As the species is wide-ranging and covers large areas in any one night, the study area and subject site represent only a very small amount of the total potential foraging habitat for the species within the locality. The study area, and subject site in particular is not considered to be significant to the viability of the species. This species would be expected to more heavily utilise other higher quality areas of habitat in the locality.

iii. Discussion of conservation status

a. Local, regional and state-side status

The Grey-headed Flying-fox is listed as Vulnerable under Schedule 2 of the TSC Act. It is also listed as Vulnerable under the EPBC Act. The presence of Ku-ring-gai Flying-fox Reserve at Gordon within Ku-ring-gai LGA indicates some local significance.

b. Threatening processes

The following key threatening processes are known to affect the Grey-headed Flying-fox:

- **Clearing of native vegetation** as this reduces the abundance of foraging and roosting habitat;
- **Ecological consequences of high frequency fire** as foraging and roosting habitat may be damaged or destroyed;
- **Infection of native plants by Phytophthora cinnamomi** as vegetation that is utilised by this species may be susceptible and may be killed or damaged; and
- **Human-caused climate change** as it may alter the extent and nature of its preferred habitat.

c. Habitat requirements

The Grey-headed Flying-fox occurs in subtropical and temperate rainforests, tall sclerophyll forests and woodland, heaths and swamps as well as urban gardens and cultivated fruit crops (OEH 2014d). Grey-headed Flying-foxes congregate in large numbers at roosting sites (camps) that may be found in rainforest patches, Melaleuca stands, mangroves, riparian woodland or modified vegetation in urban areas (NSW Scientific Committee 2004c).

d. Other documentation

A draft national recovery plan has been prepared for the Grey-headed Flying-fox. The overall objectives are: to reduce the impact of threatening processes; to arrest decline throughout their range; to conserve their functional roles in seed dispersal and pollination of native plants; and to improve the comprehensiveness and reliability of information available to guide recovery (DECCW (NSW) 2009). The proposal will minimally contribute to the threatening process of "Clearing of native vegetation" with the removal of a single *Eucalyptus*

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

e. Assessment of adequacy of reservation

The Grey-headed Flying-fox occurs in many conservation reserves throughout the greater Sydney region. These areas include Dalrymple-Hay Nature Reserve, Lane Cove National Park Garigal National Park and Ku-ring-gai Chase National Park. The individuals occurring in these areas are more secure than individuals occurring on private property closer to development.

f. Limit of known distribution

The Grey-headed Flying-fox occurs along the east coast of Australia from Bundaberg in Queensland to Melbourne, Victoria (NSW NPWS 2001). This species may range to the western slopes of the Great Dividing Range in northern NSW (NSW NPWS 2001). The study area falls within the known distribution of this species.

iv. Discussion of the likely effect of the proposal at local and regional scales

a. Significance within a local context

The proposal will remove only a very small area of potential foraging habitat for the species in relation to the habitat within the locality. The clearance of this small area of potential foraging habitat is not considered significant within the local context as larger areas of higher quality habitat remain within the locality and wider region. These areas are more likely to provide roosting and foraging habitat for this species.

b. Discussion of connectivity

The vegetation within the study area and subject site is sparsely connected to vegetation in the locality as the study area is bounded by residential land holdings, main roads and general urban development. Scattered trees throughout these land holdings provide limited but some connectivity to other areas of more extensive and intact vegetation which is mostly to the west and north west of the study area.

The habitat to be removed as part of the proposal represents a very small portion of available habitat in the locality. Larger nearby bushland includes Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. All of these larger areas are sparsely connected by scattered trees within an urban environment with connectivity coming closest in their outer most extents.

Due to the loss of only a small proportion of potential foraging habitat in the locality and the highly mobile nature of this species, it is not expected that the proposal will decrease the ability of movement of individuals and gene flow between habitats or populations.

c. Consideration of threatening processes

The OEH Grey-headed Flying-fox profile considers the species to be threatened by the following processes:

- Loss of foraging habitat

  The habitat proposed for removal is a small proportion of the total foraging habitat available to the species in the locality and is not considered a significant loss for the species. Habitat values similar to the study area and subject site exist throughout the locality within gardens and public open space and reserves. The species is highly adaptive and feeds on isolated trees within urban environments.

- Disturbance of roosting sites

  The proposal is not in the immediate vicinity of any roosting sites and therefore will not cause disturbance to roosting.

- Unregulated shooting

  The proposal is not for an activity that would cause conflict with Grey-headed Flying-foxes, and would not incite a need to shoot.

- Electrocution on powerlines

  There is an increased risk of electrocution on powerlines if above-ground powerlines are installed for the development. These will be of an insignificant extent compared with the length of powerlines in surrounding streets.

5.3.4 Eastern Bentwing-bat

i. Discussion of local and regional abundance and distribution

a. Discussion of other known local populations

There are 24 records of the Eastern Bentwing-bat in Ku-ring-gai LGA. There are 29 records of the Eastern Bentwing-bat in the locality, these records are scattered throughout the locality but most commonly occurring to the north to north- west of the study area. Due to the number of records in the locality and knowing that colonies can number from 100 to 150,000 individuals (OEH 2014b) it is likely that the locality records are from the same population.

Twenty-nine records occur within the locality Therefore, any individuals utilising the study area would form a component of the broader population ranging outside of the locality.

b. Discussion of other known regional populations

The Eastern Bentwing-bat is found along the east coast of Australia (OEH 2014b). Within the wider locality, the Eastern Bentwing-bat there are scattered records throughout the urban region of Sydney and the Central Coast and further afield in National Parks. The Eastern

Bentwing-bat has been recorded within Lane Cove National Park and Ku-ring-gai Chase National Park. There are 159 records of the Eastern Bentwing-bat within the Sydney Metropolitan CMA and 544 records within the Hawkesbury-Nepean CMA.

ii. Assessment of habitat

a. Description of habitat values

The majority of the study area was presumably cleared around 1850 to the early 1900s when the area of Gordon (then still known as Lane Cove) was established as a settlement and developed following the construction of the post office and railway station (Ku-ring-gai Historical Society Inc, 2008). Since that time, little to no natural regeneration of native vegetation has occurred, with most areas remaining as exotic grassland and planted garden among buildings.

