Plan of Management (PoM)
Gundy Road – Drainage Reserve

150 Gundy Road, Scone NSW, 2337

NCA21R125970

11 June 2021

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Gundy Road – Drainage Reserve

150 Gundy Road, Scone NSW, 2337

Kleinfelder Document: NCA21R125970

Kleinfelder Project: 20213660

Prepared for:

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1.0	Draft	11 June 2021
Prepared	Reviewed	Endorsed
David Martin	Gilbert Whyte	Gilbert Whyte

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1 INTRODUCTION

1.1 BACKGROUND

Kleinfelder was engaged by Perception Planning to prepare a Plan of Management (PoM) for a Drainage Reserve at Lot 2 DP 1169320, 150 Gundy Road Scone (hereafter as "the Subject Site") (see **Figure 1**). The Subject Site is subject of a proposed residential subdivision, part of which includes the establishment of, and maintenance of, a reserve ("the Drainage Reserve"). The Drainage Reserve contains significant biodiversity values including threatened species habitat, a high abundance of mature (>200 years old) hollow-bearing trees, and the *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* Critically Endangered Ecological Community (CEEC) ("Box Gum Grassy Woodland"). The Drainage Reserve will be dedicated to the Upper Hunter Shire Council.

The following terms are used throughout this report to describe geographical areas (**Figure 1**).

- The Subject Site – 150 Gundy Road, Scone, NSW (Lot 2 DP 1169320).
- The Drainage Reserve - areas of the Subject Site proposed for conservation.
- Locality – land within a 5 km radius of the study area.

This PoM provides a summary of biodiversity values within the Subject Site, key threats associated with construction and operational phases of the proposed development, and key strategies for the management of biodiversity values, with an implementation period of 20 years.

1.2 SITE DESCRIPTION

The Subject Site is approximately 57 hectares (ha) and is located in the township of Scone, within the Upper Hunter Council Local Government Area (LGA). The site is zoned 'R1 – General Residential' under the Upper Hunter Local Environmental Plan 2013.

The Subject Site is characterised by a mix of native woodland vegetation and grassland (**Figure 2**). The topography is characterised by a predominantly level grassland along the northern boundary, a low drainage channel traversing east to west (bisecting the site), and a steady incline towards the southern boundary. The majority of the remnant woodland vegetation occurs alongside the drainage feature (the "Drainage Reserve").

1.3 PROPOSED DEVELOPMENT

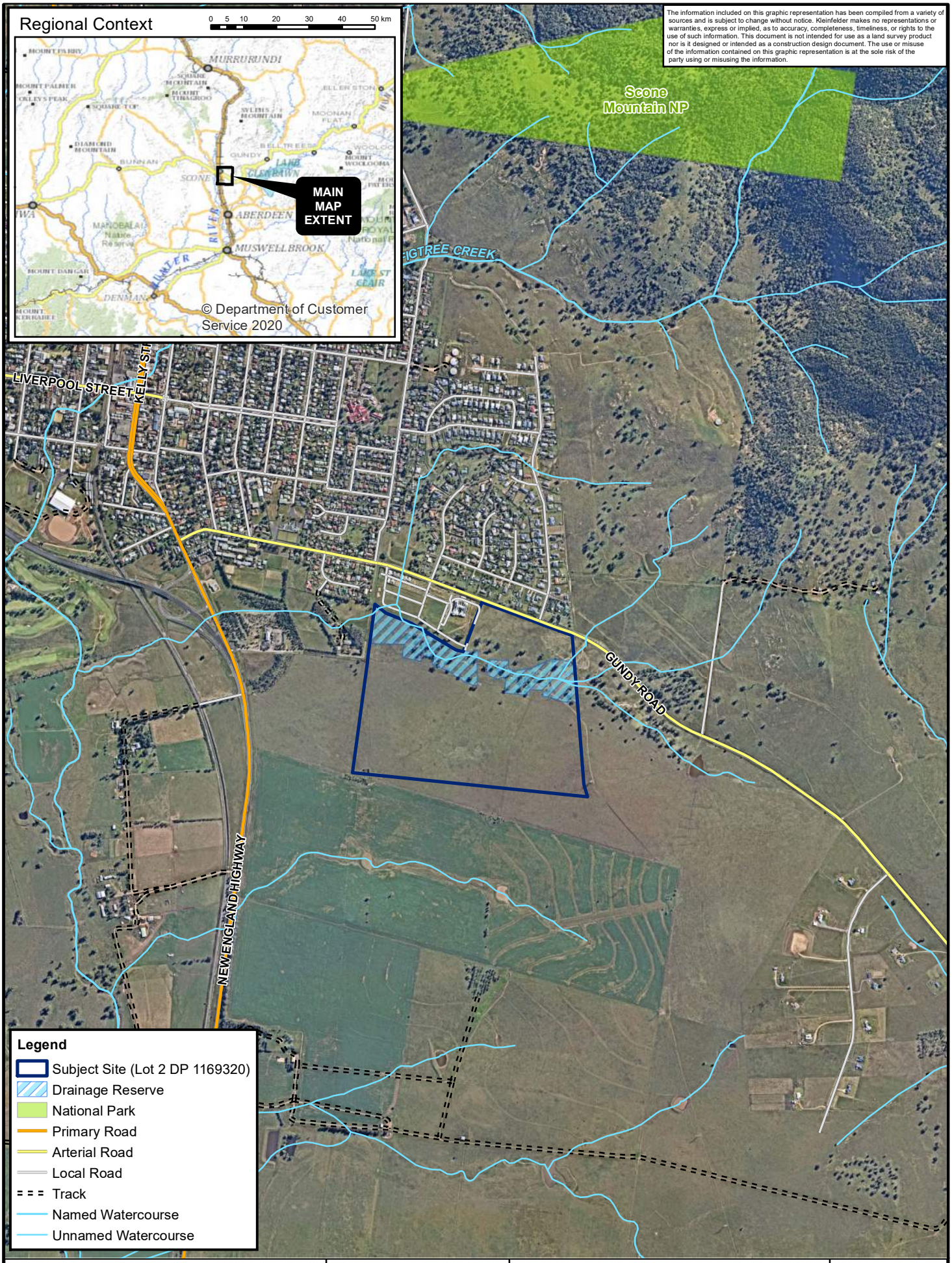
The proposed development will comprise a 407 lot subdivision, including public parks, pathways and open spaces. The proposed development will also include the establishment of a reserve (hereafter referred to as the "Drainage Reserve") within the Study Area. The Drainage Reserve will encompass an area of intact native woodland and derived grassland within the center of the site. The management of biodiversity values within the Drainage Reserve is detailed within this PoM.

1.4 MANAGEMENT PLAN OBJECTIVES

1.4.1 Objectives

This PoM is a requirement of the conditions of consent relevant to DA 163/2017 as determined by Upper Hunter Shire Council. The PoM is required to be prepared and approved, in preparation of the Drainage Reserve dedication to Council. The key objectives of the PoM are:

1. To minimise impacts to flora and fauna, and their habitats, during the construction phase of the residential subdivision project.
2. To improve the condition of the existing Box Gum Grassy Woodlands in the Drainage Reserve and to ensure that it is maintained in a healthy condition.
3. To restore the existing derived grassland areas in the Drainage Reserve back to Box Gum Grassy Woodlands and to ensure that it is maintained in a healthy condition.
4. To augment ground habitat (e.g. ground timber and hollow logs) in the existing derived grassland areas and to maintain such habitat features throughout the Drainage Reserve.
5. To ensure that any landscaping activities in the Park / Open Space areas of the residential subdivision are consistent with the objectives of Box Gum Grassy Woodlands conservation.



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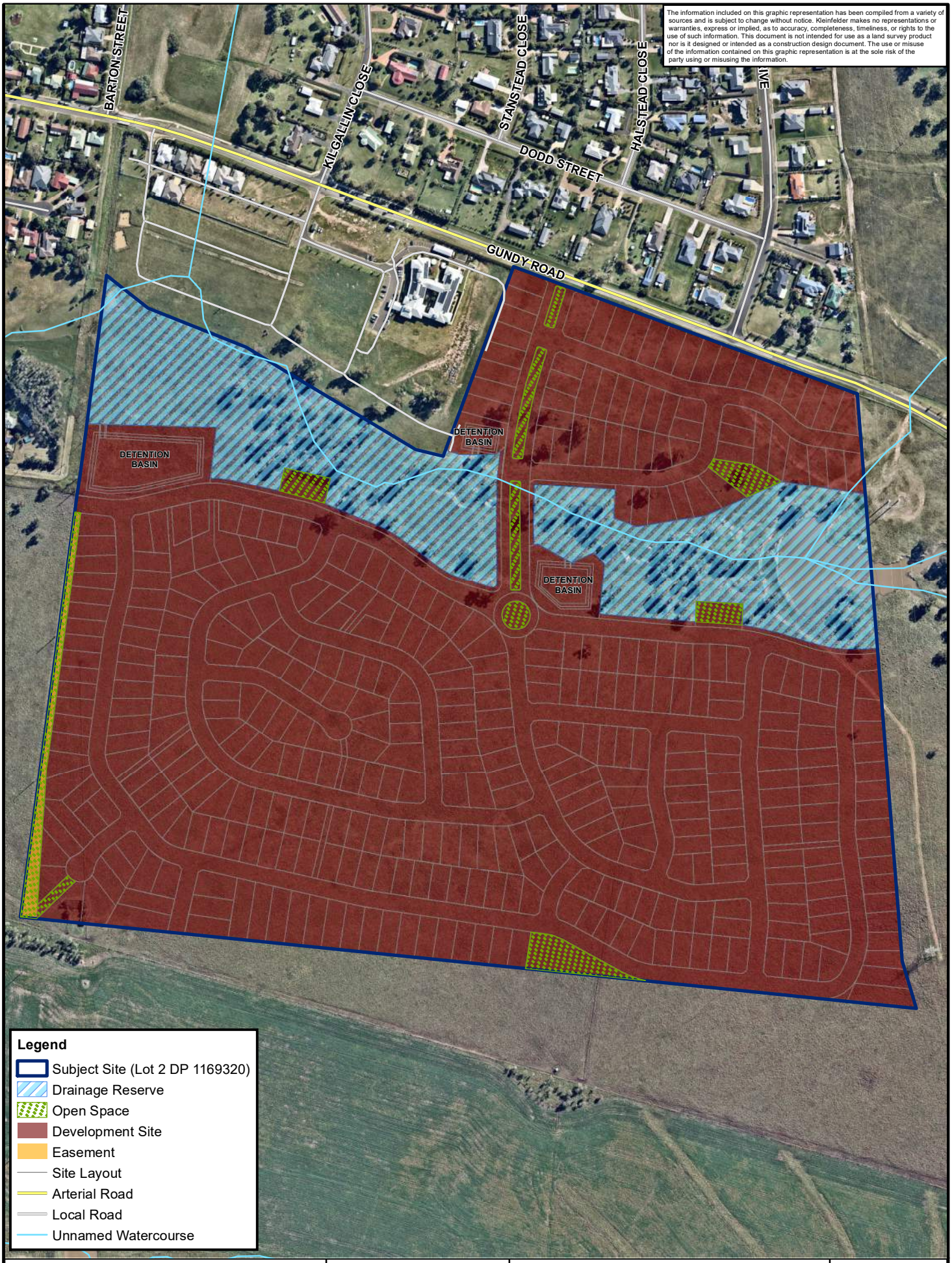

