



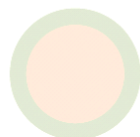
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Threatened Species Assessment

Meriton Apartments Pty Ltd

Residential Development at
132–138 Killeaton Street, St Ives

Total Earth Care Pty Ltd
July 2010



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Threatened Species Assessment

132 - 138 Killeaton St, St.Ives

Table of Contents

	Page
1 INTRODUCTION	2
2 AIMS AND OBJECTIVES	2
3 LEGISLATION AND POLICY	3
3.1 Threatened Species Conservation Act 1995	3
3.2 Environmental Planning and Assessment Act 1979	3
3.3 Environment Protection and Biodiversity Conservation Act 1999	3
3.4 Ku-ring-gai Local Environment Plan (Town Centres) 2010	4
4 METHODS	4
4.1 Desktop Research	4
4.2 Flora	4
4.3 Fauna	5
4.4 Limitations	5
5 RESULTS	5
5.1 Previous Studies and Reports	5
5.1.1 Tree Survey – Peter Richards Tree and Landscape Consultants 2010	5
5.2 Landscape	6
5.3 Flora	6
5.3.1 Plant Species	6
5.3.2 Plant Communities	7
5.3.3 Threatened Plant Species	9
5.3.4 Threatened Populations	11
5.3.5 Threatened Ecological Communities	12
6 HABITAT POTENTIAL FOR THREATENED SPECIES	13
6.1 Flora	13
7 CONCLUSION	16
8 BIBLIOGRAPHY	18
APPENDICES	
A	Flora and fauna species inventories
B	Maps and figures
C	Assessment of Significance

Threatened Species Assessment

132–138 Killeaton Street, St Ives

EXECUTIVE SUMMARY

Total Earth Care has undertaken a Threatened Species Assessment and Report at the subject site 132-138 Killeaton Street, St Ives, New South Wales, on behalf of Meriton Apartments Pty Ltd. The Threatened Species Assessment has been prepared as part of an Environmental Assessment to assess the potential environmental impacts of the proposal. The requirements in relation to the flora on the site, are set out in the Director-General's Requirements for Application number MP 10_0057.

This Threatened Species Assessment and Report has been undertaken with reference to the Department of Environment, Climate Change and Water's "Threatened Species Assessment Guidelines" (2007), and the Ku-ring-gai Local Environment Plan (Town Centres) 2010.

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 Threatened Species Assessment has considered the flora species, vegetation communities and habitat components and concluded that the subject site does not currently support threatened flora species that are indigenous to the area, and has not identified significant habitat for any threatened flora species, flora populations or endangered ecological communities (EEC) targeted in the survey and assessment. There are species occurring on the site that are component species of the plant community Sydney Turpentine-Ironbark Forest, which is an EEC listed within the Schedules of both the *NSW Threatened Species Conservation Act 1995* (TSC Act) and the *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999*.

This report concludes that the potential impacts will not have a significant effect on the Sydney Turpentine-Ironbark Forest located within the study area, and that a Species Impact Statement is not required. This document details actions to be taken to avoid, mitigate and compensate unavoidable impacts on flora and fauna species by improving or maintaining overall biodiversity values on the subject site.

Threatened Species Assessment

132–138 Killeaton Street, St Ives

1 INTRODUCTION

Meriton Pty Ltd is currently proposing construction of 5 x 5-storey residential flat buildings containing 298 units, basement car parking, adaptive reuse of the former monastery building for a gym, swimming pool and other communal facilities, and landscaping of the site and other associated works. The area of the site is 22, 970 m².

In liaison with the NSW Department of Planning (DoP) the proponent has been issued with Director General's 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), 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 *Threatened Species Assessment Guidelines (2007)* and;
- The Commonwealth Department of Environment, Water, Heritage and the Arts should be consulted to ascertain whether the proposed development triggers the need for an assessment and approval under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*

This Threatened Species 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.

For the purpose of this report, the subject site comprises the area of land directly affected by the development proposal, that being the property at 132–138 Killeaton Street, St Ives. The study area comprises the subject site in addition to the surrounding land that may be potentially indirectly affected by the development, including the adjacent properties of single and two storey dwellings to the east, north and west of the site, Masada College to the south and south-east of the site and Corpus Christi School to the south-west of the site.

2 AIMS AND OBJECTIVES

The aims of the Threatened Species Assessment for the current proposal are to:

- survey and describe the existing flora within the subject site;
- determine the presence or likely occurrence of threatened plant 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 flora 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 LEGISLATION AND POLICY

3.1 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.

3.2 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 a small part of the subject site is representative of the STIF EEC vegetation assemblage and 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.

3.3 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.

Sydney Turpentine Ironbark Forest is listed as an EEC under the EPBC Act. However, unlike the TSC Act, which recognises that STIF may occur as single remnant trees, the EPBC Act requires, for a remnant to conform to the EPBC Act's definition of STIF, that the canopy must have a tree cover

greater than 10%, and an area greater than a hectare. Patches of less than 10% tree canopy cover are also included if they are more than one hectare in size and are part of a native vegetation remnant larger than five hectares. The patch of vegetation on the subject site that has been mapped as STIF as per the TSC Act does not qualify as STIF under the EPBC Act as its total area is approximately a quarter of a hectare, does not have an intact vegetation structure and has a canopy cover of less than 10%, and is not part of a larger native vegetation remnant.

Consultation with Craig Paterson Assistant Director of the Assessment Section Approvals and Wildlife Division Department of the Environment, Water, Heritage and the Arts, supported this view. The advice of the Assistant Director supported the view that, in this case, with the information supplied as a result of this Threatened Species Assessment, that a referral to the federal minister for assessment and approval was not required as the EEC does not occur on the subject site pursuant to its definition under the EPBC Act. No threatened species as listed under the EPBC Act were noted on or adjacent the subject site and likewise, no referral to the federal minister was therefore required.

3.4 Ku-ring-gai Local Environment Plan (Town Centres) 2010

Part 7 of the Ku-ring-gai Development Control Plan (Town Centres) 2010 (DCP), prepared as part of the Ku-ring-gai Local Environment Plan (Town Centres) 2010 (LEP) identifies areas of Natural Resources Sensitivity – Biodiversity, and constrains development relevant to the categorization of these lands. A small section of the subject site, corresponding to the canopy of the two largest *Eucalyptus saligna* located on the northern boundary has been assigned Category 5 – Landscape Remnant. This categorisation requires that development should be designed to retain the native vegetation on site and that plantings should consist of not less than 50% locally native species.

The development proposal involves planting of 46 locally occurring species while 3 locally occurring species are proposed for removal. A further 6 specimens of understory trees are proposed for removal. This is commensurate with Part 7.6 of the DCP which allows for compensatory measures through offsetting by replanting and rehabilitating significant vegetation.

4 METHODS

4.1 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.

4.2 Flora

General botanical surveys were conducted on the subject site on 24th June 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), previous broad-scale mapping of the Cumberland Plain by NPWS (2003), previous broad-scale mapping of the Sydney

1:100,000 map sheet by Benson & Howell (1994), and the previous vegetation mapping of the Sydney Metropolitan Catchment Management Area (DECCW 2009);

- 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).

4.3 Fauna

Although not required as part of the DGRs for the proposal, general fauna surveys were conducted on the subject site during the afternoon of 24th June 2010. Weather conditions were mild, 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.

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.

No threatened fauna species were recorded on site during the survey work.