The habitat within the study area does not support suitable roosting habitat and there is limited foraging habitat for this species. The Eastern Bentwing-bat would be likely to utilise the study area and subject site only occasionally for foraging, this would be as part of a larger foraging range.

The study area and subject site is not considered to be significant to the viability of the species as it represents a very small amount of potential foraging habitat within the locality and wider region. This species would be expected to more heavily utilise other higher quality areas of habitat in the locality.

b. Discussion of habitat utilisation

The study area does not provide suitable breeding habitat for this species as it congregates in maternity caves to breed. Foraging habitat for this species occurs in the study area, and subject site however it is compromised by the simplified form of scattered trees above pavement or an exotic understorey. Lights may attract insects, and therefore may form preferred foraging sites. It is likely that the Eastern Bentwing-bat utilises the subject site, mainly as part of a larger foraging range and that the species roosts in caves, road culverts and buildings' elsewhere within the locality.

The subject site is not considered to be significant to the viability of the species due to representing a very small area of potential foraging habitat within the locality. This species would be expected to utilise other higher quality areas of habitat in the locality.

iii. Discussion of conservation status

a. Local, regional and state-side status

The Eastern Bentwing-bat is listed as Vulnerable under Schedule 2 of the TSC Act. It is not listed under the EPBC Act.

b. Threatening processes

The following key threatening processes are known to affect the Eastern Bentwing-bat:

- **Clearing of native vegetation** as this reduces the abundance of foraging and roosting habitat;
- **Loss of hollow-bearing trees** as they provide hollow logs that serve as important roosting sites;
- **Ecological consequences of high frequency fire** as foraging and roosting habitat may be damaged or destroyed;
- **Infection of native plants by Phytophthora cinnamomi** as vegetation that is utilised by this species may be susceptible and may be killed or damaged; and
- **Human-caused climate change** as it may alter the extent and nature of its preferred habitat.

c. Habitat requirements

Caves are the primary roosting habitat for the Eastern Bentwing-bat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures (OEH 2014b).

d. Other documentation

No recovery plan has been prepared for this species. No specific Threat Abatement Plan is relevant to this species, however the Action Plan for Australian Bats provides a recovery outline (Duncan et al. 1999). No critical habitat for this species has currently been identified by the Director-General of the OEH.

e. Assessment of adequacy of reservation

Most records within the wider region are within reserved areas such as National Parks of the Blue Mountains and Wollomi and Yengo National Parks and therefore protected. No records of this species is found to be within the immediate proximity of the subject site. Records of the Eastern Bentwing-bat are scattered throughout the locality, particularly to the west of the subject site within Lane Cove National Park. Security for the species is likely to be moderate within the locality. Suitable, secure habitat occurs more extensively in larger nearby bushland such as Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north east and Ku-ring-gai Chase National Park to the north of the subject site. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat.

f. Limit of known distribution

The Eastern Bentwing-bat is distributed along the NSW coast and 250km inland (OEH 2014b). The subject land falls within the known distribution of this species.

iv. Discussion of the likely effect of the proposal at local and regional scales

a. Significance within a local context

The proposal will remove only a very small area of potential foraging habitat for the species in relation to the habitat within the locality. Fundamentally, the vegetation to be removed on the subject site is a small portion of highly modified vegetation primarily surrounded by established urban development. The clearance of this small area of potential foraging habitat from the subject site is not considered significant within the local context as larger areas of higher quality habitat remain within the locality and wider region. These areas are more likely to provide roosting and foraging habitat for this species.

b. Discussion of connectivity

The vegetation within the study area and subject site is sparsely connected to vegetation in the locality as the study area is bounded by residential land holdings, main roads and general urban development. Scattered trees throughout these land holdings provide limited but some connectivity to other areas of more extensive and intact vegetation which is mostly to the west and north-west of the study area.

The habitat to be removed as part of the proposal represents a very small portion of available habitat in the locality. Larger nearby bushland includes Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. All of these larger areas are sparsely connected by scattered trees within an urban environment with connectivity coming closest in their outer most extents.

Due to the loss of only a small proportion of potential foraging habitat in the locality and the highly mobile nature of this species, it is not expected that the proposal will decrease the ability of movement of individuals and gene flow between habitats or populations.

c. Consideration of threatening processes

The OEH Eastern Bentwing-bat profile considers the species to be threatened by the following processes:

- Damage or disturbance of roosting caves

  The study area does not provide suitable roosting habitat in the form of caves or crevices. The proposal is not likely to disturb significant habitat such as maternity caves as they do not occur on the subject site.

- Loss of foraging habitat

Some limited foraging habitat will be removed, however it is not considered to be important for this species. The Eastern Bentwing-bat is likely to utilise the study area as part of a much larger foraging range.

- Application of pesticides in or adjacent to foraging areas

  The proposal is unlikely to increase the application of pesticides. The risk of occasional exposure to any pesticides used on the subject site therefore is considered to be very low.

- Predation by feral cats and foxes

  The proposal is not likely to exacerbate the impacts of cats and foxes in the study area.

5.4 Feasible Alternatives

DGR 5.6 Description of feasible alternatives

The following are further requirements related to your obligation under Section 110(2)(h) to address the following:

> *a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development.*

There are three broad alternatives to the proposal:

- Do nothing;
- Alternative development layout; and
- Reduced scale.

These are discussed below.

5.4.1 Do Nothing

If nothing is done and no development occurs, the remnant native vegetation within the subject site, STIF, is unlikely to survive in the long term *in situ*.

The remnant native vegetation within the subject site is in very poor structural condition overall and under its current land use it has no regenerative potential as it consists of one *Eucalyptus paniculata* above mown grass beside a pavement. It is surrounded with exotic trees and exotic garden plants. If left as it is in the long term, this vegetation would be expected to continue to exist as it is until the tree reaches the end of its lifespan (or dies due to other means).

5.4.2 Alternative Development Location, Layout and Scale

The proposed development is constrained by the lack of available space for expansion. Alternative layouts were not considered viable in terms of social and economic constraints for sustainable development.

