Biodiversity Management Plan
Glenwood High School

Forman Avenue (Lot 5227 DP868693), Glenwood NSW 2768

NCA22R138834

20 April 2022

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Prepared for:

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David Martin James Baldry	David Martin	David Martin

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1 INTRODUCTION

1.1 BACKGROUND

Kleinfelder Australia Pty Ltd (Kleinfelder) was engaged by Jacobs Group Australia Pty Ltd (Jacobs) to prepare a Biodiversity Management Plan (BMP) to manage and regenerate an area of *Cumberland Plain Woodland in the Sydney Bioregion* (Cumberland Plain Woodland) (Critically Endangered Ecological Community [CEEC]) located within the grounds of Glenwood High School, Forman Avenue (Lot 5227 DP868693), Glenwood NSW 2768 (The 'Subject Site') (see **Figure 1**). The completion of a BMP for the Subject Site is a requirement of the Request for Additional Information from the Department of Planning and Environment (DPE) (dated 23/03/2022):

> *"The revised Glenwood High School Biodiversity Development Assessment Report (BDAR) submitted as part of the Response to Submissions (RtS) recommends measures be imposed to manage and regenerate the Cumberland Plain Woodland area, as part of a Biodiversity Management Plan (BMP). The EIS states that the BMP would be developed outside of the SSD application and by the school operator. The Department considers the regeneration of the Cumberland Plain Woodland a vital component of the site and SDD application, accordingly appropriate management of the regeneration area is required. You are requested to submit a preliminary strategy for the management and regeneration of the Cumberland Plain Woodland undertaken by a qualified ecologist or bush regeneration specialist" (NSW Department of Planning and Environment 2022).*

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

- **Subject Site –** Forman Avenue (Lot 5227 DP868693), Glenwood NSW 2768.
- **Development Site -** The area within the Subject Site to be directly impacted by the proposed development, i.e. the footprint of the school building.
- **Reserve** - areas of Cumberland Plain Woodland within the Subject Site proposed for management.
- **Locality** – land within a 5 km radius of the Subject Site.

This BMP 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 five (5) years.

1.2 SITE DESCRIPTION

The Subject Site is located within the suburb of Glenwood, approximately 5 km northeast of Blacktown CBD (**Figure 1**). The Subject Site is within the Blacktown City Council Local Government Area (LGA) and is zoned as SP2 – Infrastructure under the *Blacktown Local Environmental Plan 2015* (LEP).

The Subject Site is bound by residential developments to the east via Glenwood Park drive and to the south via Forman Avenue. The northern and eastern boundaries of the school are bound by Glenwood reserve, which is zoned RE1 – Public Recreation. The majority of Subject Site is either mixed native/exotic gardens, or managed exotic grassland and existing infrastructure. There is a small patch of intact native grassy woodland located in the north-eastern portion of the Subject Site (**Figure 2**). The vegetation within this patch is commensurate with

Cumberland Plain Woodland in the Sydney Bioregion CEEC under the New South Wales Biodiversity Conservation Act 2016 (BC Act).

1.3 PROPOSED DEVELOPMENT

The proposal involves major alterations and additions to the existing high school, comprising the construction of a new 3 storey building that will provide contemporary learning spaces, replacing 18 existing demountable classrooms on site. The proposed development will provide 47 additional learning spaces, including refurbished wood/metal and food tech units, provision of an additional support learning unit plus new administration and staff facilities, upgrades to the existing library, construction of new covered walkways and ancillary utility infrastructure and landscaping works.

1.4 MANAGEMENT PLAN OBJECTIVES

1.4.1 Objectives

This BMP is a requirement of the Request for Additional Information from the Department of Planning and Environment (DPE). The BMP is required to be prepared by a suitably qualified person (i.e. qualified ecologist or bush regeneration specialist) and provide a preliminary strategy for the management and regeneration of the Cumberland Plain Woodland. The key objectives of the BMP include:

1. To minimise impacts to flora and fauna, and their habitats, during the construction phase of the Glenwood High School development.
2. To improve the condition of the Cumberland Woodland within the Reserve and to ensure that it is maintained in a healthy condition.
3. To restore the existing derived grassland areas within the Reserve with species commensurate with that of Cumberland Plain Woodland and to ensure that it is maintained in a healthy condition.
4. To outline a strategy for the management of key weed species identified within the BDAR (Kleinfelder 2021) as key threats to the vegetation within the Reserve.
5. 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 Reserve.

Metres
0 25 50 100 150 200 250

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DATA SOURCE:
NSW DFSI - 2021
Nearmap - 2022

Locality

Jacobs Group (Australia) Pty Ltd
Biodiversity Management Plan
Glenwood High (Lot 5227 DP868693)
Forman Avenue, Glenwood NSW

FIGURE:

1

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2 BIODIVERSITY VALUES

2.1 KEY BIODIVERSITY VALUES

A Biodiversity Development Assessment Report (BDAR) was completed for the Glenwood High School development by Kleinfelder following the completion of a site-based assessment (01 June 2021). The key results of the BDAR are detailed below.

2.1.1 Flora Species

A total of 64 flora species were identified during field surveys, 36 of these were exotic species. No threatened species were identified within the Subject Site. A list of the flora species identified within the Subject Site is provided in **Appendix B**.