4.4 Limitations

A field survey was conducted during the afternoon of 24th June 2010. In addition to the survey undertaken, the potential 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.

5 RESULTS

5.1 Previous Studies and Reports

5.1.1 Tree Survey – Peter Richards Tree and Landscape Consultants 2010

Consulting arborist Peter Richards Tree and Landscape Consultants was commissioned by Meriton Pty Ltd to identify remnant trees growing within the subject site. This survey identified all trees within the subject site including any native trees considered potential remnants of the original EEC (STIF) (Figure 2, Appendix B). The survey found 14 specimens of locally occurring tree species, while the majority of all native trees surveyed are located outside their natural distribution and not considered indigenous to the site. Only three locally indigenous canopy tree species were recorded on the site as outlined below (Table 1),

Table 1 Locally indigenous canopy tree species within subject site as mapped by Peter Richards Tree and Landscape Consultants (2010).

Locally Occurring Native Tree Species	Common Name	Number of Specimens	STIF Characteristic species
<i>Eucalyptus resinifera</i>	Red Mahogany	1	Yes
<i>Syncarpia glomulifera</i>	Turpentine	2	Yes
<i>Eucalyptus saligna</i>	Sydney Blue Gum	4	No

It should also be noted that the Ku-ring-gai Council Development Application Summary Sheet (DASS) (Ku-ring-gai Council 2007) does not mention Tree # 134 *Eucalyptus saligna* Sydney Blue Gum (as per Tree Survey – Peter Richards Tree and Landscape Consultants 2010) in either the list of trees to be removed or trees to be retained. The Peter Richards Tree and Landscape Consultants tree Survey annotates this tree as being proposed for removal. The current assessment disagrees with the identification within the DASS of two *Eucalyptus punctata* occurring on site. *Eucalyptus punctata* is a local canopy tree species but not a characteristic species of STIF. However, these have been identified in the current report as *Eucalyptus leucoxylon*, which is not a locally indigenous species. Other locally indigenous non-canopy tree species occurring on the subject site include *Pittosporum undulatum* and *Acacia decurrens*.

5.2 Landscape

The subject site is located at St Ives, and incorporates an irregularly shaped 2.297 hectare (ha) parcel of land with a frontage to Killeaton Street (Appendix B, Figure 2). The site is a roughly 'L' shaped property composed of two similarly sized rectangular areas of land each approximately 150 metres (m) long and 80m wide. These rectangles of land run perpendicular to each other with the northern rectangle running east-west with a frontage to Killeaton Street and the southern rectangle running north-south. Where these two rectangles of land meet is the approximate occurrence of the two storey former brick monastery building. The vast majority of the site is cleared of native vegetation, with planted and remnant trees being largely restricted to the perimeter of the subject site. There are six trees occurring as an isolated grove in the central area of the northern rectangle. The majority of the site is cleared of woody vegetation and is a grassland composed largely of exotic grasses and forbs.

The soil landscape is mapped by Chapman *et al* (1989) as the Blacktown Soil Landscape. The Blacktown Soil Landscape is described as occurring as gently undulating rises on Wianammatta Group shales and Hawkesbury Shale. Soils are described as being shallow to moderately deep with red and brown podzolic soils on crests, upper slopes and well drained areas. On lower slopes and in areas of poor drainage, soils are deep yellow podzols and soloths. Soils have low fertility and poor drainage. The land is gently sloping with an average gradient of 1.4%.

5.3 Flora

5.3.1 Plant Species

A total of 93 plant species were recorded within the study area during the flora field survey, including 32 native species and 61 introduced species (Appendix A, Table 1.). There were 16 native species recorded in the subject site that are not indigenous to the area, and 16 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 61 introduced species, 10 are recorded as noxious, as listed under the *NSW Noxious Weeds Act 1993* for the Ku-ring-gai LGA (Table 2).

Table 2 Plant species recorded within the subject site listed under the *NSW Noxious Weeds Act 1993* for Ku-ring-gai LGA (Order No.20)

<i>Control Class¹</i>	Common Name	Scientific Name
4	Asparagus fern	<i>Asparagus aethiopicus</i>
4	Blackberry except cultivars Black satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smoothstem, Thornfree	<i>Rubus fruticosus</i> aggregate species
4	Camphor laurel	<i>Cinnamomum camphora</i>
4	Castor oil plant	<i>Ricinus communis</i>
3	Cape Broom	<i>Genista monspessulana</i>
4	Ochna	<i>Ochna serrulata</i>
5	Oxalis Includes all Oxalis species and varieties except the native species <i>O. chnoodes</i> , <i>O. exilis</i> , <i>O. perennans</i> , <i>O. radicata</i> , <i>O. rubens</i> , and <i>O. thompsoniae</i>	<i>Oxalis</i> species and varieties
4	Privet (broad leaf)	<i>Ligustrum lucidum</i>
4	Privet (narrow leaf)	<i>Ligustrum sinense</i>
4	Turkey Rhubarb	<i>Acetosa sagittata</i>

5.3.2 Plant Communities

Three plant communities were identified within the subject site:

- Sydney Turpentine Ironbark Forest
- Native and Exotic Woodland; and
- Grassland

Previous broad-scale vegetation 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. Mapping of the native vegetation of the Cumberland Plain and adjacent areas by NPWS (2002) has identified Turpentine Ironbark Margin Forest on the subject site. Turpentine Ironbark Margin Forest is a component of the Endangered Ecological Community (EEC) Sydney Turpentine-Ironbark Forest (STIF) as listed under the TSC Act. This mapping by NPWS (2002) maps STIF as occupying the central portion of the subject site and being a structural classification of <10% canopy cover ('urban').

Previous vegetation mapping of the Sydney Metropolitan Catchment Management Area (DECCW 2009) (Appendix B, Figure 3) identifies two small patches of STIF correlating to the canopy spread of two specimens of *Eucalyptus saligna* Sydney Blue Gum and the one specimen of *Eucalyptus*

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. |

resinifera Red Mahogany occurring on the subject site. These trees are mapped by Peter Richards Tree and Landscape Consultants (2010) as tree numbers #42, #46 and #131 respectively. *Eucalyptus saligna* is not a characteristic species of STIF as per the Scientific Committee's Determination but *Eucalyptus resinifera* is a characteristic species as per the Scientific Committee's Determination. There are two other specimens of *Eucalyptus saligna* on the subject site and these occur outside of the area mapped by DECCW (2009) as STIF.

The distribution of plant communities identified in the current survey within the study site is shown in Appendix B, Figure 4 and are described below. Figure 4 includes the indicative locations of the non-indigenous native species listed as threatened under the NSW TSC Act 1995.

Sydney Turpentine Ironbark Forest

This community occurs in three isolated small areas within the subject site. The two largest of the subject site's four *Eucalyptus saligna* occur in the vegetation community mapped as STIF by the current assessment. They occur in the largest and most floristically and structurally diverse of the three STIF remnants on the site, with the other two remnants being composed of canopy trees only. This largest STIF remnant on the subject site is defined by the canopy spread of the two contiguous canopies of the *Eucalyptus saligna* found within it, and also incorporates a smaller area to the west where a small number of understorey and groundlayer species occur. The two other areas of STIF mapped in this report are restricted to the canopy spreads of a single isolated *Eucalyptus resinifera* Red Mahogany north of the former monastery and a pair of *Syncarpia glomulifera* Turpentine occurring on the south-western boundary of the subject site. Both of these smaller remnants of STIF have no other native species in association with them. They have been assessed as remnants of STIF as per the Scientific Committee's final determination which states that STIF can occur structurally as remnant trees. Both *Eucalyptus resinifera* and *Syncarpia glomulifera* are characteristic species for STIF.