While avoiding the STIF individual would point to other alternative sites and layouts, after consideration with regard to social and economic factors and to all planning policies, it has been determined that the most favourable development layout to proceed with is the layout and site which has been put forward and is outlined in Section 2.1.5 and that the most favourable long term ecological outcome would be to offset the currently existing STIF in a more appropriate area securing its long term viability.

In the proposed offset area, there is potential to provide for and plant out an understorey, whereas none occurs at present. The proposed offset will provide for a larger area of better quality STIF than that being removed resulting in a net gain in biodiversity values for the subject site, study area and wider locality.

Chapter 6

Assessment of Likely Impacts on Endangered Ecological Communities

This chapter covers the following DGRs:

DGR 6. ASSESSMENT OF LIKELY IMPACTS ON ENDANGERED ECOLOGICAL COMMUNTIES

6.1 Determining Affected Endangered Ecological Communities

DGR 6.1 Assessment of endangered ecological communities likely to be affected

The following are further requirements related to your obligation under Section 110(3)(a) to address the following:

> *a general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action.*

One EEC has been determined as occurring within the study area. A modified form of Sydney Turpentine Ironbark Forest (STIF)_occurs at the northern extent of the subject site (see **Figure 4.2**). The presence of *Eucalyptus paniculata* in this area indicates that the original community was most likely aligned with STIF, although it is currently represented by an individual tree.. More information regarding the floristics and structure of these communities within the study area can be found in Chapter 4.

Examination of the final determination for this community, the descriptions by Tozer *et al.* (2010) and mapping prepared by the SMCMA have been utilised as part of this assessment.

STIF is listed as an EEC under the TSC Act and as a CEEC under the EPBC Act. However, given the condition of the community and its small patch size, the vegetation on the subject site does not constitute the community as defined and listed under the EPBC Act.

6.2 Assessment of Endangered Ecological Communities Likely to be Affected

The following DGRs have been addressed for the affected EEC:

DGR 6.2 Description of Habitat

The following are further requirements related to your obligation under Section 110(3)(c) to address the following:

> *a full description of the type, location, size and condition of the habitat of the ecological community and details of the distribution and conditions of similar habitats in the region.*

DGR 6.2.1 Study area

An assessment of habitat in the study area is required and must include:

- *a description of each threatened ecological community, including:*
  - *a description of those areas where the community may only be represented by soil stored seed with no or few above ground components, and*
  - *description of disturbance history and recovery capacity. If the site shows signs of disturbance, details should be provided of the site's disturbance history. An assessment should be made of the ability of the ecological community to recover to a state representative of its pre-disturbance condition. This assessment will include consideration of the site's in-situ and migratory resilience and will be accompanied by a map of the recovery capacity of the ecological community across the site. Consideration should be given to the results (preliminary or otherwise) of restoration projects being undertaken at other sites that contain the ecological community when assessing its recovery capacity.*
- *comparison of the affected community with the endangered ecological community as determined by the NSW Scientific Committee.*
- *reference to any relevant available recovery plans and draft recovery plans and vegetation assessment and mapping.*
- *maps, consistent with the descriptions provided, showing the extent and condition of the (C)EEC.*

DGR 6.2.2 Locality

A discussion of other occurrences of each (C)EEC in the locality must be provided. This must include:

- *a comparison of other known occurrences and their habitats with those of the study area in terms of remnant sizes, connectivity, species diversity and abundances, quality and condition (including levels of disturbances, weed diversity and abundances).*
- *The tenure and long-term security of other occurrences and its habitat.*
- *The relative significance of the subject site for each (C)EEC in the locality and region.*

DGR 6.3 Discussion of conservation status

The following are further requirements related to your obligation under Section 110(3)(b) to address the following:

> *for each ecological community present, details of its local, regional and State-wide conservation status, the key threatening processes generally effecting it, its habitat requirements and any recovery plan or any threat abatement plan applying to it.*

The following are further requirements related to your obligation under Section 110(3)(b1) to address the following:

> *an assessment of whether those ecological communities are adequately represented in conservation reserves (or other similar protected areas) in the region.*

The following are further requirements related to your obligation under Section 110(3)(b2) to address the following:

> *an assessment of whether any of those ecological communities is at the limit of its known distribution.*

The relative significance of the subject site for each threatened ecological community in the locality must be discussed. In particular, discussion of other known occurrences of each affected threatened ecological community must be provided. Such an assessment must consider and compare the differences in remnant sizes, connectivity, species diversity and abundances, quality and condition (including levels of disturbances, weed diversity and abundances), tenure and long-term security of other known occurrences and habitats in the locality with those in the study area.

This SIS must also include reference to the threatening processes that are generally accepted by the scientific community as affecting each (C)EEC and are likely to be caused, promoted or exacerbated by the proposal and to the Priorities Action Statement and any approved or draft recovery plans or threat abatement plans which may be relevant to the proposal.

Known occurrences in the locality and region of fragmentation, decrease in extent or degradation of each (C)EEC or its habitat should be documented.

DGR 6.4 Discussion of the likely effect of the proposal at local and regional scales

The following are further requirements related to your obligation under Section 110(2)(g) to address the following:

> *a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region.*

DGR 6.4.1 Significance within a local context

Provision of information to allow adequate determination of the significance of the effects of the proposal in accordance with Section 5A of the EP&A Act (see section 8 of these requirements below) is required. The significance of impacts in the study area for conservation of affected ecological communities in the locality must be discussed. An assessment of the significance of such impacts must compare and take into account the differences in remnant sizes, connectivity, species diversity and abundances, quality and condition (including levels of disturbances, weed diversity and abundances), tenure and long-term security of other known occurrences and habitats in the locality with those in the study area.

DGR 6.4.2 Extent of habitat removal or modification

The location, nature and extent of habitat removal or modification which may result from the proposed action including the cumulative loss of habitat from the study area (including all proposed DAs and those areas in the subject area already with development consent or identified for development) and the impacts of this on the viability of the (C)EEC in the locality.

This must include an assessment of the proportion of the endangered ecological community to be affected by the proposal, in relation to the total extent of the endangered ecological community, and the impact of this on the viability of the (C)EEC at the local level.

DGR 6.4.3 Discussion of connectivity

The potential of the proposal to increase fragmentation of each threatened ecological community, its relation to adjoining vegetation and to exacerbate edge effects or to decrease the ability for movement of individuals and/or gene flow between habitats must be discussed.

