205-209 Grange Avenue, Marsden Park

Biodiversity Management Plan

M Development Group

22 March 2021

Final

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The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Position:	Director
Signed:	
Date:	17 March, 2021

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Glossary

Abbreviation	Definition
BC Act	NSW *Biodiversity Conservation Act 2016*
BMP	Biodiversity Management Plan
CBD	Central Business District
CEEC	Critically Endangered Ecological Community
Council	Blacktown City Council
CPW	Cumberland Plain Woodland
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
FFA	Flora and Fauna Report
LEP	Local Environment Plan
LGA	Local Government Area
Locality	The area within a 5km radius of the subject land
NSW	New South Wales
OWRC	Other Weed of Regional Concern under the *NSW Biosecurity Act 2015*
Project Footprint	The extent of impacts of proposed works for the Project.
RFEF	River Flat Eucalypt Forest
RP	Regional Priority weed under *NSW Biosecurity Act 2015*
SEPP	State Environmental Planning Policy
SP	State Priority weed *NSW Biosecurity Act 2015*
Subject Land	Comprises 205-209 Grange Ave, Marsden Park (Lot 1 DP 781987 and Lots 3 and 4 (Section J) DP 193074)
TEC	Threatened Ecological Community
The Project	Refers to the development at 205-209 Grange Ave, Marsden Park commissioned by M Development Group Pty Ltd.
VMP	Vegetation Management Plan
WM Act	*Water Management Act 2000*
WoNS	Weed of National Significance under the *NSW Biosecurity Act 2015*

1. Introduction

Cumberland Ecology was commissioned by M Development Group Pty Ltd (the 'proponent') to prepare a Biodiversity Management Plan (BMP) for 205-209 Grange Avenue, Marsden Park (Lot 1 DP 781987 and Lots 3 and 4 (Section J) DP 193074) (the 'subject land') for the proposed development (the 'Project') (see **Figure 1**). This BMP will support a development application under Part 4 of the New South Wales (NSW) Environmental *Planning and Assessment Act 1979* (EP&A Act) and accompany a Flora and Fauna Assessment (FFA) and Vegetation Management Plan (VMP) also prepared by Cumberland Ecology for the subject land.

1.1. Project Background

The Project involves the consolidation of three lots into one Torrens Title lot along with Torrens title subdivision of the consolidated lot into three; construction of three residential flat buildings and associated works, including roads, demolition of structures, tree removal, access driveways to basement car parking, stormwater drainage and landscaping works. The extent of construction impacts of the Project is hereafter referred to as the 'Project footprint'.

1.1.1. Location

The subject land is wholly located within the Blacktown City Council (Council) Local Government Area (LGA); approximately 50 km from the Sydney Central Business District (CBD) and 12 km from the Blacktown CBD. The subject land is bound to the south and west by semi-rural properties, to the north by Grange Avenue, and to the east by an unoccupied lot which includes Bells Creek and its associated riparian area. **Figure 1** illustrates the immediate locality of the subject land.

1.1.2. Description of Subject Land

The subject land is approximately 3.28 ha and is located within the Marsden Park Precinct under the North West Growth Centre State Environmental Planning Policy (SEPP) The subject land currently consists of single-storey brick dwellings and sheds and is surrounded by typical rural garden planting, paddocks and native and exotic vegetation. However, the subject land also contains a small area of River Flat Eucalypt Forest which is listed as an Endangered Ecological Community (EEC) under the NSW *Biodiversity Conservation Act 2016* (BC Act) Act and Critically Endangered Ecological Community (CEEC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as well as scattered trees consistent with Cumberland Plain Woodland which is listed as a CEEC under both the BC Act and EPBC Act.

The subject land is contained on natural depression which runs from west (highest point) to east (lowest point) into Bells Creek located in the adjacent lot.

The subject land contains an existing drainage line in the south-eastern corner which runs in a south to west direction from the dam located in lot (Lot 3 (Section J) DP 193074) through into Bells Creek on the adjacent lot located east of the subject land. This drainage line is mapped as a first order watercourse by NSW Department of Primary Industries. Consequently, the subject land is considered to be flood prone.

Note that the dam located in the adjacent lot is not proposed to be dewatered as part of the Project and therefore does not require a Dam Dewatering Plan.

1.1.3. Zoning and Land Use

The subject land contains multiple zonings, with the majority of the subject land zoned as SP2 – Local Drainage, E3 – Environmental Management and R3 – Medium Density Residential under the Marsden Park Precinct Plan. The subject land is currently being used for residential purposes but has been used for grazing of livestock in the past.

1.2. Purpose

Most of the subject land and all of the Project footprint is located within Biocertified land under the North West Growth Centre SEPP (DPIE 2006) and therefore does not require any further ecological assessment or offsetting of impacts. However, Council has requested a BMP for the subject land. The purpose of this BMP is to address Contention 6 d of Council's Statement of Facts and Contentions for the Project which requires a BMP to be prepared to ensure that construction activities are undertaken in accordance with controls regarding the clearance of native vegetation and ecology identified within Section 2.3.4 of the *Blacktown City Council Growth Centre Precincts Development Control Plan 2010 (amended May 2020) (Blacktown City Council 2010)* (the 'Plan'). These specific controls are reproduced below.

Section 2.3.4.2 Controls:

1. *Native trees and other vegetation are to be retained where possible by careful planning of subdivisions to incorporate trees into areas such as road reserves and private or communal open spaces.*
2. *Where practicable, prior to development commencing, applicants are to:*
    - *Provide for the appropriate re-use of native plants and topsoil that contains known or potential seed bank; and*
    - *Relocate native animals from the development site.*
3. *Within land that is in a Riparian Protection Area as shown on the figure in the relevant Precinct Schedule:*
    - *All existing native vegetation is to be retained and rehabilitated, except where clearing is required for essential infrastructure such as roads; and*
    - *Native vegetation is to be conserved and managed in accordance with the Riparian Protection Area controls in Appendix B.*
4. *Development on land that adjoins land zoned E2 – Environmental Conservation is to ensure that there are no significant detrimental impacts to the native vegetation and ecological values of the E2 zone.*
5. *All subdivision design and bulk earthworks are to consider the need to minimise weed dispersion and eradication.*
6. *A landscape plan is to be submitted with all subdivision development applications, identifying:*
    - *All existing trees on the development site and those that are proposed to be removed and retained;*

- *The proposed means of protecting trees to be retained during both construction of subdivision works and construction of buildings;*
- *Proposed landscaping, including the location and species of trees, shrubs, and groundcover to be planted as part of the subdivision works;*
- *The relationship of the proposed landscaping to native vegetation that is to be retained within public land, including factors such as potential for weed or exotic species invasion; and*
- *The contribution of the proposed landscaping to the creation of habitat values and ecological linkages throughout the Precinct.*

7. *The selection of trees and other landscaping plants is to consider:*
   - *The prescribed trees in Appendix D;*
   - *The use of locally indigenous species where available; and*
   - *Contribution to the management of soil salinity, groundwater levels and soil erosion.*

The section where each of these controls is addressed in this BMP is shown in **Table 1** below.