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DATA SOURCE:
NSW DFSI - 2020
NSW OEH - 2020
Nearmap - 2021

Subject Site and Drainage Reserve

Perception Planning
Plan of Management
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:

2

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2 BIODIVERSITY VALUES

2.1 KEY BIODIVERSITY VALUES

A Flora and Fauna Assessment Report (FFAR) was completed for the project by Kleinfelder following the completion of a site-based assessment (7 – 9 April 2021). The key results of the FFAR are detailed below.

2.1.1 Flora Species

A total of 88 plant species were identified within the Drainage Reserve. These were comprised of 39 exotics and 49 natives, the majority of which were native herbs and grass species (see **Appendix A**) with minimal native tree and shrub species recorded within the site. No threatened flora species were detected.

A total of four (4) Priority Weed species for the Hunter Local Land Services Region (DPI, 2021) were identified within the site, three of which are also listed as Weeds of National Significance (WoNS) (DoEE 2021c), these include the following species:

- *Echium plantagineum* (Patterson's Curse) [Priority Weed]
- *Opuntia stricta* (Common Prickly Pear) [WoNS and Priority Weed]
- *Senecio madagascariensis* (Fireweed) [WoNS and Priority Weed]
- *Lycium ferocissimum* (African Boxthorn) [WoNS and Priority Weed]

Minor infestations of other exotic species were also identified within the site, including the following species:

- *Salvia reflexa* (Mintweed)
- *Cirsium vulgare* (Spear Thistle),

A comprehensive list of exotic species is presented in **Appendix A**. Major infestations of key weeds are shown in **Figure 3.** Mitigation measures to prevent the spread of weeds are presented in **Section 3**.

2.1.2 Vegetation Communities

One native vegetation community exists within the Drainage Reserve. This community is represented by three condition classes within the Subject Site, two of which exist within the Drainage Reserve (, including:

- PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition Woodland)– Area within reserve: 3.04 ha.
- PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition Derived Grassland)– Area within reserve: 6.17 ha.

The vegetation within the Drainage Reserve represents two Critically Endangered Ecological Communities (CEECs) (see **Figure 3**):

- *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands* Critically Endangered Ecological Community (CEEC) – Listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

- *White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (CEEC). – Listed under the New South Wales *Biodiversity Conservation Act 2016* (BC Act').

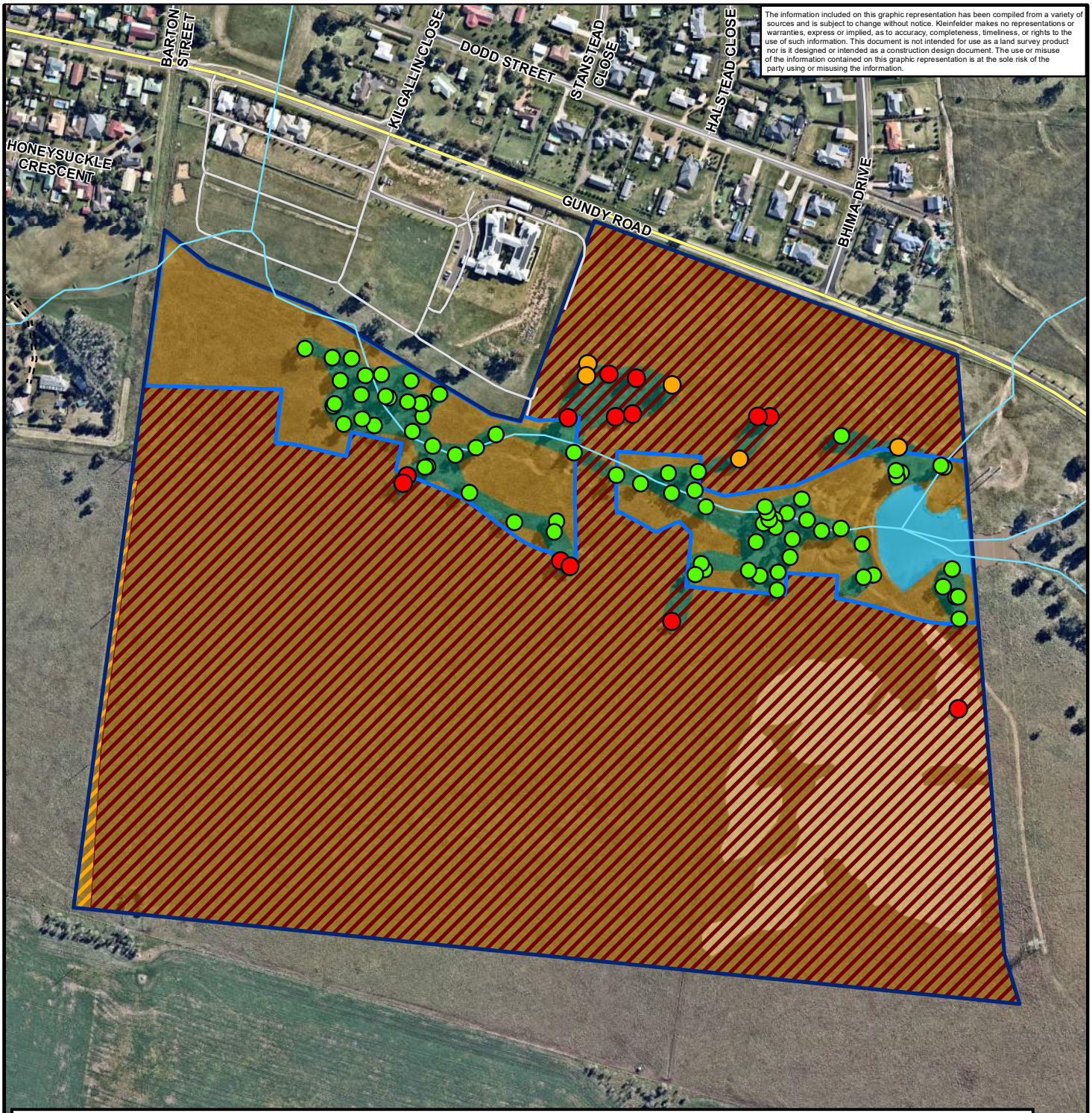
2.1.3 Fauna and Habitat Values

The Subject Site is characterised by mostly derived native grassland and a drainage surrounded by an area of open Grassy woodland, which has a sparse shrub layer. The vegetation within the grassland areas is likely to represent minimal foraging habitat for a number of fauna species. The open woodland community represents potential foraging and denning/roosting habitat for numerous microbat, bird and mammal species. Key fauna habitat features identified during the site assessment includes the following:

- Eighty-five Hollow-bearing Trees (HBT) either *Eucalyptus 'albemol'* or *Eucalyptus melliodora* (Yellow Box) with and additional three dead stags.
- Fallen logs/timber scattered throughout the woodland area creating habitat for reptiles and mammals.
- Mature trees within the Subject Site provide foraging and nesting habitat for several common native bird species. Other species include several microbats and other arboreal mammals may occupy these large mature trees.
- Two waterbodies exist within the Subject Site connected by a drainage line from East to North-West.

A total of 46 fauna species were identified during the assessment. This includes seven (7) threatened fauna species, including:

- Yellow-bellied Sheathtail Bat *(Saccolaimus flaviventris)* [Vulnerable BC Act],
- Southern Myotis (*Myotis macropus*) [Vulnerable BC Act],
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) [Vulnerable BC Act],
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) [Vulnerable BC Act],
- Eastern Cave Bat (*Vespadelus troughtoni*) [Vulnerable BC Act],
- Grey-headed Flying-fox (*Pteropus poliocephalus*) [Vulnerable BC Act and EPBC Act], and
- Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable BC Act and EPBC Act).



Legend

- Subject Site (Lot 2 DP 1169320)
- Drainage Reserve
- Development Site
- Easement
- Arterial Road
- Local Road
- Track
- Unnamed Watercourse

Hollow-bearing Tree Locations and Impact

- To be removed
- To be retained
- To be retained within lot

Plant Community Types

- Zone 1: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley (Moderate Condition - CEEC)
- Zone 2: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley – Moderate Condition)
- Zone 3: PCT 618: White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley – Low Condition)
- Dam

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Nearmap - 2021

Vegetation and Biodiversity Values

Perception Planning
Plan of Management
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:

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2.2 KEY THREATS

2.2.1 Inappropriate Grazing

Inappropriate livestock grazing can have a detrimental impact on Box-Gum Grassy Woodland by altering the species composition and structure of the community through selective grazing of more palatable species and regenerating species (i.e. canopy species), soil compaction and facilitating weed incursion (DECCW 2010). The Subject Site is currently subject to livestock grazing and is characterised by a low to moderate diversity of native flora with no signs of canopy regeneration. Conversely, regenerating canopy species were detected outside of the Subject Site, along the boundary fence within a neighbouring property where grazing is currently excluded.

