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Construction Flora and Fauna Management Sub-Plan

DesignInc Pty Ltd

Lindfield Learning Village
Eton Road, Lindfield NSW

December 2018

Construction Flora and Fauna Management Sub-Plan

Lindfield Learning Village

Eton Road, Lindfield NSW

Kleinfelder Document Number: NCA18R82665

Project No: 20191317

Prepared for:

DESIGNINC PTY LTD

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Contents

1. INTRODUCTION

The proposed redevelopment of the old University of Technology Sydney (UTS) Campus and attendant Development Application (DA) are being administered for the Department of Education (DoE) by DesignInc Sydney Pty Ltd.

1.1 SCOPE

Kleinfelder have been engaged to prepare a Construction Flora and Fauna Sub-Plan (FFMSP) as part of development condition B34.

Condition B34.

The Applicant must prepare a Construction Flora and Fauna Management Sub-Plan (FFMSP) in consultation with OEH. The plan must address, but not be limited to, the following:

a) measures to minimise the loss of key fauna habitat, including tree hollows

b) measures to minimise the impacts on fauna on site, including conducting fauna preclearance surveys prior to vegetation clearing, building/structure demolition

c) engagement of an appropriately qualitied ecologist with experience in capturing native wildlife to be on site for all vegetation removal activities

d) controlling weeds and feral pests

e) an Unexpected Finds Procedure detailing procedures and management measures to be implemented in the event that flora and fauna is uncovered in any area not identified in the updated Biodiversity Assessment (BAR)

f) measures to ensure biodiversity values not intended to be impacted are protected, including barriers and mapping of protected/ 'no-go' areas

g) a program to monitor the effectiveness of the measures in the FFMSP for the Phase 1 development plan for the new school development.

This FFMSP is a management plan for APZ construction and initial works (Phase 1) only. Kleinfelder has prepared this FFSMP for the site in October 2018 prior to commencement of construction.

The scope of our FFSMP has focused on the subject site (DoE land) and extended out to the study area (including the pathway extension to the bus stop).

The study areas includes:

- Establishment of APZ around Phase 1 for the entirety of the DoE owned Land;
- Construction of a small footpath to the bus stop area north-east of the subject site.

The FFSMP had been developed in consideration of the Landscape Management Plan (LMP) and its associated directions and recommendations (i.e. tree retention, soil protection, fauan management). Further to this the FFSMP details the actions required for weed management plan as directed by EcoPlanning Weed Management Strategy (2018).

1.2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The study area lies within the Ku-ring-gai Local Government Area (LGA).

The study area is bounded by Lane Cover River National Park to the south, east and west, and existing residential development to the northern perimeters. The bushland on the study area is contiguous with the adjoining Lane Cove National Park, being used for recreation and educational purposes. As the Lane Cove National Park adjoins the study area it is important that works do not adversely impact the national park. OEH (in letter dated 23/11/2018) requests Lane Cove National Park is notified 2 weeks prior to the date of works commencing.

The majority of the site is mapped as the Hawkesbury soil landscape. The northern part of the study area is mapped as the Lucas Heights soil landscape. Shallow soils and exposed sandstone are common surface features.

The subject site has existing UTS buildings within a natural bushland environment.

The proposed development would require the management of the bushland environment to meet the prescribed standards for Asset Protection Zones (NSW RFS 2005).

A tree survey has been prepared to ascertain the trees on site, their density, connectivity and selection for removal to meet the NSW RFS standards (LMP).

1.3 VEGETATION CLASSIFICATION

Vegetation types are considered for the purpose of this FFSMP. The study area contains two natural vegetation communities and one area of modified vegetation:

1. Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast (ME64; PCT1776)
2. Dwarf Apple - Broad-leaved Scribbly Gum - Sydney Peppermint low open woodland on sandstone ridges with subtle enrichment in northern Sydney (ME67; PCT1782).
3. Cleared land exotics and exotic/non-indigenous plantings.

For any further information please see *Biodiversity Assessment Report (*Ecoplanning 2017).

2. FFSMP OBJECTIVES AND ZONES

2.1 MANAGEMENT AIMS AND OBJECTIVES

The primary aim of this FFSMP is to provide a working document for the Construction of the APZ that will outline the actions and procedures required to meet the relevant Consent Condition B34.

2.1.1 APZ Management Zones

The site has been divided into management zones based on the landscape characteristics and planned APZ management and outcomes:

- **Management Zone (IPA Parkland):** This Management Zone will follow the same guidelines as IPA management (*an IPA should provide a tree canopy cover of less than 15% and should be located greater than 2 metres from any part of the roofline of a dwelling. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2 metres above the ground (NSW RFS 2006). The vegetation for landscaping within IPA will eliminate potential fire ignition and spread sources by using/retaining specific species and total native tree and shrub cover should be retained as clumps or islands and should maintain a covering of no more than 20% of the total area. Tree removal will take place to come into line with the standards of the NSW Rural Fire Services*). Specifically, **the trees will be removed including stumps and ground roots to 150mm below finish level**, and ground cover within the IPA Parkland will be highly modified to a mown grassy parkland standard and garden beds with specific plant species to eliminate ignition and spread sources. This area will form part of the landscaped area to the north of the building for an outdoor play area.

- **IPA Management Zone (IPA):** The remaining IPA will provide a tree canopy cover of less than 15% and should be located greater than 2 metres from any part of the roofline of a dwelling. Garden beds of flammable shrubs are not to be located under trees and should be no closer than 10 metres from an exposed window or door. Trees should have lower limbs removed up to a height of 2 metres above the ground (NSW RFS 2006). The ground layer will be managed to less than 10cm on a regular (as-needed) basis. The vegetation for landscaping within IPA will eliminate potential fire ignition and spread sources by using/retaining specific species and total native tree and shrub cover should be retained

as clumps or islands and should maintain a covering of no more than 20% of the total area. Tree removal will take place to come into line with the standards of the NSW Rural Fire Services. Specifically, **the trees will be removed by cutting at ground level and leaving root structures in place.**

- **Pathway Management Zone (PMZ):** The proposed path to the bus stop is on adjacent landholding. Within the pathway to the north all trees within the study area will be retained until clarification of this area is received in regards to tree removal. One tree has been highlighted for removal (tree #38, Brush Box).

2.1.2 Tree Clearing Zones

These zone will be further divided into tree clearing management zones in consultation with the tree clearing contractor. This will ensure works are done to the required standard before leaving a zone and proceeding to the next zone. Each zone will be inspected and signed off by the Bushfire Consultant prior to moving to next zone.

2.1.3 Erosion and Sediment Control

Prior to clearing, the potential for soil erosion and sediment impacts to surrounding areas (including Lane Cove National Park) will be observed in consultation with the Construction Soil and Water Sub-plan. The project manager, project ecologist and arborist contractor will need to ensure no sediment leaved the vegetation clearing area during the clearing project, and that adequate sediment controls are in place post clearing.

2.2 WEED MANAGEMENT

Weed management is considered in this FFSMP. Kleinfelder have prepared a Baseline Weed Survey which has been incorporated into this LMP (**Appendix 3**). Exotic flora species are found in low number across the subject site, except in areas of planting and in drainage lines. Where exotic species have naturalised or planted specimens have escaped garden beds into the bushland, they should be treated in accordance with the methods detailed by Ecoplanning (2018), incorporated into the Baseline Weed Survey (**Appendix 3**).

Weed treatment where applicable (as determined by the project ecologist), should be actioned prior to commencement of clearing, to prevent the spread across the APZ and potentially into the Lane Cove National Park.

A visual weed buffer zone monitoring of approximately 20m external to the site boundary (i.e. within the national park estate) will be treated prior to APZ installation to limit the potential for the spread of weeds into the Lane Cove National Park. Activities that may result in weed propagation should be observed and managed by the project ecologist throughout the clearing and construction phases of development.

2.3 THREATENED SPECIES AND FAUNA MANAGEMENT

No threatened fauna species have been recorded in the subject site (EcoPlanning 2017), however management in accordance with this FFSMP includes mitigation measures for threatened species that potentially utilise the site (e.g. Powerful Owl) (see **Appendix 4**).

Further to threatened species, all fauna potentially impacted from the APZ implementation will be managed through the fauna displacement protocol (see **Appendix 4**).

2.3.1 Nest Boxes and Hollow Bearing Trees

The subject site has several trees with nest boxes installed and a potential hollow bearing tree present. These fauna habitat features were identified in the tree survey (**Appendix 1**), and will be adequately protected through the retention of that tree and the provision of a project ecologist supervision throughout the APZ clearing.

3. IMPLEMENTATION OF CONSTRUCTION FFMSP

Clearing for APZ is expected to commence in December 2018 and is expected to take 4-6 weeks (dependent on weather). The following section detail how the construction and implementation of the APZ will managed the Condition B34 requirements.