Table 1 Section of BMP where controls are addressed

Section 2.3.4.2 Controls	BMP
1 – Retained Vegetation	***Section 2.3***
2 – Salvage of Vegetation and Fauna Action Plan	**Chapter 3**
3 – Riparian Protection Area	***Section 4.1***
4 – Protection of E2 Environmental Conservation Land	***Section 4.1.1***
5 – Weed Management	***Section 6.5***
6 – Landscape Plan	**Chapter 5**
7 – Tree Selection	***Section 5.1***

2. Vegetation and Fauna Habitat

Cumberland Ecology has undertaken both vegetation surveys and a habitat assessment of the subject land as part of the FFA and VMP preparation. The results are briefly summarised below (refer to FFA or VMP for further detail).

2.1. Vegetation within the Subject Land

A total of 11 vegetation communities have been identified within the subject land. The main communities impacted by the Project footprint are Exotic Grassland, cleared land and exotic vegetation. The vegetation communities found within the subject land are shown in **Figure 2** and detailed in **Table 2** below.

Table 2 Vegetation Communities present within the subject land

Vegetation Community	Subject Land (ha)	Project Footprint (ha)
River-flat Eucalypt Forest (Degraded)	0.12	0.01
River-flat Eucalypt Forest (Scattered Trees)	0.04	0.04
Cumberland Plain Woodland (Scattered Trees)	0.08	0.001
Non-endemic Native	0.07	0.07
Typha orientalis	0.04	0.00
Exotic Vegetation	0.25	0.19
Exotic Grassland	2.16	0.84
Coral Tree (*Erythrina crista-galli*)	0.03	0.002
Blackberry (*Rubus fruticosus spp. agg.*)	0.01	0.003
Dam	0.02	0.00
Cleared Land	0.46	0.37
TOTAL	**3.28**	**1.53**

2.2. Habitat Features

A total of 16 habitat features have been identified within the subject land, ten of which are proposed to be removed as part of the Project. These habitat features were identified as they provide potential habitat to native fauna due of the presence of hollows, crevices, shelter or waterbodies. The location of each habitat feature are detailed in **Figure 2** and **Table 3** below. These habitat features were identified to have the potential to provide refuge for arboreal mammals, microchiropteran bats, amphibians, reptiles and birds. A list of all fauna species encountered within the subject land during site surveys is included in the FFA.

Table 3 Habitat features present within the subject land

Feature Type	Scientific Name	Common Name	Habitat Type
Tree	*Phoenix canariensis*	Canary Island Date Palm	Fronds
Rock/Metal Pile	-	-	Refuge

Feature Type	Scientific Name	Common Name	Habitat Type
Tree	*Syagrus romanzoffiana*	Cocos Palm	Fronds
Rock/Metal Pile	-	-	Refuge
Tree Hollows	-	Stag	2 small and 2 medium hollows
Small Pond	-	-	Refuge/breeding
Rock/Metal Pile	-	-	Refuge
Tree Hollows	*Poplar alba*	Silver Poplar	2 medium hollows
Log/Wooden Pile	-	-	Refuge
Log/Wooden Pile	-	-	Refuge
Dam	-	-	Refuge/breeding
Rock/Metal Pile	-	-	Refuge
Log/Wooden Pile	-	-	Refuge
Log/Wooden Pile	-	-	Refuge
Rock/Metal Pile	-	-	Refuge
Rock/Metal Pile	-	-	Refuge

2.3. Impact to Native Vegetation

The Project footprint has been strategically located in the northern half of the subject land which contains the lowest biodiversity value and currently consists of planted native and exotic vegetation in the form of garden beds as well as three residential dwellings and sheds. No vegetation is proposed to be retained within the Project footprint, however native vegetation is being retained within the remaining area of the subject land, including the VMP area. Due to the highly modified and exotic nature of the vegetation currently found within the Project footprint, it is not deemed appropriate to re-use the topsoil present. However, suitable trees being removed are proposed to be salvaged and used to enhance the habitat value of either the landscaping for the Project or Management Zone 1 of the VMP (see ***Section 3.3***).

3. Fauna Action Plan

3.1. Actions to Assist in Natural Relocation of Fauna

This Fauna Action Plan has been drafted to assist in natural relocation of fauna. Methods to ameliorate any unnecessary impacts from clearing include:

- Staged clearing process;
- Clearance supervision by ecologists;
- Relocation of captured fauna; and
- Transportation of injured fauna to a Veterinary Clinic.

The methods to minimise impacts are described in detail below.

3.2. Stage Clearing Process

3.2.1. Pre-clearance Surveys

Fauna pre-clearance surveys will be conducted within a one-week (seven days) period prior to clearance activities commencing. This measure will minimise the risk of birds nesting between the time of the pre-clearance survey and commencement of clearance works.

Fauna pre-clearance surveys will consist of identifying, marking and documenting suitable fauna habitat features. These features include significant rock outcrops and crevices, large boulders, nests, decorticating bark, stags, and hollow-bearing trees. These fauna habitat features have the potential to support species such as bats, gliders, possums, reptiles and birds. Ecologists undertaking preclearance surveys will be equipped with endoscopic cameras to enable the examination of hollows considered likely to contain fauna. Features identified as likely to support resident fauna were marked with a large "H" using fluorescent spray paint as well as with flagging tape. Habitat feature details will be recorded including:

- Species;
- Height in meters;
- Diameter at Breast Height (DBH) in centimetres;
- Number of hollows;
- Average hollow size class (small, medium or large);
- Type of habitat feature (tree, log, log pile or rock pile); and
- Location using a handheld GPS.

