



BIODIVERSITY LETTER AND ADDENDUM: REVIEW OF ECOLOGICAL LOSS FROM PAST CLEARING AT 600 WEST PARADE, BUXTON

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Full Environmental Practitioners Membership with:



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1. Introduction

1.1. Project Background

EnviGrow Environmental Services (**EES** or **EnviGrow**) has been engaged to undertake a review of past clearing at 600 West Parade, Buxton, in Wollondilly Shire Council Local Government Area (**LGA**). This investigation was conducted to address relevant data gap related to the native vegetation clearing and ecological loss associated with this action. This site is proposed for subdivision and rehabilitation of native vegetation and fauna habitat, previously located within proposed lots 3 and 4.

The entire site has been previously surveyed by EnviGrow Environmental Services during a formal flora and fauna assessment (FFA). This document serves as a targeted investigation of ecological value of the entire site prior to clearing activities. This document also recognised the reclassification of lot 3 & 4 to E3 zoned allotments.

The scope of works included:

- Desktop review of the formal bushfire assessment, ecological assessment and vegetation management plan created by EES;
- Desktop review of relevant resources: vegetation mapping, historical aerial imagery and council land zoning;
- General inspection of the entire property;
- Targeted inspection of the western half of the site (lot-3 & 4):
 - Inspect the subdivision lot subject to minor vegetation clearing;
 - Assess the impacts of the prior clearing on biota and associated habitats; and
 - Describe and classify the vegetation community previously located on site.
- Identify the expected impacts of the past clearing and the likely extent;
- Measures to offset any ecological loss; and
- Maps that will encompass the extent of cleared native vegetation and future replanting.

1.2. Legislation and Resources that Govern the Investigation

Previous assessments:

- EnviGrow Environmental Services (2017) Flora and Fauna Assessment, 600 West Parade, Buxton (EnviGrow FFA, 2017).
- EnviGrow Environmental Services (2017) Bushfire Prone Land Assessment, 600 West Parade, Buxton (EnviGrow BSA, 2017).
- EnviGrow Environmental Services (2017) Vegetation Management Plan, 600 West Parade, Buxton (EnviGrow VMP, 2017).

Flora resources used to guide the investigation were:

- *Flora of New South Wales* (Harden. G 2000);
- *Field Guide to the Native plants of the Sydney Region* (Robertson. L 2003);
- *Native Plants of the Sydney Region* (Allen & Unwin 2010);
- *Ocean Shore to Desert Dunes* (Keith. D 2004);
- Plant Net Online;
- Bionet; and
- Threatened species Profiles by Office of Environment and Heritage.

Fauna resources used to guide the investigation:

- *A Field Guide to the Mammals of Australian, third Edition* (Menhorst. P & Knight. F);
- *Reptiles and Amphibians of Australian Seventh Edition* (Cogger. H 1994);
- *Field Guide to Australian Birds* (Morcombe. M 2004);
- Bio atlas;
- Threatened species profiles by Office of Environment and Heritage; and
- Field and research experience of the authors.

1.3. Site Elements

1.3.1. Location and History

The site was located on 600 West Parade, Buxton, Wollondilly Shire Council LGA. The site is currently used for rural residential purposes and is subject to consistent property maintenance. Historically, the site has only been partially cleared through the removal of native understory vegetation. However, significant clearing occurred between 2013-14 resulting in complete removal of all vegetation on site (both native and exotic).

The majority of the property remained cleared with minimal remnant bushland. This is a landscape feature shared by many for the surrounding properties to some degree. However, some of the surrounding properties still contained remnant native bushland across their site.

Access to the site occurred through Johnson Street via West Parade. The site remains relatively level though lot 1 & 2 before transitioning to a gentle slope (3°-7°) within lots 3 & 4.



