Key Issues

The proposed development has been designed to avoid vegetation and species habitat removal, where possible. A total of 0.93 ha of native vegetation will be retained in the southern portion of the Subject Site.

Potential direct impacts include the following:

- Habitat fragmentation and a general loss of biodiversity.
- Damage to adjacent vegetation during clearing.

Potential indirect impacts include the following:

- The spread of weeds via clothes, boots, vehicles and machinery.
- Weed encroachment due to increased edge effects.

3.2.2 Management Objective

The key management objective is to ensure that native vegetation to be retained within the Subject Site is adequately protected during the construction phase.

3.3 FAUNA AND HABITAT MANAGEMENT

3.3.1 Key Issues

The development area contains key habitat features suitable for a range of fauna species. These features include hollow-bearing trees and habitat logs that may contain resident fauna populations at risk of displacement.

3.3.2 Management Objectives

Key objectives that relate to the management of fauna habitat and displaced fauna include the following:

- Provide a clear description of the protocols and methods for pre-clearing surveys, vegetation clearing and habitat tree removal; and
- Prevent injury or death of fauna that are displaced during vegetation clearing or any other construction activities.

3.4 FAUNA HABITAT REPLACEMENT

3.4.1 Key Issues

Hollow-bearing trees

A total of 29 hollow-bearing trees and dead stags were identified within the Study Area, of which 18 potential will be removed for the proposed development (some hollows may be retained within school design within the Biodiversity Area). Due to the range of hollow-dependent species (including potential threatened species) that may utilise the Subject Site, a nest-box program is required to supplement the removal of hollow-bearing trees at a ratio of 1:1.

Habitat Connectivity

The Study Area is mapped as forming part of a larger corridor connecting Lake Macquarie to Gosford along the valley floor (lowlands). Locally the vegetation forms part of movement corridor connecting vegetation near Tuggerah Lake, at Tuggerawong, to vegetation in the west, across the rail corridor. Additionally, the vegetation on site provides connectivity to vegetation to the north of the site, surrounding Warnervale Athletic Field. The vegetation within the study area has the potential to contribute to the connectivity of different habitat types and allow the movement of threatened species such as the Squirrel Glider.

3.4.2 Management Objectives

The following objectives are relevant to habitat replacement:

- To encourage the recovery and reuse of existing natural resources such as habitat logs and hollows to be placed in suitable habitat.
- To ensure that there is no net loss of hollow specialist species, by installation of nest boxes.
- To ensure that nest boxes are occupied by a broad range of native fauna including target threatened species such as the Squirrel Glider.
- To describe monitoring and reporting strategies to monitor utilisation of nest-boxes and the overall effectiveness of the habitat replacement strategy.

The following objective are relevant to improving habitat connectivity.

- To reinstate glider poles in key areas to reduce canopy gaps and allow the undisrupted movement of gliders through the Subject Site and maintain a north-south corridor.
- To plant tree species that will eventually create canopy links in key areas.
- To describe the monitoring and reporting strategies promote habitat connectivity.

3.5 WEED MANAGEMENT

3.5.1 Key Issues

A total of 19 exotic plant species were recorded within the Subject Site. Of these, four species are declared priority weed species within the Central Coast LGA (DPI 2019):

- Asparagus Fern (*Asparagus virgatus*)
- Ground Asparagus (*Asparagus aethiopicus*)

- Lantana (*Lantana camara*)
- Small-leaved Privet (*Ligustrum sinense*)

In accordance with the objectives of the NSW *Biosecurity Act 2015*, landowners have a duty to control and prevent the spread of priority weeds within their lands.

In addition to priority weeds, the subject site also contains infestations of environmental weeds such as Whiskey Grass (*Andropogon virginicus*). This species and others have the potential to cause habitat degradation if left unmanaged.

A complete list of exotic plant species recorded within the Subject Site is presented in **Appendix 1**.

3.5.2 Management Objective

The objective of weed management is to achieve a weed free resilient self-sustaining vegetation community within the Subject Site. The specific target for the VMP is to reduce weeds to less than 10% cover by Year 1 and to less than 5% by Year 3 following construction.

3.6 VEGETATION RESTORATION

3.6.1 Key Issues

Historical vegetation clearing along the western boundary of the Subject site has reduced the extent of canopy and midstorey vegetation. The vegetation in this area is regenerating naturally and is comprised of a sparse native groundcover, with juvenile shrubs, and occasional larger trees. Replacement plantings may be required in addition to assisted regeneration to ensure that vegetation integrity in this area is restored.

3.6.2 Management Objectives

The objectives of vegetation restoration include the following:

- To restore and enhance vegetation integrity in cleared areas.
- To achieve a 90% survival rate of tube-stock plantings.

- To achieve a species diversity target that is 50% compatible with mature native vegetation by Year 3.
- To describe monitoring and reporting strategies to measure the success of restoration management activities.

4. IMPLEMENTATION

4.1 MANAGEMENT ZONES

The subject site has been split into three management zones (**Figure 4**). A description of each management zone is described below.