A total of seven (7) 'High Threat Exotics" and three (3) Priority Weeds for the Greater Sydney Local Land Services Region under the *Biosecurity Act 2015* (NSW) were identified within the site, all of which are also listed as Weeds of National Significance (WoNS) (DAWE 2022). An additional species is listed as a WoNS but not as a Priority Weed is included in the list of species below:

- *Asparagus asparagoides* (Bridal Creeper) [WoNS and Priority Weed]
- *Senecio madagascariensis* (Fireweed) [WoNS and Priority Weed]
- *Olea europaea* subsp. *cuspidata* (Common Olive) [WoNS]
- *Rubus fruticosus sp. agg.* (Blackberry complex) [WoNS and Priority Weed]

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

- *Cenchrus clandestinus* (Kikuyu)
- *Setaria parviflora*
- *Sporobolus africanus* (Parramatta Grass)

A comprehensive list of exotic species is presented in **Appendix A**. Discussion of the threat of weed infestations on the area of Cumberland Plain Woodland is provided in **Section 2.2.1**. Level of weed infestation within each Management Zone is discussed in **Section 3.1.** Mitigation measures to prevent the spread of weeds are presented in **Section 3**.

2.1.2 Vegetation Communities

One (1) native vegetation community exists within the Reserve. This community is represented by three condition classes within the Subject Site, two (2) of which exist within the Reserve (**Figure 3**), including:

- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (CEEC - Moderate Condition) - Area within Reserve: 0.33 ha.
- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition) - Area within Reserve: 0.08 ha.

The vegetation within the Reserve represents one Critically Endangered Ecological Community (CEEC); *Cumberland Plain Woodland in the Sydney Bioregion* CEEC as listed under the BC Act (see **Figure 3**).

2.1.3 Fauna and Habitat Values

Fauna habitat within the Subject Site is characterised by open managed (mown) grassland areas, gardens of dense shrubs (i.e. *Callistemon spp.*, *Acacia spp.* and exotics), mature eucalypts, and a fenced off patch of intact native woodland. Much of the vegetation within the Subject Site is highly managed, as such there is a low abundance of wooden debris, leaf litter and dense shrub cover which would otherwise provide important habitat for ground dwelling native fauna. As such, most of the vegetation within the Subject Site is likely to only constitute habitat for highly mobile threatened species (i.e. birds and bats), and locally occurring species associated with urban/suburban environments.

The exception is the patch of native woodland (The Reserve), which is characterised by a mature canopy of eucalypts, a scattered midstorey of *Melaleuca spp. Acacia spp.* and *Bursaria spinosa*, hollow-bearing trees, abundant fallen timber, and a drainage depression capable of retaining water (considered likely frog habitat). Conversely, the Reserve is dominated by exotic groundcover species and is only partially connected to scattered patches of vegetation along a watercourse to the north, and streetside vegetation throughout the locality. As such, the Reserve represents habitat for locally occurring woodland birds, common arboreal marsupials, and only highly mobile threatened species (i.e. birds and bats).

Key fauna habitat features identified during the site assessment includes the following:

- Four (4) Hollow-bearing Trees (HBT) either *Eucalyptus tereticornis* (Forest Red Gum) or *Eucalyptus moluccana* (Grey Box) with and additional two (2) dead stags (**Figure 2**).
- Two (2) hollow fallen logs within the Reserve creating habitat for reptiles and mammals (**Figure 2**).
- 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.
- A Drainage Swale occurs within the Reserve, providing habitat suitable for a variety of native fauna species.

No threatened fauna species were identified within the Subject Site during the site assessment. A total of eleven (11) species of fauna were detected within the Subject Site during field surveys. These included eleven (11) bird species, which are common to urban/suburban environments. More commonly encountered species included the Red-rumped Parrot (*Psephotus haematonotus*), Rainbow Lorikeet (*Trichoglossus haematodus*), Eastern Rosella (*Platycercus eximius*), and Noisy Miner (*Manorina melanocephala*).

Legend

- Subject Site
- Development Site
- Reserve
- Unnamed Watercourse
- Sub-arterial Road
- Local Road

Habitat Features

- Dead Stag
- Hollow Log (on ground)
- Hollow bearing Tree

Plant Community Types

- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Moderate Condition)
- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Low Condition)
- PCT 849 - Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion (Planted)
- Planted Native/Exotic Vegetation
- Exotic Grassland (Managed)
- Existing Infrastruture

Metres
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Nearmap - 2022

Vegetation and Biodiversity Values

Jacobs Group (Australia) Pty Ltd
Biodiversity Management Plan
Glenwood High (Lot 5227 DP868693)
Forman Avenue, Glenwood NSW

FIGURE:
2

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2.2 KEY THREATS

2.2.1 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). Cumberland Plain Woodland is considered 'highly vulnerable' to weed invasion due to its position on relatively fertile soils, past land-use practices, and its naturally grassy understory (DEC 2005). A total of three (3) Priority Weed species for the Greater Sydney Local Land Services Region (DPI 2022) were identified within the Subject Site. All three species are also listed as Weeds of National Significance (WoNS) (DAWE 2023). These species included: *Asparagus asparagoides* (Bridal Creeper), *Senecio madagascariensis* (Fireweed) and *Rubus fruticosus sp. agg.* (Blackberry). An additional species *Olea europaea subsp. cuspidata* (Common Olive) is listed exclusively as a WoNS, Of the abovementioned weeds, Bridal Creeper was identified as having the highest cover within the Reserve, however all four occur at a relatively low abundance. Dominant weed species occur in the understorey of the Reserve and include *Cenchrus clandestinus* (Kikuyu), *Ehrharta erecta* (Panic Veldtgrass), *Setaria parviflora* and *Sporobolus africanus* (Parramatta Grass)

African Olive and Bridal Creeper, and Moth Vine (*Araujia sericifera*), all recorded on site, have been identified as particularly significant weeds or the Cumberland Plain Woodland, owing to their highly competitive nature and ability to suppress understorey species. Bridal Creeper and Moth Vine are among a suite of exotic vines and scramblers that are listed as a threatening process in NSW which are also considered a specific threat to the ecological community (NSW Scientific Committee, 2006). African Olive is a particularly significant threat to the ecological community. It has an ability to permanently change the structure of the ecological community through dense mid-canopy formation and, like other weeds such as Bridal Creeper, can suppress native plant species in the understorey

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 educational facility, 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).