Figure 1.A. Map Vegetation Extent before clearing 2013

Red line = Site Boundary

Yellow polygon= Exotic/native landscaped vegetation not endemic to the region

Blue Polygon= Native vegetation endemic to the region

Project Number: 3009

Project address: 600 West Parade, Buxton

Assessment: Biodiversity Letter Report and Addendum to the Flora and Fauna Report (2017)

1.3.2. Previous Physical Landscape

The site can be divided into two main categories: native bushland of moderate disturbance (cleared understory) and locations with high levels of anthropogenic disturbance. In the map located within the section above (**Figure 1.A**) anthropogenic disturbance is clearly visible through light green foliage (exotic flora species and accompanying high nutrient fill), cleared lawns, three roofed structures, piles of debris and cleared land with bare earth exposed. Native vegetation of moderate disturbance was indicated by grey green foliage, this vegetation was often recognised with little to no understory.

2. Flora, Habitat and Community

Based on historic aerial imagery and supporting anecdotal consultation with the landowner and neighbouring landowners, the majority of the site consisted of Pine specimens and common exotic landscape species. These sources also suggest that the remaining portion of the site was native bushland with a cleared and maintained understory in most locations.

Usually, vegetation maps are procured from two different sources, these are: *Office of Environment and Heritage* (OEH) (2009) & *National Parks and Wildlife Service* (2002). However, due to the location of the site only one map contained the site. Please refer to **Figure 2.A**.

The OEH map indicated the presence Shale/Sandstone Transition Forest (SSTF), Sydney Sandstone Ridgetop Woodland (SSRW) and Wingecarribee Burragarong Sandstone Forest (WBSF) within the surrounding area

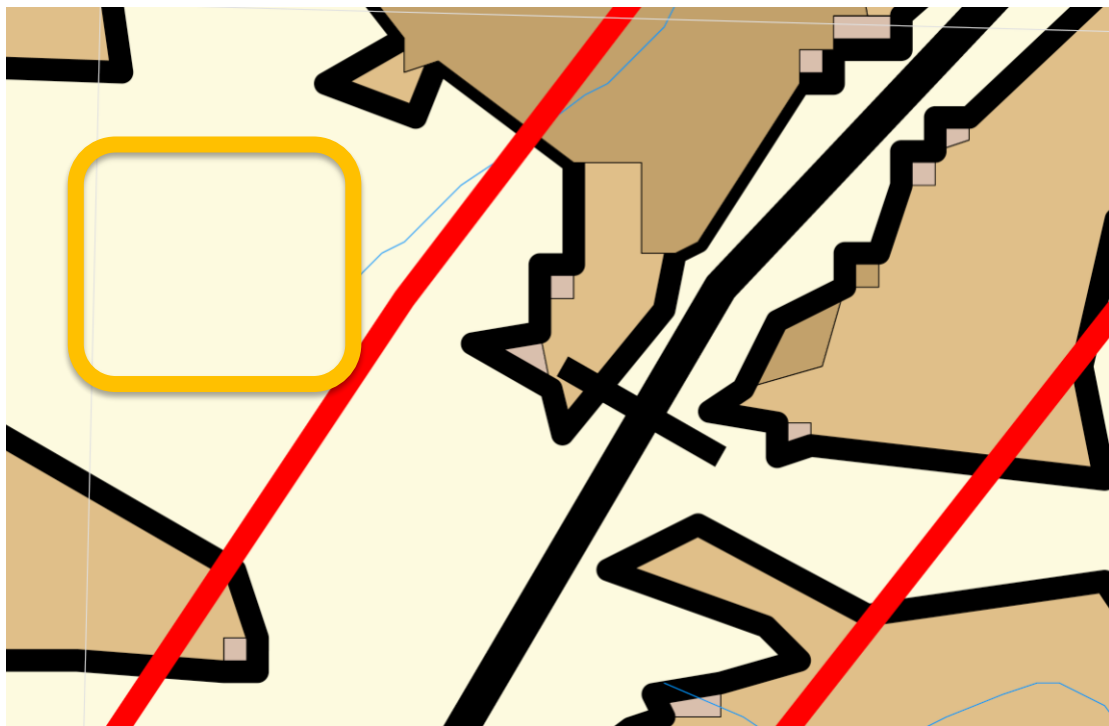


Figure 2.A. Vegetation Mapping from the Office of Environment and Heritage Vegetation Mapping