4.1.1 Management Zone 1

Management Zone 1 is the largest management zone within the Subject Site and is defined by the development area. Given that construction will be limited to this area, several management guidelines are applicable, including the following:

- Erosion and Sediment Control – to prevent sediment from leaving the development area.
- Vegetation Protection - pre-clearance surveys and vegetation clearing protocols.
- Fauna Management - displaced fauna and fauna habitat recovery.
- Fauna Habitat Restoration – the installation of glider poles.
- Weed Management.

4.1.2 Management Zone 2

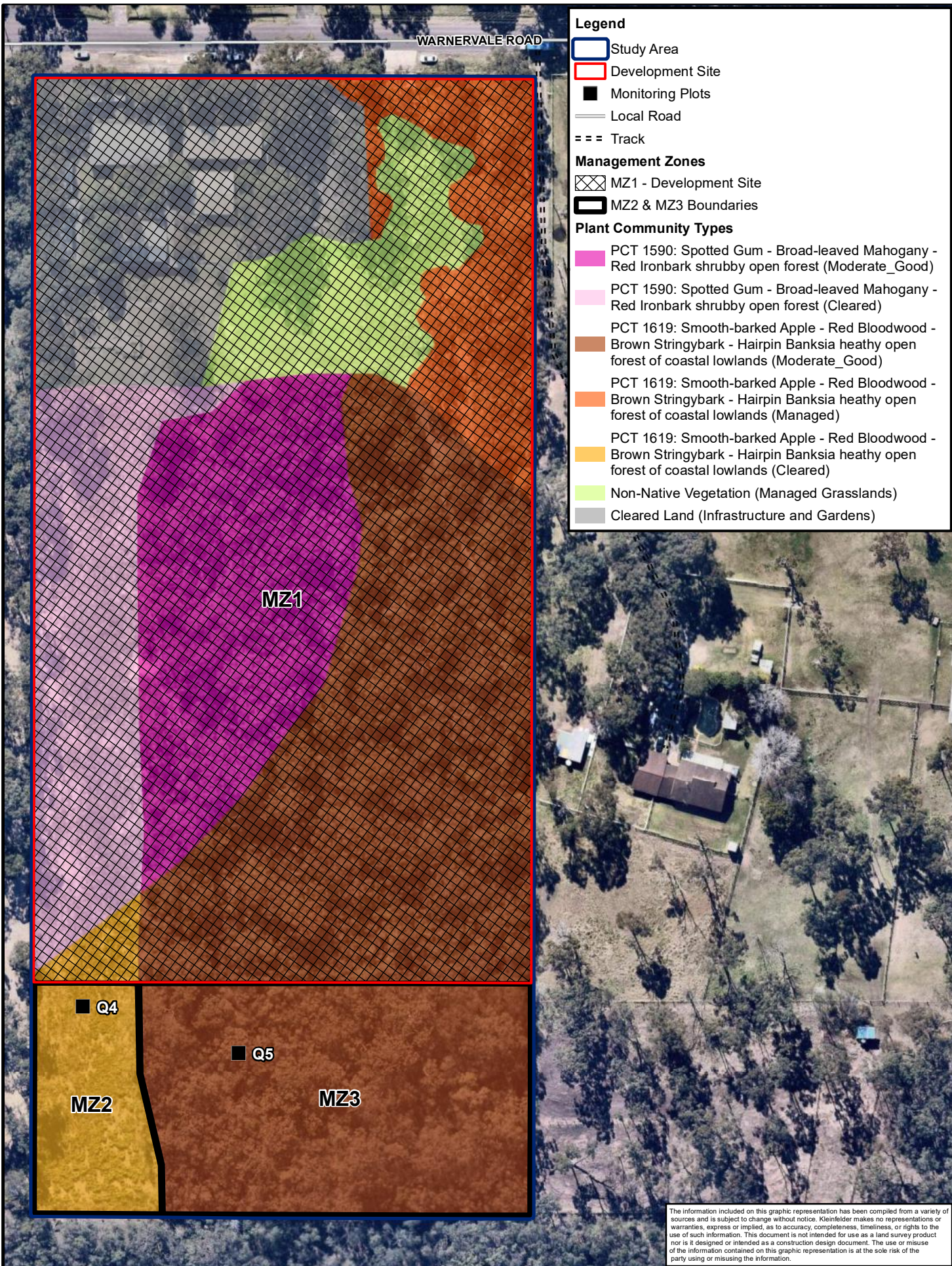
Management Zone 2 consists of the better-quality forest vegetation to be retained in the south-eastern corner of the Subject Site. Management guidelines which apply to this zone include:

- Erosion and Sediment Control – to prevent sediment from entering this zone.
- Fauna Management - displaced fauna may be released into this zone and fauna habitat features may be reinstated.
- Fauna Habitat Restoration -nest boxes may be installed in this area.
- Weed Management.

4.1.3 Management Zone 3

Management Zone 3 consists of the naturally regenerating vegetation to be retained in the south-western corner of the Subject Site. Management guidelines which apply to this zone include:

- Erosion and Sediment Control – to prevent sediment from entering this zone.



- Weed Management
- Vegetation Restoration – assisted natural regeneration and supplemented planting if required.