If connectivity between adjacent remnants of endangered ecological communities is likely to be affected, the impact of the proposal on connectivity must also be discussed.

DGR 6.4.4 Consideration of threatening processes

Assessment of effects must not be limited to threats that are recognised as key threatening processes, but must include threatening processes that are generally accepted by the scientific community as affecting the species or population and are likely to be caused or exacerbated by the proposal. Assessment should also include consideration of information in the Priorities Action Statement and any approved or draft recovery plans or threat abatement plans which may be relevant to the proposal.

6.2.1 Sydney Turpentine Ironbark Forest

STIF in the Sydney Basin Bioregion is dominated by *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark). Other associated canopy species include *Eucalyptus globoidea* (White Stringybark), *Eucalyptus resinifera* (Red Mahogany), *Angophora costata* (Smooth-barked Apple) and *Angophora floribunda* (Rough-barked Apple).

STIF typically occurs in clay soils derived from Wianamatta Shale or shale layers within Hawkesbury Sandstone., though may also on plateaus and hillsides and on the margins of shale cappings over sandstone (NSW Scientific Committee 2007).

The geographic distribution of STIF is highly restricted and is currently estimated to cover an area of less than 2500 ha. The current distribution comprises a series of small remnant patches and highly modified relics that persist as small clumps of trees without a native understorey. Almost all, if not all, remnants are now surrounded by urban development. Consequently, the distribution of STIF is severely fragmented, such fragmentation contributes to a large reduction in the ecological function of the community (NSW Scientific Commitee 2011, NSW Scientific Committee 1998).

i. Description of habitat within the study area

Within the study area this community occurs as a single *Eucalyptus paniculata* individual with a drip zone of approximately 0.027 ha. Across the study area STIF occurs as a mix of remnant and potentially planted canopy trees, mainly *Syncarpia glomulifera* and *Angophora costata* (**Photographs 4.1 to 4.5)**. Exotic planted garden species mainly make up small trees throughout the study area and the shrub layer is either absent or comprised of exotic planted garden species. Native dicot herb species within the majority of the study area are also poorly represented. More detailed floristics of this community are outlined in **Section 4.4.1.**above.

a. Disturbance, Seed Bank and Recovery Potential

The majority of the study area was presumably cleared around 1850 to the early 1900s when the area of Gordon (then still known as Lane Cove) was established as a settlement and developed following the construction of the post office and railway station (Ku-ring-gai Historical Society Inc, 2008). Since that time, little to no natural regeneration of native vegetation has occurred, with most areas remaining as exotic grassland and planted garden among buildings.

The study area is mostly covered with buildings and pavement with those areas not covered being managed as mown lawns or as planted gardens. Therefore there is very little area available for recovery potential. Furthermore, with the duration of time in which the study area has been modified, it is probable that the soil seed bank for locally indigenous species is largely depleted, leaving little to no opportunity for regeneration under current management over the entirety of the study area.

Owing to changes to the natural vegetation and habitat over a prolonged period, it is concluded that the community function of this example of STIF has been greatly reduced, as indicated by the:

- Changes in community structure;
- Changes in species composition;

- Existing disruption of ecological processes (including modification of natural soil profiles and restriction of natural genetic exchange);
- Invasion and establishment of exotic species;
- Degradation of habitat, and
- Fragmentation and isolation of habitat.

It would be difficult for the remaining indigenous vegetation to naturally regenerate to any form of native bushland based on:

- General principles of small reserve design (Fox 1992), with regard to the small area of vegetation to be retained and rehabilitated, and the large edge effect;
- The reduction in ecosystem function within the subject lands; and
- The presence of large populations of environmental weeds in vegetative and soil seedbank forms.

The current extent of the understorey, the very small size and openness of the vegetation means that it faces significant edge-effects, and representation of its pre-disturbance condition is highly unlikely. Any restoration efforts would rely on significant planting and weed management.

b. Comparison with the Final Determination

The final determination for STIF describes the community as one that typically occurs on areas with clay soils derived from Wianamatta Shale, or shale layers within Hawkesbury Sandstone with occasional occurrences on plateaus and hillsides and on the margins of shale cappings over sandstone (Paragraphs 8 and 9 of the Final Determination). It is present within the local government areas of Ashfield, Auburn, Canterbury, Concord, Drummoyne, Leichhardt, Marrickville, Bankstown, Ryde, Hunters Hill, Baulkham Hills, Ku-ring-gai, Hornsby, Parramatta, Bankstown, Rockdale, Kogarah, Hurstville and Sutherland (Paragraph 6)

The structure of the community is described as originally being forest, but may now exist as woodland or as remnant trees. Characteristic tree species in the STIF are S*yncarpia glomulifera, Eucalyptus globoidea, Eucalyptus resinifera, Eucalyptus paniculata, Angophora costata* and *Angophora floribunda*. (Paragraphs 3 and 4)

Characteristic species of STIF as listed in the Final determination (Paragraph 1) include, but are not limited to

Acacia decurrens	*Acacia longifolia*	*Allocasuarina torulosa*
Acacia falcata	*Acacia myrtifolia*	*Angophora costata*
Acacia implexa	*Acacia parramattensis*	*Angophora floribunda*

