

**RETAIL DEVELOPMENT, LOT 101 DP1028645, BARDEN
RIDGE**

Flora and Fauna Assessment

For:

Woolworths Limited

August 2011

Final Report



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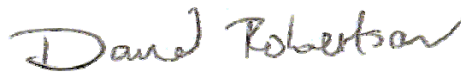
Report No. 11036RP1

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Introduction

1.1 Purpose

The purpose of this report is to evaluate the impacts of the proposed development of a retail centre and associated car park on flora and fauna values at Lot 101 DP 1028645, Barden Ridge (hereafter referred to as the 'subject land') (**Figure 1.1**).

The objectives of this report are to:

- Describe the vegetation communities and fauna habitat characteristics of the subject land;
- Identify any threatened species, populations or ecological communities existing on the subject land (as listed under the schedules of the *Threatened Species Conservation Act 1995* (TSC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act));
- Assess the likelihood of occurrence of threatened species, populations or ecological communities on the subject land;
- Assess the potential impact of the proposed development on threatened flora and fauna, including the completion of Assessments of Significance under Section 5A of the *Environmental Planning and Assessment Act 1979* (EP&A Act); and
- Recommend mitigation measures to reduce the impacts of the proposed development on the flora and fauna values.

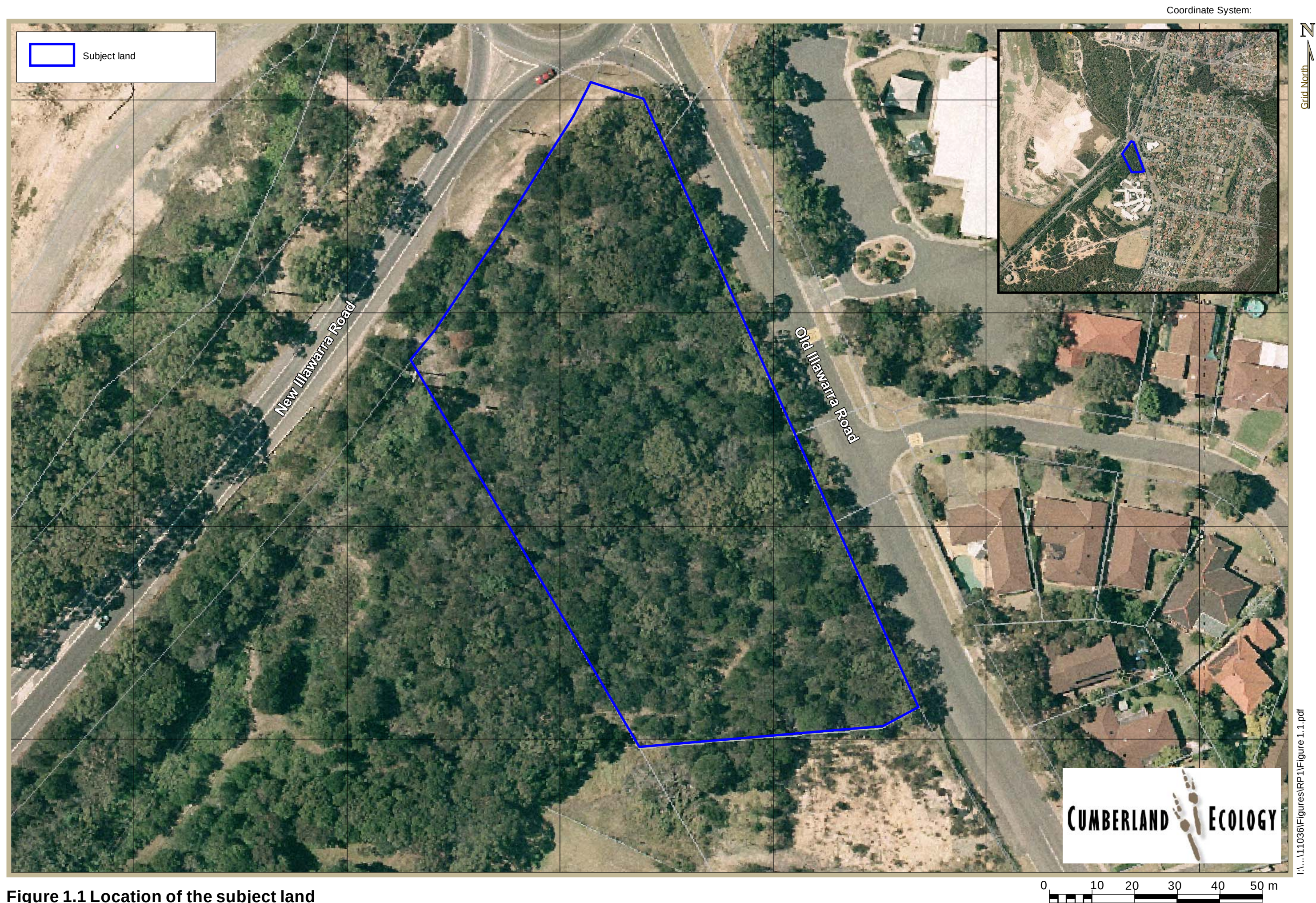


Figure 1.1 Location of the subject land

1.2 Background

Lot 101 DP 1028645 is the location of a proposed retail development plan involving a retail facility and an associated car park. The subject land is located in the Sutherland Local Government Area (LGA) at Barden Ridge, between New Illawarra Road and Old Illawarra Road (**Figure 1.1**) and is approximately 0.96ha in size. The layout of the proposed retail development is shown in **Figure 1.2**.

1.2.1 Zoning

The subject land is zoned 10 – Neighbourhood Centre under the *Sutherland Shire Local Environmental Plan 2006* (SSLEP 2006). This means that consent to a development application can only be granted by the consenting authority (i.e. Sutherland Shire Council) after consideration of the relevant objectives for the zones, which includes the following:

- To promote small-scale retail and business activities to serve the day-to-day needs of the surrounding local community;
- To provide for pedestrian-friendly and safe shopping designed to cater particularly for the needs of all ages and disabilities; and
- To encourage shop-top housing in association with small business uses.

Sutherland Shire Council may consent to development of land in Zone 10 – Neighbourhood Centre that is not otherwise allowed on land in that zone, but is allowed on land in a zone that is adjacent to or adjoins Zone 10 – Neighbourhood Centre, if the consent authority is satisfied that:

- The subject land is surplus to the current and future needs of the community, or development that is otherwise allowed in the Zone 10 – Neighbourhood Centre is not economically viable on the subject land;
- The proposed development will not prejudice the current and future needs of the community;
- The proposed development will not adversely affect land in the adjoining zone or the surrounding area of the proposed development; or
- The proposed development is consistent with the objectives of the adjoining zone.

1.2.2 Bushfire Considerations

The subject land is classified as a Category 1 Bushfire Prone Land under the *Sutherland Shire Development Control Plan 2006* (SSDCP 2006). Bushfire Prone Land is defined as an area of land that can support a bushfire or is likely to be subject to bushfire attack. The SSDCP 2006 incorporates the Bushfire Prone Land mapping certified by the Rural Fire Service in accordance with Section 146 of the EP&A Act.

1.2.3 Wetlands and Waterways

The subject land is not identified in the SSDCP 2006 as being affected by flooding, waterways, wetlands, or riparian corridors.

1.2.4 Flora and Fauna

The subject land is not identified in the SSDCP 2006 as containing species and communities of high conservation significance. Species and communities of high conservation significance are defined as those threatened species, populations and communities protected by the TSC and EPBC Acts.

1.2.5 Greenweb Strategy

The SSDCP 2006 identifies key habitat and habitat linkage areas called Greenweb Areas as part of a strategy to improve and maintain habitat and wildlife corridors in the Sutherland Shire. Developmental objectives and controls exist for all areas mapped as Greenweb Core, Greenweb Support and Greenweb Restoration. The subject land is mapped as Greenweb Support. The objectives for all development in Greenweb Areas are to:

- Prevent direct loss of habitat in core and support areas by requiring the retention or restoration of areas of habitat in a size and configuration that will enhance long term sustainability;
- Prevent fragmentation of bushland by requiring the landscaped component of a site to function as a wildlife corridor, linking proximate areas of core habitat;
- Improve the function of riparian zones and foreshores as natural areas so that they provide linkages and corridors between areas of habitat;
- Minimise weed invasion and spread by requiring appropriate landscape treatment of developments within Greenweb areas;
- Require revegetation of habitat or corridor, so as to compensate for detrimental impacts accruing from the development of land; and
- Utilise landscaped area to re-establish corridors in urban areas through the establishment of canopy and groundcover links across properties.

