

# Biodiversity Management Sub-Plan

## Lindfield Learning Village

### Eton Road, Lindfield, NSW

20212527

5 November 2020



95 Mitchell Road, Cardiff, NSW 2285

Phone: +61 2 4949 5200



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## Lindfield Learning Village Eton Road, Lindfield, NSW

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Prepared for:

BLACKASH BUSHFIRE CONSULTING  
PO BOX 715  
WAHROONGA NSW 2076

Prepared by:

**Kleinfelder Australia Pty Ltd**

95 Mitchell Road, Cardiff, NSW 2285  
Phone: +61 2 4949 5200

ABN: 23 146 082 500

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Brad Deane	Rob Townsend Tony Hawkins	Dan Pedersen

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# 1 INTRODUCTION

This Biodiversity Management Sub-Plan (BMSP) has been prepared by Kleinfelder Australia Pty Ltd (Kleinfelder) on behalf of the NSW Department of Education (DoE) and School Infrastructure NSW (SINSW) (the Applicant) to support the installation of an Asset Protection Zone (APZ), at Lot 3 Deposited Plan (DP) 1151638 and Lot 20 DP 1204689 within the Lane Cove National Park (LCNP) and a portion of Lot 1 DP 270770, Lindfield NSW 2070 (the subject land).

This BMSP has been prepared to support biodiversity impacts in conjunction with the LCNP Landscape Management Plan (Kleinfelder, 2019) (see **Appendix 1**). This BMSP is not a Construction Environmental Management Plan (CEMP) for the construction of the LLV, nor should it be treated as such.

This BMSP supports Phase 3 of the State Significant Development Application (SSD 16\_8114) for the Lindfield Learning Village (LLV), whereby the proposed APZ will provide a defensible space between Learning Village and surrounding bushland.

This BMSP addresses the installation of the LLV APZ, plus the following construction items:

- Construction Traffic (e.g. impacts on street trees and retained vegetation from crane movements, clearing associated with access).
- Proposed construction hours.
- Installation and maintenance of fencing (e.g. fauna/flora on site could be impacted through works associated with installation of boundary fencing),
- Light spill.
- Construction noise.
- Retained vegetation protection measures.
- Similar actions with potential to impact upon the surrounding environment.

This BMSP addresses vegetation management outside the property boundary of the LLV (see **Figure 1**). Kleinfelder have previously prepared a Landscape Management Plan (LMP) to address APZ installation and monitoring for Phase 1 of the LLV in 2018, with subsequent addendums to that document made to address Phase 2 and 3 of SSD 16\_8114 in July 2019. However, management methodology outlined under this BMSP may be applied throughout the entirety of the LLV development to mitigate any potential impacts to flora and fauna both at the LLV and in the surrounding environment.

Any controls referenced under this BMSP are to be applied in conjunction with those listed under the aforementioned LMP (Kleinfelder, 2019) **Appendix 1**.

## 1.1 SCOPE

This BMSP has been prepared with reference to the following documents:

- *Management of Bushfire Hazard – Dunston Grove*, prepared by School Infrastructure NSW, dated 17 June 2020.
- *Determination Notice for DPIE proponents* (REF 19/043), issued by the NSW Department of Planning, Industry and Environment (DPIE) on 8 November 2019.
- *Construction Agreement for Future Easement* granted by the Minister administering the *National Parks and Wildlife Act 1974* (NSW) for the LCNP.
- The LLV APZ Review of Environmental Factors (REF), prepared by DesignInc Sydney Pty Ltd in 2019.
- The LLV LCNP LMP, prepared by Kleinfelder in August 2019.

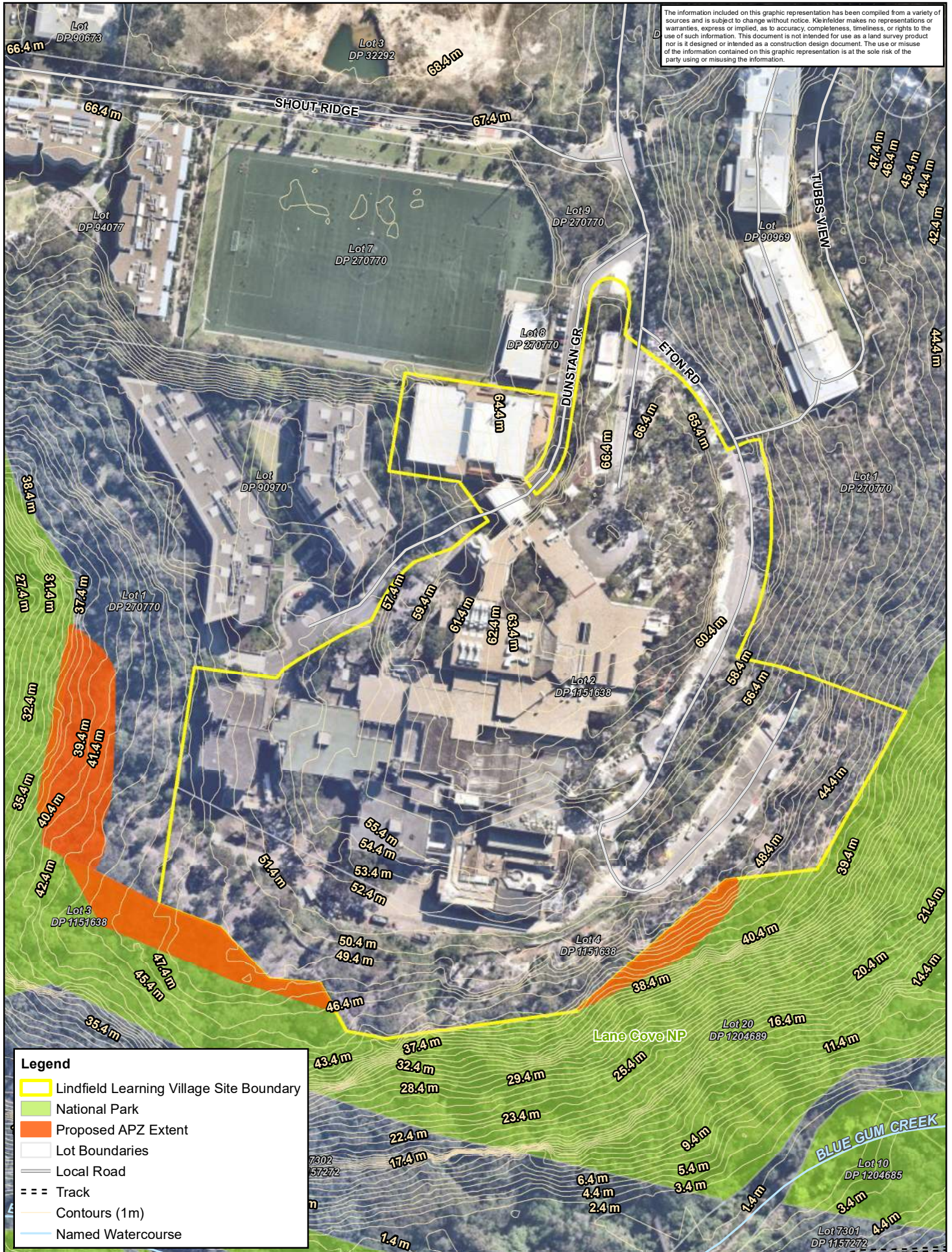
This BMSP has been prepared to meet the scope outlined in **Table 1** below. As stated above, Kleinfelder prepared the LMP for the installation of the LLV within the bounds of the LCNP in August 2019. It is noted that some of the information required under the scope of the BMSP is covered under the August 2019 LMP and, to avoid duplication, wherever cross-over occurs the BMSP will reference the LMP for onsite management.



**Table 1: Scope of BMSP**

Item		Section within BMSP
<b>a) Include details of:</b>		
i)	Potential impacts to flora and fauna due to activities being proposed as part of the development including construction traffic, proposed construction hours, details of fencing, light spill, construction noise and on-site crane movements.	<b>Section 2</b>
ii)	Mitigation measures to limit impacts including the installation and maintenance of exclusion fencing along and around retained native vegetation.	<b>Section 2</b>
iii)	Tree protection measures to be implemented, including those required under condition C19.	<b>Section 2</b>
<b>b) Measures to communicate to the construction workforce the biodiversity values that are to be retained and protected.</b>		<b>Section 2.2</b>
<b>c) Procedures for:</b>		
i)	Any removed hollows to be salvaged and installed into trees within the vegetated areas to be retained or be substituted with nest boxes that are suitable for local native fauna;	<b>Section 4.1</b>
ii)	Pre clearing surveys and subsequent relocation of fauna to be undertaken under the guidance of a suitably qualified ecologist prior to vegetation removal;	<b>Section 4.2</b>
iii)	Provision of evidence of pre-clearing surveys and relocation of fauna to the Certifier; and	<b>Section 4.3</b>
<b>d) Procedures for capturing and relocating animals that are injured or displaced during vegetation clearing.</b>		<b>Section 5</b>





<p>0 7.5 15 30 45 60 75 Metres</p> <p><b>KLEINFELDER</b> Bright People. Right Solutions. www.kleinfelder.com</p>	<p>PROJECT REFERENCE: 20212527</p> <p>DATE DRAWN: 28/10/2020 15:57 Version 9</p> <p>DRAWN BY: BDeane</p> <p>DATA SOURCE: NSW DFSI - 2017 Nearmap - 2019 SINSW - 2020 Commonwealth of Australia - on behalf of the Intergovernmental Committee on Surveying &amp; Mapping - 2019</p>	<p><b>Proposed APZ Extent</b></p> <p>Blackash Bushfire Consulting Biodiversity Management Sub-Plan</p>	<p>FIGURE:</p> <p><b>1</b></p>
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## 2 FLORA AND FAUNA IMPACTS

Item	
<b>a) Include details of:</b>	
i)	Potential impacts to flora and fauna due to activities being proposed as part of the development including construction traffic, proposed construction hours, details of fencing, light spill, construction noise and on-site crane movements.
ii)	Mitigation measures to limit impacts including the installation and maintenance of exclusion fencing along and around retained native vegetation.
iii)	Tree protection measures to be implemented, including those required under condition C19.

This section provides a brief outline of the potential flora and fauna impacts resultant from the scope of construction outlined in **Section 1** and installation of the LLV APZ. For a complete summary of potential impacts please see the LLV APZ Review of Environmental Factors (REF), prepared by Design Inc Sydney Pty Ltd in 2019.

### 2.1 POTENTIAL IMPACTS

See **Table 2** for a summary of potential impacts to flora and fauna and associated mitigation measures to be applied throughout the duration of construction of the LLV and installation of the proposed APZ.