4.2 MANAGEMENT STRATEGIES

4.2.1 Erosion and Sediment Control

The following recommendations are to be implemented during the construction and operational phases to reduce erosion potential within the development area:

- Install a suitable sediment control fence on down slopes of the development area prior to any ground excavations.
- Conduct weekly checks of the fence to identify and repair any areas of failure.
- Remediate any rills or areas of erosion within 1 month of observed erosion to prevent sediment transfer.
- Avoid stockpiling of materials adjacent to native vegetation, but instead use areas that are already cleared/ disturbed.

4.2.2 Vegetation Protection

Vegetation to be retained within the Subject Site should be clearly identified either through the construction of a temporary fence or barricade along the southern portion of the development area. This should be conducted prior to construction. Vegetation clearing should be conducted in a way that ensures that large trees and branches do not fall and damage retained vegetation.

4.2.3 Fauna Management

4.2.3.1 Pre-clearance Surveys

Pre-clearing surveys are to be undertaken by an experienced ecologist prior to commencement of any vegetation clearing activities within the development area. The ecologist will conduct pre-clearing surveys to identify:

- Fauna species likely to be encountered during construction and potential impacts to fauna during vegetation clearing.

- Preferred locations to relocate fauna species and habitat features that can be retained following construction.
- Pre-clearing surveys will take place 1-2 days prior to the commencement of vegetation clearing. The ecologist will mark all potential fauna habitat in the development area with high visibility tape (e.g. hollow-bearing trees, habitat logs, trees containing active bird nests).

4.2.3.2 Vegetation Clearing Protocol

The following recommendations are to be implemented during vegetation clearing within the Development Site:

- An ecologist is to be present on site during all vegetation clearing operations.
- Vegetation should be cleared in a way that will allow fauna species living in or near the clearing site enough time to move out of the area without additional human intervention.
- No clearing should occur during the early evening or at night, as this is when fauna species are most likely to be active.
- Habitat links must be maintained during clearing to allow fauna species to move safely from the site to adjacent areas.
- Clearing should begin in the area that is furthest from vegetation to be retained.
- The direction of clearing should also ensure that fauna species are directed away from threats such as roads, developed areas or disturbed areas (e.g. residential areas or cleared spaces > 100m).
- Habitat trees are to be cleared following the removal of all other vegetation within the development area.
- Habitat trees are to be left standing for 1-2 nights after all other vegetation has been removed, to allow for occupying species to self-relocate.
- Habitat trees are to be 'soft-felled' under the supervision of the ecologist. The soft-felling technique involves tapping trees with an excavator bucket and waiting for signs of fauna activity. If no fauna is observed after 1-minute of observation, the tree should be felled and then inspected on the ground for fauna.
- Vegetation clearing is to be conducted in a manner such that vegetation is not felled onto retained vegetation or habitat trees.

4.2.3.3 Displaced Fauna

The following recommendations apply to the management of any displaced fauna species during vegetation clearing activities:

- All handling of fauna species should be conducted by an experienced ecologist.
- Animals are to be removed and relocated to the adjacent bushland/nest boxes.
- Nocturnal fauna species, such as microbats, are to be 'soft released' using bat boxes placed in adjacent habitat.
- Nocturnal fauna species, such as gliders and possums, are to be secured in suitable enclosures and kept in a quiet, dark and cool environment until they can be released into suitable habitat after dark.
- If any injured fauna species are found during the construction period, construction must stop immediately so that the injured animal can be taken to a vet or wildlife carer.

4.2.3.4 Fauna Habitat Recovery

The following recommendations apply specifically to fauna habitat features that are to be recovered from the development area following vegetation clearing:

- Habitat features suitable for recovery, including tree hollows, logs and bush rock, should be selected by an experienced ecologist prior to vegetation clearing.
- The ecologist should inspect any habitat features for the presence of fauna prior to relocation. If fauna species are identified, the habitat feature is to be left for a 24 hour period and then moved if the animal has not self-relocated. Relocation of the animal into suitable adjacent habitat is to be conducted by the ecologist as a final option in the event that the animal will not self-relocate.
- Habitat features are to be relocated in Management Zone 2 or suitable adjacent bushland areas under the supervision of the ecologist.

4.2.4 Fauna Habitat Replacement

4.2.4.1 Nest-boxes

Commercial suppliers that produce a range of nest boxes that have been designed to suit specific species/groups of wildlife. Important characteristics when constructing or commissioning nest boxes include the following:

- The front and base should be made from hardwood (> 25 mm thick).

- The box should include a hinged lid to allow easy inspection during monitoring/maintenance checks (the hinge should be stainless steel or aluminium).
- Only non-toxic paint should be used on the outside and the inside and the entrance hole should be left un-painted.
- Grooves should be cut on the inside face to allow ease of access/exit.
- Drainage holes should be included in the base.
- Wood shavings or sawdust should be placed in the bottom of the box prior to installation.
- Rear entrances should be included in the design where appropriate.

Habitat occurs within the Subject Site for a range of fauna species. A total of 18 habitat trees potentially containing 62 hollows will be removed from the development area. Hollows removed from the disturbance area will be replaced with nest-boxes on a ratio of one to one. The following nest box types are to be installed:

- Microbat Boxes
- Small Parrot Boxes
- Large Parrot Boxes
- Small Arboreal Mammal Boxes
- Medium Arboreal Mammal Boxes
- Large Forest Owl Boxes.