1.3 Terms and Abbreviations

EP&A Act: *Environmental Planning and Assessment Act 1979;*

EPBC Act: *Environment Protection and Biodiversity Conservation Act 1999;*

LGA: Local Government Area;

Project: Retail development plan on the subject land;

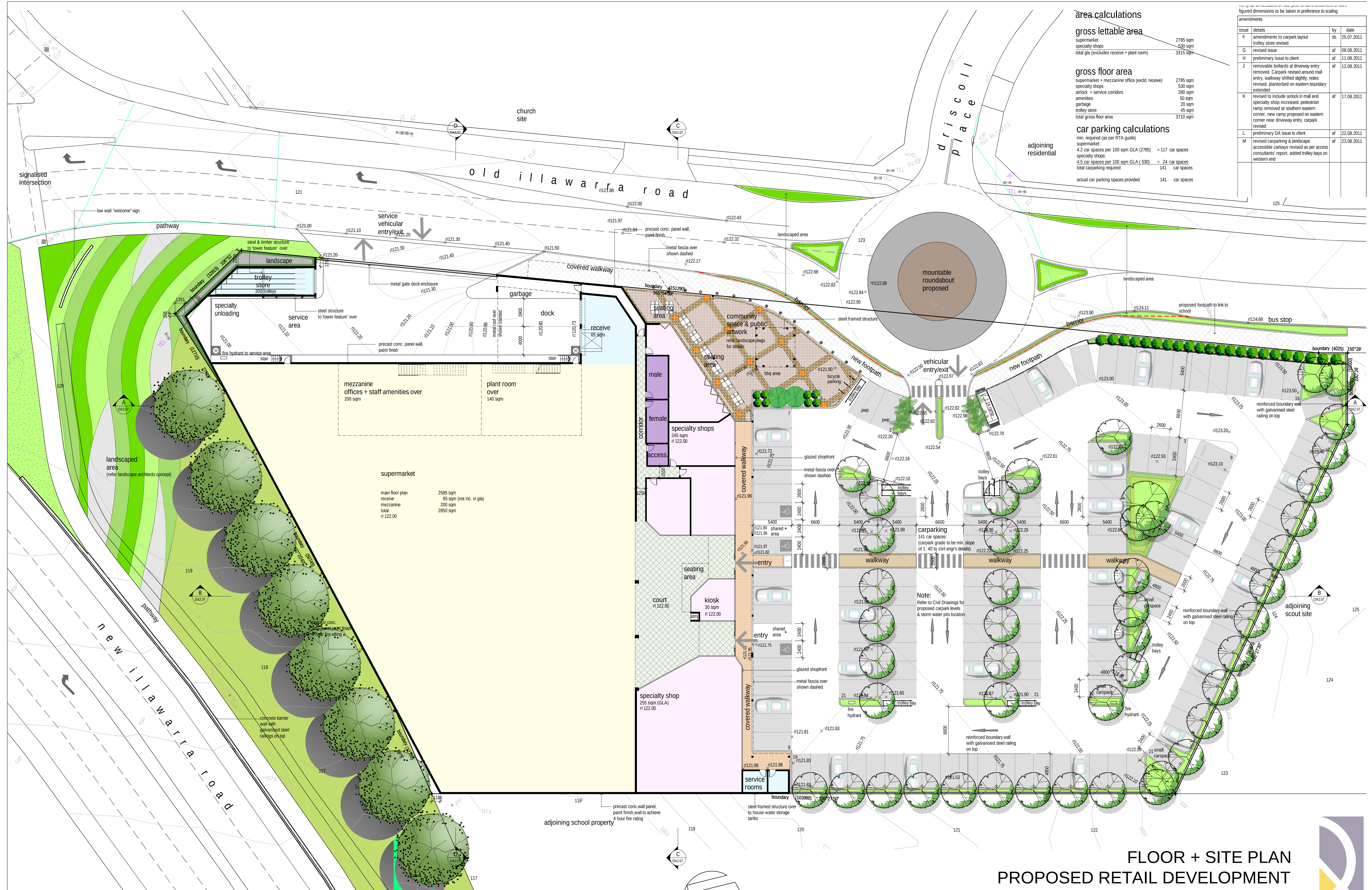


SSDCP 2006: Sutherland Shire Development Control Plan 2006;

SSLEP 2006: Sutherland Shire Local Environment Plan 2006;

Subject land: Refers to Lot 101 DP1028645, the parcel of land on which the proposed development will occur;

TSC Act: *Threatened Species Conservation Act 1995.*



Methodology

2.1 Database Analysis

Database analysis was conducted for the locality using both the Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database (OEH, 2011) and the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) Protected Matters Search Tool (DSEWPC, 2011). The Atlas of NSW Wildlife was interrogated for records of TSC Act-listed threatened flora and fauna species within Sutherland LGA and the EPBC Protected Matters Search tool was used to retrieve a list of threatened flora and fauna species and vegetation communities that are predicted to occur within a 5km radius of the subject land. The species records obtained were used to direct targeted on-ground surveys of the subject land.

2.2 Flora Survey

The vegetation within the subject land was initially surveyed on 29 February 2008, to obtain an overview of the nature and distribution of the vegetation of the subject land. An additional survey was undertaken on 24 June 2011 to validate existing mapping, with a particular reference to endangered ecological communities (EECs), to determine the equivalent community in the recent OEH vegetation mapping project and to conduct quadrat and threatened flora searches.

Vegetation sampling conducted within the subject land during the recent survey included:

- Quadrat sampling (20m x 20m) to obtain information on species composition and community structure;
- Random meander survey to detect additional flora species not recorded during quadrat sampling; and
- Threatened species searches for threatened flora previously recorded from the locality.

A total of two quadrats were sampled during the flora survey. The locations of flora quadrats were recorded using a GPS and are shown in **Figure 2.1**. The process of quadrat sampling included the following:

- Identifying and recording all vascular flora species present in each strata within the plot or directly adjacent to the plot;
- Assigning a cover-abundance value to each species recorded within the plot, using a modified Braun-Blanquet scoring system, to reflect their relative cover and abundance in the plot; and
- Recording details about vegetation structure such as percentage foliage cover and height of each strata.

All vascular plants recorded or collected were identified using keys and nomenclature provided in Harden (Harden, 1990-1993). Where known, taxonomic and nomenclatural changes have been incorporated into the results, as derived from PlantNet (Botanic Gardens Trust, 2011).

2.3 Fauna Survey

2.3.1 Habitat Assessment

A fauna habitat assessment was undertaken within the subject land on 28 February 2008. The assessment included consideration of important indicators of habitat condition and complexity including the occurrence of microhabitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks. Structural features considered included the nature and extent of the understorey and ground stratum and extent of canopy. Tree hollows were used as a general indication of habitat quality for arboreal fauna, and hollow dwelling birds and bats. Tree hollows observed during surveys were noted and the general vegetation condition and tree maturity was used to predict whether trees on site were likely to contain hollows.

2.3.2 Hair Tube Trapping

Hair tube sampling was undertaken in February and March 2008 to detect arboreal and terrestrial mammals occurring within the subject land and adjacent land. A total of 20 Faunatech hair tubes, which target both small and medium sized fauna, were utilised. Half of these were placed on the ground and half on trees. Locations of hair tubes are shown in **Figure 2.1**. Hair tubes were baited with a mixture of peanut butter, honey, and rolled oats. Each hair tube transect was left for 10 nights. Hair samples collected from the hair tubes were sent to Georgeanna Story of 'Scats About' for identification.

2.4 Limitations

The flora survey was conducted during two visits in February 2008 and June 2011. At the time of the surveys the weather conditions had been favourable for plant growth and production of features required for identification of most species. Owing to the survey relying on two inspections, it is unlikely that all species present have been recorded. Despite this, it is probable that the vast majority of species have been recorded and that issues including

conservation significance of the flora, condition and viability of bushland and likely impact on native vegetation have been satisfactorily assessed.

The fauna surveys are limited in being “snapshot” investigations and so present a view of the fauna that were active during the time of the surveys. The data produced by the surveys is intended to be indicative of the types of species that could occur and not an absolute census of all vertebrate species of the site.

Only limited fauna survey work was undertaken owing to the size and location of the subject land. Extensive fauna surveys have been conducted in the locality and within the Sutherland LGA. For this reason, there is an excellent database of information to interrogate for threatened species records. Given the size and location of the site and extensive records available from the Atlas of NSW Wildlife, it is considered that adequate fauna data was collected to meet the requirements of the investigation.



Figure 2.1 Survey locations

Results

3.1 Introduction

The majority of the subject land was cleared in the 1950s and 1960s. The vegetation within the subject land consists primarily of woodland vegetation, however there are elements of heath-related vegetation within the south eastern side. The vegetation within the subject land is bounded by New Illawarra Road to the north west, Old Illawarra Road to the east, a cleared area and buildings to the south and vegetation to the south west. Accessibility of the subject land has resulted in the presence of scattered collections of dumped rubbish and rubble (**Photograph 3.1**). Lists of flora and fauna recorded within the subject land are provided in **Appendix A** and **Appendix B**, respectively.



Photograph 3.1 Rubble dumped in southern end of subject land

3.2 Vegetation Community

The subject land currently supports regrowth vegetation which shows some variation in condition. The vegetation in the central portion of the subject land is generally in good condition, however the margins tend to have dense populations of exotic shrubs and groundcovers.

The vegetation within the subject land forms a low closed and low open forest dominated by *Allocasuarina littoralis* (Black She-oak). *Corymbia gummifera* (Red Bloodwood) is a common associate species, with other canopy species being generally rare, including *Eucalyptus haemastoma* (Broad-leaved Scribbly Gum), *Eucalyptus oblonga* (Narrow-leaved Stringybark), *Eucalyptus piperita* (Sydney Peppermint) and *Syncarpia glomulifera* (Turpentine). The tree stratum ranges in height from 6-12m with a Projected Foliage Cover (PFC) of 50-60%. Owing to the dense canopy, the shrub and understorey strata are generally sparse, except along the margins. Species in the shrub stratum include *Kunzea ambigua* (Tick Bush), *Isopogon anemonifolius* (Broad-leaved Drumstick) and *Banksia ericifolia* (Heath-leaved Banksia). The exotic *Lantana camara* (Lantana) and the native *Pittosporum undulatum* (Sweet Pittosporum) are common in patches within the subject land. The shrub stratum ranges in height from 0.5-3m with a PFC of 10-60%. Common species within the groundcover include *Entolasia stricta* (Wiry Panic), *Lepidosperma laterale*, *Lepidosperma concavum*, *Austrostipa pubescens*, *Xanthorrhoea resinosa* (Grass Tree). The ground stratum ranges in height from 0-0.5m with a PFC of 5-15%. The main structural features of the vegetation community are shown in **Photograph 3.2** and **Photograph 3.3**.