Aristida vagans

Billardiera scandens

Breynia oblongifolia

Bursaria spinosa

Centella asiatica

Cheilanthes sieberi

Clematis aristata

Clematis glycinoides

Clerodendrum tomentosum

Commelina cyanea

Corymbia gummifera

Daviesia ulicifolia

Dianella caerulea

Dichelachne rara

Dichondra repens

Dodonaea triquetra

Echinopogon caespitosus

Elaeocarpus reticulatus

Entolasia marginata

Entolasia stricta

Eucalyptus acmenoides

Eucalyptus globoidea

Eucalyptus paniculata

Eucalyptus resinifera

Exocarpos cupressiformis

Glycine clandestina

Goodenea hederacea

Goodenia heterophylla

Hardenbergia violacea

Imperata cylindrica

Indigofera australis

Kennedia rubicunda

Kunzea ambigua

Lepidosperma laterale

Leucopogon juniperinus

Lomandra longifolia

Melaleuca decora

Microlaena stipoides

Notelaea longifolia

Oplismenus aemulus

Oxalis exilis

Ozothamnus diosmifolius

Pandorea pandorana

Panicum simile

Pittosporum revolutum

Pittosporum undulatum

Poa affinis

Polyscias sambucifolius

Pomax umbellata

Poranthera microphylla

Pratia purpurascens

Pseuderanthemum variabile

Rapanea variabilis

Rubus parvifolius

Smilax glyciphylla

Stipa pubescens

Syncarpia glomulifera

Themeda australis

Tylophora barbata

Veronica plebeia

Zieria smithii

The subject site and study area are located within the Ku-ring-gai LGA. The soil landscape of the area is Glenorie which occurs on both steep and undulating to rolling low hills on Wianamatta Group shales. The community within the subject site exists as a single remnant *Eucalyptus paniculata* tree, a characteristic canopy species of STIF. Although the subject

site and study are highly developed, scattered occurrences of diagnostic species for STIF occur within planted and landscaped areas. Diagnostic STIF species recorded on the subject site comprises a mix of planted and potential remnants and includes the following species

- *Angophora costata;*
- *Dianella caerulea;*
- *Dichondra repens;*
- *Elaeocarpus reticulatus;*
- *Oplismenus aemulus;*
- *Pratia purpurascens;*
- *Syncarpia glomulifera; and*
- *Veronica plebeia.*

Although the above listed species are diagnostic for STIF, they are common species that are found in a variety of native vegetation communities and are not exclusive to STIF.

Although the STIF within the subject site is represented by a single, remnant *Eucalyptus paniculata* individual, technically the community does conform to the definition of STIF under the TSC Act, albeit in a highly degraded form.

c. Recovery Plan

There is no Recovery Plan relevant to this community. There is however a document referred to as 'Best Practice Guidelines: Sydney Turpentine Ironbark Forest', which outlines threats and associated management practices (DECC (NSW) 2008). These will be used for reference in the development of any necessary Vegetation Management Plans for the management of the offset.

d. Maps

Figure 4.2 shows the location of the area of STIF within the study area. Mapping of the locality is provided in **Figure 2.3** and **Figure 2.5**.

ii. Sydney Turpentine Ironbark Forest within the locality

STIF is mapped quite extensively within the locality in a scattered pattern. **Figure 2.3** shows that these occur mostly to the west and east of the subject land as scattered patches amongst Urban and Exotic vegetation from within metres of the subject lands to the full extent of the 5 km locality.

The largest patch of mapped STIF occurs to the north of the Avondale Golf Club, to the west of the subject lands. Other good quality remnants of STIF occur in Rofe Park and Sheldon

Forest, for which an application for a Biobank site has been submitted. Occurrences of STIF have also been reported in Lane Cove National Park.

The fragmented nature of the vegetation in the locality is shown in **Figure 2.3** and **Figure 2.5**. Within the distribution areas of STIF, it exists in a series of small remnant patches indicating that STIF is highly fragmented on a regional level.

iii. Discussion of conservation status

a. Conservation status

STIF is listed as an EEC under the TSC Act and as a CEEC under the EPBC Act. The patch of STIF occurring within the subject site has been determined as corresponding to only the TSC Act listing.

b. Key Threatening Processes

STIF is threatened by the following key threatening processes:

- Clearing of native vegetation. This includes further clearing for urban development and subsequent impacts from fragmentation as well as mowing, which stops regrowth;
- Invasion and establishment of exotic vines and scramblers as this may result in competition with native understorey and ground layer species;
- Invasion of native plant communities by exotic perennial grasses as this may result in competition with native understorey and ground layer species;
- Invasion, establishment and spread of *Lantana camara* as this may result in competition with native understorey and ground layer species;
- Invasion by a variety of weeds have been listed as key threatening processes. These include invasion by exotic vines and creepers and exotic perennial grasses.

Other threatening processes that have relevance to the fauna associated with STIF include:

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

Other threats to the community include

- Loss of community structure particularly understorey species from under-scrubbing, landscaping and continual mowing;
- The main threat is further clearing for urban development, and the subsequent impacts from fragmentation;

- Habitat degradation from inappropriate access and disturbance from people, horses, trail bikes and other vehicles;
- Urban run-off, which leads to increased nutrients and sedimentation;
- Weed invasion, including listed weeds such as Lantana, exotic vines and scramblers, and exotic perennial grasses; and
- Inappropriate fire regimes, which have altered the appropriate floristic and structural diversity

c. Habitat requirements

STIF occupies undulating terrain and broad ridgetops close to the shale/sandstone boundary on the more fertile shale influenced soils, up to 500m ASL with a mean annual rainfall between 850 and 1250mm.

d. Recovery or Threat Abatement Plan

There is no Recovery Plan applicable to this community. There are no specific Threat Abatement Plans relevant to this community.

e. Conservation reserves

STIF is represented in Dalrymple Hay Nature Reserve, Sheldon Forest and at St Ives. Occurrences of STIF have also been reported in Lane Cove National Park. On wider scale, STIF has been recorded in, but not limited to, the Blue Mountains National Park and Dural Nature Reserve. Due to the large proportion of the original extent of STIF that has been cleared, the community is listed as endangered and is therefore not considered to be adequately represented in conservation reserves.

f. Limit of distribution

STIF occurs on the higher altitude margins of the Cumberland Plain, and on the shale ridge caps of sandstone plateaus (eg Hornsby Plateau). Currently STIF is has been recorded from the Local Government Areas of Ashfield, Auburn, Canterbury, Concord, Drummoyne, Leichhardt, Marrickville, Bankstown, Ryde, Hunters Hill, Baulkham Hills, Ku-ring-gai, Hornsby, Parramatta, Bankstown, Rockdale, Kogarah, Hurstville and Sutherland within the Sydney Basin Bioregion (NSW Scientific Committee 2008).