**Table 2: Potential impacts and mitigation measures for LLV Construction and APZ**

Item	Potential Impacts	Mitigation Measures
<b>Construction Hours</b>		
<p>Construction hours to be between:</p> <ul style="list-style-type: none"><li>7am – 6pm Monday to Friday.</li><li>8am – 1pm Saturday.</li></ul> <p>APZ Installation hours (within LCNP) to be 7am-5pm Monday to Friday (see Condition 17 of Notice for Determination for reference).</p>	<ul style="list-style-type: none"><li>Minor noise impacts to fauna within the immediate surroundings via the movement of construction / vegetation modification traffic and use of machinery / hand-held equipment onsite.</li><li>Kleinfelder have not been made aware of any other construction related activities which have the potential for adverse noise impacts on the surrounding environment.</li></ul>	<ul style="list-style-type: none"><li>Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li><li>No clearing will occur during the early evening or at night (i.e. when most fauna species are active and likely to be active).</li><li>Construction hours within the recommended hours under the Interim Construction Noise Guideline (DECC, 2009).</li><li>Concurrence from the NPWS Authorised Officer must be obtained for any work on weekends or public holidays.</li></ul>
<b>Construction Traffic</b>		
<p>Construction traffic within the LLV APZ limited to that required for completion of the installation process, potentially including:</p> <ul style="list-style-type: none"><li>Mobile crane (20 tonne to 100 tonne).</li><li>Light vehicles (access restricted to LLV ground wherever possible).</li><li>Small, soft-tyred loader with a grapple attachment.</li></ul>	<ul style="list-style-type: none"><li>Risk of ground disturbance and surface scarification via vehicle movements.</li><li>Low risk of fauna collision during vehicle movements.</li></ul>	<ul style="list-style-type: none"><li>Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li><li>Controls as outlined under <b>Section 2.2</b> of this BMSP.</li><li>Use of a larger crane with more reach that may be parked within LLV grounds is to be undertaken in preference to a crane tracking into the LLV APZ footprint.</li><li>All vehicles are to remain on agreed and established trails and tracks where possible to minimise un-necessary soil disturbance. A small, soft-tyred loader with a grapple attachment may be used to transport cut material to the chipper.</li><li>The Project Ecologist will pre-clear survey each work area prior to entry by arborist team.</li></ul>



Item	Potential Impacts	Mitigation Measures
<b>APZ Delineation</b>		
As stated under the LMP (Kleinfelder, 2019), a tree survey will be undertaken prior to the commencement of the APZ installation to identify trees to be removed.	<ul style="list-style-type: none"> <li>• Potential risk of over-clearing to that required to meet Outer Protection Area (OPA) standards for an APZ.</li> <li>• No threatened flora have been identified onsite during site surveys (DesignInc, 2019).</li> <li>• Low impact to potential foraging habitat through the removal of overstorey trees, shrubs and the lifting of canopy to 2m above ground.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li> <li>• Application of the tree selection criteria (Section 3.3 of 2019 LMP) prioritises the removal of invasive species and vegetation with low habitat value over hollow-bearing trees, threatened species and potential feed trees.</li> <li>• Hollow-bearing trees and those containing nest boxes will be retained wherever possible.</li> <li>• Trees will be tagged for identification during the vegetation modification process.</li> <li>• Details noted in Section 3.2 of the LMP (Kleinfelder, 2019) will be recorded and kept by the Project Ecologist for verification purposes throughout the duration of vegetation modification works.</li> <li>• A delegate of the NSW National Parks and Wildlife Service (NPWS) will be invited to attend the tree survey ensure the opinions of all respective parties are expressed and adhered to prior to the commencement of site works.</li> <li>• Flag bunting is to be fitted with signs stating 'Asset Protection Zone site – no public access' to discourage public access during installation of the APZ.</li> </ul>
<p>Prior to the commencement of the proposed APZ installation, the perimeter of the proposed APZ will be pegged by a registered surveyor and a temporary fence will be installed between the proposed works area and the adjacent LCNP.</p> <p>The LLV construction site will be fenced by a steel hoarding fence. Temporary access / egress locations may be required during the installation of the LLV APZ.</p>	<ul style="list-style-type: none"> <li>• Potential to obstruction of fauna movements via the installation of temporary delineation fences.</li> <li>• Low potential for damage to natural sandstone during installation of pegs and temporary fencing.</li> <li>• There is potential for fauna to enter the construction site through temporary access locations within the LLV construction site fence.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li> <li>• Temporary fencing installation will be utilising flag bunting (or similar) wherever possible to allow unrestricted movement of fauna. Flagging tape may be utilised in areas where installation of flag bunting is not feasible and / or safe.</li> <li>• Temporary access / egress locations within the LLV construction fence will be reinstated at the completion of each workday.</li> </ul>



Item	Potential Impacts	Mitigation Measures
<b>APZ Installation</b>		
Actions undertaken in conjunction with adjacent construction.	<ul style="list-style-type: none"><li>• Poor communication with construction personnel may result in injuries to both workers and fauna onsite if fauna are approached by workers or are struck by site machinery.</li><li>• Over-clearing or removal of vegetation to be retained may occur if construction personnel access environmental protection areas.</li></ul>	<ul style="list-style-type: none"><li>• Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li><li>• Controls as outlined under <b>Section 2.2</b> of this BMSP.</li><li>• Inductions to the LLV construction site will include environmental instructions referencing from this BMSP and the LMP (Kleinfelder, 2019), further noting that no construction personnel are to handle fauna onsite and that no unauthorised personnel are to entering the LLV APZ and surrounding bushland.</li><li>• All clearing contractors will be inducted to the proposed works using the induction attached to the 2019 LMP prior to commencement of clearing works. All contractors will sign on to the induction once complete.</li><li>• A hard-copy of this BMSP and the LMP (Kleinfelder, 2019) will be maintained by the Project Environmental Supervisor and Construction Manager throughout the duration of construction to reference for environmental management onsite.</li><li>• Temporary access / egress locations within the LLV construction fence will be reinstated at the completion of each workday.</li><li>• Any fauna relocation is to be undertaken by suitably qualified personnel.</li></ul>



Vegetation modification works will be undertaken within areas shown on **Figure 1** by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).

- There is potential for adverse impacts to retained vegetation in the following circumstances:
  - During removal of adjacent vegetation / trees.
  - Via vehicle movements within the APZ footprint.
  - Via potential soil compaction from site machinery.
- Intermittent noise impacts will occur during APZ installation hours from site machinery and handheld machinery.
- Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see **Appendix 1**) and this BMSP.
- Access to occur as outlined under Section 4.2 of the LMP (Kleinfelder, 2019).
- Controls as outlined under **Section 2.2** of this BMSP.
- Installation of exclusion fencing (surrounding the proposed APZ and protected vegetation) will be undertaken by personnel working on foot and will utilise flag bunting (or similar) tied to tree and / or wooden stakes so as to minimise impacts to the surrounding environment. Installation of exclusion fencing within the LCNP and proposed APZ will be undertaken under the supervision of the Project Ecologist and / or Project Environmental Supervisor.
- The LLV construction site is to be excluded from the surrounding environment by a clearly signposted steel hoarding fence (or similar). This fence is to be installed by foot personnel. Where vehicles / machinery are required to transport fence panels, this will occur within the bounds of the LLV so as to avoid impacts to the surrounding environment.
- The construction contractor will be responsible for remediation of any environmental impacts resultant of fence installation that is noted by the Project Ecologist and / or Project Environmental Supervisor.
- The Project Ecologist will clarify which trees are to be removed prior to commencement of works within each area / section.
- The Project Ecologist will inspect each work area prior to the commencement of vegetation modification works to relocated and / or protect fauna and potential fauna habitat as required.
- Trees slated for removal will be communicated to arborists by the Project Ecologist to minimise traversing of the mobile crane and to avoid over clearing.
- Trees to be retained will be tagged and marked with flagging tape / spray paint for identification purposes.
- Site vehicles and the mobile crane(s) will not be parked within the Tree Protection Zone (TPZ) of retained trees onsite, measured onsite as diameter at breast height times twelve (DBH x 12).
- Tree removal will utilise management methodology outlined under Section 4.3.2 of the LMP (Kleinfelder, 2019) to prevent potential impacts to the surrounding environment.
- Stands of midstorey vegetation and shrubs to be retained will be marked with flag bunting and / or flagging tape to prevent over clearing.
- Flag bunting and flagging tape will be retained throughout the duration of vegetation modification works and removed at the completion of APZ installation. All trees on the site that are not approved for removal will be suitably protected during construction





Item	Potential Impacts	Mitigation Measures
		<p>as per the recommendations of the Arborist Impact and Tree Risk Assessment prepared by McArdle Arboricultural Consultancy, dated 30 August 2019 and the advice of the project arborist appointed under condition B36.</p> <ul style="list-style-type: none"> <li>• If access to the area within any protective barrier is required during the works, it must be carried out under the supervision of the project arborist appointed under condition B36 (an Arborist with a minimum qualification of AQF 5 qualified arborist). Alternative tree protection measures must be installed, as required.</li> <li>• The removal of tree protection measures, following completion of the works, must be carried out under the supervision of a qualified (the project arborist appointed under condition B36) arborist and must avoid both direct mechanical injury to the structure of the tree and soil compaction within the canopy or the limit of the former protective fencing, whichever is the greater.</li> <li>• Native vegetation to be protected in perpetuity (e.g. threatened species, drainage lines, etc) will be delineated / protected using post and wire fencing so as not to impact the movement of fauna. Variations to this design to be verified by the Project Ecologist and / or Environmental Supervisor (e.g. star picket with 2 strand wire).</li> </ul>
<p>Vegetation modification works will be undertaken within areas shown on <b>Figure 1</b> by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).</p> <p>(Continued)</p>	<ul style="list-style-type: none"> <li>• There is potential for soil erosion within the APZ footprint via the tracking of machinery through the proposed works area, through the removal of vegetation (including selected overstorey, mid-storey and groundcover vegetation) and through foot traffic onsite.</li> <li>• There is potential for soil compaction from the use of a crane onsite.</li> <li>• Kleinfelder have not been made aware of any other construction works that may cause soil erosion or compaction.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential soil erosion will be monitored and managed outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li> <li>• Controls as outlined under <b>Section 2.2</b> of this BMSP.</li> <li>• Works are not to be undertaken during wet weather where there is potential for soil erosion.</li> <li>• Installation of erosion and sediment controls is to occur within seven (7) days of observing erosion (or potential erosion) onsite, with the erosion location stabilised as best possible immediately.</li> <li>• The NPWS authorised officer is to be contacted for assistance in the event erosion requiring installation of controls (point above) is required.</li> <li>• APZ installation on varying slopes will be managed as outlined under Section 3.7 of the LMP (Kleinfelder, 2019).</li> <li>• Additional construction works will need to be covered under the Construction Environmental Management Plan (CEMP) for that activity.</li> </ul>



Item	Potential Impacts	Mitigation Measures
<p>Vegetation modification works will be undertaken within areas shown on <b>Figure 1</b> by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).</p> <p>(Continued)</p>	<ul style="list-style-type: none"> <li>There is low potential for injury to fauna during the removal of vegetation onsite via removal of fauna habitat and movement of machinery within the proposed works area.</li> </ul>	<ul style="list-style-type: none"> <li>Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li> <li>Controls as outlined under <b>Section 2.2</b> of this BMSP.</li> <li>The Project Ecologist and Environmental Supervisor will be capable of identifying the threatened species <i>Darwinia biflora</i>, <i>Tetratheca glandulosa</i>, <i>Epacris purpurascens</i> var. <i>purpurascens</i>, Red-crowned Toadlet and Powerful Owl. All identified specimens will be flagged, identified to staff/contractors involved in the activity and not disturbed.</li> <li>If removal of a hollow-bearing tree is required consultation with NWS Area Manager will be undertaken prior to the works being undertaken.</li> <li>All potential habitat trees will be checked after felling for any injured animals. A local wildlife rescue group must be contacted for assistance if injured animals are found.</li> <li>In the event any threatened species are found within the APZ footprint, the following process will be undertaken: <ul style="list-style-type: none"> <li>Immediately cease all work likely to affect the threatened species, populations or endangered ecological communities, or their habitats.</li> <li>Inform the NPWS office as relevant. Notification must be made as soon as practicable by phone, electronically or in writing.</li> <li>Not recommence work likely to affect the threatened species, populations or endangered ecological communities, or their habitats until receiving written advice from NPWS to do so.</li> </ul> </li> <li>NPWS will be contacted for a copy of <i>Large Forest Owls – Standard Conditions</i> (NPWS, 2019) prior to the commencement of the proposed APZ installation. This guideline will be adhered to during the APZ installation process.</li> </ul>
<p>Vegetation modification works will be undertaken within areas shown on <b>Figure 1</b> by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).</p> <p>(Continued)</p>	<ul style="list-style-type: none"> <li>No nightworks will be undertaken within the extent of the LLV APZ.</li> <li>Kleinfelder have not been made aware of any construction activities which may result in light spill upon areas surrounding the proposed APZ and construction site.</li> </ul>	<ul style="list-style-type: none"> <li>Wherever nightwork (requires approval if to be enacted) involved in the construction of the LLV occurs, this will be covered under the Construction Environmental Management Plan (CEMP) for that activity.</li> </ul>



