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Flora and Fauna Assessment

Lipman Properties Pty Ltd

Residential Development at
128 Herring Road Macquarie Park

Total Earth Care Pty Ltd
March 2010

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EXECUTIVE SUMMARY

Total Earth Care has undertaken a Flora and Fauna Assessment and Report at the subject site 128 Herring Road, Macquarie Park, New South Wales on behalf of Lipman Properties Pty Ltd. The Flora and Fauna Survey and Assessment Report has been prepared as part of an Environmental Assessment to assess the potential environmental impacts of the proposal. These requirements, including those required in relation to the flora and fauna that occur or may utilise the site are set out in the Director-General's Requirements for Application numbers MP 09_0195, MP 09_0217 and MP 09_0218.

This Flora and Fauna Assessment and Report has been undertaken with reference to the Department of Environment, Climate Change and Water's "Draft Guidelines for Threatened Species Assessment under part 3A of the Environmental Planning Act 1979" (2005), "Principles for the Use of Biodiversity Offsets in NSW" (2008), and the Department of Water and Energy's "Guidelines for Controlled Activities in Riparian Corridors" (2008).

There is potential that the proposed development will have some minor direct and indirect impacts on flora and fauna, and their habitats, which occur on the subject site and within the study area. This flora and fauna assessment has considered the flora and fauna species, vegetation communities and habitat components and concluded that the subject site does not currently support threatened flora and fauna species that are indigenous to the area, and has not identified significant habitat for any species targeted in the survey and assessment. The plant community adjacent to the subject site within the study area has been recorded as Sydney Turpentine Ironbark Margin Forest, a component of the EEC Sydney Turpentine-Ironbark Forest.

This report concludes that the potential impacts will not have a significant impact on the Sydney Turpentine-Ironbark Forest located within the study area, and that a Species Impact Statement is not required. This document, along with the Vegetation Management Plan (Total Earth Care, 2010), details actions to be taken to avoid, mitigate and compensate unavoidable impacts on flora and fauna species by improving or maintaining biodiversity values overall on the subject site, particularly by detailing measures to protect and rehabilitate the higher quality riparian zone habitat within the University Creek corridor that occurs on the site and connects with adjoining plant communities.

1 INTRODUCTION

Lipman Properties Pty Ltd is currently proposing the redevelopment of a 1.7 hectare (ha) portion of the Morling College site located at 128 Herring Road, Macquarie Park. This includes the subdivision of the site and construction of an eight stage development, including the construction of five residential multi-level buildings with associated underground parking domain works.

In liaison with the NSW Department of Planning (DoP) the proponent has been issued with Director Generals Requirements (DGRs). The DGRs provide a preliminary scope for the preparation of an Environmental Assessment to accompany a Part 3A project application to the NSW Minister for Planning. An assessment of the environmental impacts of the proposed project has been specified in the DGR's. Additionally several key issues are identified from the DGRs for the investigation and management of biodiversity on the subject site and study area. In summary these are to;

- address impacts on flora (including trees to be retained) and fauna, including threatened species, populations and Endangered Ecological Communities (EEC) and their habitats and steps taken to mitigate any identified impacts to protect the environment and land in accordance with DECCW *Draft Guidelines for Threatened Species Assessment under Part 3A of the Environmental Planning Act 1979*.(DEC/DPI 2005) and;
- detail actions that will be taken to avoid or mitigate impacts or compensate for unavoidable impacts of the project on threatened species, populations, Endangered Ecological Communities and their habitats. Any proposed offsetting measures should be developed in accordance with the *Principles for the Use of Biodiversity Offsets in NSW* (DECCW 2008) and;
- demonstrate the implementation of measures to protect and rehabilitate the adjoining University Creek and Riparian Corridor in accordance with the *Guidelines for Controlled Activities in Riparian Corridors* (DWE 2008).

This Flora and Fauna Assessment addresses the key biodiversity issues highlighted above, and will be used to inform the overall Environmental Assessment to accompany the Part 3A project application. Additionally a Vegetation Management Plan has also be prepared and submitted, and this will provide more detail related to the management of vegetation within the riparian corridor proposed as part of the development.

For the purpose of this report, the subject site comprises the area of land directly affected by the development proposal. The study area comprises the subject site in addition to the surrounding land that may be potentially indirectly affected by the development, including the Macquarie University land adjoining to the north, sections of University Creek upstream and downstream of the subject site and sections of Morling College adjoining to the south. The locality encompasses a larger area that includes neighbouring properties and includes sections of Lane Cove National Park and Council Reserves.

2 AIMS AND OBJECTIVES

The aims of the flora and fauna assessment for the current proposal are to:

- survey and describe the existing flora and fauna within the subject site;
- determine the presence or likely occurrence of threatened species, populations and ecological communities (or their habitats), as listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *NSW Threatened Species Conservation Act 1995* (TSC Act);
- assess the potential impacts of the proposed development on the existing flora and fauna, and their habitats having regard to *Threatened species assessment guidelines. The assessment of significance*. (DECC, 2007); and
- determine areas that are of conservation significance and should be either excluded or constrain development as part of the current or future proposals.

3 METHODS

3.1 Desktop Research

Prior to field surveys, records of all threatened species, populations and endangered ecological communities (EEC) previously recorded within a 5km radius of the subject site were obtained from the Department of Environment, Climate Change and Water (DECCW) Wildlife Atlas database. An EPBC Act Protected Matters Report was generated using the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) Protected Matters Search Tool for a 5km radius of the subject site. The report identifies matters of national environmental significance in the study area including threatened biodiversity and other matters protected by the EPBC Act.

Threatened species, threatened populations, threatened communities, or their habitats, were targeted during the field survey. Recent existing reports of the biodiversity of the study area and locality were also reviewed prior to field surveys and these are briefly summarised in following sections of this report.

3.2 Flora

General botanical surveys were conducted on the subject site and adjoining area to the north of the subject site (together termed the 'study area') on 18th December 2009 and 12th January 2010 involving:

- the identification of native and exotic plant species according to *Field Guide to the Native Plants of Sydney* (Robinson 2003) and the *Flora of NSW* (Harden 1992, 1993, 2000, 2002), with reference to recent taxonomic changes;
- the identification and mapping of plant communities (where present) according to the structural definitions of Specht & Specht (1999), and to previous broad-scale mapping of the Cumberland Plain by NPWS (2003); and of the Sydney 1:100,000 map sheet by Benson & Howell (1994);
- targeted searches for plant species of conservation significance according to the "random meander" method (Cropper 1993).

The conservation significance of plant species and plant communities was determined according to:

- TSC Act for significance within NSW; and
- EPBC Act for significance within Australia.

All flora species were recorded and an inventory of species was compiled (Table 1, Appendix A).

3.3 Fauna

General fauna surveys, involving diurnal and nocturnal techniques, were conducted on the subject site during the afternoon and evenings of 4th and 6th January 2010. Weather conditions were warm, with a light wind and no rain. The diurnal surveys involved observations of animal activity, habitat identification and searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, scratches and diggings). Surveys for avifauna and amphibians involved visual detection and aural recognition of bird and frog calls. Table 1 provides a summary of fauna survey techniques.

The nocturnal survey involved spotlighting from foot for direct visual observations of animal activity; call playback for aural recognition of threatened owls, arboreal mammals and frogs; and the placement of ultrasonic bat call detection equipment (Anabat). Fauna species targeted during nocturnal survey included (but were not limited to) *Ninox strenua* Powerful Owl and *Pteropus poliocephalus* Grey-headed Flying-fox.

The conservation significance of fauna species and populations was determined according to:

- TSC Act for significance within NSW; and
- EPBC Act for significance within Australia.

All fauna sightings as well as fauna habitat types and evidence of fauna activity were recorded and an inventory of species was compiled (Table 2, Appendix A).

Table 1 Fauna Survey Techniques

Survey Technique	Targeting	Survey Effort
Call Playback	Powerful Owl	Over two nights
Spotlighting	Nocturnal mammals, birds, reptiles and amphibians	Over two nights
Diurnal Searches	All mammals, reptiles, diurnal birds, amphibians	Over two days
Ultrasonic call recordings (Anabat)	Micro-bats	Over two nights

3.4 Limitations

Field surveys were conducted over 4 days and 2 evenings during summer 2009/2010. In addition to the surveys undertaken, the full spectrum of flora and fauna species and ecological processes likely to occur on the site were considered by identifying potential habitats for such species and assessing the potential for these species to occur on the site based on previous records, the type and condition of habitats present, the land use of the site and its landscape context.

4 RESULTS

4.1 Previous Studies and Reports

4.1.1 Urban Bushland in the Ryde LGA

Ryde City Council has undertaken surveys to map the extent and classify the remnant native vegetation of the local government area (Oculus, 2001). The survey involved reference to existing vegetation mapping schemes of the Sydney region and interpretation of aerial images. Some ground truthing was carried out and limited to a few sites focusing on predicted or known areas supporting EECs. The survey identified six native plant communities, three of which are identified as having national and state conservation significance. The report lists the largest and/or most significant bushland reserves in the local government area and this includes an area referred to as Macquarie University Nature Reserve.

The report suggests that the EEC Sydney Turpentine-Ironbark Forest (STIF) was probably the most common native plant community in the Ryde LGA prior to European settlement. The report identifies a small and degraded remnant of STIF on land that occurs adjacent to the proposed development site within Macquarie University amongst other areas.

4.1.2 Ryde Flora and Fauna Study 2006

The *Ryde Flora and Fauna Study 2006* (Biosphere Environmental Consultants, 2006) was commissioned by Ryde City Council to identify base-line biodiversity in four key reserves of the LGA. The survey focused on vertebrate and invertebrate fauna and native and exotic plant species assessing both species richness and relative abundance with surveys carried out in autumn and spring.

Although none of the reserves were free of urban impacts the report identified that several bushland reserves in the LGA retained representative native flora and fauna. Several rare and two threatened plant species were located during the survey effort by Biosphere as were threatened ecological communities. One threatened owl and one threatened microchiropteran bat species were detected during their surveys and the report suggests that both species were foraging preferentially along the Lane Cove River corridor (Biosphere Environmental Consultants, 2006).

In assessment of the fauna survey results, the 2008 Ryde Flora and Fauna Study suggests that terrestrial mammals, large reptiles and frogs have been significantly affected by development in the Ryde LGA. Predation by foxes, dogs and cats and clearing of native vegetation are identified as resulting in the widespread loss of terrestrial mammals and larger reptiles. The significant decline of frog species in the LGA is attributed to substantial loss of foraging and breeding habitat, impacts on water quality and predation by introduced fish species (Biosphere Environmental Consultants, 2006).

The report states that forest and woodland birds are still well represented in the LGA due to the habitat provided by tree canopy including that of surveyed reserves. However due to an absence of mid-storey vegetation cover, the smaller passerines (perching birds) had declined markedly (Biosphere Environmental Consultants, 2006).

The major impacts that are affecting the biodiversity of the LGA are summarised in the 2008 Ryde Flora and Fauna Study and these include but are not limited to:

- weed invasion;
- contamination of creeks and ground water;
- changes in flow patterns of creeks through storm water control;
- increased erosion of creek banks;
- loss of ephemeral freshwater habitat;
- penetration of bushland by walking tracks, roads and easements;
- feral animals, such as foxes, cats, dogs, rats and mice;
- high density of native, predatory birds;
- night-light pollution from street lights and house lights;
- noise and movement disturbance; and
- edge effects

4.1.3 Ryde Flora and Fauna Study 2008

In 2008 Ryde City Council commissioned Bioshere Environmental Consultants to produce *The Ryde Flora and Fauna Study 2008* (Biosphere Environmental Consultants, 2008). This study focused more on the flora and fauna species found in the smaller reserves not surveyed in the 2006 study. The study echoed the previous report's findings (Biosphere Environmental Consultants, 2006) and found poorer species diversity in these smaller reserves with increased impacts such as weeds, predatory birds and edge effects. There was little additional management recommendations.

4.1.4 Macquarie University Preliminary Ecological Assessment

The *Macquarie University Preliminary Ecological Assessment* (EDAW, 2006) was prepared as part of a review of the overall master planning for Macquarie University and was primarily based on desktop methods. The specific scope of the assessment was to:

- review existing background information and comment on potential development constraints given legislative requirements;
- undertake additional investigations to confirm existing data as required; and
- identify and comment on any potential threatened species on the site and the constraints these would place on development.

Five areas of remnant native plant communities were identified over the University campus in the assessment comprising three ecological communities (EDAW, 2006). One of the communities, Sydney Turpentine-Ironbark Forest (STIF) is listed as an Endangered Ecological Community under the TSC Act and Critically Endangered Ecological Community under the EPBC Act. Several stands of STIF are recorded in the assessment including 'Remnant 3' that is adjacent to the subject site of the current survey (Figure 1, Appendix B). Remnant 3 is described by EDAW (2006) as supporting very little understorey and generally in poor condition due to landscape maintenance. Vegetation, other

than the remnants of native plant communities, is described as mainly planted native endemic or non-locally endemic and exotic trees in mown areas.

A five kilometre radius search of the DECC Wildlife Atlas identified 13 threatened fauna species previously recorded from the locality. The potential habitat and likelihood for the threatened species, from the database records, to occur at the University campus is assessed and in summary EDAW (2006) suggest that:

- some threatened bird and bat species may potentially use the university site as foraging or roosting habitat. However the site was assessed as unlikely to provide important habitat for threatened bird and bat species given the limited extent of vegetation and the availability of alternative habitat in nearby Lane Cove National Park; and
- it is unlikely that there is adequate area of suitable habitat to support viable populations of threatened mammal species previously recorded from the locality.

The disjunct nature of the remnant native vegetation communities and lack of fauna habitats over the University Campus is noted. Habitats were assessed as generally more suited to fauna species adapted to urbanised environments (EDAW, 2006).

The report highlights the provisions of the *NSW Threatened Species Conservation Act 1995* (TSC Act) and *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) particularly; the preparation of 7-part Tests (under Section 5A of the TSC Act) for any future development at the University that potentially impacts on threatened species, populations or communities; or where a proposed activity is located in an area identified to be of national environmental significance, the matter needs the approval of the Minister for Environment and Heritage.

A Concept Plan was submitted to the NSW Department of Planning (NSW Department of Planning, 2008) and put on exhibition on 21st May 2008. As part of this plan it was proposed that remnant 3 will require partial or complete removal. The Concept Plan was subsequently approved in August 2009 by the Minister (DoP).

4.1.5 Native Vegetation of the Cumberland Plain

At a regional scale *The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities* (Tozer, 2003), provides a survey of vegetation communities occurring on the Cumberland Plain and adjacent plateaus characterised by Wianamatta Shale soils. This study recognises that most of the native vegetation communities of the Cumberland Plain and neighbouring Wianamatta Shales are listed as endangered under the *Threatened Species Conservation Act 1995* (Tozer, 2003). As such, part of the rationale for the survey was to address the need for quantitative data to assist in the identification of native plant communities and provide an assessment of the conservation value of vegetation remnants.