3.2.2. Two-stage Clearance Procedure

The clearing will be conducted using a two-stage clearing process:

i. Stage 1

Firstly, vegetation not identified during pre-clearance surveys as fauna habitat will be cleared. All vegetation around the habitat item will be cleared so that the fauna habitat is isolated.

i. Stage 2

Secondly, identified habitat trees are left to stand overnight to allow resident fauna to voluntarily relocate from the area. Habitat trees are then cleared using the following protocols:

- Trees will be gently shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows;
- An excavator will be used to start pushing the tree over. The excavator should have a grab mechanism that allows for the habitat tree to be lowered to the ground slowly, thus minimising the risk of injury or mortality to fauna;
- If salvageable, branches with hollows and sections of trunk will be marked and set aside for transfer to a storage area for eventual placement within revegetation/landscaping areas;
- The attending ecologist will inspect all visible hollows for the presence of fauna following felling of the tree; and
- The felled habitat tree will then be mulched to prevent any additional fauna returning to the tree; or transported to the revegetation/landscaping area.

The two-stage clearing process is designed to enable fauna to feel secure whilst clearing occurs around their tree, and to allow them a chance to self-relocate at night to coincide with typical foraging behaviours of arboreal animals.

Ecologists are to be present during all Stage 2 clearing works in order to rescue animals identified during the clearance operation. Any fauna found will be captured and relocated to nearby remnant vegetation and released in the fauna relocation site identified in **Figure 3**. It is recommended to release microchiropteran bats after nightfall to minimise the risk of predation by diurnal predators and harassment by birds. Any animals that are inadvertently injured will be taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized.

All persons working on the vegetation clearing will be briefed about the possible fauna present at the time of construction, and what procedures should be undertaken in the event of an animal being injured or disturbed.

Where bat species are found following felling of the tree but not able to be accessed, the section of the tree will be removed using a chainsaw (or a suitable alternative low-impact method) to extract the bats. The ends of the extracted tree section and cavity openings will be temporarily blocked with a piece of cloth during transportation to the fauna release location.

3.3. Salvage of Habitat Features

If suitable, hollows and native trees being cleared should be salvaged and re-used within either the landscaping for the Project or in Management Zone 1 of the VMP to augment and improve existing fauna habitat values of the subject land. The number of hollows and logs to be salvaged will be confirmed at the time of clearing due to the regular occurrence of trees shattering when felled, rendering the habitat feature unusable for salvage.

Once a tree is felled, the attending ecologist will mark the log with an 'S' using pink spray tape to indicate that this feature should be salvaged. In the case of hollows, the branch harbouring the suitable hollow will need to be cut into a smaller section using a chainsaw. Both salvage hollows and logs will then need to be stockpiled within the Project footprint or in a suitable location approved by Council prior to re-use. This stockpile should be located away from the stockpile of any vegetation to be mulched and clearly marked so as to avoid the accidental destruction of salvaged habitat features.

3.4. Fauna Relocation Site

Any fauna incapable of self-relocation should be relocated to remnant vegetation outside the clearing limits. The proposed fauna relocation site is located in the south-western corner of the subject land and comprises Management Zone 1 of the VMP (see **Figure 2**). Diurnal fauna such as reptiles and birds should either be relocated immediately or placed in the shade until relocation is possible. Captured nocturnal fauna such as microbats, possums and gliders should be placed in a safe, shady area. The ecologist is to return to the relocation site after sunset to release the fauna so as to minimise stress from exposure to predators and sunlight/heat. The capture and relocation of any venomous snakes is to be conducted by trained snake handlers only.

3.5. Fauna Handling Protocol

Ecologists are responsible for capturing vertebrate fauna during the habitat clearing process, as this maximises the number of vertebrate fauna able to be rescued and enables injured animals to be euthanised quickly and humanely if required.

Cumberland Ecology personnel operate under the following licences:

- Animal Research Authority TRIM 14/3039 under the *Animal Research Act 1985* for fauna surveying and monitoring; and
- Scientific Licence SL100103 under Section 132c of the *National Parks and Wildlife Act 1974* to pick flora for identification purposes and to harm, trap, hold, and release fauna for survey purposes.

Animals caught are to be placed in appropriate calico bags, plastic containers or capture cages whether alive, dead or euthanised. A judgement is required on injured animals as to whether they are suitable for release, transport to a vet or should be euthanised. This decision is based on the welfare of the animal and whether it is likely to survive when it is released.

3.6. Fauna Handling

3.6.1. Birds

Avifauna are likely to be encountered during clearing operations. Birds commonly occur throughout the site, potentially including some species which are threatened. They utilise tree hollows, trees and shrubs as suitable nesting locations. Small bird nests should be detected during the pre-clearing phase, with all hollows being checked, where possible, for faunal activity prior to clearing.

- If a small bird is injured during clearing, it should be handled carefully and inspected, after which it should be placed in a dark cool container. If the animal has obvious significant injuries, it should be euthanised or taken to a vet for assessment.
- If a bird is struck but no clear injuries can be seen, the bird should be captured and contained within a dark cool capture enclosure, such as a nally bin (plastic container with holes). The bird should be taken to the site office and inspected regularly. If normal movement is observed, the animal should be released. If normal movement is not observed, the animal should be taken to a vet or wildlife carer.
- If young are detected during clearing, they are to be removed from the nest or hollow and contained in a cool dark place with a suitable substrate such as a hessian bag. It is likely that parents will flee prior to or during clearing, thus the juveniles must be taken to a vet or wildlife carer as soon as is practical.
- Should eggs be detected, these are to be frozen as per reptile eggs.

3.6.2. Reptiles

3.6.2.1. Small Lizards

Small lizards are the most commonly captured fauna within clearing operations. Types of lizard detected typically include skinks and geckoes. These fauna are fast moving and small, and can be easily injured with incorrect handling techniques. Protocols for the capture by ecologists are provided below:

- Terrestrial small lizards are typically detected during machinery movements and when clearing log piles. When one is detected, radio the machinery operator, instruct them to lower their blade or bucket, and after positive communications have been established, enter the machinery exclusion zone. Following this, track the animal and cup it with an open hand on the surface. Move your other hand under the first hand, and feel for the animal's head, and place light pressure on the neck, pinning the animal to the ground, then use the thumb and forefinger to gain control of the animal's head. Alternately, if the animal is in litter, it is appropriate to grasp a handful of litter then place the litter inside a container;
- Arboreal small lizards are to be captured in much the same way, noting that large sheets of decorticating bark are to be pulled back and checked under; and
- Following capture, inspect the animal for obvious external injuries such as bleeding, protruding bones, or obviously misshapen body sections. If injuries are detected, follow the euthanasia protocol detailed in ***Section 3.7.2.1***. If uninjured, place the animal inside a vertically held plastic container, with the lid opened at one corner. The container should have some shelter such as bark within it.

3.6.2.2. Snakes

A variety of snakes are known to occur within the project area, ranging from relatively harmless snakes to those with potential to cause life-threatening envenomation. During clearing, all snakes are to be treated as venomous.