Item	Potential Impacts	Mitigation Measures
<p>Vegetation modification works will be undertaken within areas shown on <b>Figure 1</b> by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).</p> <p>(Continued)</p>	<ul style="list-style-type: none"> <li>• There is potential for the spread of weeds and environmental pathogens through vehicle and pedestrian movements onsite.</li> <li>• There is potential for proliferation of weed species within disturbed areas if satisfactory rehabilitation techniques are not applied.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation measures as outlined under the LCNP LMP (Kleinfelder, 2019) (see <b>Appendix 1</b>).</li> <li>• Controls as outlined under <b>Section 2.2</b> of this BMSP.</li> <li>• All vehicles, plant and equipment must be washed down to remove any soil or plant matter prior to entering the reserve and when travelling from an area of known weed infestation to a new work area within the reserve.</li> <li>• Disturbance to low growing species must be minimised during vegetation removal and ground cover retained to a minimum of 100 mm.</li> <li>• Any restoration or rehabilitation works will only use locally sourced indigenous plant species, unless otherwise approved in writing by the NPWS Authorised Officer.</li> <li>• Any felled timber or vegetation will be dispersed throughout the adjacent environment to aid stabilisation of bare soils, enhance fauna habitat and reduce fire risk.</li> </ul>
<p>Vegetation modification works will be undertaken within areas shown on <b>Figure 1</b> by a team of arborists acting under the instruction of the Project Ecologist (who reports to the LLV Project Environmental Supervisor).</p> <p>(Continued)</p>	<p>Low potential for impacts to unknown areas of Indigenous Heritage.</p>	<p>To be managed as per Conditions 32 and 33 of the <i>Determination Notice for DPIE proponents</i> (REF 19/043) (DPIE, 2019).</p>



## 2.2 C19 - TREE PROTECTION REQUIREMENTS

In accordance with Condition C19, the following controls will be applied in addition to those started under **Table 2** of this BMSP throughout the duration of construction of the LLV and installation of the proposed APZ:

- Street trees will not be trimmed or removed unless it forms a part of the development consent or prior written approval from Ku-ring-gai Council (Council) is obtained or is required in an emergency to avoid the loss of life or damage to property.
- All street trees immediately adjacent to the approved disturbance area / property boundary/ies will be protected at all times during construction in accordance with Council's tree protection requirements. Any street tree, which is damaged or removed during construction due to an emergency, must be replaced, to the satisfaction of Council.
- All trees on the site that are not approved for removal will be suitably protected during construction as per the recommendations of the Arborist Impact and Tree Risk Assessment prepared by McArdle Arboricultural Consultancy, dated 30 August 2019 and the advice of the project arborist appointed under condition B36.
- If access to the area within any protective barrier is required during the works, it will be carried out under the supervision of the project arborist appointed under condition B36 (an Arborist with a minimum qualification of AQF 5 qualified arborist). Alternative tree protection measures will be installed, as required. The removal of tree protection measures, following completion of the works, will be carried out under the supervision of a qualified (the project arborist appointed under condition B36) arborist and will avoid both direct mechanical injury to the structure of the tree and soil compaction within the canopy or the limit of the former protective fencing, whichever is the greater.

The following controls (in addition to those stated under **Table 2** of this BMSP) will apply to fence installation onsite

- Installation of exclusion fencing (surrounding the proposed APZ and protected vegetation) will be undertaken by personnel working on foot and will utilise flag bunting (or similar) tied to tree and / or wooden stakes so as to minimise impacts to the surrounding environment. Installation of exclusion fencing within the LCNP and proposed APZ will be undertaken under the supervision of the Project Ecologist and / or Project Environmental Supervisor.
- The LLV construction site is to be excluded from the surrounding environment by a clearly signposted steel hoarding fence (or similar). This fence is to be installed by foot personnel. Where vehicles / machinery are required to transport fence panels, this will occur within the bounds of the LLV so as to avoid impacts to the surrounding environment.
- The construction contractor will be responsible for remediation of any environmental impacts resultant of fence installation that is noted by the Project Ecologist and / or Project Environmental Supervisor.

Native vegetation to be protected in perpetuity (e.g. threatened species, drainage lines, etc) will be delineated / protected using post and wire fencing so as not to impact the movement of fauna. Variations to this design to be verified by the Project Ecologist and / or Environmental Supervisor (e.g. star picket with 2 strand wire).





## 3 ENVIRONMENTAL COMMUNICATION

Item
b) Measures to communicate to the construction workforce the biodiversity values that are to be retained and protected.

### 3.1 ENVIRONMENTAL INDUCTION – APZ PERSONNEL

All workers involved in the installation of the proposed APZ will be required to complete an environmental induction prior to the commencement of work. The induction will outline management controls to be applied by all personnel during site works and will be delivered by the Project Ecologist and / or Project Environmental Supervisor.

A copy of the Environmental Induction is attached to the Project LMP (Kleinfelder, 2019).

### 3.2 CONSTRUCTION INDUCTION – ALL PERSONNEL

All personnel inducted to the LLV construction site will be required to complete an induction prior to commencing work. It is the responsibility of the Construction Contractor to include a summary of environmental management practices stipulated under the 2018 Kleinfelder LMP (LLV Property), the 2019 Kleinfelder LMP (LCNP), this BMSP and any other relevant environmental management plans.

At minimum, the induction will include the following items:

- **Fauna Management:** No personnel are to approach fauna onsite. Any fauna encountered are to be avoided and reported to your supervisor who will notify management personnel. Fauna are only to be relocated by a suitably qualified ecologist and / or wildlife carer.
- **Access Management:** No access to bushland surrounding the LLV Construction Site is permitted unless authorised by the Project Manager, Construction Manager, Project Environmental Supervisor or Project Ecologist.
- **Waste Management:** Workspaces are to be kept free of waste, to be disposed of in waste receptacles. Construction waste is to be disposed of in skip bins provided onsite.
- **Heritage:** In the event that any items of potential heritage are encountered, works are to be stopped immediately and management personnel notified. Management personnel are to notify the NPWS and works are not to recommence until either the NPWS authorise recommencement or an Aboriginal Heritage Impact Permit (AHIP) is obtained.
- **Threatened Species:** In the event that any potential threatened flora and fauna are encountered, works are to be stopped immediately and management personnel notified. Works are not to recommence unless permitted by the Project Environmental Supervisor or Project Ecologist. Threatened species that may occur onsite include *Darwinia biflora*, *Tetratheca glandulosa*, *Epacris purpurascens* var. *purpurascens*, Red-crowned Toadlet and Powerful Owl (photographs for identification will be provided during the induction process).



## 4 COMPENSATORY HABITAT & FAUNA MANAGEMENT

Item	
<b>c) Procedures for:</b>	
i)	Any removed hollows to be salvaged and installed into trees within the vegetated areas to be retained or be substituted with nest boxes that are suitable for local native fauna;
ii)	Pre clearing surveys and subsequent relocation of fauna to be undertaken under the guidance of a suitably qualified ecologist prior to vegetation removal;
iii)	Provision of evidence of pre-clearing surveys and relocation of fauna to the Certifier; and

### 4.1 COMPENSATORY HABITAT INSTALLATION

Currently, it is not anticipated that any hollow-bearing trees will be removed as part of the proposed APZ installation and construction works. As stated in the *Determination Notice for DPIE proponents* (REF 19/043) (DPIE, 2019), the authorised officer from NPWS is to meet the Project Environmental Supervisor prior to the commencement of vegetation works for clarification on clearing areas and erosion and sediment controls. It is also noted that the authorised NPWS officer will be invited to attend the tree selection process, which will take place as outlined under the LCNP LMP (Kleinfelder, 2019).

As stated under the *Determination Notice for DPIE proponents* (REF 19/043), if removal of a hollow bearing tree or removal of a tree containing a nest box is required during the installation of the proposed APZ or construction of the LLV, the Area Manager of the NPWS will be contacted. The following details will be discussed with the NPWS Area Manager:

- Reason hollow-bearing tree and / or nest box requires removal.
- Size of the hollow / nest box opening aperture.
- Potential species that may utilise nest box / hollow.
- Can the hollow / nest box be salvaged and reused?
- Number and type of nestboxes required to be installed as compensatory habitat.
- Preferential height and aspect of nest box installation.

Preferentially, nestboxes will be installed upon retained trees within the LLV APZ footprint. This will be communicated to the NPWS Area Manager for concurrence. Any access agreement required to install compensatory habitat will be the responsibility of the Project Manager, Construction Manager or appropriate delegate.

### 4.2 PRE-CLEARANCE SURVEYS

All vegetation works within the proposed APZ footprint will be undertaken under the supervision of the Project Environmental Supervisor and / or Project Ecologist, who will inspect the proposed works area for any fauna or potential fauna habitat prior to commencement. Any fauna with potential to be impacted by the proposed works will be relocated, with GPS points of capture and release location taken. The time and species of fauna will be noted, and a photograph of the fauna species will be taken if possible. The results of pre-clearing surveys and a record of all fauna relocated by the Project Ecologist and / or Project Environmental Supervisor will be provided to the certifier for verification.

### 4.3 RECORD OF WORKS

The Project Ecologist will maintain a log of works undertaken when onsite for the duration of the APZ clearing program and surrounding construction. This log will contain the details regarding fauna relocation stated above in **Section 4.2**. The log and any records of fauna relocation will be included as part of the completion letter to be prepared by the Project Ecologist at the completion of the installation of the proposed activity.



## 5 FAUNA RELOCATION

### Item

#### d) Procedures for capturing and relocating animals that are injured or displaced during vegetation clearing.

Displacement of fauna may occur as part of the clearing process. All clearing will be supervised by a suitably qualified and experienced ecologist (Project Ecologist or fauna spotter catcher) engaged by the project manager. Fauna relocation will utilise the procedure outlined under Section 4.3.3 of the LCNP LMP (Kleinfelder, 2019), relocating fauna into the extent of the APZ within the LLV property boundary (see **Figure 2**). These areas have been selected due to being located within the LLV boundary and in locations containing remnant forest vegetation with little to no pedestrian traffic. Alternatively, an access agreement may be sought with the NPWS to release any fauna encountered within the LCNP.

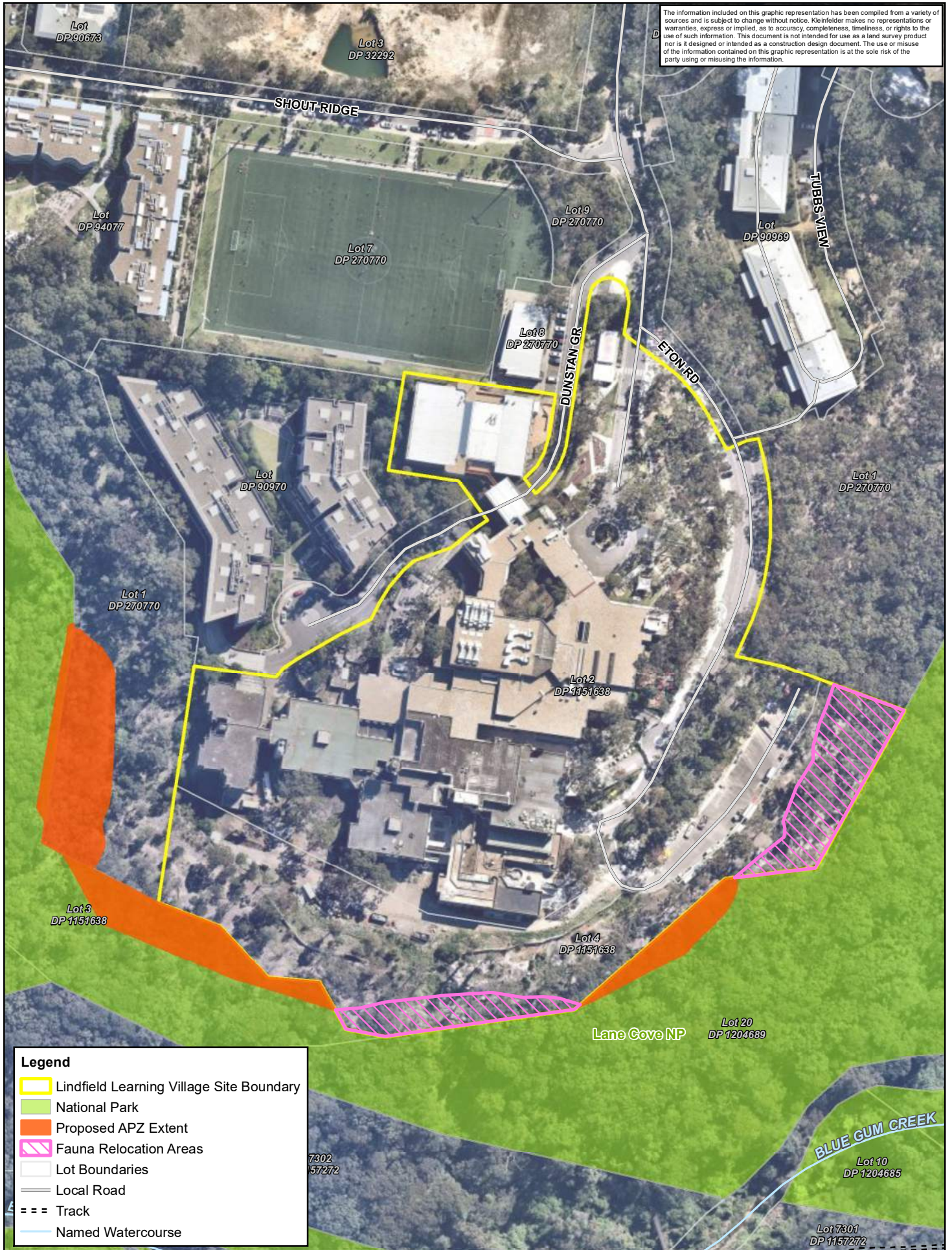
It is further noted that fauna may be encountered by construction personnel onsite. No unauthorised site personnel are to approach fauna onsite. The Project Ecologist / Project Environmental Supervisor will be contacted in the event construction personnel encounter fauna requiring relocation. If the Project Ecologist / Project Environmental Supervisor are not onsite, WIRES NSW (Wildlife Information Rescue and Education Service - 1300 094 737) may be contacted for assistance. The Project Ecologist is to be made aware of all fauna encountered and any contacts to WIRES, including the following details:

- Fauna species (if known).
- Fauna condition (e.g. healthy, injured, stressed).
- Fauna location.
- Did the fauna self-relocate?
- Was the fauna collected by WIRES?
- If collected by WIRES, name and contact number of the WIRES handler.