Yellow white = cleared and disturbed land	Light brown = Sydney Hinterland Transition Forest
Grey-brown = shale/sandstone transitional forest	Dark brown = Wingecarribee-Burragarong Sandstone Forest
Yellow Box = Location of Site	

Flora surveys were conducted using the random meander technique throughout the site. This meander did at times become targeted rather than random e.g. if a change in habitat was spotted during the walk-through process. The meander was also less random during large stretches of monoculture vegetation assemblages that had already been surveyed once: for example, highly disturbed grassy fields with limited species diversity. These areas required a meander in fast zig-zag formation allowing more time to be spent on areas with a more complex vegetation assemblage. In addition, no quadrants were used in any specific areas to define community boundaries or average numbers of specimens. Post-field flora procedures involved the analysis of plant specimens collected during field surveying. These specimens

required further testing and resources to confirm the species or subspecies classification.

The site inspection confirmed that a section of the proposed development (lot-3 & 4) did contain some native flora species associated with SSTF in early recruitment. These specimens were not recorded in abundant numbers due to consistent site maintenance, but the vegetation of adjoining lots provide further evidence of SSTF.

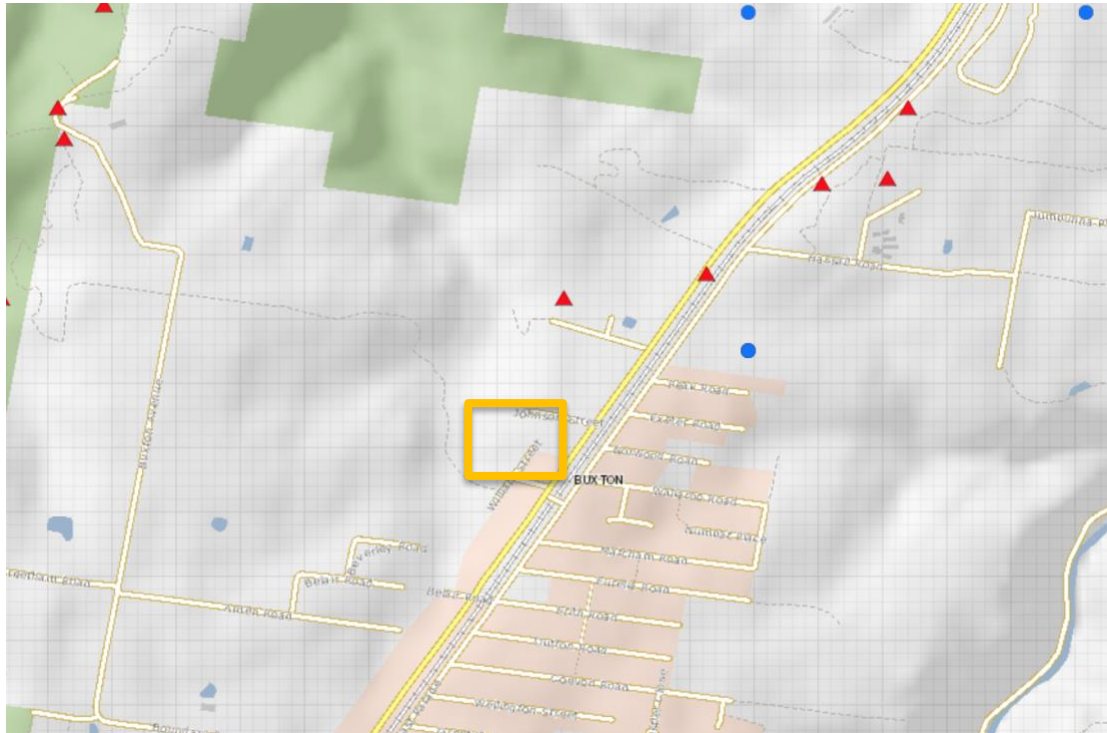


Figure 2.B. Threatened flora species search on Bionet for 10km by 10 km area surrounding the subject site (yellow box = subject site).