Snakes are not to be handled by ecologists unless deemed experienced, trained and competent to do so. The Cumberland Ecology Project Manager is to be notified whenever a snake is detected, and will determine the most appropriate and safest course of action. If a snake is detected, stop work and notify your supervisor.

Snake handling is to be minimised wherever possible. If required, a snake bag and hook should be used. The open bag is to be placed in front of the snake, allowing it a dark spot to self-relocate to. It can be encouraged into the bag with the use of the hook, or hooked into the bag with the bag being held upright and the hook placed approximately one third of the way along the body of the snake. Tongs may be used if a snake is located in an inaccessible location, such as in a tree hollow. Snakes are to be deposited in a bag, and the bag given a strong downward shake to ensure that the snake is at the bottom of the bag. Once in the bag, the bag is to be twisted and tied off, and the tabs on the exterior of the bag used to place the snake into the flat area created by the hoop.

Uninjured snakes are to be immediately released at a suitable location. Should the snake be injured during clearing, it should be taken to a vet or wildlife carer, or euthanised on site if the injuries are deemed to extensive.

3.6.3. Amphibians

Frogs encountered within the project include those which utilise trees (arboreal), those that utilise ground habitat (terrestrial) and those that burrow (fossorial).

- Tree dwelling frogs are typically detected in tree hollows following tree felling. These should be caught by hand by cupping them on a surface, and closing the hand around them. Food preparation gloves should be worn to avoid oils from hands touching their skin. The frogs should be checked for health, and then placed in a plastic container containing a substrate similar to that in which it was caught. Note that water should not be added to containers, only moist soil. This is due to the permeable nature of frog skins whereby they may become over-hydrated when submerged for extended periods.
- Terrestrial frogs will likely be detected during the clearing of ground debris such as rocks and logs. These should also be caught by hand wearing food handling gloves, checked for health and placed in a plastic container, with moist soil and litter provided for shelter.
- Fossorial frogs will likely be detected during clearing where soil is disturbed, particularly in the vicinity of drainage lines. There is a high likelihood of these types of frogs being injured due to disturbance of soil by machinery.
- When frogs are detected, they are to be checked for obvious external injuries, and an assessment made of their health. Frogs should be capable of normal locomotion, and responsive when handled. Frogs that are unresponsive or do not locomote normally should be assessed by a supervisor and euthanised as appropriate.

3.6.4. Mammals

3.6.4.1. Terrestrial Mammals

i. Small mammals

Small terrestrial mammals which have potential to occur within the clearing operations include a range of species and groups including mice, rats, Antechinus, rabbits, hares and echidnas. Each group is likely to react differently to disturbance caused by clearing, with species such as hares likely to flee prior to clearing, but groups such as rodents and dasyurids seeking shelter.

Small terrestrial mammals are to be caught whenever possible, as they are fast moving and can quickly hide in small and hard to reach spaces once they have been initially disturbed. Small terrestrial mammals will typically be detected during clearing of suitable habitat such as hollow logs, log piles and rocky debris.

Animals are to be pinned on the substrate with the index and middle fingers around the back of the neck, and the remainder of the hand controlling the body. Animals will be inspected for injury, and individually placed inside a calico bag appropriate for their size. The animal should then be removed from the clearing area, left in their bag and stored in a cool, dark container. Following this the animal will be transferred to the release location, and released on or just prior to nightfall, depending on whether the species is nocturnal.

Species such as the Short-beaked Echidna may attempt to burrow when a capture attempt is made. This can be counteracted by a quick capture, thus not allowing the animal to deeply engage with the ground. If the individual is found to have burrowed, moving of soil around the animal followed by lifting from underneath the feet will be sufficient to extract the individual. Welding gauntlets should be worn to avoid injury to staff.

If injured animals are detected, the ecologist must be notified, and will assess the animals' condition. Dependant on the extent of injuries, some small mammals may be rehabilitated by wildlife carers, thus it is advised that a vet assess injured small mammals. Injured animals are to be stored in hessian bags in a cool dark location until such time as they can be taken to the vet.

3.6.4.2. Arboreal Mammals

Arboreal mammals are likely to be encountered during clearing operations. Mammals such as gliders and possums are likely to occur on the site. As a result, it is vital that all hollows be thoroughly checked once felling has occurred.

Possums and gliders are relatively adept at moving on the ground, thus present a challenge for spotter catchers. Capture is best undertaken when animals are in a confined space, such as in a tree hollow. In this instance, a bag should be placed over the tree hollow and the animal encouraged from the opposite end. Where this is not possible and the animal is moving on the ground, a team of two should attempt the capture, with one member of the team covering the animal with a calico bag, and the other controlling the animal's head with the index and middle fingers through the bag. The animal can then be placed inside another bag or catch cage following inspection for injury. Being arboreal mammals, both possums and gliders have sharp teeth and claws adapted for climbing and gnawing timber, thus controlling the head is vital, as is the wearing of thick gloves.

Arboreal mammals should be checked for obvious physical injury before release, and it should be determined whether normal locomotion and response is occurring. In the instance where severe injury has occurred, it will be at the discretion of the supervisor as to whether the animal is euthanised. All other injured animals should be taken to the vet for assessment and possible rehabilitation.

3.6.5. Bats

Bats include both megachiropteran and microchiropteran bats. In order to facilitate detection of microchiropteran bats, hollows as well as eaves on buildings should be extensively checked and cracked open wherever possible. It may be possible to engage the assistance of machinery operators to crack open large trees in order to inspect hollows or demolition crews to assist in inspection of buildings during demolition. Secondary detection such as the use of auditory cues (such as high pitched clicking and chattering) can also be used to detect this group.

If bats are detected during clearing, only inoculated ecologists are to handle them. There is potential that bats carry the Australian bat lyssavirus, a virus similar to rabies, which is fatal if contracted. To this end, supervisors are to be notified when bats are detected. Bats should only be handled using gloves, and should be stored in hung calico bags in a cool dark place. Similar species should be kept together, as mixtures of bat species can lead to predation. No more than 5 bats are to be kept in a single large calico bag.

Bats are to be identified to species level, following inspection for injury. If normal locomotion cannot be achieved, such as in an instance where a wing bone is broken, the animal is to be euthanised.

3.7. Euthanasia Protocol

3.7.1. Birds

Euthanising of birds will occur via blunt force trauma to the head. It should be noted that this is only to occur if conditions are suitable for death to occur in one blow only. If the animal is moving rapidly or fighting violently, it may be more humane for the animal to be contained in a dark cool catch cage or nally bin, and taken to a vet for euthanasia.