Note that a larger number of nest boxes for arboreal mammals should be installed due to the large number of Sugar Gliders that were detected within the Subject Site and in consideration of the large number of local records of the Squirrel Glider.

Nest boxes are to be installed in the southern portion of the Subject Site (Management Zone 3). The exact location of nest box placement within these areas should be determined by an experienced ecologist during installation and should take into account the following factors:

- Target species home range and likely territory to be defended.
- Fauna access (e.g. flight path for birds).
- Aspect (i.e. overheating can increase mortality of young).
- Distance to feeding resources.
- Camouflage from potential predators.
- Access for monitoring.

Nest boxes should be mounted in healthy living trees without existing hollows. Aspect of the nest box should aim to provide shelter from the sun and rain (Freegard and Richter 2009), with

the exception that bat boxes may be positioned to receive late afternoon sun providing warmth prior to nocturnal exit (Goldingay and Stevens 2009). Bat boxes should be installed on a tree clear of branches above or below the box (de Souza-Daw, 2003) and where possible nest boxes should be installed on opposite sides of a single tree to provide two approaches and exit options.

4.2.4.2 Habitat Connectivity

A habitat connectivity strategy has been developed for the project (**Appendix 3**). This will involve the installation of glider poles in key locations to reduce canopy gaps between retained trees and allow Gliders to move freely through the Subject Site (north-south movement corridor). Gliders can glide for a distance of up to 1.8 times the height of the launch site less 2 m (i.e. gliding distance = (launch height – 2) x 1.8). All Glider poles will be installed in consideration of the height of the nearest tree with the aim of providing options for animals using the Subject Site for movement and dispersal.

Tree planting at the base of each glider pole (2 trees) will occur with suitable tree species (*Corymbia gummifera* (Red Bloodwood) is recommended). These plantings are designed to eventually replace the glider poles with naturally linking canopy.

Installation of glider poles and tree planting is to occur during School Construction works.

4.2.5 Weed Management

Weed control is to be conducted by a qualified bush regenerator either with demonstrated experience or holding TAFE Certificate IV in Conservation and Land Management. Weed control is to be achieved using a combination of slashing, mowing and herbicide application. Recommended control methods for priority weeds are presented **Table 5**. The following recommendations are also considered necessary to prevent the spread of weeds during construction:

- Any vehicles, machinery or equipment should be inspected and be free of weed propagules before entering the Subject Site.
- Pre-construction control of weeds within the development area is to occur four weeks prior to construction commencing. This will involve appropriate application of herbicide and the slashing/ removal of woody weeds such as *Lantana camara* (Lantana) and other priority weeds.

Table 5: Priority weed species and control methods

Scientific Name	Method of control
Asparagus Fern <i>Asparagus virgatus</i>	<ul style="list-style-type: none"> Spray all of the foliage to the point of runoff on actively growing plants with 500 mL of Glyphosate 360 g/L per 100 L of water during spring to autumn. Or hand pull if the soil is moist – make sure all of the roots are removed.
Ground Asparagus <i>Asparagus aethiopicus</i>	<ul style="list-style-type: none"> Spray all of the foliage to the point of runoff on actively growing plants with 500 mL of Glyphosate 360 g/L per 100 L of water during spring to autumn. Or hand pull if the soil is moist – make sure all of the roots are removed.
Lantana <i>Lantana camara</i>	<ul style="list-style-type: none"> A combination of manual removal and using herbicides. Follow up control is generally required to prevent re-infestation by regrowth or new seedlings.
Small-leaved Privet <i>Ligustrum sinense</i>	<ul style="list-style-type: none"> Remove large plants manually and then apply herbicide using the cut and paint method. Ensure that plants are cut close to the ground and that sawdust is removed prior to herbicide application. Follow up control may be required to prevent re-infestation by regrowth or new seedlings from seeds already present in the seedbank.

Within Management Zone 1, weed control works are to occur prior to the commencement of clearing on site to reduce the potential for spread of weed species during disturbance works. Within Management Zones 2 and 3, initial weed control works are to occur upon the commencement of works within the development site. A follow-up control event is to occur within year 1. Weed control is then to occur annually, thereafter for the 5-year period of this VMP.

4.2.6 Vegetation Restoration

Cleared areas within the southern portion of the Subject Site (Management Zone 3) are already in a state of natural regeneration. These areas are therefore likely to continue to improve with minimal management. In the event that supplemented planting is required to achieve restoration objectives, canopy and shrub species are preferred for planting. It is likely that groundcover species such as grasses and herbs will colonise the area naturally.

Suitable tree and shrub species for supplemented planting include the following, these species should be planted at a density of one plant per 10 m²:

- *Angophora costata* (Smooth-barked Apple).
- *Corymbia gummifera* (Red Bloodwood).
- *Eucalyptus capitellata* (Brown Stringybark).
- *Allocasuarina littoralis* (Black She-oak).
- *Melaleuca nodosa* (Prickly Paperbark).

5. MONITORING AND REPORTING

Implementation of the VMP is required to commence immediately upon any construction work beginning. Annual monitoring to ensure compliance and maintenance is required for five (5) years.