The key requirements of the FFMSP are:

1. Lane Cove National Park is notified 2 weeks prior to the date of works commencing (OEH request, 23/11/2018).

2. Prior to commencement of clearing works of native vegetation within APZ area, the site boundary must be clearly delineated on the ground to prevent any clearing extending beyond the site.

3. Prior to commencement of clearing works, erosion and sediment controls must be installed downslope of the works in accordance with the Construction Soil and Water Sub-plan. The erosion and sediment controls will be maintained by the project manager for the duration of the clearing works until the APZ area is identified as stabilised by a suitably qualified expert.

4. Prior to bulk APZ clearing, exclusion or protection fencing will be installed for habitat protection, tree protection and unexpected finds. The exclusion fencing will be maintained by the project manager for the duration of works (as directed by the project ecologist).

5. All clearing works of native vegetation within the APZ area will be conducted under the direct supervision of a qualified and experienced Project Ecologist engaged by the Project Manager.

6. All Clearing Contractor staff will be inducted by the project ecologist prior to commencing works, to understand the sensitivities and expectations associated with the ecology while clearing at this site.

7. The project site will be sectioned into management zones in consultation with the contractor. Works will be conducted within management zones until completion and sign off, before entering next management zone.

3.1 MEASURES TO MINIMISE THE LOSS OF KEY FAUNA HABITAT

No key habitat has been determined on the site.

Fauna habitat generally refers to shelter and foraging (feed).

Shelter includes tree hollows, loose bark, nest boxes, nests and possum dreys, fallen timber, hollow logs and fallen timber, shrub/ground layer vegetation, leaf litter, rocks and sandstone, water soaks or drainage lines, and any other features deemed by the experienced project ecologist.

Feed habitat refers to flowering trees and shrubs, water holes, *Allocasuarina* fruit (Black Cockatoos), and any other potential features deemed by the experienced project ecologist.

All hollow bearing trees have been identified and conserved in the LMP. 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, it will be either:

1. Checked for presence of fauna before removal, and possible relocation of the habitat feature into adjacent or selected location (based on approvals sandstone rocks and hollow logs can be moved). Habitat features should be located to a pre-determined area within the site boundary and protected from further impacts during clearing.
2. Retained in-situ (in consultation with the Project Manager and stakeholders) if the feature is considered exceptional and does not pose additional risk (e.g. tree hollow or sandstone shelf can be retained).

3.2 MEASURES TO MINIMISE THE IMPACTS ON FAUNA ON SITE

To minimise impact to fauna 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).

Appendix 2 describes the pre-clearing protocol and the fauna displacement protocol (Kleinfelder LMP 2018).

The Project Ecologist will have the following qualifications and experience:

- A fauna spotter catcher qualification AHCFAU301A: **Response to Wildlife Emergencies (including relocation)**: A spotter catcher is a person licensed to detect, capture, care for, assess, and release wildlife disturbed by vegetation clearance activities.
- Minimum 2 years handling fauna and working on construction sites.

3.2.1 Large Forest Owls

Large forest owls, specifically Powerful Owl have been identified as utilising the site (EcoPlanning 2017). Large forest owls with potential to be in the locality include Masked Owl, Barking Owl and Sooty Owl. Therefore, specific attention has been raised by OEH to adequately manage any interaction with large forest owls.

Contact must be made with Birdlife Australia, by the project ecologist, prior to any works commencing. Birdlife Australia are actively monitoring powerful owls in Greater Sydney and have the most up to date information on sightings and nesting locations.

Contact: Birdlife Australia
Birdlife Melbourne Office
T 03 9347 0757
powerfulowl@birdlife.org.au

November to March is the preferred period for maintenance works within areas inhabited by large forest owls (i.e. the non-breeding season). The following conditions apply in areas of known habitat for large forest owls during the non-breeding season:

- All staff/contractors involved in vegetation works are to be provided information on how to identify Powerful Owl roosting and breeding location and their behaviours (no roosting or breeding location within the study area).
- Avoid vegetation trimming that opens the canopy in riparian zones (no riparian zones within the study area).

- Retain all hollows and all horizontal roosting branches of 4-10 cm diameter in flyways (i.e. above creeks and tracks) if possible (no creeks within the study area).
- Large hollow-bearing trees (tree diameter> 80 em) and hollows (>30cm diameter) are to be retained wherever possible. If removal is unavoidable, the applicant must seek advice from NPWS Area office North Western Sydney (no large hollow bearing trees within the study area).
- Ensure noisy works (chainsaw, mulching) are not carried out within one hour before sunset, or one hour after sunrise.
- Avoid trimming of horizontal branches within 1m of tree hollows > 30cm diameter (likely perching branch for breeding hollows) (no breeding hollows within the study area).

3.3 ENGAGEMENT OF AN APPROPRIATELY QUALITIED ECOLOGIST

Kleinfelder are an appropriately qualified ecologist and have capacity to provide experienced project ecologists for the purpose of APZ clearing at this site. All our staff used on this project will have the fauna spotter catcher qualification AHCFAU301A: Response to Wildlife Emergencies and minimum 2 years handling fauna and working on construction sites that involve clearing of native vegetation.

3.4 CONTROLLING WEEDS AND FERAL PESTS

The site has a generally low weed infestation and no recognised pests. The intent of this measure is to ensure no new weeds or pests are introduced to the site. It is an important outcome that weeds are not introduced from the subject site into the surrounding national park. This will be managed by the project ecologist through:

1. The site induction process, ensuring all contractors understand the site expectations regarding clean vehicles, equipment and plant and
2. 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.

3. By zoning out designated work areas so weeds are not transported from one zone to another zone across the site.

4. A visual weed buffer zone monitoring of approximately 20m external to the site boundary (i.e. within the national park estate) will be treated prior to APZ installation to limit the potential for the spread of weeds into the Lane Cove National Park.

5. Groundcover weeds within the remainder of the subject site will be treated following installation of the APZ. Woody weeds will be removed as part of APZ installation.

6. The visual weed buffer zone monitoring of approximately 20m external to the site boundary (i.e. within the national park estate) should be observed by the project ecologist throughout the clearing and construction phases of development. Specific actions include:

    - Weed monitoring will be undertaken at the site during the clearing works, including the APZ area and along the subject site/National Park boundary interface. Any weeds identified will be treated/removed.

Weed management and monitoring will occur as outlined under the Baseline Weed Survey (**Appendix 3**).

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.

3.5 CONTROLLING EROSION AND SEDIMENT IMPACTS

To protect the adjoining national park from potential erosion and sediment runoff impact during clearing, the project manager, project ecologist and the arborist contractor will be made aware of the Construction Soil and Water Sub-plan, and the requirements for erosion and sediment control mitigation prior to commencement of clearing.

3.6 UNEXPECTED FINDS PROCEDURE

Often when clearing works for construction for APZ commences, unexpected finds occur, which are difficult to be predicted in the planning process. 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 issue.

To suitably manage the issue in in the event that flora and fauna is uncovered in any area (not being identified in the updated Biodiversity Assessment Report), the project ecologist would cease works in that area (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 BAR) or other relevant authority.

3.7 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.

Trees will be protected from disturbance by tree protection fencing. This will include protection of the tree root zone, preferably out to a distance of 5m from the tree stem or the drip line. Where this separation is not possible or practical, the Project Ecologist will consult with the Project Manager and provide an alternate solution for tree protection (in some cases consulting with the qualified arborist).

The sandstone outcrop areas are unique values that will avoid direct impact. These areas will be fenced off for the duration of the tree clearing. If this action adversely constrains any development requirement or tree clearing, consultation with the project ecologist and project manager will determine an appropriate outcome (minimising impact where practical).

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 cease works in that area (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 BAR) or other relevant authority.

3.8 MONITORING PROGRAM

This FFSMP is a management plan for construction and initial APZ installation works only. No ongoing monitoring is required under this FFSMP.

The monitoring associated with the FFMSP will include:

1. Ensuring contractor has been inducted and aware of site environmental constraints
2. Monitoring vehicles to ensure they are clean when arriving on site
3. Ensuring works are conducted within each specified work zone
4. Prior to leaving a work zone, the quality of APZ works will be monitored by the Bushfire Consultant, who will sign off that that specific zone has been established to suitable standard
5. Monitoring the condition of tree protection fences and exclusion zone fencing throughout the duration of clearing
6. Monitoring the site to ensure works do not extend into surround areas
7. Monitoring the tree retention data set, ensuring the effectiveness of tree protection and sandstone impact mitigation
8. Monitoring weeds at the subject site including along the subject site/National Park boundary interface throughout the APZ construction period, to identify the spread of any weeds and treat/remove weeds.

No ongoing monitoring of the vegetation is required within the scope of this sub-plan for construction.

All future monitoring post APZ construction will be conducted under the direction of the Landscape Management Plan (LMP Kleinfelder 2018).