The site is surrounded by sixteen threatened flora species within a 10km by 10km area. EnviGrow notes the proximity of *Persoonia glaucescens*, *Persoonia hirsute*, and *Commersonia prostrata* to the subject site as the most significant threatened species.

P. glaucescens predominantly selects the ridgetop and upper-slope habitat. Although the upper section of the site is described as upper slope/ridgetop, this particular species thrives under reduced competition and an increase of light (fringe habitat). The site's vegetation assemblage before clearing did not reflect these expected habitat values. Areas that did reflect values of less competition and greater light did so due to consistent maintenance of the site's understory features and were unlikely to house many understory species such as *P. glaucescens* after this action.

P. hirsute is expected to occur within the shrubby understory of dry sclerophyll forest. The species favours sandy/stoney soil habitat and is commonly recognised in disturbed fringe habitat. Although the site's soils were partially sandy, they were not stoney. Similar to *P. glaucescens*, *P. hirsute* prefers fringe habitat, an attribute not common on the site before clearing occurred.

The third closest threatened species to the site was *Commersonia prostrata*. This species has a strong affinity to sandy-peaty soils and is located in close proximity to

water bodies. No section of the site occurred in close proximity to a water body or was described as sandy-peaty.

Although there are many threatened species associated with SSTF, the aerial image indicated that the majority to the native vegetation's understory was already absent through consistent understory clearing and maintenance. It is unlikely that any threatened flora species used the low-quality habitat on site or survived the continual understory maintenance regime across the extended time period. For further analysis of species located within the region refer to **Figure 2.E**.

One endangered ecological community was recognised within the site before complete clearing occurred. The extent of the community (3800²m) was calculated through the use of historic aerial imagery of the site -- refer to blue polygon in **Figure 1.A**. Visual inspection of the canopy foliage allowed EnviGrow to trace a polygon around locations of potential SSTF. Based on the gaps of vegetation cover within the image it is assumed that the majority of the native community contained little to no understory across most of the polygon. The information was confirmed by the landowner and surrounding land owners. The loss of the SSTF community is ecologically significant and will require onsite offset within lots 3 & 4.

Present within the 10km by 10km Bionet search	Strong connection to SSTF	Habitat present on site	Quality of Habitat Present Before Clearing
<i>Acacia bynoeana</i>	Yes	Yes	The site before complete clearing did reflect some general habitat values associated with the species, dry sclerophyll forest on sandy soils, but does not reflect the more specific habitat feature of mild disturbance. The species can be located around trails, road edges, spoil mounds and recently burnt areas. Due to the severity of understory clearing before the complete clearing event, this species is not expected to be present on site before complete clearing.
<i>Commersonia prostrata</i>	No	No	NA
<i>Darwinia biflora</i>	Yes	No	NA
<i>Epacris purpurascens</i> var <i>purpurascens</i>	Yes	No	NA
<i>Eucalyptus camfieldii</i>	No	No	NA
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Yes	Yes	It is likely that the original vegetation and soil of the site would support the presence of this species (before anthropogenic disturbance). However, due to the ongoing maintenance of understory vegetation within the community, it is unlikely any specimen of this species would have been able to thrive under such a high level of disturbance of a sustained period of time.
<i>Melaleuca deanei</i>	No	No	NA
<i>Persicaria elatior</i>	No	No	NA
<i>Persoonia bargoensis</i>	Yes	Yes	Low to Moderate habitat in the form of increased light and space in some small areas of the site. However, site maintenance was a consistent action onsite, reducing the likelihood species present on site before the complete clearing event.
<i>Persoonia hirsuta</i>	No	Yes	Based on the limited habitat information provided with the OEH profile, this species has some basic habitat on site – sclerophyll forest on sandy soils. Maintenance of the understory on site is expected to restrict this ground-dwelling species' ability to colonise the site. Based on this action and the evidence of rich soil fill, the habitat is downgraded from moderate to low.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	Yes	Yes	Although this species has a strong affinity to SSTF habitat, it is also described as a species with the habit of growing among dense grasses and sedges; which are of low abundance and highly disturbed on site before the complete clearing event.
<i>Pomaderris brunnea</i>	No	No	NA
<i>Pterostylis saxicola</i>	Yes	No	NA
<i>Syzygium paniculatum</i>	Yes	No	N/A
<i>Tetradlea glandulosa</i>	Yes	Yes	This species is expected to have a moderate habitat on site at some point in time. The highly disturbed state of the site before the complete clearing event, does not support the possibility of the species being on site. .