3.7.2. Reptiles

3.7.2.1. Lizards

Euthanising of lizards will occur via blunt force trauma to the head. It should be noted that this is only to occur if conditions are suitable for death to occur in one blow only. If the animal is moving rapidly or fighting violently, it may be more humane for the animal to be contained in a dark cool catch cage or nally bin, and taken to a vet for euthanasia.

3.7.2.2. Snakes

Euthanising of snakes will occur through blunt force trauma administered by a single blow. In this instance, the snake pinner will be used to pin the snake on the ground directly behind the head. The snake tongs will then be used to move the snake to an appropriate area, with the pinner used again to control the head, following which a single fatal blow is to be delivered. The snake will likely continue to writhe for some minutes following blunt force trauma.

3.7.3. Amphibians

3.7.3.1. Frogs

Euthanasia for frogs will occur through blunt force trauma to the brain, delivered in one rapid blow. A suitable substrate should be used to ensure that one blow kills the animal outright.

3.7.4. Mammals

Euthanising small mammals will occur via blunt force trauma to the head. It should be noted that this is only to occur if conditions are suitable for death to occur in one blow only. If the animal is moving rapidly or fighting violently, it may be more humane for the animal to be contained in a dark cool catch cage or nally bin, and taken to a vet for euthanasia.

3.7.5. Arboreal mammals

Euthanasia shall occur via blunt force trauma to the head; however, only in situations where animals are critically injured and it can be ensured that animals will be killed in one blow.

3.7.6. Bats

This is to be carried out by blunt force trauma if a single killing blow can be guaranteed, or the animal is to be taken to the vet.

3.8. Euthanasia – Secondary Protocol

In some instances, blunt force trauma may only render the animal unconscious, particularly larger mammals and avifauna. In the event of doubt, a secondary euthanasia method should be implemented to ensure death. The recommended secondary method is cervical dislocation, which involves separation of the skull and the brain from the spinal cord by pressure applied posterior to the base of the skull.

For birds, the neck is dislocated by taking the birds legs in the left hand (if right handed) and the head between the first two fingers of the right hand with the thumb under the beak. A sharp jerk with each hand, pulling the head backward over the neck will herniate the brain stem and break the spinal cord and carotid arteries.

For smaller mammals (e.g. rabbits, small gliders), hold head downwards by grasping the hind legs in one hand; turn the palm of the other hand towards the rabbit head and take the neck between the thumb and index finger or between the index and middle fingers. Push down so that the neck is stretched and the head moves backwards, until dislocation is felt.

For larger mammals (>3kg), where muscle mass prevents cervical dislocation or pithing, the unconscious animal should be immediately transported to the vet for euthanising.

3.9. Fauna Injury Management

Any injured fauna deemed likely to survive transportation with minimal pain should be immediately taken to the nearest veterinary clinic for treatment. All further clearance work must cease in the absence of the ecologist. If it is determined that the animal may have a chance of survival, it is to be transferred to an experience wildlife

carer such as WIRES for rehabilitation. Dependant on the severity of injuries, euthanasia via blunt force trauma to the skull may be required. If the animal is too large, it is to be taken to the vet for humane euthanasia.

3.9.1. Veterinary Clinics

Any injured fauna deemed likely to survive transportation with minimal pain should be immediately taken to one of the local veterinary clinics listed below for treatment:

Veterinary Clinic	Address	Contact Number
Quakers Hill Veterinary Clinic	138 Burdekin Rd, Quakers Hill, 2763	02 9626 9561
Riverstone Veterinary Hospital	159 Garfield Rd E, Riverstone 2765	02 9627 4011
Greencross Vets	6/17-43 Hollinsworth Rd, Marsden Park 2765	02 9134 0899

3.10. Reporting Requirements

The ecological consultant is to provide to the clearing contractor the following reports within 10 business days of the activity:

- A pre-clearance letter itemising habitat features before tree felling; and
- A clearance supervision report itemising the extent of habitat cleared as well as a full list of species encountered/relocated.

The clearing contractor must then forward on the report to Blacktown City Council.

4. Protection of Environmentally Sensitive Areas

4.1. Riparian Protection Area

The unnamed drainage line present within the subject land is not mapped as a Riparian Protection Area under the Plan. However, considering it is mapped as a first order watercourse under the *Water Management Act 2000* (WM Act), a 10 m buffer from the drainage line should be applied as a riparian zone. The following should be applied to the riparian zone in order to conserve and manage the native vegetation present:

- All native vegetation is to be maintained and rehabilitated (note that management of the riparian zone is included in Management Zone 1 of the VMP);
- All infrastructure, stockpiles, machinery are to be located outside of the riparian zone;
- The boundary of the development footprint should be clearly marked and fenced to prevent unnecessary access to the riparian zone (see ***Section 6.1***);
- Erosion and sediment control measures such as a sediment fencing should be installed around the boundary of the development footprint (see ***Section 6.2***);
- Fencing within the riparian zone is not necessary and should be avoided.

Note that although outside the subject land, Bells Creek in the adjacent lot to the east is mapped as Riparian Protection Area under the Plan. The Project is located outside of this Riparian Protection Area and no impacts are expected, however the mitigation measures described in **Chapter 6** should be implemented within the subject land in order to prevent any adverse impacts to that Bells Creek Riparian Protection Area.

4.1.1. E2 – Environmental Conservation Area

The western area of the lot adjacent to the subject land is zoned as E2 – Environmental Conservation. This zoning is found directly along Bells Creek. Although a buffer of E3 – Environmental Management zoned land is present between the subject land and the E3 zoning, the mitigation measures described in **Chapter 6** should be implemented during construction in order to ensure there are no significant detrimental impacts to the native vegetation and ecological values of the E2 zone. In particular, the following measures regarding the stormwater discharge outlet into Bells Creek should be implemented:

- The design and construction of the stormwater outlet within the should aim to be 'natural' which may include, for example, the use of natural material such as gravel and boulders;
- The design and construction footprint, and the extent of the disturbance within the Riparian Protection Area should be minimised while achieving the desired function and outcome; and
- A 'rehabilitation' design rather than a 'construction' design should be applied which may include, for example, the planting of suitable aquatic vegetation at the point of exit.

5. Landscape Plan

A landscape plan is to be prepared by a landscape architect or suitably qualified consultant which identifies the following:

- All existing trees on the development site and those that are proposed to be removed and retained;
- The proposed means of protecting trees to be retained during both construction of subdivision works and construction of buildings;
- Proposed landscaping, including the location and species of trees, shrubs, and groundcover to be planted as part of the subdivision works;
- The relationship of the proposed landscaping to native vegetation that is to be retained within public land, including factors such as potential for weed or exotic species invasion; and
- The contribution of the proposed landscaping to the creation of habitat values and ecological linkages throughout the Precinct.