2.2.2 Vegetation Clearing and Habitat Loss

Vegetation Clearing of is considered a primary threat to the conservation of Cumberland Plain Woodland CEEC (BC Act) (DEC 2005). This clearing has occurred gradually over time resulting in increasingly isolated, small patches of woodland that are more vulnerable to potential impacts and support fewer species. The proposed development will require the clearing of native vegetation to a minor extent, including 0.01 ha of woodland (PCT 849 – *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*). Vegetation clearing will not impact any hollow bearing trees identified within the Subject Site that may represent nesting habitat for a variety of native bird and arboreal mammal species. Incursions into areas 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 development may further exacerbate habitat loss and degradation of vegetation through inappropriate management of retained vegetation.

2.2.3 Erosion and Sedimentation

Mature vegetation is considered integral in preventing erosion through bank stabilisation and sediment control (DEC 2005). 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 (Cumberland Plain Woodland) and threatened species habitat.

2.2.4 Urbanisation and Increased Nutrient Loading

Much of the Cumberland Plain was cleared historically to make way for agricultural practices. Whilst still common, the landscape, particularly within the Blacktown LGA has become increasingly urban in nature, with agricultural sites being subdivided to make way for high density urban developments. Urbanisation results in 'site hardening' or the covering of ground surfaces with impervious infrastructure that prevents rainwater from entering the water table (DEC 2005). This results in increased runoff, most of which ends up flowing overland or via creeks through bushland. Runoff often collects and carries excess sediment and nutrients produced in the urbanised landscape and transports it to native bushland.

The excess nutrient load can negatively impact bushland by encouraging the growth of exotic plant species, some of which may have been introduced via the runoff.

Urbanisation and increased nutrient loading represent a threat to biodiversity values during:

- ***Construction Phase:*** Construction activities within the Subject Site have the potential to reduce soil stability and cause erosion. Suitable conditions could result in potential impacts to retained vegetation via runoff, and the introduction/facilitation of weed incursions.
- ***Operational Phase:*** The proposed education facility may further exacerbate nutrient loading within native vegetation, in turn facilitating habitat degradation through the introduction/facilitation of weed incursions.

2.2.5 Lighting, Noise and Water Pollution

Urban developments can result in a number of indirect impacts pertaining to Cumberland Plain 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 development action 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.

3 MANAGEMENT PLAN

3.1 MANAGEMENT ZONES

Four (4) 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 3**, and detailed in **Table 1**.

- **Management Zone 1:** Reserve (woodland rehabilitation)
- **Management Zone 2:** Reserve (woodland restoration)
- **Management Zone 3:** Development Site
- **Excluded:** Existing School Grounds (not impacted)

Table 1: Management Zones within the Subject Site

Management Zone	Description
Management Zone 1: Reserve (woodland rehabilitation)	**Total area within Subject Site:** 0.33 ha **Community:** PCT 849 – *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*, Critically Endangered Ecological Community (BC Act) - Moderate Condition **Form:** Grassy Woodland **Description:** The vegetation within this zone was characterised by a canopy dominated by *Eucalyptus tereticornis* (Forest Red Gum), with the occasional *Eucalyptus crebra* (Narrow-leaved Ironbark). The midstorey is comprised of *Melaleuca decora*, *Acacia parramattensis* (Parramatta Wattle), *Bursaria spinosa* (Sweet Bursaria), and the occasional *Olea europaea* subsp. *cuspidata* (African Olive). The ground layer within this zone is dominated by exotic grasses including *Paspalum dilatatum**(Paspalum), *Eragrostis curvula* (African Lovegrass), and *Ehrharta erecta* (Panic Veldtgrass). A mix of native grasses and herbs still persist within this vegetation zone, including *Microlaena stipoides* (Weeping Grass), *Einadia hastata* (Berry Saltbush), *Dichondra repens* (Kidney Weed), and *Commelina cyanea* (Native Wandering Jew). **Disturbances:** Vegetation condition within this zone is impacted by the occurrence of priority weed species and the dominance of an exotic grassy groundlayer. Key exotic species within this zone include the dominance of High Threat Weeds (HTW) in the ground layer (e.g., *Paspalum dilatatum*, *Eragrostis curvula*, *Ehrharta erecta*) and Priority Weeds for the Greater Sydney region including *Olea europaea* subsp. *cuspidata*, *Rubus fruticosus* (Blackberry), *Asparagus asparagoides* (Bridal Creeper), and *Senecio madagascariensis* (Fireweed). **Management Goals:** This zone exists outside of the Development Site and will be retained within the proposed Reserve. It will be subject to active management to maintain and restore the CEEC, improve habitat values, reduce weed impacts and extent. Supplementary plantings of Cumberland Plain Woodland species should be completed alongside restoration within Management Zone 2 where needed.
Management Zone 2: Reserve (woodland restoration)	**Total area within Subject Site:** 0.08 ha **Community:** PCT 849 – *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion* - Low Condition **Form:** Derived Grassland **Description:** Canopy is reduced to scattered canopy trees including *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), and *Angophora floribunda* (Rough-barked Apple). The midstorey, whilst largely reduced, contains *Melaleuca decora*, *Acacia parramattensis* (Parramatta Wattle). The groundcover within this zone is highly managed (mown) and dominated by exotic grasses including *Cenchrus clandestinus* (Kikuyu Grass), *Setaria parviflora* (Pigeon Grass), *Lolium rigidum*