Figure 2.C. Limited Threatened Flora Table

diluted by exotic species and contained a cleared and maintained native understory in most locations.

Another species, *Climacteris picumnus victoriae*, was located less than 4km from the subject site. The site did contain some of the broad habitat attributes associated with this species. However, the habitat for the species is expansive. The relative extent of habitat lost for this species on site is minimal, compared to the large extent of the higher quality habitat surrounding the site. Furthermore, the general habitat loss is expected to be restored on site within lot 3 & 4.

C. nanus occurs in a wide range of habitat landscapes, including the forest/woodland featured on the subject site. However, it is not expected to have used this site as primary habitat based on poor shelter habitat, limited food-based habitat and constant disturbance through maintenance and upkeep.

P. Volans was located 4km and 7km from the subject site. Both of the locations where *P. Volans* was observed were locations of optimum habitat for the species (large extents of old growth forest vegetation) a feature not shared with the subject site. It is unlikely the species utilised any form of onsite habitat on a consistent or permanent basis.

P. cinereus is another threatened species within the region, and this species is expected to have significant habitat on site through the form of feed trees. For this reason, the clearing action may have affected the extend of useable habitat for the locatal population. This impact will need to be address within the VMP through the planting of known *P. cinereus* feed trees.

Lastly, *S. rueppellii*, a species located 4km to 8km from the subject site may have lost a limited number shelter habitat sites (hollows) during the clearing action. This loss is expected to be offset by the replanting of canopy species as well as the installation of habitat boxes prescribed within the VMP.

The primary habitat features that are expected to be on site before clearing are: winter flowering gums, limited number of Koala feed trees and small hollows. These habitat values were based on stakeholder interviews, aerial imagery and the locality of threatened species within the region. EnviGrow notes the absence of native understory and consistent maintenance in many locations, and for this reason, has not included: understory vegetation (for shelter and feeding), fallen logs, bush rock, soaks, piles of debris, burrows or groundcover as habitat before the complete clearing event. EnviGrow recommends the VMP include fauna habitat restoration to ensure the site provides habitat that is equivalent or greater than the habitat lost from previous clearing.