A Landscape Concept Plan has been prepared for the subject land by Vision Dynamics (Vision Dynamics 2020) which identifies the trees within the development site proposed to be retained or removed, as well the location and species proposed to be planted as part of the landscaping works for the Project. The proposed landscaping is restricted to the development footprint which is located in the northern portion of the subject land where all existing trees are proposed to be removed. The trees being retained outside of the development footprint but within the subject land should be protected as per ***Section 5.2***. All landscaping work should be undertaken in accordance with the weed mitigation measures described in ***Section 5.4*** in order to restrict the potential for weed or exotic species invasion of the subject land.

The landscape plan will provide additional vegetation, including native vegetation to an area that is currently dominated by cleared areas, exotic grassland and exotic garden plantings which will create additional habitat value and ecological linkages within the subject land, along Grange Avenue to the area of vegetation along Bells Creek, overall increasing the vegetation coverage within the Marsden Park Precinct.

5.1. Landscaping Plant Selection

In accordance with the Plan, trees and other landscaping plants should be selected from the prescribed list. This landscaping species planting list has been reproduced in **Appendix A** of this BMP. Additionally, locally indigenous species should be selected where available and sourced from local nurseries if possible.

In order to manage salt salinity, groundwater levels and soil erosion, the following should be considered in the landscaping design:

- Retaining or restoring native vegetation where possible;
- Avoid over-watering of lawns, parks and other landscaped areas; and
- Plant native species that are drought-tolerant and require little irrigation (tolerant to Electrical Conductivity levels of 4000 µS/cm).

6. Mitigation Measures

The following mitigation measures apply to all contractors working within the project boundary. These include but are not limited to the following:

- Inductions are to be completed prior to commencement of works;
- All contractors are to complete environmental awareness training and be notified of any threatened flora, fauna or sensitive areas within the project boundary.

6.1. Marking Limits of Vegetation Clearing

Prior to any clearing being undertaken within the subject land, the edge of the vegetation to be cleared is to be clearly delineated. Clearing of vegetation will be limited to these areas and must not exceed beyond the demarcated clearing boundary. Clearing limits can be marked with high visibility tape, temporary fencing, or other appropriate boundary markers. To avoid unnecessary damage to adjacent vegetation or inadvertent habitat removal, disturbance is to be restricted to the delineated area. No stockpiling of equipment, soils, or machinery will occur beyond the boundary. Stockpiling of materials must be done so in allocated areas within the clearing boundary and must not be placed within environmentally sensitive areas, including riparian zones and the VMP Area (E3 zoned land).

The person responsible for the clearance activities will be responsible for ensuring that the boundary markers are installed.

All no-go/exclusion zones such as the surrounding riparian and VMP Area are to be made known to all contractors working on the project. These no-go zones are to remain untouched and not impacted for the duration of construction. Highly visible temporary fencing is to be erected to fully delineate these zones. Furthermore, all workers within the project are to be made aware that no clearing or parking of plant machinery during periods of no work is permitted beyond the project boundary.

6.2. Sediment Fencing

In order to prevent soil matter from entering areas of the subject land outside of the development footprint, including the riparian area, retained vegetation and VMP Area, a sediment fence should be installed along the extent of the Project boundary prior to the commencement of construction works. This sediment fence should remain for the duration of the Project and be inspected and maintained periodically.

6.3. Protective Fencing of Trees

Any trees that are to be retained within the Project boundary (as identified by an Arborist) are to have protective barrier fencing placed around trunks and critical root zones to protect from any underground works. Any underground works are not to sever tree roots unless approved by an Arborist. All protection measures are to be implemented prior to construction and are to be in accordance with Australian Standards 4970-2009.

Any trees that require directional felling are to be demarcated to avoid damage to environmentally protected areas. No access tracks and haul roads are to be prepared under or within the extent of the canopy of trees identified as a habitat item or a threatened species or trees that are to be retained. The parking of cars or plant

machinery is also prohibited within areas of protected trees or threatened species. Additionally, the excavation or placement of fill under such trees is also prohibited unless advised by an ecologist or arborist.

6.4. Priority Weeds and Weeds of National Significance

Priority Weeds are weeds prioritised for control under the *NSW Biosecurity Act 2015* (Biosecurity Act). State Level Priority Weeds have specific legal requirements for management written into the Biosecurity Act under regulations and controls, while Regional Priority Weeds have recommended management actions and strategic regional responses under the Greater Sydney Strategic Weed Management Plan (LLS: Greater Sydney 2019) and are given a status based on the risk they pose to the environment and the particular region in which they are found and include State Priority (SP) weeds, Regional Priority (RP) weeds and Other Weeds of Regional Concern (OWRC).

The subject land contains scattered and dense patches of Priority weeds as well as other exotic species. All weeds must be removed from site or stockpiled securely and covered in black plastic to ensure the spread of weeds does not occur. *Opuntia stricta* (Common Prickly Pear) in particular is able to re-establish and spread should any vegetative parts remain and must not be mulched. No Priority weeds should be mulched but instead be disposed of at an appropriate contaminated green waste facility. Care should be undertaken to ensure that Priority Weeds do not mix with native vegetation which is going to be mulched and reused for landscaping or rehabilitation purposes.

A list of the Priority Weeds identified within the subject land is included in **Table 4.** Weed control must be carried out regularly to ensure the soil seed bank of exotic species is reduced. It is important that spread throughout the subject land and into adjacent land is avoided. Management and removal strategies for each weed species recorded from the subject land is provided in Appendix C of the VMP.