Management Zone	Description
	(Wimmera Ryegrass), and *Sporobolus africanus* (Parramatta Grass). Some native grasses and herbs persist within the vegetation zone including *Microlaena stipoides* (Weeping Grass), *Dichondra repens* (Kidney Weed), and *Oxalis perennans*. A intermittently filled swale occurs within the Reserve. **Disturbances:** Historic vegetation clearing and ongoing management (mowing). This management zone is primarily comprised of exotic grasses and forbs. **Management Goals:** The extent of this community within the Reserve will be subject to active management to maintain and restore the community, improve habitat values, reduce weed impacts and extent. Most notably, this will include restoration of canopy vegetation through the planting of tree species associated with PCT 849. Additional planting of sub-aquatic vegetation within the existing swale is recommended to enhance its overall habitat value.
Management Zone 3: Development Site	**Total area within Subject Site:** 0.76 ha **Community:** This zone is managed as part of Glenwood High School and is predominantly occupied by existing infrastructure. A small area (approximately 0.01 ha) of low condition PCT 849 - *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion,* lies within this management zone. Additionally, a managed exotic grassland occurs within the Development Site. **Form:** Low condition native vegetation to be impacted by development. Managed as open space and occupied by existing infrastructure proposed for removal. **Description:** An area actively managed and occupied by infrastructure associated with Glenwood High School. Management Zone 3 includes a small area (0.01 ha) of PCT 849 as well as managed exotic grasslands. **Management Goals:** This zone will be occupied by a new 3 storey building that will provide contemporary learning spaces for the Students of Glenwood High School. Construction will be managed in a way that minimises potential indirect impacts to the neighbouring Reserve. Here, planting will occur to improve the overall condition of native vegetation within the Subject Site.
Excluded: Existing School Grounds (not impacted)	**Total area within Subject Site:** 4.9 ha **Form:** Derived Grassland impacted by development. Managed as parks and open spaces. **Description:** The extent of the Subject Site outside of the Reserve and Development Site. It is predominantly comprised of existing infrastructure associated with the school and exotic grassland. A lesser extent of low condition PCT 849 – Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, occurs sporadically across the Subject Site. Areas of planted exotic/native vegetation occur within this zone.

3.1.1 Management Stages

The BMP will be implemented over a 5-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 (Baseline) following the completion of works to the end of the implementation period, 5 years after the completion of construction (Year 5).

3.1.2 Performance Criteria

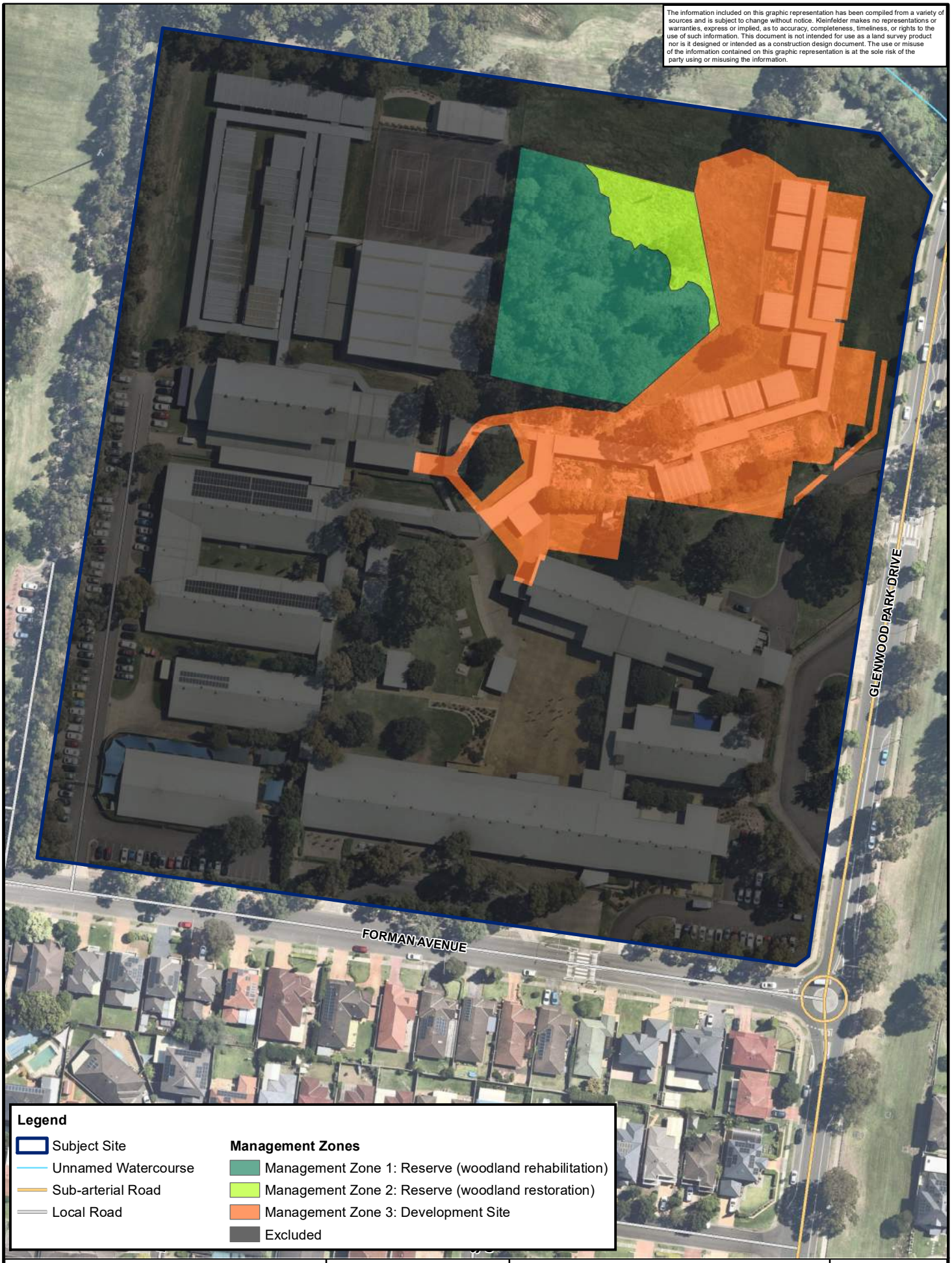
The overall performance criterion of this BMP are as follows:

- **Vegetation Extent:** The area of Cumberland Plain Woodland within the Reserve will increase to encompass areas of Management Zone 1 and Management Zone 2 through the restoration of low condition vegetation (Management Zone 2)
- **Vegetation Condition:** The condition of vegetation within Management Zone 1 and 2 will progress towards the community benchmarks for PCT 849, derived from the NSW BioNet Vegetation Classification, by the final monitoring report (DPE 2022). These benchmarks are outlined below:
  - A high diversity of native species commensurate with Cumberland Plain Woodland,
  - A high cover of native species consistent with Cumberland Plain Woodland including:
    - 53% Foliage Percentage Cover (FPC) of tree species (TG)
    - 16% FPC of shrub species (SG)
    - 9% FPC of forb species (FG)
    - 58% FPC of grass and grass-like species (GG)
    - 4% FPC of ‘other’ species
- The presence of native canopy regeneration within Management Zone 2 of the Reserve – measured through sapling presence/absence of key canopy species including: *Eucalyptus fibrosa* (Red Ironbark), *Eucalyptus tereticornis* (Forest Red Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark).
- The presence of native understorey species regeneration within Management Zone 2 of the Reserve – measured through the presence/absence of key understorey species including: *Themeda australis* (Kangaroo Grass), *Carex inversa* (Know Sedge), *Bursaria spinosa subsp. spinosa* (Native Blackthorn), *Daviesia ulicifolia* (Gorse Bitter Pea) and *Dodonaea viscosa subsp. cuneata* (Hop Bush).
- Absence of Priority Weeds, Weeds of National Significance (WoNS), and High Threat Weeds (HTWs).

3.1.3 Responsibilities

Implementation and funding of this BMP is the responsibility of the school who will be the proprietor of the Reserve throughout the implementation period. The BMP will be implemented over a 5-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 BMP will be undertaken by suitably experienced and qualified persons or companies engaged by the proprietor of the site and 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
- Unnamed Watercourse
- Sub-arterial Road
- Local Road

Management Zones

- Management Zone 1: Reserve (woodland rehabilitation)
- Management Zone 2: Reserve (woodland restoration)
- Management Zone 3: Development Site
- Excluded

Metres
0 5 10 20 30 40 50

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DATA SOURCE:
NSW DFSI - 2021
Nearmap - 2022

Management Zones

Jacobs Group (Australia) Pty Ltd
Biodiversity Management Plan
Glenwood High (Lot 5227 DP868693)
Forman Avenue, Glenwood 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 (subsection 5.3) of the Biodiversity Development Assessment Report (BDAR) (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 Reserve in accordance with monitoring program detailed in **Section 3.5.1.** Baseline monitoring is to be completed within one (1) month of the completion 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.

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 Reserve.

- Vegetation clearing should 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 Reserve, particularly within Management Zone 2 under the supervision of the project ecologist.
- Removal of habitat trees within the Subject Site will be done under the supervision of the project ecologist and will include the following tree felling procedures:
    - 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.
    - During vegetation clearing works, tree trunks and larger branches (over 10 cm diameter) determined to be salvageable on instruction from the project ecologist can be removed from the Development Site and are to be cut up into long pieces (i.e. over 4 m where possible) and carefully placed within the 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 Development Site 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 Reserve. 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 Reserve

Existing school fencing occurs along the boundary of the Reserve. It is recommended this fencing be replaced with a style with greater durability, that can simultaneously restrict access to students, delineate the boundary for general school maintenance (i.e. mowing), and prevent exotic grasses from growing into the Reserve. Suitable fencing could include a post and rail style with a 30cm solid barrier at the base of the fenceline to minimise exotic grass infiltration into the Cumberland Plain Woodland.

3.4.2 Restoration of Cumberland Plain Woodland

Restoration of Cumberland Plain Woodland will occur in Management Zones 1 and 2 within the Reserve. This aims to maintain 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 the reservation of the vegetation within Reserve are summarised in **Section 3.1.2**.

The restoration of Cumberland Plain Woodland CEEC within the Reserve will adopt a strategy of adaptive management, informed by annual monitoring results and recommendations.