It is uncertain as to whether these trees, while locally indigenous species, are planted or remnant ancestors from the original community of STIF. Consideration was given to the *Eucalyptus saligna* in particular being naturalised specimens from non-local provenance. Swarms of this species occur as non-natural components within St Ives Wildflower Garden bushland two kilometres to the north. There *Eucalyptus saligna* is altering the ecological processes of the endangered ecological community of Duffys Forest Ecological Community (DFEC) upon that site as a non-natural swarm. The geographical and ecological provenance of those specimens of *Eucalyptus saligna* is unknown. While *Eucalyptus saligna* is not considered to be a species native to the community of DFEC at that site, and it is a species native to STIF in the local area, it is not possible to confirm the geographic or ecological provenance of the *Eucalyptus saligna* growing on the subject site. It was noted that there was no evidence of seedling recruitment from any of these canopy species within the subject site.

With regards to the distribution of local indigenous species upon the subject site, there was a strong correlation between highest densities of locally indigenous ground layer species – principally *Dichondra repens*, *Oplismenus* sp, *Microlaena stipoides*, *Hardenbergia violacea* and *Pratia purpurascens* – occurring below the canopies of the two largest *Eucalyptus saligna* that occur along the northern boundary of the subject site. These two specimens of *Eucalyptus saligna* are proposed to be retained as part of the development. The groundlayer under the other locally indigenous tree species, namely the two other *Eucalyptus saligna*, the single *Eucalyptus resinifera* and the two *Syncarpia glomulifera*, contains virtually no native indigenous species.

The occurrence of the locally indigenous shrub species in the understorey shows some localised correlation to the canopies of the two northernmost occurring *Eucalyptus saligna* but is not as strong as for the groundlayer species. *Acacia decurrens* and *Acacia floribunda* occur as single individuals on the perimeter of the drip zone of these two *Eucalyptus saligna* canopies, while *Pittosporum undulatum* occurs as 8 individuals with the majority occurring just outside the canopy drip zone of the two northerly occurring *Eucalyptus saligna*. Most of these *Pittosporum undulatum* occurring outside the drip zone of the two most northerly and largest specimens of *Eucalyptus saligna* were not mapped in the current assessment as STIF due to the observation that they were specimens of a species able to colonise altered ecological conditions, including derived communities or those significantly affected by anthropogenic causes. Most of these *Pittosporum undulatum* appear to have germinated in soils physically and chemically altered by the planted specimens of exotic conifers including *Cupressus torulosa* and *Thuja plicata*. The current assessment considers that these specimens of *Pittosporum*

undulatum have germinated in soil and light conditions significantly altered from those ascribed to the Scientific Committee's final determination, due largely to the allelopathic and shading influences of the exotic conifers and the significant physical changes to the soils 'o' horizon. The soil landscape and vegetation's structural characteristics are so altered that the STIF community does not occur here, despite the occurrence of *Pittosporum undulatum*, a characteristic species of STIF.

Within the largest, most northerly remnant of STIF are two trees and one seedling of *Syzygium paniculatum* Magenta Lilly Pilly which is an Endangered species under the TSC Act (1995). This species is not local to the area. It is discussed below in section 4.3.3 *Threatened Species*.

Native and Exotic Woodland

The Native and Exotic Woodland plant community occurs principally towards the perimeter of the subject site (Figure 4) with a small occurrence adjacent to the north-west corner of the former monastery. The canopy of the community consists of scattered native and exotic trees with the majority of specimens demonstrably planted (Appendix A).

This plant community is dominated by non-indigenous native canopy species including *Lophostemon confertus* Brush Box and *Eucalyptus elata* Weeping Peppermint. Exotic species recorded are numerous and represented by few or single isolated specimens. The dominant exotic species include *Cupressus torulosa* Bhutan Cypress, *Pinus radiata* Radiata Pine and *Harpephyllum caffrum* Kaffir Plum. Canopy heights are approximately 10 to 20m.

Understorey of the Native and Exotic Woodland community is characterised by widely scattered planted/naturalised small trees and shrubs such as the non-indigenous native *Melaleuca armillaris* Bracelet Honey Myrtle and *Pittosporum undulatum* Sweet Pittosporum. *Pittosporum undulatum* is a characteristic species of STIF as per the Scientific Committee's Determination. Understorey heights are from 5 to 10 metres.

Grazed and formerly mown exotic and native grasses and forbs, dominate the groundcover stratum and include *Pennisetum clandestinum* Kikuyu, *Hypochaeris radicata* Cat's Ear, *Paspalum dilatatum* Paspalum, *Asparagus aethiopicus* Asparagus Fern, *Plantago lanceolata* Lamb's Tongue and *Sida rhombifolia* Paddy's Lucerne.

Within the vegetation community, to the south west corner of the subject suite are three trees of *Eucalyptus scoparia* Wallangarra White Gum which is an Endangered species under the TSC Act (1995). This species is not local to the area and is discussed below in section 4.3.3 *Threatened Species*.

Grassland

This vegetation Community occupies the majority of the subject site away from the edges of its perimeter. It is dominated by exotic grasses currently grazed by horses kept on site. Previous to this current land use it was regularly mown. The dominant species in this community is *Pennisetum clandestinum* Kikuyu. Less commonly occurring species include *Plantago lanceolata* Lamb's Tongue, *Hypochaeris radicata* Cat's Ear and *Ehrharta erecta* Panic Veldt Grass. The only locally native species observed in this community was very rarely *Microlaena stipoides* Weeping Grass.

5.3.3 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 3). Their approximate occurrences are indicated in Figure 4.

Table 3 Threatened flora species recorded on the subject site from the current survey.

Scientific Name	Common Name	TSC Act Status ²	EPBC Act Status ³
<i>Eucalyptus scoparia</i>	Wallangarra White Gum	E1	V
<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E1	V

Eucalyptus scoparia Wallangarra White Gum

Three individuals of *Eucalyptus scoparia* Wallangarra White Gum, were recorded during the current survey in the far south western corner of the site. These are planted specimens of a species well outside of its natural range and habitat. These specimens are all proposed to be removed as part of the proposed development.

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 15m 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

Two small mature individuals and one seedling of *Syzygium paniculatum* Magenta Lilly Pilly were recorded during the current survey, located along the central part of the northern boundary. The two mature individuals are presumed to be planted and the seedling a naturalized offspring from one of these planted specimens. These specimens are neither proposed for removal or retention as part of the development. These specimens, though of a species occurring in the Sydney area, are 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).

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

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

- 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; and
- 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 22 threatened plant species occurring within 5km of the site (Table 4).