Grazing will be excluded from the Drainage Reserve under this PoM during the **Construction** or **Operational** phases of the proposed development.

2.2.2 Weed Incursions

Weeds are known to compete with native flora species, leading to declines in species diversity and regeneration, and changes to fauna habitat values (DECCW 2010). A total of four (4) Priority Weed species for the Hunter Local Land Services Region (DPI, 2021) were identified within the Subject Site, three of which are also listed as Weeds of National Significance (WoNS) (DoEE 2021). These species included: *Echium plantagineum* (Patterson's Curse), *Opuntia stricta* (Common Prickly Pear), *Senecio madagascariensis* (Fireweed), *Lycium ferocissimum* (African Boxthorn). Of the abovementioned weeds, Fireweed was identified as having a high cover, particularly to the north of the woodland. African Boxthorn and Prickly Pear were concentrated alongside the watercourse and under isolated mature trees.

Weed incursions will continue to be a threat to biodiversity values during:

- ***Construction Phase:*** Construction activities occurring on site as part of the proposed development, namely vehicle movements and transport of materials (i.e. soil and mulch) have the potential to facilitate the spread of exotic flora species within the Subject Site.
- ***Operational Phase:*** The proposed residential subdivision, if unmanaged, may further exacerbate local weed incursions or facilitate the introduction of novel weed species through the dumping of garden waste and changes to nutrient inputs from increase runoff (i.e. due to potential changes to surface hydrology).

2.2.3 Introduced Fauna Species

Introduced fauna species are a significant threat to Box-Gum Grassy Woodland, key species relevant to the Subject Site include predators (i.e. foxes, cats and dogs) and honeybees (DECCW 2010). Introduced predators and domestic pets from neighbouring residential developments pose a key threat to native fauna through predation, especially woodland birds and fauna species that may utilise the hollow-bearing trees on site. Introduced Honeybees (*Apis mellifera*) were recorded on site within tree hollows and are known to compete with native species for nesting sites and habitat resources. Competition from feral honeybees for tree hollows an floral resources is considered a key threatening process by the NSW Threatened Species Scientific Committee (TSSC 2002).

Introduced fauna species are likely to be a key threat to biodiversity values during:

- ***Operational Phase:*** The proposed residential subdivision may further exacerbate the threat of introduced predators through the introduction of domestic pets (i.e. cats and dogs).

2.2.4 Vegetation Clearing and Habitat Loss

The proposed development will require the clearing of native vegetation, including 1.21 ha of woodland (PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley*). Vegetation clearing will involve the removal of 12 hollow-bearing trees and one hollow-bearing dead stag, representing nesting habitat for a variety of native bird and arboreal mammal species. Incursions into area of native woodland and grassland may exacerbate existing weed management threats and adversely impact threatened species and ecological communities occurring within the Subject Area.

Vegetation clearing and habitat loss represents a threat to biodiversity values during:

- ***Construction Phase:*** Other than the direct impacts to native vegetation and fauna habitat detailed above, construction activities within the Subject Site have the potential to impact retained vegetation through accidental incursions, and the introduction and facilitation of weed incursions.
- ***Operational Phase:*** The proposed residential subdivision may further exacerbate habitat loss and degradation of vegetation through inappropriate management of retained vegetation and the removal of 'firewood' from the Reserve by residents.

2.2.5 Erosion and Sedimentation

Erosion resulting from earthworks such as the operation of machinery during the construction phase may facilitate the movement of water-borne sediments that have the potential to adversely impact important biodiversity values on site. This may include impacts on the condition of native vegetation, threatened ecological communities (Box-Gum Grassy Woodland) and threatened species habitat.

2.2.6 Inappropriate Fire Regimes

Periodic burning by bushfires and by indigenous people is recognised as playing an important role in the development and maintenance of grassy ecosystems such as Box-Gum Grassy Woodland occurring within the Subject Site (DECCW 2010). However, inappropriately high fire frequency or extensive burning may limit recruitment of some species, cause local extinctions of fire sensitive species, facilitate the spread of some exotic species (such as Coolatai Grass *Hyparrhenia hirta*), reduce fauna habitat features (fallen logs, hollow trees, litter) and threaten the occurrence of flora and fauna populations (Clarke 1999; Davies 1999). Conversely, a lack of fire in Australian temperate grasslands can lead to sward collapse and weed invasion (Morgan and Lunt 1999).

2.2.7 Lighting, Noise and Water Pollution

Urban developments can result in a number of indirect impacts pertaining to Box-Gum Grassy Woodlands and the habitat they provide, including increased lighting (light pollution) and noise (noise pollution), and changes to surface water runoff and quality. Threats to local biodiversity values pertaining to the proposed development include the following:

- ***Construction Phase:*** Increased noise from construction activities and changes to surface water runoff patterns and quality.
- ***Operational Phase:*** The proposed residential subdivision may result in changes to soil nutrient status from fertilisers and wastewater disposal; increased/inappropriate lighting within the woodland area; and increased noise from traffic and residential land use.

3 MANAGEMENT PLAN

3.1 MANAGEMENT ZONES

Five Management Zones pertain to the Subject Site based on current condition/status, management requirements, and proposed future land use. The management zones are shown in **Figure 4**, and detailed in **Table 1**.

- **Management Zone 1:** Reserve (woodland rehabilitation)
- **Management Zone 2:** Reserve (woodland restoration)
- **Management Zone 3:** Riparian restoration
- **Management Zone 4**: Parks and Open Spaces
- **Management Zone 5**: Development Site

Table 1: Management Zones within the Subject Site

Management Zone	Description
Management Zone 1: Reserve (woodland rehabilitation)	**Total area within Subject Site:** 2.19 ha **Community:** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Moderate Condition). – Box-Gum Grassy Woodland CEEC (EPBC Act and BC Act). **Form:** Moderate Condition Grassy Woodland **Description:** sparse canopy of *Eucalyptus 'albemol'* (an unsubscribed species considered to be a hybrid between *Eucalyptus moluccana* and *Eucalyptus albens* [pers. Comm S. Bell]) + *Eucalyptus melliodora* (Yellow Box). Reduced midstorey including *Notelaea microcarpa* (Native Olive), *Sclerolaena muricata* (Black Rolypoly), and *Maireana microphylla* (Small-leaf Bluebush). Diverse groundcover dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass). **Disturbances:** Historic vegetation clearing, grazing, and minor weed invasion. Exotic flora species recorded within the vegetation zone include, *Cirsium vulgare* (Spear Thistle), *Lycium ferocissimum* (African Boxthorn), *Sida rhombifolia* (Paddy's Lucerne), *Salvia reflexa* (Mintbush), and *Senecio madagascariensis* (Fireweed). **Management Goals:** This zone will be retained within the proposed Drainage Reserve and subject to active management to maintain and restore Box-Gum Grassy Woodland CEEC, improve habitat values, reduce weed impacts, and remediate watercourse.
Management Zone 2: Reserve (woodland restoration)	**Total area within Subject Site:** 5.16 ha **Community:** PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived - Moderate Condition). – Box-Gum Grassy Woodland CEEC (BC Act). **Form:** Moderate Condition Derived Grassland **Description:** Canopy and midstorey absent. Diverse groundcover dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass). **Disturbances:** Historic vegetation clearing, grazing, and minor weed invasion. Exotic flora species within this zone include: *Cirsium vulgare* (Spear Thistle), *Lycium ferocissimum* (African Boxthorn), *Sida rhombifolia* (Paddy's Lucerne), *Salvia reflexa* (Mintbush), and *Senecio madagascariensis* (Fireweed). **Management Goals:** This zone will be retained within the proposed Drainage Reserve and subject to active restoration of Box-Gum Grassy Woodland CEEC including re-

Management Zone	Description
	establishment of native canopy, improve habitat values, reduce weed impacts, and remediate watercourse.
Management Zone 2: Riparian restoration	**Total area within Subject Site:** 3.94 ha (1.73 ha within constructed detention basins and 2.21 ha within existing dam, creekline and riparian strip [5 m buffer from creekline]) **Community:** Detention basins, dam areas, creek line and riparian strip (including mapped woodland and grassland [PCT 618]) **Form:** Dam areas and constructed retention basin. **Description:** Previously comprised of a groundcover dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass). **Disturbances:** Grazing impacts, development impacts, removal of native vegetation within constructed retention basins. **Management Goals:** This zone will comprise of open water (dams), an ephemeral watercourse, and constructed retention basin. Goals will include the restoration of riparian vegetation along existing watercourse and dam.
Management Zone 4: Parks and Open Spaces	**Total area within Subject Site:** 1.48 ha **Community:** Previously mapped PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (Derived – Moderate/Low Condition). – Box-Gum Grassy Woodland CEEC (BC Act). **Form:** Derived Grassland impacted by development. Managed as parks and open spaces. **Description:** Previously comprised of a groundcover dominated by native grasses including: *Austrostipa aristiglumis* (Plains Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria diffusa* (Open Summer-grass), and *Aristida ramosa* (Purple Wiregrass). **Disturbances:** Development impacts, removal of native vegetation. **Management Goals:** This zone will comprise of managed parks and open recreational spaces with the proposed subdivision development. Landscaping is to be consistent with the objectives of Box Gum Grassy Woodlands conservation.
Management Zone 5: Development Site	**Total area within Subject Site:** 44.74 ha **Community:** Previously mapped PCT 618 – *White Box x Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley* (woodland and derived grassland) **Form:** Derived Grassland and woodland impacted by development. Within proposed development footprint (not including detention basins, and parks and open spaces) **Description:** Previously comprised of native vegetation constituting native woodland and grassland. **Disturbances:** Development impacts, removal of native vegetation. **Management Goals:** This zone will involve the removal of native vegetation. Goals within this zone include the appropriate management of key threats to vegetation cleared and retained within the adjacent Drainage Reserve. Landscaping within this zone (i.e. street trees) is to be consistent with the objectives of Box Gum Grassy Woodlands conservation.