Vegetation within the subject land appears most closely aligned with the OEH map unit Woronora Sandstone Exposed Bloodwood Woodland. This community is described as being situated on shallow sandy loams on broad ridges associated with Mittagong Sandstones or rocky exposed Hawkesbury Sandstone (DECCW, 2009). Within the subject land, this community occurs primarily on sandy soils. Within the Sydney Metropolitan Catchment Management Authority (SMCMA), this community occurs across the central and north-western Woronora Plateau and on some exposed slopes of the western margin of the Hornsby Plateau and is represented in Heathcote and Georges River National Park and Dharawal State Recreational Areas (DECCW, 2009).



Photograph 3.2 **Woronora Sandstone Exposed Bloodwood Woodland**



Photograph 3.3 **Woronora Sandstone Exposed Bloodwood Woodland**

3.3 Flora Species

Over 120 flora species have been recorded within the subject land, with approximately 70% of the species being native. A list of flora species that were detected on the subject land is provided in **Appendix A**.

No threatened flora species were recorded on the subject land during the flora surveys. An analysis of the likelihood of occurrence within the subject land for each threatened flora species recorded within the Sutherland LGA is provided in **Appendix C**. No threatened flora species were considered to be affected by the proposed development therefore no Assessments of Significance were carried out for threatened flora species.

3.4 Fauna Habitat

Vegetation within the subject land provides some potential habitat for native fauna species, including terrestrial and arboreal mammals, birds and reptiles.

There were limited hollow-bearing trees suitable for arboreal mammals, birds and microchiropteran bats to utilise, with the main species supporting hollows primarily being *Eucalyptus haemastoma* (Broad-leaved Scribbly Gum). These hollows have the potential to support small to medium sized mammals. Several tall shrub trees were fallen over in the subject land, but are unlikely to form significant habitat for native species. Leaf litter was primarily composed of fallen *Casuarina* leaves. Small burrows into this leaf litter were detected throughout the subject land.

No natural streams or wetlands occur on the subject land and habitat for amphibian species is therefore limited. An exposed rock outcrop was located in the southern section of the subject land and deposited piles of rubble and dumped rubbish are located throughout the subject land. Some of the rock outcrop and the rubbish could provide sheltering for reptile and amphibian species.

3.5 Fauna Species

3.5.1 General

A wide variety of vertebrate species are known to occur within the Sutherland LGA, as this LGA contains large areas of native vegetation. However, the subject land is unlikely to support a wide variety of birds, reptiles, amphibians and mammals as the site is almost entirely surrounded by either roads or development.

Hair tube investigations by Cumberland Ecology recorded five fauna species from the subject land, although no threatened species were recorded. Species detected were *Rattus rattus* (Black Rat), *Perameles nasuta* (Long-nosed Bandicoot), *Vulpes vulpes* (Fox), *Petaurus* sp. (Glider sp.) and a probable *Trichosurus* sp. (Brushtail Possum sp.).

Hair analysis was unable to determine if the glider species was *Petaurus breviceps* (Sugar Glider) or *Petaurus norfolcensis* (Squirrel Glider). The Sugar Glider is a common species

that is not listed under any conservation legislation, however the Squirrel Glider is listed as Vulnerable under the TSC Act. No Squirrel Gliders have been recorded from the LGA or from a 10km radius around the subject land, and it is therefore considered that the species detected was most likely to have been a Sugar Glider.

During the hair survey a nest was detected in an *Allocasuarina torulosa* (Forest Oak) along the north western boundary of the subject land. A Common Ringtail Possum (*Pseudocheirus peregrinus*) was sighted emerging from the nest. As the identification of the *Trichosurus* sp. was a 'probable' identification, there is the possibility that the hair may have been from a Common Ringtail Possum.

Scats collected from the subject land detected four fauna species. These species were *Rattus rattus* (Black Rat), *Wallabia bicolor* (Swamp Wallaby), *Felis catus* (Cat) and a probable *Perameles nasuta* (Long-nosed Bandicoot).

A list of fauna species that were detected on the subject land is provided in **Appendix B**.

3.5.2 Threatened Species

No threatened fauna species were detected on the subject land. An analysis of the likelihood of occurrence within the subject land for each threatened fauna species recorded within Sutherland LGA is provided in **Appendix C**. A number of threatened species have the potential to occur on the subject land including:

- Birds: Gang-gang Cockatoo, Glossy Black-cockatoo, Varied Sittella, Powerful Owl and Masked Owl;
- Mammals: Grey-headed Flying-fox, Eastern Freetail-bat, Eastern Bentwing-bat, Greater Broad-nosed Bat; and
- Reptiles: Rosenberg's Goanna.

Assessments of Significance were carried out on threatened fauna species considered to potentially utilise the subject land (**Appendix D**). The assessments determined that none of the threatened fauna species considered likely to occur would be significantly affected by the proposed development.

Impact Assessment

4.1 Introduction

This chapter discusses the potential impacts of the proposed project on vegetation communities, flora species, fauna habitat and fauna species. The ecological values of the subject land and adjacent vegetation can be impacted by direct and indirect impacts. Direct impacts are the primary result of the proposed development and include impacts such as vegetation clearing and loss of habitat. Indirect impacts are the secondary processes that occur as a result of the proposed development, such as increased edge effects and alteration to hydrological regimes.

4.2 Impacts to Vegetation Communities

4.2.1 *Direct Impacts*

The primary impact resulting from the proposed development is the loss of vegetation within the subject land through vegetation clearance. A total of 0.96ha of Woronora Sandstone Exposed Bloodwood Woodland will be cleared from the subject land. The condition of the vegetation community varies as a result of previous land clearance and ongoing edge effects. This community is not listed and an EEC under the TSC Act or EPBC Act, and is well represented in the locality. Approximately 4,037ha of this community has been mapped as occurring within the SMCMA (DECCW, 2009). The area of this vegetation community to be cleared represents a small portion of the community in the locality and SMCMA.

4.2.2 *Indirect Impacts*

i. Introduction

The direct impact of vegetation clearance within the subject land has the potential to lead to a number of indirect impacts such as increased edge effects, alteration to abiotic factors and increased sedimentation and erosion. As the subject land will be completely cleared, the indirect impacts related to adjacent vegetation. The indirect impacts of the proposed project on vegetation communities are discussed below. These indirect impacts are also relevant to flora and fauna species, as vegetation communities constitute habitat for flora and fauna species.

ii. Increased edge effects

Clearing of the vegetation within the subject land can lead to an increase in edge effects, which will occur at the interface between the subject land and adjoining vegetation. These edge effects can potentially have an adverse impact on the habitat quality of the vegetation adjoining the subject land, including reducing the quality and integrity of the adjoining vegetation and altering the microclimate within these areas (e.g. increased sunlight, air temperature and soil temperature). The quality of the adjoining vegetation has been reduced due to previous and current land uses and the invasion of exotic species. Given the modified nature of the vegetation surrounding the subject land, the impact of edge effects is considered to be minimal.

iii. Increased sedimentation and erosion

During the construction of the proposed project there is potential for the adjoining vegetation to be impacted by increased sedimentation and erosion as a result of clearing and the transfer of material to and from the subject land. An increase in the amount of sediment and eroded material can smother adjoining vegetation if appropriate control measures are not implemented. Smothering can cause dieback of herbs and shrubs and reduce regeneration of groundcover species. Sediment and eroded material can also contain weed matter and nutrients, and movement of this material into the adjoining vegetation can facilitate the spread of weeds. However, given that the vegetation adjoining the subject land currently has a moderate level of weed invasion, this impact is considered to be negligible.

iv. Physical damage

The adjoining vegetation communities can be damaged physically by human activities. This can include trampling of vegetation, soil compaction and vegetation removal. These activities can alter regeneration of species within the vegetation communities and result in an alteration to community composition and structure. These impacts are likely to occur if the boundaries of the construction works are not delineated clearly. However the impacts from physical damage are considered overall to be minor.

4.3 Impacts to Flora

No flora species listed under the TSC Act or EPBC Act was recorded within the subject land. It is not considered likely that the proposed development will have a significant detrimental impact on threatened flora species and no Assessments of Significance are considered necessary.

Potential impacts to flora species include:

- Unnecessary removal and thinning of vegetation;
- Runoff, erosion and sedimentation;
- Hydrological changes (e.g. increased storm water runoff from the car park);

- Weed invasion; and
- Long and short-term edge effects resulting from the clearing of vegetation (e.g. changes in light filtration).

Given the condition of the vegetation within the subject land and adjacent areas, it is considered that these impacts will be minor. Vegetation across the adjacent land currently experiences a number of impacts from previous and current land uses. Indirect impacts such as edge effects resulting from the clearing of vegetation and weed invasion are not expected to be exacerbated further than current conditions.

4.4 Impacts to Fauna

4.4.1 *Fauna Habitat*

Vegetation within the subject land provides some potential fauna habitat. Due to the limited number of hollow-bearing trees on the subject land, it is not considered to constitute a significant area of habitat. Trees on the subject land had no hollows large enough for nesting purposes for nocturnal owl species. It is therefore considered unlikely that these animals nest in this area, although there is potential foraging habitat present.

The hollows however, may provide limited roosting/nesting habitat for some arboreal mammal species such as possums but the potential for such species to be threatened is considered to be low. Small hollows may also provide roosting/breeding habitat for microchiropteran bat species and there is a small potential for threatened microbat species to utilise the site for either foraging or roosting. The more extensive similar habitat within the Sutherland LGA is considered more likely to provide important habitat for such species.

