

Ecology Assessment

4 Forest Rd, Warriewood NSW 2102

By Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

March updated October 2022 and July 2024





About this document

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Statement of Authorship

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Limitations Statement

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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Signed: Geraldene Dalby-Ball (Elaway)– Director of Ecological Consultants A

Summary

Introduction and Background

- This Flora and Fauna was prepared initially in 2022 for BMN Properties Pty Ltd for the proposed development at 4 Forest Rd, Warriewood, NSW 2102 (Lot B in DP 370222), in the Northern Beaches Council LGA.
- The proposed development is to demolish the existing dwelling and replace it with a 13 Lot subdivision including a perimeter road.
- The majority of the lots 1-10 are dominated by exotic grass, exotic canopy and/or landscape plants. Lots 9 and 11 have existing buildings. Lots 12 and 13 are in areas of Themeda grass (native grass). Noting this is not the Endangered Ecological Community of Themeda Grasslands. It is grassland by way of previous clearing the canopy and naturally would be forest. Native grass is over 15% cover in the South Western area.
- Main ecological impacts are from the proposed road (extension of Forest Road along a road reserve and continuing along the western boundary of the site. It is within the site boundary before exiting to link with neighbor properties in the northwest corner. This road is in keeping with Council's masterplan.
- Residential Lots in the current proposal are in low quality (low VI) vegetation. The two lots in native grass areas have been assessed as 100% loss of native grass. The VI of the grass plot was too low to trigger off-set credits however the area of impact was included to determine if the 2500m² threshold would be triggered by this proposal.
- The increase in cover of Themeda Grass (native) and including vegetation loss in the existing road reserve removes over the 2500m² BOS threshold for clearing of native vegetation.

In addition to this the Biodiversity Values map has been updated and a portion of the mapped area (~293m²) of native vegetation is within the location of the proposed western boundary road.

At the time of the initial survey the proposal didn't trigger the BOS, and the site was not on the BV map. The 2024 mapping has the western boundary on the BV Map. The BOS is now triggered for this site.

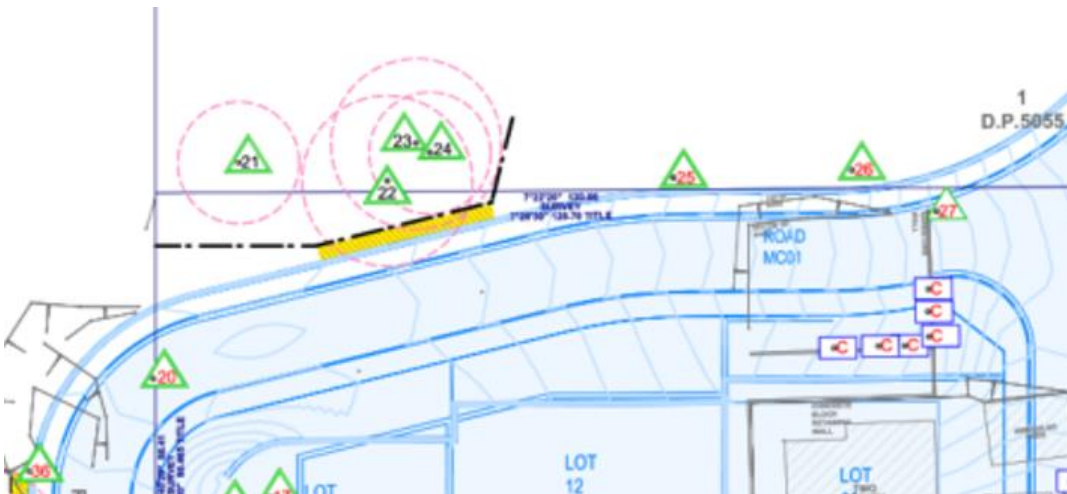
A BDAR report has commenced and most key aspects of the BDAR have been included in this Flora Fauna report. The finalisation of a BDAR for the site is ***confidently expected to not change in conclusions from this Flora and Fauna report*** (as the principle of Avoid, Minimize, Mitigate) has been implemented and the required threatened species have been considered. The finalisation of the BDAR will make known the credits required to off-set impacts.

The impact area assessed in the BDAR will be all works on site in areas of native vegetation as well as assessment of APZ and the area of road construction outside the site boundaries.

- A number of iterations have seen the reduction in impact and retention of high priority trees. The western boundary road has been brought fully within the site retaining 4 priority trees. Only two are still impacted and these are unavoidable due to the road having to join that already started on

the neighbouring site. This change can be seen in the screen shots below. This has reduced the subdivision from the original 14 to now 13 lots.

Extract from 2024 plan with overlay of Arborist data. Showing road moved away from west and the retention of trees, #21, 22, 23, 24. The road could not be kept west in the vicinity of trees #25 and #26 as it has to meet the joining road. Below this is the 2022 image this design had the loss of those trees and 14 Lots. The RFS requires this road to be 8m wide to a reduction in width to retain the trees would not be in accordance with RFS requirements for this location.



Current Plan – 2024. South west corner and western boundary road. Retention of trees, #21, 22, 23, 24.



Plan from 2022. Trees #21, 22, 23, 24s were to be removed in this 14 Lot subdivision plan.

- The southern boarder road has its path dictated by the existing road . The road would need to bend out into the site to avoid the trees on the road reserve. Engineering requirements and the existing fixed alignment have influenced the road position. An alternative to avoid the removal of trees here has not been possible. Tree planting is required (see landscape plan).

- Recommendations have been provided to reduce the likelihood of impact and mitigate impacts if the proposal is approved. Noting a BDAR may be required to determine credit requirements associated with the approval.

Methods

- On-ground survey took place on by Senior Ecologist Geraldene Dalby-Ball March/April 2022, October 2022, Feb 2024 and June 2024 (orange) (see details in Methods Section).
- Flora and fauna observations were recorded on-site using binoculars. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- Specific searches were made for threatened Flora and Fauna as well as using data from the authors extensive knowledge of the location (conducting 10+ ecology projects in close vicinity (800m) as well as being a local resident and attending the neighbouring high school. Targets surveys and habitat assessment includes Large Forest Owls, Microbats, Flying Foxes and Frogs. Detailed full searches were made of the site, including proposed roads and APZ. A distance of over 100m from the site was examined for possibly caves/crevices that could be used by microbats.
- Review of proposed development was evaluated for potential environmental impacts and ways to reduce impact.
- Supplementary reports were used to indicate impacts (Bushfire, Arboricultural and civil) and mitigation (native landscaping proposed).

Results

- No threatened flora or fauna species were recorded on-site during surveys. Threatened species are within Ingleside Chase and local knowledge and Bionet was used to determine target species. A review of BAM predicted species indicated all have been considered in this Flora / Fauna report. If any additional species are determined to need surveys as part of the BAM they will be conducted.
- Test of significance has been conducted for microbats, Grey Headed flying Fox and Large Forest Owls. – while these resulted in a ‘not significant’ impact recommendations have been made to assist the long-term sustainability of species.
- Trees on site are a mix of *Eucalyptus*, *Corymbia*, *Angophora*, *Syncarpia* and *Allocasuarina* species. The same, and more species are present in the area of the proposed road. The arborist report has full details of species locations. Trees were inspected for hollows and other key habitat. Hollows are present in trees being retained. An additional habitat survey will occur immediately prior to any works. Tree hollows will be mapped in the BDAR if required.
- No significant habitat features, will be impacted by the proposed development on the site. The road works proposed would remove one tree with habitat hollows. The land to the west is part of the escarpment (Ingleside Chase) and contains many habitat areas and trees (outside the development areas).
- Tree protection will be consistent with the Arborist report (update 2024 to be provided). Main trees to be managed are trees within close proximity to proposed road works. NB: see final arborist report for details of works and tree numbers. Noting that while trees 17 and 18 have been marked for removal these too may be retained. For this assessment they have been assumed lost.
- **Indirect Impacts:** The associated impacts (people, vehicles, light, cats/dogs) have been considered in indirect and direct impacts. Increased cross-over between residents and native wildlife and plants

and their habitats is likely. Actions needed to minimise potential negative impacts on native plants and animals and their habitats are required. Some of these are included in the mitigation section.

- **Avoid and Minimise:** Changes to the design since 2022 have occurred to avoid impacts. This includes the movement of the western boundary road to retain trees #21, 22, 23, 24. Investigations to retained trees #25 and 26 indicated that due to the need to join the neighbour site road and RFS requirements for 8m wide road loss of these trees cannot be avoided and have the road. Noting the road is a Council requirement. Trees 17 and 18 (in Lot 13) will be retained unless Council requires them to be removed for 'sightlines' along the road. This will only be known after input from Council – hence removal has been assumed at the moment.
-
- **The Landscape plan** for the public areas has species that are locally native and from WWV plant list including *Blueberry Ash*, *Christmas Bush*, *Backhousia myrtifolia* – see Landscape plan 2024 for full detail. Areas for private in-lot planting are also shown.

Mitigation Measures

If the development is approved mitigation works will be required..

Before works:

- Construction Environmental Management Plan (CEMP) for approval by Council pre CC.
- Vegetation Mgt Plan for approval by Council pre CC
- These plans are to maximise retention of native vegetation, hollows, habitat including via fencing, signage, info in tool-box talks, sequencing of works and all requirements in the Arborist report.
- Also to note retention of trees 17 and 18 unless removal required by Council.
- VMP to cover removal of weeds to eliminate from site and prevent spread of seed/pieces and focus on long-term works of vegetation and APZ management (includes during and post works).
- Effective site preparation and management to minimise sediment runoff and ensure none reached the local waterways.
- Tree and bushland Protection (signs and fencing).
- Kangaroo Grass: seed collection.
- Preclearance inspections and reporting (ecology) identification of habitat and actions needed.

The associated impacts (people, vehicles, light, cats/dogs) will have an impact and there will be increased cross-over between residents and native wildlife. Actions needed to minimise potential negative impacts on native plants and animals and their habitats have been provided in Section 4 and include information for new residents so they understand the importance of being good 'bush-neighbours'.

During works:

- The Vegetation Management Plan and Construction Env Mgt Plan implemented to minimise impacts during works and then maximise on-going health of the bushland that will be remaining

along the proposed road. Ongoing maintenance of the edge is required and management of any weed incursions.

- Ecologist on site during tree removals – habitat salvage and re-location on-site or Ingleside Chase.. Assessment for any loss of hollows/habitat. Requirements to replace at a ratio of 2(replaced):1 (lost).
- Tree and bushland Protection and seed collection from any trees approved to be removed.
- Retention of top-soil moved (especially Kangaroo Grass area) as part of earth works for re-spreading on 'new' top surfaces that are to be vegetated.
- Translocation of some kangaroo Grass to on and off-site locations and retention of the top soil from Lots 12 and 13 for replacement in areas where weeds have been removed
- Effective site management to minimise sediment runoff.
- Bush hygiene protocols are to be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

Habitat augmentation (hollows) on-site once trees grow. Also having locally native species in landscaping including local Kangaroo Grass. The areas of the Lots can be in better condition (vegetation wise) post works than currently. The road is part of the APZ and dwelling locations are to be sited such that they do not require additional clearing on the public land, that is on the western side of the road.

Detail the management of the APZ area (~300m²) to be managed by Lot 11 and 12.

Legislation: Various pieces of legislation apply to this location and the proposed works are in keeping with the objective of the Acts. Key acts are listed below.

- *Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Biodiversity Conservation Act 2016 (BC Act).*
- *Fisheries Management Act 1994 (FM Act).*
- *National Parks & Wildlife Act 1974 (NP&W Act).*
- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*
- *Warriewood Valley DCPs (Various in C6)*
- *Other DCP controls relevant including: Warriewood Valley Masterplan and Design Guidelines, B4.18 Heathland and Woodland Vegetation) and B4.18 (Preservation of Tree and Bushland Vegetation).*

Council Comments on the Previous Ecological Report are listed in the screenshot below. Following this is a summary of how they have been addressed.

(c) The submitted Flora and Fauna Impact Assessment report includes insufficient and inaccurate information regarding the following matters:
(i) Total area of clearing including a map showing the calculated area of native vegetation removal;
(ii) Removal and retention of trees;
(iii) Details on surveys conducted of threatened species on the Site;
(iv) Assessment of direct and indirect impacts and appropriate mitigation measures;
(v) Proposed compensatory landscaping.
(d) A portion of the site and road reserve is identified as "Biodiversity" on the Biodiversity Map referred to in clause 7.6 of PLEP 2014. Insufficient information has been submitted to enable the consent authority to properly take into consideration the matters set out in clause 7.6(3) of PLEP 2014, or to be satisfied of the matters in clause 7.6(4) of PLEP 2014.
(e) The proposal fails to demonstrate that it avoids and minimises impacts upon the biodiversity values and native vegetation of the Site and surrounding land, in accordance with clause 7.6(3)(b) of PLEP 2014.
(f) The use of off-site Asset Protection Zones is only considered appropriate under exceptional circumstances. Section 3.2.5 of Planning for Bush Fire Protection 2019 ("PBP") has not been addressed as part of the application and the proposed road gradients exceed the maximum slope permitted under PBP.

(Ci) total clearing area of native vegetation has been provided in maps and includes areas of APZ, Roads and those areas wholly within the site. Areas with native grass over 15% cover have been counted as areas of native vegetation.

(Cii) Removal and retention of trees is based on the Arborist report and extracts from 2024 updated are included in this report. Tree removal in the APZ has been noted as not required as the road covers most of the APZ and the area to the South is already an APZ (for the school) and most will be removed for the proposed road extension.

(Ciii) Information on the survey methods for Threatened Species has been expanded (see Section xxx).

(Civ) Assessment has been made of the direct impacts (vegetation removal) and the indirect impacts (increased lighting, noise, vehicle movements, domestic animals) has been expanded (see Section xxx).

(Cv) The Landscape Plan (2024) has native species, from the Warriewood Valley masterplan that are all appropriate to the site. Plant placement has taken bushfire into account. The landscaped area covered by the Plan is for the public domain. Additional landscaping will be required in individual allotments. This will come under review with individual DAs and will need to be appropriate for an area joining the Escarpment.

(e) Avoid and minimise has been addressed and includes the actions that have occurred since the 2020 plan, in particular the pulling the road away from the trees (21, 22, 23, 24). All four will be retained now. In the previous layout there were removed. Also the removal of one Lot (from 14 to 13). Other aspects of the perimeter road have been assessed and are not movable due to existing road links.

(f) see the Bushfire Mgt Plan for details on the APZ locations. In summary the APZ is 30m from the outer edge of all dwellings to the South and the West. This is within the site and the road. Additional studies are occurring to see if there will be any requirements to the west of the road (See Figure showing APZ) overlay on the subdivision and road layout) see Figure 1.8 NEED DIAGRAM HERE of overlay.

At this time no canopy removal is required in APZ. The APZ areas have been assessed on-foot and the overlay shows the extent in terms of reduction of mid/understory vegetation/habitat.

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1 Introduction

1.1 Scope of works

Ecological Consultants Australia (ECA) trading as Kingfisher Urban Ecology & Wetlands were contracted in 2022 by BMN Properties Pty Ltd to provide a “Flora and Fauna Assessment” to assess potential direct and indirect impacts on any threatened species, populations and communities as per section 5A of the Environmental Planning & Assessment Act 1979. The ‘test of significance’ has been undertaken in accordance with s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act) and where relevant considered under the Commonwealth EPBC Act. A recent review of the site in 2024 notes it is still weed dominated in the subdivision area however native vegetation is continuous in the proposed road area. BOS trigger is being reviewed.

1.1 Limitations of the Study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after environmental circumstances related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, biological life-cycle patterns as in the case of small plants such as species of orchids etc. No specific invertebrate surveys were conducted.

Surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame and assess the suitability of habitat for particular species.

Surveys were conducted in 2022 and in 2024 (June) – the area of native grass had increased between surveys.

1.2 Site information and general description

The Subject Site (the “Site”) is the area of direct and likely indirect impacts and is defined as the whole of the property. The Study Area includes the Subject Site, as well as any additional surrounding land traversed during the field survey. The Subject Site (the “Site”) is identified as Lot B in DP 370222, in the local government area of Northern Beaches Council.

The site has an area of 9,728m² and contains cleared areas, an existing drive, house and sheds and an edge of native bushland on the south and west of the site.

Note that in the result the PCT numbers have changed since 2022 and have not yet been updated in this report. Being a flora and fauna report the species are most important as they can then be including VMP and replanted. If this was a BDAR the PCTs would be updated to enable offsetting.