Table 4 Priority Weeds recorded within the subject land

Family	Scientific Name	Common Name	Weed Status
Alliaceae	*Agapanthus praecox*	Agapanthus	OWRC
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	OWRC
Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	OWRC
Asteraceae	*Senecio madagascariensis*	Fireweed	SP, WoNS
Cactaceae	*Opuntia stricta*	Common Prickly Pear	SP, WoNS
Caprifoliaceae	*Lonicera japonica*	Japanese Honeysuckle	OWRC
Convolvulaceae	*Ipomoea indica*	Morning Glory	OWRC
Fabaceae (Caesalpinioideae)	*Senna pendula*	Winter Cassia	OWRC
Fabaceae (Faboideae)	*Erythrina crista-galli*	Cockspur Coral Tree	OWRC
Fabaceae (Faboideae)	*Robinia pseudoacacia*	Black Locust	OWRC
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	OWRC

Family	Scientific Name	Common Name	Weed Status
Oleaceae	*Olea europaea* subsp. *cuspidata*	African Olive	RP
Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	OWRC
Poaceae	*Chloris gayana*	Rhodes Grass	OWRC
Poaceae	*Eragrostis curvula*	African Lovegrass	OWRC
Rosaceae	*Rubus fruticosus* spp. agg.	Blackberry Complex	SP, WoNS
Rutaceae	*Murraya paniculata*	Mock Orange	OWRC
Salviniaceae	*Salvinia* spp.	Salvinia	SP, WoNS
Verbenaceae	*Lantana camara*	Lantana	SP, WoNS

Key: SP = State Priority, RP = Regional Priority, WoNS = Weed of National Significance, OWRC = Other Weed of Regional Concern

Where exotic species are cleared, they are to be completely removed offsite and disposed of at a licensed landfill waste facility or treated correctly in accordance with the Weed Control Methods detailed in Appendix C of the VMP.

It is to be considered that the mixing of topsoil and woody debris is avoided during clearing of vegetation. Care is to be taken when clearing through areas containing weed infestations. Where soil of cleared areas contains exotic plant propagules, it is to be removed off site and disposed of within a licensed land fill facility.

6.5. Hygiene Protocols

To avoid the spread of Chytrid fungus, *Phytophthora cinnamomi* and other soil borne pathogens appropriate hygiene procedures and guidelines described in Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Botanic Gardens Trust 2008) will be followed.

All machinery, clothing (such as boots and gloves), and tools, which will have contact with soil will be disinfected with a spray prior to entering and leaving the site.

Recommended disinfectant products include:

- Non-corrosive disinfectants including Coolacide®, Phytoclean®, or Biogram® which can be for cleaning footwear, tools, tyres, machinery and other items in contact with soil; and
- 70% Methylated spirits solution in a spray bottle which is suitable for personal use (clothing).

6.6. Installation of Nest Boxes

As identified during initial site surveys, a number of hollows are located within the subject land, some of which are proposed to be removed as part of the Project. Consequently, this loss of habitat will need to be offset through the installation of nest boxes to a ratio of 1:1 (i.e. one nest box for every hollow removed). The exact number and type of nest boxes required is dependent on the total number and size of hollows being removed

and will be confirmed during the pre-clearance assessment to be conducted prior to construction work commencing.

Nest boxes are to be installed in suitable trees within the fauna relocation site (Management Zone 1 of the VMP) as identified in **Figure 3** which will is not being impacted by the Project. Nest boxes must be installed as a minimum height of 4 m on trees that do not already contain hollows and have a minimum diameter at breast height of 30 cm. Exact locations will be determined on the day of installation under supervision of an ecologist.

In order to protect the resident fauna from harsh sunlight conditions, the nest boxes should be faced in either a north-east or south-west orientation. The nest boxes will be monitored for condition and use by native fauna during monitoring specified in the VMP. If nest boxes any are found damaged during monitoring, they will be repaired or replaced.

7. References

Blacktown City Council. 2010. Blacktown City Council Growth Centre Precincts Development Control Plan 2010 (BCC Growth Centre DCP 2010), Blacktown.

Botanic Gardens Trust. 2008. Best Practice Management Guidelines for Phytophthora cinnamomi within the Sydney Metropolitan Catchment Management Authority Area. Botanic Gardens Trust Royal Botanic Gardens Sydney, , Sydney.

DPIE. 2006. North West Growth Centre State Envrionmental Policy (Sydney Growth Centres).

LLS: Greater Sydney. 2019. Greater Sydney Regional Strategic Weed Management Plan 2017 - 2022 - Revised September 2019. Local Land Services NSW.

Vision Dynamics. 2020. Landscape Concept Plan - 205-209 Grange Avenue, Marsden Park.

APPENDIX A :
Landscaping Species Planting List

Table 5 Landscaping Species Planting List

Stratum	Scientific Name	Common Name	Native
Trees	*Acer buergerianum*	Trident Maple	No
	Agonis flexuosa	Willow Myrtle	Yes
	Angophora floribunda	Rough Barked Apple	Yes
	Banksia integrifolia	Coastal Banksia	Yes
	Casuarina glauca	Swamp She-Oak	Yes
	Corymbia maculata	Spotted Gum	Yes
	Eucalyptus amplifolia	Cabbage Gum	Yes
	Eucalyptus crebra	Narrow Leafed Red Ironbark	Yes
	Eucalyptus microcorys	Tallow-wood	Yes
	Eucalyptus moluccana	Grey Box	Yes
	Eucalyptus tereticornis	Forest Red Gum	Yes
	Fraxinus 'Raywoodii'	Claret Ash	No
	Jacaranda mimosifolia	Jacaranda	No
	Melaleuca linariifolia	Snow In Summer	Yes
	Melaleuca nodosa	Ball Honeymyrtle	Yes
	Melaleuca styphelioides	Prickly Paperbark	Yes
	Melia azedarach	White Cedar	No
	Sapium sebiferum	Chinese Tallow Tree	No
Shrubs	*Agapanthus orientalis*	Agapanthus	No
	Acmena smithii 'Hedge Master'	Lilly Pilly	Yes
	Anigozanthos flavidus	Tall Kangaroo Paw	Yes
	Banksia spinulosa	Hairpin Banksia	Yes
	Bursaria spinosa	Tasmanian Christmas Bush	Yes
	Callistemon linearifolius	Narrow-leaved Bottlebrush	Yes
	Crinum pedunculatum	Crinum Lily	Yes
	Doryanthes excelsa	Gymea Lily	Yes
	Dodonaea viscosa	Giant Hop Bush	Yes
	Gardenia augusta	Common Gardenia	No
	Grevillea poorinda 'Royal Mantle'	Grevillea	Yes
	Hakea sericea	Silky Hakea	Yes
	Kunzea ambigua	Tick Bush	Yes
	Micromyrtus ciliata	Fringed Heath Myrtle	Yes
	Phormium tenax 'Purpureum'	NZ Purple Flax	No
	Thryptomene saxicola	Rock Thryptomene	Yes