3.9 REPORTING

The APZ construction will be recorded as follows:

- A detailed daily log will be kept by the project ecologist, detailing where clearing occurred and any relevant information associated (unexpected finds, tree protection standrds, completion of zone etc.);
- If/when issues arise and alternate actions have been approved, a brief report detailing the modifications will be prepared by the supervising ecologist; and
- Vegetation Clearing: Upon the completion of clearing, the project ecologist supervising clearing works will provide a final letter/ report including the daily log.

4. REFERENCES

Alphitonia Environmental Construction Services (2016) *Vegetation Management Strategy* UTS Ku-ring-gai Campus, Eton Road, Lindfield (0982)

EcoPlanning (2017) *Biodiversity Assessment Report, Framework for Biodiversity Assessment – Lots 1, 2 and 4 // DP 1151638,* University of Technology, Ku-ring-gai Campus, Lindfield.

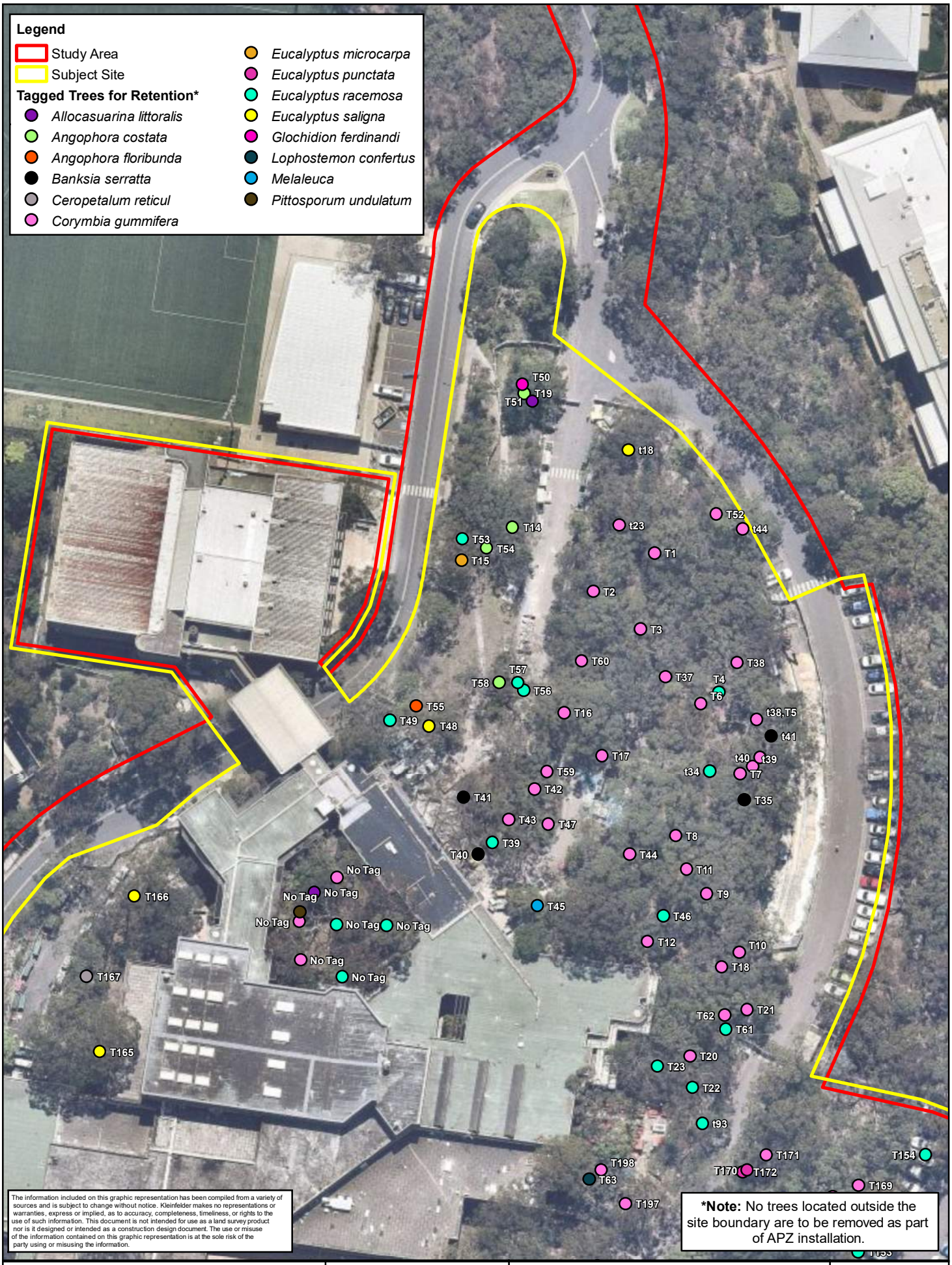
NSW Rural Fire Service (2005). *Standards for Asset Protection Zones.*

NSW Rural Fire Service (2006). *Planning of Bush Fire Protection 2006: A Guide for Councils, Planners*, Fire Authorities, and Developers.

EcoPlanning (2018). Weed Management Strategy – draft for DA submission.

Kleinfelder (2018). Landscape Management Plan for Lindfield Learning College Redevelopment

APPENDIX 1. TREE RETENTION SURVEY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Subject Site
Tagged Trees for Retention*
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Angophora floribunda
Banksia serratta
Ceropetalum reticul
Corymbia gummifera
Eucalyptus microcarpa
Eucalyptus punctata
Eucalyptus racemosa
Eucalyptus saligna
Glochidion ferdinandi
Lophostemon confertus
Melaleuca
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*Note: No trees located outside the site boundary are to be removed as part of APZ installation.
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PROJECT REFERENCE: 20191317
DATE DRAWN: 18/12/2018 11:49 Version 6
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DATA SOURCE:
NSW DFSI - 2017
nearmap - 2018
Tagged Trees for Retention Within Main Site (North)
DesignInc Sydney Pty Ltd
Lindfield Learning Village
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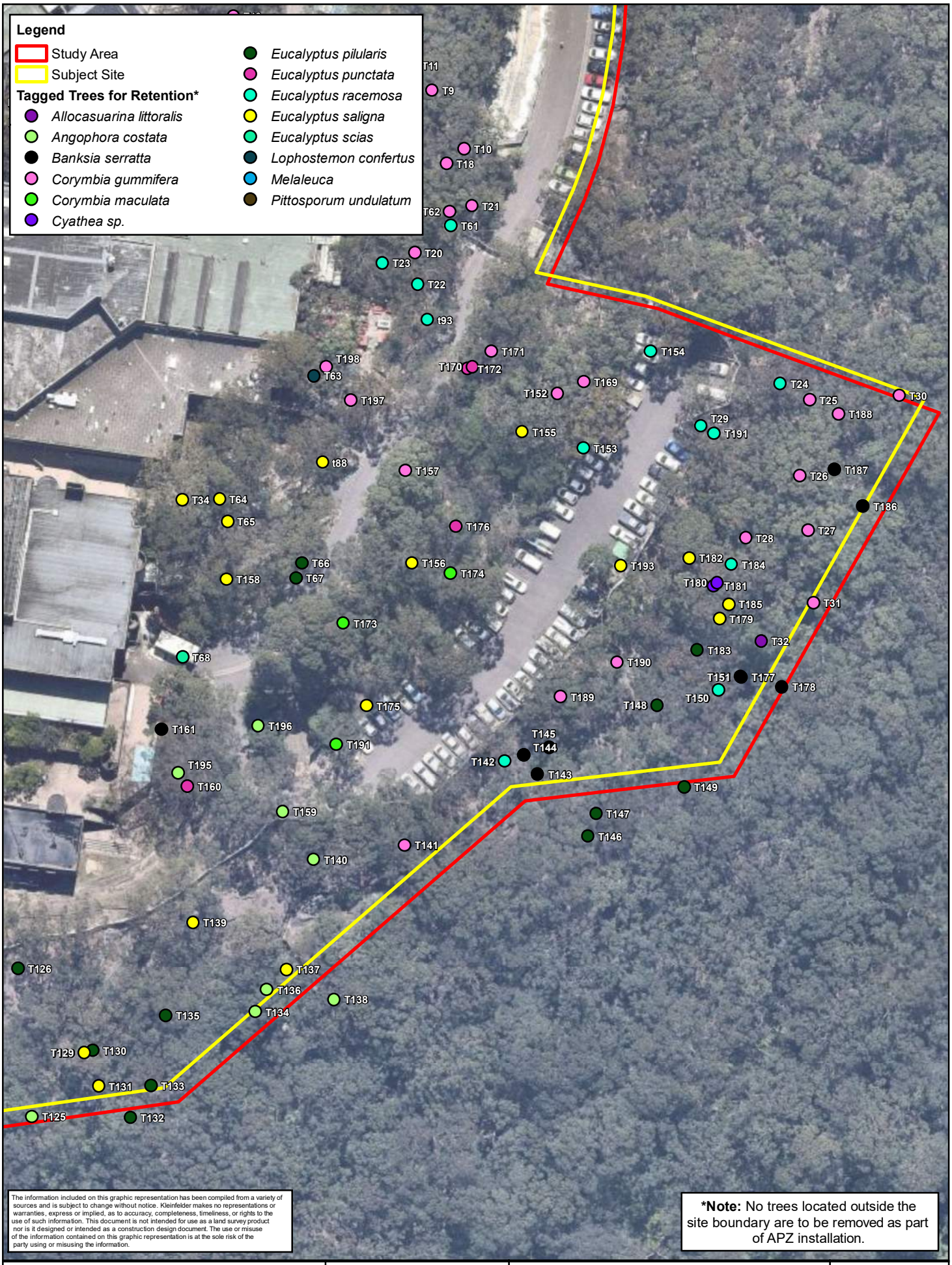