The aim of the survey was to revise the existing plant community classification to take account of; recently described communities and other communities warranting recognition; provide quantitative data for characteristic species in each community (frequency of occurrence and relative abundance); identify species showing high fidelity to each community as a basis for diagnosing community type in the field; estimate the present cover of native vegetation; and derive a spatial model as a basis for predicting the vegetation type and conservation value of all remaining remnants (Tozer, 2003). In classifying communities interpreted in light of previous publications and EEC listed under the TSC Act, Tozer (2003) recognises and describes more than one unit for some community types, including Sydney Turpentine-Ironbark Forest which incorporates both Turpentine-Ironbark Forest and Turpentine-Ironbark Margin Forest.

The survey incorporated systematic, stratified field sampling to record floristic structure and composition, a classification procedure based on hierarchical, agglomerative clustering analysis; spatial modelling of community distributions using geological, climatic and topographic variables; and the interpretation of patterns in canopy composition and remnant condition in aerial photographs. The resulting *Native Vegetation of the Cumberland Plain, Western Sydney − 1:25 000 Map Series* (NPWS, 2002) incorporates Ryde LGA in Map 10 of the series. For the subject site there is no classified extant native overstorey vegetation. The nearest area to the subject site that is mapped as having native

overstorey is approximately 1km north of the subject site in Macquarie University. This is mapped as Turpentine Ironbark Forest and Turpentine Ironbark Margin Forest.

4.1.6 Tree Survey – Treescan Urban Forest Management (TURM 2009)

Consulting Arborists Treescan were commissioned by Lipman Properties Pty Ltd to identify remnant trees growing within the development footprint (TUFM 2009). This survey identified any native trees considered potential remnants of the original EEC (STIF) (Figure 2, Appendix B). The survey found 29 specimens of locally occurring species, as outlined below (Table 2), while the majority of all trees surveyed are located outside their natural distribution and not considered indigenous to the site. It was documented in the Treescan email report that the planned offset regeneration works in lieu of the proposed tree removals would be of benefit. The regeneration and weed restoration works proposed to occur within the riparian zone to increase the riparian width would be of greater value at a local scale than the proposed removal of the 18 remnant trees.

Documentation associated with the Treescan site analysis confirmed that the excavation required within the car park construction footprint would not impact the health of the neighbouring STIF community. Recommendations were provided with a "hand-excavation only" safety zone around remnant native canopy species characteristic of STIF to protect the primary root system, using a calculation of a radius of 12m x tree diameter at breast height.

It is proposed to exclude construction activities and associated impacts within a 6 metre setback zone between the car park excavation and the north-east site boundary. This area will be fenced and protected during the duration of the construction and incorporated within the construction plans. These measures are designed to safe guard the STIF located on the adjoining site, and any retained native trees on site.

Table 2 Locally occurring tree species within development footprint as mapped by Treescan (2009).

Locally Occurring Native Tree Species	Common Name	Number of Specimens
Corymbia gummifera	Red Bloodwood	1
Eucalyptus globoidea	White Stringybark	5
Syncarpia glomulifera	Turpentine	8
Eucalyptus punctata	Grey Gum	6
Angophora costata	Sydney Red Gum	2
Eucalyptus pilularis	Blackbutt	6

4.2 Landscape

The subject site is located at Macquarie Park, and incorporates a 1.7 ha parcel of land running from the northern to eastern corners of the larger property known as the Morling College Site. A significant proportion of the subject site lacks vegetation due to built infrastructure including houses, a larger multi-storey accommodation block, chapel, day care facility, shed and carports, with associated roads and driveways. The remainder of the site is regularly mown consisting largely of exotic grassland, with some remnant canopy trees and planted native and exotic trees. There is a playing field in the north-western part of the mown area. Immediately bounding the chapel, day care facility and dwellings are small cultivated gardens. Along the north-western boundary adjoining the Cochlear development within Macquarie University is a creekline, University Creek, with a more intact assemblage of remnant trees and some naturalised indigenous species (but not remnant from the original vegetation). The understorey of this strip of vegetation along University creek is largely exotic trees and shrubs, and connects with the better quality native vegetation on the adjoining site.

Two soil landscapes are mapped by Chapman *et al* (1989) within the Flora and Fauna study area. The Glenorie Soil Landscape covers the north-west third and south-east third of the study area with

the Lucas Heights Soil Landscape mapped in a band through the central third of the site. Chapman and Murphy (1989) described the Glenorie Soil Landscape as occurring over the Ashfield and Bringelly Shales of the Wianamatta Group Shales. Surface soils are friable loams, overlying clay loams with various clay sub soils deeper through the profile. This soil type has a generally low to moderate fertility and erodibility increases from low for surface soils through to moderate for subsoils.

The geology of the Lucas Heights Soil Landscape is primarily the Mittagong Formation but may include minor intrusions of Hawkesbury Sandstone and Ashfield Shale. Soil composition includes sandy loams on the surface followed by stony sandy clay loams through to clays in the lower part of the profile. This soil landscape generally has a low fertility and overall moderate to high erodibility (Chapman and Murphy 1989). In the case of the subject site, the area mapped by Chapman ***et al*** (1989) appears, from ground truthing, to be Ashfield Shale.

There is evidence that some parts of the site have had the parent soils modified. Widespread alteration of natural soil levels has occurred along the central and northern boundary where the soil level has been built up and leveled. Again, around the playing field, there has been leveling of soils. There is a low but distinct batter running parallel to the creekline between the creek and the playing field. This batter contains some large pieces of concrete building rubble. Despite these changes in levels, most of the subject site's surface soil appears to be composed of parent soil representative of the subject site's original soil. With the exception of visible pieces of exposed fill in the aforementioned small area between the creek and the playing field, any filled areas appear to be commensurate with soil sourced from on-site and of the upper horizons of the subject site's soil profile. The creekline is severely eroded in places due to increased stormwater runoff.

Current land uses adjacent to the site are urban residential development, passive recreational parkland associated with the Morling College and educational facilities within Macquarie University, and a multi-level development currently being constructed (Cochlear Global Headquarters). There is a small but floristically and structurally intact remnant of Sydney Turpentine Ironbark Forest occupying approximately 0.01 of a hectare on Macquarie University's land directly adjacent to the northern tip of the subject site. The overall Master Plan for the re-development of the university site has identified that this remnant of STIF may be modified and/or removed, although the Plan states that the University Creek riparian corridor will be protected and enhanced (CRI 2008), and this should include the area that is mapped as STIF.

4.3 Flora

4.3.1 Plant Species

A total of 76 plant species were recorded within the study area during the flora field survey, including 56 native species and 20 introduced species (Table 1, Appendix A). There were 18 native species recorded in the subject site that are not indigenous to the area, and 38 locally indigenous species. The non indigenous native species includes two species listed as threatened under the NSW TSC Act 1995 as detailed in section 4.3.3 below.

Of the 20 introduced species, 8 are recorded as noxious, as listed under the *NSW Noxious Weeds Act 1993* for the Ryde City LGA (Table 3).

Table 3 Plant species recorded within the study site listed under the *NSW Noxious Weeds Act 1993* for Ryde City LGA (Order No.20).

Control Class[1]	Common Name	Scientific Name
4	Camphor Laurel	*Cinnamomum camphora*
4	Large Leaf Privet	*Ligustrum lucidum*
4	Small Leaf Privet	*Ligustrum sinense*
4	Asparagus Fern	*Asparagus aethiopicus*
4	Morning Glory	*Ipomoea indica*
4 & 5	Lantana	*Lantana camara*
4	Camphor Laurel	*Cinnamomum camphora*
4	Senna	*Senna pendula var glabrata*

4.3.2 Plant Communities

Two plant communities were identified within the subject site:

- Cleared and Disturbed Woodland / Grassland; and
- Riparian Vegetation

A third plant community was found within the study area outside the subject site and was assessed for the purposes of this report due to its connectivity to the subject site and its conservation value:

- Sydney Turpentine Ironbark Forest (STIF) adjoining the site in Macquarie University.

This community is located on the Macquarie University site to the north of the proposed development. While the subject site includes some remnant native trees that are characteristic of the STIF community, these areas do not constitute the EEC as described below.

Previous broad-scale mapping of the Sydney 1:100,000 map sheets by Benson and Howell (1994) have not identified any native plant communities either on, or immediately adjacent to, the subject site. Similarly, mapping of the native vegetation of the Cumberland Plain and adjacent areas by NPWS (2002) has not identified any native plant communities either on, or immediately adjacent to the subject site. The mapping project by NPWS (2002) did identify several stands of Sydney Turpentine-Ironbark Forest and Turpentine Ironbark Margin Forest approximately one kilometre to the north of the subject site. As noted in earlier sections, preliminary biodiversity assessments of the university campus by EDAW (2006) has mapped Sydney Turpentine-Ironbark Forest adjoining the north east boundary of the subject site and elsewhere on the University campus (Figure 3, Appendix B).

The distribution of plant communities identified in the current survey within the study site is shown in Figure 3 Appendix B and are described below.

[1] Noxious weed control categories (pursuant to the *NSW Noxious Weeds Act 1993*):

Class 1 State Prohibited Weeds. The plant must be eradicated from the land and the land must be kept free of the plant.

Class 2 Regionally Prohibited Weeds. The plant must be eradicated from the land and the land must be kept free of the plant.

Class 3 Regionally Controlled Weeds. The plant must be fully and continuously suppressed and destroyed.

Class 4 Locally Controlled Weeds. The growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.

Class 5 Restricted Plants. The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with.

Cleared and Disturbed Woodland / Grassland

The Cleared and Disturbed Woodland / Grassland plant community occurs over the majority of the subject site (Figure 3) in the open parkland, around the dwellings, chapel, day care centre and sheds. The canopy of the Cleared and Disturbed community consists of scattered native and exotic trees throughout the parkland (Appendix A).

Dominant native canopy species throughout the site are *Syncarpia glomulifera* Turpentine, *Eucalyptus pilularis* Blackbutt, *Eucalyptus globoidea* White Stringybark, *Eucalyptus punctata* Grey Gum and *Angophora costata* Sydney Red Gum. Exotic species recorded are numerous but generally shorter and represented by few or single specimens than native trees. The dominant species include *Jacaranda mimosifolia* Jacaranda and *Liquidambar styraciflua* Liquidambar. Canopy heights are 10 to 20m.

Understorey of the Cleared and Disturbed Woodland / Grassland community is characterised by widely scattered planted/naturalised small trees and shrubs such as *Buckinghamia celsissima* Ivory Curl Flower (occasional), *Melia azederach* White Cedar (occasional) and *Callistemon* cvs Bottlebrush. Planted small trees or horticultural shrubs occur in landscaped areas around the dwellings (eg *Camellia* cvs and *Pelargonium* cvs). Understorey heights are from 1.5 to 4 metres.

Mown exotic and native grasses, annual and perennial weeds dominate the groundcover stratum and include *Pennisetum clandestinum* Kikuyu, *Paspalum dilatatum* Paspalum, *Cynodon dactylon* Couch, *Plantago lanceolata* Lambs Tongue, *Sida rhombifolia* Paddy's Lucerne, *Dichondra repens* Kidneyweed and *Modiola caroliniana* Red Flowered Mallow.

The Cleared and Disturbed Woodland / Grassland community has a very low resilience and would require significant restoration works to return it to a native community. The resilience is noted as being higher below the larger remnant tree's canopies compared to the more open areas away from remnant trees. This slightly higher, but still very low resilience, seems to be a response to lower weed competition in turn influenced by canopies and roots of the remnant trees to those weed species. There is no measurable resilience in the area of the playing field with no native species encountered.

The pattern of finding healthier perennial native remnant species protected from mowing around the bases of remnant trees in relict modified/mown STIF in the local area was not encountered on this site. Presumably the grazing pressure of the high rabbit numbers has outcompeted species that can normally resist regular mowing such as *Dianella caerulea* Paroo Lily. It should be noted that all areas of the property appear to be mown and grazed by rabbits quite heavily. Some seeds, particularly leguminous species, have long term dormancy as underground stored seed. It is relevant to note the effect of the suppression of mowing at several similar sites where *Pennisetum clandestinum* Kikuyu and introduced *Cynodon dactylon* Couch under remnant and planted trees underwent a cessation of mowing which resulted in recovery of STIF species in an even more isolated site than this one (e.g. Killara Park, East Killara), including several rare or threatened species.

However, there was no evidence of such species occurrence at the subject site and the likelihood of them occurring and recovering from any potential underground seed store is remote. This fact, combined with the vegetation structure and composition on the site, disturbance history, planted trees and shrubs and low resilience precludes the occurrence of the STIF EEC from this zone.

Riparian Vegetation

Riparian Vegetation occurs along the creek near the northwest boundary of the site. The creek flows northeast through this section of the site It is connected to a small patch of a floristically more diverse remnant of vegetation downstream on the adjoining Macquarie University land (subsection of the area marked as remnant 3 in the EDAW, 2006, mapping) (Figure 1, Appendix B) which is discussed below *(STIF adjoining the site in Macquarie University*). STIF is listed as an Endangered Ecological Community (EEC) under Schedule 1 of the *Threatened Species Conservation Act 1995* (TSC Act) and as Critically Endangered under the Commonwealth EPBC Act 1999.

Canopy of the Riparian Vegetation along the creek is dominated by characteristic native plant species for STIF with *Angophora costata* Sydney Red Gum and *Eucalyptus globoidea* White Stringybark occurring occasionally. *Eucalyptus pilularis* Blackbutt, also occurs commonly as a co-dominant. One specimen of *Eucalyptus saligna* Sydney Blue Gum occurs within this vegetation zone. Canopy height

in this vegetation community is up to 25m, Foliage Projective Cover (FPC) is 50% within the boundaries of the Riparian Vegetation community. There is a level of canopy connectivity within this plant community. Age class structure of this Riparian Vegetation zone indicates the majority of canopy consisting of remnant trees and some scattered regrowth trees.

There is a mid-storey of *Pittosporum undulatum* Sweet Pittosporum to heights of 8m along with weedy species such as *Ligustrum lucidum* Large-leaved Privet, *Ligustrum sinense* Small-leaved Privett and *Cinnamomum camphora* Camphor Laurel to 5m with an FPC of < 5%.

The understorey is sparse with a FPC of <5% up to 2 metres with *Acacia linifolia* Flax Leaved Wattle and *Polyscias sambucifolia* Elderberry Panax both uncommon. *Polyscias sambucifolia* is a characteristic species of STIF (DECC 2010c)

The groundcover stratum is composed, on the edge of this vegetation zone, of dense swards of non-local native *Nephrolepis cordifolia* Fishbone Fern and *Ipomoea indica* Blue Morning Glory. Other species occur uncommonly in the groundcover and include *Centella asiatica* Indian Pennywort, *Dichondra repens* Kidney Weed and *Oplismenus aemulus* Basket Grass.