Table 4 Threatened flora species previously recorded within the locality (5km radius search) on the DECCW Wildlife Atlas and the EPBC Protected Matters Search

Scientific Name	TSC Act Status ¹	EPBC Act Status ²
<i>Acacia bynoeana</i>	E1	V
<i>Cryptostylis hunteriana</i>	V	V
<i>Darwinia biflora</i>	V	V
<i>Deyeuxia appressa</i>	E1	E1
<i>Diuris bracteata</i>	E1	Extinct
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	V	-
<i>Eucalyptus camfieldii</i>	V	V
<i>Eucalyptus nicholii</i>	V	V
<i>Eucalyptus scoparia</i>	E1	V
<i>Genoplesium baueri</i>	V	-
<i>Grevillea caleyi</i>	E1	E1
<i>Grevillea shiressii</i>	V	-
<i>Haloragodendron lucasii</i>	E1	-
<i>Hibbertia puberula</i>	E1	-
<i>Lasiopetalum joyceae</i>	V	V
<i>Leptospermum deanei</i>	V	-
<i>Melaleuca biconvexa</i>	V	V
<i>Melaleuca deanei</i>	V	-
<i>Persoonia hirsuta</i>	E1	-
<i>Pimelea curviflora</i> var. <i>curviflora</i>	V	-
<i>Syzygium paniculatum</i>	E1	-
<i>Tetratheca glandulosa</i>	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

5.3.4 Threatened Populations

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

5.3.5 Threatened Ecological Communities

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

One EEC, Sydney Turpentine-Ironbark Forest (STIF) is recorded on the subject site in the current and previous surveys. STIF is listed as endangered under the NSW TSC Act 1995.

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, depicts the EEC STIF as occurring on the subject site.

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 the community 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 does not qualify to conform to this definition as the native vegetation does not have an intact understorey and is less than 1 hectare in area, with the total area mapped as less than a quarter of a hectare.

In summary, the subject site contains a total of 16 locally indigenous species and 10 noxious weed species. Two threatened flora species occur on the subject site, (*Eucalyptus scoparia* Wallangarra White Gum and *Syzygium paniculatum* Magenta Lilly Pilly) and both are planted specimens non-indigenous to the area. This assessment has concluded that the endangered ecological community STIF does occur within the subject site as determined under the TSC Act but only as a few isolated trees with very poor species diversity associated with them. A total of 11 species characteristic of STIF under the TSC Act determination are present on site. Structural intactness is poor with no continuous vegetation layers present.

6 HABITAT POTENTIAL FOR THREATENED SPECIES

6.1 Flora

Table 5 summarises the habitat potential of the subject site for the threatened plant 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 5 Habitat potential for threatened flora species previously recorded within the locality (10km search) on the DECCW Wildlife Atlas and listed under the EPBC Act.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
<i>Acacia bynoeana</i>	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.
<i>Cryptostylis hunteriana</i>	This leafless orchid stands 45cm tall and easily distinguished by its hairy, maroon labellum. Population dispersal is more frequent in the south coast of NSW. In the Sydney region populations are located within the Kuring-gai Chase N.P, Ben Boyd N.P and Pittwater region. Potential habitats include an open understory in a diversity of communities including swamp-heath and woodlands. Dominant canopy cover is typically of <i>Eucalyptus sclerophylla</i> , <i>E.sieberi</i> , <i>Corymbia gummifera</i> and <i>Allocasuarina littoralis</i> . This species is possibly reliant on the symbiosis relationship with fungal species for nutrient uptake.	Low. Subject site supports marginal habitat in places.
<i>Darwinia biflora</i>	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 Kuring-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 <i>Eucalyptus haemastoma</i> , <i>Corymbia gummifera</i> and/or <i>E. squamosa</i> . 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 Marginal preferred soil type and vegetation associations occur on the subject site
<i>Deyeuxia appressa</i>	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 primarily moist-wet soils.	Low. Distribution of this species is highly restricted.
<i>Diuris bracteata</i>	Presumed extinct from its previously isolated region in Gladesville, this species is currently known in Gosford and Wyong LGA. This orchid flowers between August and September. Habitats include dry sclerophyll forests and woodlands both with a grassy understorey.	Nil. Distribution of this species is highly restricted.
<i>Epacris purpurascens</i> var. <i>purpurascens</i>	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.	Low Subject site supports marginal habitat in places.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
<i>Eucalyptus camfieldii</i>	Restricted distribution in a narrow band from Raymond 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 <i>E.oblonga</i> Narrow-leaved Stringybark, <i>E. capitellata</i> Brown Stringybark and <i>E. haemastoma</i> Scribbly Gum. Poor response to too frequent fires.	Low. Subject site supports marginal soil type and vegetation associations in places.
<i>Eucalyptus nicholii</i>	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.
<i>Eucalyptus scoparia</i>	A small tree with a smooth pale bark. Found on sloping terrain and rocky outcrops on well-drained soils. Habitat preference for open eucalyptus forests and woodlands. Geographical distribution extends from Queensland to the north to southern NSW.	Low Subject site supports some marginal habitat in places. Planted specimens occur on site.
<i>Genoplesium baueri</i>	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.
<i>Grevillea caleyi</i>	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 <i>Eucalyptus sieberi</i> and <i>E. gummifera</i> . Commonly found in the endangered Duffys Forest ecological community.	Low Subject site supports some marginal habitat in places.
<i>Grevillea shiressii</i>	A highly attractive shrub, 2-5m tall. Flowers alter in coloration from green when immature to blue and mauve and finally cream when mature. Leaves are lanceolate to elliptic. Populations are known within the Gosford LGA and within the lower Hawkesbury River. Preference for wet sclerophyll forests on alluvial sandy or loamy soils. It is an obligate seeder susceptible to alteration of pre-existing fire regime. Seed germination can occur in the absence of fire but requires additional disturbance to promote this.	Low. Subject site does not support preferred soil type or vegetation associations.
<i>Haloragodendron lucasii</i>	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.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
<i>Hibbertia puberula</i>	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. Singular yellow flowers appear in October to November, however, habitat destruction has greatly impacted this species.	Nil. Subject site does not support preferred soil type or vegetation associations.
<i>Lasiopetalum joyceae</i>	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 Subject site supports some marginal habitat in places.
<i>Leptospermum deanei</i>	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. <i>Tristaniopsis laurina</i> , <i>Baechea myrtifolia</i> ; Woodland - e.g. <i>Eucalyptus haemstoma</i> ; and Open Forest - e.g. <i>Angophora costata</i> , <i>Leptospermum trinervium</i> , <i>Banksia ericifolia</i> . The species is probably killed by fire	Low Subject site supports some marginal habitat in places.
<i>Melaleuca biconvexa</i>	This small paperbark species is only located within NSW. Populations are dispersed throughout Jervis Bay to Gosford in the north. <i>M.biconvexa</i> prefers damp alluvial soils in low sheltered altitudes. Flowers form white urn-shaped clusters in September to October. Species is tolerant of infrequent fires, however alteration to fire regimes and hazard reduction burns currently threaten populations. A high frequency of known populations occurs on private land. These are subject to alteration to hydrological flow and impacts associated with grazing and soil compaction.	Low. Subject site does not support preferred soil type or vegetation associations.
<i>Melaleuca deanei</i>	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.	Low Subject site supports some marginal habitat in places.
<i>Persoonia hirsuta</i>	The Hairy Geebung has been recorded in the Sydney coastal area (subsp. <i>hirsuta</i> - Gosford to Berowra to Manly to Royal National Park), the Blue Mountains area (subsp. <i>evoluta</i> - Springwood, Lithgow, Putty) and the Southern Highlands (subsp. <i>evoluta</i> - Balmoral, Buxton, Yanderra and Hill Top areas). It is probably killed by fire (as other <i>Persoonia</i> 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.
<i>Pimelea curviflora</i> var. <i>curviflora</i>	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. Subject site supports some marginal habitat in places.
<i>Syzygium paniculatum</i>	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 as natural population. Subject site supports some marginal habitat in places. Species occurs as planted specimens on site and seedling recruitment from anthropogenic swarm is occurring.