5.1 MONITORING METHODS

5.1.1 Annual Walkover

To monitor the area subject to this VMP the following methods are required:

- A general random meander across all three management zones to assess the condition of the vegetation and to look for any changes in structure or new weed species/populations;
- Photo monitoring points in Management Zone 2 and Management Zone 3 should be established prior to clearing and rehabilitation works, and again immediately following initial weed control and planting works, to monitor the condition and natural regeneration of the vegetation;
- Assessment of the status of rehabilitation of Zone 3:
 - Monitor success of initial plant installations (90% or greater survival rate of plantings);
 - If initial plantings and native rehabilitation of groundcover, understorey and canopy has not reached target cover by year two (2) further installation of native plantings characteristic of the PCT 1619: Smooth-barked Apple – Red Bloodwood – Brown Stringybark – Hairpin Banksia heathy open forest of coastal lowlands will be required. Target cover for Zone 3 comprises:
 - Native groundcover – minimum of 4/m²;
 - Understorey – minimum of 1/5m²; and
 - Canopy – minimum of 1/10m².
- Inspection and documentation to ensure annual weed control within Management Zones 1 to 3 has been implemented in according to methods discussed in **Section 3.5**.

Monitoring reports and mapping detailing the results of the annual survey should be provided to Council. Monitoring should be undertaken for a five-year period.

5.1.2 Vegetation Integrity Monitoring

Vegetation plots/transects were undertaken by Kleinfelder (2019) as part of the BDAR works. These plots/transects included collection of site condition data for the composition, structure and function attributes listed in **Table 6** in accordance with Section 5.3 of the BAM (OEH 2017). The location of the plots/transects were selected through stratified random sampling to provide a representative sample of the variation in vegetation composition and condition within each vegetation zone.

Table 6: Composition, Structure and Function components of vegetation integrity

Growth form groups used to assess composition and structure	Function attributes
<ul style="list-style-type: none"> Tree (TG) Shrub (SG) Grass and grass-like (GG) Forb (FG) Fern (EG) Other (OG) 	<ul style="list-style-type: none"> Number of large trees Tree regeneration (presence/absence) Tree stem size class (presence/absence) Total length of fallen logs Litter cover High threat exotic vegetation cover (HTE) Hollow-bearing trees (HBT)

As indicated on **Figure 4**, Q5 was undertaken in the area which forms VMP Management Zone 2, and Q4 was undertaken in the area which forms VMP Management Zone 3. The data collected from Q4 and Q5 as part of the BDAR works will be utilised as baseline data to inform vegetation integrity monitoring for the VMP.

The current vegetation integrity score of Q4 and Q5 is outlined in **Table 7**.

Table 7: Current vegetation integrity score for Q4 (Management Zone 3) and Q5 (Management Zone 2)

Zone	PCT	Condition class	Area (ha)	Condition scores (Current Score)			Vegetation integrity score
				Composition	Structure	Function	
4	1619	Managed	0.32	45.6	52.7	28.8	41
5	1619	Cleared	0.04	39.3	23.8	9.7	20.9

Vegetation integrity monitoring should be conducted annually in the locations of BDAR plot/transects Q4 and Q5. Data collected should be consistent with that collected for the BDAR to enable annual review of the composition, structure and function components which inform the vegetation integrity score of the Management Zone. Results of the monitoring will be provided in the annual VMP reports. Should a drop in vegetation integrity score be observed in either Management Zone 2 or 3, remedial works should be undertaken (e.g. replanting, weed management) to re-establish the vegetation integrity score.

5.1.3 Nest Box Monitoring

Nest box monitoring and maintenance should occur annually, commencing at the end of Year 1. Monitoring will be conducted annually to determine nest box usage, and any repair and replacement requirements (as required). Monitoring will be conducted for a minimum of five years. Results of the monitoring will be provided in the annual VMP reports, including locations of any threatened species identified.

5.1.4 Glider Pole and Canopy Link Monitoring

Glider pole and canopy link monitoring and maintenance should occur annually, commencing at the end of Year 1. Monitoring will be conducted annually to determine glider pole usage and any repair and replacement requirements (as required). During each monitoring event, all glider poles should be inspected for evidence of use such as scratches and worn areas. Monitoring will be conducted for a minimum of five years. Results of the monitoring will be provided in the annual VMP reports, including locations of any threatened species identified.

5.1.5 Reporting

Annual monitoring reports should be prepared by a suitably qualified Ecologist and/or bush regenerator and submitted to Council annually detailing the progress of the bush regenerator works, observations of the annual walkover, and results of the vegetation integrity monitoring, nest box monitoring and glider pole and canopy link monitoring. A final report should be submitted to Council certifying the completion of the VMP at the end of the five-year period. Photo monitoring points, vegetation integrity monitoring points, and method of performance must be identified for future monitoring and reporting purposes. Any recommended additional actions must be completed to the satisfaction of Council prior to the lodgement of the final report.

5.2 RISK AND CONTINGENCY MEASURES

The subject site is located close to a busy road and is adjacent other wooded areas, making it susceptible to risks. The primary risks include:

- Vandalism;
- Rubbish dumping;

- Weed encroachment; and
- Bushfire.

Contingency measures include the application of this VMP which will help to minimise the above risks, as well as ongoing repair/replacement of any damaged fences. A 70 m asset protection zone (APZ) will be implemented around the subject site reducing potential bushfire impacts (Kleinfelder, 2019b).