3.1.1 Management Stages

The PoM will be implemented over a 20-year period. The timing of management tasks and performance criteria are based on Management Stages defined by the progress of the proposed development. The stages are defined as the following:

- **Pre-Construction Phase:** Between development approval and the initiation of construction works on site.
- **Construction Phase:** Between the initiation and completion of construction within the site.
- **Post Construction Phase:** Between the completion of construction and the first monitoring event.
- **Adaptive Management/Operational Phase:** Between the first monitoring event and the end of the implementation period, 20 years after the completion of construction (Year 20).

3.1.2 Performance Criteria

The overall performance criterion of this PoM are as follows:

- **Vegetation Extent:** The area of the Box Gum Grassy Woodlands in the drainage reserve will be increased from 3.04 ha to at least 8.2 ha (through restoration of the derived grassland areas, minus the areas of the new detention basins).
- **Vegetation Condition:** The condition of the Box Gum Grassy Woodland within Management Zones 1 & 2 will meet benchmarks for State 1 as per the Box Gum Grassy Woodland State and Transition Model (DEWHA 2010). Benchmarks are to be assessed based on key condition variables detailed within the National Recovery Plan for Box Gum Grassy Woodland (DECCW 2010), and condition benchmarks for PCT 618 derived from the NSW Bionet Vegetation Classification. These benchmarks are as follows:
  - The presence of a woodland vegetation structure – 10 - 30% projective foliage cover (PFC)
  - The presence of large and medium grass tussocks
  - A high diversity of native grasses and herbs –including:
    - At least 12 native understorey species (excluding grasses) (DECCW 2010),
    - At least one listed ‘important’ species (DECCW 2010)
    - Cover of native shrub species of between 11-16% (benchmark for PCT 618 for the North Coast and Sydney IBRA bioregions respectively (DPIE 2021).
    - Cover of native grass & grass-like species of between 58-91% (DPIE 2021)
    - Cover of native forb species of between 10% (DPIE 2021)
    - Cover of native ‘other’ species of between 5% (DPIE 2021)
  - The presence of an understorey comprised of ‘mostly perennial, few annuals’, measured through the percentage cover/abundance of native perennial and native annual species. Target: Native understory >50% cover perennial species.
  - The presence of native canopy regeneration – measured through the presence/absence of key canopy species including: *Eucalyptus ‘albemol’*, *Eucalyptus melliodora* (Yellow Box), *Eucalyptus moluccana* (Grey Box), and *Eucalyptus albens* (White Box).

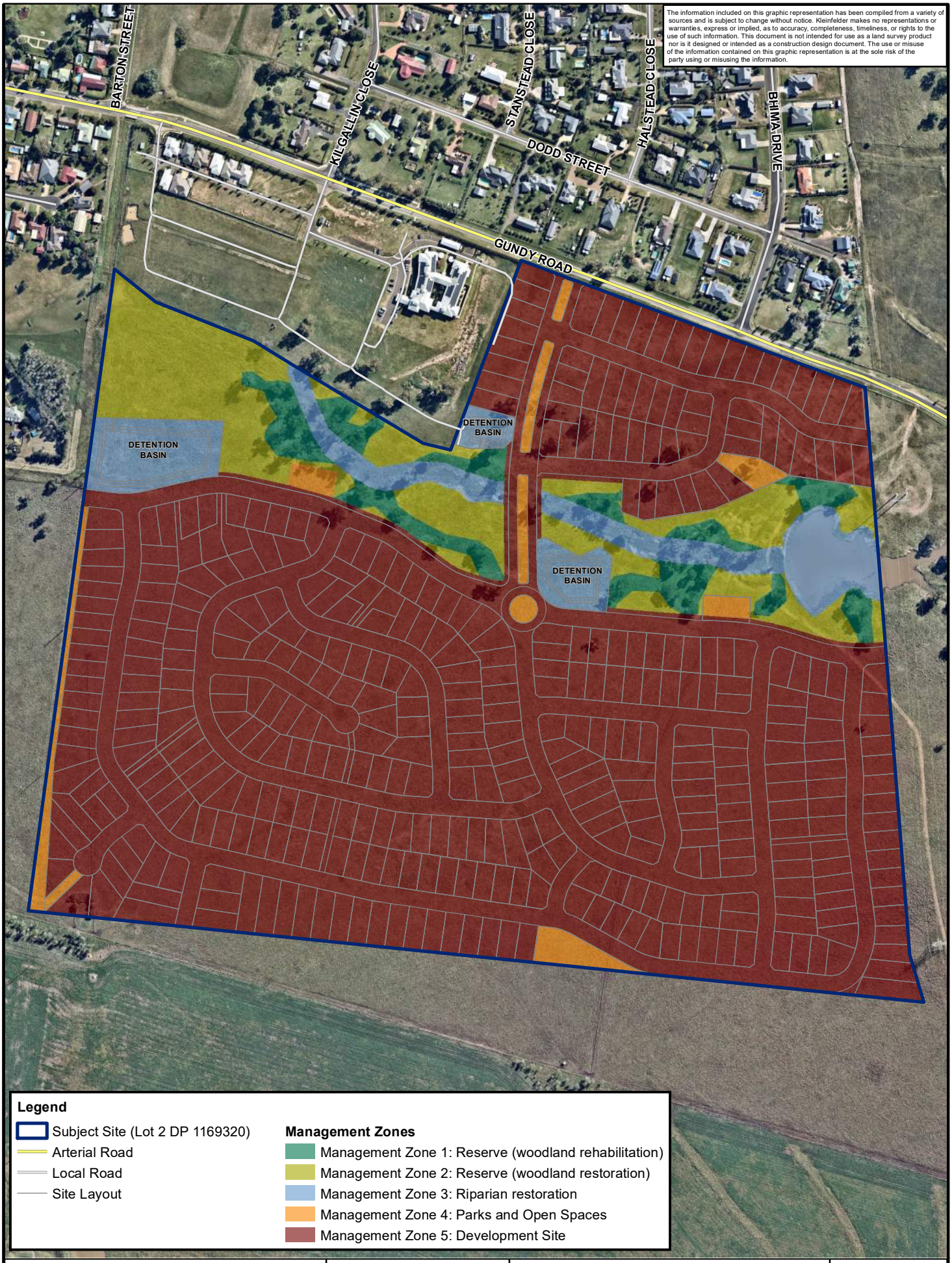
- Absence of Priority Weeds, Weeds of National Significance (WoNS), and High Threat Weeds (HTWs).
- The ground layers within Management Zone 1 and 2 have a 'floristic value score' (FVS) of over 4 in accordance with Rehwinkel (2015) indicating 'high conservation value grassland'.
- The presence of key fauna habitat features including:
    - Fallen logs: Average 400 m of fallen logs (dbh >10cm) per hectare (measured as an average of 40 m of fallen logs across permanently monitored 1000 m^2 floristic plots).

- The maintenance of boundary fencing and signage around the Drainage Reserve
- No signs of firewood collection, dumping of waste (inc. garden waste)
- The maintenance of habitat features (i.e. nest boxes and/or repurposed hollows)
- The establishment and maintenance of native vegetation within constructed stormwater retention basins

3.1.3 Responsibilities

Implementation and funding of this PoM is the responsibility of the proponent who will be the proprietor of the Drainage Reserve throughout the implementation period. The PoM will be implemented over a 20-year period. Management of the reserve will adopt an adaptive management process and may be subject to review of monitoring results and recommendations.

Strategies outlined in the PoM will be undertaken by suitably experienced and qualified persons or companies engaged by the proprietor of the site and drainage reserve. Any vegetation restoration works (including weed management, plantings and landscaping) will be undertaken by a suitably qualified and experienced professional bush regeneration contractor. The minimum qualifications and experience required for the bush regeneration contractor are a TAFE Certificate IV in Conservation and Land Management (or equivalent) and three years demonstrated experience (for site supervisor) and a TAFE Certificate 2 in Conservation and Land Management and one year demonstrated experience (for other personnel). Monitoring and reporting will be undertaken by suitably qualified Ecologists. Fire management should only be undertaken by suitable qualified and experienced professionals in the field of ecological burn management.



Legend

- Subject Site (Lot 2 DP 1169320)
- Arterial Road
- Local Road
- Site Layout

Management Zones

- Management Zone 1: Reserve (woodland rehabilitation)
- Management Zone 2: Reserve (woodland restoration)
- Management Zone 3: Riparian restoration
- Management Zone 4: Parks and Open Spaces
- Management Zone 5: Development Site

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DATA SOURCE:
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NSW OEH - 2020
Nearmap - 2021

Management Zones

Perception Planning
Plan of Management
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:
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3.2 PRE-CONSTRUCTION PHASE

3.2.1 Construction Environmental Management Plan (CEMP)

A Construction Environmental Management Plan (CEMP) will be established prior to the commencement of construction. The CEMP must include:

- The environmental site management measures must remain in place and be maintained throughout the period of the development.
- The CEMP must address all environmental aspects of the development's construction phases, and include where relevant, but not be limited to, the following:
    - Project Contact Information
    - Site Security Details
    - Timing and Sequencing Information
    - Site Soil and Water Management Plan
    - Noise and Vibration Control Plan
    - Air Quality monitoring and management
    - Health and Safety Plan
    - Incident Management Contingency
    - Implementation of mitigation measures specified in Section 5 (subsections 5.2.2) of the Flora and Fauna Assessment Report (FFAR) (Kleinfelder 2021).
    - Unexpected Finds Protocol

3.2.2 Establishment of Monitoring Program

Floristic monitoring plots and photo monitoring points are to be established within the Drainage Reserve in accordance with monitoring program detailed in **Section 3.5.1.** Baseline monitoring is to be completed within one (1) month of the commencement of construction works within the Subject Site.