Scientific Name	Species Habitat Preference	Likelihood of Species to Occur on Subject Site
<i>Tetratheca glandulosa</i>	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.

7 CONCLUSION

As part of an Environmental Assessment currently being prepared as per the Director-General's Requirements for Application number MP 10_0057, this Threatened Species Assessment was carried out by Total Earth Care on behalf of Meriton Apartments Pty Ltd for the subject site 132-138 Killeaton Street, St Ives.

The assessment found that 16 locally indigenous species grew on the subject site, including two canopy tree species that are characteristic species for the Endangered Ecological Community (EEC) Sydney Turpentine Ironbark Forest (STIF) which is listed as Endangered under the New South Wales Threatened Species Conservation Act, 1995 (TSC Act) and Critically Endangered under the Federal Environmental Protection and Biodiversity Conservation Act, 1999 (EPBC Act). The assessment has found that three small areas of STIF occur on the subject site as per the TSC Act's definition of STIF, principally existing as isolated canopy trees of characteristic species of STIF, or under the canopy of component species of STIF associated with understory and groundlayer species that are characteristic or component species of STIF.

The assessment found that no areas of STIF occurred on the subject site that conformed to the definition of STIF under the EPBC Act due to the small size and poor structural intactness of the native remnant vegetation communities on the subject site. No threatened flora or fauna species were identified that are indigenous to the locality, and no significant habitat for any threatened flora species, flora populations or endangered ecological communities was identified on the subject site.

The assessment of the potential direct and indirect impacts of the construction proposal, including the removal of one specimen of *Eucalyptus resinifera* and one specimen of *Syncarpia glomulifera* is considered unlikely to cause a significant impact on the health and status of the STIF community within the subject site or the broader study area, as detailed within the 7-part test attached in Appendix 3. As such, the 7-part test has found that a Species Impact Statement is not required.

Both the DGRs and the DCP set out requirements to mitigate against both direct and indirect impacts as a result of the proposal. The DGRs require that impacts specifically relating to threatened species, populations and endangered ecological communities and their habitats are addressed. Steps taken to mitigate these impacts also need to be addressed. The Town Centres DCP 2010 places the subject site within Category 5-Landscape Remnant which specifies that native vegetation should be retained. As a means to achieve this, where native vegetation removal is unavoidable, the concept of 'no net loss' has been incorporated into the DCP. The DCP relates not just to threatened species, populations and communities but to all native flora and fauna. There are a number of expected and potential impacts in the proposal that can be avoided, mitigated against or compensated for to achieve a level of 'no net loss', both with threatened species, communities and populations and native flora and fauna more generally.

These mitigation measures are:

- Tree protection zones should be extended to include all connected or neighbouring areas mapped as STIF in the current assessment for the purpose of rehabilitating resilient habitat. The largest most northerly remnant of STIF that demonstrates some level of resilience of groundcover and shrub species should be managed through assisted natural regeneration (bush regeneration) to recover the structural formation and recruit any resilient species of STIF in this remnant. There is the potential for many species to be present in the soil as soil

stored seed and the total number of native species present may be much higher than those observed. Physical protection of this area to exclude adjoining threats and ongoing maintenance over perpetuity would be required to achieve this outcome of retaining, protecting and rehabilitating existing habitat.

- Areas of landscaping within the study site should include not less than 50% locally native species as per specifications within the DCP section 7.6 (Ku-ring-gai Council 2010a).
- Revegetation of areas must be undertaken only after there is reasonable satisfaction that areas do not have native resilience that would be hindered or destroyed by planting of locally occurring species. Landscape plans must be sensitive to the resilience on site and consideration should be made to any dormant resilience potential within the site.
- Revegetation or replanting using local species must only occur where the plant stock has been collected in a manner that is genetically integral to the site so as to not lead to a reduction in genetic biodiversity. Collection and production of propagules from a narrow range of specimens in relation to the number of plants produced must be guarded against in order to avoid inbreeding and resultant loss of genetic biodiversity. Collection of propagules from locally indigenous vegetation proposed for removal should occur for use in revegetation upon the site, while adhering to the genetic integrity guidelines to prevent loss of genetic integrity, particularly extrapolation of a small genetic range into a relatively large number of individuals. This is known as the 'founder effect' and is to be guarded against by strict adherence to the Florabank Guidelines (Greening Australia 2010)
- Planting of 46 locally occurring tree species will offset, over time, the proposed removal of 10 trees of locally occurring species.

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Appendix A

Flora Species Inventory

Meriton Apartments Pty Ltd
132-138 Killeaton Street, St Ives

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 Ku-ring-gai 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
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
u	Uncommon, species occur only once or twice during the survey

Family	Genus species	Common name	General Status	Woodland	Grassland	STIF
Fabaceae - Mimosoideae	<i>Acacia baileyana</i>	Cootamundra Wattle	*	u		
Fabaceae - Mimosoideae	<i>Acacia binervia</i>	Coast Myall		u		
Fabaceae - Mimosoideae	<i>Acacia decurrens</i>	Black Wattle	*	u		
Fabaceae - Mimosoideae	<i>Acacia elata</i>	Mountain Cedar Wattle	ni	u		
Fabaceae - Mimosoideae	<i>Acacia floribunda</i>	White Sally Wattle				u
Polygonaceae	<i>Acetosa sagittata</i>	Rambling Dock	*	u		
Alliaceae	<i>Agapanthus praecox ssp orientalis</i>	African Lily	*	o		
Asteraceae	<i>Ageratina adenophora</i>	Crofton Weed	*	u		
Myrtaceae	<i>Agonis flexuosa</i>	Willow Myrtle		u		
Primulaceae	<i>Anagallis arvensis</i>	Scarlet Pimpernel	*	u		
Apocynaceae	<i>Araujia sericifera</i>	Moth Vine	*	c		
Asparagaceae	<i>Asparagus aethiopicus</i>	Asparagus Fern	*	c		
Rubiaceae	<i>Asperula arvensis</i>		*	u		
Asteraceae	<i>Bidens pilosa</i>	Bogan's Flea	*	o		u

Sterculiaceae	<i>Brachychiton populneus</i>	Kurrajong		u		
Theaceae	<i>Camellia sasanqua</i>		*	u		
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress	*	u	o	
Casuarinaceae	<i>Casuarina glauca</i>	Swamp Oak		o		
Ulmaceae	<i>Celtis australis</i>		*	o		
Apiaceae	<i>Centella asiatica</i>	Indian Pennywort		o		
Lauraceae	<i>Cinnamomum camphora</i>	Camphor Laurel	*	o		
Asteraceae	<i>Cirsium vulgare</i>	Spear Thistle	*	u	u	
Asteraceae	<i>Conyza sp</i>	Fleabane	*	o		
Malaceae	<i>Cotoneaster glaucophyllus</i>		*	u		
Cupressaceae	<i>Cupressus torulosa</i>	Bhutan Cypress	*	o		
Poaceae	<i>Dichelachne rara</i>					u
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed		o		u
Iridaceae	<i>Dietes sp</i>		*	u		
Poaceae	<i>Drepanostachyum sp</i>	Bamboo	*	u		
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	*	c	c	o
Myrtaceae	<i>Eucalyptus elata</i>	River Peppermint		c		
Myrtaceae	<i>Eucalyptus leucoxylon</i>	Yellow Gum		o		
Myrtaceae	<i>Eucalyptus resinifera</i>	Red Mahogany				u
Myrtaceae	<i>Eucalyptus robusta</i>	Swamp Mahogany		u		
Myrtaceae	<i>Eucalyptus saligna</i>	Sydney Blue Gum		u		u
Myrtaceae	<i>Eucalyptus scoparia</i>	Wallangarra White Gum	T	o		
Euphorbiaceae	<i>Euphorbia peplus</i>	Petty Spurge	*	o	u	
Fraxinaceae	<i>Fraxinus griffithi</i>	Evergreen Ash	*	u		
Fumariaceae	<i>Fumaria sp</i>		*	u		
Fabaceae - Faboideae	<i>Genista monspessulana</i>	Montpellier Broom	*	u		
Fabaceae - Faboideae	<i>Glycine tabacina</i>			u		u
Asteraceae	<i>Gnaphalium sp</i>	Cudweed	*	u		
Proteaceae	<i>Hakea salicifolia</i>	Willow-leaved Hakea		u		
Fabaceae - Faboideae	<i>Hardenbergia violacea</i>	Purple Coral Pea		u		
Anacardiaceae	<i>Harpephyllum caffrum</i>	Kaffir Plum	*	o		