5.3 PROJECT SCHEDULE

The project schedule detailed below in **Table 8** provides an indication regarding the timing and duration for the management requirements of the subject site.

Table 8: Project schedule

Management task	Timing	Personnel	Deliverable
Erosion and Sediment Control: Installation of a sediment fence	Installation prior to vegetation clearing.	Site supervisor	Sediment and runoff protection documented.
	Inspections, and clean out as required, for entire duration of construction works.		
Vegetation Protection: Installation of temporary exclusion fencing along southern disturbance area-retained vegetation interface.	Prior to the commencement of clearing.	Site Supervisor	Appropriate installation of fencing, and documented within VMP Annual Report.
Fauna Management: Pre-clearing surveys	Conducted prior to the commencement of clearing.	Qualified Ecologist	All habitat features appropriate marked prior to clearing. Documented in clearing supervision letter/report and submitted to Council.
Fauna Management: Vegetation Clearing supervision	During clearing	Qualified Ecologist	All habitat trees soft-felled under the supervision of an ecologist. Documented in clearing supervision letter/report and submitted to Council.

Management task	Timing	Personnel	Deliverable
Fauna Management: Displaced Fauna	During clearing	Qualified Ecologist	All fauna captured during habitat tree felling is appropriately relocated. Documented in clearing supervision letter/report and submitted to Council.
Fauna Habitat Replacement: Installation of nest boxes	Portion of the boxes installed prior to vegetation clearing (install at least two weeks prior). Remaining boxes installed within 1 month of clearing.	Qualified Ecologist	Installation of appropriate nest boxes to replace lost habitat. Documented within VMP.
Fauna Habitat Replacement: Installation of glider poles	During construction works within site.	Construction contractors under supervision of Qualified Ecologist	Appropriate installation of glider poles. Documented within VMP Annual Report.
Monitoring: Nest box monitoring and repair	Annually from Year 1 during winter.	Qualified Ecologist	Documented in VMP Annual Report, with associated mapping
Monitoring: Glider Pole and Canopy Link Monitoring	Annually from Year 1.	Qualified Ecologist	Documented in VMP Annual Report, with associated mapping
Weed Management: Weed control works	Within management zone 1: conducted prior to works on site.	Qualified bush regenerator	Documented in VMP Annual Report, with associated mapping
	Within Management Zones 2 and 3: Conducted twice in first year and then annually thereafter.	Qualified bush regenerator	Documented in VMP Annual Report, with associated mapping
Vegetation Restoration: Tree planting (if required)	Post year 2 monitoring event, if required.	Qualified bush regenerator	Documented in VMP Annual Report, with associated mapping
Monitoring: Annual monitoring	Annually at the completion of works	Ecologist	Annual VMP report. Completion report at the end of Year 5.

6. REFERENCES

de Souza-Daw, R. (2003). *The Bat Roost Box Kit*.

Freegard, C. and Richter, V. (2009). *DEC Nature Conservation Service Biodiversity Standard Operating Procedure Nest Boxes for Monitoring Arboreal Mammals*.

Gibbons, P and Lindenmayer, DB. (2003). *Tree Hollows and Wildlife Conservation in Australia*, CSIRO Publishing, Canberra.

Goldingay, R.L. and Stevens, J.R. (2009). 'Use of artificial tree hollows by Australian birds and bats'. *Wildlife Research*, 36: 81-97.

Kleinfelder (2019). Biodiversity Development Assessment Report for the New Warvervale Public School. A report prepared on behalf of the NSW Department of Education.

Murphy, C. L. (1993). Soil Landscapes of the Gosford-Lake Macquarie 1:100,000 Sheet Map and Report, Department of Conservation and Land Management, Sydney.

OEH (Office of Environment and Heritage) (2017). The Biodiversity assessment Method.

APPENDIX 1. FLORA SPECIES LIST

Native plant species recorded within the Subject Site

Family	Scientific Name	Common Name
Acanthaceae	<i>Brunoniella australis</i>	Blue Trumpet
Anthericaceae	<i>Laxmannia gracilis</i>	Slender Wire Lily
Anthericaceae	<i>Thysanotus tuberosus</i>	Common Fringe Lily
Anthericaceae	<i>Tricoryne elatior</i>	Yellow Autumn-lily
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod
Araliaceae	<i>Trachymene incisa</i>	-
Asteraceae	<i>Coronidium scorpioides</i>	Button Everlasting
Asteraceae	<i>Cyanthillium cinereum</i>	Iron Weed
Asteraceae	<i>Lagenophora stipitata</i>	Blue Bottle-daisy
Asteraceae	<i>Ozothamnus diosmifolius</i>	Rice flower
Asteraceae	<i>Sphaeromorphaea australis</i>	Spreading Nut-heads
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-oak
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed
Convolvulaceae	<i>Polymeria calycina</i>	
Cyperaceae	<i>Chorizandra cymbaria</i>	
Cyperaceae	<i>Cyperus eragrostis</i>	Umbrella sedge
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge
Cyperaceae	<i>Gahnia radula</i>	
Cyperaceae	<i>Lepidosperma filiforme</i>	
Cyperaceae	<i>Lepidosperma laterale</i>	
Cyperaceae	<i>Ptilothrix deusta</i>	
Cyperaceae	<i>Schoenus apogon</i>	Common Bog-rush
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Common Bracken
Dilleniaceae	<i>Hibbertia diffusa</i>	Wedge Guinea Flower
Dilleniaceae	<i>Hibbertia empetrifolia</i>	
Fabaceae (Faboideae)	<i>Bossiaea rhombifolia</i>	
Fabaceae (Faboideae)	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
Fabaceae (Faboideae)	<i>Glycine clandestina</i>	
Fabaceae (Faboideae)	<i>Glycine tabacina</i>	
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	Purple Coral Pea
Fabaceae (Faboideae)	<i>Mirbelia rubiifolia</i>	Heathy Mirbelia
Fabaceae (Faboideae)	<i>Podolobium scandens</i>	Netted Shaggy Pea