The accumulated Casuarina leaves on the ground provides some degree of shelter/burrowing habitat for small mammals. Similar habitat is located to the south west of the subject land. The rock outcrop, fallen trees and leaf litter found on the site would provide habitat for small to medium sized ground mammals, reptiles and invertebrates. These characteristics are also found in land adjacent to the subject land.

The following key threatening processes are applicable to the habitat to be removed from the subject land:

- Clearing of native vegetation;
- Loss of hollow-bearing trees; and
- Removal of dead wood and dead trees.

Removal of the vegetation for the proposed development will reduce the extent of fauna habitat to a small degree but would not significantly reduce overall potential higher value fauna habitat in the locality, or habitat important to threatened species.

4.4.2 Fauna Species

No threatened fauna species have been recorded within the subject land. Several threatened fauna species have been recorded from the locality including microbats, birds, and a monitor. However, the subject land does not provide quality of habitat such that these threatened species are likely to be impacted by the proposed development.

Potential direct impacts to fauna species on the subject land and in the adjacent vegetation include:

- Loss of habitat; and
- Noise disturbance from construction work.
- Potential indirect impacts to fauna species include;
- Hydrological changes resulting in altered fauna habitats.

The impact of the proposed development on the threatened fauna species with the potential to occur within the subject land is assessed by the Section 5A assessments in **Appendix D**. These assessments indicate that it is unlikely that the proposed development would have a significant detrimental impact upon any listed threatened fauna species.

4.5 Impacts to Sutherland LGA Biodiversity Values

4.5.1 Greenweb Strategy

Sutherland Shire developed a Greenweb Strategy in February 2001 to supplement the aims and objectives of bushland preservation in the Sutherland Shire Local Environment Plan (SSLEP 2006). The subject land has been identified Greenweb Support. This means the subject land is adjacent to an identified major habitat area or corridor and its value as support to these areas must be considered during development.

The proposed development will occur in an area that is identified as Greenweb Support. As shown in **Figure 1.1**, the subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The subject land itself represents the north western extremity of the vegetation unit remaining to the south of the New Illawarra Road. As the vegetation does not form part of a significant corridor and its removal will not disrupt connectivity to other vegetated areas, the area identified as Greenweb Support in the locality will not be significantly impacted by the proposal.

4.5.2 Bushland Vegetation

The proposed development must consider the SSLEP. Under clause 32 Bushland Vegetation Consideration, consent will not be granted unless it is shown that the proposed development will not significantly adversely impact the following;

- i. *The protection of rare and endangered flora and fauna species and the protection of habitats for native flora and fauna*

No threatened species of flora and fauna are known to occur on the subject land.

- ii. *The protection of wildlife corridors and vegetation links with other nearby bushland vegetation*

The subject land has been identified as Greenweb Support, with further Greenweb Support to the south and west and an area of Greenweb Core habitat lying to the north west of the subject land. A corridor may be deemed to exist, joining vegetation to the south to vegetation to the north west of the subject land. However New Illawarra Road dissects this link, and has resulted in the limited function of the corridor. The removal of vegetation for the proposal will therefore not significantly adversely impact the habitat corridor and vegetation links with surrounding bushland, the main existing links being retained.

- iii. *The protection of bushland vegetation as a natural stabiliser of the soil surface and the protection of existing landforms such as natural drainage lines, water courses and foreshores*

The subject land occurs on gently sloping land, and removal of vegetation is not likely to significantly impact on the stability of the soil surface in the areas adjacent to the subject land.

No major water course or natural drainage line runs through the subject land. Possible impacts to the water regime may arise from storm water discharge and this must be taken into consideration in the planning and landscaping stage of the development.

- iv. *The protection of bushland vegetation of scenic values and the retention of the unique visual identity of the landscape*

The amount of bushland to be removed will not impact adversely on the scenic values of the area, nor will it compromise the visual identity of the landscape. Large areas of bushland remain in adjacent areas and will maintain the character of the locality.

4.6 Recommendations and Mitigation Measures

4.6.1 Construction phase

Potential impacts to flora and fauna occurring in the construction phase that can be managed include: unnecessary vegetation removal, runoff, sedimentation, erosion, pollution and habitat loss.

Unnecessary vegetation removal may occur if the boundaries of the subject land are not clearly defined. This site should be clearly marked to ensure no vegetation beyond these marks is removed. During development, precautions should be taken to ensure that not sediment or pollution drains further into Greenweb Core areas. To prevent excess runoff

flowing off the building site, barriers should be established to divert the flow of water away from the surrounding bushland and into appropriate drainage systems. Silt traps should be established to prevent the impacts of sedimentation on the surrounding bushland. To reduce sedimentation on the construction site, erosion control measures need to be implemented. This may involve minimising the amount of exposed soils on the site at any given time. During development, precautions should be taken to ensure that no pollution escapes the construction site. Pollution traps and efficient removal of pollution to an off-site location would help to minimise pollution impacts.

As native fauna species have been detected utilising trees on the subject land, measures to minimise the impacts to these species need to be carried out. Where machinery is required to fell trees with hollows, the blade or bucket of the machinery should be tapped against the base of the tree to disturb any fauna present and provide time to leave the hollow. Any fauna found should be removed and relocated to adjoining bushland. Any fauna injured during clearing should be handed to WIRES for care and rehabilitation.

4.6.2 Post-construction phase

As all of the vegetation on the subject land will be removed, the scope for mitigation strategies in the post-construction phase would be limited to ensuring potential impacts to the surrounding bushland are avoided. Stormwater discharge from the proposed development should be managed to minimise impacts of erosion, scouring and nutrification.

Conclusion

The proposed project will remove areas of regrowth vegetation that provides habitat for native flora and fauna species. Approximately 0.96ha of Woronora Sandstone Exposed Bloodwood Woodland will be removed from the subject land. As the community is not an EEC and is well represented and conserved throughout the locality, the proposed development is not considered to have a significant impact on the community.

No threatened flora species were detected on the subject land. Each threatened flora species recorded in the Sutherland LGA has been assessed for likelihood of occurrence and as none were likely to occur, these species are not likely to be significantly impacted by the proposed development.

The vegetation to be removed from the subject land also constitutes potential habitat for some threatened fauna species known from the locality. Leaf litter, ground vegetation, bushrock and fallen branches found on the subject land would provide habitat for small ground mammals, reptiles and invertebrates. As the subject land is relatively small, and potential habitat for ground- and tree-dwelling fauna will remain in the locality, none of the threatened fauna species with the potential to occur within the subject land are considered to be significantly impacted by the proposed development.

Mitigation measures are provided for the project to minimise the impacts to the ecological values of the subject land and adjacent areas. Mitigation measures should be undertaken in the construction phase to minimise impacts from vegetation clearance, runoff, sedimentation, erosion and pollution. There is also the need for the safe removal of native fauna species during the vegetation clearance. Considerations in the post-construction phase would need to address potential impacts to the surrounding bushland.

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Appendix A

A.

Flora Species List

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Trees					
Casuarinaceae	<i>Allocasuarina littoralis</i>	Black She-oak			v
Myrtaceae	<i>Corymbia gummifera</i>	Red Bloodwood		1	c
Myrtaceae	<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum			c
Myrtaceae	<i>Eucalyptus oblonga</i>	Sandstone Stringybark			r
Myrtaceae	<i>Eucalyptus paniculata</i>	Grey Ironbark			r
Myrtaceae	<i>Eucalyptus pilularis</i>	Blackbutt			r
Myrtaceae	<i>Eucalyptus piperita</i>	Sydney Peppermint			r
Myrtaceae	<i>Syncarpia glomulifera</i>	Turpentine			r
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum			r
Small Trees					
Proteaceae	<i>Banksia serrata</i>	Old Man Banksia			o
Casuarinaceae	<i>Allocasuarina littoralis</i> (small tree)	Black She-oak	6	5	
Myrtaceae	<i>Corymbia gummifera</i> (small tree)	Red Bloodwood		5	
Myrtaceae	<i>Eucalyptus haemastoma</i> (small tree)	Broad-leaved Scribbly Gum		1	
Shrubs					
Proteaceae	<i>Banksia ericifolia</i> (small tree)	Heath Banksia		1	
Apiaceae	<i>Platysace linearifolia</i>				r
Casuarinaceae	<i>Allocasuarina littoralis</i> (shrub)	Black She-oak	2		c
Ericaceae	<i>Astroloma humifusum</i>	Native Cranberry	2		o
Ericaceae	<i>Epacris pulchella</i>	NSW Coral Heath	2	2	r
Ericaceae	<i>Leucopogon esquamatus</i>		1		
Ericaceae	<i>Leucopogon microphyllus</i>				adj
Ericaceae	<i>Monotoca scoparia</i>	Prickly Broom-heath			r
Ericaceae	<i>Woollsia pungens</i>		2		o
Euphorbiaceae	<i>Homolanthus populifolius</i>			1	