Table 1.1 - Site Administrative Information

Category	Details
Title Reference (Lot/DP)	B/DP370222
Area (m ²)	9,728m ²
Street Address	4 Forest Rd, Warriewood NSW 2102
LGA	Northern Beaches Council
Land Zoning	R3 – Medium Density Residential



Figure 1.1. Site location. Source: SixMaps 2022.

1.3 The Proposal

The proposed development relates to the subdivision of Lot B in DP 370222. Figure 1.2a shows the area the impact area assessed in the 2022 Flora and Fauna report. Figure 1.2b shows the layout with the road and Figure 1.3 indicates the area of consideration over 2024 aerial.

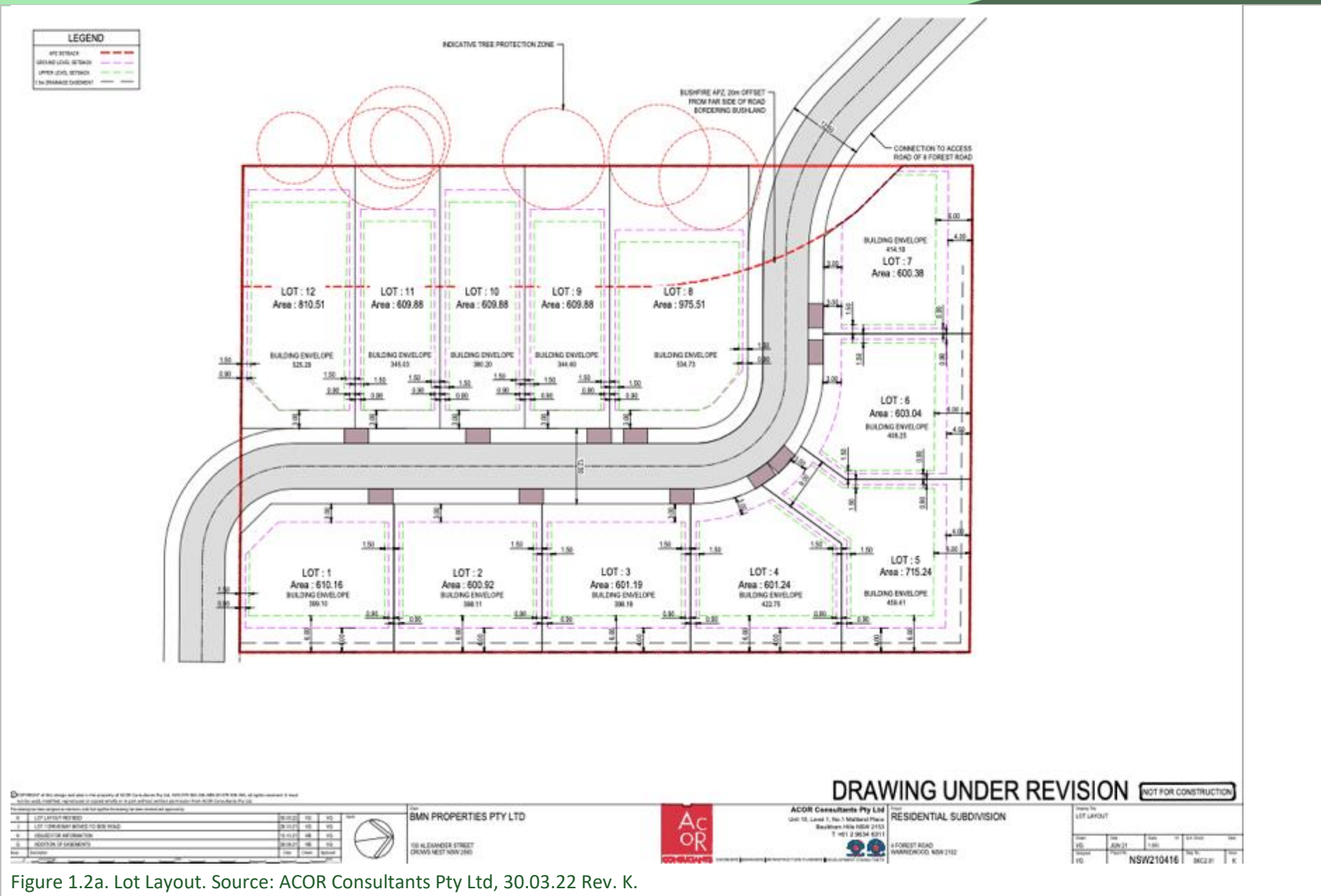


Figure 1.2a. Lot Layout. Source: ACOR Consultants Pty Ltd, 30.03.22 Rev. K.



Figure 1.2b. 2021 Preliminary Lots and road . Source: ACOR Consultants Pty Ltd, 28.10.21 Rev. E. now reduced to that in 1.3a and 1.3b

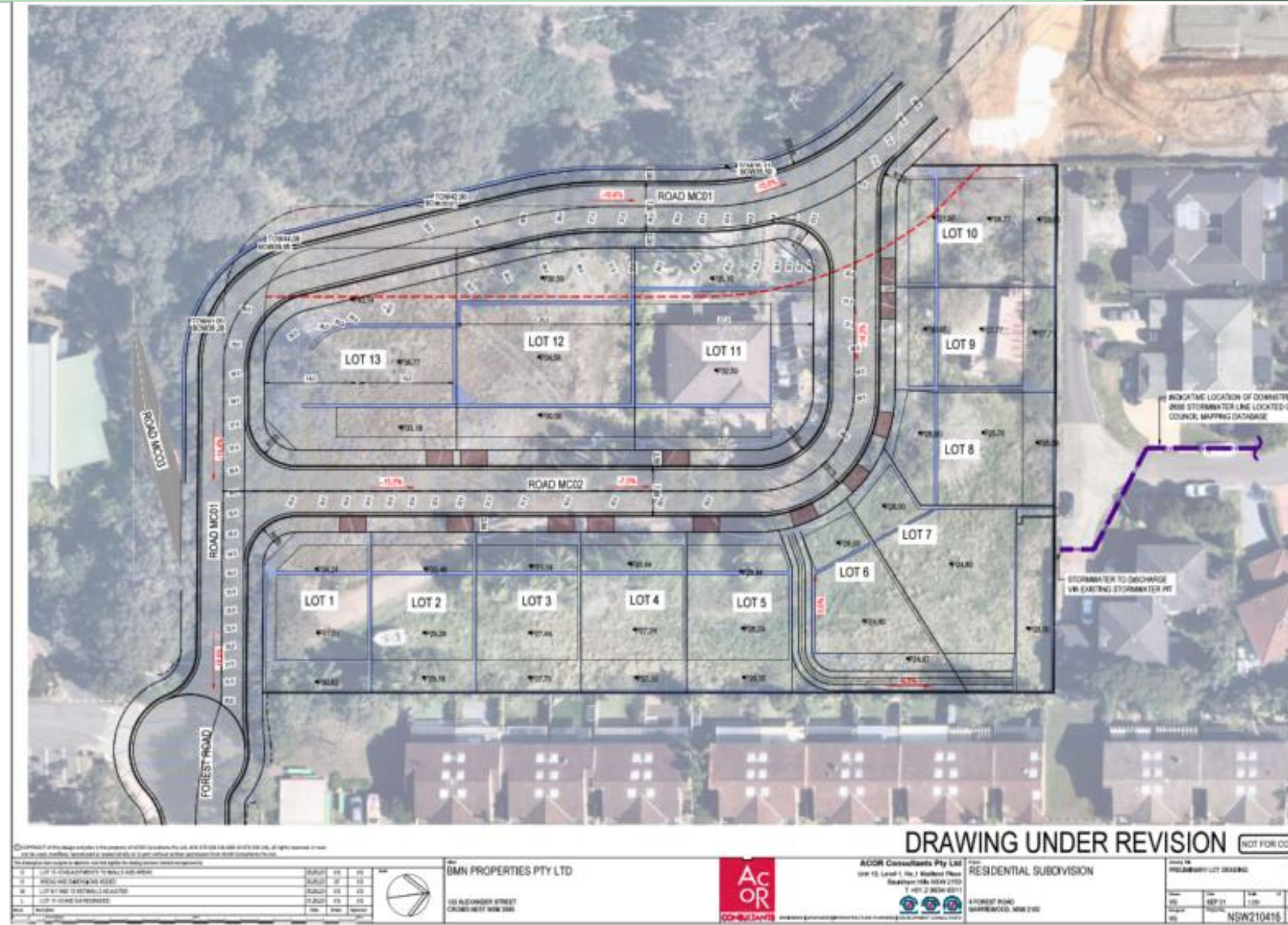


Figure 1.3a 2024 layout with lot and road overlay on aerial. Showing smaller lots and road works more within the site boundary.

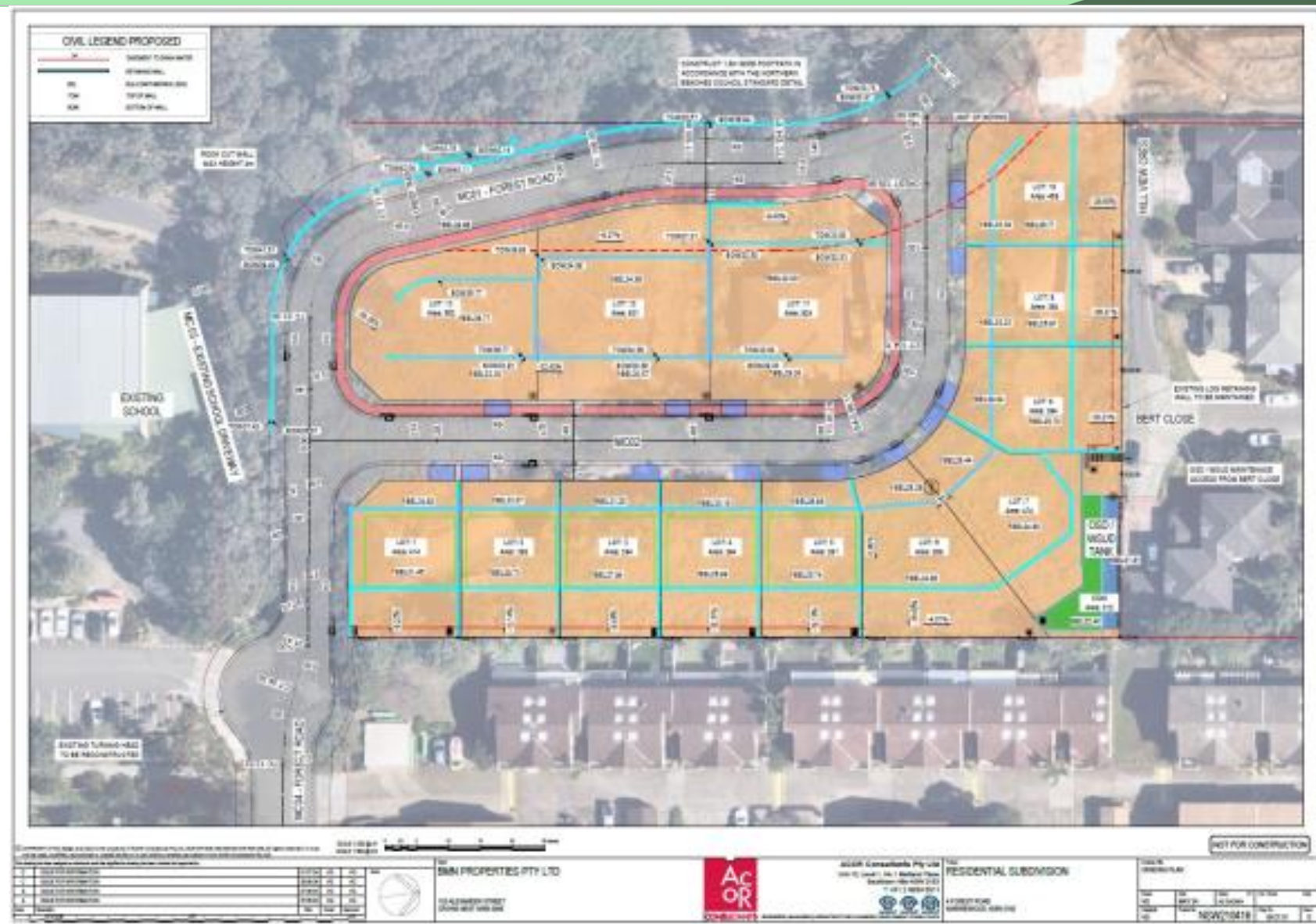


Figure 1.3b 2024 layout with lot and road over lay on aerial. Showing smaller lots and road works more within the site boundary

Figure 1.4 shows the area of native vegetation removal overlayed on plan.



Figure 1.4 shows the area of native vegetation removal overlayed on the planned works. The APZ is largely within the road corridor. Total area xxm^2 .

Area of focus for the impact assessment is shown in Figure 1.5. Total area (1.33ha) of vegetation removal/modification and (off-site) including exotic vegetation and the APZ. Noting the APZ does not require canopy tree removals.

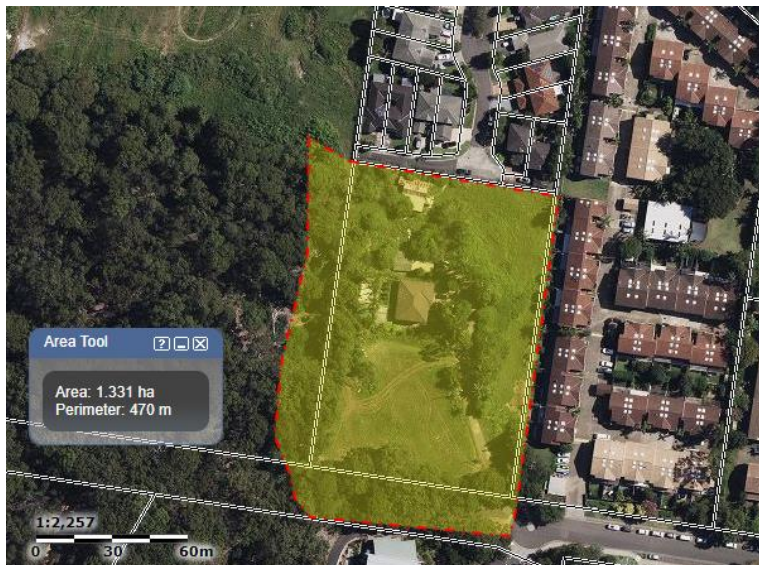


Figure 1.5 Area of focus in impact assessment is shown in Figure 1.1

Most of the sites grassed areas are Kikuyu however the southwestern portion contains Kangaroo Grass on approximately 1700m². Cover is at over 15% native. This area is shown in Figure 1.6. Native grass area was not diverse enough to have a VIS over 15 (on its own) to trigger the requirement for offset credits. The area 1700m² though has been included in determining if BOS area threshold triggered.



Figure 1.6 Area of grass, 1700m², containing Themeda with over 15% cover.

The area of Native vegetation removal on the site is shown in Figure 1.7 noting the North West corner is highly weed dominated.

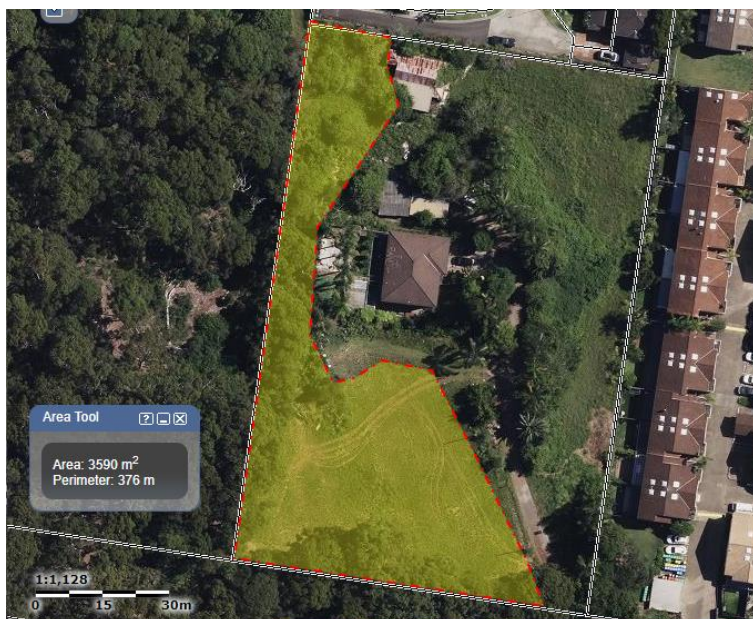


Figure 1.7 Proposed native vegetation removal (3500m²) on the site (conservative) as includes weedy NW area.