The subject lands fall within the known distribution of the community.

iv. Discussion of the likely effect of the proposal at local and regional scales

a. Significance within a local context

Many of the mapped areas of STIF within the locality are larger in area than the area of the community within the subject site. Furthermore, many of the patches of STIF in the locality are connected to larger portions and tracts of vegetation. The larger patches mapped in the

locality have a more intact canopy cover and greater species diversity than the vegetation within the subject site. Many of the patches of STIF in the wider locality are managed for conservation through bush regeneration activities. Although these patches may have substantial weed growth, they are likely to be managed to control these weeds. Some of the larger patches of STIF within the locality are protected within Council reserves but smaller areas are on private land as is on the subject lands and may be subject to future development applications.

The proposal will remove approximately 0.027 ha of STIF, comprising a single canopy tree within the subject site. This represents 0.027 ha of an estimated 2300 hectares remaining, or 0.001% of the total area of STIF mapped by OEH (then DECCW 2009). While clearance of such a proportion may have an effect at a regional scale, in consideration of the poor condition, relatively poor connectivity and lack of regenerative potential of the remnant on the subject site, the overall effect is considered to be minimal. In terms of habitat provided by STIF on the subject site, it does not provide great contribution within in the region, again due to its poor condition and therefore poor ecological qualities.

The vegetation of the subject site is considered to be in very poor condition, with extremely low diversity and abundance of native species. The subject site and surrounds are highly urbanised and developed..The species diversity of the subject site is dominated by exotic garden plants and trees and some environmental weeds. The species diversity of the vegetation within the subject site is such that it lacks enough native flora species to be classified as any particular vegetation community according to the method described by Tozer *et al.* (2010). However, the remnant *Eucalyptus paniculata* tree still satisfies the criteria of the final determination for STIF. Larger remnants of STIF trees with some groundcover or understorey within the locality are more likely to have a larger number of native species present and a higher proportion of species indicative of this community. It is considered that the vegetation on the subject site is not highly significant compared with the other patches of STIF in the locality and wider region.

b. Extent of habitat removal or modification

STIF occurs near the northern boundary of the subject site on a mown nature strip beside the pavement. The extent of buildings, landscaped gardens and paved areas has greatly reduced diversity and abundance of native species. The proposed development requires the removal of effectively 0.027 ha of STIF which represents the total occurrence of the community within the subject site. Given the low ecological value of the STIF patch within the subject site, its removal is considered to only minimally affect the viability of this EEC in the locality.

c. Discussion of connectivity

Essentially, the STIF on the subject site exists as a relatively isolated tree from other tracts of STIF vegetation in the locality, although it may have some limited connectivity with similarly scattered remnant STIF trees within the study area and surrounds. Generally though, the study area is bounded by main roads such as the Pacific Highway, and urban development. The patch of STIF supports such a low diversity of native species, ie one tree,

that its overall ecological function is minimal, as are its contributions to gene flow. STIF to be removed as part of the development will not greatly affect other areas of STIF in terms of connectivity within the locality.

d. Consideration of threatening processes

The processes generally accepted as threatening STIF include:

- Clearing for agriculture and urban/rural residential development which reduces its extent. The proposal will contribute to this process through clearing for urban development;
- Grazing which reduces the ability of native species to regenerate. The study area is not threatened by grazing;
- Mowing which reduces the ability of native species to regenerate. The study area is subject to mowing;
- Rubbish dumping which reduces the quality of habitat. This is not an impact in the study area as these private lands are managed and rubbish free;
- Weed invasion as this suppresses the growth of native plant species. The study area is currently threatened by some weed invasion;
- Frequent fire as this reduces the ability of some native species to regenerate. The study area is separated from large areas of bushland and is not likely to have been burnt in several decades. Bushfire is extremely unlikely under this proposal and so this threatening process is unlikely to affect STIF as a result of the proposal.

It is recognised that clearing of vegetation poses a threat to STIF generally. The area that will be cleared for the proposal is considered to form only minimal habitat and is not currently in a long term viable natural state. Alternative higher quality remnants exist in the locality.

Mowing or grazing of viable STIF will not occur as a result of the proposal. Long-term soil modification and pavement is currently suppressing any natural ability for regeneration and the proposal will not exacerbate the effect on any areas of viable STIF.

The proposal is not likely to exacerbate the degradation of habitat resulting from an altered fire regime as the current fire regime (absence of fire) will be maintained.

6.3 Description of Feasible Alternatives

DGR 6.5 Description of feasible alternatives

The following are further requirements related to you obligation under Section 110(3)(e) to address the following:

a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development.

Where a Statement of Environmental Effects, Environmental Impact Statement or Review of Environmental Factors deals with these matters, the SIS may refer to the relevant section of the SEE, EIS or REF.

The SIS must include details of the condition and use of other parts of the subject area and why these can or cannot be considered as feasible alternatives.

Feasible alternatives have been assessed and this DGR addressed in Chapter 5.

Chapter 7

Ameliorative Measures

This chapter covers the following DGRs:

DGR 7. AMELIORATIVE MEASURES

7.1 Description of Ameliorative Measures

7.1 Description of ameliorative measures

The following are further requirements related to your obligation under Sections 110(2)(i) and 110(3)(f) to address the following:

> *a full description and justification of the measures proposed to mitigate any adverse effect of the action on the species and populations [s.110(2)(i)] [or] ecological community [s.110(3)(f)] including a compilation (in a single section of the statement) of those measures.*

Ameliorative measures as part of the proposal include during-construction measures and some long-term management strategies. Pre-construction measures such as pre-clearance fauna surveys to check for any nesting or roosting fauna and move to adjacent habitat is unwarranted due to the lack of nesting or roosting habitat offered by the trees present. Long-term management strategies are discussed in Section 7.1.1.

Potential impacts to flora and fauna occurring in the construction phase relating to the proposal and which can be managed include: runoff, sedimentation, erosion and pollution. Precautions need to be taken to minimise the drainage impacts downslope and at the stormwater end point. Sediment control and reduction measures should be implemented to reduce sediment runoff into urban stormwater systems in order to mitigate affect to environments receiving such stormwater.

During development, precautions should be taken to ensure that no pollution escapes the construction site. Pollution traps and regular removal of pollution to an off site location would assist to minimise pollution impacts. A Waste Management Plan has been prepared by McGregor Environmental Services (October 2013) which mitigates waste and pollution entering the surrounding environment.