The Riparian Vegetation zone is a narrow corridor associated with the creek line, and has a high edge effect of weeds and disturbance. It has a low resilience, and is very limited in area due to the adjoining sports oval. The zone is to become incorporated into the proposed core riparian zone, improving species diversity in this area and improving linkages with the adjoining STIF community.

Sydney Turpentine Ironbark Forest (STIF) in the adjoining Macquarie University Site.

Near the northern corner of the site on Macquarie University land where the Riparian Vegetation zone drains into, is a remnant of STIF occupying approximately 30m x 50m. Although outside the subject site, the area was targeted during field surveys based on the assessments of previous studies (EDAW, 2006) and to assess the potential direct or indirect impacts of the proposed development (site clearing, construction works, erosion and sedimentation etc) to this vegetation. In determining the classification of the community this report has applied the diagnostic tests described for the community by Tozer (2003). No impacts to this community are predicted from the proposed development.

Canopy of community is from 25 to 30m and dominated by *Angophora costata* Sydney Red Gum, with *Eucalyptus pilularis* Blackbutt and *Syncarpia glomulifera* ssp *glomulifera* Turpentine also present. A midstorey to 15m of regenerating canopy species is present. The sparse understorey is between 1 and 2m with common species including regenerating *Angophora costata* Sydney Red Gum and *Pittosporum undulatum* Sweet Pittosporum, with shrubs such as *Acacia longifolia* ssp *longifolia* Sydney Golden Wattle, *Leucopogon juniperinus* Prickly Beard-heath and *Ozothamnus diosmifolius* Rice Flower also present. The regenerated area of groundcover stratum is dominated by native grasses and herbs with the mown area of the community a mix of native and exotic groundcover species. Dominant native groundcover species throughout are *Dianella caerulea* Blue Flax-lily, *Entolasia* spp, *Glycine clandestina*, *Imperata cylindrica* Blady Grass, *Lomandra longifolia* Spinyheaded Mat-rush, *Microlaena stipoides* var *stipoides* Weeping Grass and *Pratia purpurascens* Whiteroot.

Regrowth woody weeds and vines including *Cinnamomum camphora* Camphor Laurel, *Ipomoea indica* Blue Morning Glory and *Ligustrum lucidum* Large Leaved Privet are present and exotic grasses and annual or perennial herbs include *Digitaria sanguinalis* Summer Grass, *Conyza* sp Fleabane, *Ehrharta erecta* Panic Veldtgrass, *Paspalum dilatatum* Paspalum and *Taraxacum officinale* Dandelion.

This plant community has a moderate resilience with the lower stratums regenerating over the majority of the area most likely as a result of the cessation of mowing practices. Weed control works have also most likely been carried out and threatening classes such as woody and vine weeds are re-establishing.

4.3.3 Threatened Plant Species

There were 2 threatened plant species listed under the TSC Act, both of which are listed under the EBPC Act, recorded on the subject site in the current investigation (Table 4).

Table 4 Threatened flora species recorded on the subject site from the current survey.

Scientific Name	Common Name	TSC Act Status[2]	EPBC Act Status[3]
Eucalyptus scoparia	Wallangara White Gum	E1	V
Syzygium paniculatum	Magenta Lilly Pilly	E1	V

Eucalyptus scoparia Wallangarra White Gum

One individual of *Eucalyptus scoparia* Wallangarra White Gum was recorded during the current survey in the far eastern corner area of the site. It is a planted specimen associated with the garden of a single storey dwelling. Additionally it is well outside of its natural range and habitat. This single planted specimen was identified as *Eucalyptus punctata* Grey Gum in the arborist's report. This specimen occurs within the 5m setback zone along the north-east boundary and hence should not be impacted upon by any construction provided that the recommended tree protection measures as detailed in the Arborist report are implemented.

Eucalyptus scoparia Wallangarra White Gum is an Endangered plant species in NSW as listed under Schedule 1 of the TSC Act and Vulnerable under the federal EPBC Act. This is a small tree species to 15 m tall with smooth, powdery white to pale grey bark that occurs in Queensland and reaches its southern limit in NSW in only three locations near Tenterfield, including Bald Rock National Park (DECC, 2008b). Habitat of the species is open eucalypt forest and woodland on well-drained granite hilltops, slopes and rocky outcrops in its natural range and distribution (DECC, 2008b) and the species is commonly grown in south-eastern Australia as an ornamental plant (Brooker *et al*, 2002)

Threats to the species within the natural range and distribution, identified by the DECC (2008b) are;

- Clearing and fragmentation of open forest and woodland habitat for agriculture and development
- Timber collection;
- Damage to plants by bushwalkers; and
- Risk of local extinction because populations are small.

No recovery plan has been prepared by the NSW Department of Environment, Climate Change and Water for *Eucalyptus scoparia* Wallangarra White Gum.

Syzygium paniculatum Magenta Lilly Pilly

One individual of *Syzygium paniculatum* Magenta Lilly Pilly was recorded during the current survey, located along the central part of the boundary running NW to SE. It occurs north of the proposed building within the Stage 2 area (Building B). It is a planted specimen and occurs within the proposed 6m wide setback zone that runs parallel to the boundary at this part of the site and hence should not be impacted upon by any construction works. Additionally it is a planted specimen and growing outside its natural habitat (i.e. non-indigenous to the area).

Syzygium paniculatum Magenta Lilly Pilly is an Endangered plant species in NSW as listed under Schedule 1 of the TSC Act and Vulnerable under the Federal EPBC Act. The *Syzygium paniculatum* Magenta Lilly Pilly is a small to medium sized rainforest tree that grows to 8m tall and is found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities (DECC 2010d). The species is commonly grown in south-eastern Australia as an ornamental species (Brooker *et al*, 2002).

[2] CE critically endangered (Schedule 1A of the TSC Act); E1 – endangered (Schedule 1 of the TSC Act); V – vulnerable (Schedule 2 of the TSC Act).

[3] CE – critically endangered, E – endangered, V – vulnerable

Threats to the species within the natural range and distribution, identified by the DECC (2010d) are;

- As a rainforest plant, it is likely the Magenta Lilly Pilly has not evolved to cope with frequent fire.
- Loss of habitat through clearing for residential development.
- Grazing and trampling of habitat by grazing stock.
- Weeds, particularly Lantana, are invading the species' habitat.

No recovery plan has been prepared by the NSW Department of Environment, Climate Change and Water for *Syzygium paniculatum* Magenta Lilly Pilly

Additionally a search of the DECCW Wildlife Atlas identified 31 threatened plant species occurring within 10 km of the site (Table 5).

Table 5 Threatened flora species previously recorded within the locality (10km search) on the DECCW Wildlife Atlas.

Scientific Name	TSC Act Status[1]	EPBC Act Status[2]
Hibbertia puberula	E1	
Tetratheca glandulosa	V	V
Epacris purpurascens var. purpurascens	V	
Acacia bynoeana	E1	V
Acacia terminalis ssp terminalis	E1	
Haloragodendron lucasii	E1	E
Camarophyllopsis kearneyi	E1	
Hygrocybe anomala var. ianthinomarginata	V	
Hygrocybe aurantipes	V	
Hygrocybe austropratensis	E1	
Hygrocybe collucera	E1	
Hygrocybe griseoramosa	E1	
Hygrocybe lanecovensis	E1	
Hygrocybe reesiae	V	
Hygrocybe rubronivea	V	
Prostanthera marifolia	CE	Ex
Callistemon linearifolius	V	-
Darwinia biflora	V	V
Eucalyptus camfieldii	V	V
Eucalyptus nicholii	V	V

Table 5 cont' Threatened flora species previously recorded within the locality (10km search) on the DECCW Wildlife Atlas.

Leptospermum deanei	V	V
Melaleuca deanei	V	V
Syzygium paniculatum	E1	V
Caladenia tessellata	E1	V
Genoplesium baueri	V	-
Sarcochilus hartmannii	V	
Deyeuxia appressa	E1	E
Grevillea caleyi	E1	
Persoonia hirsuta	E1	
Lasiopetalum joyceae	V	
Pimelea curviflora var. curviflora	V	V

[1] E1 – endangered (Schedule 1 of the TSC Act); CE – Critically Endangered (Schedule 1A of the TSC Act) V – vulnerable (Schedule 2 of the TSC Act).
[2] E – endangered, V – vulnerable, Ex- Extinct

4.3.5 Threatened Populations

No threatened flora populations listed under the TSC Act were recorded on the subject site in the current investigation.

4.3.6 Threatened Ecological Communities

Sydney Turpentine Ironbark Forest (Threatened Species Conservation Act, 1995)

One EEC, Sydney Turpentine-Ironbark Forest (STIF) is recorded adjacent to the subject site in the current and previous surveys. STIF is listed as endangered under the NSW TSC Act. In determining the identification of STIF as per the TSC Act adjacent to the subject site, this report has applied the diagnostic tests described by Tozer (2003) for the two sub-units of the community, namely Turpentine-Ironbark Forest and Turpentine-Ironbark Margin Forest. Assessment included the survey of a 0.04 ha sample quadrat.

In the first instance the survey results did not meet the required minimum native species for the test to proceed to diagnosis by floristic composition for either Turpentine-Ironbark Forest (33 species) or Turpentine-Ironbark Margin Forest (38 species).

However, the understorey and groundcover stratums are not at an advanced phase of regeneration and a total of 27 native species were recorded from all stratums. In proceeding with the test for Turpentine-Ironbark Forest (Tozer, 2003) the 12 positive diagnostic species present in the survey quadrat did not meet the required 18 to confirm the presence of the community. Alternatively in proceeding with the test for Turpentine-Ironbark Margin Forest the sample quadrat contained more than the minimum 11 positive diagnostic species to confirm the presence of the sub unit. Therefore STIF of the adjoining site in this assessment most closely corresponds to the Turpentine-Ironbark Margin Forest subunit of STIF described by Tozer (2003).

Regionally, Turpentine-Ironbark Margin Forest occurs in higher rainfall areas on the margins of the Cumberland Plain in close proximity to a sandstone/shale boundary. The parent geology consists predominantly of Wianamatta Shale with lesser components of Mittagong Formation and Hawkesbury

Sandstone. In areas with lower rainfall the community grades with Turpentine-Ironbark Forest and these two subunits cumulatively represent STIF (Tozer, 2003). STIF is an Open Forest community with a sparse shrub stratum and well developed groundcover stratum but can exist as woodland or as remnant trees dependant on disturbance history (NSW Scientific Committee, 1998).

STIF occurs within the local government areas Ashfield, Auburn, Canterbury, Concord, Drummoyne, Leichhardt, Marrickville, Bankstown, Ryde, Hunters Hill, Baulkham Hills, Ku-ring-gai, Hornsby, Parramatta, Bankstown, Rockdale, Kogarah, Hurstville, and Sutherland and is restricted to the Sydney Basin Bioregion. Large areas of STIF have been cleared for agriculture and urban development with remnants small and scattered and only small areas of STIF are presently included in conservation reserves (NSW Scientific Committee, 1998). In many of the LGA's where the community is known, particularly in the inner western suburbs, only remnant trees may remain. The NSW Scientific Committee (1998) suggests that these stands may have particular ecological and genetic significance and may be important sources of propagation material for use in rehabilitation projects.

Various estimates of the remaining area of the community range from 0.5% (NSW Scientific Committee, 1998) to 4.5% (NPWS, 2004) of its original extent. Threats to the community include clearing, physical damage from recreational activities, rubbish dumping, grazing, mowing and weed invasion (NSW Scientific Committee, 1998). The DECC has identified total of 10 strategies to help recover this EEC and these are accompanied by a total of 16 priority actions.

Previous mapping of the native vegetation of Western Sydney Map Sheet 10 - Map 10 - Auburn LGA, Concord LGA, Hunters Hill LGA, Ku-ring-gai LGA, Lane Cove LGA, North Sydney LGA, Ryde LGA, Strathfield LGA and Willoughby LGA 1:25, 000, does not depict any mapped vegetation communities on the subject site.

From surrounding extant vegetation, mapping of the general locality, from structural and floristic remnants, and soil landscape on the site, it could be inferred that originally the entire site was covered with STIF (subunit Turpentine Ironbark Forest) (Tozer, 2003)). However, the total number of positive diagnostic species to identify STIF in the diagnostic test (Tozer, 2003) for the entire site does not meet the required 18 positive diagnostic species, with only 14 recorded for the entire study area. The total number of native species (21) for the entire subject site also falls short of the minimum required for a 0.04 hectare survey plot for either subset of STIF (Turpentine Ironbark Forest requires a minimum of 33 native species, Turpentine Ironbark Margin Forest requires a minimum of 38 native species).

Sydney Turpentine Ironbark Forest (Environment Protection and Biodiversity Conservation Act 1999)

The Commonwealth Environment Protection Biodiversity Act (1999) also recognises the EEC Sydney Turpentine Ironbark Forest and is listed as critically endangered. The definition of this EEC under the EPBC Act differs somewhat to that of the NSW TSC Act. The EPBC Act encompasses a broader range of formations and includes communities that the TSC Act considers as separate to STIF.

The EPBC Act is however more narrow in scope when it defines minimum benchmarks of total area and structural intactness than does the TSC Act. The EPBC Act requires that any vegetation to be encompassed by the Act's definitions of STIF must be at least one hectare in area and to have an intact native understorey.

The vegetation on the subject site or study area does not qualify to conform to this definition as the vegetation (on the adjoining site) with an intact understory is less than 1 hectare in area.

In summary, the subject site contains a total of 38 locally indigenous species and 8 noxious weed species. Two threatened flora species occur on the subject site, (*Eucalyptus scoparia* Wallangarra White Gum and *Syzygium paniculatum* Magenta Lilly Pilly) and while neither will be directly impacted by the proposal both are planted specimens non-indigenous to the area. This assessment has concluded that the endangered ecological community STIF does not occur within the subject site as the subject site resilience is assessed as low, there was no evidence of recovery of STIF species within the subject site and the likelihood of them occurring and recovering from any potential underground seed store is remote. Removal of isolated native tree species that are characteristic of STIF will be required, however again they are not considered to form part of an EEC within the subject site. A much higher quality remnant of native vegetation occurs on the adjoining Macquarie University site, and this most closely resembles the Turpentine Ironbark Margin Forest subunit of STIF. The

riparian zone of the subject site does contain some canopy trees characteristic of STIF, although in a very much modified form. The value of this area, and the value of the proposed protection and enhancement of the corridor is the protection of the riparian zone, protection of the adjoining STIF community and the improved linkages on and off the site.

4.4 Fauna

4.4.1 Fauna Species

A total of 21 vertebrate fauna species were visually and aurally identified during the current field survey, including 1 frog species, 13 bird species, 6 mammal species and 1 species of eel. Upon analysis of the Anabat data, a probable recording of *Chalinolobus gouldii* Gould's Wattle Bat was made. *Chalinolobus gouldii* has been noted for its highly adaptive nature and its ability to utilise residential dwellings for roosting sites (Churchill, 1998). No threatened species were located within the study area.