Restoration techniques used within the Reserve include restricting entry to the site, weed management, habitat augmentation as well as planting of indigenous plant species through direct seeding, tubestock, and 5 litre (L) pots (McIntosh and Phelps, 2021). These methods are detailed below:

Restriction of Entry

The Reserve occurs within the grounds of Glenwood High School where it is surrounded by managed exotic grassland and existing education related infrastructure. Whilst a fence occurs around this community, it has been exposed to various degrading processes that are likely impacting native floristic diversity and structure, canopy regeneration, weed abundance, and resulted in elevated nutrient loads. Several of these impacts, particularly weed infiltration, can be exacerbated by foot traffic. To minimise further degradation of the vegetation, access to the site will be restricted. This shall be achieved through the upgrading of the fence and the installation of signage communicating that entry is restricted only to those permitted.

Weed Management

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

Revegetation and Supplementary Planting

The Reserve is characterised by sparse mature woodland, scattered native shrubs, and a high cover of exotic groundcover species (i.e. grasses and herbs). It occurs within a highly developed landscape in a disturbed condition, where it is surrounded by infrastructure and managed exotic grassland. The improvement of fencing and signage aims to further restrict entry by students and reduce weed incursion, in turn aiding the process of natural regeneration. This regeneration is expected to be further assisted through the control and suppression of weeds throughout the BMP implementation period and the planting of native species throughout the Reserve.

The following supplementary planting is recommended:

- **Management Zone 1:** Supplementary planting of shrub and understorey species characteristic of the local vegetation community (PCT 849) and Cumberland Plain Woodland CEEC (see **Appendix B**). Supplementary planting of canopy species is to be completed within this Management Zone to increase canopy cover alongside the species recommendations detailed for Management Zone 2.
- **Management Zone 2:** Revegetation of canopy shrub and understory species is required within this zone following weed control. These species are to be planted in accordance with planting list in **Appendix B**. A different assemblage of water-tolerant species will be planted within the Drainage Swale to create additional habitat for native fauna. The need (or lack thereof) for supplementary planting following the initial planting event will be communicated in future annual monitoring reports.

All planting should utilise the species listed within **Appendix B**, with preference for local provenance stock. Recommended species include those associated with PCT 849 and Cumberland Plain Woodland CEEC (DPE 2022, DPE 2010). Where these species cannot be sourced, only local species indicative of Cumberland Plain Woodland. Planting will be staged as required, including direct seeding as well as the placement of tubestock and 5L tree stock (Management Zone 2).

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. Tree trunks and larger branches (over 10 cm diameter) deemed suitable by the project ecologist supervising clearing can be removed from the development area during vegetation clearing. Where suitable these trunks and larger branches can then be cut up into long pieces (i.e. over 4 m where possible) and carefully placed into woodland and grassland areas within the 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).

3.4.3 Restoration of Drainage Swale

An existing drainage swale occurs within Management Zone 2 of the Reserve. This swale intermittently holds water, creating habitat for native fauna. Vegetation within and surrounding the swale is largely comprised of exotic grasses and forbs. The revegetation of the swale will be completed at the same time as revegetation works elsewhere in the Reserve, following the completion of construction. Plant species to be planted in these areas will be characteristic of the local vegetation community (PCT 849) and Cumberland Plain Woodland CEEC, with the addition of suitable wetland species recommended by Blacktown Local Council (See **Table B2**, **Appendix B**).

3.4.4 Landscaping of Parks and Open Spaces

Landscape planting in open spaces within the Subject Site will include plant species consistent with local vegetation (PCT 849) and the Cumberland Plain Woodland CEEC, in accordance with the Landscape Design Plans (McIntosh and Phelps, 2021). The following measures are to be implemented where suitable and alongside the requirements of the Landscape Design Plans (McIntosh and Phelps, 2021) in the landscaping of parks and open space areas:

- Any native trees to be retained within proximity to the Development Site 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.
- 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 within proximity to the Reserve.

3.4.5 Weed Management

Weed management within the Reserve will prioritise the management of the following species, including:

- *Asparagus asparagoides* (Bridal Creeper) [WoNS and Priority Weed]
- *Rubus fruticosus sp. agg*. (Blackberry) [WoNS and Priority Weed]
- *Olea europaea subsp. cuspidata* (Common Olive) [WoNS]
- *Paspalum dilatatum* (Paspalum)
- *Araujia sericifera* (Moth Vine)

Management will adopt the ‘Bradley method’, which involves the progressive, staged removal of weeds from less disturbed areas (i.e. Management Zone 1) followed by removal from more weed infested areas (i.e. Management

Zone 2). 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 first stage of weed removal should occur within the Reserve prior to any planting, with an effort made to preserve existing native groundcover species.

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 presence of native groundcover species within 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 2022). 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 36 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. Follow up weed management may be required as per the recommendations of future reports. It is expected that other restoration tasks including the restriction of entry, upgrading of fence and additional plantings will assist in the natural reduction of general exotic species cover over the duration of the BMP implementation period (5 years) and beyond.

3.5 ADAPTIVE MANAGEMENT/OPERATIONAL PHASE

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

3.5.1 Monitoring Program

A monitoring program will be implemented to ensure that the measures detailed within this BMP 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
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
Baseline Monitoring Survey	Completed within one (1) month following the completion of works	Establishment of two permanent monitoring plots and completion of the Monitoring Programme	Baseline Monitoring Report
Annual Monitoring Survey	Completed one (1) year following the completion of construction. Completed annually until the fourth year of the monitoring program.	Completion of the Monitoring Programme	Annual Monitoring Survey Report
Final Summary Report	Completed at the end of the 5-year implementation period.	Completion of the Monitoring Programme Summary of the Monitoring Programme throughout implementation period.	Final Annual Summary Report inclusive of Year 5 results.