7.1.1 Long term management strategies

DGR 7.1.1 Long term management strategies

Consideration must be given to developing long term management strategies to protect areas within the study area which are of particular importance for the threatened species or endangered populations likely to be affected. This may include proposals to restore or improve habitat on site where possible.

Landscaping outside of the proposed offset area includes planting of a mix of exotic garden species and native species, including including four species representative of STIF including *Angophora costata* (Smooth-barked Apple), *Eucalyptus paniculata* (Grey Ironbark), *Elaeocarpus reticulatus* (Blueberry Ash) and *Dianella caerulea* (Flax Lily). There are no areas within the study area that are of particular importance for threatened species or populations as the study area is highly developed and urbanised...

7.1.2 Compensatory strategies

DGR 7.1.2 Compensatory strategies

Although the vegetation within the subject site occurs as a highly modified and degraded form of STIF, it is proposed that the STIF be offset.

An on-site Offset Area of 600 m^2 or 0.06 ha, located along the Merriwa Street frontage and western boundary, is proposed. The proposed offset consists of planting at least two *Eucalyptus paniculata* individuals to replace the individual being removed as part of the proposed development. Characteristic canopy, midstorey and understorey species of STIF, sourced from local species or seeds of local provenance, will also be planted as part of the regeneration of STIF within the subject site. The planting of STIF midstorey and understorey species along with the replacement of canopy tree species will result in a larger patch (2:1 offset ratio) of better quality STIF than the patch proposed to be removed as part of the development. Details of the layout of the offset areas and the complete planting schedule are provided in the Landscape Plan (**Appendix D**).

In line with principles 6 and 7 of 'Principles for the use of biodiversity offsets in NSW', the proposed offset will provide a net improvement to biodiversity over time by revegetating STIF to include higher numbers of canopy species as well as shrub and groundcover species which currently are absent from the subject site. It will also have secure land tenure with the form of a Covenant or other appropriate security mechanism registered against the land to secure the STIF in the long term.

7.1.3 Ongoing monitoring

DGR 7.1.3 Ongoing monitoring

Erosion and sediment control measures, should be installed prior to construction, and will be monitored throughout construction. Long term sediment and erosion controls should be part of the design of the development.

It is recommended that a Vegetation Management Plan (VMP) be prepared to monitor the ongoing maintenance of vegetation and habitat within the proposed offset area. The VMP will be prepared in accordance with any conditions of consent issued by Council..

7.1.4 Translocation

There is no proposal for any translocation of flora or fauna from or within the subject site.

Chapter 8

Assessments of Significance of Likely Effect of Proposed Action

This chapter covers the following Director General's Requirements:

DGR 8. ASSESSMENT OF SIGNIFICANCE OF LIKELY EFFECT OF PROPOSED ACTION

8.1 Endangered Ecological Communities

8.1.1 Sydney Turpentine Ironbark Forest

Sydney Turpentine-Ironbark Forest (STIF) is an open forest community that typically occurs on areas with clay soils derived from Wianamatta Shale, or shale layers within Hawkesbury Sandstone. Dominant canopy trees are *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey ironbark). Common understorey shrubs include *Pittosporum undulatum* (Sweet Pittosporum), *Dodonaea triquetra* (Hop bush), *Polyscias sambucifolia* (Elderberry panax) and *Acacia falcata* (Sickle wattle). In open grassy areas, *Themeda australis* (Kangaroo grass) and *Imperata cylindrica* (Blady grass) are common (NSW NPWS 2004, NSW Scientific Committee 1998).

A small portion of modified STIF exists on the subject site which conforms to the TSC Act listing for STIF. However, this highly degraded remnant does not conform to the EPBC Act listing for the critically endangered ecological community.

(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,*

Not applicable.

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

Not applicable.

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

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

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

Effectively 0.027 ha of STIF canopy vegetation is to be removed as part of the proposed development. This area includes a single *Eucalyptus paniculata* tree with no understorey as it exists on a mown nature strip beside pavement. The STIF on the subject site is thus, overall, highly modified. The vegetation in its current condition holds little ecological value and conforms only to the TSC Act listing.

Although the habitat to be removed is small and highly modified, the proposed action will remove the all of the community within the subject site.

The composition of the ecological community as provided in the final determination consists of a far greater number of native plants than that occurring on the subject site. The vegetation of the subject site is considered to be in poor condition with low diversity and abundance of native species throughout. Larger remnants of STIF within the locality are more likely to have a higher proportion of species indicative of the community. It is considered that the vegetation on the subject site is not of high importance when compared with other larger and more intact patches of STIF in the wider locality. Only one species within the final determination, *Eucalyptus paniculata* is present.

The removal of the STIF within the subject site is not considered to adversely affect the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

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

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

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

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

Effectively 0.027 ha of STIF, comprising a single canopy tree, is to be removed as part of the proposed development. This area represents 100% of the STIF on the subject site.

The vegetation proposed for removal is already relatively isolated and exists along the street frontage within a developed urban area. Connectivity through the locality is by scattered remnant STIF trees which extend through a large area of the locality. The proposal will cause very minor further fragmentation of its scattered distribution within the locality.

The STIF on the subject site exists as a single canopy tree over pavement and has presumably existed in that way for a substantial length of time. The soil on the mown nature strip and beneath the pavement has undoubtedly been modified and the native seed bank is likely to have been exhausted. As it exists, there is little ecological quality and no scope for natural regeneration and existence of the community over time, thus, it is unlikely that the site provides feasible long-term future habitat value for the community. It is therefore considered that the vegetation on the subject site is not greatly important for the long-term survival of the community in the wider locality.

The proposed offset will have greater long term security of a larger area for STIF species to exist as a more intact community in the long-term, therefore increasing the likelihood of its long-term survival of STIF in the wider locality.

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

There is no critical habitat for STIF currently listed by the Director-General of the OEH.

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

There is no Recovery Plan or Threat Abatement Plan relevant to STIF.

(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 action proposed constitutes the key threatening process "Clearing of native vegetation". When focusing on the subject site, the proposal exacerbates the impact of this key threatening process within the subject site and the study area. However, at a much broader scale, within the locality, such exacerbation becomes less threatening. This threatening process is also not considered to have great impact on this community in the locality, as the small remnant of a single canopy tree is highly degraded and contributes little to the conservation of this community. The Offset Area proposed would provide a higher quality remnant and in the long term act to negate the impact or exacerbation of the key threatening process "Clearing of native vegetation".