Total area of vegetation in clearing area plus the proposed APZ (30m from dwellings) is 6240m² and is shown in Figure 1.8. This area is based on the Bushfire advice of (2024) and the dwelling boundaries based on building envelopes (as per lot lay out 2024). Noting the advice is that no additional trees require removal for APZ. Tree removal is already occurring for the road extension and additional clearing is not required (Bushfire Report xxx date). The Arborist report covers all trees requiring removal and no additional trees are needed to be added due to 30m APZ. Noting also that this area includes the existing road to the school and thus overestimates the vegetated area. The treed area between the School (Marta Maria) and the propose development site is already an APZ (required for the School). The APZ area alone is shown in Figure 1.9



Figure 1.8 Area of native vegetation to be impacted plus the non-impacted APZ. This total area was included when determining entry into the BOS.

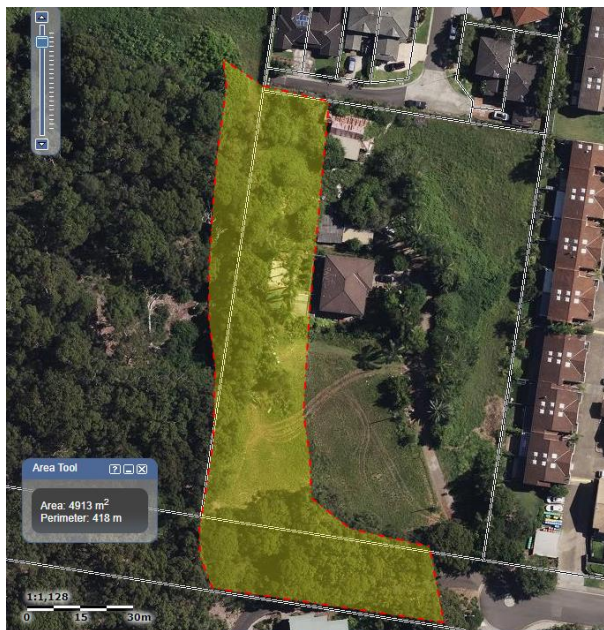


Figure 1.9 Area of APZ alone and is based on proposed building envelopes and being 30m from a dwelling to the South and West of the site.

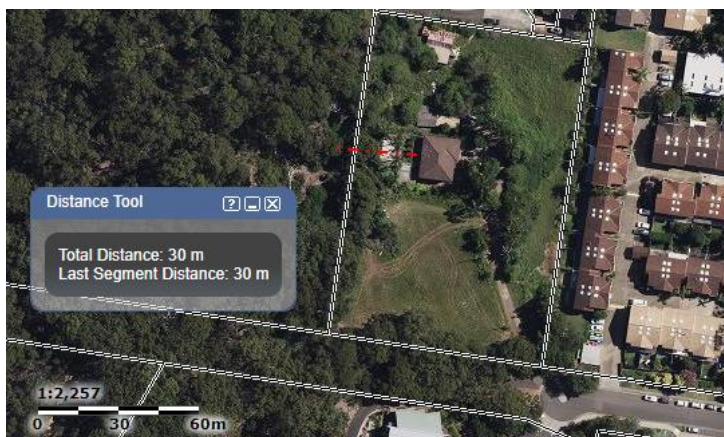


Figure 1.10 showing 30m from the rear of the existing dwelling (in-line with proposed dwellings).

Please check this wording below. If there is the need to removed shrubs in the APZ and if this 30 m extends further west than the road then good to show. Will be part of Council curb site / vision line management I assume.

APZ management requirements for this site do not occur on public land. A small area (~300m²) of APZ inner protection area (IPA) is shared between Lots 11 and 12 see Figure 1.11. This will be managed by those property owners and be on the title of those properties. There is no burden on Council to manage the public land (Ingleside Chase) for bushfire APZ purposes related to this proposed development.



Figure 1.11 Area ($\sim 300\text{m}^2$) of APZ inner protection area (IPA) shared management between Lots 11 and 12.

1.4 Sources of information used in the assessment

The following sources of information were used for this assessment:

Bionet, previous studies and the author's knowledge of the local area, were used to determine the possible occurrence of endangered ecological communities and threatened plant species on-site. The Bionet records accessed cover a 10km² area extending from the site and include recordings from 1993 to the present day.

Records from the following databases were collated and reviewed:

- Atlas of NSW Wildlife (Bionet). New South Wales, Office of Environment and Heritage (OEH).
- NSW Threatened Species Information (DPIE).
- The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH, 2016) VIS_ID 4489.
- PlantNET (The Royal Botanic Gardens and Domain Trust 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Plans and drawings specific to this development:

- Arboricultural Impact Appraisal and Method Statement. Naturally Trees, 6 Nov 2021 and extrcats from 2024.
- Pre-DA Set Plans. ACOR Consultants Pty Ltd 2024
- Revised Lot Layout. ACIR Consultants Pty Ltd 30.3.ww Rev K.

1.5 Legislative context and statutory requirements

The implications for the proposal were assessed in relation to key biodiversity legislation and policy including:

- *Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

The Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) provides a legal framework to protect and manage national and international important flora, fauna, ecological communities and heritage places (defined by the EPBC Act as matters of national environmental significance). The EPBC Act is applicable to the proposal if it was considered that an impact on a 'matter of national environmental significance' were likely, thus providing a trigger for referral of the proposal to the Department of Environment and Heritage.

Matters of national environmental significance identified in the Act are:

- world heritage properties;
- national heritage places;
- Ramsar wetlands;
- nationally threatened species and communities;
- migratory species protected under international agreements;
- the Commonwealth marine environment; and

- nuclear actions.

The Commonwealth Government has published 'Significant Impact Guidelines' to assist in the determination of whether an action is likely to have a significant impact on a matter of national environmental significance.

The proposal does not impact on a matter of national environmental significance and therefore is compliant with the EPBC Act.

- *Environmental Planning and Assessment Act 1979 (EP&A Act).*

The Environmental Planning and Assessment Act 1979 (EP&A Act) requires that the assessing body, in the case of this proposal the local government, consider the impact of the development, with respect to this Flora and Fauna Impact Assessment, on the environment. **The proposal indicates no significant impact on threatened species or ecological communities, or their habitats.**

- *Biodiversity Conservation Act 2016 (BC Act).*

The Biodiversity Conservation Act 2016 (NSW) (BC Act) and Biodiversity Conservation Regulation 2017 provide greater protection for biodiversity, particularly threatened species and threatened ecological communities. The 'test of significance' is set out in s. 7.3 of the BC Act and is used to determine if a development or activity is likely to affect threatened species or ecological communities, or their habitats. The test of significance was conducted for threatened species and ecological communities likely to occur in the area of the proposed development and the proposal was found to not significantly impact listed threatened species and ecological communities. **The proposal is therefore compliant with the BC Act.**

- *National Parks & Wildlife Act 1974 (NP&W Act).*

The proposed development is compliant with the NP&W Act.

- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*

The Biosecurity Act 2015 (NSW) repeals and replaces the Noxious Weeds Act 1993. Under the Biosecurity Act all landowners have a 'General Biosecurity Duty' to control invasive weeds on their property and prevent them from spreading to other properties or native bushland. The objectives of the Act are to manage and eradicate weeds that cause a high level of environmental, economic or social harm. With the removal and management of weeds the proposal is compliant with the objectives of the Act.

- Northern Beach Council DCP and LEP

The proposed lots satisfies provisions outlined in both the Pittwater Local Environmental Plan 2014 - 7.6 (Biodiversity protection) and Pittwater Development Control Plan 21 – DCP as impacts on native vegetation and the environment are low. The road however has a high direct impact on the bushland and habitats and there is little scope to avoid loss if the Council's master planned road network is to be fulfilled. Particularly as developments around have been approved based on the continuation of the road.

DCP Controls

2.1.1 Biodiversity Offsets Scheme Threshold

The Biodiversity Offsets Scheme (BOS) is a test used to determine when it is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) and thus evaluate the impacts of a proposal.

In 2022 the development did not trigger the BOS area clearing threshold nor is the site located on the BV map. The area clearing threshold trigger is based on the minimum or actual lot size associated with the property (Less than 1 ha) and the thresholds for clearing which triggers BOS (0.25 ha or more).

Area clearing threshold

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply	The development, including the road, will clear over 0.25 ha of vegetation. Thus, the BOS area clearing threshold would apply.
Less than 1 ha	0.25 ha or more	
1 ha to less than 40 ha	0.5 ha or more	
40 ha to less than 1000 ha	1 ha or more	
1000 ha or more	2 ha or more	

Biodiversity Values Map threshold

The Biodiversity Values (BV) Map identifies land of high biodiversity value, as defined by clause 7.3(3) of the Biodiversity Conservation Regulation 2017. The Biodiversity Offsets Scheme applies to clearing of native vegetation and other biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017 on land identified on the map.



Figure 1.5a. The site (red mark) located on the BV map. The site (red mark) is not located on land mapped as biodiversity value as identified on the Biodiversity Values Map.

Therefore, the development did not trigger the BOS as per the Biodiversity Values Map threshold in 2022 but does in 2024 (see Figure 1.5b)

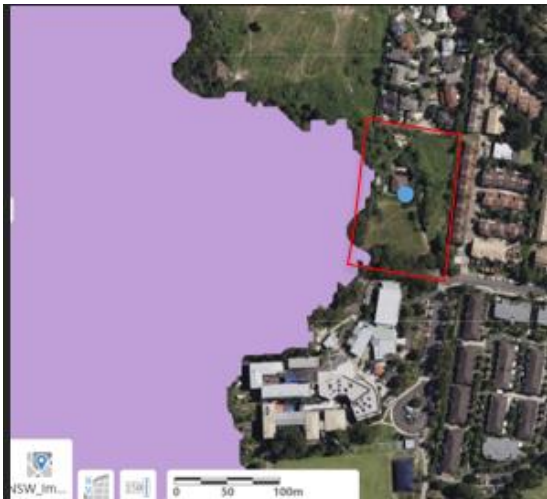


Figure 1.5b. The site (blue dot) located on the BV map.

The site (red mark) is partially on Biodiversity Values Mapped land.

As there is native vegetation clearing this area then development now does trigger the BOS as per the Biodiversity Values Map threshold in (see Figure 1.5b)

2 Methods

2.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball assessed the site in March 2022. Weather was fine and sunny during survey.

During site visits, notes and photos were taken of the vegetation types, flora and fauna present. Due to the small area of proposed impacts, detailed or systematic surveys were not performed. Surveys were general and opportunistic in nature and were performed by traversing the site. Surveys included one diurnal bird and fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified.

A brief additional survey was conducted in June 2024 and additional work is being done if a BDAR is required.

2.1.1 Searches for threatened species summary of methods

Large Forest Owls

The author has surveyed the Warriewood valley and escarpment area for large forest owls over the past five years. Powerful owls have been seen as well as the roost tree confirmed on the northern boundary of the escarpment. Moss tiles have been seen in the escarpment near Mary and a reserve which is within one kilometre of the site poster barking owls have been observed by the report author around Narrabeen lagoon and barking hours have been recorded by others Navy air 1 waterfall. Or recordings for in the past five years. The site was searched 4 potential breeding habitat confirmed not present. Coldplay back was not done during the breeding season as breeding habitat is not present and foraging habitat is ashamed to present for all three species.

Microbats

An anabat or equivalent echo locating device has not been used on the site. Alternatively, data from similar sites has been used how long with habitat assessment. Habitat assessment indicates breeding /roosting habitat present for hollow using sites including trees on-site and one will a small 5cm diameter hollow proposed to be removed.

Roosting habitat for other species such as those using caves and overhangs for culverts also have habitat in the local area as the escarpment has both caves and overhangs within 500 metres of the site. For this reason most microbat species have been assumed to have the site as part of the foraging area. Detailed analysis within anabat for 16 days can be arranged in September if required. Doing this would only confirm which spaces are not present at the time of surveys. This is more critical in a beta given the credit requirements for species assumed to present. For a flora and fauna spaces can be ashamed to present and their key habitat protected an if that cannot occur for it to be medicated. In the case of this flora and fauna we are shaming presents and mitigating with the implementation of suitable long life next box and habitat for microbats. This can be detailed in a vegetation management plan.

None of the microbat species expected require mist or harp trapping as a must in the survey type.

Breeding Habitat: One hollow on the western part of the site could be roosting / breeding habitat. No cave / tunnel microbats habitat is on the site. If this was a DBAR we would assume presence within the 500m

area. I did a walk through the escarpment area in search for caves/overhangs within 100m of the site. 100m was chosen as species polygon boundaries would have a 100 metre radius buffer around an accurate GPS point location centred on a cave/feature entrance. Note: The foraging habitat of this species is assessed as an ecosystem credit; only breeding habitat generates species credits.

Grey Headed Flying Fox

Grey-headed flying-fox *Pteropus poliocephalus*

Site	Per camp		
Survey method	Survey period	Total effort	Min. no. of days
Daytime camp survey	October – December	6hrs (two hours/day)	3 (one per month)

Survey methods: *Daytime camp survey* of flying-fox camp (see Section 2.8).

Potential breeding habitat: Any recorded flying fox camps, places where flying foxes are observed roosting during the day and roosting habitat likely to occur on the subject land. If a camp is located the survey only needs to take place in the camp (i.e. the area occupied by the species) to identify breeding females.

Approach to create species polygon: Use GPS to map the outer perimeter of the camp to create the species polygon. An example of how this may be done is illustrated in Figure 1c.

Note: The foraging habitat of this species is assessed as an ecosystem credit; only breeding habitat generates species credits.

Closest GHFF camps are in Warriewood Wetlands and Capua Close Avalon. None are on the site. GHFF monitoring included Oct, Nov, Dec 2023. No camps but yes to foraging habitat.

Gang Gang Cockatoo and Glossy Black Cockatoo

It is only necessary to survey for Glossy Black Cockatoo breeding habitat. This was done for a distance of ~100m from the site.

Squirrel Gliders. Sugar Gliders are known in the escarpment (pers obsv every year from 2009. Their chew marks are still fresh on Bloodwood trees within 100m of the site. They are expected on the site and in Ingleside Chase. Squirrel Gliders, larger and generally less abundant, may also be present. Nocturnal searches were done in September 2023 for a duration of 2 nights 4 hours each night. Addition studies can be undertaken to ensure none in the trees propose for removal.

Threatened plant species surveys

Threatened plants were surveyed in accordance with *Field surveys help ecologists assess the impact of a development on threatened species, populations of a species or ecological communities*.by DPE

<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/surveying-threatened-plants-and-habitats-nsw-survey-guide-biodiversity-assessment-method-200146.pdf>

The site was traversed in 10m wide lines in areas of open vegetation / grasses. Particular searches were made for orchids in their flowering times. In the area vicinity of the western road a walk was done the length of it and return with a spacing of less than 10m.