Several *Pteropus poliocephalus* Grey-headed Flying Foxes were observed flying over the site during nocturnal survey. No individuals were observed foraging within the subject site during the current survey. *Pteropus poliocephalus* Grey-Headed Flying-Fox is listed as a Vulnerable species under Part 1 of Schedule 2 of the *Threatened Species Conservation Act 1995* (TSC Act).

The Grey-Headed Flying-Fox is a highly mobile species with a nightly feeding range of 20 to 50km from a roosting camp. Diet typically comprises a wide variety of flowering and fruiting plants (Tidemann 1995, Churchill 1998), in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines. Grey-Headed Flying-Foxes play a vital role in the cross pollination of more than 80 native species (Churchill, 1998). Non-indigenous and exotic tree species introduced to the urban landscape provide additional foraging habitat for this species within the locality; where previously existed a period of reduced availability of native food resource during the winter months, and non-native species now supply food resources throughout the year (Parry-Jones & Augee 2001, Williams et al 2006). The closest known roosting camp to the subject site is located at located at Gordon, approximately 5km to the north-east of the subject site. Approximately 450,000 Grey-headed Flying Foxes have been known to occupy the Gordon camp in peak seasons (KBCS, 2009).

Other species recorded in the study area during the current survey are generally typical of urban, peri-urban and surrounding natural areas within the Sydney Basin Biogeographical Region and are considered widespread in distribution and common to abundant within their ranges. A full list of species recorded during the current survey can be found in Appendix A.

4.4.2 Fauna Habitats

Fauna habitats of the subject and study area are assessed in two main categories for the current survey. Fauna habitat features and resources at a locality scale form part of the broader landscape of the study area. Site specific fauna habitat features and resources provide the key elements required by native fauna for the maintenance of life cycles. Fauna habitats identified in the current survey and associated general fauna are summarised in Table 6.

The subject site supports a variety of habitat resources that may be utilised by common protected or threatened fauna occurring in the locality. The main habitat types occurring in the study area occur within the Riparian Vegetation and Cleared and Disturbed areas.

The riparian vegetation occurring in association with University Creek provides offers a range of habitat resources to a variety of native fauna species. The canopy of large trees such as *Angophora costata* Sydney Red Gum, *Eucalyptus pilularis* Blackbutt and *Syncarpia glomulifera* ssp *glomulifera* Turpentine provides potential foraging, nesting, roosting and sheltering habitat for arboreal mammals including *Trichosurus vulpecular* Common Brushtail Possum and *Pseudocheirus peregrinus* Common Ringtail Possum, in addition to microchiropteran bats and medium to large birds. Lower stratums are generally discontinuous, highly modified and disturbed by past and current land use. Occasional mid-storey species such as *Acacia longifolia* ssp *longifolia* Sydney Golden Wattle offer a foraging resource to many bird species and arboreal mammals. Groundcovers and small shrubs provide foraging and sheltering habitat for common terrestrial mammals and reptiles and small birds. Occasional fallen timber and leaf litter in places contribute to foraging and sheltering habitat for reptiles and small

terrestrial mammals. The creek itself, although degraded and eroding in places, offers habitat to amphibians such as *Limnodynastes peroni* Striped Marsh Frog, particularly where fringing vegetation of low grasses, herbs and groundcovers offer shelter and protection.

Cleared and Disturbed Grassland areas dominate the subject site and provide limited fauna habitat, as such areas are generally lower in habitat complexity. Cleared mown areas offer foraging habitat for terrestrial mammals such as *Oryctolagus cuniculus* Rabbit and birds such as *Dacelo novaeguineae* Laughing Kookaburra. There is an absence of fully structured vegetation, large trees supporting hollows, limited leaf litter and loose surface soils, no sandstone outcrops or ledges, few loose rocks and an absence of logs and rotting stumps.

Table 6 Fauna habitat types and resources.

Area	Habitat Feature	Habitat Resources and Fauna
Locality	Large continuous tracts of native plant communities, including Lane Cove National Park	Foraging, nesting, roosting and sheltering for birds, reptiles, amphibians, arboreal and terrestrial mammals and bat species.
	Landscape planted and street trees	Foraging, nesting, roosting and sheltering for birds, reptiles, amphibians, arboreal and terrestrial mammals and bat species.
	Drainage corridors	Foraging, nesting, roosting and sheltering for small, medium and large birds, arboreal mammals, reptiles and amphibians.
Subject Site	Broken canopy of native and/or exotic trees	Foraging, nesting, roosting and sheltering for small, medium and large birds, reptiles, arboreal mammals, megachiropteran and microchiropteran bat species.
	Sparse and disjunct midstorey and/or understorey	Foraging, nesting, roosting and sheltering for small and medium birds, reptiles, arboreal mammals and arboreal frogs.
	Highly modified groundcover	Foraging for small and medium birds, reptiles, amphibians and terrestrial mammals.
	Low occurrence of stags and tree hollows	Nesting, sheltering and roosting for small, medium and large birds, reptiles, arboreal mammals and microchiropteran bats.
	Open mown areas	Foraging for small and large terrestrial mammals and birds
	Access roads and pathways	Foraging and flyways for microchiropteran bat species.
	Creek line and damp areas	Foraging, nesting, roosting, sheltering for small, medium, large birds, arboreal mammals, reptiles and amphibians, foraging habitat for aquatic vertebrates.

The riparian vegetation and cleared areas in combination offer potential foraging habitat to threatened owl species known form the locality. Previous surveys conducted within the Lane Cover River corridor have recorded *Ninox strenua* Powerful Owl and *Ninox connivens* Barking Owl (Biosphere Environmental Consultants, 2006). Prey species of the Powerful Owl are known to include the Greater Glider, Common Ringtail Possum, Sugar Glider, Grey-headed Flying-Fox and roosting diurnal birds, including the Pied Currawong, Australian Magpie and Rainbow Lorikeet (DECC 2005a). Prey species of the Barking Owl include common native and introduced birds species such as Crimson Rosella, Starlings, Australian Magpie, Pied Currawong. Native arboreal mammals such as Sugar Glider, Squirrel Glider and Common Ringtail Possum seem to be preferred where possible but the species will also hunt rabbits, mice, rats, and microchiropteran bats species (Higgins 1999, NPWS 2003). Several prey species for both species of threatened owls were recorded as occurring within

the subject site during the current surveys, including Common Ringtail Possums, Rabbit, Pied Currawong, Australian Magpie and Rainbow Lorikeet.

Currently the subject site is a highly modified landscape that lacks many of the natural habitat features and resources that are important in the maintenance of native fauna diversity and life cycles, including fully structured vegetation, tree-hollows, a diverse shrub layer for food sources and protection, leaf litter and loose surface soils, sandstone outcrops and ledges, loose rocks, an abundance of logs and rotting stumps. In addition to the altered nature of fauna habitats, current human activities within the subject site and surrounding area, including high levels of night light, noise and vehicle or human traffic, are likely to reduce fauna habitat potential. Relative to the condition of native vegetation on the subject site, limited connectivity to bushland and the absence of many habitat features and resources as described above, the subject site has a low to moderate level of fauna habitat value.

4.4.3 Wildlife Corridors

Natural corridors provide connections within the landscape between larger areas of habitat. Corridors facilitate the movement and genetic exchange of flora and fauna, which allows the continuation of viable populations. The importance of wildlife corridors, such as drainage lines and fully or partially contiguous vegetation cover, is well documented (eg Recher ***et al***, 1986). At a locality scale the University Creek and riparian vegetation are offering some habitat resources and contribute to a fragmented corridor extending through the University campus and Morling College Site toward Lane Cove National Park in the north east. However the site is not considered to be part of a significant wildlife corridor for the movement and dispersal of native flora and fauna for the locality due to the limited habitat structure of the vegetation community within the study area and existing fragmentation within the locality.

4.4.4 Threatened Fauna Species

A single Vulnerable fauna species, Grey-headed flying-fox listed under the TSC Act or EBPC Act was recorded flying overhead during the nocturnal surveys, and no threatened fauna species were recorded on the subject site. A search of the DECCW Wildlife Atlas and EPBC Act Protected Matters Report identified 27 threatened fauna species previously recorded within 10km of the site (Table 3). Seven species have a dual listing under the TSC Act and EBPC Act.

Table 7 Threatened fauna species previously recorded within the locality (10km of the site) on the DECC Wildlife Atlas.

Scientific Name	Common Name	TSC Act Status[4]	EPBC Act Status[5]
Botaurus poiciloptilus	Australasian Bittern	V	-
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	E
Cercartetus nanus	Eastern Pygmy-possum	V	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Dasyurus maculatus	Spotted-tailed Quoll	V	E
Ephippiorhynchus asiaticus	Black-necked Stork	E1	-
Falco hypoleucos	Grey Falcon	V	-

[4] CE critically endangered (Schedule 1A of the TSC Act); E1 – endangered (Schedule 1 of the TSC Act); V – vulnerable (Schedule 2 of the TSC Act).

[5] CE - critically endangered, E – endangered, V – vulnerable

Table 7 cont' Threatened fauna species previously recorded within the locality (10km of the site) on the DECC Wildlife Atlas.

Scientific Name	Common Name	TSC Act Status[6]	EPBC Act Status[7]
Glossopsitta pusilla	Little Lorrikeet	V	-
Ixobrychus flavicollis	Black Bittern	V	-
Lathamus discolor	Swift Parrot	E1	E
Limosa limosa	Black-tailed Godwit	V	-
Litoria aurea	Green and Golden Bell Frog	E	V
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	V	-
Mormopterus norfolkensis	Eastern Freetail-bat	V	-
Nettapus coromandelianus	Cotton Pygmy-Goose	E1	-
Ninox connivens	Barking Owl	V	-
Ninox strenua	Powerful Owl	V	-
Pandion haliaetus	Osprey	V	-
Petaurus australis	Yellow-bellied Glider	V	-
Polytelis swainsonii	Superb Parrot	V	-
Pseudophryne australis	Red-crowned Toadlet	V	-
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Ptilinopus superbus	Superb Fruit-Dove	V	-
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-
Varanus rosenbergi	Rosenberg's Goanna	V	-
Xanthomyza phrygia	Regent Honeyeater	E1	E

4.4.5 Threatened Populations

No threatened flora populations listed under the TSC Act were recorded on the subject site in the current investigation.

5 HABITAT POTENTIAL FOR THREATENED SPECIES

5.1 Flora

Table 8 summarises the habitat potential of the subject site for the threatened plant and fungi species previously recorded as occurring within 5km radius of the site on the DECC Wildlife Atlas and listed in the EPBC Act matters of national environmental significance report for the locality.

[6] CE critically endangered (Schedule 1A of the TSC Act); E1 – endangered (Schedule 1 of the TSC Act); V – vulnerable (Schedule 2 of the TSC Act).

[7] CE - critically endangered, E – endangered, V – vulnerable

Table 8 Habitat potential for threatened flora species previously recorded within the locality (10km search) on the DEC Wildlife Atlas and listed under the EPBC Act.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Acacia bynoeana	Bynoe's Wattle is a semi-prostrate shrub to a metre high. The species is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Occurs in heath or dry sclerophyll forest on sandy soils. Generally prefers open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrowleafed Apple.	Low. Subject site supports marginal habitat in places.
Acacia bynoeana	Bynoe's Wattle is a semi-prostrate shrub to a metre high. The species is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Occurs in heath or dry sclerophyll forest on sandy soils. Generally prefers open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrowleafed Apple.	Low. Subject site supports marginal habitat in places.
Acacia terminalis ssp terminalis	Very limited distribution between Botany Bay to the northern foreshore of Port Jackson. Recent collections have only been made from the Quarantine Station, Clifton Gardens, Dover Heights, Parsely Bay, Nielson Park, Cooper Park, Chifley and Watsons Bays.Coastal scrub and dry sclerophyll woodland on sandy soils .	Low. Subject site does not support preferred soil type of vegetation associations.
Caladenia tessellata	The Tessellated Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. It was also recorded in the Huskisson area in the 1930s. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	Low. Distribution of this species is highly restricted
Callistemon linearifolius	This shrub is recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. There are currently only 5-6 populations in the Sydney area, of the 22 populations recorded in the past. Three of these are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve, and Spectacle Island Nature Reserve. Further north it has been recorded from Yengo National Park. Grows in dry sclerophyll forest	Low. Marginal preferred soil type and vegetation associations occur on the subject site
Camarophyllopsis kearneyi	Known only from its type locality in Lane Cove Bushland Park in the Lane Cove local government area in the Sydney metropolitan region. Its occurrence appears to be limited to the Lane Cove Bushland Park. Surveys in potentially suitable habitats elsewhere in the Sydney Basin Bioregion have failed to find Camarophyllopsis kearneyi.	Low. Distribution of this species is highly restricted. Subject site supports some marginal habitat in places.
Darwinia biflora	An erect to spreading shrub to 80cm high. Occurs at 129 sites in the northern and north-western suburbs of Sydney, in the Ryde, Baulkham Hills, Hornsby and Ku-ring-gai local government areas. The species occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include *Eucalyptus haemastoma*, *Corymbia gummifera* and/or *E. squamosa*. The vegetation structure is usually woodland, open forest or scrub-heath. Fire is an important factor in the life cycle of this species. Fire kills all plants, but also produces a flush of germination from seed stored in the soil. The number of individuals at a site declines with time since fire, as the surrounding vegetation develops.	Low-Medium. Marginal preferred soil type and vegetation associations occur on the subject site