Monitoring Program Methods

Monitoring will be completed within the 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 (DPE 2020), and;
- Vegetation Benchmarks for PCT 849 as per the NSW BioNet Vegetation Classification (DPE 2022)

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; Management Zone 1) and weed infestation are to be updated during every monitoring event using a hand-held GPS.

Vegetation Condition

A total of two (2) 20 m x 20 m quadrats are to be established within the Reserve during baseline monitoring, with one (1) quadrat placed within Management Zone 1, and the other (1) within Management Zone 2. The quadrats are to be sampled as per Section 5.3.4 of the NSW Biodiversity Assessment Method (BAM), excluding the implementation of a central 50 m transect (DPE, 2020). The midline at the starting point of each quadrat is to be marked with a stake to ensure accuracy of repeat monitoring. The location and bearing of the quadrats are to be recorded in a GPS device.

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 in accordance with the BAM (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 20 m quadrat)
- Cover of litter and bare ground (as per adjusted BAM method) (within the 20 m x 20 m quadrat)
- Total length of fallen logs (dbh <10 cm) (as per adjusted BAM method) (within the 20 m x 20m quadrat)
- Photo monitoring: a single photo is to be taken at the staked point facing into the quadrat.

Reserve Maintenance

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

- Condition of boundary fencing and signage around the Reserve
- Signs of degradation e.g., dumping of waste (inc. garden waste), infiltration of exotic species and priority weeds.
- Condition of habitat features (i.e. existing hollows)
- Condition and composition of native vegetation within the Drainage Swale.

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 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 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 the consent authority.
- **Final Summary Report:** The final Annual Monitoring Survey Report, inclusive of the monitoring results of Year 5 as well as a summary the results of the Monitoring Programme throughout. This is to be delivered 5 years post completion of works.

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APPENDIX A FLORA SPECIES LIST

Table A1: Subject Site Flora Species List

Number	Family	Scientific Name	Common Name	Form
1.	**Apiaceae**	*Daucus glochidiatus*	Native Carrot	Forb (FG)
2.	**Campanulaceae**	*Lobelia purpurascens*	Whiteroot	Forb (FG)
3.	**Chenopodiaceae**	*Einadia hastata*	Berry Saltbush	Forb (FG)
4.	**Chenopodiaceae**	*Einadia trigonos*	Fishweed	Forb (FG)
5.	**Commelinaceae**	*Commelina cyanea*	Native Wandering Jew	Forb (FG)
6.	**Convolvulaceae**	*Dichondra repens*	Kidney Weed	Forb (FG)
7.	**Fabaceae (Faboideae)**	*Glycine tabacina*	Variable Glycine	Other (OG)
8.	**Fabaceae (Mimosoideae)**	*Acacia parramattensis*	Parramatta Wattle	Tree (TG)
9.	**Juncaceae**	*Juncus subsecundus*	Finger Rush	Grass & grasslike (GG)
10.	**Lamiaceae**	*Westringia fruticosa*	Coastal Rosemary	Shrub (SG)
11.	**Lomandraceae**	*Lomandra longifolia*	Spiny-headed Mat-rush	Grass & grasslike (GG)
12.	**Myrtaceae**	*Angophora floribunda*	Rough-barked Apple	Tree (TG)
13.	**Myrtaceae**	*Callistemon citrinus*	Crimson Bottlebrush	Shrub (SG)
14.	**Myrtaceae**	*Eucalyptus crebra*	Narrow-leaved Ironbark	Tree (TG)
15.	**Myrtaceae**	*Eucalyptus moluccana*	Grey Box	Tree (TG)
16.	**Myrtaceae**	*Eucalyptus tereticornis*	Forest Red Gum	Tree (TG)
17.	**Myrtaceae**	*Melaleuca decora*	-	Shrub (SG)
18.	**Oxalidaceae**	*Oxalis perennans*	-	Forb (FG)
19.	**Pittosporaceae**	*Bursaria spinosa*	Native Blackthorn	Shrub (SG)
20.	**Poaceae**	*Cynodon dactylon*	Common Couch	Grass & grasslike (GG)
21.	**Poaceae**	*Microlaena stipoides*	Weeping Grass	Grass & grasslike (GG)
22.	**Proteaceae**	*Grevillea spp.*	-	Shrub (SG)
23.	**Proteaceae**	*Grevillea spp.*	-	Shrub (SG)
24.	**Vitaceae**	*Cayratia clematidea*	Native Grape	Other (OG)