Table 1

Maximum distance between parallel field traverses per life form and vegetation density

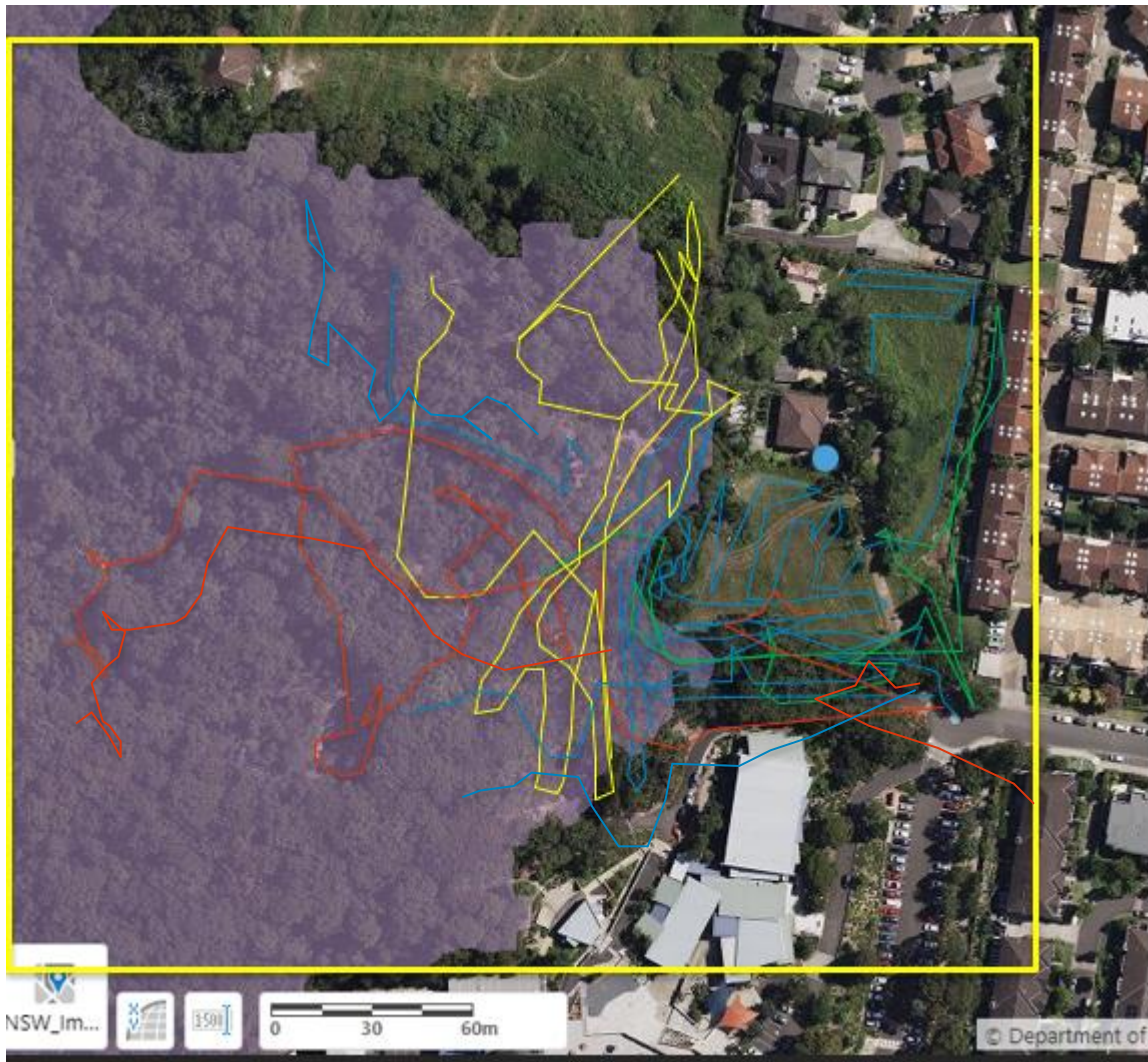
Life form	Maximum distance between parallel field traverse (separation widths) (metres)	
	In open vegetation*	In dense vegetation*
Trees	40	20
Mallee tree		
Tall shrubs (>6 metres)		
Medium shrubs (1–6 metres)	20	10
Cycads and large ferns		
Sub-shrubs (including chenopods) (<1 metre)	15	10
Herbs and forbs	10	5
Ferns (<1 metre)	10	5
Grasses/sedges/rushes and other graminoids		
Orchids		
Epiphytes and climbers		
Aquatic plants	Search the appropriate parts of the waterbody using a traverse coverage that equates to the relevant growth form.	

* refer to Walker and Hopkins (1990) for definition of open/dense vegetation.

<https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/about-threatened-species/surveys-and-assessments>

The Survey area and locations surveyed are provided in Figure 2.1 Different colour for different time. April 2022 (blue), October 2022 (green), Feb 2024 (yellow) and June 2024 (orange). The site was inspected on 6 occasions. Duration typically not less than 30mins and the four main surveys shown below were in excess of 2 hrs. All were in the day with the June 2024 also including dusk and night. The additional dates were in response to being after or during rain and were spontaneous/advantageous in nature. A total of 16 survey hours have been conducted on-site.

Survey Area



Survey

Figure 2.1 survey area showing track. May 2022 (blue), October 2022 (green), Feb 2024 (yellow) and June 2024 (orange).

3 Results

3.1 Desktop results – Plant Community Types (PCTs) and Vegetation Zones

A review of the most up-to-date vegetation mapping, Sydney Metropolitan Area Vegetation Mapping - Version 3.1 (OEH, 2016) VIS_ID 4489), identified 3 plant community types (PCT) within site. The PCTs identified are, PCT 1250 - *Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion*; PCT 1776 - *Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast*; and PCT 1841 - *Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region*.

Table 3.1 – Table of vegetation community synonyms as per NSW and Commonwealth legislation.

NSW PCT Code	PCT Name	BC Act 2016	EPBC Act 1999
1250	Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion	No associated TEC	No associated TEC
1776	Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast	No associated TEC	No associated TEC
1841	Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region	No associated TEC	No associated TEC

NB these will be updated with new PCTs as part of BDAR if BDAR needed.

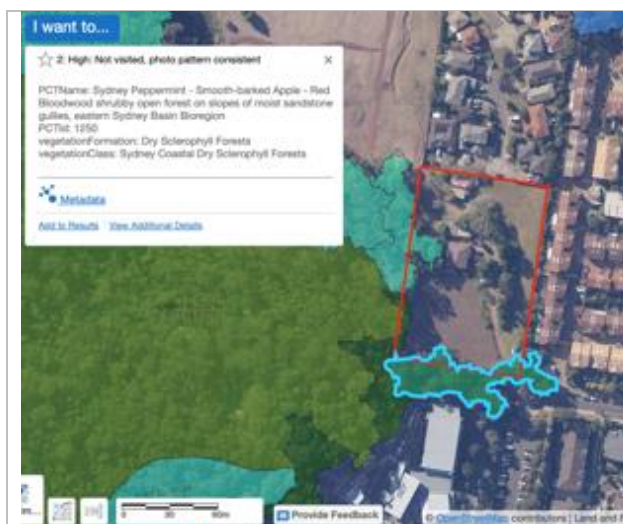


Figure 3.1a. PCT 1250 Sydney Peppermint - Smooth-barked Apple - Red Bloodwood shrubby open forest on slopes of moist sandstone gullies, eastern Sydney Basin Bioregion. SEED 2022.

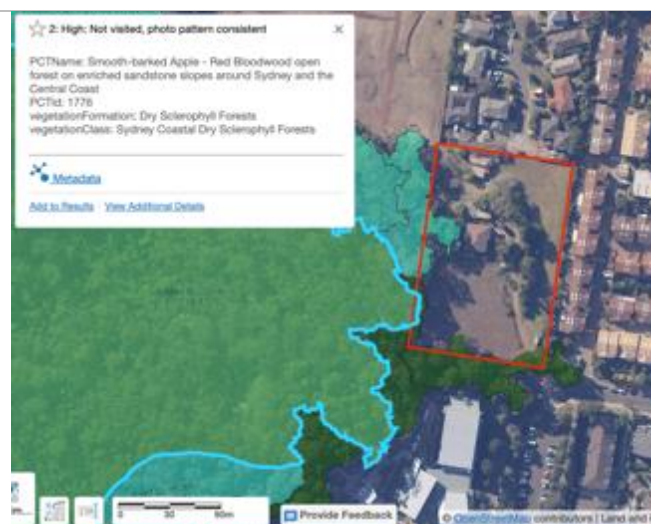


Figure 3.1b. PCT 1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast. SEED 2022.

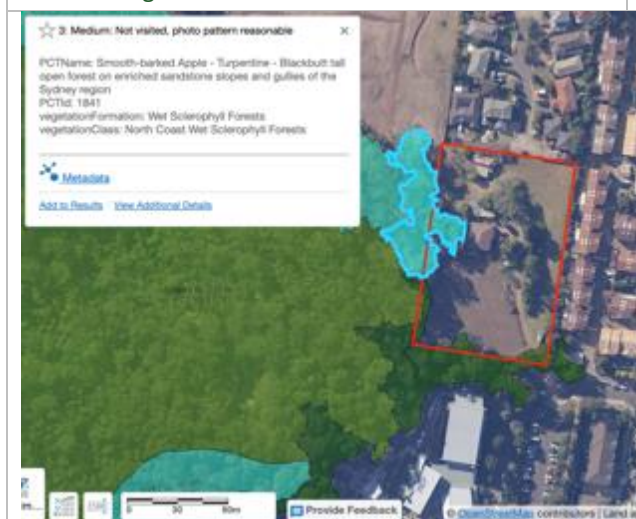


Figure 3.1c. PCT 1841 - Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region. SEED 2022.

3.2 Threatened flora

Bionet results were compared with the list from the BAM calculator to ensure all possible species were considered.

BioNet records within 10km of the study site had 22 species currently listed as vulnerable or endangered under state and/or commonwealth legislation, out of a total of 2,013 species. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 3.2** below. This is based on likelihood of occurrence.

Table 3.2. Threatened flora recorded within a 10km radius since 1993. NSW OEH Bionet 2022.

Family	Scientific Name	Common Name	NSW status	Cwealth status	Records
Fabaceae	<i>Acacia terminalis</i> subsp. <i>Eastern Sydney</i>	Sunshine wattle	E1	E	2
Rutaceae	<i>Boronia umbellata</i>	Orara Boronia	V,P	V	1
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V,3		10
Euphorbiaceae	<i>Chamaesyce psammogeton</i>	Sand Spurge	E1		14
Orchidaceae	<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	V,P,2	V	1
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V		3
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	64
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	5
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E1,P,2	E	3
Grammitidaceae	<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	E1,3		2
Proteaceae	<i>Grevillea caleyi</i>	Caley's Grevillea	E4A,3	CE	462
Myrtaceae	<i>Kunzea rupestris</i>		V	V	1
Malvaceae	<i>Lasiopetalum joyceae</i>		V	V	2
Proteaceae	<i>Macadamia integrifolia</i>	Macadamia Nut		V	8
Orchidaceae	<i>Microtis angusii</i>	Angus's Onion Orchid	E1,P,2	E	165
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E1,P,3	E	27
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	28
Lamiaceae	<i>Prostanthera densa</i>	Villous Mint-bush	V	V	1
Lamiaceae	<i>Prostanthera marifolia</i>	Seaforth Mintbush	E4A,3	CE	1
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	E4A	CE	34
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V	26
Elaeocarpaceae	<i>Tetratheca glandulosa</i>		V		155

Note: E = Endangered, V = Vulnerable, P = Protected.

3.3 Threatened fauna

A total of 553 fauna species have been recorded within 10km of the study site according to BioNet records since 1993. Of these, 70 species are currently listed as vulnerable or endangered under state and/or commonwealth legislation. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 3.3** below, this is based on likelihood of occurrence.

NB: species whose habitat doesn't occur on site have been omitted from this list – those with marginal habitat have been retained on the list.

Table 3.3 Threatened fauna recorded within a 10km radius since 1993. NSW OEH Bionet 2022.

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Amphibia	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V,P	V	89
Amphibia	<i>Litoria aurea</i>	Green and Golden Bell Frog	E1,P	V	5
Amphibia	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V,P		142
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	39
Aves	<i>Ardenna carneipes</i>	Flesh-footed Shearwater	V,P	J,K	3
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		8
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	3
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		54
Aves	<i>Calidris alba</i>	Sanderling	V,P	C,J,K	8
Aves	<i>Calidris canutus</i>	Red Knot	P	E,C,J,K	2
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	3
Aves	<i>Calidris tenuirostris</i>	Great Knot	V,P	CE,C,J,K	4
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		3
Aves	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		145
Aves	<i>Charadrius leschenaultii</i>	Greater Sand-plover	V,P	V,C,J,K	3
Aves	<i>Charadrius mongolus</i>	Lesser Sand-plover	V,P	E,C,J,K	2
Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		5
Aves	<i>Diomedea exulans</i>	Wandering Albatross	E1,P	E	5
Aves	<i>Esacus magnirostris</i>	Beach Stone-curlew	E4A,P		2
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		15
Aves	<i>Gygis alba</i>	White Tern	V,P		1
Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	V,P		27
Aves	<i>Haematopus longirostris</i>	Pied Oystercatcher	E1,P		7
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		54
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		9
Aves	<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	19

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		26
Aves	<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	33
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		6
Aves	<i>Macronectes giganteus</i>	Southern Giant Petrel	E1,P	E	2
Aves	<i>Macronectes halli</i>	Northern Giant-Petrel	V,P	V	1
Aves	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		1
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		3
Aves	<i>Ninox connivens</i>	Barking Owl	V,P,3		39
Aves	<i>Ninox strenua</i>	Powerful Owl	V,P,3		650
Aves	<i>Numenius madagascariensis</i>	Eastern Curlew	P	CE,C,J,K	10
Aves	<i>Onychoprion fuscata</i>	Sooty Tern	V,P		3
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		31
Aves	<i>Petroica boodang</i>	Scarlet Robin	V,P		3
Aves	<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V,P		2
Aves	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	V,P		3
Aves	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	V,P		5
Aves	<i>Puffinus assimilis</i>	Little Shearwater	V,P		2
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	3
Aves	<i>Sternula albifrons</i>	Little Tern	E1,P	C,J,K	2
Aves	<i>Thalassarche cauta</i>	Shy Albatross	V,P	V	4
Aves	<i>Thalassarche chrysostoma</i>	Grey-headed Albatross	P	E	1
Aves	<i>Thalassarche melanophris</i>	Black-browed Albatross	V,P	V	5
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		8
Aves	<i>Tyto tenebricosa</i>	Sooty Owl	V,P,3		2
Aves	<i>Xenus cinereus</i>	Terek Sandpiper	V,P	C,J,K	2
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		534
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	23
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	18
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		3

Class	Scientific Name	Common Name	NSW status	Cwealth status	Records
Mammalia	<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	E1,P	E	63
Mammalia	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	V,P		28
Mammalia	<i>Miniopterus australis</i>	Little Bent-winged Bat	V,P		82
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		191
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V,P		62
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		8
Mammalia	<i>Phascolarctos cinereus</i>	Koala	V,P	V	75
Mammalia	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	5
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	246
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		3
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		11
Mammalia	<i>Vespadelus trougtoni</i>	Eastern Cave Bat	V,P		2
Reptilia	<i>Caretta caretta</i>	Loggerhead Turtle	E1,P	E	6
Reptilia	<i>Chelonia mydas</i>	Green Turtle	V,P	V	14
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		115

3.4 Endangered Populations

Two (2) **endangered populations** have been recorded to occur within 10km of the site. Table 3.4 identifies the populations.

The endangered populations are unlikely to be within the study site or a corridor linking populations to those communities. No further assessment is required for these communities.

Table 3.4. Endangered Populations within 10km of site.

Family	Scientific Name	Common Name	NSW status	Cwealth status	Records
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Mammalia	<i>Phascolarctos cinereus</i>	Koala in the Pittwater Local Government Area	E2,V,P	V	70

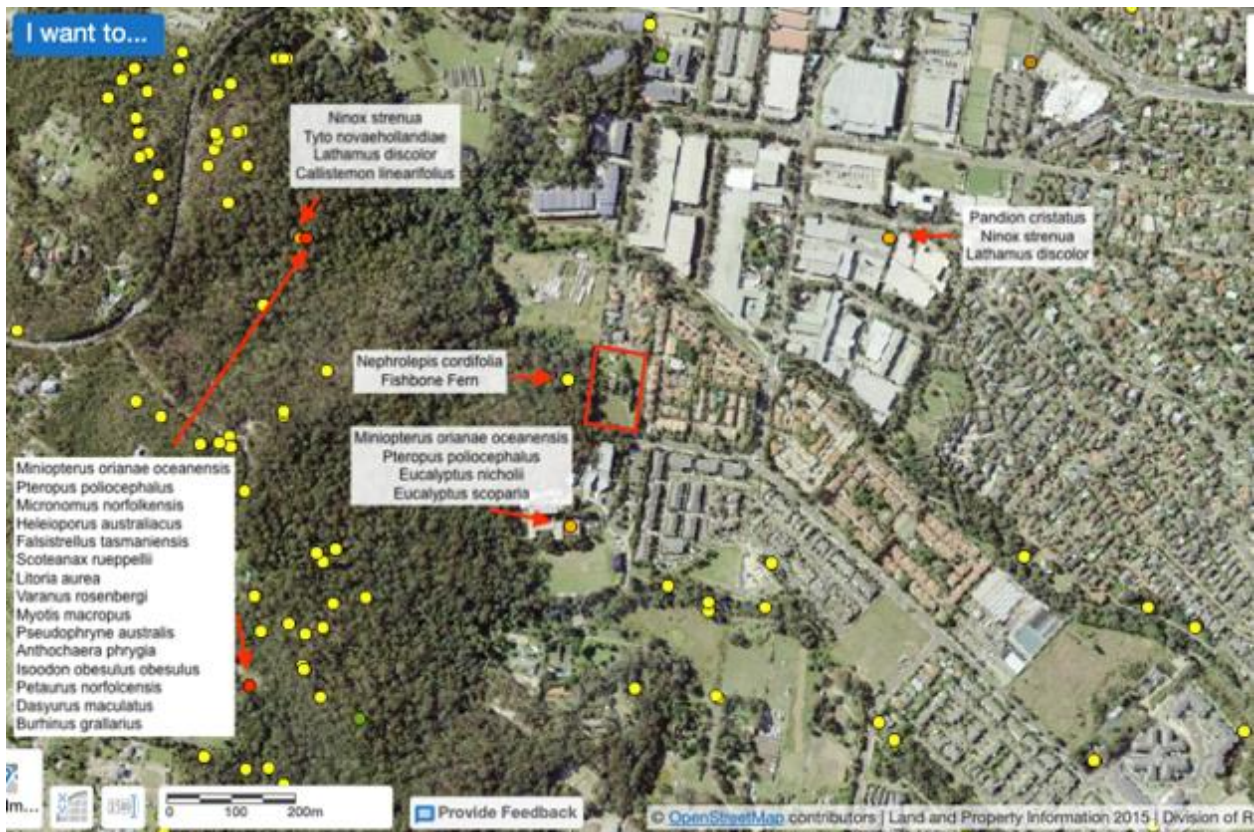


Figure 3.2. Threatened species sighted. Source: SEED 2022. Will be updated in BDAR needed.