3.3 CONSTRUCTION PHASE

The following measures will be adhered in the construction phase of the project, that being immediately prior to, during and immediately after completion of clearing, earthworks and construction. All contractors, sub-contractors, and personnel must be notified of these measures.

3.3.1 Construction Impact Mitigation

The procedures and mitigation measures detailed below are to be followed/implemented to minimize direct and indirect impacts to biodiversity values within the Subject Site:

- Vegetation may only be removed from the approved development footprint
- Exclusion fencing will be installed around the boundaries of vegetation to be retained. The exclusion fencing will extend out to at least 5 m from trees and native vegetation.
- Trees to be retained within the Development footprint will have bunting installed around their drip line, to prevent any disturbance that may impact on their health; this must remain around the tree until all construction activities have been completed.

- The areas of retained vegetation within the exclusion fencing shall be marked as **'No-Go' zones**. All vehicles, construction materials and refuse will be prohibited from these areas. Compaction and the placement of fill within 5 metres of trees and native vegetation will be prohibited.

3.3.2 Vegetation Clearing Supervision

The following procedures in relation to vegetation clearing are to be followed to minimise impacts to biodiversity values within the Subject Site and to maximise the salvage of habitat features to be used in restoration works within the Drainage Reserve.

- Vegetation clearing is not to occur during the months of spring, to avoid the peak breeding period of hollow-dependent fauna.
- Preclearing surveys will be conducted by the project ecologist and will include the following procedures:
  - The project ecologist will inspect vegetation within the clearing footprint and advise the site manager and tree clearing staff of any habitat potential and precautions necessary during vegetation removal.
  - Any significant, salvageable habitat features (such as large ground logs and bush rocks) will be clearly marked with flagging tape or spray paint and are to be salvaged and redistributed in the Drainage Reserve, under the supervision of the project ecologist.
  - All hollow-bearing trees in the clearing footprint will be clearly marked with flagging tape and/or spray paint.
- Removal of hollow-bearing trees will be done under the supervision of the project ecologist and will include the following tree felling procedures:
  - Immediately prior to felling, hollow-bearing trees are to be knocked (with an excavator bucket or other machinery) to encourage fauna to evacuate the tree. The hollow-bearing tree will then be "soft-felled". Sectional dismantling will be undertaken where hollows are to be reused (on instruction from the project ecologist).
  - Felled trees will be inspected by the project ecologist or licensed wildlife carer immediately following tree felling. Any displaced fauna will be relocated into adjacent habitat, as close to the development area as possible. Any injured fauna will be placed into the care of a local veterinary hospital or wildlife rescue group. In circumstances where native fauna species are detected, clearing will cease until the ecologist or wildlife carer has relocated the animal.
  - Before being stock-piled, felled trees must be left for at least 48 hours on the ground to allow fauna to escape.
  - Any salvaged hollows will then be stockpiled, to be used as ground habitat in the Drainage Reserve (see **Section 3.4.2**).
  - Note that nest box installation, maintenance and monitoring will be undertaken to offset the loss of the hollows in the development footprint. Nest boxes/repurposed hollows must be installed in trees that do not currently have natural hollows present. However, as almost all trees within the Drainage Reserve already contain multiple hollows, nest boxes may need to be installed at an alternative site approved by Council.
  - During any vegetation clearing works, all tree trunks and larger branches (over 10 cm diameter) are to be removed from the development area and are to be cut up into long pieces (i.e. over 4 m where

possible) and carefully placed within the Drainage Reserve, in such a way as to look natural, not add to bushfire risks, and to provide benefit to native fauna (on instruction from the project ecologist).

- Cleared vegetation (that is not salvageable as ground habitat, see above) will be mulched and re-used throughout the site, where necessary, as part of any vegetation regeneration or landscaping activities. Non-salvageable material shall be disposed of in an approved manner.
- If any injured or displaced fauna are encountered onsite in the absence of an ecologist or licensed wildlife carer, the advice of the ecologist and/or a local wildlife rescue group will be sought immediately.
- During site inductions, all contractors, sub-contractors, and personnel must be notified of these vegetation protection requirements.

3.3.3 Management of Erosion and Sedimentation

Hydrological and erosion / sediment controls must be implemented to maintain the quality and quantity of pre-development water flows into downstream wetland areas.

Measures to reduce soil erosion and pollutant run-off during construction activities include:

- Installation of erosion and sediment control measures (including silt fencing) around the boundary of the Drainage Reserve prior to any works
- Regular inspection of erosion and sediment control measures, particularly following rainfall events, to ensure their ongoing functionality.
- Management of excavated materials to reduce the movement of sediments during high wind or rainfall events.
- Avoiding stockpiling of materials adjacent to the Drainage Reserve and within 40 m of watercourses, stockpiling should be undertaken in areas that are already cleared/ disturbed.
- Undertake maintenance of silt fences and other mitigation measures to isolate runoff.

Erosion and sediment control measures should be designed and installed following the Guidelines for Erosion and Sediment Control on Building Sites (DLWC 2001). Useful information can also be found within the Blue Book (Landcom 2004).

3.3.4 Weed Management During Construction

Appropriate weed control measures must be implemented during the construction phase, including the following:

- All weeds removed from the site must be transported in a sealed container or bag and disposed at a waste management facility licensed to accept green waste.
- Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor.

3.4 Post Construction Phase

3.4.1 Establishment of Drainage Reserve

Permanent fencing must be erected around the boundaries of the drainage reserve. Fencing must be of a type that is durable, restricts livestock/vehicle access and allows movement of native fauna. Suitable fencing could

include open post and rail or post and wire (no barbed wire on the top or bottom strand). Locked gates shall be installed at any agreed illegal access points.

Permanent educational conservation signs must be installed at multiple points around the boundary of the reserve, so they are clearly visible to the residents of the new residential development. Information must include a summary of restrictions associated with the drainage reserve (e.g. no firewood collection, vehicle access or livestock grazing). Signage must also include suggestions on how to minimize impacts on Box Gum Grassy Woodlands, by undertaking activities such as planting local species in gardens, minimising clearing, erecting nest boxes, limiting use of fertilisers, controlling pets and managing weeds.

3.4.2 Restoration of Box-Gum Grassy Woodland

Restoration of Box-Gum Grassy Woodland will occur in Management Zones 1 and 2 within the Drainage Reserve, with the aim of maintaining and enhance biodiversity values within Management Zone 1 (woodland) and restore woodland within Management Zone 2. Consequently, each zone has specific restoration requirements based on current state (woodland or grassland) and condition. Detailed goals for each management zone are detailed in **Table 1**, performance criterion for Box-Gum Grassy Woodland are summarised in **Section 3.1.2**.

The restoration of Box-Gum Grassy Woodland within the Drainage Reserve will adopt a strategy of adaptive management, informed by annual monitoring results and recommendations.

Literature informing restoration techniques detailed in this report include:

- Department of Environment, Climate Change and Water NSW (2011). National Recovery Plan for White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland. DECCW NSW, Sydney
- Rawling, et al. (2010). A Guide to Management Box Gum Grassy Woodlands. Department of the Environment, Water, Heritage and the Arts, Canberra ACT.
- Oliver, et al. (2009). Adaptive Management Guidelines for Box Gum Grassy Woodlands. DECC NSW.

Restoration techniques used within the Drainage Reserve include removal of cattle grazing, weed management, tubestock planting/direct seeding, habitat augmentation, and fire management. These are detailed below.

Removal of Cattle Grazing

The site has a long history of use for cattle grazing and has been exposed to various agricultural management regimes including pasture improvement, including the application of fertilisers. These practices have likely impacting native floristic diversity and structure, canopy regeneration, weed abundance, and resulted in elevated nutrient loads. As such, cattle will be excluded from the Drainage Reserve within the **Pre-Construction Phase**. Monitoring will inform the adaptive management of the woodland to reverse the impacts of previous land use (i.e. soil nutrient management) (see Rawlings, *et al*. 2010).

Weed Management

Weed management will be undertaken within Management Zones 1 and 2 in accordance with **Section 3.4.5**.

Revegetation and Supplementary Planting

The Drainage Reserve is characterized by sparse mature woodland, scattered native shrubs, and a high cover and diversity of native groundcover species (i.e. grasses and herbs). Cattle grazing is likely to have limited the natural regeneration of native canopy within the Subject Site, with juvenile eucalypts only recorded along the north-western site boundary, outside of the site. The exclusion of cattle from the Drainage Reserve during the **Pre-Construction Phase** is expected to result in increased eucalypt recruitment and survival, negating the need for extensive supplementary planting within the woodland and much of the adjacent grassland. Natural regeneration is expected to be further assisted through the control and suppression of weeds throughout the PoM implementation period.

The following supplementary planting is recommended:

- **Management Zone 1:** Supplementary planting of shrub species characteristic of the local vegetation community (PCT 618) and Box-Gum Grassy Woodland CEEC (see **Appendix B**). No planting of canopy or groundcover species initially. The requirement for supplementary planting of canopy and groundcover species will be addressed within recommendations of annual monitoring reports.
- **Management Zone 2:** Revegetation of canopy species and shrub is required within this zone. Canopy species are to be planted in accordance with planting list in **Appendix B**. The need for supplementary planting of groundcover species will be by the recommendations of annual monitoring reports.

All planting should utilise the species listed within **Appendix B**, with preference for local provenance stock. Where these species cannot be sourced, only local species indicative of Box-Gum Grassy Woodland should be utilized in consultation with Upper Hunter Shire Council.

Habitat Augmentation

Fallen and standing timber (coarse woody debris and dead branches, snags, stumps etc) provides essential or important breeding, foraging or shelter habitat for many threatened species. All tree trunks and larger branches (over 10 cm diameter) are to be removed from the development area during vegetation clearing. Suitable logs and branches are then to be cut up into long pieces (i.e. over 4 m where possible) and carefully placed into woodland and grassland areas within the Drainage Reserve. Placement of logs and branches are to be in such a way as to look natural, not add to bushfire risks, and to provide benefit to native fauna (on instruction from the project ecologist).