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Euphorbiaceae	<i>Micrantheum ericoides</i>				r
Euphorbiaceae	<i>Phyllanthus hirtellus</i>	Thyme Spurge		3	o
Fabaceae (Caesalpinioideae)	<i>Phyllota phyllicoides</i>	Heath Phyllota	1		
Fabaceae (Caesalpinioideae)	<i>Senna pendula*</i>				r
Fabaceae (Faboideae)	<i>Bossiaea scolopendria</i>				adj
Fabaceae (Faboideae)	<i>Daviesia mimosoides</i>				r
Fabaceae (Faboideae)	<i>Erythrina X sykesii* (shrub)</i>	Coral Tree		1	r
Fabaceae (Mimosoideae)	<i>Acacia decurrens</i>	Black Wattle			r
Fabaceae (Mimosoideae)	<i>Acacia linifolia</i>	Flax Wattle		1	o
Fabaceae (Mimosoideae)	<i>Acacia longifolia</i>	Sydney Golden Wattle	2	1	o
Fabaceae (Mimosoideae)	<i>Acacia myrtifolia</i>	Red Stem Wattle		adj	r
Fabaceae (Mimosoideae)	<i>Acacia ulicifolia</i>	Prickly Moses			o
Myrtaceae	<i>Callistemon citrinus</i>	Crimson Bottlebrush			r
Myrtaceae	<i>Corymbia gummifera (shrub)</i>	Red Bloodwood		2	o
Myrtaceae	<i>Eucalyptus oblonga (shrub)</i>	Sandstone Stringybark	1		
Myrtaceae	<i>Kunzea ambigua</i>	Tick Bush	5	3	v
Myrtaceae	<i>Leptospermum polygalifolium</i>	Lemon Scented Tea-tree	1		o
Myrtaceae	<i>Melaleuca hypericifolia</i>	Hillock Bush			o
Myrtaceae	<i>Syncarpia glomulifera (shrub)</i>	Turpentine			r
Oleaceae	<i>Ligustrum sinense*</i>	Small-leaved Privett			r
Oleaceae	<i>Notelaea longifolia</i>	Mock Olive			r
Pittosporaceae	<i>Pittosporum undulatum (shrub)</i>	Sweet Pittosporum	2	2	c
Proteaceae	<i>Banksia ericifolia</i>	Heath Banksia	2		c
Proteaceae	<i>Banksia marginata</i>	Silver Banksia			r

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Proteaceae	<i>Banksia oblongifolia</i>	Fern-leaved Banksia			r
Proteaceae	<i>Banksia serrata (shrub)</i>	Old Man Banksia			o
Proteaceae	<i>Banksia spinulosa</i>	Hairpin Banksia	1		r
Proteaceae	<i>Grevillea sericea</i>	Pink Spider Flower	3		r
Proteaceae	<i>Grevillea sphacelata</i>	Grey Spider Flower		1	
Proteaceae	<i>Hakea sericea</i>	Needlebush	1	1	r
Proteaceae	<i>Hakea teretifolia</i>	Dagger Hakea	1		
Proteaceae	<i>Isopogon anemonifolius</i>	Broad-leaved Drumsticks	2	3	o
Proteaceae	<i>Lambertia formosa</i>	Mountain Devil		1	r
Proteaceae	<i>Lomatia silaifolia</i>	Crinkle Bush		2	o
Proteaceae	<i>Persoonia lanceolata</i>	Lance Leaf Geebung	1		r
Proteaceae	<i>Persoonia levis</i>	Broad-leaved Geebung			r
Proteaceae	<i>Petrophile sessilis</i>	Prickly Conesticks	2		o
Sterculiaceae	<i>Lasiopetalum ferrugineum</i>			1	
Verbenaceae	<i>Lantana camara*</i>	Lantana	2	2	c
Xanthorrhoeaceae	<i>Xanthorrhoea concava</i>			1	
Xanthorrhoeaceae	<i>Xanthorrhoea media</i>			1	
Xanthorrhoeaceae	<i>Xanthorrhoea resinosa</i>				c
Herbs – Ferns and Allies					
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken			r
Lindsaeaceae	<i>Lindsaea linearis</i>	Screw Fern			r
Lindsaeaceae	<i>Lindsaea microphylla</i>	Lacy Wedge Fern			r
Herbs - Dicots					
Asteraceae	<i>Ageratina adenophora*</i>	Crofton Weed	1		r
Asteraceae	<i>Bidens pilosa*</i>	Tall Speargrass			o
Asteraceae	<i>Cirsium vulgare*</i>	Spear Thistle			r
Asteraceae	<i>Conyza bonariensis*</i>	Flaxleaf Fleabane			o
Asteraceae	<i>Hypochaeris radicata*</i>	Flatweed			o
Asteraceae	<i>Senecio madagascariensis*</i>	Fireweed			r
Asteraceae	<i>Soliva sp.</i>				r

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Asteraceae	<i>Sonchus oleraceus</i> *	Common Sow-thistle			r
Clusiaceae	<i>Hypericum perforatum</i> *	St. Johns Wort			r
Convolvulaceae	<i>Dichondra repens</i>		2		
Eleaocarpaceae	<i>Elaeocarpus reticulatus</i> (seedling)	Blue Berry Ash		1	
Euphorbiaceae	<i>Euphorbia peplus</i> *	Petty Spurge			o
Fabaceae (Caesalpinioideae)	<i>Senna pendula</i> * (seedling)			1	
Gentianaceae	<i>Centaurium sp.</i> *				r
Haloragaceae	<i>Gonocarpus teucrioides</i>	Germander Raspwort		1	r
Malvaceae	<i>Sida rhombifolia</i> *	Paddy's Lucerne			o
Myrsinaceae	<i>Anagallis arvensis</i> *	Scarlet Pimpernel			r
Oxalidaceae	<i>Oxalis sp.</i>				o
Phytolaccaceae	<i>Phytolacca octandra</i> *	Inkweed			r
Pittosporaceae	<i>Pittosporum undulatum</i> (seeding)	Sweet Pittosporum	2		
Plantaginaceae	<i>Plantago lanceolata</i> *	Lamb's Tongues			r
Proteaceae	<i>Grevillea sericea</i> (seedling)	Pink Spider Flower		1	
Scrophulariaceae	<i>Veronica plebeia</i>	Trailing Speedwell			r
Solanaceae	<i>Solanum nigrum</i> *	Black-berry Nightshade			r
Verbenaceae	<i>Verbena bonariensis</i> *	Purpletop			o
Verbenaceae	<i>Verbena officinalis</i> *	Common Verbena			r
Herbs - Monocots					
Asparagaceae	<i>Asparagus densiflorus</i> *	Asparagus Fern			r
Commelinaceae	<i>Tradescantia fluminensis</i> *	Wandering Jew			r
Cyperaceae	<i>Caustis flexuosa</i>	Curly Wig		1	o
Cyperaceae	<i>Cyathochaeta diandra</i>			2	r
Cyperaceae	<i>Lepidosperma concavum</i>		1		c
Cyperaceae	<i>Lepidosperma laterale</i>	Variable Sword-sedge	2	3	c
Iridaceae	<i>Patersonia glabrata</i>	Leafy Purple-flag		1	
Juncaceae	<i>Juncus sp.</i>				r
Liliaceae	<i>Lilium formosanum</i> *	Formosan Lily			r

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Lomandraceae	<i>Lomandra longifolia</i>	Spiky-headed Mat-rush	1	3	o
Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush		2	o
Lomandraceae	<i>Lomandra obliqua</i>	Twisted Mat-rush		1	r
Orchidaceae	<i>Acianthus ?forficatus</i>	Pixie Caps		1	
Phormiaceae	<i>Dianella caerulea var. producta</i>	Blue Flax Lily	1	1	o
Phormiaceae	<i>Dianella revoluta</i>	Blueberry Lily		1	
Poaceae	<i>Andropogon virginicus*</i>	Whisky Grass	1		
Poaceae	<i>Anisopogon avenaceus</i>	Oat Speargrass			r
Poaceae	<i>Austrostipa pubescens</i>			3	c
Poaceae	<i>Briza maxima*</i>	Quaking Grass			r
Poaceae	<i>Cortaderia selloana*</i>	Pampas Grass			r
Poaceae	<i>Cynodon dactylon</i>	Common Couch			o
Poaceae	<i>Ehrharta erecta*</i>	Panic Veldtgrass			o
Poaceae	<i>Entolasia stricta</i>	Wiry Panic	2	3	c
Poaceae	<i>Eragrostis curvula*</i>	African Love Grass	1		c
Poaceae	<i>Imperata cylindrica</i>	Blady Grass		2	c
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass	2		o
Poaceae	<i>Panicum simile</i>				o
Poaceae	<i>Paspalidium distans</i>				o
Poaceae	<i>Paspalum urvillei*</i>	Vasey Grass			o
Poaceae	<i>Setaria parviflora*</i>				r
Poaceae	<i>Stenotaphrum secundatum*</i>	Buffalo Grass	2		o
Poaceae	<i>Themeda australis</i>	Kangaroo Grass		1	r
Climbers					
Apocynaceae	<i>Araujia sericifera*</i>	Moth Vine			r
Apocynaceae	<i>Parsonsia straminea</i>	Common Silkpod			r
Convolvulaceae	<i>Ipomoea indica*</i>	Morning Glory	2		o
Fabaceae (Faboideae)	<i>Hardenbergia violacea</i>	False Sarsparilla		1	
Fabaceae (Faboideae)	<i>Vicia sativa*</i>	Common vetch			r
Lauraceae	<i>Cassytha pubescens</i>	Common Devil's Twine			r
Luzuriagaceae	<i>Geitonoplesium cymosum</i>	Scrambling Lily			r

Table A.1 Flora Species List

Family	Scientific Name	Common Name	Q1	Q2	Random Meander
Pittosporaceae	<i>Billardiera scandens</i> var. <i>scandens</i>	Apple Dumplings	1	3	o

KEY

*denotes exotic species

Cover/abundance score:

- 1: <5%, rare;
- 2: <5%, occasional;
- 3: <5%, common;
- 4: <5% very common;
- 5: 5-25%
- 6: 25-50%;
- 7: 50-75%; and
- 8: 75-100%

Random meander score:

- r: rare;
- o: occasional;
- c: common; and
- vc: very common

Appendix B

B.