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DATE DRAWN: 18/12/2018 11:45 Version 6

DRAWN BY: BDeane

DATA SOURCE:
NSW DFSI - 2017
nearmap - 2018

Tagged Trees for Retention Within Main Site (East)

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Lindfield Learning Village

FIGURE:

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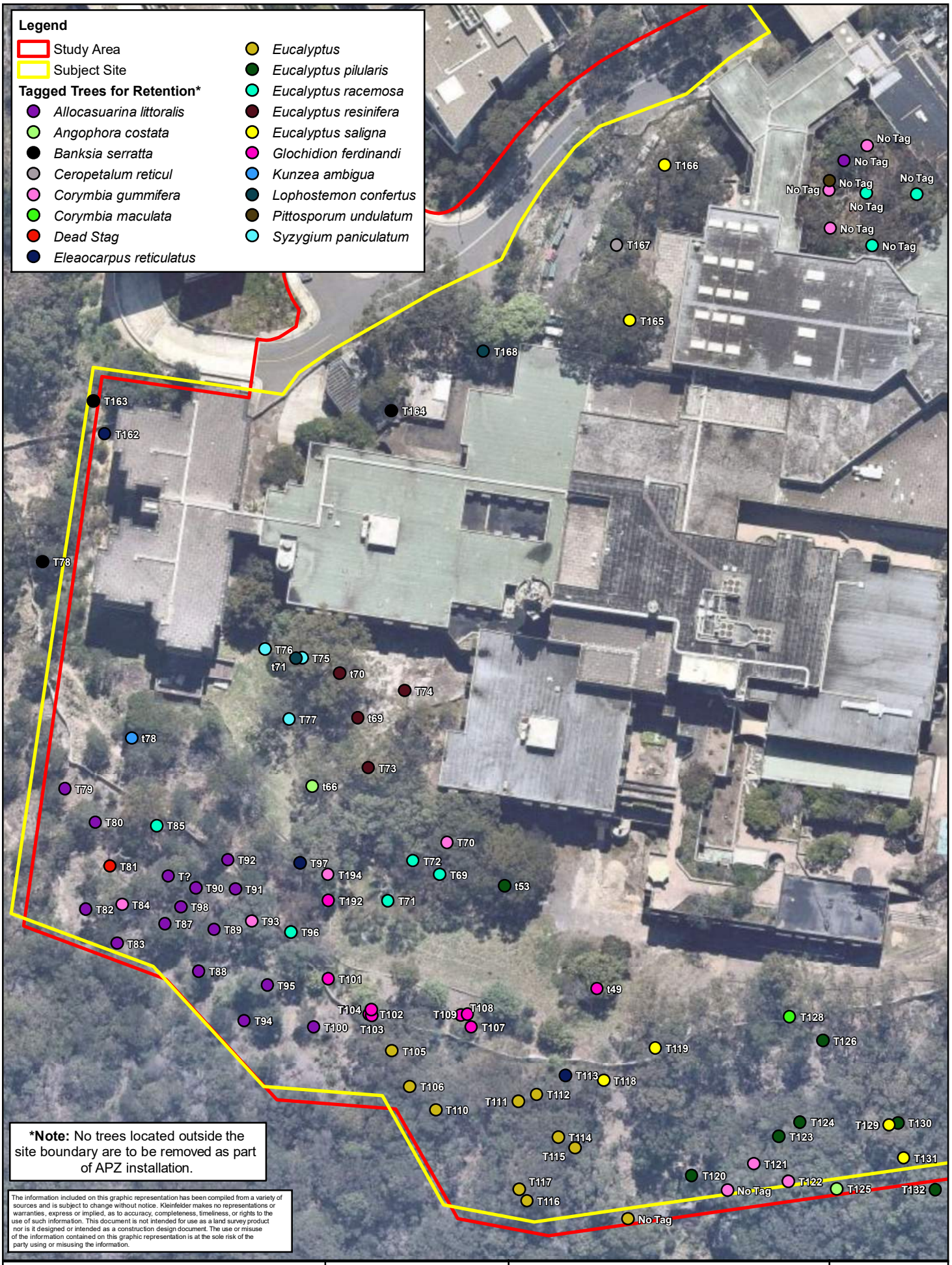
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Banksia serratta
Ceropetalum reticul
Corymbia gummifera
Corymbia maculata
Dead Stag
Eleaocarpus reticulatus
Eucalyptus
Eucalyptus pilularis
Eucalyptus racemosa
Eucalyptus resinifera
Eucalyptus saligna
Glochidion ferdinandi
Kunzea ambigua
Lophostemon confertus
Pittosporum undulatum
Syzygium paniculatum
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NSW DFSI - 2017
nearmap - 2018
Tagged Trees for Retention Within Main Site (West)
DesignInc Sydney Pty Ltd
Lindfield Learning Village
FIGURE:
3
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APPENDIX 2. TREE CLEARING PROTOCOLS

PRE-CLEARING PROTOCOL

Prior to the commencement of any clearing within the site, extent and delineation of the clearing area will be consulted by the Project Ecologist to the Contractor, to ensure there are no accidental incursions.

The Project Ecologist will perform a physical search of that zone and approve for works to commence.

FAUNA DISPLACEMENT PROTOCOL

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, within the subject site. If released onto national park estate, prior agreement with NPWS is required. The optimal location for release will be the eastern side of the southernmost carpark;
- 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 a nest box 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; and

- 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).

APPENDIX 3. BASELINE WEED SURVEY

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Baseline Weed Survey

DesignInc Pty Ltd

Lindfield Learning Village
Eton Road, Lindfield NSW

7 December 2018

Baseline Weed Survey

Lindfield Learning Village

Eton Road, Lindfield NSW

Project No: 20191317

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 3 for limitations applying to this report.

Document Control:

Version	Description	Date	Author	Technical Reviewer	Peer Reviewer
1.	Draft for client review	7 December 2018	B.Deane	D.Pedersen	D.Pedersen

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Contents

Tables

Figures

1. INTRODUCTION

The proposed redevelopment of the old University of Technology Sydney (UTS) Campus and attendant Development Application (DA) are being administered for the Department of Education (DoE) by DesignInc Sydney Pty Ltd.

Figure 1 provides an aerial image of the proposed development site, located at Eton Road, Lindfield NSW 2070 (the subject site).

Kleinfelder have been engaged to prepare a Baseline Weed Survey (BWS) prior to clearing works for the Phase 1 new school development plan, in accordance with the project Construction Flora and Fauna Management Sub-Plan (FFMP) and Landscape Management Plan (LMP).

This BWS has been prepared to address comments received by the NSW Office of Environment and Heritage in relation to the project LMP, and the potential for weed infestations to spread onto the NPWS Land Cove National Park estate. The BWS will identify the extent of weed management works within the Phase 1 development footprint (including asset protection zone (APZ) implementation).

An onsite weed inspection was required (conducted on 4 December 2018) prior to APZ clearing conducted under the Linfield Learning Village (LLV) State Significant Development Application (SSDA).

1.1 SCOPE

The scope of this study has focused on the subject site (DoE land) footprint to be impacted by APZ clearing.

The proposed development includes:

- establishment of an APZ to property extent around Phase 1 of construction;
- installation of a new boundary fence,
- landscaped area to the north of the building for an outdoor play area;
- construction of a small footpath to the bus stop area north-east of the subject site;

- construction of a fire trail to the south of the building; and
- construction of the water hydrant ring main.

This BWS has been prepared to provide a baseline weed occurrence and concentration outlined within the LLV site boundary, identifying areas where pre-clearing and ongoing weed management will be required and where APZ installation will need to be conducted in such a manner as to not propagate the spread of existing weeds within the LLV site boundary.

This document will further address the requirement to establish a visual weed buffer zone where the site borders on the Lane Cove National Park.

1.2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is bounded by Lane Cove National Park to the south, east and west, and existing residential development to the northern perimeters. Shallow soils and exposed sandstone are common surface features.

The subject site has existing UTS buildings within a natural bushland environment. The building has been dis-used for a period of time, and the bushland management has not been appropriately managed, including weed control.

The proposed development would redevelop the existing UTS Lindfield Campus to a school, which is being approved in proposed 3 Phases, this current phase being Phase 1. Phase 1 will require the management of the bushland environment to meet the prescribed standards for Asset Protection Zones (NSW RFS 2005).