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Deyeuxia appressa	An erect perennial grass that is a highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. Was then collected in 1941 from Killara, near Hornsby. Has not been collected since and may now be extinct in the wild due to the level of habitat loss and development that has occurred within these areas. Grows on wet ground.	Low. Distribution of this species is highly restricted.
Epacris purpurascens var. purpurascens	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence including sclerophyll forest, scrubs and swamps on sandstone. Lifespan is recorded to be 5-20 years, requiring 2-4 years before seed is produced in the wild. Killed by fire and reestablishes from soil-stored seed.	Medium. Subject site supports marginal habitat in places.
Eucalyptus camfieldii	Restricted distribution in a narrow band fromRaymond Terrace in the north, south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of ***E.oblonga*** Narrow-leaved Stringybark, ***E. capitellata*** Brown Stringybark and ***E. haemastoma*** Scribbly Gum. Poor response to too frequent fires.	Low. Subject site supports marginal soil type and vegetation associations in places.
Eucalyptus nicholii	This species is widely planted as an urban street tree and in gardens but is quite rare in the wild. It is confined to the New England Tablelands of NSW, where it occurs from Nundle to north of Tenterfield, largely on private property. Natural habitat for the species is dry grassy woodland, on shallow and infertile soils, mainly on granite.	Nil. Subject site does not support preferred soil type or vegetation associations.
Genoplesium baueri	A terrestrial orchid 6-15 cm high, fleshy, brittle, yellowish-green or reddish. Inflorescence sparse, 1-3 cm long, 1-6-flowered. The species has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Known to occur in the Pittwater, Cumberland, Burragorang and Sydney Cataract areas. Grows in sparse sclerophyll forest and moss gardens over sandstone. Flowers Dec. – Mar.	Low. Subject site supports some marginal habitat in places.
Grevillea caleyi	Restricted to an 8km square area around Terrey Hills, approximately 20km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas. All natural remnant sites occur within a habitat that is both characteristic and consistent between sites. All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by Eucalyptus sieberi and E. gummifera. Commonly found in the endangered Duffys Forest ecological community.	Low. Subject site supports some marginal habitat in places.
Haloragodendron lucasii	An erect hairless shrub to 1.5 m tall, with fourwinged branches arising in pairs. The flowers are creamy-white and almost stalkless, with four triangular erect sepals (petal-like structures). The known locations of this species are confined to a very narrow distribution on the north shore of Sydney. The species is associated with dry sclerophyll forest. Reported to grow in moist sandy loam soils in sheltered aspects, and on gentle slopes below cliff-lines near creeks in low open woodland. Associated with high soil moisture and relatively high soil-phosphorus levels.	Low. Distribution of this species is highly restricted. Subject site supports some marginal habitat in places.
Hibbertia puberula	Has not been seen for over 40 years. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. Occurs on sandy soil often associated with sandstone.	Nil.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Hygrocybe anomala var. ianthinomarginata	Type locality, Lane Cove Bushland Park, Lane Cove Local Government Area. Other records from Royal and Blue Mountains NPs. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Hygrocybe aurantipes	Type locality, Lane cove Bushland Park, Lane Cove Local Government Area. Other records from Blue Mountains National Park (Mt Wilson) and Hazelbrook. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Hygrocybe austropratensis	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss. Does not produce above ground fruiting bodies (fungus) all year round. Fruiting bodies begin appearing mid May to mid July sometimes to August.	Low. Subject site supports some marginal habitat in places.
Hygrocybe collucera	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Hygrocybe griseoramosa	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Hygrocybe lanecovensis	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Hygrocybe reesiae	Type locality, Lane cove Bushland Park, Lane Cove Local Government Area. Also recorded from Blue Mountains National Park in the Hazelbrook area. Also found in Tasmania. Occurs in gallery warm temperate forests dominated by Lilly Pilly (Acmena smithii), Grey Myrtle (Backhousia myrtifolia), Cheese Tree (Glochidion ferdinandi) and Sweet Pittosporum (Pittosporum undulatum). Associated with alluvial sandy soils of the Hawkesbury Soil Landscapes with naturally low fertility and erodible. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Hygrocybe rubronivea	Only know from type locality at Lane Cove Bushland Park, Lane Cove Local Government Area. Occurs in gallery warm temperate forests dominated by Lilly Pilly Acmena smithii, Grey Myrtle Backhousia myrtifolia, Cheese Tree Glochidion ferdinandi and Sweet Pittosporum Pittosporum undulatum. Associated with alluvial sandy soils of the Hawesbury Soil Landscapes. Occur as individuals or in groups, terrestrial rarely on wood and only if extremely rotten; substrates include soil, humus, or moss.	Low. Subject site supports some marginal habitat in places.
Lasiopetalum joyceae	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone	Low-Medium. Subject site supports some marginal habitat in places.
Leptospermum deanei	A shrub known from Hornsby, Warringah, Ku-ringgai and Ryde LGAs the species occurs in Woodland on lower hill slopes or near creeks preferring sandy alluvial soil or sand over sandstone. Vegetation associations are Riparian Scrub - e.g. *Tristaniopsis laurina, Baechea myrtifolia*; Woodland - e.g. *Eucalyptus haemstoma*; and Open Forest - e.g. *Angophora costata*,*Leptospermum trinervium, Banksia ericifolia*. The species is probably killed by fire	Low Subject site supports some marginal habitat in places.
Melaleuca deanei	Occurs in two distinct areas, in the Ku-ringgai/Berowra and Holsworthy/Wedderburn areas with more isolated occurrences at Springwood Wollemi National Park, Yalwal and on the Central Coast. The species grows in heath on sandstone. The species is known from the following reserves, Berowra Valley Regional Park, Brisbane Water National Park, Ku-ring-gai Chase National Park, Garigal National Park, Lane Cove National Park, Royal National Park and Heathcote National Park.	Medium. Subject site supports some marginal habitat in places.
Persoonia hirsuta	Occurs in woodlands and dry sclerophyll forest on sandstone or very rarely on shale.	Low. Subject site supports some marginal habitat in places.
Persoonia hirsuta	The Hairy Geebung has been recorded in the Sydney coastal area (subsp. hirsuta - Gosford to Berowra to Manly to Royal National Park), the Blue Mountains area (subsp. evoluta - Springwood, Lithgow, Putty) and the Southern Highlands (subsp. evoluta - Balmoral, Buxton, Yanderra and Hill Top areas). It is probably killed by fire (as other Persoonia species are) but will regenerate from seed. The Hairy Geebung is found in sandy soils in dry sclerophyll open forest, woodland and heath on sandstone	Low. Subject site supports some marginal habitat in places.
Pimelea curviflora var. *curviflora*	Open forest and shrublands on sandy soils in coastal areas or shale/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes. Often grows amongst dense grasses and sedges.	Low. Subject site supports some marginal habitat in places.
Pimelea curviflora var. curviflora	A much-branched shrub 20 to 120cm high with hairy stems and flowers are red to yellow. Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridge tops and upper slopes in woodlands amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing.	Low – Medium. Subject site supports some marginal habitat in places.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
Pimelea spicata	Has been recorded from both Shale Hills and Shale Plains Woodland sub units of Cumberland Plain Woodland. The species is found on well structured clay soils and is strongly associated with Grey Box, Forest Red Gum, Narrow-leaved Ironbark, Blackthorn, and Kangaroo Grass.	Medium. Subject site supports some marginal habitat in places.
Prostanthera marifolia	Occurs as localised patches in or in close proximity to the Duffys Forest Ecological Community, which is listed as an Endangered Ecological Community in Schedule 1, Part 3 of the *Threatened Species Conservation Act* 1995. The sites are located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.	Low. Subject site supports some marginal habitat in places.
Sarcochilus hartmannii	From the Richmond River in northern NSW to Gympie in south-east Queensland. Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000 m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees.	Nil. Subject site does not support preferred soil type of vegetation associations
Syzygium paniculatum	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	Low. Subject site supports some marginal habitat in places.
Tetratheca glandulosa	In areas of shale-sandstone transition habitat such as shale-cappings over sandstone. Occupies ridgetops, upper-slopes and mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam with stony lateritic fragments common. Vegetation varies from heaths and scrub to woodlands, open woodlands and open forest with distribution broadly corresponding to Sydney Sandstone Ridgetop Woodland.	Low. Subject site supports some marginal habitat in places.

5.2 Fauna

Table 9 summarises the habitat potential of the subject site for the threatened fauna species previously recorded as occurring within 5km radius of the site on the DECCW Wildlife Atlas and listed in the EPBC Act matters of national environmental significance report for the locality.

Table 9 Habitat potential for threatened fauna species previously recorded within the locality (10km search) on the DECCW Wildlife Atlas.

Species	Preferred Habitat	Likelihood of Occurrence
Botaurus poiciloptilus	The Australasian Bittern is a large, stocky bird, reaching up to 75 cm in length. In NSW the species may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes. Australasian Bitterns hide during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Breeding occurs in summer from October to January. Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds, and there are usually six olive-brown eggs to a clutch.	Nil-low. Subject site does not support freshwater wetlands.
Callocephalon fimbriatum	The Gang-gang Cockatoo is found in the central NSW coast and Tableland areas, including Canberra and the Hawkesbury/Nepean and Sydney Metro region. Usually frequents forested areas with old growth attributes required for nesting and roosting purposes. Also utilises less heavily timbered woodlands and urban fringe areas to forage, but appears to favour well timbered country. Preferred diet comprises the seeds of eucalypts, wattles and introduced hawthorns but the species will also consume berries, fruits, nuts and insects and their larvae.	Low-Medium. Subject site offers nesting and foraging habitat.

Table 9 cont' Habitat potential for threatened fauna species previously recorded within the locality (10km of the site) on the DEC Wildlife Atlas.

Calyptorhynchus lathami	The Glossy Black Cockatoo is distributed along the Australian east coast and inland districts, the species occurs from western Victoria to Rockhampton in Queensland and as far west as Cobar and Griffith in NSW. Locally nomadic; flocking habitat is limited to dryer forest types of suitable feeding habitat with the species feeding exclusively on seeds from Casuarina species. Breeding occurs in autumn and winter; one chick is raised by both parents in a nest constructed in a large tree-hollow (NPWS 1999).	Low. Subject site does not offer preferred nesting or foraging habitat
Cercartetus nanus	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pillaga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a 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, except in north-eastern NSW where they are most frequently encountered in rainforest.They feed largely on nectar and pollen collected from banksias, eucalypts and bottlebrushes. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (eg. grass-tree skirts). Nest-building appears to be restricted to breeding females, where tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks.	Nil-Low. Subject site does not offer preferred nesting and only limited preferred foraging habitat.
Chalinolobus dwyeri	The Large-eared Pied Bat is a microchiropteran bat found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel). Forage in low to mid-elevation dry open forest and woodland and well-timbered areas containing gullies close to roosting habitat. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and have a high fidelity to the same cave over many years. This species probably forages for small, flying insects below the forest canopy and likely to hibernate through the coolest months.	Low. Subject site does not offer roosting habitat. Subject site offers some foraging habitat. Species may fly over site on occasion.
Dasyurus maculatus	The Spotted-tailed Quoll is currently found along the escarpments, tablelands and coast of the eastern seaboard from the Bundaberg area in south-east Qld south through NSW to Victoria and Tasmania. Spotted-tailed Quolls are found in a variety of forest types including dry and moist eucalypt forests and rainforest. They tend to move along drainage lines and make dens in fallen hollow logs or among large rocky outcrops. They are usually nocturnal but are known to hunt and bask during the day. They are known to hunt on the ground and in trees	Nil-low. Subject site does not offer preferred habitat to the species
Ephippiorhynchus asiaticus	The Black-necked Stork is the only stork species in Australia. The species is widespread across coastal northern and eastern Australia, becoming increasingly uncommon further south into NSW, and rarely south of Sydney. Some birds may move long distances and can be recorded well outside their normal range.Inhabits permanent freshwater wetlands including margins of billabongs, swamps, shallow floodwaters, and adjacent grasslands and savannah woodlands; can also be found occasionally on inter-tidal shorelines, mangrove margins and estuaries.	Nil-low. Subject site does not support freshwater wetlands.

Table 9 cont' Habitat potential for threatened fauna species previously recorded within the locality (10km of the site) on the DEC Wildlife Atlas.

Falco hypoleucos	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Recorded utilizing a range of habitat from coastal to arid areas. Roosts and nests in dead or alive trees.	Nil-low. Species is a vagrant to Sydney region. Subject site offers some foraging habitat.
Glossopsitta pusilla	The Little Lorikeet is the smallest of the Australian Lorikeets. The species is distributed from Cairns in QLD to Adelaide in SA. In New South Wales Little Lorikeets are occur in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending west to Albury, Parkes, Dubbo and Narrabri. The species predominately forages for nectar and pollen in the tree canopy as well as melaleucas and mistletoes.	Nil-low. Subject site does not support preferred foraging habitat.
Ixobrychus flavicollis	The Black Bittern has a wide distribution, from southern NSW north to Cape York and along the north coast to the Kimberley region. The species also occurs in the south-west of Western Australia. In NSW, records of the species are scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. Nests, built in spring are located on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks. Between three and five eggs are laid and both parents incubate and rear the young.	Nil-low. Subject site does not support preferred foraging habitat.
Lathamus discolour	The Swift Parrot migrates from breeding grounds in Tasmania to the Australian mainland in winter the species ranges from south-eastern South Australia across inland and coastal areas to southeast Queensland. The preferred habitat on mainland Australia is woodlands and riparian vegetation where there are winter flowering eucalypts such as the Swamp Mahogany, Eucalyptus robusta in coastal areas (NPWS 2002a). Breeding in Tasmania between September and February sometimes in small colonies the nest is an unlined tree hollow with three to five eggs laid. The species feeds mainly on nectar but also pollen and insects (NPWS 2003).	Nil-low. Subject site does not support preferred foraging habitat.
Limosa limosa	The Black-tailed Godwit is a large sandpiper that breeds in Mongolia and Eastern Siberia and migrates to Australia in August, returning to the northern hemisphere in March. The species inhabits sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats, where it forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Black-tailed Godwits roost on low banks of mud, sand and shell bars.	Nil-low. Subject site does not support preferred foraging habitat.
Litoria aurea	The Green and Golden Bell Frog is distributed along the NSW and eastern Victorian coasts and some isolated locations west of the Great Dividing Range in NSW, this species inhabits wetlands such as marshes, dams and stream verges. Preferred habitat includes unshaded water bodies with adjacent grassy areas and suitable diurnal sheltering sites such as emergent vegetation and rocks and is known to inhabit highly disturbed sites within the Greater Sydney region (NPWS 1999). Frequently active by day. Adults prey on invertebrates and other amphibians. Tadpoles feed on algae or other vegetative material (NPWS 1999). Breeding usually occurs in summer when conditions are warm and wet (Cogger 1992) and water-bodies used for breeding usually have a substrate of sand, rock or clay, are still and shallow and are free of predatory fish eg Mosquito Fish.	Nil-low. Subject site does not support preferred foraging habitat.

Table 9 cont' Habitat potential for threatened fauna species previously recorded within the locality (10km of the site) on the DEC Wildlife Atlas.