Fire Management

The minimum fire interval suggested for Box-Gum Grassy Woodlands is five (5) years, with a maximum interval of 40 years (DEWHA 2010). The timing and frequency of prescribed burns should be based on consideration of floristic composition, condition of the remnant, and timing of flowering/seeding of native and exotic species.

Burns should be applied to remnants in mosaics (i.e. burning small areas at staggered intervals) to allow regeneration and increase the survival of ground fauna (including invertebrates, amphibians and reptiles) and promote diversity in the states of the ecological community (DEWHA 2010). Fire management within the Drainage Reserve will be based on a Fire Management Plan.

3.4.3 Restoration of Riparian Vegetation and Watercourses

The revegetation of creek banks and areas surrounding existing dams and retention basins will be completed at the completion of construction. Plant species to be planted in these areas will be characteristic of the local vegetation community (PCT 618) and Box-Gum Grassy Woodland CEEC, with the addition of suitable wetland species as listed in **Appendix B**.

3.4.4 Landscaping of Parks and Open Spaces

Landscape planting in parks and open spaces within the Subject Site will include plant species consistent with local vegetation (PCT 618) and the Box-Gum Grassy Woodland CEEC. Species recommended for planting are detailed within **Appendix B**. The following measures are to be implemented in the landscaping of parks and open space areas:

- Any native trees to be retained within proposed parks and open space areas will be protected during construction and appropriately maintained throughout the implementation period.
- Stockpiled topsoil and mulched vegetation from the development site will be utilised in site landscaping and revegetation works for any areas that require rehabilitation.
- Where any plantings are required, locally indigenous flora will be used. Plants must be sourced from nurseries that grow seed sourced from local areas, to avoid planting of human created cultivars.
- For any park areas that require turfing or direct seeding, only non-invasive (and preferably locally native) grasses/groundcovers will be used.
- Fertiliser use will be strictly limited to a specifically designed Australian native plant fertiliser or an organic based fertiliser with low levels of phosphorus (P). Artificial and chemical fertilisers are strictly prohibited.

3.4.5 Weed Management

Weed management within the Drainage Reserve will prioritise the management of the four (4) listed Priority Weed species detected within the Subject Site, including:

- *Echium plantagineum* (Patterson's Curse) [Priority Weed]
- *Opuntia stricta* (Common Prickly Pear) [WoNS and Priority Weed]
- *Senecio madagascariensis* (Fireweed) [WoNS and Priority Weed]
- *Lycium ferocissimum* (African Boxthorn) [WoNS and Priority Weed]

Management will adopt the 'Bradley method', which involves the progressive removal of weeds from less disturbed areas (outside of mapped weed infestations), followed by removal from more weed infested areas (i.e. mapped weed infestation areas). This method also aims to remove weeds with minimal disturbance and allow native species to re-establish naturally from the existing seed bank and rootstock.

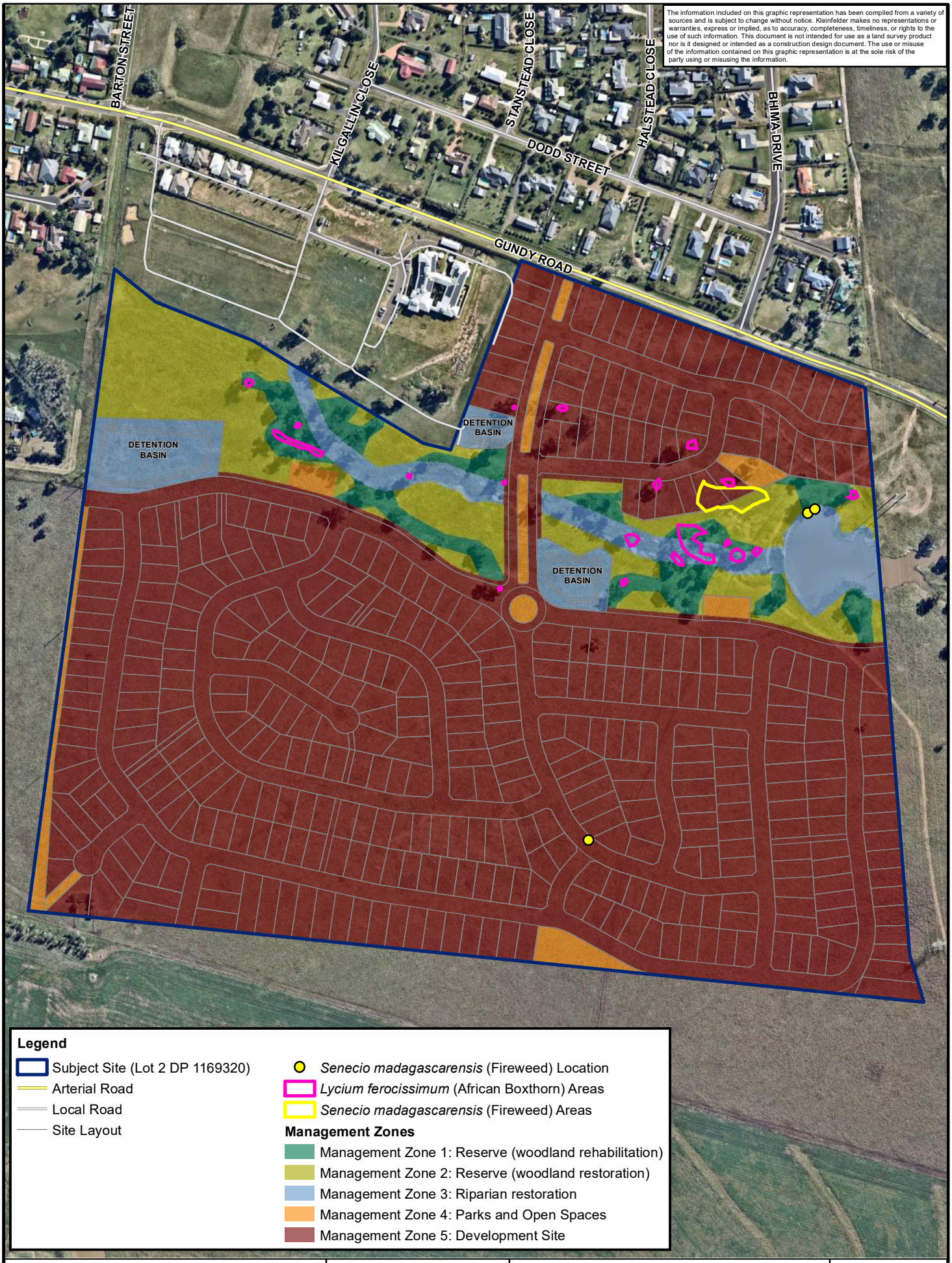
The following steps are to be followed when controlling weeds on the site:

1. The weed removal team will require a site-specific induction, to understand what weeds are to be removed, the process of removal, identification of the native species, and the procedures to be followed.

2. Manual weed removal. Due to the high cover of intact native groundcover within Drainage Reserve the manual removal of weeds will be prioritised where possible.
3. Weed propagules collected during weed control activities are to be taken offsite. This will stop weed material smothering native plants and prevent re-establishment. This material is to be taken to an appropriate waste disposal center to prevent further weed spread in the region.
4. Chemical weed control. Chemical should be applied only where application to larger weeds can be isolated (i.e. no broad application).

For concentrations and dosage rates on targeted chemical control, refer to the Department of Primary Industries New South Wales 'WeedWise' webpage (DPI, 2021a). Any weed spraying should be conducted by an authorised person, having a Chemical Application Certificate or similar qualification. This would ensure that best practice is adhered to in consideration of the sensitive nature of the surrounding ecosystems.

The removal of general exotic species (of which 39 were recorded – see **Appendix A** for full list of exotic plant species recorded within the Subject Site [Kleinfelder 2021]) will be based on the recommendations provided in annual monitoring reports. It is expected that other restoration tasks including the removal of cattle grazing and additional plantings will assist in the natural reduction of general exotic species cover over the duration of the PoM implementation period (20 years).



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PROJECT REFERENCE: 20213660

DATE DRAWN: 2021/06/09 17:55 Version 1

DRAWN BY: GJoyce

DATA SOURCE:
NSW DFSI - 2020
NSW OEH - 2020
Nearmap - 2021

Weed Mapping

Perception Planning
Plan of Management
Lot 2 DP 1169320 Gundy Road, Scone NSW

FIGURE:

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3.5 ADAPTIVE MANAGEMENT/OPERATIONAL PHASE

Adaptive management will be undertaken within the Drainage Reserve throughout the implementation period, with monitoring and report recommendations used to continually inform management strategies. Monitoring and reporting requirements under this Plan of Management are detailed below.

3.5.1 Monitoring Program

A monitoring program will be implemented to ensure that the measures detailed within this PoM are implemented and successful. The program will be completed throughout the implementation period, a summary of key monitoring events and deliverables are shown in **Table 2**. Monitoring program methods are detailed below. Reporting requirements are detailed in **Section 3.5.2**.

Table 2: Monitoring and Reporting Summary

Monitoring Event	Timing	Scope	Deliverable
Baseline Monitoring Survey	Completed within one (1) month prior to construction	Establishment of permanent monitoring plots and completion of the Monitoring Programme	Baseline Monitoring Report
Pre-clearance Survey	Prior to vegetation clearing	Assessment of habitat features to be removed.as per **Section 3.3.2**	Pre-Clearance Letter Report
Clearance Supervision	During vegetation clearing	Supervision of vegetation clearing of habitat features to be removed.as per **Section 3.3.2**	Clearance Supervision Letter Report
Annual Monitoring Survey	Completed one (1) month following the completion of construction. Completed annually thereafter for entire implementation period (20 Years)	Completion of the Monitoring Programme	Annual Monitoring Survey Report
Final Summary Report	Completed at the end of the 20-year implementation period.	Summary of the Monitoring Programme throughout implementation period.	Final Summary Report

Monitoring Program Methods

Monitoring will be completed within the Drainage Reserve throughout the implementation period as per the schedule detailed in **Table 2**. Monitoring methods address key performance criterion listed in **Section 3.1.2**, and are informed by the following resources:

- The Biodiversity Assessment Method 2020 (known hereafter as "BAM 2020") (DPIE 2020),
- A Guide to Managing Box Gum Grassy Woodlands (Rawlings *et al.* 2010), and
- A Method to Assess Grassy Ecosystem Sites: Using Floristic Information to Assess a Site's Quality (Rehwinkel 2015).