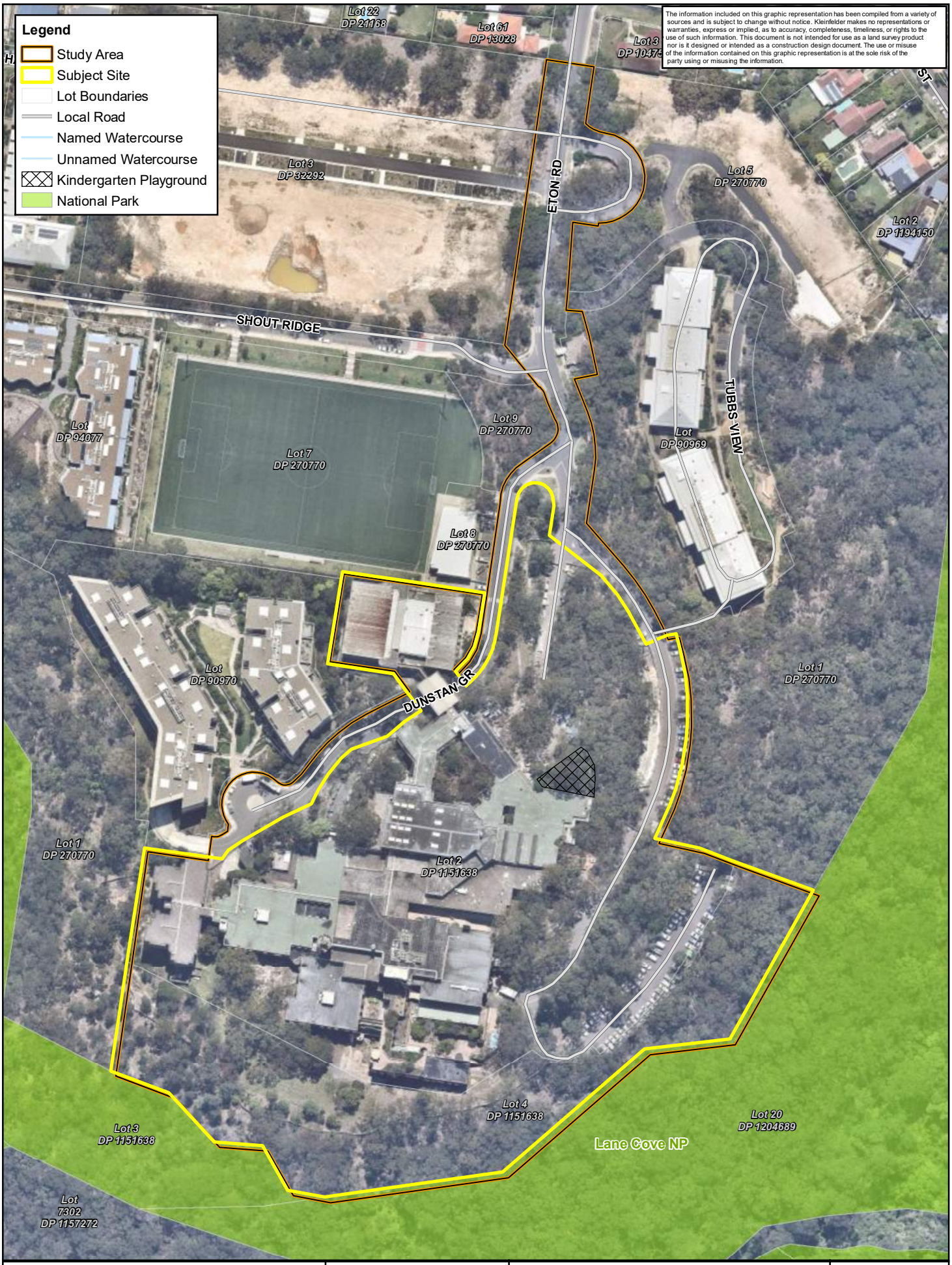
1.3 VEGETATION CLASSIFICATION

The existing environment for the UTS has overgrown landscape gardens (unmanaged – minimal management) and APZ's surrounding the building. The surrounding lands to the east and west have APZ management requirements associated with other development approvals. EcoPlanning (2017) have mapped two natural vegetation communities and one area of modified vegetation within the LLV site boundary:

- Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast (ME64; PCT1776) – located upon sandstone outcrops to the southeast of the site.

- Dwarf Apple - Broad-leaved Scribbly Gum - Sydney Peppermint low open woodland on sandstone ridges with subtle enrichment in northern Sydney (ME67; PCT1782).
- Cleared land exotics and exotic/non-indigenous plantings, which is captured in Management Zones C and E.

For further information please see the project *Biodiversity Assessment Report* (Ecoplanning 2017).



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DRAWN BY: BDeane
DATA SOURCE:
NSW DFSI - 2017
nearmap - 2018

Subject Site

DesignInc Sydney Pty Ltd
Baseline Weed Survey
Lindfield Learning Village
APZ Landscape Management Plan

FIGURE:
1

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2. BWS OBJECTIVES AND ZONES

2.1 MANAGEMENT AIMS AND OBJECTIVES

The primary aim of this BWS is to provide a working document that will outline the actions and procedures required to:

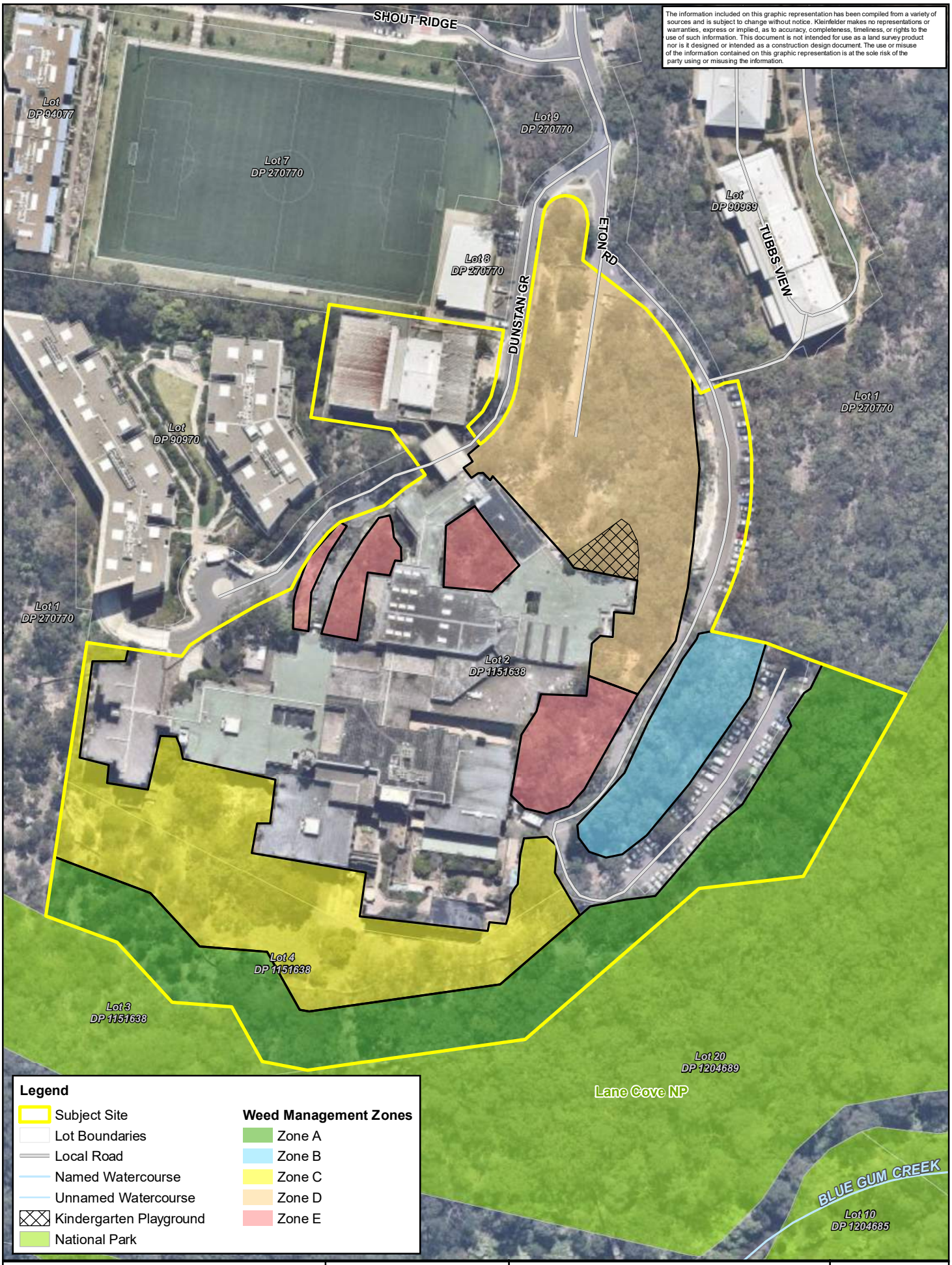
- Identify the presence of all weeds within the boundaries of the subject land.
- Illustrate/mapping the distribution of weeds within the subject site.
- Provide recommendations for pre-clearing treatment and ongoing maintenance of weeds onsite.
- Prevent the propagation and spread of weeds during APZ installation into the adjacent Lane Cove National Park.