Fauna Species List

Table B.1 Fauna Species List

Scientific Name	Common Name	Detection Method
<i>Felis catus</i> *	Cat	Sc
<i>Perameles nasuta</i>	Long-nosed Bandicoot	H, Sc (probable)
<i>Petaurus</i> sp.	a glider	H
<i>Pseudocheirus peregrinus</i>	Common Ringtail Possum	O
<i>Rattus rattus</i> *	Black Rat	H, Sc
<i>Trichosurus</i> sp	a brushtail possum	H (probable)
<i>Vulpes vulpes</i> *	Fox	H
<i>Wallabia bicolor</i>	Swamp Wallaby	Sc

KEY

Detection method: H = hair funnel, O = opportunistic sighting, Sc = scat

* denotes Introduced species

Appendix C
C.

Likelihood of Occurrence Tables

Table C.1 Analysis of the Likelihood of Occurrence of Threatened Flora Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of occurrence	Assessment of Significance?
<i>Acacia baueri</i> subsp. <i>aspera</i>		V	1	Occurs in low, damp heathlands, often on exposed rocky outcrops over a wide range of climatic and topographical conditions. Appears to prefer open conditions; rarely observed where there is any shrub or tree canopy development.	No suitable habitat within the subject land and there are limited recent records in the locality. Not recorded during flora survey	No
<i>Acacia bynoeana</i>	Bynoe's Wattle	E1	4	Found in heath and woodland on sandy soils. Prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches.	Sub-optimal habitat within the subject land. Not recorded during flora survey.	No
<i>Acacia pubescens</i>	Downy Wattle	V	11	Occurs on alluviums, shales and at the intergrade between shales and sandstones. Occur in open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	No suitable habitat within the subject land. Not recorded during flora survey.	No
<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E1	3	Coastal scrub and dry sclerophyll woodland on sandy soils. Habitat is generally sparse and scattered. Very limited distribution between Botany Bay to the northern foreshore of Port Jackson.	Sub-optimal habitat within the subject land. Not recorded during flora survey.	No
<i>Astrotricha crassifolia</i>	Thick-leaf Star-hair	V	1	Grows in dry sclerophyll woodland on sandstone	Limited records within the	No

Table C.1 Analysis of the Likelihood of Occurrence of Threatened Flora Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of occurrence	Assessment of Significance?
Caladenia tessellata	Thick Lip Spider Orchid	E1	25	Generally found in grassy sclerophyll woodland on clay loam or sandy soils.	locality. Not recorded during flora survey. No suitable habitat within the subject land. Not recorded during flora survey.	No
Chamaesyce psammogeton	Sand Spurge	E1	1	Uncommon on sand dunes near the sea	No suitable habitat within the subject land. Not recorded during flora survey.	No
Darwinia biflora		V	2	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	No suitable habitat within the subject land. Not recorded during flora survey.	No
Diuris aequalis	Buttercup Doubletail	E1	1	Recorded in forest, low open woodland with grassy understorey and secondary grassland on the higher parts of the Southern and Central Tablelands.	No suitable habitat within the subject land. Not recorded during flora survey.	No
Eucalyptus camfieldii	Heart-leaved Stringybark	V	30	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges.	Sub-optimal habitat within the subject land. Not recorded during flora survey.	No
Eucalyptus scoparia	Wallangarra White Gum	E1	2	Found in open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops.	No suitable habitat within the subject land. Not recorded during flora survey.	No
Genoplesium baueri	Bauer's Midge Orchid	V	8	Grows in sparse sclerophyll forest and moss	Suitable habitat within the	No

Table C.1 Analysis of the Likelihood of Occurrence of Threatened Flora Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of occurrence	Assessment of Significance?
				gardens over sandstone.	subject land. Not recorded during flora survey.	
Grammitis stenophylla	Narrow-leaf Finger Fern	E1	1	Grows on rocks in rainforest and in wet sclerophyll forest.	Limited records within the locality. Not recorded during flora survey.	No
Hibbertia puberula		E1	1	Recorded from sandy soils, often associated with sandstone mainly from coastal areas	Limited records within the locality. Not recorded during flora survey.	No
Leucopogon exolasius	Woronora Beard-heath	V	7	The plant occurs in woodland on sandstone.	Suitable habitat within the subject land. Not recorded during flora survey.	No
Melaleuca deanei	Deane's Paperbark	V	28	The species grows in heath on sandstone. Occurs in two distinct areas, in the Ku-ring-gai/Berowra and Holsworthy/Wedderburn areas respectively. There are also more isolated occurrences at Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas.	Sub-optimal habitat within the subject land. Not recorded during flora survey.	No
Persoonia hirsuta		E1	7	Found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	Suitable habitat within the subject land. Not recorded during flora survey.	No

Table C.1 Analysis of the Likelihood of Occurrence of Threatened Flora Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of occurrence	Assessment of Significance?
Pomaderris prunifolia	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	E2	1	Grows on rocky slopes, often along creeks	Limited records within the locality. Not recorded during flora survey.	No
Prostanthera densa	Villous Mint-bush	V	14	Grows in sclerophyll forest and shrubland, on coastal headlands and near-coastal ranges, on sandstone	Suitable habitat within the subject land. Not recorded during flora survey.	No
Prostanthera marifolia	Seaforth Mintbush	E4A	2	Woodland dominated by Eucalyptus sieberi and Corymbia gumnifera. In deeply weathered clay soil with ironstone nodules	Limited records within the locality. Not recorded during flora survey.	No
Pterostylis gibbosa	Illawarra Greenhood	E1	1	Grows among grass in sclerophyll forest; rare, chiefly in the southern parts of the central coast, with a disjunct population in the Hunter Valley	Limited records within the locality. Not recorded during flora survey.	No
Pterostylis sp. Botany Bay	Botany Bay Bearded Orchid	E1	3	Occupies moist level sites on skeletal sandy soils derived from sandstone. Associated vegetation is coastal heath dominated by Melaleuca nodosa and Baeckea imbricata.	Suitable habitat within the subject land. Not recorded during flora survey.	No
Pultenaea aristata	Prickly Bush-pea	V	1	The species occurs in either dry sclerophyll woodland or wet heath on sandstone.	Suitable habitat within the subject land. Not recorded during flora survey.	No
Senecio spathulatus	Coast Groundsel	E1	10	Senecio spathulatus is a specialised coastal	No suitable habitat. Not	No

Table C.1 Analysis of the Likelihood of Occurrence of Threatened Flora Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of occurrence	Assessment of Significance?
				species occurring mostly on frontal dunes and forming low, broad clumps	recorded during the flora survey	
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	V	8	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	No suitable habitat within the subject land. Not recorded during flora survey.	No
<i>Thelymitra atronitida</i>	Black-hooded Sun Orchid	E4A	2	Recorded from shallow black peaty soil in coastal heath on sandstone.	Limited records within the locality. Not recorded during flora survey.	No
<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V	1	Grows in coastal saltmarshes; chiefly in the Sydney district	Limited records within the locality. Not recorded during flora survey.	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
Amphibia						
<i>Crinia tinnula</i>	Wallum Froglet	V	35	Found only in acid paperbark swamps and sedge swamps.	Sub-optimal habitat present. Not recorded during surveys. Not likely to occur.	No
<i>Litoria aurea</i>	Green and Golden Bell Frog	E1	500	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (<i>Typha</i> spp.) or spikerushes (<i>Eleocharis</i> spp.).	No suitable habitat. Not likely to occur.	No
<i>Heleioporus australiacus</i>	Giant Burrowing Frog	V	47	Found in heath, woodland and open forest with sandy soils.	No suitable habitat. Not likely to occur.	No
<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	82	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.	No suitable habitat. Not likely to occur.	No
Aves						
<i>Anthochaera phrygia</i>	Regent Honeyeater	E1	2	The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak.	Sub-optimal habitat present. Not likely to occur.	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1	2	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	Suitable habitat available., however limited recent records in the locality. Potential to occur on subject land.	No
<i>Cacatua leadbeateri</i>	Major Mitchell's Cockatoo	V	2	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	No natural habitat available.	No
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	6	Generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	Some suitable foraging habitat available. Potential to occur on subject land.	Yes
<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	V	1	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (<i>Allocasuarina littoralis</i>), Forest She-oak (<i>A. torulosa</i>) or Drooping She-oak (<i>A. verticillata</i>) occur	Some suitable foraging habitat available. Potential to occur on subject land.	Yes
<i>Circus assimilis</i>	Spotted Harrier	V	4	Occurs in grassy open woodland including	No suitable habitat. Not likely	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
				acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	to occur.	
<i>Climacteris picumnus</i>	Brown Treecreeper	V	1	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	No suitable habitat. Not likely to occur.	No
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	19	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Suitable habitat present. Potential to occur on subject land.	Yes
<i>Epthianura albifrons</i>	White-fronted Chat	V/E2	12	Usually found foraging on bare or grassy ground in wetland areas.	No suitable habitat. Not likely to occur.	No
<i>Glossopsitta</i>	Purple-crowned	V	1	Found in open forests and woodlands,	Sub-optimal habitat present.	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
porphyrocephala	Lorikeet			particularly where there are large flowering eucalypts. Also a mallee specialist.	Not likely to occur.	
Glossopsitta pusilla	Little Lorikeet	V	2	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other trees.	Sub-optimal habitat present. Not likely to occur.	No
Hieraaetus morphnoides	Little Eagle	V	4	Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	Sub-optimal habitat present. Not likely to occur.	No
Ixobrychus flavicollis	Black Bittern	V	1	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation.	No suitable habitat. Not likely to occur.	No
Lathamus discolor	Swift Parrot	E1	5	Occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations.	Sub-optimal habitat present. Not likely to occur.	No
Lophoictinia isura	Square-tailed Kite	V	4	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	No suitable habitat. Not likely to occur.	No
Melithreptus gularis gularis	Black-chinned	V	1	Occupies mostly upper levels of drier open	No suitable habitat. Not	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
	Honeyeater			forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark, White Box, Grey Box, Yellow Box and Forest Red Gum.	recorded during surveys. Not likely to occur.	
Ninox connivens	Barking Owl	V	1	Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses. Denser vegetation is used occasionally for roosting.	Sub-optimal habitat present. Not likely to occur.	No
Ninox strenua	Powerful Owl	V	923	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest.	Suitable foraging habitat available. Potential to occur on subject land.	Yes
Pandion haliaetus	Osprey	V	18	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes.	No suitable habitat. Not likely to occur.	No
Petroica boodang	Scarlet Robin	V	4	Lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	Sub-optimal habitat present. Not likely to occur.	No
Petroica phoenicea	Flame Robin	V	1	Prefers clearings or areas with open understoreys. Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes.	No suitable habitat. Not likely to occur.	No
Petroica rodinogaster	Pink Robin	V	1	Inhabits rainforest and tall, open eucalypt	No suitable habitat. Not likely	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
				forest, particularly in densely vegetated gullies.	to occur.	
Pezoporus wallicus wallicus	Eastern Ground Parrot	V	1	Occurs in high rainfall coastal and near coastal low heathlands and sedgeland, generally below one metre in height and very dense.	No suitable habitat. Not recorded during surveys. Not likely to occur.	No
Ptilinopus regina	Rose-crowned Fruit-Dove	V	1	Occur mainly in sub-tropical and dry rainforest and occasionally in moist eucalypt forest and swamp forest, where fruit is plentiful.	No suitable habitat. Not likely to occur.	No
Ptilinopus superbus	Superb Fruit-Dove	V	2	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	No suitable habitat. Not likely to occur.	No
Pyrholaemus sagittatus	Speckled Warbler	V	1	A wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies.	No suitable habitat. Not likely to occur.	No
Tyto novaehollandiae	Masked Owl	V	29	Lives in dry eucalypt forests and woodlands from sea level to 1100m.	Suitable foraging habitat available. Potential to occur on	Yes