3.5 Site photos 2022 and 2024



Plate 1. Two Red Bloodwood trees proposed to be removed. Both are mature neither have of his holidays. Glider chew marks were looked for however were absent 2022. Still in in Irrawong road though.



Plate 2. View from the southern boundary of the property looking northeast. Location of proposed retaining wall 2022



Plate 3. Southern boundary with a narrow span of native vegetation before joining Forest Road curling up into the school 2022. Any vegetation not removed for the road extension will continue to be part of the APZ (for the school).

Photos 2024



Plate 4. Road reserve adjoining Marter Maria School entrance road – 2024 (APZ)



Plate 5. View from the southern boundary. Native canopy and shrub vegetation to the south is in the road reserve. See boundary marker. Trees on site are numbers 17 and 18 (possibly being retained). Tree 20 is close to the boundary.

There is an area of “managed land” between the proposed development and Mater College to the south. The bushfire report pertaining to the School (2000) requires a 30m IPA at the school perimeter; a 2022 bushfire report that confirms the 30m IPA; and an RFS Referral Response which confirms the 30m buffer to the north and west of the school buildings. The road reserve itself is 20m wide so some of the site may need to be IPA to fulfil the schools APZ requirements.

4 Impacts

4.1 Direct Impacts

4.1.1 Tree and Vegetation removal

Tree and Vegetation removal results from the existing road expansion and the creating and connecting of the road on the western boundary. Also from the APZ (no canopy removal required) and from cut and fill on the sites to establish level building blocks. This will see the removal of the Themeda grass.

The Arborist report has been updated (extracts) 2024 and trees proposed for removal (according to arborist assessment, include 5 on the site (#6, 17,18,27) and an additional 12 in the road reserve next to Marter Marina and two (trees 25 and 26) on the upslope side of the proposed western boundary road joining the escarpment.

Native ground and midstory will be removed for the rear cut/fill perimeter road / APZ. In 2022 this had been moved further east (downslope to retain trees 21, 23 and 24 (*A. costata*). In 2024 it has been moved to protect more trees to the west however the need to include the access off forest road by the school results in 12 trees proposed for removal. Forest Road by the school has the greatest impact on trees. This section is an APZ (IPA) for the school and so is under-scrubbed for hazard reduction purposes.

Figure 4.1 has a summary from the June 2024 Arborist information.

- *Angophora costata* (x6) *Eucalyptus robusta* (Swamp Mahogany) (x3)
- *Corymbia gummifera* (Red Bloodwoods) (x4) *Eucalyptus botryoides* (x2) *Glochidion ferdinandi* (x1)

The 2024 tree impact includes impacts to trees on the road outside of the property boundary.

17	<i>Corymbia gummifera</i>	24	14	450	5.4	80%	M	Nil	Grass	Nil	H	AA1
18	<i>Corymbia gummifera</i>	26	20	500	6.0	80%	M	Nil	Grass	Nil	H	AA1
19	<i>Corymbia gummifera</i>	18	15	600	7.2	80%	M	Nil	Natural ground	Nil	H	A1
20	<i>Angophora costata</i>	22	16	500	6.0	90%	M	Nil	Natural ground	Nil	H	AA1
25	<i>Angophora costata</i>	20	16	500	6.0	90%	M	Nil	Natural ground	Nil	H	AA1
26	<i>Angophora costata</i>	20	16	500	6.0	90%	M	Nil	Natural ground	Nil	H	AA1
27	<i>Glochidion ferdinandi</i>	8	9	250	3.0	80%	M	Nil	Garden	Nil	M	A1
28	<i>Angophora costata</i>	14	10	350	4.2	80%	M	Nil	Grass	Nil	M	A1
29	<i>Eucalyptus robusta</i>	18	16	500	6.0	90%	M	Nil	Garden	Nil	H	A1
30	<i>Eucalyptus robusta</i>	9	6	300	3.6	80%	S	Nil	Natural ground	Nil	M	A1
31	<i>Corymbia gummifera</i>	9	6	250	3.0	80%	M	Nil	Natural ground	Nil	M	A1
32	<i>Angophora costata</i>	10	8	300	3.6	80%	M	Nil	Natural ground	Nil	M	A1
33	<i>Eucalyptus robusta</i>	8	4	250	3.0	80%	S	Nil	Natural ground	Adj. driveway	M	A1
34	<i>Eucalyptus botryoides</i>	14	14	600	7.2	80%	M	Nil	Natural ground	Adj. driveway	H	A1
35	<i>Angophora costata</i>	10	8	300	3.6	80%	M	Nil	Natural ground	Adj. driveway	M	A1
36	<i>Angophora costata</i>	20	16	500	6.0	80%	M	Nil	Natural ground	Nil	H	AA1
37	<i>Eucalyptus robusta</i>	8	4	150	2.0	80%	S	Nil	Natural ground	Nil	L	A1
38	<i>Angophora costata</i>	10	6	300	3.6	80%	M	Co-dominant	Natural ground	Nil	M	A1
39	<i>Eucalyptus botryoides</i>	7	8	300	3.6	80%	M	Leaning	Natural ground	Nil	M	A1

Extract from Arborist report (2024) containing full list of trees proposal for removal. Noting the APZ requires no additional tree removal

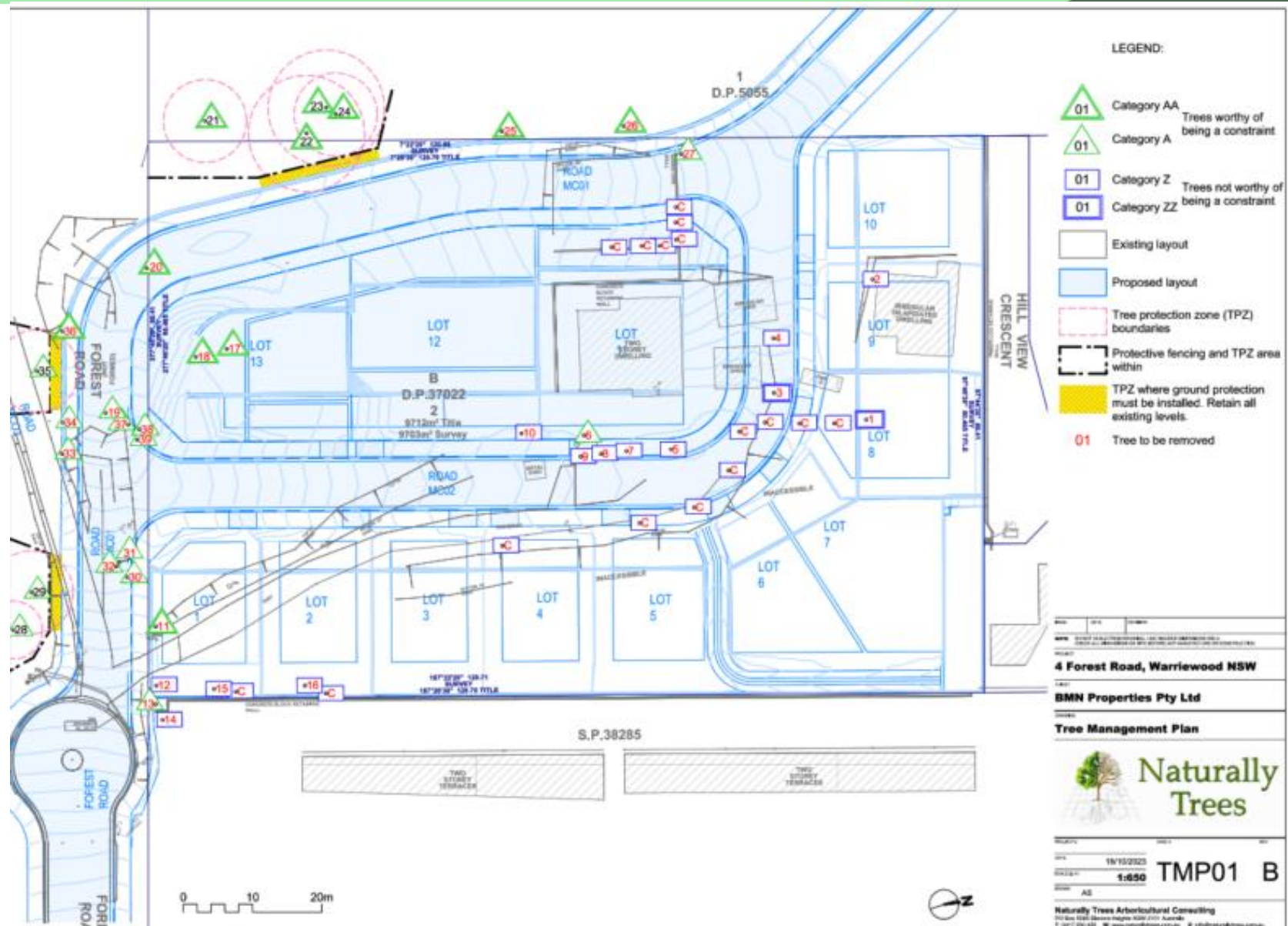


Figure 4.1. Tree Management Plan. Source: Naturally Trees June 2024

It is recommended that offset planting occur on site. Plantings aim to replace the canopy in alignment with requirements of Bushfire. The Landscape Plan includes native tree and tall and small shrub species suitable for the area. In summary there will be more planted than are being removed, also taking into consideration the loss of potential hollows from older trees. Habitat is also being augmented (see VMP – pre cc).

Trees 17 and 19 – *Corymbia gummifera* (Red Bloodwoods) proposed for removal with Sheoaks juveniles among these and ground cover of Bracken, Lomandra and Kangaroo Grass. These trees and associated native cover will be retained if possible. They are outside the dwelling envelope and the road.



4.2 Indirect Impacts

The proposed actions will result in indirect impacts affecting species or communities.

4.2.1 Vehicle movements

Vehicle movements will be greater and will be in closer proximity to the bushland in Ingleside Chase. This includes impacts from car lights and noise as well as the potential direct impacts of fauna being struck by vehicles. Its expected the roads will also have street lights and these will have light spill into the bushland areas and degrade the edge habitat for fauna. Impacts include possibly increased predation as well as lower habitat use. Slower vehicle movements particularly at night and a culture of care will be needed for those in the residential subdivision or using the western boundary road.

Light Spill

Light spill is a potential impact from all aspects of the development (not just road) and 'Dark Sky Friendly Lighting is required' to minimise impacts. This can be conditioned and would be part of the public domain lightening. Including the areas (roads) to be in Council management.

Companion animals

Companion animals (cats / dogs) do impact native wildlife to varying degrees and can be heavily impactful in reserves such as Ingleside Chase. The area to the west of the development would be best as a Wildlife Protection area and no domestic animals allowed west of the road. No domestic animals are to be able to 'roam'. Ideally cats would be prohibited from the subdivision.

Weed incursion

Weeds can be managed through a Vegetation Mgt Plan. Landscaping in private spaces must not have environmental weeds.

4.2.2 Loss of Breeding Opportunities

Works in the site may result in temporary-reduced breeding opportunities for locally occurring native species including amphibians, reptiles, birds, mammals and invertebrates through the production of construction noise and vegetation removal.

4.2.3 Weed growth and invasion

Weed species may arise within the direct works zone and surrounding landscaped areas through soil disturbance or by being brought in as seed on work machinery, tools, equipment and worker clothes (e.g. boots). Soil disturbance combined with the elevated nutrients and increased light exposure may result in increased weed growth, aggravated by the high abundance of weeds present pre-works.

4.2.4 Introduction of pathogens

The introduction of pathogens may occur into the site, via machinery, tools, equipment and worker clothing (e.g. boots). Diseases to watch out for include Phytophthora (also known as Root Rot – type of water mold) and Myrtle Rust (*Puccinia psidii* – type of fungus). See Appendix for methods to control selected pathogens.

4.2.5 Noise

The proposed actions may result in noise which may result in minor disturbance to sensitive fauna in the local canopy.

4.2.6 Runoff

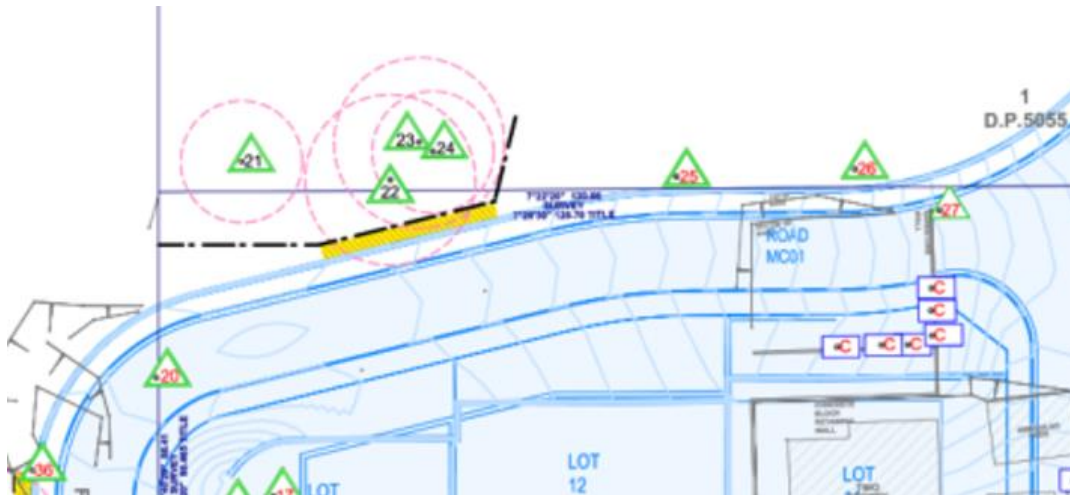
The proposed actions may result in transport of sediment from the work zones as a result of increased storm water runoff.

4.3 Avoid and Minimise

- A number of iterations have seen the reduction in impact and retention of high priority trees. The western boundary road has been brought fully within the site retaining 4 priority trees. Only two are still impacted and these are unavoidable due to the road having to join that already started on the neighbouring site. This change can be seen in the screen shots below. This has reduced the subdivision from the original 14 to now 13 lots.

Extract from 2024 plan with overlay of Arborist data. Showing road moved away from west and the retention of trees, #21, 22, 23, 24. The road could not be kept west in the vicinity of trees #25 and #26 as it has to meet the joining road. Below this is the 2022 image this design had the loss of

those trees and 14 Lots. The RFS requires this road to be 8m wide to a reduction in width to retain the trees would not be in accordance with RFS requirements for this location.



Current Plan – 2024. South west corner and western boundary road. Retention of trees, #21, 22, 23, 24.



Plan from 2022. Trees #21, 22, 23, 24s were to be removed in this 14 Lot subdivision plan.

The southern boarder road has its path dictated by the existing road. Engineering requirements and the existing fixed alignment have influenced the road position. An alternative to avoid the removal of trees here has not been possible. Tree planting is required (see landscape plan).

Stormwater is piped to receiving infrastructure and treatment areas prior to entering natural waterways. De-watering is not an issue on this site as the downslope environment is already urban.

6 Recommendations

6.1 Mitigation Measures

The following mitigation measures have been suggested with approval of the subdivision.

6.1.1 Plans required pre CC

Construction Environmental Management Plan (CEMP) for approval by Council pre CC and Vegetation Mgt Plan for approval by Council pre CC

These plans are to maximise retention of native vegetation, hollows, habitat including via fencing, signage, info in tool-box talks, sequencing of works and all requirements in the Arborist report. Also to note retention of trees 17 and 18 unless removal required by Council. VMP to cover removal of weeds to eliminate from site and prevent spread of seed/pieces and focus on long-term works of vegetation and APZ management (includes during and post works).

6.1.2 Tree Protection

Tree protection will be installed. See final arborist report for details of works and tree numbers.

Delineation of Work areas. During construction of any infrastructure associated with the subdivision the delineation of works zones, adjacent vegetation is required to minimise impact.