2.2 MANAGEMENT ZONES

Five separate Management Zones have been delineated for the purposes of this assessment (see **Figure 2**). The area of each management zone has been determined based upon environmental sensitivity, method of APZ installation, current condition and level of management required. These Management Zones include:

- **Management Zone A:** Management Zone A denotes the 20m buffer between vegetation within the subject land and the adjacent Lane Cove National Park. Effective management and ongoing monitoring of this zone is essential to prevent the propagation of weeds into the adjacent National Park.
- **Management Zone B:** Management Zone B is located between the south-eastern carpark and the main site building. Management Zone B contains a high density of weeds within close proximity to drainage lines, and is bordered by open roads and carparking space. A lack of native groundcover means weed management will need to be undertaken in conjunction with erosion control in this zone.
- **Management Zone C:** Management Zone C is located within the existing perimeter fence line to the south of the former UTS buildings. Management Zone C contains a mixed of land cleared for construction, former landscaping vegetation and remnant vegetation.

- **Management Zone D:** Management Zone D denotes the proposed Grassy Parkland Inner Protection Area (IPA). This area will be cleared for construction with ongoing maintenance expected as part of site landscaping works.
- **Management Zone E:** Management Zone E denotes the internal courtyard and vegetation to the north-west of the former UTS buildings.



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DATA SOURCE:
NSW DFSI - 2017
nearmap - 2018

Management Zones

DesignInc Sydney Pty Ltd
Baseline Weed Survey
Lindfield Learning Village
APZ Landscape Management Plan

FIGURE:

2

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3. METHODOLOGY

3.1 DOCUMENT REVIEW

Kleinfelder have reviewed the project Biodiversity Assessment Report (BAR), prepared by Ecoplanning Pty Ltd (Ecoplanning 2017) to support the project Environmental Impact Statement (EIS). Weeds identified as part of surveys, including their location within the subject site, were noted to provide background information for the current assessment.

3.2 FIELD SURVEY

A field survey of the subject site was undertaken on 4 November 2018 by a Kleinfelder ecologist. Weed mapping was undertaken by walking, observing and recording locations using a Garmin™ 64S GPS unit.

It should be noted that GPS systems do not produce survey-accurate field records, with inaccuracies of up to 5m or more, particularly under dense canopy cover. However, this inaccuracy is not considered to detriment their use, as GPS recordings will illustrate the area in which a weed is found, supported by recommendations that weed management be undertaken by trained bush regenerators with knowledge of the weeds identified onsite.

4. RESULTS

4.1 WEED SURVEY

A total of 19 weed species were identified during site surveys. See **Table 2** in **Appendix 1** for a list of weed species identified on-site and **Figure 3** for the distribution of these species within the subject site.

4.2 ZONE A (VISUAL WEED BUFFER)

Weed density within the 20m visual weed buffer zone (Zone A) was generally low, with the majority of weed presence limited to areas surrounding drainage lines from the subject site.

Ongoing monitoring of this zone will be required to ensure weed propagation into the adjacent Lane Cove National Park does not occur.

Two locations of sediment run-off through sediment and erosion controls from the subject site were observed in Zone A (See *Areas of Concern* in **Figure 3**). Inspection and replacement of sediment controls (when insufficient or damaged) must be conducted regularly as transfer of seed-containing sediment aids in weed propagation and spread.

4.2.1 Drainage Line Weed Density

Drainage lines contained high weed density (see *Areas of Concern* in **Figure 3**) in close proximity to the site boundary with the Lane Cove National Park, resulting from runoff and associated erosion. Treatment of weeds in these areas strictly within the subject site will need to occur prior to Zone A APZ installation to reduce the potential for weed spread propagation. This would include ensuring sediment controls are in place and adequate.

Ongoing monitoring of this zone will be required to ensure weed propagation into the adjacent Lane Cove National Park does not occur.

4.3 ZONE B

Zone B was dominated by woody weeds (e.g. lantana, small-leaved privet, mickey mouse) as part of two large clumps surrounding drainage lines. The remainder of this zone contained a loose distribution of woody weeds such as hen and chicken and mickey mouse, with groundcover largely limited to ground asparagus and bare earth.

Ongoing management of this zone is essential for managing the spread of seed into Zone A and the adjacent Lane Cove National Park.

It is expected that woody weeds will be removed from this Management Zone during installation of the APZ. As such, treatment of this zone under the BWS will be as per Management Zones C – E. Subsequent management of groundcover and weed growth will occur during post APZ installation weed management and monitoring.

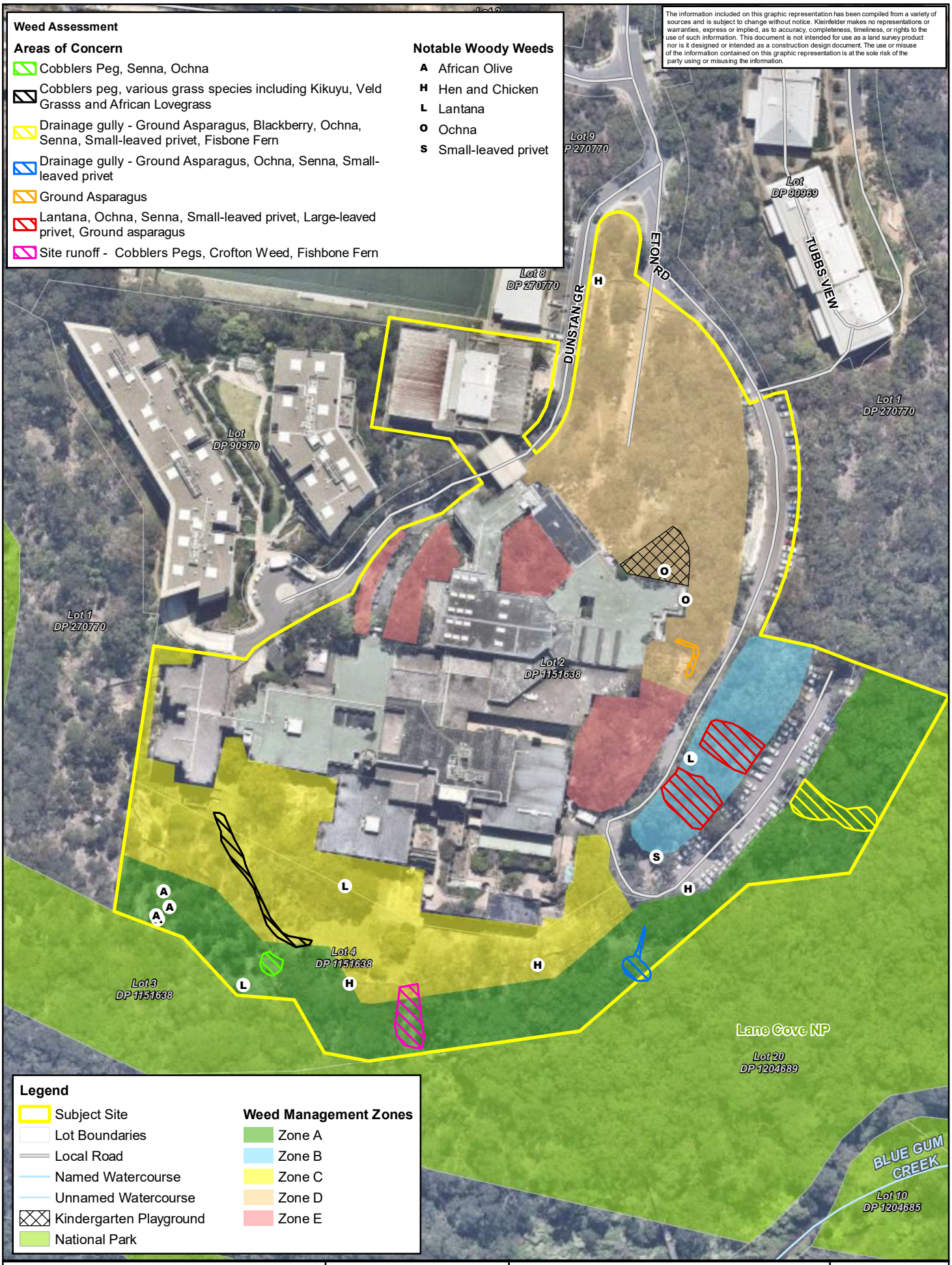
4.4 ZONE C

Zone C is dominated by a combination of exotic and native grasses surrounded by unmanaged garden beds containing both exotic and native woody vegetation. The absence of defined drainage lines between Zone C and Zone A (buffer zone) mitigate to need for urgent weed management. Weed infestation will be controlled via post APZ installation management and monitoring (see **Section 5.1.3**).