NPWS will be contacted for a copy of *Large Forest Owls – Standard Conditions* (NPWS, 2019) prior to the commencement of the proposed APZ installation. This guideline will be adhered to during the APZ installation process.



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#### Legend

- Lindfield Learning Village Site Boundary
- National Park
- Proposed APZ Extent
- Fauna Relocation Areas
- Lot Boundaries
- Local Road
- Track
- Named Watercourse

0 7.5 15 30 45 60 75  
Metres



PROJECT REFERENCE: 20212527

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DRAWN BY: BDeane

DATA SOURCE:  
NSW DFSI - 2017  
Nearmap - 2019  
SINSW - 2020  
Commonwealth of Australia - on behalf of the  
Intergovernmental Committee on  
Surveying & Mapping - 2019

## Proposed Fauna Relocation

Blackash Bushfire Consulting  
Biodiversity Management Sub-Plan

FIGURE:

**2**





## 6 REFERENCES

*Construction Agreement for Future Easement* granted by the Minister administering the *National Parks and Wildlife Act 1974* (NSW) for the LCNP.

Department of Environment and Climate Change (DECC) (2009). *Interim Construction Noise Guideline*, NSW Government, Sydney, NSW.

DesignInc (2019). *Review of Environmental Factors – Lindfield Learning Village Asset Protection Zone*, DesignInc Sydney Pty Ltd, Sydney NSW

*Determination Notice for DPIE proponents* (REF 19/043), issued by the NSW Department of Planning, Industry and Environment (DPIE) on 8 November 2019.

Intergovernmental Committee on Surveying and Mapping 2019, *ELVIS – Elevation and Depth – Foundation Spatial Data, 1 Metre DEM* (data sourced from NSW Government: Spatial Services (2013)), Commonwealth of Australia - on behalf of the Intergovernmental Committee on Surveying & Mapping, Canberra ACT

Kleinfelder, 2018. *Lindfield Learning Village Landscape Management Plan*. Kleinfelder Australia Pty Ltd, Cardiff NSW 2285

Kleinfelder, 2019. *Lindfield Learning Village, Lane Cove National Park Landscape Management Plan*. Kleinfelder Australia Pty Ltd, Cardiff NSW 2285

OEH 2016, *Lane Cove National Park Plan of Management*. NSW National Parks and Wildlife Service. Published by the Office of Environment and Heritage, Sydney

*Management of Bushfire Hazard – Dunston Grove*, letter prepared by School Infrastructure NSW to Dunston Grove Body Corporate, dated 17 June 2020.



# APPENDIX 1: LANE COVE NATIONAL PARK LMP (KLEINFELDER, 2019)



## Landscape Management Plan



### DesignInc Pty Ltd

Lindfield Learning Village, Lane Cove  
National Park  
Eton Road, Lindfield NSW

23 August 2019





# Landscape Management Plan

Lindfield Learning Village, Lane Cove National Park

Eton Road, Lindfield NSW

**Project No:** 20201099  
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**Prepared for:**

**DESIGNINC PTY LTD**

Only DesignInc, its designated representatives, or relevant statutory authorities may use this document and only for the specific project for which this report was prepared. It should not be otherwise referenced without permission. See Appendix 4 for a summary of limitations applying to this report.

## Document Control:

Version	Description	Date	Author	Technical Reviewer	Peer Reviewer
1.0	Final	23 August 2019	B.Deane	J.Berry	J.Berry

## Kleinfelder Australia Pty Ltd

95 Mitchell Road  
Cardiff, NSW 2285  
Phone: 02 4949 5200  
ABN: 23 146 082 500



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## ABBREVIATIONS

<b>APZ</b>	Asset Protection Zone
<b>Council</b>	Ku-ring-gai Council
<b>DP</b>	Deposited Plan
<b>DoE</b>	Department of Education
<b>ha</b>	Hectare
<b>IPA</b>	Inner Protection Area
<b>LGA</b>	Local Government Area
<b>LCNP</b>	Lane Cove National Park
<b>MZ</b>	Management Zone
<b>NPWS</b>	National Parks and Wildlife Service
<b>NSW RFS</b>	New South Wales Rural Fire Service
<b>REF</b>	Review of Environmental Factors
<b>Subject Site</b>	Land owned by DoE
<b>Study Area</b>	Total area for tree data collection



## 1. INTRODUCTION

---

This Landscape Management Plan (LMP) has been prepared by Kleinfelder on behalf of the NSW Department of Education and School Infrastructure NSW (the Applicant) to accompany a Review of Environmental Factors (REF), prepared under Part 5 of the *Environmental Planning and Assessment Act 1979* EP&A Act, for the installation of an Asset Protection Zone (APZ) at Lot 3 Deposited Plan (DP) 1151638 and Lot 20 DP 1204689, Lane Cove National Park (LCNP) Lindfield NSW 2070.

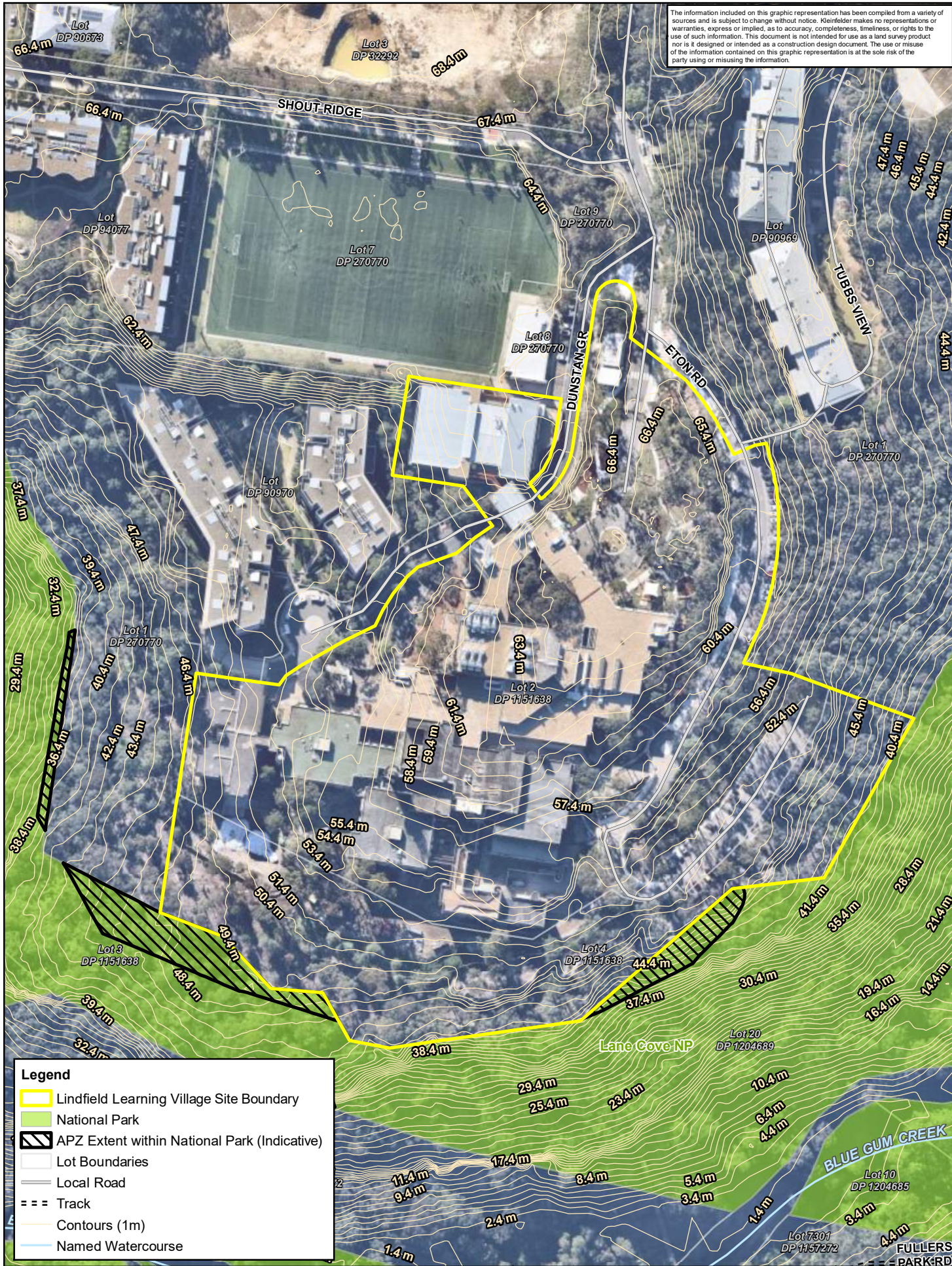
This LMP further supports the State Significant Development Application (SSD 16\_8114) for the Lindfield Learning Village (LLV), whereby the proposed APZ will provide a defensible space between the partially approved Learning Village and surrounding bushland.

On 24 October 2018 the Minister for Planning granted partial development consent to SSD 16\_8114 for Phase 1 construction and operation of a new school for 350 students. The remainder of SSD 8114 (as originally proposed) has not yet been granted consent and has been subject to further investigation.

This LMP applies solely to vegetation management outside the property boundary of the LLV (see **Figure 1**). Kleinfelder have previously prepared an LMP to address APZ installation and monitoring for Phase 1 of the LLV in 2018, with subsequent addendums to that document made to address Phase 2 and 3 of SSD 16\_8114 in July 2019.



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0 7.5 15 30 45 60 75 Metres

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NSW DFSI - 2017  
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Commonwealth of Australia - on behalf of the  
Intergovernmental Committee on  
Surveying & Mapping - 2019

**Proposed APZ Extent**

DesignInc Sydney Pty Ltd  
Landscape Management Plan  
Lot 3 DP 1151638 and Lot 20 DP 1204689  
Lane Cove National Park

FIGURE:  
**1**



## 1.1 PURPOSE

The purpose of this LMP is to provide an outline of actions to be applied during the installation of the APZ within the LCNP. As such, the intent behind this LMP is to provide a working document that provides for erosion and sediment management, native flora and fauna (including threatened species) management, potential fauna habitat management and addresses weed management, with an outline of ongoing monitoring and maintenance procedures.

All personnel involved in vegetation works within the borders of the LCNP will be subject to the provisions of this document, and will be required to complete and sign the attached induction (see **Appendix 1**) to confirm their acknowledgement of both the environmentally significant nature of the proposed works area and their obligations to conduct all works as per this LMP.

Actions outlined under this LMP will be applied in addition to those stated under other documents submitted as part of the same application.

## 1.2 SCOPE

The scope of this LMP focusses on the application to install and manage an APZ at Lot 3 DP 1151638 and Lot 20 DP 1204689, within the LCNP. This APZ will support the occupation of the LLV via an enhancement of the SSD 16\_8114 APZ, which was installed to the LLV property boundary limits in January 2019.