Miniopterus schreibersii oceanensis	The Eastern Bent-wing Bat is distributed through out eastern Australia from north Queensland to far southeastern South Australia. In NSW recorded from the coast to the western slopes of the Great Dividing Range. Occurring in forests and woodlands the species live in colonies and roost in caves, old mines and occasionally buildings. Females form nursing colonies in spring utilising specific nursery caves with high humidity and temperature. The species forages for insects above the tree canopy (DEC 2005). Have two foraging flights a flight.	Medium. Subject site offers some foraging habitat. Species may fly over site on occasion.
Mormopterus norfolkensis	The Eastern Freetail-bat occurs in dry sclerophyll forest and woodland east of the Great Dividing Range from south Queensland to southern NSW. They roost mainly in tree hollows but will are also found roosting under bark or in man-made structures. They are generally solitary and probably insectivorous (DEC 2005).	Low-medium. Subject site offers some roosting and foraging habitat.
Nettapus coromandelianus	The Cotton Pygmy-goose is a small surface-feeding duck with a goose-like bill. Although once found from north Queensland to the Hunter River in NSW, the Cotton Pygmy-goose is now only a rare visitor to NSW. Freshwater lakes, lagoons, swamps and dams, particularly those vegetated with waterlilies and other floating and submerged aquatic vegetation. The Cotton Pygmy-goose uses standing dead trees with hollows close to water for roosting and breeding.	Nil-low. Subject site does not support preferred habitat.
Ninox connivens	The Barking Owl occurs throughout Australia except for the central arid regions and Tasmania, sparse in southern Australia. Inhabits eucalypt woodland, open forest, swamp woodlands and, especially in inland areas, timber along watercourses, during the day they roost along creek lines, usually in tall understorey trees with dense foliage such as Acacia and Casuarina species, or the dense clumps of canopy leaves in large eucalypts. Home range is from 30 to 200 hectares and birds are present all year.	Low-medium. Subject site supports preferred prey species. Subject site does not support or preferred roosting nesting habitat.
Ninox strenua	The Powerful Owl is found throughout forests and woodlands of south eastern Australia from southeast Queensland to southeast South Australia. In NSW the species is less common in the southern part of its range. Occupying a large home range of more than 1000 ha, the species roosts by day in dense vegetation, commonly on drainage lines and in gullies. Require tree-hollows of more than 50cm depth for nesting, where one to two eggs are laid. Diet consists of medium sized arboreal marsupials with preferred prey including Greater Gliders, Ringtail Possums, Sugar Gliders and Flying Foxes.	Low-medium. Subject site supports preferred prey species. Subject site does not support or preferred roosting nesting habitat.
Pandion haliaetus	Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia, and rare in inland Australia.They favour coastal areas, especially the mouths of large rivers, lagoons and lakes.They feed on fish over clear, open water. Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	Nil-low. Subject site does not support preferred habitat.
Petaurus australis	The Yellow-bellied Glider is found along the eastern seaboard to the western slopes of the Great Divide, from southern Queensland to Victoria (NPWS 2002a). The species inhabits tall mature eucalypt forests and nests in large tree hollows where they build substantial, spherical nests of eucalypt leaves. Yellow-bellied Gliders feed from a range of sources, including winter-flowering eucalypts that provide nectar and pollen, and sap-trees, which are eucalypt trees into which they chew V-shaped incisions to collect sap.	Nil-Low. Subject site offers some foraging habitat.

Table 9 cont' Habitat potential for threatened fauna species previously recorded within the locality (10km of the site) on the DEC Wildlife Atlas.

Polytelis swainsonii	The Superb Parrot is a distinctive large, bright grass-green parrot. The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.May forage up to 10 km from nesting sites, primarily in grassy box woodland.	Nil-low. Subject site does not support preffered habitat
Pseudophryne australis	The Red-crowned Toadlet is generally confined to the Sydney Basin, occuring in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings, sheltering under rocks and amongst dense vegetation in thick leaf litter. Breeds in damp leaf litter. Hatching occurs when the tadpoles are well developed and the site has had heavy rainfall.	Nil-low. Subject site does not support preferred habitat.
Pteropus poliocephalus	The Grey-headed Flying-Fox occurs along the east coast of Australia from Bundaberg in Queensland to Melbourne in Victoria and to the western slopes of the Great Diving Range in northern NSW. Habitat includes heath, swamps, forests, woodlands and rainforests. The species roosts in aggregations of up to tens of thousands of animals and migrates depending on availability of food resources, which may be seasonal. Mating commences in March and females give birth to one young in October or November, with a six-month gestation. Nectar, pollen and fruits or foraged from native trees and vines or sometimes fruit crops.	Medium-high. Observed flying over site. Subject site does not comprise a camp. Subject site offers some foraging habitat.
Ptilinopus superbus	The Superb Fruit-dove occurs principally from north-eastern in Queensland to north-eastern NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya. There are records of vagrants as far south as eastern Victoria and Tasmania. 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.The nest is a structure of fine interlocked forked twigs, giving a stronger structure than its flimsy appearance would suggest, and is usually 5-30 metres up in rainforest and rainforest edge tree and shrub species.	Nil-low. Subject site offers some foraging habitat.
Saccolaimus flaviventris	The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range - most of Victoria, south-western NSW and adjacent South Australia - it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Roosts singly or in groups of up to six, in tree hollows and buildings, however in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees. This species appears to defend an aerial territory. Breeding has been recorded from December to mid-March, when a single young is born. Seasonal movements are unknown.	Low-Medium. Subject site offers some foraging habitat. Species may fly over site on occasion.
Varanus rosenbergi	Rosenbergi's Goanna occurs in NSW along the Central Coast regions inhabiting Sclerophyll forest, woodland and heathland. Diet consists of insects, reptiles, small mammals and birds. Associated with termites, the mounds of which this species nests in. Termite mounds are a critical habitat component. Individuals require large areas of habitat. Shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens.	Nil-low. Subject site does not support preferred nesting or foraging habitat

Table 9 cont' Habitat potential for threatened fauna species previously recorded within the locality (10km of the site) on the DEC Wildlife Atlas.

Xanthomyza phrygia	The Regent Honeyeater is formerly distributed from South Australia, Eastern Victoria, NSW and to Dalby in Queensland; distribution of this species has now become extremely patchy. In NSW the species has been recorded from coastal areas to as far west as Narrabri with important breeding areas west of Armidale. The species is semi-nomadic and occurs in temperate eucalypt woodlands with most records from box-ironbark associations and wet lowland coastal forests. One to three eggs are laid between July and November in a nest constructed in eucalypts, casuarinas or mistletoes. Diet consists of nectar (with a preference for eucalypts including Red Ironbark, White Box and Yellow Box) and soft and hard bodied arthropods.	Nil-low. Subject site does not support preffered habitat

6 LEGISLATION AND POLICY

6.1 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) provides for the conservation and protection of threatened species, populations and ecological communities of animals and plants through specific objectives relating to the conservation of biodiversity and promoting ecologically sustainable development. The Schedules of the TSC Act identify endangered or vulnerable species, populations, ecological communities, critically endangered species or ecological communities and key threatening processes affecting the listed species, populations and ecological communities. Provision is made for the preparation of recovery plans for listed threatened species, populations and ecological communities and threat abatement plans to manage key threatening processes.

The TSC Act provides for the declaration and mapping of habitats that are critical to the survival of those identified threatened species, populations and ecological communities that are classified as endangered (critical habitats). Further, the TSC Act also sets out the methods of assessment, management and regulation of actions that may damage critical or other habitat or otherwise significantly affect threatened species, populations and ecological communities.

6.2 Environmental Planning and Assessment Act 1979

As the current project is to be considered under Part 3A of the EP&A Act, the terms of reference for the environmental assessment has be set out in the draft DGRs, including the *Threatened species assessment guidelines. The assessment of significance* document to technically inform the preparation of 7-part tests.

The remnant vegetation in the adjacent area is representative of the STIF EEC vegetation assemblage, and while the endangered community does not currently occur on the subject site and has a very limited potential to regenerate naturally, the potential impacts of the proposal on this community will be considered in a 7-part test (Appendix C).

Additionally two threatened plant species listed under the schedules of the TSC Act are recorded on the subject site, with both outside their natural habitats and were considered to be planted on site. Therefore assessment of significance of the potential impacts of the current proposal in relation to *Syzygium paniculatum* Magenta Lilly Pilly and *Eucalyptus scoparia* Wallangarra White Gum will not be prepared for this report.

6.3 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) would only become relevant if it was considered that an impact on a 'matter of National Environmental Significance (NES)' were likely, thus providing a trigger for referral of the proposal to the Department of the Environment and Water, Heritage and the Arts.

Matters of national environmental significance identified in the Act are:

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

6.4 Water Management Act 2000 (WMA)

A function of the *Water Management Act 2000* (WMA) is related to the management of potential impact of activities on the terrestrial and aquatic transitional zone by any proposed construction within the riparian zone which is defined as 40m from a river, lake or estuary. The *Guidelines for Controlled Activities – Riparian Corridors* (DWE, 2008) established under the WMA Act recommends the creation of riparian corridor zones of varying widths for works within 40 metres of a creekline. These zones, and the type of permitted activity within these zones according to the Guideline includes the .

- Core Riparian Zone (CRZ) – must be retained or revegetated with native species. No infrastructure, stormwater or vehicles are to be located within 10m of this zone; and
- Vegetative Buffer (VB) – filters surface water runoff, litter, weed intrusion and nutrients from entering CRZ. A recommended 10m vegetative zone retained with no construction and infrastructure.

The Controlled Activity Approval from DECCW under the *Water Management Act 2000* for works within 40 metres of the creek is not required as the project is to be assessed under Part 3A of the EP&A Act.

6.5 Commonwealth and NSW Governments Bilateral Agreement Relating to Environmental Impact Assessment

A bilateral agreement has been made between the Commonwealth and NSW governments regarding environmental impact assessment. Essentially the agreement removes the need for the Commonwealth to assess actions occurring within NSW which would otherwise be assessed under Part 8 of the EPBC Act. Instead, NSW carries out the assessment under NSW legislation and the agreement is aimed at actions which would need assessment under the EPBC Act, TSC Act and EP&A Act. In NSW most developments that would be controlled actions in relation to matters of national environmental significance are assessed and approved under the EP&A Act and it is recognised that under this Act there is an obligation on all consent authorities to consider the impacts of the development on the environment (including biophysical, social and economic factors) including impacts on:

- World Heritage values of a World Heritage property in New South Wales;
- National Heritage values of a National Heritage place in New South Wales;
- the ecological character of a Ramsar wetland property in New South Wales;

- threatened species, populations or ecological communities and their habitats listed under the TSC Act, where any recovery plan for the species or community, and any threat abatement plan for a process that threatens the species or community is relevant; and
- listed migratory species.

6.6 SEPP 44 – Koala Habitat Protection

State Environmental Planning Policy No.44 - Koala Habitat Protection (SEPP 44) aims to protect the Koala and its habitat by incorporating prescriptions for consent authorities to consider during the assessment of development applications. SEPP 44 contains prescriptions for the consideration of "potential koala habitat" and "core koala habitat" for developments within Local Government Areas listed on Schedule 1 of the Policy. Ryde LGA is listed on Schedule 1 as an area to which SEPP 44 applies.

"Potential koala habitat" is defined by SEPP 44 as "areas of native vegetation where the trees of types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component". Three tree species were recorded within the study area, *Eucalyptus punctata* Grey Gum, *E. microcorys* Tallowwood and *E. robusta* Swamp Mahogany, as listed under Schedule 2 of the Policy as Koala "feed tree species". The tree species represented as Koala trees constitute less than 15% of the total number of trees in the canopy stratum in any of the plant communities described in the current survey of the subject site. As such the subject site does not support "potential koala habitat", as defined under SEPP 44.

"Core koala habitat" is defined under SEPP 44 as areas of land that contain "a resident population of koalas, evidenced by attributes such as breeding females and recent sightings of and historical records of a population". No evidence (such as sightings, calls, scats and fur) of a resident population of the Koala were recorded during the current investigation. As such the subject site does not support and "core koala habitat", within the meaning of SEPP 44.

6.7 SEPP 19 – Bushland in Urban Areas

State Environmental Planning Policy No.19 - Bushland in Urban Areas (SEPP 19) aims to, amongst other things, "protect and preserve bushland" within the urban areas of Sydney (Department of Planning 1986). Ryde is listed under SEPP 19 as a Council area to which the Policy applies.

Clauses 6, 7 and 8 of the Policy outline requirements for development consent to be considered by a consent authority, when assessing development applications that involve disturbance to bushland "zoned or reserved for public open space". The subject site is not zoned "for public open space" pursuant to Ryde LEP 2000, and thus Clauses 6, 7 and 8 of SEPP 19 do not apply to the proposed development.

7 IMPACT ASSESSMENT

The impact of the current proposal, including subdivision and construction of the staged development at 128 Herring Rd, is to be predominately limited to the area identified as the 'subject site'. The proposal will include the removal of some native and exotic plant species where necessary to enable the construction project to occur, including excavation for the underground car park areas. Aspects of the proposal to limit the potential impacts to flora and fauna include the retention of as many trees as possible outside the construction zone, tree protection measures for those trees retained, a six metre set back for excavation from the north boundary to limit indirect impacts to the trees adjoining the site, and creation of a riparian corridor associated with University Creek consisting of a core riparian zone and vegetated buffer.

This flora and fauna assessment has considered the flora and fauna species, vegetation communities and habitat components and concluded that the subject site does not currently support threatened flora and fauna species that are indigenous to the area, and has not identified significant habitat for any species targeted in the survey and assessment. The plant community adjacent to the subject site

within the study area has been recorded as Sydney Turpentine Ironbark Margin Forest, a component of the EEC Sydney Turpentine-Ironbark Forest. While this community would have occurred over the study area prior to clearing, it is not present on the subject site. The Riparian community will not be directly impacted upon by construction activities and impact mitigation measures are proposed to ensure that this area is protected, and the riparian zone (CRZ and VB) will be restored as per the Vegetation Management Plan (Total Earth Care, 2010). The Cleared and Disturbed vegetation community shows some geological and biological characteristics of STIF but does not form a community of any measurable quality or intactness.

The Assessment of Significance (7-part test) has concluded that the potential impact to STIF located within the study area from the proposed development is not significant, and a Species Impact Statement is not required. Further more the highly modified remnant community within the riparian zone of the subject site is heavily degraded and of poor flora composition.

The two threatened flora species recorded on the site are outside their natural distribution and have been planted in the landscape gardens. One threatened fauna species was observed flying over the subject site during the nocturnal surveys, *Pteropus poliocephalus* Grey-headed Flying-fox however it is considered that the removal of a few potential feed trees will be offset by the retention and enhancement of vegetation within the riparian zone, with an overall improvement of the habitat quality of the site in the long-term. For these reasons, further assessment of these species has not been conducted

In relation to the current proposal for the subject site this report concludes that:

- two threatened flora species were recorded on site, however they will not be impacted by the proposed development, are planted and are both considered to be outside their natural distribution;
- the proposed removal of flora species are not considered significant feeding trees for the *Pteropus poliocephalus* Grey-headed Flying-fox within the locality or study area, and will not impact the vulnerable species;
- there is unlikely to be a significant impact on the general native flora and fauna of the subject site and study area as a result of the proposal;
- there is unlikely to be a significant impact on native flora and fauna habitats as a result of the proposal;
- the 7-part Test (Assessment of Significance) under the EP&A Act has concluded that there is unlikely to be a significant impact on the STIF endangered ecological community adjacent to the subject site as a result of the proposal provided precautionary measures to protect the area are implemented during construction and design elements consider the potential for ongoing impacts during operation of the proposed facility;
- it is unlikely that the proposed development will impact the adjacent riparian corridor which will include protection of a core riparian zone and rehabilitated of both the Core Riparian Zone and Vegetated Buffer will be in accordance with the *Guidelines for Controlled Activities in Riparian Corridors* (DWE 2008).

8 RECOMMENDATIONS

This assessment has concluded that the current proposal is unlikely to impact on the native flora and fauna of the subject site and biodiversity of adjacent areas. Further to the assessment within this report, and to minimise or control potential impacts of the current proposal on the native flora and fauna of the subject site and study area, this report recommends the following.