4.5 ZONES D & E

Zone D and E have been mapped separately due to differences in ongoing management. Zone D is to be managed as a grassy parkland while Zone E will be managed as a landscaped garden.

Both sites have a low prevalence of weeds throughout. One *Area of Concern* (**Figure 3**) containing a high density of ground asparagus is located within Management Zone D. This area is located within a concrete bound garden bed that will not be disturbed during APZ installation. Treatment of this area will occur during post APZ installation weed management works (see **Section 5.1.3**).



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NSW DFSI - 2017
nearmap - 2018

Baseline Weed Survey

DesignInc Sydney Pty Ltd
Baseline Weed Survey
Lindfield Learning Village
APZ Landscape Management Plan

FIGURE:

3

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5. RECOMMENDATIONS

5.1.1 Works Prior to Weed Control

Prior to any weed control works being undertaken the extent of Zone A will be delineated by para-webbing fencing (or similar) to prevent accidental intrusion into the adjacent Lane Cove National Park by bush regeneration personnel.

A site induction will be provided to works crews conducting the work, to ensure all personnel are award of the sensitivity of the site and species of weeds requiring treatment. The site induction will be provided by the project ecologist to the bush regeneration supervisor, who will thus be responsible for the actions of their crew.

Sediment and erosion controls surrounding existing drainage lines will be confirmed as secure/functional so that these areas do not provide passage for seed dispersal into the adjacent Lane Cove National Park.

5.1.2 Weed Control Prior to APZ Installation

Weed control works are to occur as per **Appendix 1**.

In summary, targeted weed control is to occur within Management Zone A prior to vegetation removal to manage the risk of weed propagation during vegetation modification. It is expected that all woody weeds will be manually removed during APZ installation outside of this zone, with ongoing control of weed regrowth occurring as part of the ongoing maintenance of the site APZ (see **Section 5.1.4**).

5.1.3 Weed Control Post APZ Installation

Weed control within the remainder of the subject site (Zones B-E) is to occur within 1-2 weeks following installation of the APZ, and scope of management required would be determined and monitored by the project ecologist.

5.1.4 Monitoring and Ongoing Management

A part of the project Partial Development Consent (SSD 8114), DoE (the proponent) must prepare an "*Operational Flora and Fauna Management Plan (OFFMP) in consultation with OEH*" (Condition D16).

Results from this baseline survey will be utilised during the preparation of the OFFMP to adequately address weed management and monitoring at the Lindfield Learning Village, applying the following key considerations:

- Ensuring weeds located within the subject site boundary do not spread into the adjacent Lane Cove National Park. This will include specific attention given to BWS Management Zone A.
- Priority weeds as detailed within the Lane Cove / Ku-ring-gai region, will be specifically targeted within the subject site.
- Weeds of National Significance (WoNS) will be controlled.
- Weed control will occur on a progressive basis, with ongoing monitoring applied to gauge the success of control efforts and identify potential weed infestation establishment.

A works plan that will be applied with regards to weed management is provided in Appendix 1.

.

6. REFERENCES

EcoPlanning (2017) *Biodiversity Assessment Report, Framework for Biodiversity Assessment – Lots 1, 2 and 4 // DP 1151638,* University of Technology, Ku-ring-gai Campus, Lindfield.

NSW Rural Fire Service (2005). *Standards for Asset Protection Zones.*

EcoPlanning (2018). Weed Management Strategy – draft for DA submission.

NSW Department of Primary Industries (2018) *New South Wales Weed Control Handbook*, State of New South Wales through Department of Industry, ISSN 1443–0622

Kleinfelder (2018). *Landscape Management Plan: Lindfield Learning Village, Eton Road, Lindfield NSW*, Kleinfelder Australia Pty Ltd, Cardiff, NSW

APPENDIX 1: WORKS PLAN

The Bradley method described by Buchanan (1999) is recommended for weed control within remnant forest areas. This method aims to remove weeds with minimal disturbance and allow native species to re-establish naturally from the existing seed bank and rootstock. The following steps are to be followed when controlling weeds on the site:

1. The weed removal team will require a site-specific induction, to understand what weeds are to be removed, the process of removal, identification of the native species, and the procedures to be followed;
2. Manual weed removal. Where there is native understorey present, dominant weeds will need to be manually treated within Zone A where possible;
3. Weed vegetative material collected during weed control activities is to be take offsite (where practical) to prevent re-establishment. This material is to be taken to an appropriate waste disposal centre to prevent further weed spread in the region;
4. Chemical weed control. Chemical should be applied only where application to larger weeds can be isolated (i.e. no broad application). No spraying should be conducted in ecologically sensitive areas of the site (i.e. high potential of spraying native species or non-target plants).

For concentrations and dosage rates on targeted chemical control, refer to the NSW Department of Primary Industries *New South Wales Weed Control Handbook* (2018). Any weed spraying should be conducted by an authorised person, having a Chemical Application Certificate or similar qualification. This would ensure that best practice is adhered to in consideration of the ecological sensitivities adjoining the subject site.

Table 1: The Weed Management Strategy prepared by EcoPlanning (2018), included into the LMP, provides treatment in accordance with the following methods

Weed type	Treatment
Tall annual herbaceous weeds	Tall herbaceous weeds are to be kept at low levels and treated prior to seeding where possible. Treatment of herbaceous weeds prior to seeding will ensure the gradual reduction of the sites weed seed bank over the management period. Techniques considered appropriate in controlling herbaceous weeds onsite include (as required and appropriate): • Spot spraying • Slashing • Hand removal
Woody weeds	Primary and secondary woody weeds are to be treated by cut/scrape and painting with neat Roundup Biactive®, accordingly. *Rubus fruticosus* should initially be removed in areas of high resilience, and where it is smothering native mid-storey growth. Woody weeds should be treated in degraded areas as a lower priority. All woody weed biomass should be neatly piled and retained onsite as habitat. Large expanses of woody weeds should be evaluated for their habitat values prior to primary removal. Juveniles woody weeds are to be treated by hand removal or careful spot spraying with a Metsulfuron-methyl based herbicide where appropriate.
Exotic grasses and monocots	Exotic grasses are to be treated throughout the site, with areas of high resilience receiving first priority. A combination of hand removal, careful spot spraying and broad scale blanket spraying will be utilised. *Ehrharta erecta* should be sprayed with a low glyphosate solution (e.g. 0.2%), which will allow for careful spot spraying amongst native species.
Exotic vines	Exotic vines are to be maintained at low levels and skirted from all mid-storey and canopy species throughout the site. Techniques considered appropriate in controlling exotic vines weeds on site include (as required and appropriate): • Hand weeding • Scrape and painting • Spot spraying

Table 2: Weeds identified within the subject site and preferred treatment method

Scientific Name	Common Name	Management Zone	Weed Type (see Table 1 above for treatment)
Lantana camara	Lantana	Zone A, Zone B, Zone C	Woody
Sida rhombifolia	Paddy's Lucerne	Zone A, Zone C, Zone D, Zone E	Herbaceous
Phyllanthus tennellus	Hen and Chicken	Zone A, Zone B, Zone C, Zone D	Woody
Nephrolepis cordifolia	Fishbone fern	Zone A, Zone C, Zone D	Other (treat as per 'Exotic grasses and monocots')
Conzya sp.	Fleabane	All zones	Herbaceous
Ochna serrulata	Mickey Mouse	Zone A, Zone B, Zone C, Zone D	Woody
Ligustrum sinense	Small-leaved privet	Zone A, Zone C	Woody
Eragrostis curvula	African lovegrass	Zone A, Zone C	Exotic grasses and monocots
Olea europaea subsp. cuspidata	African olive	Zone A	Woody
Asparagus virgatus	Asparagus fern	All Zones	Exotic grasses and monocots
Ageratina adenophora	Crofton weed	Zone A, Zone B, Zone C	Other (treat as per 'Exotic grasses and monocots')
Bidens pilosa	Cobblers Pegs	All zones	Herbaceous
Andropogen virginicus	Whiskey Grass	Zone A, Zone C	Exotic grasses and monocots
Cenchrus clandestinus	Kikuyu	Zone A, Zone B, Zone C, Zone D	Exotic grasses and monocots
Erhata erecta	Panic Veldgrass	Zone A, Zone B, Zone C, Zone D	Exotic grasses and monocots
Lugustrum lucidum	Large-leaved Privet	Zone A, Zone C	Woody
Solanum nigrum	Black-berry Nightshade	Zone A, Zone D	Herbaceous
Acacia saligna	Golden wreath wattle	Zone C	Woody
Rubus fruticosus species aggregate	Blackberry	Zone A	Woody