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
					subject land.	
<i>Tyto tenebricosa</i>	Sooty Owl	V	69	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests.	No suitable habitat. Not recorded during surveys. Not likely to occur.	No
Mammalia						
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V	51	Broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Sub-optimal habitat present. Not likely to occur.	No
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	9	Found in well-timbered areas containing gullies. 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>Hirundo ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features.	Sub-optimal habitat present. Not likely to occur.	No
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	2	Recorded across a range of habitat types, including rainforest, open forest, woodland,	Sub-optimal habitat present. Not likely to occur.	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
				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 crevices, boulder fields and rocky-cliff faces as den sites.		
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V	4	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows.	Sub-optimal habitat present. Not likely to occur.	No
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	V	23	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Forages widely – often occurs in variety of forest types.	Suitable foraging habitat available. Potential to occur on subject land.	Yes
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	V	2	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests. Roost mainly in tree hollows but will also roost under bark or in man-made structures. Found along the east coast from south Queensland to southern NSW.	Suitable foraging habitat available. Potential to occur on subject land.	Yes
<i>Myotis macropus</i>	Large-footed Myotis	V	20	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels,	No suitable habitat. Not likely to occur.	No

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
Petaurus australis	Yellow-bellied Glider	V	1	buildings, under bridges and in dense foliage. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests south.	No suitable habitat. Not likely to occur.	No
Phascolarctos cinereus	Koala	V	90	Inhabit eucalypt woodlands and forests.	No suitable habitat. Not likely to occur.	No
Pteropus poliocephalus	Grey-headed Flying-fox	V	170	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.	Sub-optimal habitat present. Not likely to occur.	No
Saccolaimus flaviventris	Yellow-bellied Sheath-tail-bat	V	1	Roosts in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	Sub-optimal foraging habitat available. No recent records in the locality. Not likely to occur.	No
Scoteanax rueppellii	Greater Broad-nosed Bat	V	4	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. This species usually	Suitable foraging habitat available. Potential to occur on subject land.	Yes

Table C.2 Analysis of the Likelihood of Occurrence of Threatened Fauna Species on the Subject Land

Scientific Name	Common Name	TSC Act Status	LGA Count	Habitat Requirements	Likelihood of Occurrence	Assessment of Significance?
				roosts in tree hollows.		
Reptilia						
Hoplocephalus bungaroides	Broad-headed Snake	E1	22	Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	No suitable habitat. Not recorded during surveys. Not likely to occur.	No
Varanus rosenbergi	Rosenberg's Goanna	V	20	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.	Suitable habitat available. Potential to occur on subject land.	Yes

Appendix D

D.

Assessments of Significance

D.1 Gang-gang Cockatoo (*Callocephalon fimbriatum*)

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In NSW, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes (DEC (NSW), 2005c). In summer, the Gang-gang Cockatoo is generally found in tall mountain forest and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may this species may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas (DEC (NSW), 2005d). The Gang-gang Cockatoo is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004c).

- (a) *In the case of a threatened species, whether the action proposed 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 vegetation on the subject land provides potential foraging habitat for the Gang-gang Cockatoo. Potential habitat will remain in the locality, providing alternate areas of habitat. As potential nesting habitat will remain in the locality, it is not likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There is one endangered population of the Gang-gang Cockatoo listed on Schedule 1 of the TSC Act but it does not occur within the locality and does not include the local population of Gang-gang Cockatoo.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96ha of potential foraging habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed development will not fragment or isolate potential habitat for this species as it is unlikely to use the subject land as a corridor and because it is highly mobile species it can move between various areas of bushland.

The subject land provides foraging habitat for the Gang-gang Cockatoo. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range.

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of this species.

(e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the OEH.

(f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plans have been prepared for this species.

(g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of "Clearing of native vegetation". The process of clearing native vegetation may affect the potential habitat for this species to a minor extent. However, much larger expanses of potential habitat will remain in the locality. Therefore, the process of "Clearing of native vegetation" is not likely to affect this species significantly.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on a local population of this species, and a SIS is not likely to be required for this species.

D.2 Glossy Black-cockatoo (*Calyptrorhynchus latham*)

The Glossy Black-cockatoo is sparsely distributed along the east coast and immediate inland districts from western Victoria to Rockhampton in Queensland (DEC (NSW), 2005e). The Glossy Black-cockatoo characteristically inhabits forests on sites with low soil-nutrient status, reflecting the distribution of key *Allocasuarina* spp, predominately Forest Oak (*Allocasuarina torulosa*) and Black She-oak (*Allocasuarina littoralis*) in eastern populations (DEC (NSW), 2005e). The Glossy Black-cockatoo is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004d).

- (a) *In the case of a threatened species, whether the action proposed 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 vegetation on the subject land provides potential foraging habitat for the Glossy Black-cockatoo. Potential habitat will remain in the locality, providing alternate areas of habitat. As much larger areas of potential nesting habitat will remain in the locality, it is not likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There is one endangered population of the Glossy Black-cockatoo listed on Schedule 1 of the TSC Act but it does not occur within the locality and does not include the local population of Glossy Black-cockatoo.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

(d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging and nesting habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed development will not fragment or isolate potential habitat for this species as it is unlikely to use the subject land as a corridor and because it is highly mobile species it can move between various areas of bushland.

The subject land provides potential foraging habitat for the Glossy Black-cockatoo. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of this species.

(e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the OEH.

(f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plans have been prepared for this species.

(g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of "Clearing of native vegetation". The process of clearing native vegetation may affect the potential habitat for this species further than current conditions. However, much larger expanses of potential habitat will

remain in the locality. Therefore, the process of "Clearing of native vegetation" is not likely to affect this species significantly.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on a local population of this species, and a SIS is not likely to be required for this species.

D.3 Varied Sittella (*Daphoenositta chrysoptera*)

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (NSW Scientific Committee, 2010). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland (NSW Scientific Committee, 2010). The Varied Sittella is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2010).

- (a) *In the case of a threatened species, whether the action proposed 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 vegetation on the subject land provides potential foraging and nesting habitat for the Varied Sittella. Potential habitat will remain in the locality, providing alternate areas of habitat. As much larger areas of potential nesting habitat will remain in the locality, it is not likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

Not applicable.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging and nesting habitat for this species.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection results in a limitation of the corridor's functioning. The proposed development will not fragment or isolate potential habitat for these species as it is unlikely to use the subject land as a corridor because it is a highly mobile species that can move between various areas of bushland.

The subject land provides potential foraging and nesting habitat for the Varied Sittella. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much wider range.

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of this species.

(e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

No critical habitat for this species has currently been identified by the Director-General of the OEH.

(f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threat abatement plans have been prepared for this species.

(g) Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposal constitutes the key threatening processes of "Clearing of native vegetation". The process of clearing native vegetation may affect the potential habitat for these species to a minor extent. However, much larger expanses of potential habitat will remain in the locality. Therefore, the process of "Clearing of native vegetation" is not likely to affect this species significantly.

Conclusion

0.96 of potential habitat will be removed from the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on the local populations of this species, and a SIS is not likely to be required for these species.

D.4 Owls

The following Assessments of Significance apply to the following species of owls that could potentially occur on the subject land:

- Masked Owl (*Tyto novaehollandiae*); and
- Powerful Owl (*Ninox strenua*).

The Masked Owl occurs sporadically throughout most of NSW although most records are within a few hundred kilometres of the coast. The species lives in eucalypt forest/woodland, densely vegetated gullies from sea level to 1100m and uses tree hollows or caves for nesting (DEC (NSW), 2005g). The Masked Owl is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004g).

The Powerful Owl is distributed from Mackay to south western Victoria, mainly on the coastal side of the Great Dividing Range. It occurs in many vegetation types from woodland and open sclerophyll to tall open wet forest and rainforest. It requires large tracts of native vegetation but can survive in fragmented landscapes. It roosts in dense vegetation and nest in large tree hollows (DEC (NSW), 2005h). The Powerful Owl is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004h).