Family	Scientific Name	Common Name
Fabaceae (Faboideae)	<i>Pultenaea rosmarinifolia</i>	
Fabaceae (Mimosoideae)	<i>Acacia falcata</i>	Hickory Wattle
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney golden wattle
Goodeniaceae	<i>Goodenia heterophylla</i> subsp. <i>eglandulosa</i>	
Goodeniaceae	<i>Goodenia paniculata</i>	Branched Goodenia
Haemodoraceae	<i>Haemodorum planifolium</i>	
Haloragaceae	<i>Gonocarpus micranthus</i> subsp. <i>micranthus</i>	
Haloragaceae	<i>Gonocarpus teucrioides</i>	Raspwort
Hypericaceae	<i>Hypericum gramineum</i>	Small St. Johns Wort
Iridaceae	<i>Patersonia sericea</i>	Silky Purple-flag
Juncaceae	<i>Juncus continuus</i>	
Lauraceae	<i>Cassytha pubescens</i>	
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw fern
Lindsaeaceae	<i>Lindsaea microphylla</i>	Lacy Wedge Fern
Lobeliaceae	<i>Lobelia purpurascens</i>	Whiteroot
Lomandraceae	<i>Lomandra filiformis</i>	Wattle Mat-rush
Lomandraceae	<i>Lomandra glauca</i>	Pale Mat-rush
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
Lomandraceae	<i>Lomandra multiflora</i> subsp. <i>multiflora</i>	Many-flowered Mat-rush
Myrtaceae	<i>Angophora costata</i>	Sydney Red Gum
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum
Myrtaceae	<i>Eucalyptus capitellata</i>	Brown Stringybark
Myrtaceae	<i>Eucalyptus eugenioides</i>	
Myrtaceae	<i>Eucalyptus fibrosa</i>	
Myrtaceae	<i>Eucalyptus haemastoma</i>	Scribbly Gum
Myrtaceae	<i>Eucalyptus umbra</i>	Broad-leaved White Mahogany
Myrtaceae	<i>Melaleuca decora</i>	
Myrtaceae	<i>Melaleuca nodosa</i>	
Myrtaceae	<i>Melaleuca sieberi</i>	
Orchidaceae	<i>Caladenia carnea</i>	Pink Fairy
Orchidaceae	<i>Calochilus robertsonii</i>	Purplish Beard Orchid
Orchidaceae	<i>Cryptostylis subulata</i>	Large Tongue Orchid
Orchidaceae	<i>Genoplesium fimbriatum</i>	Fringed Midge Orchid
Orchidaceae	<i>Thelymitra pauciflora</i>	Slender Sun Orchid
Phormiaceae	<i>Dianella caerulea</i> var. <i>caerulea</i>	Blue Flax-Lily
Phyllanthaceae	<i>Glochidion ferdinandi</i>	Cheese Tree
Phyllanthaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge

Family	Scientific Name	Common Name
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry
Pittosporaceae	<i>Pittosporum undulatum</i>	Mock Orange
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass
Poaceae	<i>Austrostipa pubescens</i>	
Poaceae	<i>Cynodon dactylon</i>	Couch
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass
Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass
Poaceae	<i>Entolasia stricta</i>	Wiry Panic
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass
Poaceae	<i>Imperata cylindrica</i>	Blady Grass
Poaceae	<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass
Poaceae	<i>Panicum effusum</i>	Hairy Panic
Poaceae	<i>Panicum simile</i>	Two-colour Panic
Poaceae	<i>Poa labillardierei</i> var. <i>labillardierei</i>	Tussock
Poaceae	<i>Rytidosperma pilosum</i>	
Poaceae	<i>Rytidosperma setaceum</i>	Smallflower Wallaby Grass
Poaceae	<i>Themeda triandra</i>	Kangaroo Grass
Polygalaceae	<i>Comesperma ericinum</i>	Pyramid Flower
Polygonaceae	<i>Rumex brownii</i>	Swamp Dock
Proteaceae	<i>Banksia spinulosa</i>	Hairpin Banksia
Proteaceae	<i>Grevillea humilis</i> subsp. <i>humilis</i>	Linear-leaf Grevillea
Proteaceae	<i>Hakea sericea</i>	Needlebush
Proteaceae	<i>Persoonia levis</i>	Broad-leaved Geebung
Pteridaceae	<i>Cheilanthes sieberi</i>	Poison Rock Fern
Restionaceae	<i>Lepyrodia scariosa</i>	
Rubiaceae	<i>Opercularia diphylla</i>	
Stylidiaceae	<i>Stylidium graminifolium</i>	Grass Trigger-plant
Thymelaeaceae	<i>Pimelea linifolia</i>	Slender Rice Flower
Xanthorrhoeaceae	<i>Xanthorrhoea latifolia</i>	