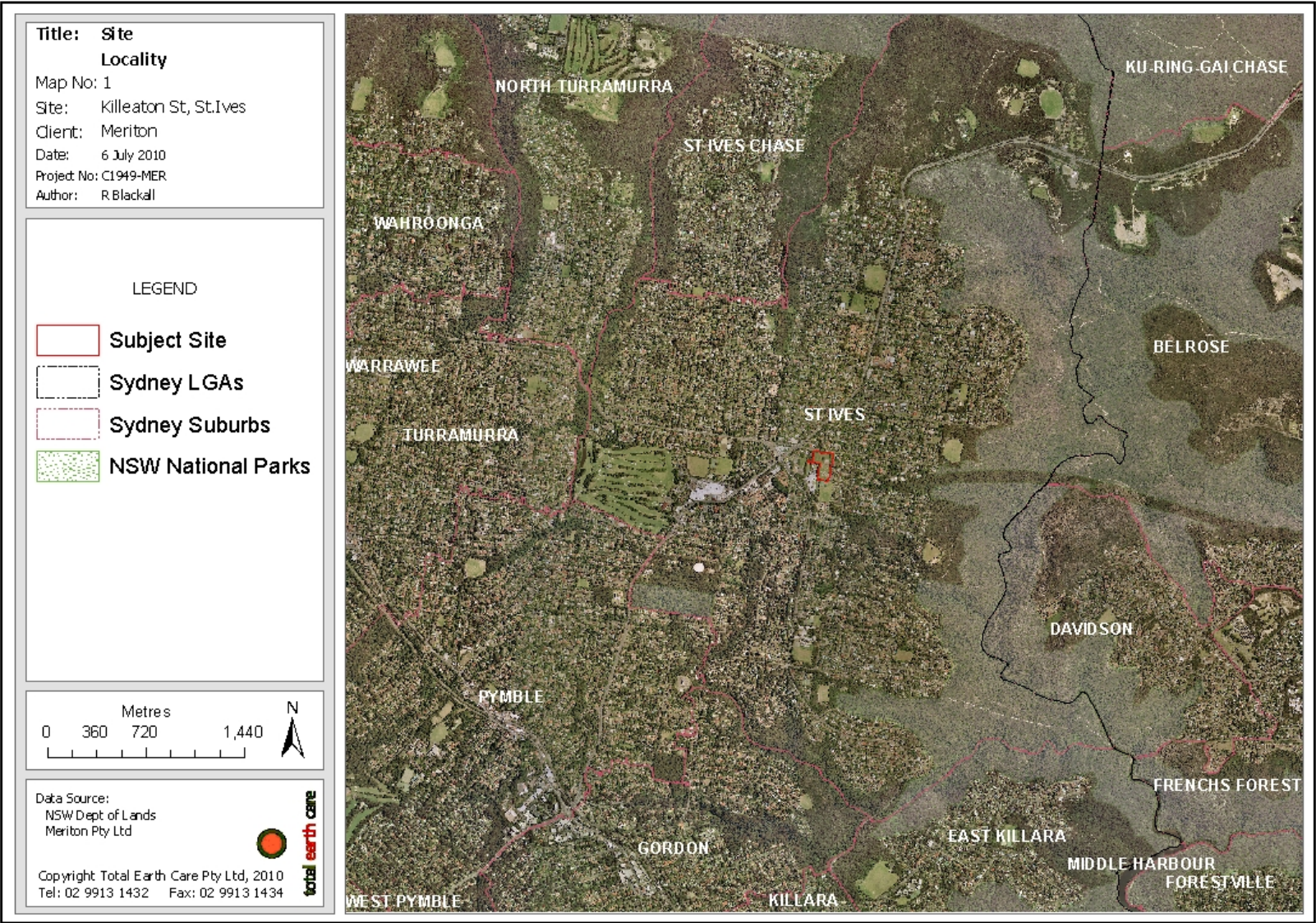
Euphorbiaceae	<i>Homalanthus populifolius</i>	Bleeding Heart		u		
Asteraceae	<i>Hypochaeris radicata</i>	Catsear	*	c	c	u
Cupressaceae	<i>Juniperus conferta</i>	Juniper	*	u		
Myrtaceae	<i>Leptospermum petersonii</i>	Lemon-scented Teatree	*	u		
Oleaceae	<i>Ligustrum lucidum</i>	Large Leaved Privet	*	o		
Oleaceae	<i>Ligustrum sinense</i>	Small Leaved Privet	*	o		
Caprifoliaceae	<i>Lonicera japonica</i>	Japanese Honeysuckle	*	o		
Myrtaceae	<i>Lophostemon confertus</i>	Brush Box	ni	c		
Myrtaceae	<i>Melaleuca armillaris</i>	Bracelet Honey-myrtle		c		
Myrtaceae	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree		o		
Poaceae	<i>Microlaena stipoides var stipoides</i>	Weeping Grass		o	u	o
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	*	u	o	
Apocynaceae	<i>Nerium oleander</i>	Oleander	*	u		
Ochnaceae	<i>Ochna serrulata</i>	Mickey Mouse Plant	*	c		
Oleaceae	<i>Olea europaea ssp cuspidata</i>	African Olive		o		
Poaceae	<i>Oplismenus sp</i>		*	u		o
Oxalidaceae	<i>Oxalis perennans</i>			u	u	u
Oxalidaceae	<i>Oxalis sp</i>		*	u		
Poaceae	<i>Paspalum dilatatum</i>	Paspalum	*	o	u	u
Passifloraceae	<i>Passiflora caerulea</i>	Blue Passionflower	*	u		
Passifloraceae	<i>Passiflora edulis</i>	Common Passionfruit	*	u		
Poaceae	<i>Pennisetum clandestinum</i>	Kikuyu Grass	*	o	c	
Arecaceae	<i>Phoenix canariensis</i>	Canary Island Date Palm	*	u		
Phytolaccaceae	<i>Phytolacca octandra</i>	Inkweed	*	u		
Pinaceae	<i>Pinus radiata</i>	Radiata Pine	*	u		
Anacardiaceae	<i>Pistacia chinensis</i>	Chinese Pistachio	*	u		
Pittosporaceae	<i>Pittosporum undulatum</i>	Sweet Pittosporum		c		u
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	*	c	c	
Lobeliaceae	<i>Pratia purpurascens</i>	Whiteroot				u
Euphorbiaceae	<i>Ricinus communis</i>	Castor Oil Plant	*	o		
Rosaceae	<i>Rubus fruticosus agg sp</i>	Blackberry	*	u		