This LMP has been prepared in accordance with the following published guidelines and standards:

- NSW Rural Fire Service (RFS) *Standards for Asset Protection Zones* (2005).
- NSW RFS *Planning for Bushfire Protection* (2006/2019).

## 1.3 MANAGEMENT AIMS AND OBJECTIVES

The primary aim of the LMP is to provide a working document that will outline the actions and procedures for the installation of the APZ in the LCNP. This aim will be achieved through meeting the following objectives:

- To ensure the APZ achieves the performance criteria set out under NSW RFS published documentation for APZ management (*Standards for Asset Protection Zones*, 2005).

- To optimise the ecological functionality of the APZ and surrounding native vegetation areas in perpetuity.
- Consider weed management and manage erosion and sediment.
- Consider threatened species interactions and fauna management.
- Provide a maintenance framework to ensure the APZ and vegetation management meets its performance criteria in perpetuity.

## 2. ASSET PROTECTION ZONES

### 2.1 ASSET PROTECTION ZONE STANDARDS

In order to best balance both the environmental sensitivity (National Park) and the overall intent of the proposed activity (provide for defendable space for the LLV), the proposed APZ will be installed to Outer Protection Area (OPA) standards. OPA standards are outlined under the currently legislated *Planning for bush fire protection 2006* and further detailed in *Planning for bush fire protection 2018* (under review) (NSW Rural Fire Service 2006, 2018). Performance criteria for APZ's installed to OPA standards are detailed in **Table 1** below.

**Table 1: Asset Protection Zone Standards**

Parameter	APZ Standard
Canopy Cover	<ul style="list-style-type: none"> <li>Overstorey canopy cover of 30% or less within the total APZ area.</li> <li>Retained tree canopies should be separated by 2 to 5 m.</li> </ul>
Shrub layer	<ul style="list-style-type: none"> <li>Shrubs should not form continuous canopy.</li> <li>Shrubs should form no more than 20% of ground cover.</li> </ul>
Groundcover	<ul style="list-style-type: none"> <li>Should be kept mown / brush-cut (indicatively no more than 100mm height).</li> <li>Leaf and other debris should be mown, slashed or mulched.</li> </ul>

The optimal vegetation structure within the APZ is a woodland canopy over a managed sedge / grassland which is maintained to less than 100 mm (10 cm) in height, and managed (mown, slashed) at annually prior to each fire season. Habitat and other significant environmental values (such as drainage lines) will be retained and protected through the retention of intact ground, shrub and tree zones up to 20% of total APZ area (NSW RFS 2005).

### 2.2 MANAGEMENT ZONES

For the purposes of this LMP, the three distinct parcels of APZ proposed are referenced as follows:

- **Management Zone 1:** Denotes the 644 m<sup>2</sup> APZ to maximum width of 11.6 m, located southeast of the LLV.
- **Management Zone 2:** Denotes the 1,384 m<sup>2</sup> APZ to maximum width of 16.4 m, located south of the LLV.
- **Management Zone 3:** Denotes the 226 m<sup>2</sup> APZ to maximum width of 3.8 m, located west of the LLV. Lot 1 DP 270770, managed by Defence Housing Australia (DHA), is located between the western boundary of the LLV and Management Zone 3. Lot 1 DP 270770



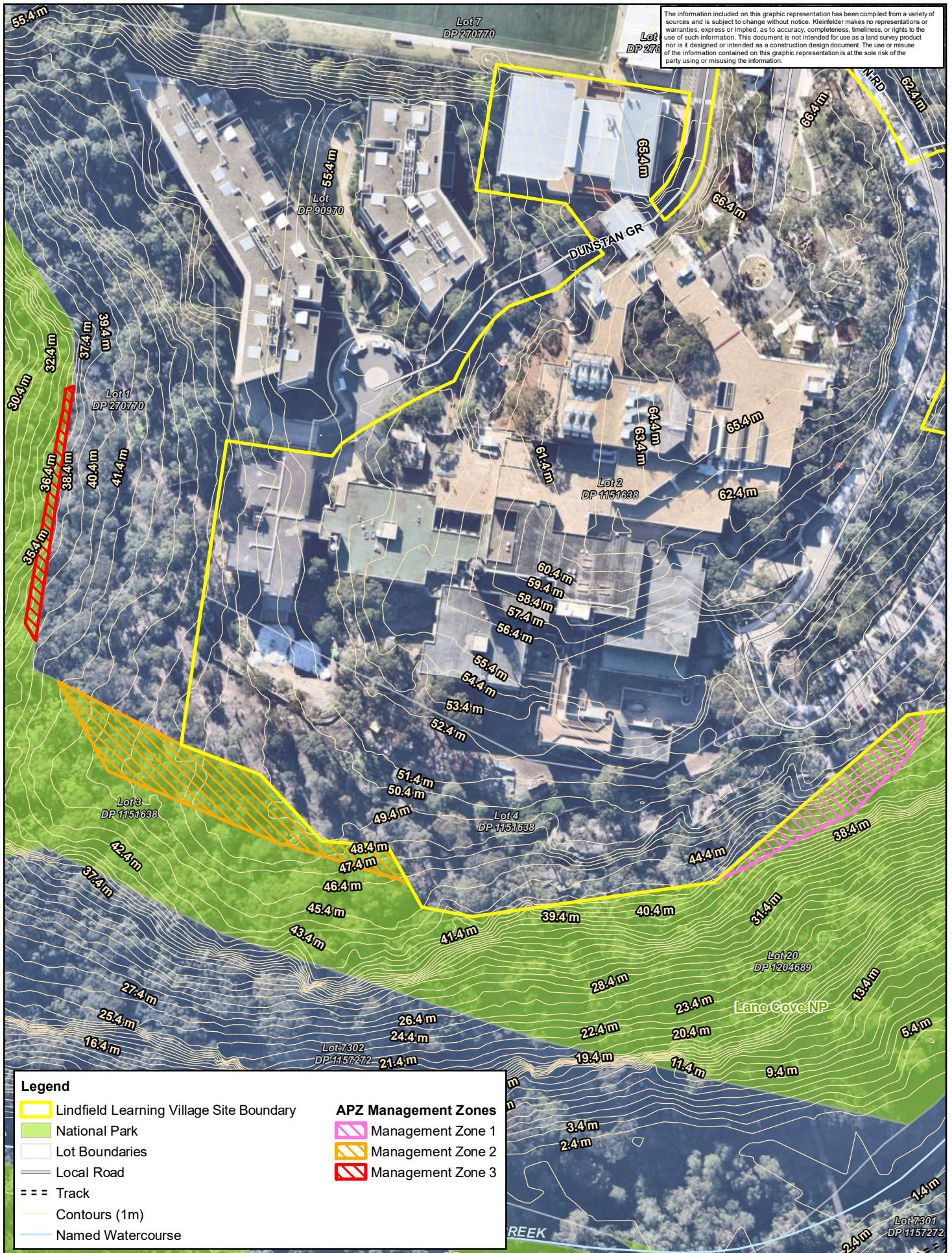
contains an approved APZ for the approved residential developments (Shout Ridge and Crimson Hill development). No works are proposed within Lot 1 DP 270770 (other than an access agreement, see **Section 4.2**) under this LMP, however, the value of the APZ within Management Zone 3 is dependent upon the approved APZ extent within Lot 1 DP 270770 being adequately managed to APZ standards.

The location of each of these Management Zones is shown in **Figure 2**.

Unless specifically stated otherwise, all controls and actions outlined under this LMP are applicable to all Management Zones.



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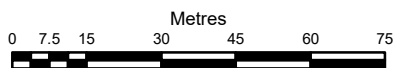


#### Legend

- Lindfield Learning Village Site Boundary
- National Park
- Lot Boundaries
- Local Road
- Track
- Contours (1m)
- Named Watercourse

#### APZ Management Zones

- Management Zone 1
- Management Zone 2
- Management Zone 3



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DATA SOURCE:  
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#### Management Zones

DesignInc Sydney Pty Ltd  
Landscape Management Plan  
Lot 3 DP 1151638 and Lot 20 DP 1204689  
Lane Cove National Park

FIGURE:

**2**





## 3. ASSET PROTECTION ZONE DELINEATION

---

### 3.1 BOUNDARY DELINEATION

The boundary of the proposed APZs will be surveyed and pegged by a registered surveyor prior to the commencement of any works under this LMP. The perimeter of the APZs are to be delineated using flag bunting (or similar)

### 3.2 TREE SURVEY

Selection of trees for retention will occur prior to the commencement of clearing to determine overstorey trees that will be removed / trimmed. Due to the sensitive nature of the site, **it is proposed that this tree survey be undertaken with a representative of the NSW National Parks and Wildlife Service** to ensure the opinions of all respective parties are expressed and adhered to prior to the commencement of site works.

The following information will be collected for all trees to be retained:

- Tree identification number (to correlate with GPS data and tree tag – see below).
- Tree species.
- Approximate tree height (m).
- Diameter at breast height (DBH) – to be split into four categories (10-20 mm, 20 – 40 mm, 40-80 mm and >80 mm).
- Presence of hollows or nestboxes.
- Tree condition (healthy, damaged, dead).
- Previous tag number (if applicable).
- Notable features (for identification / verification purposes).

Trees to be retained will be marked using a silver tree tag near ground level, imprinted with the tree identification number for verification during tree removal. Tree locations will be marked utilising a GPS with accuracy of (+/- 1 m or better) by the Project Ecologist. The high accuracy GPS is necessary to ensure correct tree identification and removal in the event tree tags are inadvertently removed.

A photograph will be taken of each tree to be retained to further support later identification. All marked trees will then be listed in a spreadsheet for use by the Project Ecologist during installation of the APZ.

### 3.3 TREE SELECTION CRITERIA

Trees to be retained will be selected based upon the following hierarchy (descending likelihood of retention):

1. Is the tree a threatened species under either the NSW *Biodiversity Conservation Act 2016* (BC Act) or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)? No threatened flora will be removed during the APZ installation.
2. Does the tree contain potential fauna habitat such as hollows or fissures capable of providing habitat for microchiropteran bats? No hollow-bearing trees will be removed during the APZ installation.
3. Does the tree contain temporary fauna habitat such as a nest or drey? Fauna habitat in use during APZ installation will not be removed.
4. Is the tree located upon a slope greater than 18°, and / or is there reason to expect that removal of the tree may increase the risk of erosion?
5. Is the tree located along the periphery of the outside of proposed APZ boundary and, as such, will need heightened controls during removal to avoid incidental impact to areas outside the APZ footprint?

### 3.4 TREE SELECTION MODIFICATIONS

It is noted events outside the control of the Applicant, such as inhabitation of a tree by fauna (nesting) or weather events (damage to tree to be retained), may result in a change to the suitability of a tree to be retained / removed. In the event this occurs, the following procedure will be adopted by the Project Ecologist during installation of the APZ:

- **Tree marked for removal requires retention:** Initially, the Project Ecologist will determine whether the tree can be maintained without removal of another or trimming of surrounding limbs. The next option would be trimming of trees in the immediate surrounds to avoid the removal of a tree marked for retention. If OPA standards cannot be met through trimming, the Project Ecologist will select an appropriate tree in the immediate surrounds that can be removed. The selected tree will not be a threatened species or contain potential fauna habitat. The new tree to be retained will be marked and details noted as per **Section 3.2**,

with the Project Ecologist noting the swap in their records (if removal of a previously marked 'retained' tree is required).

- **Tree marked for retention, but damaged or has poor structural integrity:** The tree ID number will be noted by the Project Ecologist. If the tree is damaged to a point where it is reasonably regarded as beyond repair the Project Ecologist will remove the tree from the register of trees to be retained. If the extent of the damage is uncertain or the tree is a threatened species or contains fauna habitat, advice from an AQF Level 5 Arborist will be sought prior to removal of the tree. If possible under OPA Standards, a tree slated for removal will be protected in lieu of the damaged tree.

### 3.5 THREATENED SPECIES AND CULTURAL HERITAGE MANAGEMENT

Prior to vegetation works, the proposed APZ extents will be surveyed for threatened species and cultural heritage sites. If identified, threatened flora species and cultural heritage sites will be clearly delineated via parawebbing fencing (or similar) and protected throughout the APZ installation and maintenance phases.