Flagging tape to be placed along the maximum disturbance area. Works are to be from the cleared area of land and reaching in towards the bushland area. Access will be restricted to already disturbed open areas.

6.1.3 Seed collection and Transplanting

Seed collection is to occur from any native trees and grasses that are removed. Seed to be collected from each species and saved in material or paper bags and provided to the site ecologist or Northern Beaches Council.

Transplanting of patches of Kangaroo Grass from areas that will be impacted by subdivision works (road and APZ) can occur. People doing restoration works elsewhere may take the grasses and plant elsewhere.

6.1.4 Care of Bushland Areas Long-term

The VMP will have a section for subdivision and one for post site development of individual lots. Plantings of tube stock across the site from locally native ground and shrub species is recommended and this is to be in accordance with Asset Protection Zone requirements. Restrictions and Management of Companion Animals is recommended.

6.1.5 Landscaping Public and Private areas

Public Landscaping is planned in accordance with the WWV Masterplan and have locally native species and utilise the native grasses. The planting list can be augmented by the VMP to included at least 8 ground species, 8 shrubs and 5 canopy species. Landscaping has consideration of D16.5 Landscaped Area for Newly Created Individual Allotments. Private landscaping to be assessed with each DA and have appropriate species. Landscape plans that include outdoor lighting to ensure all is Dark Sky Friendly. See Figures 5.1 and 5.2

Landscape Plan extracts are in Figure 5.1 and 5.2

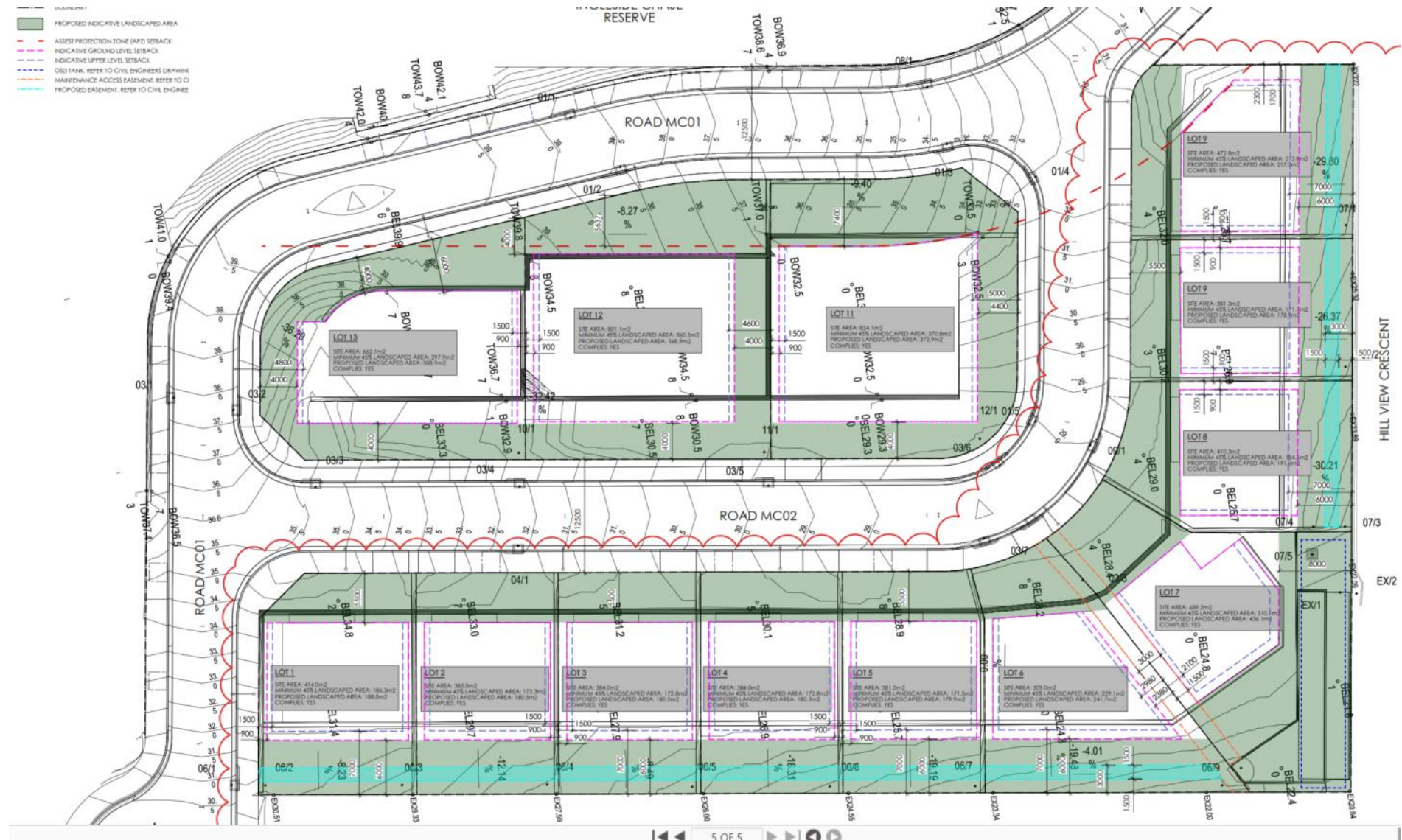


Figure 5.1 Areas for proposed landscaping within and around lots.

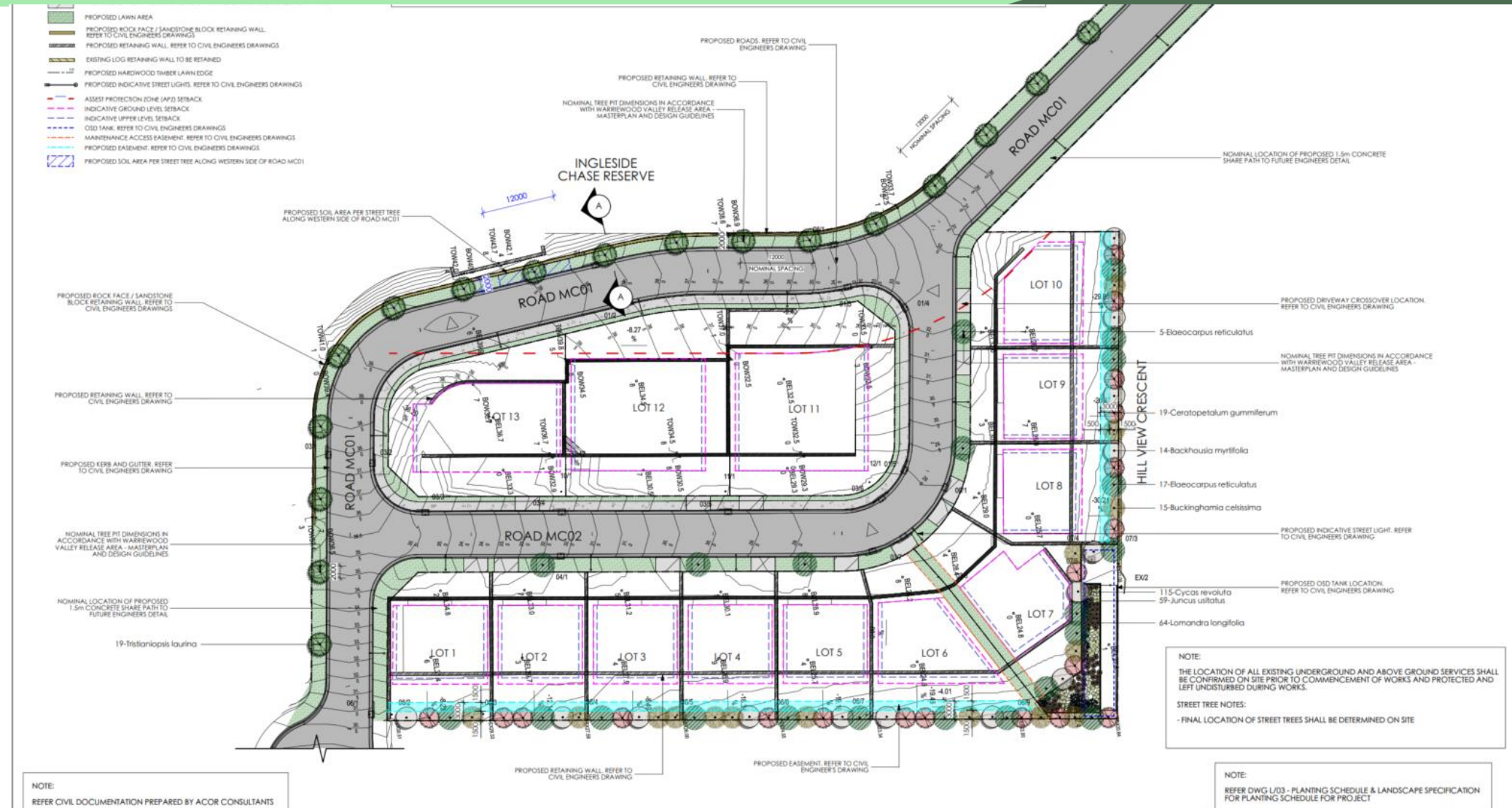


Figure 5.2 Proposed Public area planting. Species locally native and from WWV plant list. Blueberry Ash, Christmas Bush, Backhousia myrtifolia – see Landscape plan 2024 for full detail.

6.1.6 Erosion and runoff

Where required, sediment controls will be put in place. These will include, but not be limited to sediment fences, jute matting and crushed sandstone. Sediment controls will be reviewed during site inspections and/or after significant rainfall (more than 10mm in 24hrs resulting in site runoff).

6.1.1 Weed Management and Weed Removal Techniques

Weed species are present and must be appropriately managed so they do not spread. There must be continuous maintenance of the native vegetation onsite otherwise it may result in increased weed growth, exacerbated by the high abundance of weeds present pre-works. Weeds will colonize and pioneer on any cleared grounds so must be managed throughout the duration of the project as well as on-going post works.

Weed removal proposed for the site will consist of hand removal techniques, manual/mechanical removal using bush regenerator tools and winter thermal (flame) weeding. This approach will reduce the amount of herbicide used and reduce the amount of off-target damage through spot on application.

Woody perennial weeds less than 2 metres in height will require cut and paint or scrape and paint bush regenerator techniques based on the germinating/epicormic behaviour of the plant (especially plants that tend to coppice or sucker). See Appendix for further details.

6.1.2 Nest boxes

Although it is not critical, installation of a single nest box designed for microbats should be added to the site to replace potential loss of roosting habitat.

Image from: nestboxes.com.au



be added to the site to replace potential loss of

6.1.3 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix II should be followed. The site is considered to be an area which may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to water. It is recommended that Bushland Hygiene Protocols be followed closely.



Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)







Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)


7 Appendices

7.1 Appendix I– Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
<p>Hand Removal</p> 	<p>Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height.</p> <p>Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.</p>	<p>Tools: Gloves, Rakes, Knife and Weed Bags</p>
<p>Crowning</p> 	<p>Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning.</p> <p>A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility</p> <p>Soil disturbance is to be kept to a minimum when using this technique.</p>	<p>Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.</p>

Technique	Method	Equipment
<p>Cut and Paint Stems</p> 	<p>Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent of vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent.</p> <p>Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump.</p> <p>Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.</p>	<p>Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.</p>
<p>Scrape and Painting</p> 	<p>More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license.</p> <p>Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plants height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk.</p> <p>Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.</p> <p>Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.</p>	<p>Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>

Technique	Method	Equipment
<p>Cut with a Chainsaw and Paint</p> 	<p>Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license.</p> <p>Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant.</p> <p>If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants.</p> <p>Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.</p>	<p>Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.</p>
Spot Spraying	<p>Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license.</p> <p>Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.</p>	<p>Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.</p>

7.2 Appendix II– Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- And, always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)
- Only accredited supplies of plants/mulch to be used.

Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits.

Facts about Phytophthora

Phytophthora cinnamomi (Phytophthora) is a microscopic, soil borne, water-mould that has been implicated in the death of remnant trees and other plants in Australian bushland. Phytophthora is not native to Australia. It is believed to have been introduced sometime after European settlement. Phytophthora is a national problem and is listed as a key threatening process under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999.

"Dieback" simply means dying or dead plants. There are many causes of dieback; Phytophthora is just one of them. Often dieback is the result of a combination of factors such as; changed drainage patterns and nutrient loads (e.g.: increased stormwater run-off) or changed soil conditions (e.g.: dumped fill or excavation of/near root zone). Plants that are stressed are more vulnerable to Phytophthora.

7.3 Appendix III – Threatened species likelihood of occurrence

Appendix III is based on BioNet records within 10km of the study site. The following flora and fauna species are currently listed as vulnerable or endangered under state and/or commonwealth legislation. The likelihood of occurrence for the flora and fauna species is listed below.

Table 7.1 – Threatened flora species likelihood of occurrence ***please see species with no “Site Suitability”***

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Fabaceae	<i>Acacia terminalis</i> subsp. <i>Eastern</i> <i>Sydney</i>	Sunshine wattle	Coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated. Most sites are highly modified or disturbed due to surrounding urban development. Flowers in autumn but may be through to early winter. Small birds and bees are natural pollinators. Seeds mature in November and are dispersed by ants. Seed viability is high and recruitment occurs mainly after fire. A fire temperature of 60 degrees is required for optimum germination. Although plants are killed by fire, they have been recorded sprouting from the base.	Surveyed for and not present
Rutaceae	<i>Boronia umbellata</i>	Orara Boronia	This Boronia grows as an understorey shrub in and around gullies in wet open forest. It appears to regenerate well after disturbance, but it is not known whether prolonged or repeated disturbance affects long-term persistence.	Surveyed for and not present
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers in spring to summer.	Surveyed for and not present.

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Euphorbiaceae	<i>Chamaesyce psammogeton</i>	Sand Spurge	Grows on fore-dunes, pebbly strandlines and exposed headlands, often with Spinifex (<i>Spinifex sericeus</i>) and Prickly Couch (<i>Zoysia macrantha</i>). Flowering recorded in spring and summer. Sand Spurge seeds float, so some dispersal between beaches may occur. Longevity of the species is approximately 5–30 years with a primary juvenile period of less than 1 year. Plant growth occurs in spring and summer.	No habitat
Orchidaceae	<i>Cryptostylis hunteriana</i>	Leafless Tongue Orchid	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. It appears to prefer open areas in the understorey and is often found in association with the Large Tongue Orchid and the Tartan Tongue Orchid.	Surveyed for and not present
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		Found in a range of habitat types, most of which have a strong shale soil influence. These include ridgetop drainage depressions supporting wet heath within or adjoining shale cap communities e.g. Stringybark and Ironbark woodlands, various shale/sandstone transition forest associations including Turpentine Ironbark Margin Forest, Stringybark/ Scribbly Gum Woodland and Scribbly Gum/ Grey Gum/ Red Bloodwood Woodland. The species also occurs in riparian zones draining into Sydney Sandstone Gully Forest, shale lenses within sandstone habitats and colluvial areas overlying or adjoining sandstone or tertiary alluvium.	No habitat
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	Restricted distribution at Norah Head, Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Recorded in poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Not habitat and surveyed for and not present

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			Associated species frequently include stunted species of <i>E. oblonga</i> Narrow-leaved Stringybark, <i>E. capitellata</i> Brown Stringybark and <i>E. haemastoma</i> Scribbly Gum.	
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	It occurs in grassy or sclerophyll woodland in association with many other eucalypts that grow in the area, including <i>E. andrewsii</i> and many of the stringybarks, such as <i>E. caliginosa</i> . Grows on shallow relatively infertile soils on shales and slates; Niangala to Glen Innes. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Upland Wetlands of the New England Tablelands and the Monaro Plateau.	Surveyed for and not present
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	Grows in dry sclerophyll forest and moss gardens over sandstone.	No known habitat in possibly impact areas. Road way is marginal habitat.
Grammitidaceae	<i>Grammitis stenophylla</i>	Narrow-leaf Finger Fern	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	No habitat in possibly impact areas. Surveyed for.
Proteaceae	<i>Grevillea caleyi</i>	Caley's Grevillea	Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. Recorded existing on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by <i>Eucalyptus sieberi</i> and <i>E. gummifera</i> .	Surveyed for and not present. No habitat in possibly impact areas

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Myrtaceae	<i>Kunzea rupestris</i>		Grows in shallow depressions on large flat sandstone rock outcrops. Characteristically found in short to tall shrubland or heathland. Flowering occurs in spring. It has indehiscent fruits which resist soil entrapment and so may disperse many metres per week. Resprouts from the base after fire or mechanical damage. Seedlings have also been observed after fire.	No habitat in possibly impact areas
Malvaceae	<i>Lasiopetalum joyceae</i>		Grows in heath on sandstone. Flowers in spring. The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities: Shale/ Sandstone Transition Forest, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, and Turpentine-Ironbark Forest in the Sydney Basin Bioregion.	No habitat in possibly impact areas
Proteaceae	<i>Macadamia integrifolia</i>	Macadamia Nut		Not suitable naturally present
Orchidaceae	<i>Microtis angusii</i>	Angus's Onion Orchid	Currently known from only one site at Ingleside, north of Sydney. The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys Forest - Terrey Hills - Ingleside and Belrose areas.	Surveyed for during 2022 and 2024 and not present. No habitat in possibly impact areas
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	Usually found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone. Usually present as isolated individuals or very small populations. Habitat Preferences: It also favours disturbed heath, shrubby thickets and sandstone scrubs.	Surveyed for and not present. No habitat in possibly impact areas
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		Occurs on shaley/lateritic soils over sandstone and shale/ sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowland Grassy Woodland habitat at Albion Park on the Illawarra coastal plain. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense	Surveyed for and not present. May come up after disturbance.