Present within the 10km by 10km Bionet search	Strong connection to SSTF	Habitat present on site	Quality of Habitat Present Before Complete Clearing
<i>Artamus cyanopterus cyanopterus</i>	Yes	Yes	The general habitat associated with the species was located on site; this habitat was recognised as disturbed and had low value based on an absent understory and high level of disturbance.
<i>Botaurus poiciloptilus</i>	No	No	NA
<i>Callocephalon fimbriatum</i>	Yes	Yes	Habitat associated with this species is considered to be low as the vegetation community lacked significant extent and quality.
<i>Calyptorhynchus lathamii</i>	Yes	Yes	The pine species provided limited food-based habitat for this species. This habitat will need to be offset by replanting of lot 3 & 4.
<i>Cercartetus nanus</i>	No	Yes	Limited shelter and feeding habitat present on site due to understory maintenance and anthropogenic disturbance. For this reason, habitat is considered to be low quality.
<i>Chalinolobus dwyeri</i>	No	No	NA
<i>Climacteris picumnus victoriae</i>	Yes	Yes	The vegetation assemblage on site conforms with the general habitat associated with the species but was of a small extent and low quality before the complete clearing had occurred.
<i>Daphoenositta chrysoptera</i>	No	No	NA
<i>Falsistrellus tasmaniensis</i>	Yes	Yes	Some small hollow habitats are likely to have existed within the small extent of SSTF before clearing. This habitat will need to be offset within the VMP. The quality of this habitat before clearing was low to moderate.
<i>Glossopsitta pusilla</i>	Yes	Yes	Habitat for this species is present on site but does not reflect the ideal habitat located in abundance with surrounding bushland. For this reason, habitat is considered to be low quality.
<i>Heleioporus australiacus</i>	No	No	NA
<i>Melithreptus gularis gularis</i>	Yes	No	NA
<i>Miniopterus schreibersii oceanensis</i>	No	No	NA
<i>Mormopterus norfolkensis</i>	Yes	Yes	Some small hollow habitats are likely to exist within the small extent of SSTF before clearing. This habitat will need to be offset within the VMP. The quality of this habitat before clearing was low to moderate.
<i>Myotis macropus</i>	No	No	NA
<i>Neophema pulchella</i>	Yes	No	Some small hollow habitats are likely to exist within the small extent of SSTF before clearing. This habitat will need to be offset within the VMP. The quality of this habitat before clearing was low to moderate.
<i>Ninox strenua</i>	Yes	No	NA
<i>Onychoprion fuscata</i>	No	No	NA
<i>Petauroides volans</i>	Yes	No	NA
<i>Petaurus australis</i>	Yes	No	NA
<i>Petrogale penicillata</i>	Yes	No	NA
<i>Petroica boodang</i>	Yes	Yes	Habitat for this species is present on site but does not reflect ideal habitat in conjunction with surrounding bushland habitats. For this reason, habitat is considered to be low quality.

<i>Phascolarctos cinereus</i>	Yes	Yes	Based on the surrounding vegetation assemblage it is highly likely that feed trees related to the species were present onsite before the clearing activity. This habitat will need to be offset within the VMP. The quality of this habitat before clearing was low to moderate.
<i>Pseudophryne australis</i>	Yes	No	NA
<i>Scoteanax ruepellii</i>	Yes		Some small hollow habitats are likely to exist within the small extent of SSTF before clearing. This habitat will need to be offset within the VMP. The quality of this habitat before clearing was low to moderate.
<i>Stagonopleura guttata</i>	No	No	NA
<i>Tyto tenebricosa</i>	No	No	NA

Figure 2.E. Limited Threatened Fauna Table

3. Summation of Ecological Significance and Impacts

Based on a review of Bionet data, aerial images and stakeholder interviews, the past clearing action has resulted in both minor and significant instances of ecological loss. The extent of this ecological damage can be offset through on-site restoration process via replanting, weed control and fauna habitat restoration.

The previous clearing activity has removed an estimated maximum of 3800m² of SSTF, most of which was accompanied by a mostly cleared, maintained and highly disturbed understory. The impact of clearing on this critically endangered community is deemed to be significant in nature, regardless of its disturbed state before the point of clearing. The accompanying VMP will replant to an extent of 3870m²; an area that will provide 70m² more than required. This extra area will ensure any small remnant patches of SSTF concealed with the pine canopy can be offset. Furthermore, the replanting will provide a density and diversity of flora species significantly higher than the original native vegetation that contained a limited extent of understory. This will result in a greater ecological outcome for the site in both extent and diversity of flora species related to SSFT.