If any threatened species are found on site during vegetation clearing, the Project Ecologist will appropriately manage through either relocation (fauna) or delineation (flora) to provide protection from clearing. Threatened flora will be then be protected throughout the clearing process.

### 3.6 FAUNA HABITAT MANAGEMENT

The removal of hollow-bearing trees is not proposed as part of this application. Hollow-bearing trees and those containing habitat suitable for microchiropteran bats (e.g. fissures) will be marked for retention and protected from clearing activities throughout the installation and maintenance of the proposed APZ.

Nestboxes identified in the proposed works area (in useable condition) will be protected the same as hollow - bearing trees.



## 3.7 APZ CONTROLS - SLOPES GREATER THAN 10 DEGREES

The NSW RFS make recommendations where APZs are located on slopes greater than 18°. These slopes are difficult to maintain and have potential to be exposed to erosion issues. Sandstone boulders and cliffs within the proposed APZ extents are suitably stable and do not require actions, however, where slopes have exposed soils and are affected by drainage, these slopes require specific management actions.

The NSW RFS *Bush Fire Environmental Assessment Code* (2006) provides controls in relation to installing an APZ upon slopes with high erosion potential. Controls relevant to this proposal include:

- **The use of hand tools is permitted on all slopes.** Installation of the proposed APZs will utilise a team of arborists, with tree removal being undertaken using chainsaws. Management of groundcover will utilise rakes for leaf litter and brush-cutters for slashing of local grasses (i.e. handheld tools will be used). Where slopes are less than 10°, an Avant Loader (or similar) may be used to move fallen trees to the chipper location. Where possible, a crane may be used to transport trees to the chipper to reduce potential soil erosion. The crane will be restricted to lands within the LLV property boundary.
- **On slopes greater than 10° slashing must not leave vegetation shorter than 10 cm from ground surface.** Slashing will ensure vegetation is not cut below 100 mm (10 cm), further ensuring the roots structures are not compromised (keeping vegetation live), within the proposed APZ extent regardless of the slope.
- **Where trees are removed on slopes greater than 10°, the root structure will be left undisturbed.** The root structure of all trees removed will be retained (i.e. cut tree at base and leave root structure in-situ).
- **Tree removal is not permitted on slopes greater than 18°.** This control will be followed as best practically possible during the tree selection process. If retention of all trees on slopes greater than 18° is not possible, stumps will be left in-situ as an erosion control, with potential erosion monitored and addressed accordingly following clearing.
- **Pruning is only permitted slopes greater than 18° if at least 75% of the canopy cover is maintained.** As per above, this control will be followed as best practically possible during the tree selection and clearing process.

Following clearing, ongoing monitoring of the APZ areas will survey steep slopes within the APZ, noting areas where there either is observable erosion or potential for erosion to control. Subsequent recommendations will be made, including (but not limited to) potential short term

fixes such as jute mesh and long-term options such as planting native (local), fire tolerant groundcover or shrub species.

## 4. MANAGEMENT CONTROLS

---

Controls outlined in this section are to be applied during the installation, monitoring and maintenance of the proposed APZ. Installation of the proposed APZ will not commence until all relevant items stated above in **Section 3** have been completed.

**All clearing of trees will be conducted under the supervision of a qualified and experienced Project Ecologist engaged by the Project Manager.**

**At completion, the clearing performance criteria is to be certified by a suitably qualified bushfire consultant (BPAD Level 3).**

### 4.1 INDUCTION

As stated in **Section 1.1**, all workers involved in the installation of the proposed APZ will be required to complete an environmental induction prior to the commencement of work. The induction will outline management controls to be applied by all personnel during site works. All personnel / contractors will be required to sign the attached form at the end of the induction to recognise their obligations under this LMP.

See **Appendix 1** for a copy of the environmental induction.

### 4.2 ACCESS

Access to Management Zone 1 will be restricted to foot-traffic due to the presence of sandstone outcrops, with associated light vehicles, trucks, chipper and crane (for tree removal) either parking within along LLV internal roads (where permitted by the LLV Construction Manager and / or LLV Principal).

Access to Management Zone 2 will occur within the LLV grounds and APZ. Direct access to Management Zone 2 will be limited to foot traffic and light, soft-tyred (e.g. Light Loader) machinery required for the transport cut material to the truck and chipper. Floats, light vehicles and the crane (if utilised) will be restricted to the LLV grounds, while the truck and chipper may be parked within the existing APZ immediately north of Management Zone 2 pending approval by the Project Ecologist (noting weather and groundcover conditions).

Access to Management Zone 3 will require an access agreement with DHA for personnel and vehicles (soft-tyred loader, truck and chipper) to traverse Lot 1 DP 270770. Personal light vehicles and the crane (if utilised) will be parked within the LLV grounds.

## 4.3 TREE REMOVAL PROCESS

### 4.3.1 Pre-clearance Assessment

Prior to the commencement of any clearing within the proposed APZ areas, repair of fencing (whether flag bunting or otherwise) installed prior to the tree survey will occur to prevent accidental intrusion into the surrounding National Park area by personnel involved in the tree removal process.

All delineation works will be confirmed by a registered surveyor engaged by the Construction Contractor.

A suitably qualified and experienced Project Ecologist engaged by the Project Manager will conduct a pre-clearance assessment of each Management Zone (as applicable) prior to the commencement of each day of work. During this time the Project Ecologist will observe for potential fauna in the proposed works area, relocating as required. During this time, the Project Ecologist may be required to modify the trees to be retained as per **Section 3.4** of this LMP.

### 4.3.2 Tree Removal

The Project Ecologist will supervise all vegetation clearing and relocate any displaced animals that cannot safely self-relocate into adjoining vegetation (see **Section 4.3.3** for more information). The following methodology will be followed during vegetation removal works in all Management Zones:

- Prior to the commencement of clearing works a monitoring photo point will be established within each of the Management Zones. A baseline photograph will be taken facing north, east, south and west.
- Prior to the commencement of work the Project Ecologist will provide the environmental induction (see **Section 4.1, Appendix 1**) and conduct a walk-through of the proposed works area with the arborist team lead to ensure all personnel understand the required scope of works.

- Potential fauna habitat (e.g. nests, dreys) will be surveyed by a climbing arborist under the supervision of the Project Ecologist for use by native fauna prior to removal. Nests in use will not be removed.
- All vehicles are to remain on agreed and established trails and tracks where possible to minimise un-necessary soil disturbance. A small, soft-tyred loader with a grapple attachment may be used to transport cut material to the chipper.
- Vegetation will be cleared in a way that maintains retained tree integrity as specified and allows fauna living in or near the clearing site to move safely from the site to adjacent areas.
- Clearing of vegetation will be conducted in a manner that minimises the impact on retained hollow bearing habitat trees and heritage sites.
- The clearing of the smaller wooded vegetation, lower shrub layer and ground layer shall be conducted by hand using tools such as brush cutters and chainsaws. All equipment shall be free of any material or soil from other sites (i.e. providing dedicated vegetation maintenance equipment is most desirable).
- Trees should have lower limbs removed up to a height of 2 m above the ground (lifting the canopy) to create space between ground fuels and canopy fuels.
- Clearing of larger vegetation (trees) will be undertaken by chainsaw and wood-chipper (removing fuel load associated with trees, limbs and majority of mid shrub layer biomass from the APZ) and will avoid any topsoil disturbance where practicable.
- No clearing will occur during the early evening or at night (i.e. when most fauna species are active and likely to be active).
- Where trees to be removed present a risk of falling outside the APZ boundary and damaging adjacent vegetation the following process will be applied:
  - A crane may be used to support the tree in place during cutting, subsequently transporting cut material directly to the chipper.
  - Branches may be trimmed to reduce weight / lean of trees to allow for greater control of the direction of felling.
  - Trees may be felled in sections, removing branches first prior to the main trunk.
- Limbs of retained trees will be trimmed as required, cutting at the base of the limb.
- All green waste material generated during the clearing of vegetation within all the Management Zones must be removed from site or to an arranged stockpile location.



- Following the completion of clearing, the Project Ecologist will take monitoring photographs facing north, east, south and west and undertake the first round of monitoring, as per **Section 4.8**, to provide a baseline for ongoing APZ compliance.
- The Project Ecologist will prepare a letter/ report at the conclusion of all clearing works within the study area detailing works conducted against performance criteria, and an inventory of fauna species encountered during clearing.

### 4.3.3 Fauna Displacement

Displacement of fauna may occur as part of the clearing process. All clearing will be supervised by a suitably qualified and experienced ecologist engaged by the project manager (Project Ecologist or fauna spotter catcher). The following protocol will be followed:

- If possible any fauna should be allowed to self-relocate if safe to do so, if necessary and safe to do so the animal will be captured, assessed and, if appropriate, released into a pre-agreed area.
- All fauna will be handled in such a way as to prevent injury to the animal and people and if necessary the animal should be kept in an appropriate container (calico bag, hessian sack, pet pack etc.) and nocturnal species released at dusk.
- Any microbats can be soft released, that is put in one of the nest boxes within the LLV APZ and allowed to self-relocate at dusk.
- If any animal is injured during the construction process, a veterinarian will be contacted immediately for professional advice on the best course of action.
- If any native animal is injured during other operational/ construction processes while an ecologist, environmental representative or animal handler is not present, they must be contacted immediately.
- If during clearing any protected species are injured or killed, the Project Ecologist will inform Ku-ring-gai Council immediately (same day as injury/ death).

## 4.4 THREATENED SPECIES, CULTURAL HERITAGE AND FAUNA HABITAT

As stated in **Section 3.5** and **Section 3.6**, no threatened species, cultural heritage sites or hollow-bearing trees will be removed during the installation of the proposed APZ. The following controls will be applied to ensure accidental clearing of these features does not occur:

- The proposed APZ sites will be surveyed, with boundaries delineated using flag bunting (or similar) prior to the commencement of clearing activities.
- Hollow-bearing trees marked for retention during the proposed tree survey for identification during vegetation works. Nestboxes identified in the proposed works area (in useable condition) will be protected the same as hollow - bearing trees.
- Prior to the commencement of clearing, threatened flora and cultural heritage sites will be delineated using parawebbing fencing (or similar) for protection during clearing activities.

## 4.5 EROSION AND SEDIMENT CONTROL

As stated in **Section 3.7**, installation of the proposed APZ will involve disturbing the soils and increasing the likelihood of erosion and sediment movement.

The following erosion and sediment controls will be applied during the during tree selection and installation of the APZ (at minimum):

- Selection of trees and shrubs for retention will occur as per **Section 3.3** and **Section 3.7**. Trees and shrubs in areas with slopes over 18° will be retained unless removal is required for the APZ to meet OPA standards.
- Trimming of trees (noting 75% canopy cover retention is required) will be undertaken on slopes over 18° in preference to complete tree removal.
- Vegetation removal works will utilise hand-tools only (e.g. brushcutter, chainsaw).
- Transport of fallen material to the chipper may utilise a small soft-tyre loader with grapple attachment. No heavy vehicles or personal vehicles will be permitted within the proposed APZ extent.
- Stumps of trees and shrubs removed will be left in-situ as erosion control.
- Groundcover will be brush-cut to 100 mm in accordance with the NSW RFS *Bush Fire Environmental Assessment Code* (2006).
- The Project Ecologist may designate additional trees and shrubs for retention following consultation with the bushfire consultant as still meeting OPA standards.
- Shrub / groundcover vegetation adjacent to drainage lines will be maintained as a buffer against scouring. Trees will be retained where possible.
- The Project Ecologist will supervise tree removal and the shrub / ground layer management process, to ensure works minimise soil disturbance (correct equipment and work planning).

- Partial-removal of leaf litter material (required to meet APZ standards) will have regards to erosion potential, limiting removal to the minimum required for compliance with OPA performance criteria.

Works associated with tree retention and ground layer vegetation management will aim to retain a live environment (living structure), whereby the root systems and foliage will hold soils and prevent erosion. Initial works will impact the exposure to direct rainfall and turn up the soil, and some erosion and sediment movement will occur. This occurrence will need to be mitigated such that minimal erosion occurs, and sediment does not leave the APZ and into the remainder of the National Park.

Monitoring for potential erosion and sediment-laden run-off will be the responsibility of the Project Ecologist during initial APZ installation. Following APZ certification, monitoring for erosion will form part of the annual monitoring checklist (see **Section 4.8, Appendix 3**).