LINDFIELD LEARNING VILLAGE BASELINE WEED CONTROL WORKS PLAN DEC 2018					
Item	**Action**	**Timing**	**Performance Criteria**	**Area**	**Responsibility**
Prior to weed control					
Site delineation.	Installation of Para webbing fencing to clearly delineate works area, and ensure no entry occurs into NPWS Lane Cove National Park.	Prior to weed control in Management Zone A	Works area clearly delineated using Para webbing fencing (or similar)	Management Zone A	Site Manager / Project Ecologist
Induction	Induct personnel involved in weed removal, highlighting target weed species, sensitive weed removal is to be undertaken in preference to spraying where possible and highlighting that no personnel are to enter the adjacent National Park.	Prepared prior to weed control in Management Zone A. Induction is to be given to each new supervisor conducting bush regeneration works as required.	Personnel do not stray into adjacent National Park and limit off target damage.	Management Zone A	Project Ecologist / Bush regeneration supervisor
Drainage Line Management	Confirm downslope sediment controls within subject site as required when potential for of erosion and seed deposition into NPWS is apparent.	Prior to weed control, immediately prior to and following rainfall	Suitable sediment controls in place to control sediment run-off	Management Zone A	Site Manager / Project Ecologist
Actions to be Undertaken Prior the Installation of APZ ZONE A					
Weed Management	Weed control for species listed as occurring in 'Zone A' under **Table 2** as per methods outlined in **Table 1**.	Prior to APZ installation in Management Zone A	Treatment of all 'areas of concern' identified on **Figure 3**. Formation of buffer with identified weeds treated between the Lane Cove National Park and subject site.	Management Zone A	Project Ecologist
'Areas of Concern' Management	Targeted weed control for species within drainage lines as shown on **Figure 3** using methods outlined in **Table 1**.	Prior to APZ installation in Management Zone A	Treatment of weeds growing in drainage lines to provide for ongoing management of regrowth and seed stock.	'Areas of Concern' Management Zone A.	Project Ecologist
Actions to be Undertaken Prior the Installation of APZ ZONES B-E					
No action proposed. Weed management will be specifically targeted post clearing.					

LINDFIELD LEARNING VILLAGE BASELINE WEED CONTROL WORKS PLAN DEC 2018					
Item	**Action**	**Timing**	**Performance Criteria**	**Area**	**Responsibility**
Actions to be Undertaken During the Installation of APZ					
Weed identification	Where the project ecologist notes potential for works to spread weed infestations works will stop and one of two methods will be adopted: 1. Adoption of different removal technique. 2. Stop work and treat weeds prior to continuation.	Ongoing during installation of site APZ.	Material with potential to spread weeds (e.g. fruit, root system) removed from site.	All Zones.	Project Ecologist
Foreign material control	Ensure all vehicles involved in APZ installation free of material with the potential to contain seed.	Ongoing during installation of site APZ.	-	All Zones.	All personnel.
Avoid weed propagation.	Confirm downslope sediment controls as required when potential for of erosion and seed deposition following clearing on slopes is observed.	Ongoing during installation of site APZ.	-	All Zones.	Site Manager
	All vegetation green waste will need to be removed from the APZ unless an appropriate location can be determined by project manager.	Ongoing during installation of site APZ.	-	All Zones.	Site Manager / Clearing personnel
	Vehicle access within the APZ will be managed to avoid areas of weed cover so as not to provide a suitable vector of propagation.	Ongoing during installation of site APZ.	-	All Zones.	Project Ecologist / Clearing personnel
	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.	Ongoing during installation of site APZ.	-	All Zones.	Project Ecologist / Clearing personnel
Actions to be Undertaken within 1-2 Weeks following APZ Installation					
Weed Control	Weed control for species listed as occurring in Zone B, Zone C, Zone D and Zone E under **Table 2** as per methods outlined in **Table 1**.	Within 1-2 weeks following complete installation of LLV APZ	Treatment of all 'areas of concern' identified on **Figure 3**. Treatment of all weeds onsite with targeted	Management Zones B – E.	Project Ecologist / Bush regeneration supervisor

LINDFIELD LEARNING VILLAGE BASELINE WEED CONTROL WORKS PLAN DEC 2018					
Item	**Action**	**Timing**	**Performance Criteria**	**Area**	**Responsibility**
			75% cover reduction of mature presence.		
Monitoring / Management					
Site Monitoring	Monitoring of weeds within the subject site.	Every 6 months following APZ installation for minimum of 3 years. Annual monitoring thereafter.	Any weed infestation recorded and presented in mapping with supporting letter.	All Zones	Project Ecologist until otherwise confirmed
Weed Control (Zone A)	Control of weeds within the 20 m buffer from Lane Cove National Park.	Within 3 months following APZ installation then as per below.	Formation of buffer zone that is free of weeds between the subject site and Lane Cove National Park.	Zone A	Project Ecologist until otherwise confirmed
Weed Control (all Zones)	Control of weeds onsite as per the New South Wales Weed Control Handbook (2018).	Every 6 months for a minimum of 3 years, with annual monitoring thereafter. Areas of focus will be determined during monitoring assessments.	Eradication of mature weeds onsite. Control of regrowth from seed bank.	All Zones	Project Ecologist until otherwise confirmed

APPENDIX 2: STAFF CONTRIBUTIONS

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

Name	Qualification	Title/Experience	Contribution
Dan Pedersen	BSCEngTech GIFireE, BDAP-A	Senior Ecologist/ Botanist Bushfire Consultant	Report preparation and review
Brad Deane	B.BioCons, M.WIdMgt	Ecologist / Environmental Consultant	Field surveys, report and figure preparation

APPENDIX 3: 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.

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

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The findings and conclusions contained within this report are relevant to the conditions of the site and the state of legislation currently enacted in the relevant jurisdiction in which the site is located as at the date of this report.

Additionally, the findings and conclusions contained within this report are made following a review of certain information, reports, correspondence and data noted by methods described in this report including information supplied by the client or its assigns. Kleinfelder has designed and managed the program for this report in good faith and in a manner that seeks to confirm the information provided and test its accuracy and completeness. However, Kleinfelder does not provide guarantees or assurances regarding the accuracy, completeness and validity of information and data obtained from these sources and accepts no responsibility for errors or omissions arising from relying on data or conclusions obtained from these sources.

Any representation, statement, opinion or advice expressed or implied in this report is made on the basis that Kleinfelder, its agents and employees are not liable to any other person taking or not taking (as the case may be) action in respect of any representation, statement, opinion or advice referred to above.

APPENDIX 4: LICENSING

Kleinfelder employees involved in the current study are licensed or approved under the *Biodiversity Conservation Act 2016* (License Number: SL100730, Expiry: 31 March 2019) 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 4. THREATENED SPECIES MANAGEMENT

Although no threatened fauna has been surveyed within the subject site, the site has potential to provide habitat for such species. The Powerful Owl is a known species for this location, and many micro-bats utilise the habitat provided. The fauna displacement protocols in **Appendix 2** provide an overall management strategy for all fauna species potentially occurring on site during the APZ implementation works. Further, for the additional management of threatened fauna:

- No clearing should occur during the early evening or at night (i.e. when most fauna species are active and likely to be active);
- Hollow-bearing trees that have been identified will be protected through the actions of the Clearing Protocol (**Appendix 2**);
- On all occasions, trees having potential habitat hollows, nest boxes, or nests will be protected from impacts.

Threatened flora has not been found in previous surveys conducted on the subject site (EcoPlanning 2017), however *Darwinia biflora* and *Epacris purpurescens* have been recorded adjacent to the site, and has potential to occur due to habitat values. This species can be identified through its foliage, and the attending Project Ecologist will be aware and familiar with the plant for identification purposes. If a threatened plant is located within the subject site during pre-clearing surveys, it will be protected via delineation/protection fencing (consistent with the Council *Darwinia biflora* protection reserve to the north). The protection area will extend 2m from the stem of the plant. This location will be mapped and protected throughout the clearing and construction phases via a Threatened Flora Management Plan and protection fencing.

Although highly unlikely, if any threatened species are found on site, the Project ecologist would appropriately manage through either relocation (fauna) or seeking advice from the Project Manager of resolution of a threatened flora being identified.

APPENDIX 5. LICENSING

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APPENDIX 6: STATEMENT OF LIMITATIONS

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The findings and conclusions contained within this report are relevant to the conditions of the site and the state of legislation currently enacted in the relevant jurisdiction in which the site is located as at the date of this report.

Additionally, the findings and conclusions contained within this report are made following a review of certain information, reports, correspondence and data noted by methods described in this report including information supplied by the client or its assigns. Kleinfelder has designed and managed the program for this report in good faith and in a manner that seeks to confirm the information provided and test its accuracy and completeness. However, Kleinfelder does not provide guarantees or assurances regarding the accuracy, completeness and validity of information and data obtained from these sources and accepts no responsibility for errors or omissions arising from relying on data or conclusions obtained from these sources.

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