The Monitoring Program is comprised of three (3) key components: *Vegetation Extent*, *Vegetation Condition*, and *Reserve Maintenance* detailed below.

Vegetation Extent

The mapped extent of native woodland (comprising native canopy species) and weed infestation are to be updated during every monitoring event using a hand-held GPS.

Vegetation Condition

A total of four (4) 20 m x 50m quadrats are to be established within the Drainage Reserve during baseline monitoring, with two (2) quadrats placed within Management Zone 1, and two (2) quadrats within Management Zone 2. The quadrats are to be sampled as per Section 5.3.4 of the NSW Biodiversity Assessment Method (BAM) (DPIE, 2020), with a 20 m x20 m nested quadrat and a central 50 m north-south bearing transect. Quadrats are to be marked at the start and end of the 50 m transect with permanent markers. Location and bearing of transects are to be recorded to ensure accuracy of repeat monitoring.

Within each plot the following metrics are collected:

- Floristic diversity (number of native and exotic species within the nested 20 m x 20 m quadrat)
- Floristic cover and abundance for each species using the modified Braun-Blanquet cover-abundance scale (Poore 1955) (scores 1-7) (within the nested 20 m x 20 m quadrat).
- Stem size classes and the presence of native canopy regeneration (as per BAM 2020) (within the 20 m x 50 m quadrat)
- Cover of litter and bare ground (as per BAM 2020) (within the 20 m x 50 m quadrat)
- Total length of fallen logs (dbh <10 cm) (as per BAM 2020) (within the 20 m x 50 m quadrat)
- Photo monitoring: a single photo is to be taken at the start and end of the 50 m transect looking into the quadrat.

Reserve Maintenance

The monitoring program will assess condition of the Drainage Reserve through a general meander of the site and notes on the following features:

- Condition of boundary fencing and signage around the Drainage Reserve
- Signs of firewood collection, dumping of waste (inc. garden waste)
- Condition of habitat features (i.e. nest boxes and/or repurposed hollows)
- Condition and composition of native vegetation within constructed stormwater retention basins

3.5.2 Reporting

Reporting requirements and timing of deliverables are summarised within **Table 2**, all monitoring and reporting will be completed by a suitably qualified person (i.e. Ecologist), content of reporting deliverables will are detailed below:

- **Baseline Monitoring Survey Report:** This report will provide details on location of monitoring points, baseline measurements of key extent and condition variables within the Drainage Reserve.
- **Pre-clearance Survey Report:** This report will detail the results of the pre-clearance survey, including identification of fauna habitat features to be removed and those that have potential for salvage and utilisation within the Drainage Reserve.
- **Clearance Supervision:** This report will detail the results of the clearance supervision including identification of any fauna recorded during clearing works and the location of habitat features re-distributed within the Drainage Reserve to provide for habitat.
- **Annual Monitoring Survey Report:** This report will detail the results of annual monitoring, with comparison to baseline results and preceding survey events. Reporting will provide recommendations for future monitoring and management within the reserve. These reports are to be submitted annually, to Council
- **Final Summary Report:** Summary of the Monitoring Programme throughout

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APPENDIX A FLORA SPECIES LIST

Table A1: Subject Site Flora Species List (Kleinfelder 2021)

No.	Family	Scientific Name	Common Name	Form
1.	**Aizoaceae**	*Galenia pubescens*	Galenia	HTW
2.	**Aizoaceae**	*Zaleya galericulata*	Hogweed	FG
3.	**Amaranthaceae**	*Alternanthera pungens*	Khaki Weed	HTW
4.	**Amaranthaceae**	*Amaranthus retroflexus*	Redroot Amaranth	Exotic
5.	**Amaranthaceae**	*Gomphrena celosioides*	Gomphrena Weed	Exotic
6.	**Apiaceae**	*Hydrocotyle laxiflora*	Stinking Pennywort	FG
7.	**Apocynaceae**	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	Exotic
8.	**Asteraceae**	*Bidens pilosa*	Cobbler's Pegs	Exotic
9.	**Asteraceae**	*Calotis lappulacea*	Yellow Burr-daisy	FG
10.	**Asteraceae**	*Chrysocephalum apiculatum*	Common Everlasting	FG
11.	**Asteraceae**	*Cirsium vulgare*	Spear Thistle	Exotic
12.	**Asteraceae**	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic
13.	**Asteraceae**	*Euchiton japonicus*		FG
14.	**Asteraceae**	*Hypochaeris radicata*	Catsear	Exotic
15.	**Asteraceae**	*Senecio madagascariensis*	Fireweed	Exotic
16.	**Asteraceae**	*Silybum marianum*	Variegated Thistle	Exotic
17.	**Asteraceae**	*Soliva sessilis*	Bindyi	Exotic
18.	**Asteraceae**	*Taraxacum officinale*	Dandelion	Exotic
19.	**Asteraceae**	*Vittadinia cuneata*		FG
20.	**Asteraceae**	*Vittadinia muelleri*		FG
21.	**Asteraceae**	*Xanthium strumarium*		
22.	**Boraginaceae**	*Echium plantagineum*	Patterson's Curse	Exotic
23.	**Brassicaceae**	*Lepidium africanum*	Common Peppercress	Exotic
24.	**Brassicaceae**	*Rapistrum rugosum*	Turnip Weed	Exotic
25.	**Cactaceae**	*Opuntia stricta*	Common Prickly Pear	Exotic
26.	**Campanulaceae**	*Wahlenbergia communis*	Tufted Bluebell	FG
27.	**Caryophyllaceae**	*Stellaria media*	Common Chickweed	Exotic
28.	**Chenopodiaceae**	*Einadia nutans*	Climbing Saltbush	FG
29.	**Chenopodiaceae**	*Enchylaena tomentosa*	Ruby Saltbush	SG
30.	**Chenopodiaceae**	*Maireana microphylla*	Small-leaf Bluebush	SG
31.	**Chenopodiaceae**	*Salsola australis*		SG

No.	Family	Scientific Name	Common Name	Form
32.	**Chenopodiaceae**	*Sclerolaena muricata*	Black Rolypoly	SG
33.	**Chenopodiaceae**	*Sclerolaena muricata var. villosa*	Black Rolypoly	SG
34.	**Convolvulaceae**	*Convolvulus angustissimus*		OG
35.	**Convolvulaceae**	*Dichondra repens*	Kidney Weed	FG
36.	**Cyperaceae**	*Cyperus gracilis*	Slender Flat-sedge	GG
37.	**Cyperaceae**	*Fimbristylis dichotoma*	Common Fringe-sedge	GG
38.	**Euphorbiaceae**	*Euphorbia drummondii*	Caustic Weed	FG
39.	**Fabaceae (Faboideae)**	*Desmodium varians*	Slender Tick-trefoil	OG
40.	**Fabaceae (Faboideae)**	*Glycine tabacina*	Variable Glycine	OG
41.	**Fabaceae (Faboideae)**	*Medicago lupulina*	Black Medic	Exotic
42.	**Fabaceae (Faboideae)**	*Trifolium repens*	White Clover	Exotic
43.	**Geraniaceae**	*Geranium solanderi*	Native Geranium	FG
44.	**Lamiaceae**	*Lamium amplexicaule*	Dead Nettle	Exotic
45.	**Lamiaceae**	*Marrubium vulgare*	White Horehound	Exotic
46.	**Lamiaceae**	*Salvia reflexa*	Mintweed	Exotic
47.	**Malvaceae**	*Malva parviflora*	Small-flowered Mallow	Exotic
48.	**Malvaceae**	*Pavonia hastata*		Exotic
49.	**Malvaceae**	*Sida rhombifolia*	Paddy's Lucerne	Exotic
50.	**Malvaceae**	*Sida spinosa*		Exotic
51.	**Myrtaceae**	*Eucalyptus 'albemol'*		TG
52.	**Myrtaceae**	*Eucalyptus melliodora*	Yellow Box	TG
53.	**Oleaceae**	*Notelaea microcarpa*	Native Olive	TG
54.	**Oxalidaceae**	*Oxalis bowiei*		Exotic
55.	**Oxalidaceae**	*Oxalis perennans*		FG
56.	**Plantaginaceae**	*Plantago lanceolata*	Lamb's Tongues	Exotic
57.	**Poaceae**	*Aristida ramosa*	Purple Wiregrass	GG
58.	**Poaceae**	*Austrostipa aristiglumis*	Plains Grass	GG
59.	**Poaceae**	*Austrostipa scabra*	Speargrass	GG
60.	**Poaceae**	*Austrostipa verticillata*	Slender Bamboo Grass	GG
61.	**Poaceae**	*Bothriochloa macra*	Red-legged Grass	GG
62.	**Poaceae**	*Chloris truncata*	Windmill Grass	GG
63.	**Poaceae**	*Cynodon dactylon*	Common Couch	GG