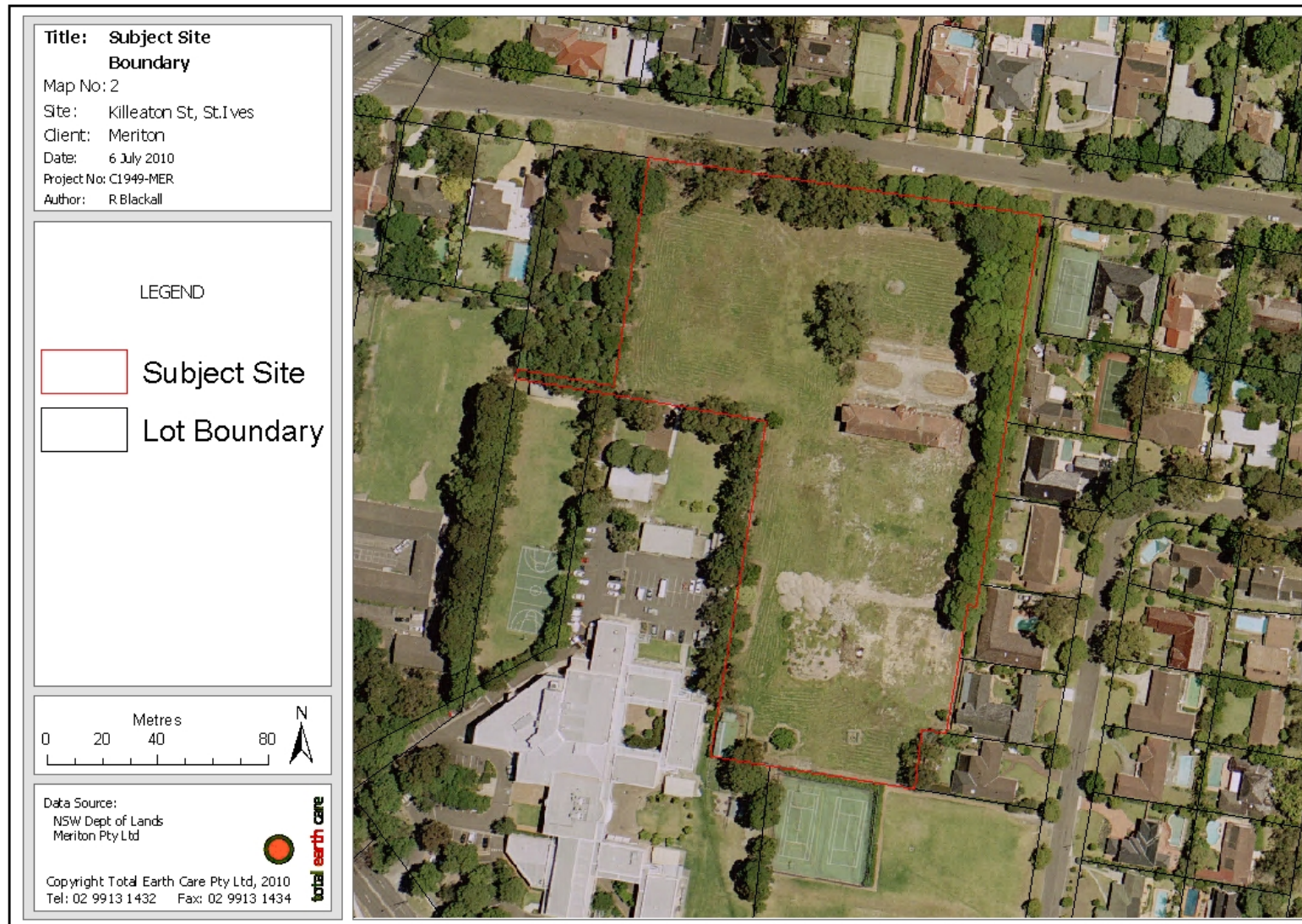
Anacardiaceae	<i>Schinus areira</i>	Pepper Tree	*	u		
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	*	u	o	
Fabaceae - Caesalpinioideae	<i>Senna pendula var glabrata</i>		*	o		
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	*	c	u	
Solanaceae	<i>Solanum mauritianum</i>		*	u		
Solanaceae	<i>Solanum nigrum</i>	Black-berry Nightshade	*	u		
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	*	c		
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass	*	u	o	
Strelitziaceae	<i>Strelitzia nicolai</i>	Giant Bird of Paradise	*	u		
Myrtaceae	<i>Syncarpia glomulifera ssp glomulifera</i>	Turpentine				u
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	T			u
Asteraceae	<i>Taraxacum officinale</i>	Dandelion	*	u	u	
Cupressaceae	<i>Thuja plicata</i>	Giant Arbor Vitae	*	u		
Verbenaceae	<i>Verbena bonariensis</i>	Purpletop	*	u	u	
Fabaceae - Faboideae	<i>Vicia sativa</i>	Vetch	*	u		
Violaceae	<i>Viola odorata</i>		*	o		
Flacourtiaceae	<i>Xylosma japonica</i>		*	u		