See **Appendix 2** for guidance towards controls that may be applied to address site erosion where observed during initial APZ installation and subsequent monitoring / maintenance events.

## 4.6 WEED MANAGEMENT

Weed species located in the extents of the proposed APZ are identified within the Review of Environmental Factors (REF) for this application. Weed management controls to be applied under this LMP include:

- Where the project ecologist notes potential for works to spread weed infestations works will stop and one of two methods will be adopted:
  - Adoption of different removal technique.
  - Stop work and treat weeds prior to continuation.
- All vehicles involved in APZ installation will be maintained free of material with the potential to contain seed.
- Confirm downslope sediment controls as required when potential for erosion and seed deposition following clearing on slopes is observed.
- All vegetation green waste will be removed from the APZ boundary.
- No vehicles (other than small soft-tyred machinery used to transport cut material) will be permitted within the proposed APZ boundaries (APZ in LCNP).

- The project ecologist will maintain effective communication with arborists to establish progressive work zones. No clearing is to be undertaken outside the prescribed zone without confirmation with the project ecologist.
- Monitoring of the proposed APZ (see **Section 4.8**) will include an assessment of weed cover.
- Recommendations from each monitoring event with regards to weeds will be undertaken within two months of receipt. Any weed management being undertaken in lands managed under this LMP will be undertaken in consultation with the NSW NPWS.

## 4.7 WASTE AND HAZARDOUS SUBSTANCE MANAGEMENT

The following controls will be applied in addition to previously stated during the installation and maintenance of the proposed APZ:

- All litter is to be disposed of in receptacles provided within the LLV site boundary.
- Personnel are to utilise permanent and temporary toilet facilities designated for construction personnel at the LLV.
- No refuelling of equipment is to occur within the extents of the proposed APZ.
- Fencing materials used to delineate APZ boundaries and items requiring protection (e.g. threatened flora) is to be removed following completion of APZ installation. Protective fences are to be installed and removed immediately prior and following each maintenance event (see **Section 4.9**).
- All machinery and equipment used on the site must be maintained to the relevant manufacturer's standards.
- All vehicles and machinery should be turned off when not in use.
- Daily equipment pre-start inspections will be undertaken by site personnel. These are designed to identify faulty equipment and potential oil leakages.
- In the event of a fuel spill, or similar event presenting potential environmental danger, spill kit materials will be used in order to immediately contain the spill.

## 4.8 MONITORING

Post installation, monitoring of the proposed APZ will be conducted by either a suitably qualified ecologist or representative of the NSW NPWS (if desired by the NSW NPWS), using

the Site Inspection Cards provided in **Appendix 3** to ensure ongoing APZ compliance while controlling both potential erosion and the introduction of weeds into the proposed APZ sites.

Monitoring and maintenance will occur at least every July and once again in January (or as required) during the first 3 years following installation of the APZ, with monitoring efforts reduced to one visit each year prior to routine maintenance of the APZ (indicatively July). Monitoring results will include a cover letter containing recommendations for further actions, the Site Inspection Cards provided in **Appendix 3** provided as an attachment. A Monitoring Datasheet will be completed for each Management Zone referenced under this LMP during each monitoring event (3 total sheets).

Results from each monitoring event will be sent to the Construction Manager during construction of the LLV, then sent to the LLV Principal once construction of Phase 2 and Phase 3 of SSD 16\_8114 is complete.

Recommendations from each monitoring event will be applied as soon as possible following receipt from the relevant ecologist / NPWS. No works will be conducted within the LCNP boundary (where the APZ are situated) without first obtaining permission from the NPWS.

## 4.9 MAINTENANCE

Maintenance of the proposed APZ extents will be triggered in one of two ways. These include:

- **Routine Maintenance:** Maintenance of the proposed APZ utilising the methodology (including protection and boundary fencing) outlined under this LMP to ensure ongoing compliance with OPA standards.
- **Prescribed Maintenance:** Denotes any maintenance being undertaken as a result of APZ monitoring, including (but not restricted to) weed management and the installation of erosion and sediment controls.

**Routine Maintenance** is to occur each year following the July – August monitoring event (prior to the NSW fire season), while **Prescribed Maintenance** is to be undertaken within 2 months following receipt of monitoring letters described above in **Section 4.8**.

All maintenance works are to be undertaken utilising control methods outlined under this LMP to prevent accidental impacts to potential cultural heritage sites, threatened species, fauna habitat and retained trees.

Permission to conduct works will be obtained from the NSW NPWS prior to the commencement of each maintenance event.

## 4.10 REPORTING

The following reports will be delivered by the Project Ecologist following completion of APZ installation:

- A daily log detailing where clearing occurred, and any relevant information associated.
- A log of any modifications of vegetation and land management to that stipulated under this LMP or agreed upon during the tree survey.
- A letter demonstrating compliance with this LMP, including the above items as attachment(s).

As stated in **Section 4.8**, monitoring will be conducted following installation of the APZ and will include the preparation of a letter containing recommendations for immediate actions (if required) and a Site Inspection Card (see **Appendix 3**) for each of the three Management Zones.



## 5. IMPLEMENTATION

**Table 2: Management Actions, Timing and Performance Criteria to Manage Vegetation under this LMP**

Item	Action	Performance criteria	Document reference	Timing/ Duration	Responsibility
<b>APZ Site Delineation</b>					
1.	LLV site boundaries to be surveyed and delineated	<ul style="list-style-type: none"> <li>Survey pegs are in place at reasonable observational intervals.</li> <li>Boundary of each APZ delineated using flag bunting (or similar material).</li> </ul>	Section 3.1, Section 4.3	TBA	Project / Construction Manager-
<b>Vegetation Clearing and Management</b>					
2.	Vegetation in proposed APZ site installed and managed to OPA standards,	<ul style="list-style-type: none"> <li>Overstorey canopy cover of 30% or less within the total APZ area.</li> <li>Retained tree canopies should be separated by 2 to 5 m.</li> <li>Shrubs should not form continuous canopy.</li> <li>Shrubs should form no more than 20% of ground cover.</li> <li>Groundcover to be kept brush-cut (indicatively no more than 100mm height).</li> <li>Leaf and other debris removed as required.</li> </ul>	Section 2.1	TBA	Landscape Contractor and Project Ecologist

Item	Action	Performance criteria	Document reference	Timing/ Duration	Responsibility
<b>Reporting</b>					
3.	Maintain daily log of works completed during clearing.	<ul style="list-style-type: none"> <li>All daily activities whilst onsite to be recorded.</li> </ul>	Section 4.10	During clearing of the APZ.	Project Ecologist
4.	Maintain a log of any modifications to vegetation and land management practices to that stipulated under this LMP or agreed upon during the tree survey.	<ul style="list-style-type: none"> <li>Provides justification for any modifications to methodology outlined under this LMP or selected trees for retention.</li> </ul>	Section 4.10	During clearing of the APZ.	Project Ecologist
5.	Provision of a completion letter following installation of the APZ.	<ul style="list-style-type: none"> <li>A summary of all works that have occurred during the installation of the APZ.</li> </ul>	Section 4.10	Completion of the installation of the APZ.	Project Ecologist
6.	Provision of a monitoring letter (see below) and recommendations, including site inspection cards.	<ul style="list-style-type: none"> <li>Provides for ongoing compliance of the APZ and identifies controls measures requiring implementation during each maintenance event.</li> </ul>	Section 4.10	January and July (bi-annual) for first 3 years following installation, then July (annual) after.	Project Ecologist or Bushfire Consultant
<b>Monitoring</b>					
7.	Ongoing monitoring to ensure fuel loads and vegetation structure meet APZ standards	<ul style="list-style-type: none"> <li>Ongoing fuel management will be monitored in January and July (bi-annual) for first 3 years following installation of the APZ, then July (annual) thereafter.</li> <li>Monitoring photographs will be taken facing north, east south and west in each Management Zone.</li> <li>Completion of site inspection cards in <b>Appendix 3</b> during each monitoring event.</li> <li>Ensure compliance with OPA standards.</li> <li>Identify where prescribed maintenance is required (see below).</li> </ul>	Section 4.8	This would occur at least every September and once again before January (or as required).	Project Ecologist or Bushfire Consultant

Item	Action	Performance criteria	Document reference	Timing/ Duration	Responsibility
<b>Maintenance</b>					
8.	<b>Routine Maintenance:</b> Maintenance of the proposed APZ utilising the methodology (including protection and boundary fencing) outlined under this LMP to ensure ongoing compliance with OPA standards.	<ul style="list-style-type: none"> <li>Ensure compliance with OPA standards.</li> <li>Only undertaken following NPWS permission to undertaken works within the APZ boundary.</li> </ul>	Section 4.9	Each year prior to NSW fire season (indicatively July-August), following July monitoring.	Landscape Contractor
9.	<b>Prescribed Maintenance:</b> Maintenance being undertaken as a result of APZ monitoring, including (but not restricted to) weed management and the installation of erosion and sediment controls.	<ul style="list-style-type: none"> <li>Maintenance actions to be undertaken as per the recommendations of monitoring reports.</li> <li>Control of exotic species and erosion.</li> <li>Only undertaken following NPWS permission to undertaken works within the APZ boundary.</li> </ul>	Section 4.9	As required following monitoring events.	Landscape Contractor

## 6. REFERENCES

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DEC 2006, *Fire Management Strategy, Lane Cove National Park, Wallumatta Nature Reserve and Dalrymple Hay Nature Reserve*, Department of Environment and Conservation, Sydney, [www.environment.nsw.gov.au/firemanagement/DalrympleHayNatureReserveFms.htm](http://www.environment.nsw.gov.au/firemanagement/DalrympleHayNatureReserveFms.htm).

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Landcom (2004) *Managing Urban Stormwater: Soils and Construction*. Volume 1 - Blue Book, 4th Edition, Parramatta, N.S.W.

OEH 2016, *Lane Cove National Park Plan of Management*. NSW National Parks and Wildlife Service. Published by the Office of Environment and Heritage, Sydney

NSW Rural Fire Service 2005. *Standards for Asset Protection Zones*. NSW Rural Fire Service, Granville NSW 2142

NSW Rural Fire Service 2006. *Bush Fire Environmental Assessment Code for New South Wales*

NSW Rural Fire Service 2006, *Planning for bush fire protection*. NSW Rural Fire Service, Lidcombe NSW 2141, ISBN 0 9751033 2 6.

NSW Rural Fire Service 2018, *Planning for bush fire protection (Pre-release)*. NSW Rural Fire Service, Lidcombe NSW 2141

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# **APPENDIX 1.      VEGETATION      MANAGEMENT INDUCTION**

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## Site Induction: Vegetation Clearing Management

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**Vegetation Clearing and APZ Modification:** Lane Cove National Park – prepared to support the Lindfield Learning Village Redevelopment

Eton Road, Lindfield NSW.

**Before any vegetation management work can commence, all contractors and sub-contractors involved in the vegetation management must ensure that every worker has undergone a site induction with a supervising ecologist and signed onto this site induction register.**

This site induction has been prepared by Kleinfelder Australia on behalf of Project Managers (DesignInc) and outlines key site requirements and proposed vegetation management procedures for the construction period.

The induction is relevant for all contractors involved in the site preparation and any interaction with the site ecological/environmental areas. All contractors attending site will be informed of the sensitive nature of the APZ and the environment protection procedures as detailed in the Landscape Management Plan.

The clearing contractor scope of works is to fell trees and clear vegetation to meet the APZ standards. The clearing contractor will be supervised by a project ecologist, and will follow the guidance of the ecologist and the Bushfire Consultant with regards to standard of works, prior to completion of a specific work zone.

Work zones will be created in consultation with the contractor and project ecologist, and works within that zone are expected to be completed prior to moving to the next specified work zone.

### **Measures to minimise the loss of key fauna habitat and any fauna on site**

No hollow-bearing trees will be removed as part of site works. However, there is scope that fauna habitat may still be adversely impacted, particularly sandstone and rocks, fallen timber and leaf litter. To mitigate any further impact on site, the project ecologist will be aware of the clearing procedures and locations at all time.

Pre clearing surveys will be conducted every morning in the specified clearing zone (specified in consultation with the clearing contractor) and throughout the day as required (i.e. when clearing moves to a new specified zone).