- (a) *In the case of a threatened species, whether the action proposed 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 vegetation on the subject land provides potential foraging habitat and limited potential nesting habitat. Much larger expanses of potential habitat will remain in the locality, providing alternate areas of habitat that are likely to be of much higher value to the species. As there are limited hollows to provide potential nesting habitat on the subject land, and such hollows are of only moderate size, it is not likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There are no populations of these species listed as endangered under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed development will not fragment or isolate potential habitat for these species as they are unlikely to use the subject land as a corridor and because they are highly mobile species and can move between various areas of bushland.

The subject land provides foraging habitat for these species. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range. The removed habitat is not considered as important for these species as these species is not known to occur on the subject land.

The removal and modification of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of these species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the OEH.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

A recovery plan has been prepared for large forest owls, which includes the Masked Owl and Powerful Owl. The ultimate aim of the recovery plan is to ensure that the species it covers persist in the wild in NSW in each region where it presently occurs. The following main objectives are relevant to the proposal:

- Objective 4: Ensure the impacts on large forest owls and their habitats are adequately assessed during planning and environmental assessment processes; and
- Objective 5: Minimise further loss and fragmentation of habitat by protection and more informed management of significant owl habitat (including protection of individual nest sites).

The proposal does not involve the removal of significant owl habitat. Potential owl habitat will remain in the locality. These owls are unlikely to use the subject land as a corridor and because they are highly mobile species and can move between various areas of bushland. Therefore the proposed development is considered to be consistent with the objectives in that it will not decrease or fragment the extent of significant habitat.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of "Clearing of native vegetation". The process of clearing native vegetation may affect the potential habitat for these species further than current conditions. However, potential habitat will remain in the locality. Therefore, the process of "Clearing of native vegetation" is not likely to significantly affect these species.

The key threatening processes of "Removal of dead wood and dead trees" may be increased by the proposal. The main threat is a loss of habitat, particularly nesting habitat through the loss of hollows available if dead trees are removed. Fauna habitat assessments detected dead wood on the subject land. The dead trees on the subject land are unlikely to support nesting habitat for these species. The removal of dead wood and dead trees for the proposed development is not likely to have a significant impact on the availability of such habitat characteristics in a local context.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat, including optimal nesting habitat, will remain in existence in the locality. The proposal is not likely to have an adverse effect on a local population of these species, and a SIS is not likely to be required for these species.

D.5 Grey-headed Flying-fox (*Pteropus poliocephalus*)

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is distributed along the east coast from Bundaberg in Queensland to Melbourne, Victoria. It occurs as far west as the western slopes of the Great Dividing Range in northern NSW. It occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps. Grey-headed Flying-foxes migrate according to the availability of native fruits, nectar and pollen. They roost in large "camps" which are generally within 20km of a food source (NSW NPWS, 2001). The Grey-headed Flying-fox is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004i) and under the EPBC Act.

- (a) *In the case of a threatened species, whether the action proposed 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,*

There is potential for the Grey-headed Flying-fox to forage on the subject land. Development of the subject land may impact on some potential habitat for this species, although the habitat on the subject land does not constitute a significant amount of potential habitat in the locality. As potential nesting habitat exists in the locality, it is not likely that the proposal will affect the life cycle of these species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There are no endangered populations of this species listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed development will not fragment or isolate potential habitat for this species as it is unlikely to use the subject land as a corridor.

The subject land provides foraging habitat for this species. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range.

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of this species.

(e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the OEH.

(f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No threat abatement plans have been prepared for this species.

A draft national recovery plan has been prepared for the Grey-headed Flying-fox. The overall objective relevant to this proposed project is to reduce the impact of threatening processes on Grey-headed Flying-foxes and arrest decline throughout the species' range.

- Objective 1. To identify and protect foraging habitat critical to the survival of Grey-headed Flying-foxes throughout their range;
- Objective 2. To protect and increase the extent of key winter and spring foraging habitat of Grey-headed Flying-foxes;
- Objective 3. To identify roosting habitat critical to the survival of Grey-headed Flying-foxes and
- Objective 4. To protect and enhance roosting habitat critical to the survival of Grey-headed Flying-foxes.

The foraging habitat for the Grey-headed Flying-fox within the subject land is in proximity to an extensive area of suitable habitat with the locality. The foraging habitat available within the subject land is not considered to be critical to the survival of this species. Areas of

suitable foraging habitat will be retained and conserved in the locality. No roosting habitat for the Grey-headed Flying-fox was identified as occurring within the subject land.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of Clearing of native vegetation. The process of clearing native vegetation may affect the potential habitat for this species further than current conditions. However, current conditions are not considered as optimal. The process of Clearing of native vegetation is not likely to significantly affect this species as the subject land does not contain significant habitat.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on local populations of these species, and a SIS is not likely to be required for this species.

D.6 Microchiropteran Bats

The following Assessments of Significance apply to the following species of microchiropteran bats known to occur in the locality:

- Eastern Freetail-bat (*Mormopterus norfolkensis*);
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*); and
- Greater Broad-nosed Bat (*Scoteanax rueppellii*).

The Eastern Freetail Bat occurs from southern Queensland to southern NSW, in dry sclerophyll forest and woodland. It roosts in tree hollows and sometimes under bark or in man-made structures (DEC (NSW), 2005e). The Eastern Freetail Bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004f).

The Eastern Bentwing Bat occurs along the east and north west coasts of Australia. It roosts in caves, derelict mines, stormwater tunnels, buildings and other man made structures. It forages above the canopy in forested areas. The Eastern Bentwing Bat forms maternity colonies in caves and populations usually centre on such caves (DEC (NSW), 2004a). The Eastern Bentwing Bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004a).

The Greater Broad-nosed Bat occurs from the Atherton Tableland to north eastern Victoria in gullies and river systems that drain the Great Dividing Range. It roosts in tree hollows and sometimes in buildings. It occurs in woodland to moist and dry eucalypt forest and rainforest but is most common in tall wet forest (DEC (NSW), 2004f). The Greater Broad-nosed Bat is listed as Vulnerable on Schedule 2 of the TSC Act (NSW Scientific Committee, 2004e).

- (a) *In the case of a threatened species, whether the action proposed 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,*

There is potential for these microbats to forage and roost on the subject land. Development of the subject land may impact on some potential habitat for these species, although the habitat on the subject land does not constitute a significant amount of potential habitat in the locality. As potential nesting habitat exists in the locality, it is not likely that the proposal will affect the life cycle of these species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There are no endangered populations of these species listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging and roosting habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed

development will not fragment or isolate potential habitat for this species as it is unlikely to use the subject land as a corridor.

The subject land provides foraging and roosting habitat for these species. The habitat that will be removed as a result of the proposal is not considered important for these species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range.

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of these species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for these species has currently been identified by the Director-General of the OEH.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plans have been prepared for these species.

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of Clearing of native vegetation. The process of clearing native vegetation may affect the potential habitat for these species further than current conditions. However, current conditions are not considered as optimal. The process of Clearing of native vegetation is not likely to significantly affect these species as the subject land does not contain significant habitat.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on local populations of these species, and a SIS is not likely to be required for these species.

D.7 Rosenberg's Goanna (*Varanus rosenbergi*)

Rosenberg's Goanna is generally found in large tracts of continuous habitat, rather than isolated pockets. This species is found in heath, open forest and woodland and has an association with termites, the mounds of which this species nests in (DEC (NSW), 2004i). Rosenberg's Goanna is listed as Vulnerable under the TSC Act (NSW Scientific Committee, 2004i).

- (a) *In the case of a threatened species, whether the action proposed 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,*

There is potential for Rosenberg's Goanna to forage and nest in the subject land. Development of the subject land may impact on some potential habitat for this species, although the habitat on the subject land does not constitute a significant amount of potential habitat in the locality. As potential nesting habitat exists in the locality, it is not likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

- (b) *In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,*

There are no endangered populations of Rosenberg's Goanna listed under the TSC Act.

- (c) *In the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

(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

Not applicable.

- (d) *In relation to the habitat of a threatened species, population or ecological community:*

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

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

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

The proposal will require the removal of 0.96 of potential foraging and nesting habitat.

The subject land is situated at the junction of two roads, which have previously dissected a vegetation corridor that leads to an area to the north west of the subject land. The result of this dissection has resulted in the corridor's function being limited. The proposed

development will not fragment or isolate potential habitat for this species as it is unlikely to use the subject land as a corridor.

The subject land provides nesting and foraging habitat for Rosenberg's Goanna. The habitat that will be removed as a result of the proposal is not considered important for this species as the subject land is only likely to comprise a small area of habitat that is part of a much larger range.

The removal of the vegetation on the subject land is not likely to have an adverse effect on the long-term survival of this species.

- (e) *Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).*

No critical habitat for this species has currently been identified by the Director-General of the OEH.

- (f) *Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

No recovery plan or threat abatement plans have been prepared for this species

- (g) *Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The proposal constitutes the key threatening processes of "Clearing of native vegetation" and "Bushrock removal". The process of clearing native vegetation may affect the potential habitat for the species further than current conditions. However, potential habitat will remain in the locality. Bushrock removal is not considered as a significant key threatening process as there is a minimal amount of bush rock that may be utilised by this species. The processes of "Clearing of native vegetation" and "Bushrock removal" are not likely to affect this species significantly as the subject land does not contain significant habitat.

Conclusion

0.96 of potential habitat will be removed on the subject land. Potential habitat will remain in existence in the locality. The proposal is not likely to have an adverse effect on a local population of this species, and a SIS is not likely to be required for this species.