- Creation of a riparian corridor along University Creek, including a 10 metre core riparian zone (CRZ) and associated vegetation buffer (VB) within the proposed setbacks of the building from the centreline of the creek. The design indicates that the setback of the Stage 4 building will be 20 metres from the centre line of the creek, and this area will include the core riparian zone (10 metres) and vegetation buffer. The proposed shared pedestrian/cycle path within the riparian zone should be located within the vegetation buffer, outside of the core riparian zone;

- A Vegetation Management Plan (VMP) is to be prepared to detail the rehabilitation of the riparian zone, including weed removal, revegetation, on-going maintenance and monitoring requirements;
- Removal of trees should be offset with the revegetation of the core riparian zone and removal of exotic species following the VMP report;
- Any landscaping or revegetation works are to incorporate locally indigenous native plant species, including those that are characteristic of STIF;
- As far as possible vegetation works recommended in the VMP should use local provenance plant stock;
- Temporary fencing is to be installed around the construction area and machinery or materials storage areas to eliminate the potential for accidental damage to the STIF adjacent to the subject site and all retained trees on the site during construction works;
- Installation, maintenance and decommissioning of sediment and erosion controls as required and as specified in any consent and soil and water management plan;
- Machinery parking and equipment or materials storage compounds are to be in areas of pre existing disturbance;
- Removal of hollow-bearing trees requires pre clearance fauna survey and removal/relocation of fauna by a licensed and qualified handler;
- Nest-boxes of varying size and shape should be installed in remaining native canopy trees;
- Native trees or limbs of trees that are removed as part of clearing for the current proposal should be mulched and used on site in rehabilitation or landscaping works; for temporary sediment and erosion control during construction; or as habitat features in any restoration works of the drainage line;
- Recommended hand trenching within a safety exclusion zone within a 12m radius x trunk diameter at breast height as per the Treescans Arborist guidelines; and
- The current proposal is to be carried out in accordance with all policies, operational procedures and guidelines in place as part of a consent condition or environmental planning instrument relating to environmental management or impact minimisation for construction projects of the scope for current proposal. This would include but not be limited *to City of Ryde Development Control Plan 2006 – 8.2 Stormwater Management* (RCC, 2006) and *Managing Urban Stormwater. Soils and Construction. Volume 1, 4th Edition* (Landcom, 2004).

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Appendix A

Flora and Fauna Species Inventories

Lipman Properties
128 Herring Road Macquarie Park

Table 1 Native and exotic plant species for current survey .

General Status	
*	Exotic (not native to Australia)
N( )	Noxious weeds and 'Control Class' as listed on NSW NW Act 1993 for the Ryde City LGA
Ni	Non - indigenous native species (does not naturally occur at this locality)
Up	Local species but at least some specimens of uncertain provenance (planted / naturalised). May not refer to all specimens.
Conservation Status	
CE	Critically Endangered - listed under Schedule 1A of the TSC Act
E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act
Plant Community - TEC Survey	
CD	Cleared and Disturbed Woodland / Grassland
R	Riparian zone along creek
STIF	Sydney Turpentine Ironbark Forest on adjoining University land
Abundance	
c	Common, species occur all over the site
o	Occasional, species occur over the survey area but not in large numbers at any occurrence
uc	Uncommon, species occur only once or twice during the survey

Family	Genus species	Common name	General Status	Consv. Status	CD W/G	R	STIF
Fabaceae - Mimosoideae	*Acacia melanoxylon*	Blackwood	Ni		uc		
Fabaceae - Mimosoideae	*Acacia linifolia*	White Wattle				uc	o
Fabaceae - Mimosoideae	*Acacia longifolia ssp longifolia*	Sydney Golden Wattle					o
Fabaceae - Mimosoideae	*Acacia stricta*	Straight Wattle			uc		
Araceae	*Alocasia brisbanensis*	Cunjevoi	Ni			o	
Myrtaceae	*Angophora costata*	Sydney Red Gum			uc	c	c
Myrtaceae	*Angophora floribunda*	Apple					uc
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*			c	o
Asteracae	*Bidens pilosa*	Cobblers Pegs	*		o	o	uc
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush	Ni		uc		
Apiaceae	*Centella asiatica*	Indian Pennywort			o	o	o
Liliaceae	*Chlorophytum comosum*	Spider Plant	*		uc		
Lauraceae	*Cinnamomum camphora*	Camphor Laurel	N(4)*			uc	
Commeliniaceae	*Commelina cyanea*	Scurvy Weed			o	o	c
Asteraceae	*Conyza canadensis*	Canadian Fleabane	*		o	o	o
Myrtaceae	*Corymbia gummifera*	Red Bloodwood			uc		
Myrtaceae	*Corymbia maculata*	Spotted Gum	Ni		uc		
Poaceae	*Cynodon dactylon*	Couch	Ni		c	c	c
Phormiaceae	*Dianella caerulea*	Blue Flax-lily			o	o	c
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass			o	uc	c
Convolvulaceae	*Dichondra repens*	Kidney Weed			o	o	c
Poaceae	*Echinopogon caespitosus var caespitosus*	Tufted Hedgehog-grass			uc	uc	c
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*		o	o	o
Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash	Up		uc	uc	o
Poaceae	*Entolasia marginata*	Bordered Panic			uc	uc	c
Poaceae	*Entolasia stricta*	Wiry Panic					o

Myrtaceae	*Eucalyptus globoidea*	White Stringybark			o	uc	uc
Myrtaceae	*Eucalyptus microcorys*	Tallowwood	Ni		o		
Myrtaceae	*Eucalyptus paniculata*	Grey Ironbark					uc
Myrtaceae	*Eucalyptus pilularis*	Blackbutt	Up		o	o	c
Myrtaceae	*Eucalyptus punctata*	Grey Gum	Up		o	uc	
Myrtaceae	*Eucalyptus robusta*	Swamp Mahogany	Ni		uc		
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	Up		uc	uc	
Myrtaceae	*Eucalyptus scoparia*	Wallangarra White Gum	Ni	E	uc		
Myrtaceae	*Eucalyptus sideroxylon*	Mugga Ironbark	Ni		uc		
Fabaceae - Faboideae	*Genista monspessulana*	Montpellier Broom	*		uc	o	o
Geraniaceae	*Geranium homeanum*	Native Geranium			uc	uc	o
Proteaceae	*Grevillea robusta*	Silky Oak	Ni		uc		
Proteaceae	*Hakea salicifolia*	Willow-leaved Hakea	Ni		o		
Fabaceae - Faboideae	*Hardenbergia violacea*	Purple Coral Pea			uc	uc	c
Dilleniaceae	*Hibbertia aspera*	Rough Guinea Flower					c
Poaceae	*Imperata cylindrica*	Blady Grass					c
Convolvulaceae	*Ipomoea indica*	Morning Glory	*			c	c
Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*		o		
Juncaceae	*Juncus usitatus*	Common Rush			uc	o	o
Verbenaceae	*Lantana camara*	Lantana	N(4&5)*			u	
Zamiaceae	*Lepidozamia peroffskyana*	Burrawang	Ni		uc		
Epacridaceae	*Leucopogon juniperinus*	Prickly Beard-heath					c
Oleaceae	*Ligustrum lucidum*	Large Leaved Privet	N(4)*			c	
Oleaceae	*Ligustrum sinense*	Small Leaved Privet	N(4)*			c	uc
Altingiaceae	*Liquidambar styraciflua*	Liquidambar	*		o		
Lomandraceae	*Lomandra hystrix*	Spiny-headed Mat-rush	Ni		uc		
Lomandraceae	*Lomandra longifolia*	Common Mat-rush			uc	o	c
Lomandraceae	*Lomandra multiflora ssp multiflora*	Many-flowered Mat-rush				uc	
Myrtaceae	*Melaleuca armillaris*	Bracelet Honey-myrtle	Ni		uc		
Meliaceae	*Melia azedarach*	White Cedar	Ni		o	uc	
Malvaceae	*Modiola caroliniana*	Red Flowered Mallow	*		c	o	uc
Poaceae	*Microlaena stipoides var stipoides*	Weeping Grass			o	o	c
Davalliaceae	*Nephrolepis cordifolia*	Fishbone Fern	Ni			c	
Poaceae	*Oplismenus aemulus*	Oplismenus			uc	o	c
Asteraceae	*Ozothamnus diosmifolius*	Rice Flower					c
Poaceae	*Pennisetum clandestinum*	Kikuyu Grass	*		c		uc
Polygonaceae	*Persicaria lapathifolia*	Pale Knotweed				uc	
Arecaceae	*Phoenix canariensis*	Canary Island Date Palm	*		uc		
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum			uc	o	c
Plantginaceae	*Plantago lanceolata*	Lamb's Tongues	*		c	o	o
Poaceae	*Poa affinis*	Poa			uc	uc	c
Podocarpaceae	*Podocarpus elatus*	Plum Pine	Ni		uc		
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax				uc	
Lobeliaceae	*Pratia purpurascens*	Whiteroot				o	c
Fabaceae - Caesalpinoideae	*Senna pendula var glabrata*	Senna	*		uc	o	uc
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*		c	o	o
Solanaceae	*Solanum aviculare*	Kangaroo Apple	Up		o		o
Poaceae	*Sporobolus africanus*	Parramatta Grass	*		c	uc	o
Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*		c		

Myrtaceae	*Syncarpia glomulifera ssp glomulifera*	Turpentine			o	o	o
Myrtaceae	*Syzygium paniculatum*	Brush Cherry	Ni	E	uc		

Table 2 Native and exotic fauna species for current survey .

Fauna Inventory

General Status

*	Exotic/introduced species
(?)	Uncertain identification
P	Protected
U	Unprotected

Conservation Status

CE	Critically Endangered - listed under Schedule 1A of the TSC Act
E	Endangered - listed under Schedule 1 of the TSC Act
V	Vulnerable - listed under Schedule 2 of the TSC Act

Record Type

O Observed	B Burnt
F Tracks/scratchings	T Trapped or netted
H Hair, feathers, or skin	Y Bone or teeth
R Road kill	P Scat
D Dog kill	W Heard call
C Cat kill	Z In raptor/owl pellet
V Fox kill	E Nest/roost
K Dead	M Miscellaneous
S Shot	N Not located
X In scat	A Stranding/ Beached
U Anabat	

Certainty (anabat analysis only)

D	Definite
Pr	Probable
Po	Possible

Status	Group	Family	Scientific Name	Common Name	Obs Type	Certainty
P	Actinopterygii	Anguillidae	*Anguilla australis*	Short-finned Eel	O	
P	Amphibia	Anura	*Limnodynastes peronii*	Brown-striped Frog	W	
P	Aves	Charadriiformes	*Vanellus miles*	Masked Lapwing	O	
P	Aves	Ciconiiformes	*Threskiornis molucca*	Australian White Ibis	O	
P	Aves	Columbiformes	*Ocyphaps lophotes*	Crested Pigeon	O	
P	Aves	Coraciiformes	*Dacelo novaeguineae*	Laughing Kookaburra	O	
P	Aves	Passeriformes	*Corvus coronoides*	Australian Raven	W	
P	Aves	Passeriformes	*Cracticus torquatus*	Grey Butcherbird	O	
P	Aves	Passeriformes	*Gymnorhina tibicen*	Australian Magpie	O	
P	Aves	Passeriformes	*Manorina melanocephala*	Noisy Miner	O	
P	Aves	Passeriformes	*Strepera graculina*	Pied Currawong	W	
P	Aves	Psittaciformes	*Alisterus scapularis*	Australian King-Parrot	O	
P	Aves	Psittaciformes	*Cacatua galerita*	Sulphur-crested Cockatoo	W	
P	Aves	Psittaciformes	*Eolophus roseicapillus*	Galah	O	
P	Aves	Psittaciformes	*Trichoglossus haematodus*	Rainbow Lorikeet	O	
P	Mammalia	Chiroptera	*Chalinolobus gouldii*	Gould's Wattled Bat	U	Pr
V	Mammalia	Chiroptera	*Pteropus poliocephalus*	Grey-headed Flying-fox	O	

P	Mammalia	Diprotodonta	*Pseudocheirus peregrinus*	Common Ringtail Possum	O	
P	Mammalia	Diprotodonta	*Trichosurus vulpecula*	Common Brushtail Possum	O	
U	Mammalia	Fissipedia	*Felis catus*	Cat	O	
U	Mammalia	Lagomorpha	*Oryctolagus cuniculus*	Rabbit	O	

Appendix B

Maps and Figures

Lipman Properties
128 Herring Road Macquarie Park

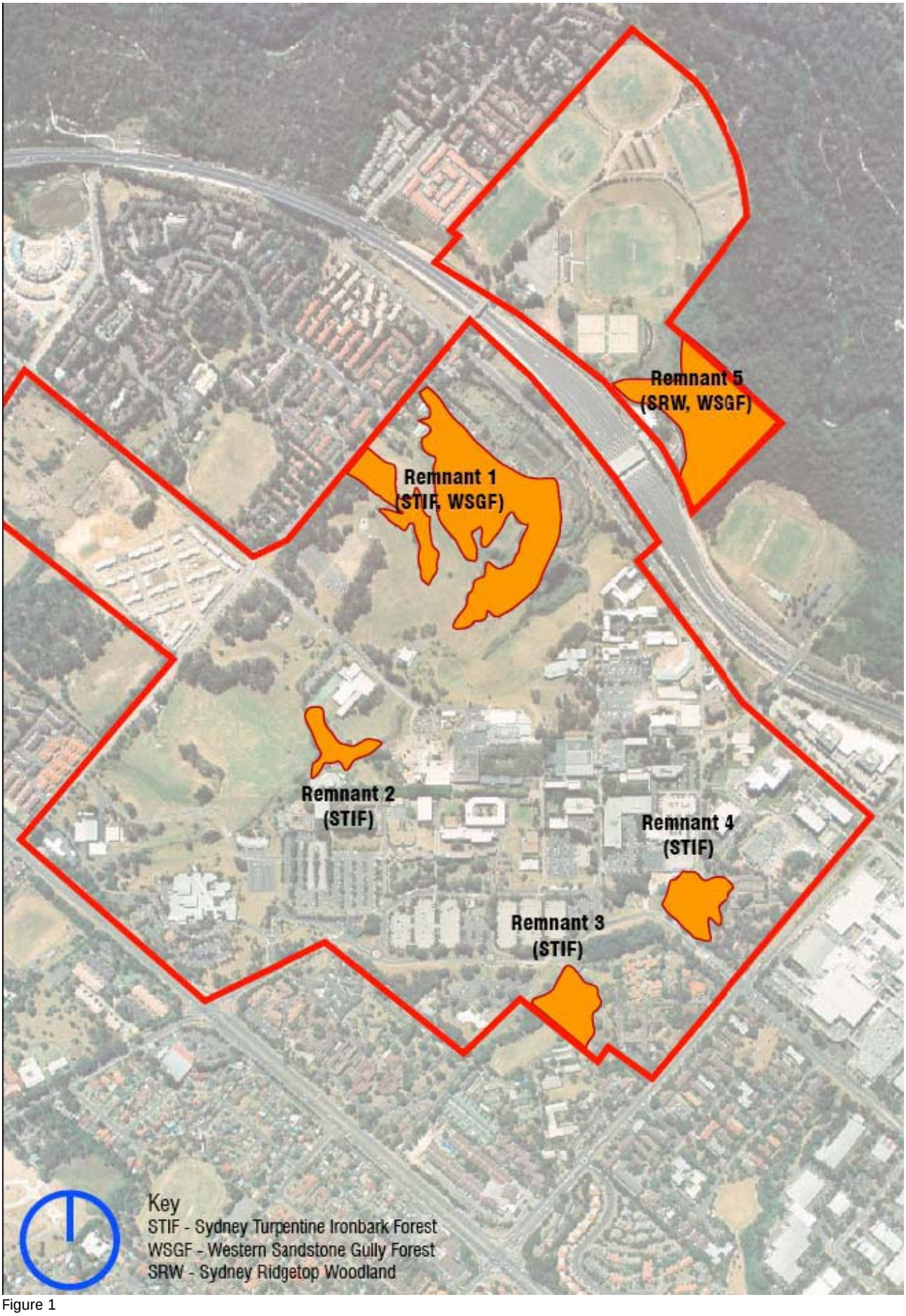

Figure 1
Remnant Vegetation at Macquarie University Plan (EDAW, 2006)