No.	Family	Scientific Name	Common Name	Form
64.	**Poaceae**	*Dichanthium sericeum*	Queensland Bluegrass	GG
65.	**Poaceae**	*Digitaria diffusa*	Open Summer-grass	GG
66.	**Poaceae**	*Digitaria divaricatissima*	Umbrella Grass	GG
67.	**Poaceae**	*Echinochloa esculenta*	Japanese Millet	Exotic
68.	**Poaceae**	*Eleusine tristachya*	Goose Grass	Exotic
69.	**Poaceae**	*Entolasia marginata*	Bordered Panic	GG
70.	**Poaceae**	*Eragrostis brownii*	Brown's Lovegrass	GG
71.	**Poaceae**	*Eragrostis leptostachya*	Paddock Lovegrass	GG
72.	**Poaceae**	*Panicum queenslandicum*	Yadbila Grass	GG
73.	**Poaceae**	*Panicum simile*	Two-colour Panic	GG
74.	**Poaceae**	*Paspalum dilatatum*	Paspalum	
75.	**Poaceae**	*Rytidosperma bipartitum*	Wallaby Grass	GG
76.	**Poaceae**	*Sporobolus caroli*	Fairy Grass	GG
77.	**Poaceae**	*Sporobolus creber*	Slender Rat's Tail Grass	GG
78.	**Polygonaceae**	*Polygonum aviculare*	Wireweed	Exotic
79.	**Polygonaceae**	*Rumex brownii*	Swamp Dock	FG
80.	**Portulacaceae**	*Portulaca oleracea*	Pigweed	FG
81.	**Primulaceae**	*Lysimachia arvensis*	Scarlet Pimpernel	Exotic
82.	**Pteridaceae**	*Cheilanthes sieberi*	Rock Fern	EG
83.	**Rubiaceae**	*Galium gaudichaudii*	Rough Bedstraw	FG
84.	**Solanaceae**	*Lycium ferocissimum*	African Boxthorn	
85.	**Solanaceae**	*Solanum esuriale*	Quena	FG
86.	**Solanaceae**	*Solanum nigrum*	Black-berry Nightshade	Exotic
87.	**Verbenaceae**	*Verbena bonariensis*	Purpletop	Exotic
88.	**Zygophyllaceae**	*Tribulus terrestris*	Cat-head	Exotic

Table A2: Subject Site Weed List (Kleinfelder 2021)

No.	Family	Scientific Name	Common Name	Form	Status
1.	**Aizoaceae**	*Galenia pubescens*	Galenia	HTW	
2.	**Amaranthaceae**	*Amaranthus retroflexus*	Redroot Amaranth	Exotic	
3.	**Amaranthaceae**	*Gomphrena celosioides*	Gomphrena Weed	Exotic	
4.	**Amaranthaceae**	*Alternanthera pungens*	Khaki Weed	HTW	
5.	**Apocynaceae**	*Gomphocarpus fruticosus*	Narrow-leaved Cotton Bush	Exotic	
6.	**Asteraceae**	*Bidens pilosa*	Cobbler's Pegs	Exotic	
7.	**Asteraceae**	*Cirsium vulgare*	Spear Thistle	Exotic	
8.	**Asteraceae**	*Conyza bonariensis*	Flaxleaf Fleabane	Exotic	
9.	**Asteraceae**	*Hypochaeris radicata*	Catsear	Exotic	
10.	**Asteraceae**	*Senecio madagascariensis*	Fireweed	Exotic	Priority Weed and WoNS
11.	**Asteraceae**	*Silybum marianum*	Variegated Thistle	Exotic	
12.	**Asteraceae**	*Soliva sessilis*	Bindyi	Exotic	
13.	**Asteraceae**	*Taraxacum officinale*	Dandelion	Exotic	
14.	**Asteraceae**	*Xanthium strumarium*		HTW	
15.	**Boraginaceae**	*Echium plantagineum*	Patterson's Curse	Exotic	Priority Weed
16.	**Brassicaceae**	*Lepidium africanum*	Common Peppercress	Exotic	
17.	**Brassicaceae**	*Rapistrum rugosum*	Turnip Weed	Exotic	
18.	**Cactaceae**	*Opuntia stricta*	Common Prickly Pear	Exotic	Priority Weed and WoNS
19.	**Caryophyllaceae**	*Stellaria media*	Common Chickweed	Exotic	
20.	**Fabaceae (Faboideae)**	*Medicago lupulina*	Black Medic	Exotic	
21.	**Fabaceae (Faboideae)**	*Trifolium repens*	White Clover	Exotic	
22.	**Lamiaceae**	*Lamium amplexicaule*	Dead Nettle	Exotic	
23.	**Lamiaceae**	*Marrubium vulgare*	White Horehound	Exotic	
24.	**Lamiaceae**	*Salvia reflexa*	Mintweed	Exotic	
25.	**Malvaceae**	*Malva parviflora*	Small-flowered Mallow	Exotic	
26.	**Malvaceae**	*Pavonia hastata*		Exotic	
27.	**Malvaceae**	*Sida rhombifolia*	Paddy's Lucerne	Exotic	

No.	Family	Scientific Name	Common Name	Form	Status
28.	**Malvaceae**	*Sida spinosa*		Exotic	
29.	**Oxalidaceae**	*Oxalis bowiei*		Exotic	
30.	**Plantaginaceae**	*Plantago lanceolata*	Lamb's Tongues	Exotic	
31.	**Poaceae**	*Echinochloa esculenta*	Japanese Millet	Exotic	
32.	**Poaceae**	*Eleusine tristachya*	Goose Grass	Exotic	
33.	**Poaceae**	*Paspalum dilatatum*	Paspalum	HTW	
34.	**Polygonaceae**	*Polygonum aviculare*	Wireweed	Exotic	
35.	**Primulaceae**	*Lysimachia arvensis*	Scarlet Pimpernel	Exotic	
36.	**Solanaceae**	*Solanum nigrum*	Black-berry Nightshade	Exotic	
37.	**Solanaceae**	*Lycium ferocissimum*	African Boxthorn	HTW - Manageable	Priority Weed and WoNS
38.	**Verbenaceae**	*Verbena bonariensis*	Purpletop	Exotic	
39.	**Zygophyllaceae**	*Tribulus terrestris*	Cat-head	Exotic	

APPENDIX B RECOMMENDED PLANTING LISTS

Table B1: Drainage Reserve Box-Gum Grass Woodland Recommended Planting List

Stratum	Scientific Name	Common Name	Management Zone 1	Management Zone 2
Canopy	*Eucalyptus 'albemol'*	Grey Box/White Box		✓
	Eucalyptus moluccana	Grey Box		✓
	Eucalyptus melliodora	Yellow Box		✓
Shrubs	*Notelaea microcarpa*	Native Olive	✓	✓
	Acacia implexa	Hickory Wattle	✓	✓
	Beyeria viscosa	Sticky Wallaby Bush	✓	✓
	Acacia buxifolia	Box-leaf Wattle	✓	✓
Ground (If Required)	*Aristida ramosa*	Purple Wiregrass	✓	✓
	Austrostipa aristiglumis	Plains Grass	✓	✓
	Austrostipa scabra	Speargrass	✓	✓
	Austrostipa verticillata	Slender Bamboo Grass	✓	✓
	Cyperus gracilis	Slender Flat-sedge	✓	✓
	Dianella revoluta	Flax Lily	✓	✓
	Geranium solanderi	Native Geranium	✓	✓
	Lomandra filiformis	Mat Rush	✓	✓
	Themeda triandra	Kangaroo Grass	✓	✓
	Wahlenbergia communis	Bluebell	✓	✓

Table B2: Riparian Restoration Recommended Planting List

Stratum	Scientific Name	Common Name	Riparian Vegetation	Detention Basins
Canopy (In areas of grassland)	*Eucalyptus 'albemol'*	Grey Box/White Box	✓	
	Eucalyptus moluccana	Grey Box	✓	
	Eucalyptus melliodora	Yellow Box	✓	
Shrubs	*Notelaea microcarpa*	Native Olive	✓	
	Acacia implexa	Hickory Wattle	✓	
	Beyeria viscosa	Sticky Wallaby Bush	✓	

Stratum	Scientific Name	Common Name	Riparian Vegetation	Detention Basins
	Acacia buxifolia	Box-leaf Wattle	✓	
	Alternanthera denticulata		✓	✓
	Aristida ramosa	Purple Wiregrass	✓	✓
	Austrostipa aristiglumis	Plains Grass	✓	✓
	Austrostipa scabra	Speargrass	✓	✓
	Austrostipa verticillata	Slender Bamboo Grass	✓	✓
	Cyperus gracilis	Slender Flat-sedge	✓	✓
	Dianella revoluta	Flax Lily	✓	✓
	Lomandra filiformis	Mat Rush	✓	✓
	Themeda triandra	Kangaroo Grass	✓	✓
	Wahlenbergia communis	Bluebell	✓	✓

Table B2: Parks and Open Spaces Recommended Planting List

Stratum	Scientific Name	Common Name
Canopy	*Eucalyptus 'albemol'*	Grey Box x White Box
	Eucalyptus moluccana	Grey Box
	Eucalyptus melliodora	Yellow Box
Shrubs	*Notelaea microcarpa*	Native Olive
	Acacia implexa	Hickory Wattle
	Beyeria viscosa	Sticky Wallaby Bush
	Acacia buxifolia	Box-leaf Wattle
Ground (If Suitable)	*Aristida ramosa*	Purple Wiregrass
	Austrostipa aristiglumis	Plains Grass
	Austrostipa scabra	Speargrass
	Austrostipa verticillata	Slender Bamboo Grass
	Cyperus gracilis	Slender Flat-sedge
	Dianella revoluta	Flax Lily
	Geranium solanderi	Native Geranium
	Lomandra filiformis	Mat Rush
	Themeda triandra	Kangaroo Grass
	Wahlenbergia communis	Bluebell

APPENDIX C STAFF CONTRIBUTIONS

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

Name	Qualification	Title/Experience	Contribution
David Martin	MSc	Ecologist (Botanist)	Field surveys, Flora and Fauna Assessment Report Author.
Mark Dean	BEnvSc&Mgnt	Ecologist	Field surveys, Reporting
Dr. Daniel O'Brien	BEnvSc&Mgt (PhD)	Senior Ecologist	Report Review
Gayle Joyce	BSc (Forestry) (Hons)	GIS Specialist	GIS and figure preparation

APPENDIX D LICENSE AND PERMITS

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