Family	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots.	
Lamiaceae	<i>Prostanthera densa</i>	Villous Mint-bush	<i>Prostanthera densa</i> generally grows in sclerophyll forest and shrubland on coastal headlands and near coastal ranges, chiefly on sandstone, and rocky slopes near the sea. Plants regenerate from rootstock after fire and flower within the first year or two.	Surveyed for and not present.
Lamiaceae	<i>Prostanthera marifolia</i>	Seaforth Mintbush	Occurs in localized patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	Surveyed for and not present. No habitat in possibly impact areas
Myrtaceae	<i>Rhodamnia rubescens</i>	Scrub Turpentine	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. This species is characterised as highly to extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Surveyed for and not present.
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	Found in rainforest on sandy soils or stabilised Quaternary sand dunes at low altitudes in coastal areas. Rainforests are often remnant stands of littoral or gallery rainforest. Is thought to tolerate wet and dry conditions on sands.	Surveyed for and not present.
Elaeocarpaceae	<i>Tetratheca glandulosa</i>		Occurs on shale/sandstone transition geology particularly in areas where shale caps occur over sandstone. Associated with Lucas heights, Gynea, Lambert and Faulconbridge soil landscapes. Generally occurs on ridgetops, upper slopes and occasionally mid-slope benches. Prefers shallow soils consisting of yellow clayey/sandy loams.	Habitat not ideal Surveyed for and not present. May come up after disturbance in rear (western) road area.

Table 7.2 – Threatened fauna species likelihood of occurrence ***please see species with no “Site Suitability”***

Please note – Marine species including Turtles (*Cheloniidae*), Marine Birds (*Diomedidae*, *Procellariidae*) and Whales (*Otariidae*, *Balaenidae*, *Balaenopteridae*, *Physeteridae*) have been omitted from this list.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Amphibia	<i>Heleioporus australiacus</i>	Giant Burrowing Frog	Sites must have native vegetation. The species has not been found on cleared land. Occurs in hanging swamps on sandstone shelves and along perennial creeks. The species is not restricted to watercourses.	In other areas of the Escarpment – no suitable breeding habitat on-site. GBF could move through the site – in forested area (proposed road).
Amphibia	<i>Litoria aurea</i>	Green and Golden Bell Frog	Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (<i>Gambusia holbrooki</i>), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.	GGBF – no habitat
Amphibia	<i>Pseudophryne australis</i>	Red-crowned Toadlet	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain; a large proportion of the development of the tadpoles takes place in the egg. Disperses outside the breeding period, when they are found under rocks and logs on sandstone ridges and forage amongst leaf-litter.	In other areas of the Escarpment – no suitable breeding habitat on-site. RCT could move through the site. RCT known recordings (inc pers obs 2020) above the Irrawong Waterfall.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. This species has been seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests.	The site is potential habitat and the most up to date Regent Honey Eater Important habitat map will be checked immediately prior to final assessment.
Aves	<i>Ardeanna carneipes</i>	Flesh-footed Shearwater	Nest on Lord Howe Island in forests on sandy soils from Ned's Beach to Clear Place, with smaller colonies below Transit Hill and at Old Settlement Beach. Eggs are laid at the end of a burrow 1 - 2 metres in length.	No habitat
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Woodlands and dry open forests with preference for those dominated by eucalypts with mallee associations. May also be found in shrublands, heaths and occasionally in modified habitats and wet forests.	Suitable habitat in the areas of dry forest in / near proposed road extension.
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Freshwater wetlands and occasionally estuarine reedbeds. Prefers permanent shallow wetlands or the pools of creeks and rivers with tall and thick vegetation.	No habitat
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen	Habitat is not suitable

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			timber. Largely nocturnal, being especially active on moonlit nights. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch. Two eggs are laid in spring and early summer.	
Aves	<i>Calidris alba</i>	Sanderling	A regular summer migrant from Siberia and other Arctic breeding grounds to most of the Australian coastline. It is uncommon to locally common, arriving from September and leaving by May (some may overwinter in Australia). Sanderlings occur along the NSW coast, with occasional inland sightings. Often found in coastal areas on low beaches of firm sand, near reefs and inlets, along tidal mudflats and bare open coastal lagoons; individuals are rarely recorded in near-coastal wetlands.	No habitat
Aves	<i>Calidris canutus</i>	Red Knot	Breeding in the Arctic Circle between August and April, it visits Australian shores in large numbers and frequents coastal sand flats and the margins of estuaries and rivers. It feeds in close-packed flocks that move in unison.	No habitat
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Aves	<i>Calidris tenuirostris</i>	Great Knot	Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. Most birds return north in March and April, however some individuals may stay over winter in Australia. Forages for food by methodically thrusting its bill deep into the mud to search for invertebrates, such as bivalve molluscs, gastropods, polychaete worms and crustaceans.	No habitat
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	Habitat present in proposed road extension area adjoining escarpment.
Aves	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	Lives in coastal woodlands and drier forest areas, open inland woodlands or timbered watercourses where casuarinas (or sheoaks), its main food trees, are common. Glossy black-cockatoos occasionally eat seeds from eucalypts, angophoras, acacias and hakeas, as well as	Food trees for Glossy Black Cockatoos are being removed. 5-part test conducted. Glossy Black Cockatoos are recorded in the Escarpment Positive recordings every year from

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			eating insect larvae. Prefers to nest in the hollows of large, old eucalypt trees, alive or dead. The typical nest site will be around 3 to 30 metres above the ground.	2022, 23, 24 of this species in areas of <i>Allocasuarina torulosa</i> (Forest She oak).
Aves	<i>Charadrius leschenaultii</i>	Greater Sand-plover	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks. Roosts during high tide on sandy beaches and rocky shores; begin foraging activity on wet ground at low tide, usually away from the edge of the water; individuals may forage and roost with other waders. Diet includes insects, crustaceans, polychaete worms and molluscs. Prey is detected visually by running a short distance, stopping to look, then running to collect the prey.	No habitat
Aves	<i>Charadrius mongolus</i>	Lesser Sand-plover	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves. The species also inhabits saltworks and near-coastal saltpans, brackish swamps and sandy or silt islands in river beds.	No habitat
Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in	Potential habitat in Escarpment area and proposed road area.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			rough or decorticated bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	
Aves	<i>Esacus magnirostris</i>	Beach Stone-curlew	The Beach Stone-curlew has been recorded around the north coast of Australia, mainly between mid-north Western Australia and north-east NSW. The species has largely disappeared from the south-east of its former range and is now rarely recorded on ocean beaches in NSW. Occurs on open, undisturbed beaches, islands, reefs, and estuarine intertidal sandflats and mudflats; beaches with estuaries or mangroves nearby are preferred; may also frequent river mouths, offshore sandbars and rock platforms.	No habitat
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	Prefers open Eucalypt forest and woodlands. Primarily feeds within the canopy of Eucalyptus, Angophora and Melaleuca trees. Prefers riparian areas but may visit isolated trees in open or cleared land.	Potential habitat in Escarpment area and proposed road area.
Aves	<i>Gygis alba</i>	White Tern	Occurs widely in tropical and subtropical seas and islands. The subspecies on Lord Howe Island is rarely seen on the mainland but occurs on Norfolk and Kermadec Islands. Most breeding sites on Lord Howe Island are close to the lagoon in the settlement area. Marine habitat. A recent arrival to Lord Howe Island, only breeding there since the 1960s. This species nests in the high branches of trees. On Lord Howe Island it nests in the introduced Norfolk Island Pine as well as native Sallywood, Blackbutt, Greybark, Banyan and Pandanus. White Terns do not build a nest but select a	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			depression or damaged area on the branch of a tree on which to balance their egg. Breeding and non-breeding birds roost in the trees during the night. Vagrant birds occur in coastal NSW waters, particularly after storm events.	
Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	Inhabits rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries. Forages on exposed rock or coral at low tide for foods such as limpets and mussels. Breeds in spring and summer, almost exclusively on offshore islands, and occasionally on isolated promontories.	No habitat
Aves	<i>Haematopus longirostris</i>	Pied Oystercatcher	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas. Nests are shallow scrapes in sand above the high tide mark, often amongst seaweed, shells and small stones. Two to three eggs are laid between August and January. The female is the primary incubator and the young leave the nest within several days.	No habitat
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater	White-bellied Sea-Eagles are in the area and while they generally stay coastal, they fly over the Escarpment and the fringe of the urban area. The site is not key habitat for Sea Eagles.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'.	
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Little Eagle nesting sites are not known from the site or immediate vicinity. The site is foraging habitat.
Aves	<i>Hirundapus caudacutus</i>	White-throated Needletail	White-throated Needletails often occur in large numbers over eastern and northern Australia. They arrive in Australia from their breeding grounds in the northern hemisphere in about October each year and leave somewhere between May and August. They are aerial birds and for a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity. The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. They catch the insects in flight in their wide gaping beaks. Birds usually	This species tends to be aerial and while roosting may occur in forest the site is very unlikely to be habitat.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			feed in rising thermal currents associated with storm fronts and bushfires and they are commonly seen moving with wind fronts. White-throated Needletails are non-breeding migrants in Australia.	
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds.	No habitat
Aves	<i>Lathamus discolor</i>	Swift Parrot	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> . Return to home foraging sites on a cyclic basis depending on food availability.	The site is potential habitat and the most up to date Swift Parrot Important habitat map will be checked immediately prior to final assessment.
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of	Square-tailed Kite nesting sites are not known from the site or immediate vicinity. The site is foraging habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage.	
Aves	<i>Macronectes giganteus</i>	Southern Giant Petrel	The Southern Giant Petrel has a circumpolar pelagic range from Antarctica to approximately 20° S and is a common visitor off the coast of NSW. Over summer, the species nests in small colonies amongst open vegetation on Antarctic and subantarctic islands, including Macquarie and Heard Islands and in Australian Antarctic territory. A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population does not nest. It is an opportunistic scavenger and predator, and scavenges from fishing vessels and animal carcasses on land. It is also an active predator of cephalopods and euphausiids, as well as smaller birds (particularly penguins) both at land and at sea. Birds will desert their nests if disturbed at the breeding colony.	No habitat
Aves	<i>Macronectes halli</i>	Northern Giant-Petrel	The Northern Giant-petrel has a circumpolar pelagic distribution, usually between 40-64°S in open oceans. Their range extends into subtropical waters (to 28°S) in winter and early spring, and they are a common visitor in NSW waters, predominantly along the south-east coast during winter and autumn. Breeding in Australian territory is limited to Macquarie Island and occurs during spring and summer. Adults usually remain near the breeding colonies	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			throughout the year (though some do travel widely) while immature birds make long and poorly known circumpolar and trans-oceanic movements. Hence most birds recorded in NSW coastal waters are immature birds. Northern Giant-Petrels seldom breed in colonies but rather as dispersed pairs, often amidst tussocks in dense vegetation and areas of broken terrain. A single chick is raised and although breeding occurs annually, approximately 30% of the potential breeding population do not nest.	
Aves	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	Primarily found in the upper levels of dry open forests and woodlands. Prefers vegetation dominated by box and ironbark Eucalypts but may be found in areas of smooth-barked gums, stringybarks, river sheoaks (nesting) and tea-trees.	Not preferential habitat – no recorded sightings within 200m.
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	Occurs on edges of eucalypt woodlands, ridges through forests and creeks. Prefers shading for ground foraging.	Not preferential habitat – no recorded sightings within 200m.
Aves	<i>Ninox connivens</i>	Barking Owl	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting. During the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large Eucalypts. Feeds on a variety of prey, with invertebrates predominant for most of the year, and birds and mammals such as smaller gliders, possums, rodents and rabbits becoming important during breeding. Live alone or in pairs.	The escarpment is Habitat and Barking Owl have been recorded in the dense Gully areas of the Escarpment within the past 5 years. Trees suitable for nests are within the escarpment. Barking Owls tend to stay in forested areas though will catch prey (rabbits) in open area. The site could be foraging habitat.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			Territories range from 30 to 200 hectares and birds are present all year. Three eggs are laid in nests in hollows of large, old eucalypts including River Red Gum (<i>Eucalyptus camaldulensis</i>), White Box (<i>Eucalyptus albens</i>), (Red Box) <i>Eucalyptus polyanthemos</i> and Blakely's Red Gum (<i>Eucalyptus blakelyi</i>). Breeding occurs during late winter and early spring.	
Aves	<i>Ninox strenua</i>	Powerful Owl	The species requires large tracts of forest or woodland, however fragmented landscapes can contribute to their range. Breeds in forests and woodlands but may forage in open areas. Mainly preys upon medium sized arboreal mammals. Requires tree hollows for breeding.	Powerful Owls live in the Escarpment lands (possibly 2 pairs). Known nests sites are in trees within 800m. PO have been recorded in the dense Gully areas of the Escarpment and breeding tree hollows on the northern edge of the escarpment within the past 3 months and frequently before that. Powerful Owls tend catch prey out of trees and the site could be is foraging habitat.
Aves	<i>Numenius madagascariensis</i>	Eastern Curlew	The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. The Eastern Curlew mainly forages on soft sheltered intertidal sandflats or mudflats, open and without vegetation or covered with seagrass, often near mangroves, on saltflats and in saltmarsh, rockpools and among rubble on coral reefs, and on ocean beaches near the tideline. The Eastern Curlew roosts on sandy spits and islets, especially on dry beach sand near the high-water mark, and among coastal	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			vegetation including low saltmarsh or mangroves. It occasionally roosts on reef-flats, in the shallow water of lagoons and other near-coastal wetlands.	
Aves	<i>Onychoprion fuscata</i>	Sooty Tern	The Sooty Tern is found over tropical and sub-tropical seas and on associated islands and cays around Northern Australia. Occasionally seen along coastal NSW, especially after cyclones. Large flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.	No habitat
Aves	<i>Pandion cristatus</i>	Eastern Osprey	Inhabits coastal areas, especially the mouths of large rivers, lagoons and lakes. Feeds on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Ospreys are in the area (Narrabeen Lagoon, Mona Vale Beach, Avalon Beach May 2024) and while they generally stay coastal, they fly over the Escarpment. The site is not direct habitat for Osprey.
Aves	<i>Petroica boodang</i>	Scarlet Robin	Ideal habitat includes eucalypt forests and woodlands with an open and grassy understorey with few shrubs. Can occur in mature or regrowth vegetation. Sometimes seen in mallee, wet forests, wetlands and tea-tree swamps. Habitat generally contains many logs and fallen timber.	Not preferential habitat due the forested area having a dense mid-layer. No recorded sightings within 200m. Rose Robin could utilise the fringe vegetation between forest and grassed areas.
Aves	<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	Occurs along the coast and coastal ranges from the Hunter River in NSW to Cape York Peninsula. It is rare south of Coffs Harbour. Three subspecies are recognised, with the most southerly in NSW and south-eastern Queensland. It	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			used to occur in the Illawarra, though there are no recent records. Occurs in, or near rainforest, low elevation moist eucalypt forest and brush box forests. Feeds on a diverse range of tree and vine fruits and is locally nomadic - following ripening fruit; some of its feed trees rely on species such as the this to distribute their seeds. Feeds alone, or in loose flocks at any height in the canopy. The nest is a typical pigeon nest - a flimsy platform of sticks on a thin branch or a palm frond, often over water, usually 3 - 10 m above the ground. Breeds in spring and early summer; a single white egg is laid. Most often seen in mature forests, but also found in remnant and regenerating rainforest.	
Aves	<i>Ptilinopus regina</i>	Rose-crowned Fruit-Dove	Coast and ranges of eastern NSW and Queensland, from Newcastle to Cape York. Vagrants are occasionally found further south to Victoria. Rose-crowned Fruit-doves occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful. They are shy pigeons, not easy to see amongst the foliage, and are more often heard than seen. They feed entirely on fruit from vines, shrubs, large trees and palms, and are thought to be locally nomadic as they follow the ripening of fruits.	No habitat
Aves	<i>Ptilinopus superbus</i>	Superb Fruit-Dove	The species is found in rainforests, rainforest margins, mangroves, wooded stream-margins, and even isolated figs, lilly pilies and pittosporums. The Superb Fruit-Dove may migrate to New Guinea in winter, but little is known of its movements, or the reasons for its sometimes-southerly	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			flights as far as Tasmania. Feeds almost exclusively on fruit, mainly in large trees.	
Aves	<i>Puffinus assimilis</i>	Little Shearwater	A widespread species in the subtropical Atlantic, Pacific and Indian Oceans. Lord Howe Island has one of the larger breeding colonies in the Australian region. Marine. Breeding sites at Lord Howe Island include Roach Island, Muttonbird Island, Blackburn Island and on the main Island at Muttonbird Point and Transit Hill.	No habitat
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	Inhabits fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. Forages nocturnally on mud-flats and in shallow water. Feeds on worms, molluscs, insects and some plant-matter.	No habitat
Aves	<i>Sternula albifrons</i>	Little Tern	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records). Nests in small, scattered colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands. The nest is a scrape in the sand, which may be lined with shell grit, seaweed or small pebbles.	No habitat
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	The species prefers dry eucalypt forests and woodlands and hunts along the edges and forests and roadsides. Mainly preys upon arboreal and ground mammals, primarily rats. Requires tree hollows in moist gullies for breeding.	The 3 rd of the Large Forest Owls, the masked Owl has habitat in the escapement and have been recorded in the dense gully areas of the