Table A2: Subject Site Exotic Flora Species List

No.	Family	Scientific Name	Common Name	Form	Status
1.	Agavaceae	*Yucca aloifolia*	Spanish Bayonet	Exotic	
2.	Apocynaceae	*Araujia sericifera*	Moth Vine	HTW - Manageable	
3.	Apocynaceae	*Plumeria rubra*	Frangipani	Exotic	
4.	Asparagaceae	*Asparagus asparagoides*	Bridal Creeper	HTW	Priority Weed and WoNS
5.	Asteraceae	*Bidens pilosa*	Cobbler's Pegs	Exotic	
6.	Asteraceae	*Dimorphotheca ecklonis*	Cape Daisy	Exotic	
7.	Asteraceae	*Senecio madagascariensis*	Fireweed	Exotic	Priority Weed and WoNS
8.	Asteraceae	*Soliva sessilis*	Bindyi	Exotic	
9.	Asteraceae	*Sonchus asper*	Prickly Sowthistle	Exotic	
10.	Asteraceae	*Taraxacum officinale*	Dandelion	Exotic	
11.	Brassicaceae	*Brassica fruticulosa*	Twiggy Turnip	Exotic	
12.	Caryophyllaceae	*Stellaria media*	Common Chickweed	Exotic	
13.	Fabaceae (Faboideae)	*Medicago polymorpha*	Burr Medic	Exotic	
14.	Fabaceae (Faboideae)	*Trifolium repens*	White Clover	Exotic	
15.	Lamiaceae	*Marrubium vulgare*	White Horehound	Exotic	
16.	Malvaceae	*Modiola caroliniana*	Red-flowered Mallow	Exotic	
17.	Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	Exotic	
18.	Oleaceae	*Fraxinus spp.*	-	Exotic	
19.	Oleaceae	*Olea europaea*	Common Olive	HTW - Manageable	WoNS
20.	Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	Exotic	
21.	Plantaginaceae	*Plantago major*	Large Plantain	Exotic	
22.	Plumbaginaceae	*Plumbago auriculata*	Cape Leadwot	Exotic	
23.	Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	Exotic	
24.	Poaceae	*Ehrharta erecta*	Panic Veldtgrass	HTW	
25.	Poaceae	*Eragrostis curvula*	African Lovegrass	HTW	
26.	Poaceae	*Lolium rigidum*	Wimmera Ryegrass	Exotic	

No.	Family	Scientific Name	Common Name	Form	Status
27.	Poaceae	*Paspalum dilatatum*	Paspalum	HTW	
28.	Poaceae	*Poa annua*	Winter Grass	Exotic	
29.	Poaceae	*Setaria parviflora*	-	Exotic	
30.	Poaceae	*Sporobolus africanus*	Parramatta Grass	Exotic	
31.	Rosaceae	*Rubus fruticosus sp. agg.*	Blackberry complex	Exotic	Priority Weed and WoNS
32.	Rubiaceae	*Galium aparine*	Goosegrass	Exotic	
33.	Rubiaceae	*Galium murale*	Small Bedstraw	Exotic	
34.	Sapindaceae	*Acer negundo*	Box Elder	HTW - Manageable	
35.	Solanaceae	*Solanum nigrum*	Black-berry Nightshade	Exotic	
36.	Solanaceae	*Solanum pseudocapsicum*	Madeira Winter Cherry	Exotic	

APPENDIX B RECOMMENDED PLANTING LISTS

Table B1: Reserve Recommended Planting List

Stratum	Scientific Name	Common Name	Management Zone 1	Management Zone 2
Canopy	*Eucalyptus crebra*	Narrow-leaved Ironbark		✓
	Eucalyptus moluccana	Grey Box		✓
	Eucalyptus tereticornis	Forest Red Gum		✓
Shrubs	*Bursaria spinosa subsp. spinosa*	Native Blackthorn	✓	✓
	Acacia decurrens	Black Wattle	✓	✓
	Acacia implexa	Hickory Wattle	✓	✓
	Acacia parramattensis	Parramatta Wattle	✓	✓
	Dodonaea viscosa subsp. cuneata	Hop Bush	✓	✓
	Daviesia ulicifolia	Gorse Bitter Pea	✓	✓
Ground/ Climbers	*Aristida ramosa*	Purple Wiregrass	✓	✓
	Aristida vagans	Threeawn Speargrass	✓	✓
	Cheilanthes sieberi	Poison Rock Fern	✓	✓
	Clematis glycinoides var. glycinoides	Headache Vine	✓	✓
	Cymbopogon refractus	Barbed Wire Grass	✓	✓
	Cyperus gracilis	Slender Flat-sedge	✓	✓
	Dianella longifolia	Blue Flax Lily	✓	✓
	Echinopogon caespitosus	Bushy-hedgehog Grass)	✓	✓
	Goodenia hederacea	Ivy Goodenia	✓	✓
	Lomandra filiformis	Mat Rush	✓	✓
	Lomandra multiflora	Many-flowered Mat-rush	✓	✓
	Microlaena stipoides	Weeping Grass	✓	✓
	Poa labillardieri var. labillardieri	Tussock Grass	✓	✓
	Themeda triandra	Kangaroo Grass	✓	✓
	Wahlenbergia gracilis	Sprawling Bluebell	✓	✓

Table B2: Drainage Swale Recommended Planting List

Stratum	Scientific Name	Common Name
Ground	*Bolboschoenus caldwellii*	
	Carex appressa	Tall Sedge
	Cymbopogon refractus	Barbed-wire Grass
	Cyperus polystachyos	
	Juncus kraussii	Sea Rush
	Lomandra longifolia	Spiny Mat-Rush
	Lomandra filiformis	Mat Rush
	Themeda triandra	Kangaroo Grass
	Poa labillardieri var. labillardieri	Tussock Grass

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 (BDAR), and Report Review.
James Baldry	MBioCons	Ecologist	Report Author
Gayle Joyce	BSc (Forestry) (Hons)	GIS Specialist	GIS and Figure Preparation

APPENDIX D LICENSE AND PERMITS

Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2023) and the *Animal Research Act 1985* to harm/trap/release protected native fauna and to pick for identification purposes native flora and to undertake fauna surveys.