Exotic plant species recorded within the Subject Site

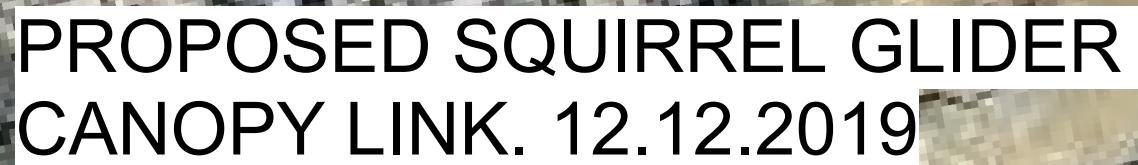
Family	Scientific Name	Common Name
Araliaceae	<i>Hydrocotyle bonariensis</i>	Largeleaf Pennywort
Asparagaceae	<i>Asparagus aethiopicus</i>	Ground Asparagus
Asparagaceae	<i>Asparagus virgatus</i>	Asparagus Fern
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane
Asteraceae	<i>Gamochaeta purpurea</i>	Purple Cudweed
Asteraceae	<i>Hypochaeris radicata</i>	Catsear
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle
Asteraceae	<i>Taraxacum officinale</i>	Dandelion
Caesalpinioidae	<i>Senna pendula</i> var. <i>glabrata</i>	
Iridaceae	<i>Watsonia meriana</i>	
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne
Oleaceae	<i>Ligustrum sinense</i>	Small-leaved Privet
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues
Poaceae	<i>Andropogon virginicus</i>	Whiskey Grass
Poaceae	<i>Axonopus fissifolius</i>	Narrow-leaved Carpet Grass
Poaceae	<i>Cenchrus clandestinus</i>	Kikuyu Grass
Poaceae	<i>Paspalum dilatatum</i>	Paspalum
Rubiaceae	<i>Richardia stellaris</i>	
Verbenaceae	<i>Lantana camara</i>	Lantana

APPENDIX 2. HABITAT TREE REGISTER

No.	Tree / Type	Hollows			Comments	Impact / Retained
		Small (<5 cm)	Medium (5 – 20 cm)	Large (>20 cm)		
1.	Stringybark	2	-	-	-	Impact
2.	Stringybark	1	-	-	European Bee's	Impact
3.	Stringybark	3	-	-	-	Impact
4.	Stringybark	2	-	-	-	Impact
5.	Ironbark	4	3	-	-	Impact
6.	Paperbark	2	-	-	-	Impact
7.	Stringybark	3	-	-	-	Impact
8.	Paperbark	4	-	-	-	Impact
9.	Smooth-barked Apple	2	2	-	-	Retained
10.	Paperbark	-	1	-	-	Retained
11.	Smooth-barked Apple	2	2	-	-	Retained
12.	Smooth-barked Apple	2	2	-	1 Medium with active Stringybark nest built in hollow	Retained
13.	Scribbly Gum	1	1	-	1 Medium with nest built in one hollow.	Retained
14.	Paperbark	2	-	-	-	Retained
15.	Stringybark	4	1	-	-	Retained
16.	Smooth-barked Apple	1	-	-	-	Retained
17.	Smooth-barked Apple	2	-	-	-	Retained
18.	Dead Stag	-	-	2	Trunk only to 5 m	Impact
19.	Dead Stag (Paperbark)	-	2	1	10 m Trunk	Impact
20.	Dead Stag (Stringybark)	4	1	-	-	Impact
21.	Dead Stag	6	-	-	-	Impact
22.	Stringybark	3	1	-	-	Impact
23.	Dead Stag	4	1	-	-	Impact
24.	Spotted Gum	1	1	-	-	Impact
25.	Dead Stag	5	-	-	Multiple long splits	Impact
26.	Smooth-barked Apple	-	-	1	1 burrow at base of tree	Retained
27.	Smooth-barked Apple	-	3	1	-	Retained

No.	Tree / Type	Hollows			Comments	Impact / Retained
		Small (<5 cm)	Medium (5 – 20 cm)	Large (>20 cm)		
28.	Dead Stag (Ironbark)	4	-	-	Flaky bark – possibly microbat habitat.	Impact
29.	Blue Gum / Flooded Gum	-	1	-	-	Impact

APPENDIX 3. GLIDER MOVEMENT STRATEGY



APPENDIX 4. STAFF CONTRIBUTIONS

The following staff were involved in the compilation of this report:

Name	Qualification	Title/Experience	Contribution
Gilbert Whyte	PhD. Bsc (Hons)	Senior Ecologist	Reporting
Samara Schulz	B.Env.Sc&Mgmt (Hons)	Senior Ecologist	Report review
Gayle Joyce	B. Forestry (Hons)	GIS Team Leader	Data management and preparation of maps