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
				Escarpment within the past 3 years. Trees suitable for nests are within the escarpment. Masked Owls tend to stay in forested areas though will catch prey in trees or open areas. The site could be foraging habitat.
Aves	<i>Tyto tenebricosa</i>	Sooty Owl	Habitat is limited mainly to the moist eucalypt forests and rainforests of the coastal, escarpment and eastern tablelands regions of NSW. Sooty Owls occur in both steep and undulating country but are strongly associated with sheltered gullies, particularly those with a tall, rainforest understorey. Hollows in live or occasionally dead trees, eucalypt or rainforest species, in moist forest; among dense foliage in rainforest gullies; caves, recesses or ledges in cliffs or banks. Roost sites are in the darkest and most secluded or sheltered positions.	No habitat on the site. The escarpment contains possibly habitat in the deep gullies.
Aves	<i>Xenus cinereus</i>	Terek Sandpiper	A rare migrant to the eastern and southern Australian coasts, being most common in northern Australia, and extending its distribution south to the NSW coast in the east. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. Generally roosts communally amongst mangroves of dead trees, often with related wader species. Breaks up into smaller flocks or even solitary birds when feeding in open intertidal mudflats.	No habitat

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	Found in rainforests communities to sclerophyll (including Box-Ironbark) forests, woodland and heath. Feeds largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes, soft fruits are eaten when flowers are unavailable and insects.	The site, forested not open grass, is habitat. Eastern Pygmy-possums were seen during the Monda Vale road clearing.
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Large-eared Pied Bat roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Mostly nocturnal animal feeding on medium-sized (500g-5kg) mammals.	
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. Hunts beetles, moths, weevils and other flying insects above or just below the tree canopy. Hibernates in winter. Females are pregnant in late spring to early summer.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
Mammalia	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	Species found in heath or open forest with a heathy understorey on sandy or friable soils. They feed on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogenous (underground-fruited) fungi.	No habitat
Mammalia	<i>Micronomus norfolkensis</i>	Eastern Coastal Free-tailed Bat	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Usually solitary but also recorded roosting communally, probably insectivorous.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.
Mammalia	<i>Miniopterus australis</i>	Little Bent-winged Bat	Moist eucalypt forest, rainforest or dense coastal banksia scrub. Little Bentwing-bats roost in caves, tunnels and sometimes tree hollows during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. They often share roosting sites with the Common Bentwing-bat and, in winter, the two species may form mixed clusters. In NSW the largest maternity colony is in close association with a large maternity colony of Common Bentwing-bats (<i>M. schreibersii</i>) and appears to depend on the large colony to provide the high temperatures needed to rear its young.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	Primarily roosts in caves but will utilise mine shafts, storm-water tunnels, buildings and other man-made structures. Forms colonies within a maternity cave and disperse within a 300km range. Forage in forested areas in the tree canopy.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.
Mammalia	<i>Myotis macropus</i>	Southern Myotis	Roosts in groups of 10-15 in areas close to water. Will utilise caves, mine shafts, tree hollows, storm water drains,	Not habitat – no dams or waterbodies close.

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			buildings, bridges and dense foliage. Forages over water bodies catching insects and small fish.	
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	Inhabits mature or old growth Blackbutt-Bloodwood forests with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia mid-storey. Requires abundant tree hollows for refuge and nest sites. Diet varies seasonally and consists of Acacia gum, eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein.	The site, including forested edge, is habitat and the similar Sugar Gliders are in the Escarpment and have been seen within 800m along Mona Vale road and near the Irrawong Escarpment off Orchard Street (2023)
Mammalia	<i>Phascolarctos cinereus</i>	Koala	Inhabit eucalypt woodlands and forests. Feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species.	The site or road is not key Koala food trees for this area. Koalas are not known from the escarpment over the past 20 years.
Mammalia	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, New South Wales and Queensland. Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes. Lives predominantly in burrows shared with other individuals.	No habitat
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Occurs within tall sclerophyll forests and woodlands, heath, swamp subtropical and temperate rainforests, and urban areas. Occurs within 20km of a significant food source. May be found close to gullies and water within vegetation with a dense canopy.	Habitat and would utilize the flowering Gums (Eucalyptus, Corymbia, Angophora) as food trees for foraging.
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilize mammal burrows. When foraging for insects, flies high and	The site, including forested edge, is habitat. Suitable breeding hollows are within the escarpment. Hollows in

Class	Scientific Name	Common Name	Habitat Requirements	Site Suitability
			fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory	Angophoras in the vicinity of the road may be used by microbats..
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Roosts in tree hollows but may be found in buildings. Primarily found in gullies and river systems that drain the Great Dividing Range. Occurs in a range of habitats including woodlands to moist or dry eucalypt forest, rainforest with greatest preference for tall wet forests. Forages along creeks and river corridors.	The site, including forested edge, is habitat. Suitable breeding hollows are within the escarpment. Hollows in Angophoras in the vicinity of the road may be used by microbats..
Mammalia	<i>Vespadelus troungtoni</i>	Eastern Cave Bat	Roosts in caves, mine shafts. Generally found in dry open forest and woodlands. Prefers areas near cliffs and rocky overhangs.	The site, including forested edge, is habitat. Suitable breeding caves/crevices/hollows are within the escarpment.
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	Found in heath, open forest and woodland. Associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component. Individuals require large areas of habitat. Feeds on carrion, birds, eggs, reptiles and small mammals. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Could move through the site. Hasn't been seen in Ingleside (2014 pers obs) in urban location (Manor Road) when moving between habitat areas. Site is not breeding habitat though could be movement corridor

7.4 Appendix IV – Species listed on-site.

Species recorded on-site. Most recorded from the on periphery in vicinity of proposed road (2023)

<i>Acacia floribunda</i>	<i>Eucalyptus umbra</i>
<i>Acacia longifolia</i>	<i>Eustrephus latifolius</i>
<i>Adiantum aethiopicum</i>	<i>Geitonoplesium cymosum</i>
<i>Allocasuarina torulosa</i>	<i>Glochidion ferdinandi</i>
<i>Angophora costata</i>	<i>Gymnostachys anceps</i>
<i>Angophora floribunda</i>	<i>Hibberia</i> sp.
<i>Billardiera scandens</i>	<i>Hydrocotyle peduncularis</i>
<i>Breynia oblongifolia</i>	<i>Livistona australis</i>
<i>Cassytha paniculata</i>	<i>Lomandra longifolia</i>
<i>Cayratia clematidea</i>	<i>Macrozamia communis</i>
<i>Cissus hypoglauca</i>	<i>Notelaea longifolia</i>
<i>Corymbia gummifera</i>	<i>Oplismenus</i>
<i>Corymbia maculata</i>	<i>Pittosporum undulatum</i>
<i>Dianella caerulea</i>	<i>Platylobium formosum</i>
<i>Dodonaea triquetra</i>	<i>Pteridium esculentum</i>
<i>Doodia caudata</i>	<i>Pultenaea flexilis</i>
<i>Eleocarpus reticulatis</i>	<i>Syncarpia glomulifera</i>
<i>Entolasia stricta</i>	<i>Themeda triandra</i>
<i>Eucalyptus botryoides</i>	<i>Xanthorrhoea</i> sp (possibly) <i>macronema</i>
<i>Eucalyptus paniculata</i>	
<i>Eucalyptus punctata</i>	
<i>Eucalyptus robusta</i>	

7.1 Appendix V – Test of Significance (5 Part Test).

7.1.1 Large Forest Owls Populations Barking, Powerful, Eastern Grass and Sooty, (*Ninox connivens*, *Ninox strenua*, *Tyto longimembris*, *Tyto tenebricosa*).

- (a) *in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

The tree removals would not however, alone, be expected to adversely affect the life cycle of Large Forest Owls such that a local population would become extinct. Potential impacts from the removal of trees and thus prey species. Tree proposed for removal do not host suitable breeding habitat features for Large Forest Owls. The proposal is unlikely to affect the life cycle of a local population of Large Forest Owls.

- (b) *in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*

Not EEC

- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*

Not EEC

- (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

Not EEC

- (c) *in relation to the habitat of a threatened species or ecological community:*

- (i) *the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*

Habitat for Large Forest Owls will not be removed because of this development. Marginal foraging habitat for owl prey species may be removed (mature canopy that could be direct roosting habitat or habitat for prey eg possums) this alone is not expected to cause a significant impact for Large Forest Owls. Known breeding hollows for threatened owls are within the escarpment.

- (ii) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*

The removal of trees from the site will include ~16 mature canopy trees and thus the prey species that use these trees preferentially. This is not expected to fragment or isolate the general habitat of Large Forest Owls.

No core habitat will be removed or modified as a result of the proposed development. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed action.

- (iii) *the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*

No essential habitat being removed. Habitat to be removed is not known breeding or roosting habitat.

- (d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

No areas of outstanding biodiversity value yet listed for this area.

- (e) *whether the proposed development or activity is, or is part of, a key threatening process or is likely to increase the impact of a key threatening process.*

Yes, tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

Conclusion:

This proposal is not likely to significantly affect Populations of Large Forest Owls (*Ninox connivens*, *Ninox strenua*, *Tyto longimembris*, *Tyto tenebricosa*) and will not be likely to put the local population at risk of extinction.

7.1.2 Microbats

Six species of microbat were assessed as having the potential to occur within the study area based on bionet. Though the likelihood of them being on-site very low. Abandoned buildings may be used however an assessment of this site indicated no use of the existing buildings by microbats. The following species would have lived in the area prior to extensive clearing of the surrounding bushland:

- Eastern Freetail-bat (*Mormopterus norfolkensis*)
- Large Bentwing-bat (*Miniopterus schreibersii oceanensis*)
- Little Bentwing-bat (*Miniopterus australis*)
- Large-eared Pied Bat (*Chalinolobus dwyeri*)
- Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- Yellow-bellied sheath-tail bat (*Saccolaimus flaviventris*)



All of the recorded species are considered to be highly mobile and would be likely to be accessing the site occasionally or opportunistically as foraging habitat across a landscape of fragmented habitat. Although these species have differing habitat requirements, they have been assessed together as the trees to be removed would be considered marginal habitat (mostly for foraging on insects that visit flowers) for all seven species.

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposed work includes tree removal (possible foraging habitat) however not considered optimal or significant foraging/breeding habitat for the species. Marginal foraging habitat for microbat species may be removed (trees) however this is not expected to place any microbat species at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

Not an EEC

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

(c) in relation to the habitat of a threatened species or ecological community:

Microbat species are highly mobile and would only be accessing the site occasionally or opportunistically as foraging habitat. It is unlikely that individuals would be exclusively reliant upon the trees being removed for foraging purposes.

- (i) *whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*

No core habitat will be removed or modified as a result of the proposed development. No areas of habitat will become fragmented or isolated from other areas of habitat as a result of the proposed action.

- (d) *whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

No areas of outstanding biodiversity value yet listed for this area.

- (e) *whether the proposed development or activity is, or is part of, a key threatening process or is likely to increase the impact of a key threatening process.*

Yes, tree removal is part of the KTP of habitat loss – direct and indirect through loss of prey habitat.

Recommendations: Micro-bat boxes should be installed on-site x 2. Boxes to be marine ply or equivalent and installed so that there is no nailing into the tree (see best practice – hanging of boxes and using coil-springs to keep in place). Boxes to be at least 4m above the ground.

7.1.3 Grey Headed Flying Foxes

Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Annual mating commences in January and conception occurs in April or May; a single young is born in October or November. Can travel up to 50 km to forage; commuting distances are more often <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.



- a) *In the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,*

The proposed work includes tree removal (possible foraging habitat) however not considered optimal or significant foraging/breeding habitat for the species. Marginal foraging habitat for microbat species may be removed (trees) however this is not expected to place any microbat species at risk of extinction.

GHFF are likely to occasionally or opportunistically visit the site to forage in flowering canopy vegetation. While it is unlikely that the trees proposed for removal significantly contribute to the lifecycle of the GHFF removal of canopy in urban areas contributes to incremental loss.

The removal of the trees at this site is not expected to place the GHFF at risk of extinction.

In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Not an EEC

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Not an EEC

b) In relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The GHFF is highly mobile and would be likely to be accessing the site occasionally or opportunistically as foraging habitat from the roost in Warriewood wetlands or from other colonies. A diversity of species are proposed for removal. The main GHFF food plants proposed for removal are the flowering Gums (*Angophora*, *Eucalyptus* and *Corymbia*).

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

Habitat is already fragmented within the landscape. The proposed works are occurring within an insignificant area of the GHFF home range. It is unlikely that the trees proposed for removal are significantly contributing towards habitat connectivity for the GHFF when considered in isolation from other development.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

Trees (particularly the *Eucalyptus* spp) are all foraging habitat for the GHFF. Importance is unknown but likely to be of low significance on its own. This proposal, in isolation, will not place GHFF at an increased risk of extinction in this local area.

c) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No

d) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Clearing is a KTP, although the trees being removed are not expected to be significantly contributing to the species survival in the locality.

Conclusion:

This proposal is not likely to significantly affect the GHFF and will not be likely to put the local population of at risk of extinction.

7.1.4 Gang Gang Cockatoo (*Callocephalon fimbriatum*) and Glossy Black Cockatoo (*Calyptorhynchus lathami*)

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposal will not impact on breeding habitat of either Cockatoo species. The site displays foraging habitat for the species in the form of flowering eucalypt species and pine trees within the site. 14 trees are proposed for removal, these trees are not considered critical habitat for the survival of the local population.



(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

Not an EEC

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

Native trees are proposed for removal, these the Sheoaks (typically in the mid story) form foraging habitat of Cockatoos.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The development will not contribute to the fragmentation of species habitat. The species is highly mobile, and the impact area is relatively small.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The habitat on site to be removed does not form breeding habitat for the species due to the lack of hollows. While the trees proposed for removal do form foraging habitat for the species, it is unlikely the site contributes significantly to the long-term survival of the species.

(d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

No areas of outstanding biodiversity value yet listed for this area.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Habitat removal is part of the KTP of habitat loss. Direct and indirect through loss of foraging habitat.

Conclusion:

The proposal is not likely to significantly effect populations of Gang Gang Cockatoo or Glossy Black Cockatoo and will not be likely to put the local population at risk of extinction.

8 Expertise of authors

With over 25 years wetland and urban ecology experience, a great passion for what she does and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by South East Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

Geraldene Dalby-Ball DIRECTOR



SPECIALISATIONS

- Urban Ecology – and habitat rehabilitation and re-creation.
- Urban waterway management – assessing, designing and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration – assessment, design and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor – environmental design, guidelines and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

- **Director and Ecologist**, Ecological Consultants Australia. 2014-present
- **Director and Ecologist**, Dragonfly Environmental. 1998
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- **WorkCover** WHS General Induction of Construction Industry NSW White Card.
- **Senior First Aid Certificate.**
- **Practicing member** Ecological Consultants Association
- **Accredited Biobank assessor (in renewal July/August 2024)**