The review of threatened flora species was undertaken using Bionet data, visual inspection of the surrounding landscape, aerial images and information released by the scientific committee. There are four primary lines of evidence to support idea of threatened species absence on site before the completed clearing event:

- Few endangered species recorded in close proximity to the site, excluding large extents of undisturbed bushland habitat;
- Disturbed state of site soils as rich fertile soils was integrated into the topsoil of the site for landscaping purposes. This would have created subpar condition for native threatened species dependent on conditions native to the region and original soil landscape;
- Disturbed state of site vegetation with exotic flora encroachment and native vegetation with removed and maintained understory; and
- Lack of threatened species within adjoining properties and limited correlation between Bionet data and the list of threatened species known to occur within SSTF.

For these reasons, EnviGrow believes that the possibility of threatened flora species being removed during the complete clearing event is unlikely. No significant ecological impact is expected to have occurred during this process. Furthermore, the VMP will restore the native vegetation habitat, to facilitate the reintegration of threatened species.

Based on the age and extent of the native vegetation, smaller tree hollows would have been removed during the complete clearing event. Hollows are a crucial form of shelter habitat for microchiropteran bats, birds and arboreal mammals. This mode of fauna habitat loss should be accounted for within the VMP through replanting canopy species capable of producing quality hollows overtime. This process should also include the installation of habitat boxes as an immediate mode of shelter before replanted vegetation matures. Review of the surrounding flora landscape and composition of SSFT canopy species indicates that winter feed trees, *C. lathami* feed trees and *P. cinereus* feed trees may have occupied the site to some extent. With this in mind, the VMP should utilise trees species that satisfy all of these habitat requirements for the site. Lastly, many endangered fauna species within the region have some form of habitat trait related to a healthy diverse understory. A feature of the site that had a

significantly reduced extent before the clearing event through ongoing maintenance and disturbance activities. Features such as understory vegetation, fallen logs and bush rock are all qualities that were absent before the clearing event occurred - further supporting the prospect that threatened fauna species were not directly affected by the clearing event. All of these features will be integrated into the E3 lots (lot-3 & 4) through measures illustrated within the VMP.

Please refer to **Figure 2.C. & 2.E.** for a limited review of threatened flora and fauna with 10km or less of the site. This table does not include a full threatened species matrix as seen in a formal flora and fauna report.

4. Conclusion and Recommendations

The results of the Flora and Fauna inspection indicated that no significant direct or indirect impacts are likely to affect any threatened species or their habitats. This was not the case for the 3800m² of moderate quality SSTF which was cleared completely. A VMP will be used to offset the loss of this ecological value by replanting a designated location within lots 3 & 4 (E3 zoned lots), a size (3870m²) greater than the area of native vegetation originally lost during the clearing event. Furthermore, the replanting will ensure a complete vegetation assemblage of SSTF rather than the highly disturbed community present before clearing. This action will also help restore fauna habitat features lost from clearing event as well as understory habitat features absent before the major clearing event, providing a significant improvement for the site's ecological value.

Biodiversity on the site will more than fully comply with "improve or maintain" principles adopted by most councils as the unauthorised clearing will be offset above and beyond what was originally lost.



Figure 4.A. Proposed locations of ecological restoration and adjoining development Footprints
light green = development footprint, dark green = restoration area, red line = site and lot boundaries

Recommendations

- Undertake a VMP to ensure long-term stability and monitoring of the proposed SSTF restoration area;
- Replant the western portion of lots 3 & 4 to an extent of 43m by 90m (3870m²);
- Replant flora species associated with SSTF;
- Integration of winter flowering gums, *P. cinereus* feed trees and *C. lathamii* feed tree into the planting design;
- Use non-invasive fauna friendly plain wire fencing between lots 3 & 4;
- Install signage to delineate the boundary of the restoration area across both sites; and
- Support fauna habitat through the use of habitat boxes, bush rock and fallen logs.

EES supports the approval of this site for the purpose of creating a four-lot subdivision based on the above-mentioned recommendations. Please feel free to contact the EES team if you have any further questions.

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