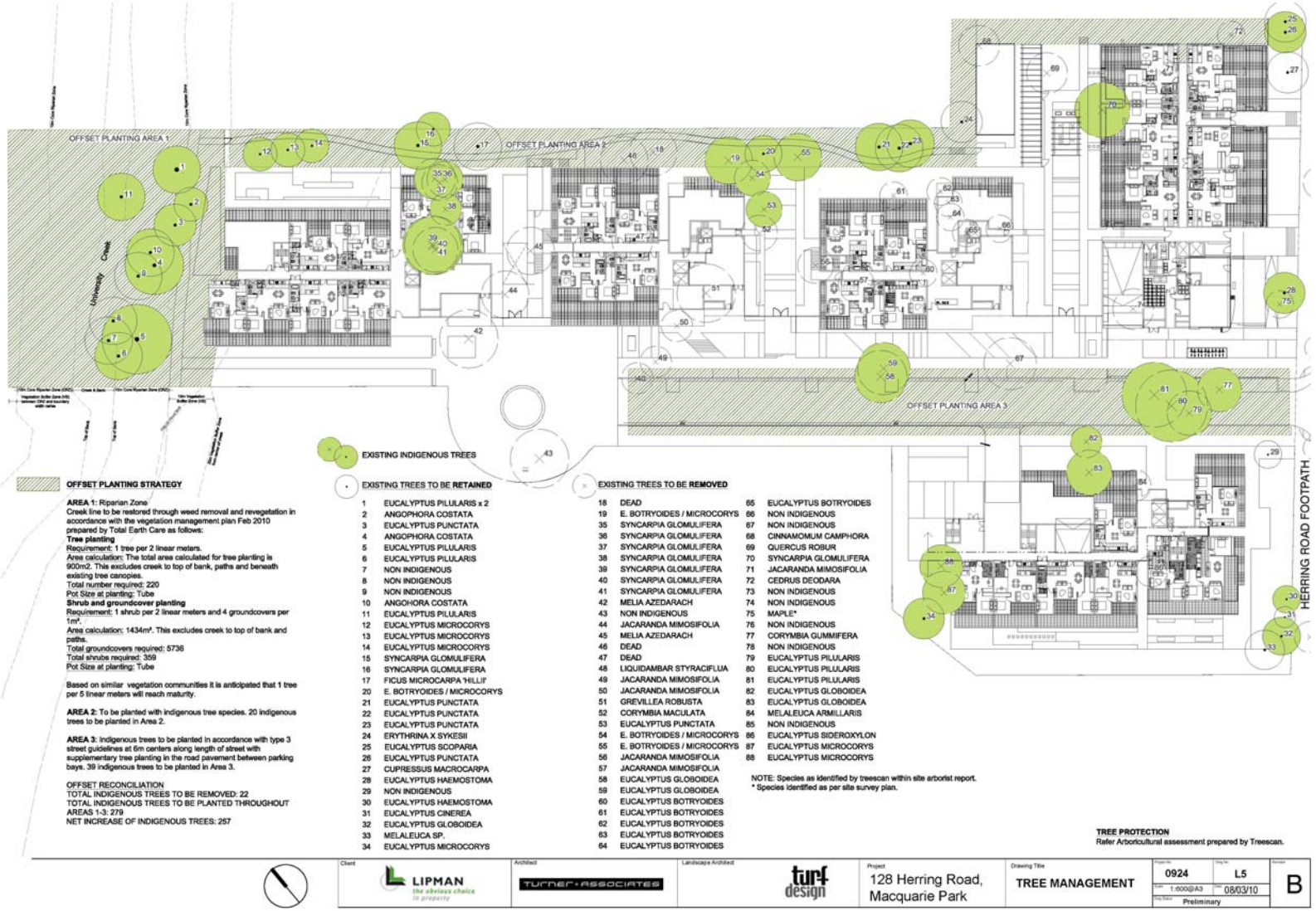

Figure 2
Survey Trees (Turf Design 2010)

Fig 3 Mapped vegetation communities within the study area and subject site, Morling College and Macquarie University

Appendix C

Assessment of Significance for Threatened Biodiversity

Lipman Properties
128 Herring Road Macquarie Park

7-part Test – Sydney Turpentine-Ironbark Forest

(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 TSC Act defines a 'threatened species' as 'a species specified in Part 1 or 4 of Schedule 1 or in Schedule 2' of the Act. Sydney Turpentine-Ironbark Forest (STIF) is not a 'threatened species', as defined under the TSC Act.

(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.

The TSC Act defines an 'endangered population' as 'a population specified in Part 2 of Schedule 1' of the Act. STIF is not an 'endangered population', as defined 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.**

The local occurrence of Sydney Turpentine-Ironbark Forest (STIF) adjacent to the subject site has been mapped by Tozer (2003) and within the *Macquarie University Preliminary Ecological Assessment* (EDAW, 2006). On a broader scale NPWS (2002) has mapped both STIF and Sydney Turpentine Ironbark Margin Forest plant communities approximately one kilometre north of the subject site, although not directly in the site.

Sydney Turpentine-Ironbark Margin Forest has been identified by TEC in the adjacent land abutting the northern site boundary. The Sydney Turpentine-Ironbark Margin Forest is a subset of STIF. STIF is listed as an Endangered Ecological Community under the TSC Act and Critically Endangered Ecological Community under the EPBC Act. The remnant STIF vegetation is highly degraded by weed infestation, clearing and other human-induced impacts.

Although, no clearing or construction works are proposed within the identified STIF community, there are potential risks associated with the construction and operation. The main known direct impacts on the extent of the area and stand of the STIF community outside the subject site from the proposal will be;

- Removal of native trees,
- Impact from construction works, and
- Changes in the sub surface hydrology and nutrient levels.

Consequential removal of native and exotic trees for the footprint construction is not proposed within the STIF vegetation community. The loss of canopy trees will be offset with the revegetation and restoration works to widen the Core Riparian Zone and improve the STIF connectivity. The TEC consultant's assessment of the significance of the trees for removal did not consider any significant value for critical habitat or fauna dispersal. A majority of these species have been planted or are located outside their natural habitat and were represented at other locations within the subject site.

The *Syzygium paniculatum* Magenta Lilly Pilly is classified as an Endangered plant species listed in NSW under Schedule 1 of the TSC Act and Vulnerable under the Federal EPBC Act. The *Syzygium paniculatum* Magenta Lilly Pilly is not an indicative STIF species and does not naturally occur within the STIF vegetation community. It was identified as a planted specimen and not considered as a remnant threatened species.

Correspondence through Lipman Properties Ltd Pty with the arborist, in Section 4.1.5, stated that the health of the trees within the STIF will not be impacted with the implementation of correct management practices. Machinery use will be restricted in the construction of the underground car park to protect primary root systems. The recommended Arborist guidelines for primary root setback can be calculated at 8 times the diameter at breast height (DBH) (cm) (Harris et al, 2004). The Treescan arborist has calculated a safety zone for hand excavation that safe guard impacts on the STIF root system at 12 times the DBH (cm).

Significant earth works is required for the completion of the underground car park within the proposed construction footprint. Potential impact on the soil ecology of the study site can alter the drainage, disrupt soil layers and increase sedimentation into water ways. Much of the study site has pockets of fill from other locations. These soils do not represent the local soil types or contain provenance seed bank. The disturbance of earth works can be minimised through management practices to reduce the movement of sediments.

Overshadowing from the construction of the multistorey infrastructure will be minimal as the buildings are located to the south of the STIF community. Five buildings are proposed over a 5 Stage process, each building will include 12 storeys. The shadowing from Stage 4 will be restricted to some afternoon shading on STIF. Growth and development of provenance STIF species could possibly be reduced with shadowing. These conditions would be greater in the cooler months however the proposed 6m setback from the boundary will reduce the shadowing effects on STIF from the proposed infrastructure.

Driveways, walking tracks and other proposed infrastructures increase the level of hard surfaces and impact hydrological flow. Changes to the water quality from surface water runoff will increase the level of sedimentation, erosion and alter water chemistry. These impacts have the potential to influence the neighbouring STIF. A visual assessment of the current status of the STIF adjacent to the subject site identified that runoff does occur within the riparian zone and has potentially led to increased dispersal of weeds. The *Invasion and establishment of exotic vines and scramblers* has been identified as a Key Threatening Process under the TSC Act.

Approval for Controlled Activities within 40 metres of the creek is not a requirement for the current proposal as it is being assessed under Part 3A of the EP&A Act, although the DGRs requires the proponent to assess and reducing the impact of waterfront works. The Vegetation Management Plan should outline management initiatives to reduce the level of impact on STIF. A vegetative barrier of unmown native grasses and sedges will effectively filter nutrients out of the runoff and reduce nutrient and sediment impact. Revegetation of the mid and understorey of the STIF community will continue to reduce the likelihood of weed establishment. The construction guidelines to reduce impact on the riparian zone are addressed in Section 8.

STIF in the adjacent site will be substantially retained in its current floristic composition and dimension. Minimal fragmentation is possible with the removal of exotic weed species within the degraded riparian zone. However, this will be marginal. The current status for the remnant STIF community has been classed as highly degraded; the proposed infrastructure requires the protection of the riparian zone and therefore the implementation of management controls. The VMP guidelines are a high priority in the management of the STIF community; it will address controls for construction works and long-term management for revegetation and weed management. Implementation of management guidelines will reduce the degradation to the STIF in the adjacent site and create a healthier riparian zone in the long-term through VMP management recommendations and revegetation measures.

(d) In relation to a 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 Sydney Turpentine-Ironbark Forest community has been extensively cleared and modified since European settlement. Only 4.5% of the original distribution in NSW of 26, 000 hectares remains intact

(DEC, 2004). The STIF community once dominated the Ryde Council; today limited STIF strands of remnant vegetation remain and are highly fragmented, similar to the study area.

A stand of STIF endangered ecological community is located outside the proposed construction footprint and does not involve direct clearing or modification. A 10 metre core riparian zone and associated buffer zone is allocated to preserve the riparian zone and a 6m setback from the boundary implemented from STIF. Under the Water Management Act 2000 infrastructure and vehicles are excluded from within 20m of a river, lake or estuary (DWE, 2008). The buffer zone will reduce potential impacts on STIF.

Canopy trees deemed for removal in conjunction with the proposed infrastructure are not identified as STIF or remnant species to the subject area. The offset to the native tree removal is the widening of the Core Riparian Zone and associated Vegetation Buffer through restoration and rehabilitation works. Long-term improvements will contribute to the establishment of a healthy biodiversity and productivity within STIF. The removal of the proposed trees will not directly cause fragmentation or isolation.

No critical habitat potential or significant tree species for sheltering or foraging of threatened species under the *TSC Act* was identified for any of the proposed trees for removal.

A Vegetation Management Plan prepared for the development provides finer details to the management of the riparian corridor.

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

No area has been designated as 'critical habitat' under Part 3 of the TSC Act 1995 for STIF.

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

There is currently no specific recovery plan in place for STIF. A draft recovery plan has been written by DECC for threatened ecological communities of the Cumberland Plain but notes that Sydney Turpentine Ironbark Forest will not be specifically addressed in the recovery plan, as only a small proportion of its distribution occurs within the study area.

There are no Threat Abatement Plans currently in operation for any Key Threatening Processes threatening the STIF that specifically relate to the subject site.

(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 TSC Act defines "threatening process" as 'a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, populations or ecological communities'. Schedule 3 of the TSC Act provides a list of the 'key threatening processes' (KTP). Of the KTP's listed in Schedule 3 of the TSC Act the following are currently in operation;

- *Competition and grazing by the feral European rabbit (*Oryctolagus cuniculus*)* – direct observations of feral European rabbits during fauna surveys. Impact is currently marginal and confined to landscaped lawns.

- *Invasion and establishment of exotic vines and scramblers*. Exotic weeds *Asparagus aethiopicus* Asparagus Fern, *Ipomoea indica* Morning Glory are prevalent throughout the riparian zone.

- *Invasion of native plant communities by exotic perennial grasses*. Exotic landscaped grasslands are wide spread through the subject site. Including *Ehrharta erecta* Panic Veldtgrass and *Pennisetum clandestinum* Kikuyu Grass.

KTP's as listed in Schedule 3 of the TSC Act that will operate as a result of the current proposal are;

- *Clearing of native vegetation*. Removal of native species are not considered critical habitat or within STIF.

- *Loss of hollow-bearing trees*. Removal of potential tree hollow forming trees within the subject site.

The main KTP's that have a potential to either commence to operate or be exacerbated on the subject site as a result of the current proposal are Infection of native plants by *Phytophthora cinnamomi* and Loss of hollow-bearing trees. However it is equally or more likely that *Phytophthora cinnamomi* would infect the subject site or study area due to dispersal in the current stormwater flows of the drainage line on the subject site boundary and the size and density of tree hollows that may be lost will possibly only currently provide sheltering and nesting habitat for a limited range of native fauna species.

The proposed development does not constitute a scheduled or preliminary KTP.

Conclusion

In light of the consideration made in the above seven factors (1-7), the proposed construction within the subject site does not impose "a significant effect" on the STIF endangered ecological community in the adjacent site. In summary the following assumptions were made;

- The proposal does not include the direct clearing or construction works within STIF, possible impacts will be managed and include the revegetation of the Core Riparian Zone and removal of the weed infestation.
- The construction footprints will not adversely reduce the dimensions of the current STIF coverage therefore; will not further fragment the community.
- Construction works will be managed for minimal impacts on the primary root system for STIF canopy trees.
- A Vegetation Management Plan will be adopted as a key guideline for construction works and management of the riparian corridor and potential impacts on STIF.

Consequently a Species Impact Statement is not required for the completion of this assessment.