If a habitat feature is identified, the project ecologist will determine the appropriate procedure. Works will not commence unless directed by project ecologist.

The Project Ecologist has fauna handling qualifications and experience. The contractor will not handle fauna, but will call the project ecologist to deal with any fauna interactions.

## **Controlling weeds and feral pests**

The intent at this location is to ensure no new weeds or pests are introduced to the site, or adjacent forested areas. This will be managed by the project ecologist through:

- The site induction process, ensuring all contractors understand the site expectations regarding clean vehicles, equipment and plant and
- By checking all equipment and plant used on the site during clearing. All vehicles to enter the site will be inspected by the project ecologist, targeting material such as wood chip and mulch, dirt etc.
- By zoning out designated work areas so weeds are not transported from one zone to another zone across the site.

Feral pests (likely rats, rabbits, foxes) will be managed through general tidiness and housekeeping (such as provision of lunch room). Any feral pest captured will be appropriately managed with by the project ecologist.

## **Unexpected Finds Procedure**

Often when clearing works for construction for APZ commences, unexpected flora/fauna or habitat finds occur. Examples are (but not limited to): small tree hollows not previously identified, sandstone areas of habitat value exposed after vegetation removed, new nests or possum dreys identified, new threatened fauna species identified, seasonality issues associated with flora species (i.e. threatened flora species identified), retained feature compromised by clearing works.

The direct supervision of a qualified and experienced Project Ecologist, and the pre-clearing surveys will provide the acceptable procedure to identify any unexpected flora or fauna issues.

To suitably manage the issue in in the event that flora and fauna is uncovered in any area, the project ecologist would cease works in that area (and will direct contractor to another pre-cleared zone), and inform the Project Manager. The area of interest would be delineated as a no go area until the liaison and direction for action has been provided by the Ecoplanning Consultant (author of the Review of Environmental Factors) or other relevant authority.

## **Measures to ensure Specific biodiversity values are protected**

Biodiversity values to be protected are essentially the retained trees and potentially sandstone outcrops and any unexpected finds.

The APZ clearing contractor will commence clearing without tree protection in place (other than delineation / instruction of trees to be removed). It is important to manage minimal disturbance to root zone of protected trees. Felling and clearing vegetation around the protected trees will ensure no impact (i.e. fell trees away from protected trees).

The sandstone outcrop areas are unique values that should avoid direct impact. These areas should be fenced off for the duration of the tree clearing, or avoid vehicle tracking over these.

Threatened flora located in the proposed works area are to be fenced off and excluded from APZ management where relevant.

To suitably manage the issue in in the event that unexpected flora and fauna finds in any area (not being identified in the updated Biodiversity Assessment Report), the project ecologist would manage accordingly.





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## APPENDIX 2. EROSION AND SEDIMENT CONTROL GUIDANCE

In event that initial inspections and / or APZ monitoring events identify erosion hotspots within the APZ area the controls listed **Table 1** below are suggested.

**Table 1: Sediment and Erosion Controls**

Nature of disturbance	Erosion Control	Sediment Control
Bare soils with observable signs of erosion.	<ul style="list-style-type: none"> <li>• <b>Temporary:</b> installation of jute mesh to cover and bind surface soils.</li> <li>• <b>Permanent:</b> Planting of fire tolerant, native shrubs, sedges or grasses such as <i>Lomandra longifolia</i>.</li> </ul>	<ul style="list-style-type: none"> <li>• Installation of coir logs downslope of disturbance area.</li> </ul>
Bare soils with little to no sign of erosion.	<ul style="list-style-type: none"> <li>• <b>Temporary:</b> note that following maintenance event is to include spreading existing leaf litter onto bare soils.</li> <li>• <b>Permanent:</b> Monitor further, if required apply control measures stated above.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>If sedimentation is observed downslope:</b> install coir logs downslope of disturbance area.</li> <li>• <b>If no sedimentation is observed:</b> no controls proposed.</li> </ul>
Observable scouring of existing drainage lines (including unmapped drainage lines).	<ul style="list-style-type: none"> <li>• <b>Temporary:</b> line the channel with sandstone aggregate.</li> <li>• <b>Permanent:</b> Planting of fire tolerant, native shrubs, sedges or grasses such as <i>Lomandra longifolia</i> within and surrounding the drainage line.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>If sedimentation is observed downslope:</b> every 2 – 5 m install sandstone aggregate as rock check dams (see Page 5-22 of the Blue Book).</li> <li>• <b>If no sedimentation is observed:</b> no controls proposed.</li> </ul>

All sediment controls are to be installed as outlined under *Managing Urban Stormwater: Soils and Construction Volume 1* (the Blue Book) (Landcom (2004)). In the event further monitoring finds the above controls are insufficient for controlling erosion and sedimentation following APZ installation specialist advice will be sought and an Erosion and Sediment Control Plan prepared for the applicable Management Zone(s).

**Please note:** the installation of sediment fences has not been considered due to the requirement for ground disturbance for correct installation (fence to be partially buried). Given the sensitive nature of the APZ within the Lane Cove National Park, it is considered that the installation of sediment fences will result in a higher disturbance than utilising less intrusive sediment controls such as coir logs.



## **APPENDIX 3.      SITE INSPECTION CARDS**

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## Site Inspection Cards

*APZ Environmental Monitoring and Rehabilitation – Lane Cove National Park  
Lindfield NSW 2070*

Date	
Name	
Company	

These Site Inspection Cards provide an account of the landscape and vegetation retention and fuel loading elements across the Lindfield Learning Village APZ within the borders of the Lane Cove National Park.

Each monitoring event will record the performance of the APZ to OPA Standards (see **Table 1** below) and recommend actions for any element not meeting the performance. Recommendations will also be made for observable erosion, presence of fauna pest species or weed species observed within the APZ boundary.

The completion will be recorded after recommendations have been actioned.

**Table 1: Asset Protection Zone Standards (Outer Protection Area)**

Parameter	APZ Standard
Canopy Cover	<ul style="list-style-type: none"> <li>Overstorey canopy cover of 30% or less within the total APZ area.</li> <li>Retained tree canopies should be separated by 2 to 5 m.</li> </ul>
Shrub layer	<ul style="list-style-type: none"> <li>Shrubs should not form continuous canopy.</li> <li>Shrubs should form no more than 20% of ground cover.</li> </ul>
Groundcover	<ul style="list-style-type: none"> <li>Should be kept brush-cut (indicatively no more than 100mm height).</li> <li>Leaf and other debris should be removed as required to prevent an accumulation of fine fuels within the APZ extents..</li> </ul>

Management Zone 1	
Date:	
Staff:	
Monitoring Parameter	Monitoring Comments and Recommendations
Retention of areas of native vegetation for threatened flora and fauna	
Native Vegetation Cover (%)	
Weed Control	
Weed species identified	
Percentage Weed Cover (%)	
Recommended Actions	
Feral Animal Control	
Signs of feral/pest animals (rats, rabbits, foxes cats)	
Recommended Actions	

Management Zone 1	
Pathogen Management	
Signs of pathogen Invasion (rust, die-back, etc)	
Recommended Actions	
Rehabilitation Actions	
Status of erosion, weed infestations	
Recommended Actions	
Asset Protection Zone Status Monitoring (Outer Protection Area)	
<b>Tree canopy:</b> Minimum 2 – 5 m separation between tree canopies or clumps. Maximum 30% canopy cover within the APZ.	<i>Where canopy connection creates a link between canopies or clumps, separation will be required using arborist to prune limbs.</i>
<b>Midstorey Management:</b> Tree pruning as required to achieve 2 - 3 m height clearance.	
<b>Shrub Management:</b> Shrubs to not form more than 20% of ground cover.	

Management Zone 1	
<b>Ground fuel loads (fine fuels):</b> Managed to 100mm height through slashing, mowing or brushcutting Monitoring of ground fuels to be conducted in January, prior to school year commencing and prior to the bushfire season (July).	<i>(fine fuels associated with grasses, shrubs, sedges, leaf and bark fall, regrowth etc.).</i>
<b>Recommended Actions</b>	
General Notes:	
Monitoring Photo Point	
<b>Bearing:</b> North	
<b>Bearing:</b> East	

Management Zone 1	
<b>Bearing:</b> South	
<b>Bearing:</b> West	



Management Zone 2	
Date:	
Staff:	
Monitoring Parameter	Monitoring Comments and Recommendations
Retention of areas of native vegetation for threatened flora and fauna	
Native Vegetation Cover (%)	
Weed Control	
Weed species identified	
Percentage Weed Cover (%)	
Recommended Actions	
Feral Animal Control	
Signs of feral/pest animals (rats, rabbits, foxes cats)	
Recommended Actions	
Pathogen Management	
Signs of pathogen Invasion (rust, die-back, etc)	
Recommended Actions	

Management Zone 2	
Rehabilitation Actions	
<b>Status of erosion, weed infestations</b>	
<b>Recommended Actions</b>	
Asset Protection Zone Status Monitoring (Outer Protection Area)	
<b>Tree canopy:</b> Minimum 2 – 5 m separation between tree canopies or clumps. Maximum 30% canopy cover within the APZ.	<i>Where canopy connection creates a link between canopies or clumps, separation will be required using arborist to prune limbs.</i>
<b>Midstorey Management:</b> Tree pruning as required to achieve 2 - 3 m height clearance.	
<b>Shrub Management:</b> Shrubs to not form more than 20% of ground cover.	
<b>Ground fuel loads (fine fuels):</b> Managed to 100mm height through slashing, mowing or brushcutting Monitoring of ground fuels to be conducted in January, prior to school year commencing and prior to the bushfire season (July).	<i>(fine fuels associated with grasses, shrubs, sedges, leaf and bark fall, regrowth etc.).</i>
<b>Recommended Actions</b>	

Management Zone 2	
General Notes:	
Monitoring Photo Point	
Bearing: North	
Bearing: East	
Bearing: South	
Bearing: West	

Management Zone 3	
Date:	
Staff:	
Monitoring Parameter	Monitoring Comments and Recommendations
Retention of areas of native vegetation for threatened flora and fauna	
Native Vegetation Cover (%)	
Weed Control	
Weed species identified	
Percentage Weed Cover (%)	
Recommended Actions	
Feral Animal Control	
Signs of feral/pest animals (rats, rabbits, foxes cats)	
Recommended Actions	
Pathogen Management	
Signs of pathogen Invasion (rust, die-back, etc)	
Recommended Actions	

Management Zone 3	
Rehabilitation Actions	
<b>Status of erosion, weed infestations</b>	
<b>Recommended Actions</b>	
Asset Protection Zone Status Monitoring (Outer Protection Area)	
<b>Tree canopy:</b> Minimum 2 – 5 m separation between tree canopies or clumps. Maximum 30% canopy cover within the APZ.	<i>Where canopy connection creates a link between canopies or clumps, separation will be required using arborist to prune limbs.</i>
<b>Midstorey Management:</b> Tree pruning as required to achieve 2 - 3 m height clearance.	
<b>Shrub Management:</b> Shrubs to not form more than 20% of ground cover.	
<b>Ground fuel loads (fine fuels):</b> Managed to 100mm height through slashing, mowing or brushcutting Monitoring of ground fuels to be conducted in January, prior to school year commencing and prior to the bushfire season (July).	<i>(fine fuels associated with grasses, shrubs, sedges, leaf and bark fall, regrowth etc.).</i>
<b>Recommended Actions</b>	

Management Zone 3	
General Notes:	
Monitoring Photo Point	
Bearing: North	
Bearing: East	
Bearing: South	
Bearing: West	





## **APPENDIX 4. STATEMENT OF LIMITATIONS**

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This report has been prepared by Kleinfelder Australia Pty Ltd (Kleinfelder) and may be used only by the Client and its designated representatives or relevant statutory authorities and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

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## APPENDIX 5. LICENSING

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Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2020) 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.



## APPENDIX 6. STAFF CONTRIBUTIONS

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

Name	Qualification	Title/Experience	Contribution
Brad Deane	B.BioCons, M.WildMgt	Environmental Consultant / Ecologist	Report and Figure Preparation
Jonathan Berry	BAppSc (Hons)	Principal Advisor	Report Review







## APPENDIX 2: STATEMENT OF LIMITATIONS

This report has been prepared by Kleinfelder Australia Pty Ltd (Kleinfelder) and may be used only by the Client and its designated representatives or relevant statutory authorities and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

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