Stratum	Scientific Name	Common Name	Native
	Westringia fruticosa	Coastal Rosemary	Yes
Groundcovers	*Aspidistra elatior*	Cast Iron Plant	No
	Brachycome multifida	Cut Leaf Daisy	Yes
	Brunoniella australis	Blue Trumpet	Yes
	Dichondra repens	Kidney Weed	Yes
	Dietes bicolor	Fortnight Lily	No
	Grevillea 'Bronze Rambler'	Grevillea cultivar	Yes
	Hardenbergia violacea	Purple Coral Pea	Yes
	Trachelospermum jasminoides	Star Jasmine	No
	Viola hederacea	Native violet	Yes
	Wahlenbergia gracilis	Australian Bluebell	Yes
Grasses	*Aristida ramosa*	Wire Grass	Yes
	Danthonia tenuior	Wallaby Grass	Yes
	Imperata cylindrica	Cogon Grass	Yes
	Liriope muscari	Turf Lily	No
	Microlaena stipoides var. *stipoides*	Weeping Grass	Yes
	Ophiopogon japonicus	Mondo Grass	No
	Pennisetum alopecuroides	Fountain Grass	Yes
	Poa labillardierei	Tussock Grass	Yes
	Themeda australis	Kangaroo Grass	Yes
Sedges/rushes	*Carex appressa*	Tall Sedge	Yes
	Dianella caerulea	Flax Lily	Yes
	Dianella revoluta	Flax Lily	Yes
	Gahnia aspera	Saw Sedge	Yes
	Isolepis nodosa	Knobby Club Rush	Yes
	Lomandra longifolia	Mat Rush	Yes
	Lomandra multiflora	Many Flowered Mat Rush	Yes
	Juncus usitatus	Common Rush	Yes
Turf	*Cynodon dactylon*	Couch Grass	No

FIGURES

Legend

- Project Footprint
- Subject Land
- Watercourse

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 25 50 75 100 m

I:\...\21008\Figures\RP3\20210317\Figure 1. Location_Subject Land

Figure 1. The subject land and Project footprint

Legend

- Project Footprint
- Subject Land
- Watercourse

Vegetation Community

- Cumberland Plain Woodland (Scattered Trees)
- River-flat Eucalypt Forest (Scattered Trees)
- River-flat Eucalypt Forest (Degraded)
- Non-endemic Native
- Typha orientalis
- Exotic Vegetation
- Coral Tree
- Blackberry
- Exotic Grassland
- Cleared Land
- Dam

Habitat Feature

- Dam
- Log/wooden pile
- Palm tree
- Rock/metal pile
- Small pond
- Tree hollows

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

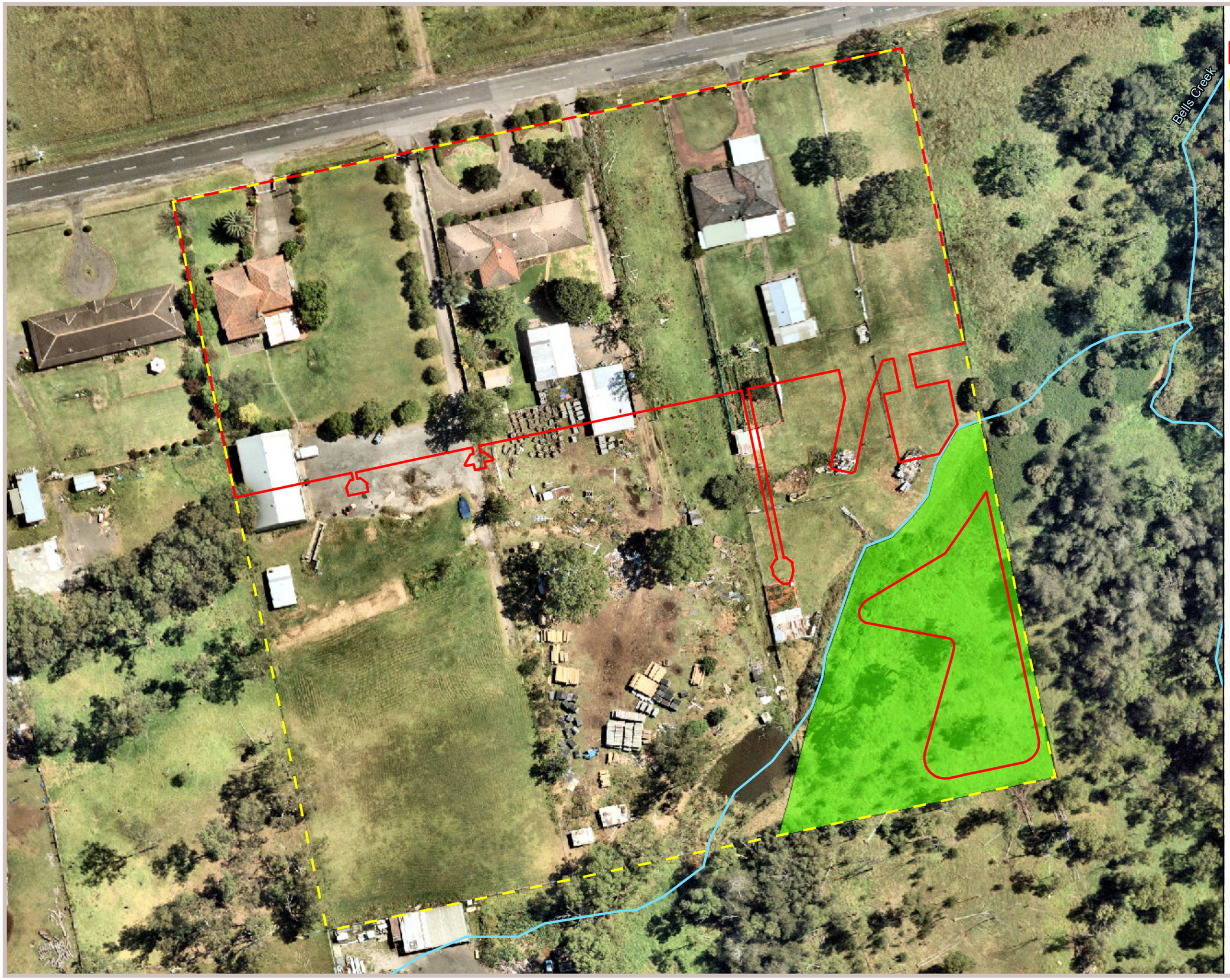
Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 10 20 30 40 m

I:\...\21008\Figures\RP3\20210317\Figure 2. Vegetation Communities_Habitat Features_Subject Land

Figure 2. Vegetation communities and habitat features within the subject land



Legend

- ProjectFootprint
- Subject Land
- Fauna relocation and nest box installation site
- Watercourse

Image Source:
Image © Nearmap (2021)
Dated: 24/01/2021

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 10 20 30 40 m

I:\...\21008\Figures\RP3\20210317\Figure 3. Fauna Relocation_Nest Box Installation

Figure 3. Fauna relocation and nest box installation site