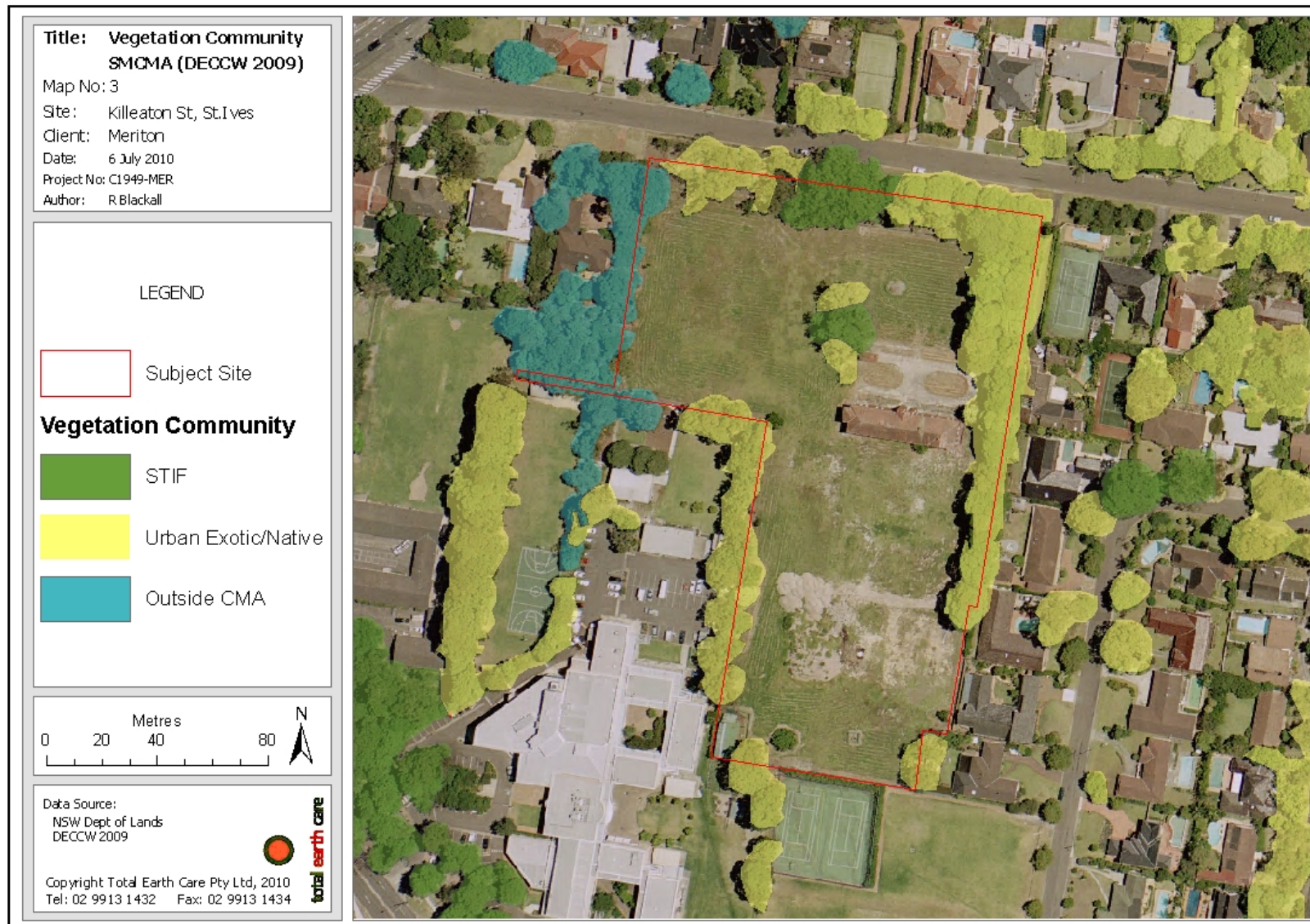
Appendix B

Maps and Figures

Meriton Apartments Pty Ltd
132–138 Killeaton Street, St Ives









Appendix C

Assessment of Significance for Threatened Biodiversity

Meriton Apartments Pty Ltd
132-138 Killeaton St, St Ives

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) has been mapped by DECCW (2009) as occurring under the canopy spread of three individual tree specimens of two species on the subject site, a single *Eucalyptus resinifera* Red Mahogany and two *Eucalyptus saligna* Sydney Blue Gum. This mapping methodology adheres to the definition of STIF as described in the Scientific Committee's final determination that the community may occur as remnant trees of which *Eucalyptus resinifera* is a characteristic species. *Eucalyptus saligna* Sydney Blue Gum, while not listed as a characteristic species of STIF by the Scientific Committee, is noted by Tozer (2003) as being a dominant species of STIF. This is allowed for within the Scientific Committee's determination by it noting that the total list of characteristic species is much higher than those listed in the final determination. The current assessment supports this mapping of the area occupied by the two most northerly occurring *Eucalyptus saligna* as STIF due to the number of associated understory and groundlayer local species, including some STIF characteristic species, found growing in association with these *Eucalyptus saligna* specimens. However, as stated they are not themselves noted as characteristic species for the community. The remaining two specimens of *Eucalyptus saligna* on the subject site that are found along the south-west boundary are not mapped by DECCW (2009) as STIF. The current assessment supports this mapping due to *Eucalyptus saligna* not being a characteristic species of STIF and these specimens not being associated with any other native species from other vegetation layers.

This pattern of highly isolated remnant canopy trees representative of STIF occurs throughout the local area. Significant remnants of structurally intact STIF occur in the local such as St Ives High School and the Horace St Road Reserve both south of the subject site within approximately 1 kilometre. The remnant STIF vegetation on the subject site is highly degraded by weed infestation, clearing and other human-induced impacts that have occurred over several decades.

The proposal would remove one mature specimen of *Eucalyptus resinifera*, which is a canopy tree species characteristic of STIF. This tree is isolated from other any other characteristic STIF species as well as any other local native species occurring in any vegetation layer. A single *Syncarpia glomulifera* Turpentine, a species characteristic of STIF, is proposed to be removed. This tree is isolated from any other locally native plant species and it forms part of a small grove of otherwise planted exotic or non-local native tree species. It has not been mapped as STIF by DECCW (2009) however the current assessment maps it as STIF. The proposal would remove one young *Eucalyptus saligna* Sydney Blue Gum. This specimen has not been mapped by DECCW (2009) as STIF. This view is supported by the current assessment. The proposal would remove one small specimen of

Pittosporum undulatum, a component species of STIF. This specimen has been mapped as occurring within the boundary of a STIF remnant by the current assessment.

The three plants of *Syzygium paniculatum* Magenta Lilly Pilly are 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. They have been identified as planted specimens and naturalized progeny of such plantings, and not considered as a remnant threatened species.

The three plants of *Eucalyptus scoparia* Wallangarra White Gum are classified as an Endangered plant species in NSW as listed under Schedule 1 of the TSC Act and Vulnerable under the federal EPBC Act. The *Eucalyptus scoparia* Wallangarra White Gum is not an indicative STIF species and does not naturally occur within the STIF vegetation community. They have been identified as planted specimens and not considered as a remnant threatened species.

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. All areas proposed for construction of buildings or underground carparks occur outside the area of STIF proposed to be retained as part of the proposed development. Likewise, all soils showing any degree of native plant resilience and seedling recruitment fall outside of the areas proposed for construction of buildings or underground carparks.

Overshadowing from the construction of the multistorey infrastructure will be minimal as the buildings are located to the south of the two Sydney Blue Gum trees proposed to be retained as part of the STIF community.

(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 was once widespread in the Ku-ring-gai LGA; today limited STIF strands of remnant vegetation remain and are highly fragmented, similar to the subject site.

A single specimen of *Eucalyptus resinifera* Red Mahogany will be removed by the proposed development. This is a characteristic STIF species. This specimen is not growing in association with any other species of local native plant. A single *Syncarpia glomulifera* Turpentine will be removed by the proposed development. This is a characteristic STIF species. This specimen is not growing in association with any other species of local native plant. Other characteristic species of STIF are proposed to be removed but these are not canopy tree species nor are they within the area defined by either DECCW (2009) as STIF. These species proposed to be removed are up to seven specimens of *Pittosporum undulatum*, and one specimen of *Acacia decurrens*. The *Acacia decurrens* is the only specimen observed on the study site. Four of the specimens of *Pittosporum undulatum* have been mapped by the current assessment as occurring outside areas mapped as STIF. *Pittosporum undulatum* is noted as being a species that has benefitted from urbanisation and is often over-represented in local bushland, particularly sandstone gullies.

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.

(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;

- *Invasion and establishment of exotic vines and scramblers.* The exotic weed *Asparagus aethiopicus* Asparagus Fern is prevalent throughout the Woodland area.
- *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 a two native canopy tree species characteristic of STIF. Removal of up to eight understorey trees characteristic of STIF. Removal of a small number of specimens of native groundlayer species listed as characteristic species of STIF.

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 on the subject site or the locality. In summary the following assumptions were made;

- The construction footprints will not adversely reduce the dimensions of the current STIF coverage in the locality as this impact is limited to two isolated trees both associated with no other local native vegetation.
- Construction works will be managed for minimal impacts on the primary root system for all STIF canopy trees proposed to be retained.
- Although two canopy tree specimens characteristic of STIF are proposed to be removed, they are isolated from any other locally native vegetation and will be offset by the planting of 46 locally occurring canopy trees, offsetting any loss of STIF canopy species in the local area as a result of the proposed development.

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