Conclusion

The STIF on the subject site exists as a non-regenerating canopy tree over mown lawn beside a pavement and has low conservation significance. Nonetheless, STIF is an endangered ecological community, and is greatly at risk from development in general. Presently though, the remnant does not greatly contribute to the long-term survival of the community. Although the community within the subject site and study area will be impacted, mitigation and compensatory measures are proposed. The Offset Area proposed provides compensatory STIF habitat where the community will have greater security in the long-term. The overall impact on the community in the wider context is not considered to be highly

significant, largely due to its condition and in the longer term, also owing the Offset Area proposed.

8.2 Threatened Fauna

8.2.1 Gang-gang Cockatoo and Gang-gang Cockatoo population in the Hornsby Ku-ring-gai Local Government Areas

The Gang-gang Cockatoo (*Callocephalon fimbriatum*) is listed as Vulnerable under the TSC Act. In Australia it is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It is usually found in tall mountain forests and woodlands in summer, particularly in heavily timbered and mature wet sclerophyll forests. In winter, it may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. The Gang-gang Cockatoo nests and roosts in tree hollows, preferentially in old growth trees (OEH 2014c).

The Gang-gang Cockatoo population in the Hornsby Ku-ring-gai Local Government Areas residing in the Ku-ring-gai and Hornsby LGA is listed as an endangered population. This population is the only known Gang-gang Cockatoo breeding population in the Sydney metropolitan area. The population is estimated to include 18 to 40 breeding pairs. The population covers, but is not restricted to, Thornleigh and Wahroonga in the north, Epping and North Epping in the south, Beecroft and Cheltenham in the west and Turramurra/South Turramurra to the east (OEH 2012).

(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,*

Twenty-nine individuals have been recorded within the locality, thus the presence of individuals in the locality is fairly well represented. However no individuals have been detected within the study area. There is a known population residing in the Lane Cove Valley to the west of the subject lands, listed as an endangered population because it is the only known Gang-gang Cockatoo breeding population in the Sydney metropolitan area. The population is estimated to include 18 to 40 breeding pairs. The population covers, but is not restricted to, Pennant Hills Park and parts of Lane Cove National Park (NSW Scientific Committee 2001).

The Gang-gang Cockatoo is a large bird that utilises resources from across a wide area. Due to the context the STIF on the subject site and its highly modified condition, if individuals did utilise resources within the subject site, it is most likely to be periodically and would not be dependent on the subject site exclusively for its survival. The removal of a small area of what is considered to be degraded vegetation from the subject site would not place a viable local population at risk of extinction.

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

The endangered population of this species is found in the Ku-ring-gai and Hornsby LGAs. It is known to inhabit areas of Lane Cove National Park, Pennant Hills Park and other forested gullies in the area where most nesting is likely to take place. Suitable nesting habitat is absent from the subject site as the hollows are not large enough for utilisation by Gang-gang Cockatoos. As such, the proposal is unlikely to disrupt the life cycle of the species and place risk of extinction upon the endangered population.

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

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

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

Not applicable.

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

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

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

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

Effectively 0.027 ha of potential native foraging habitat will be removed as part of the proposed development. This habitat exists a single *Eucalyptus paniculata* trees above mown grass beside a pavement. A further 0.095 ha of foraging habitat composed of exotic planted species will also be removed as part of the proposed development.

The native habitat proposed for removal is already relatively isolated and exists along a streetscape within a developed urban area. Similar habitat connectivity through the locality is by scattered remnant patches which extend through a large area of the locality. The proposal will cause minor further fragmentation of its scattered distribution within the locality.

As the potential habitat on the subject site represents only a very small area available to the species in the locality and the species is highly mobile, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations.

The proposal would remove only a small area of potential habitat for the species in relation to the habitat available within the locality. For this reason, clearance of habitat from the subject site is not considered significant in a local context as the subject site is likely to only provide minimal foraging habitat for the species. Habitat of greater significance is available in larger areas of bushland within Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. These areas are more likely to provide nesting and foraging habitat for this species. It is therefore considered that the habitat provided on the subject site is not important for the long-term survival of the species in the wider locality. The Offset Area proposed would provide higher quality STIF available to the Gang-gang Cockatoo with greater long-term security than that currently provided on the subject site.

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

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

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

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

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

The proposal's actions would constitute the key threatening process of "Clearing of native vegetation". As the vegetation to be removed on the subject site is highly modified by its current context being buildings around it and pavement beneath, it constitutes only marginal habitat for the Gang-gang Cockatoo. Therefore, the process of "Clearing of native vegetation" on the subject site is not likely to significantly affect this species. The Offset Area proposed would provide a higher quality remnant and in the long-term act to negate the impact or exacerbation of the key threatening process "Clearing of native vegetation".

Conclusion

The proposed development would result in the removal of a very small area of relatively degraded native vegetation that potentially provides some foraging habitat for the Gang-gang Cockatoo. Any local population of this species is unlikely to depend on the resources contained on the subject site for its survival and large areas of suitable habitat remain in the

locality with much of that being in conservation reserves. Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the subject site. An Offset Area compensating for the loss of vegetation is also proposed and in the long term will provide higher quality and more secure habitat than currently exists within the subject site. Accordingly, the proposal is not considered to significantly impact the Gang-gang Cockatoo.

8.2.2 Powerful Owl

The Powerful Owl is distributed from Mackay to south western Victoria, mainly on the coastal side of the Great Dividing Range. This species occurs in many vegetation types from woodland and open sclerophyll to tall open wet forest and rainforest. It requires large tracts of native vegetation but can survive in fragmented landscapes. It roosts in dense vegetation and nests in large tree hollows (OEH 2014e).

(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 Powerful Owl is a bird of prey which generally requires a dense canopy and shrub layer for foraging and roosting and large tree hollows for nesting. The subject site does not support nesting habitat however some minimal occasional foraging habitat is present. The habitat to be removed as part of the proposal represents a very small portion of potential foraging habitat available in the locality.

The Powerful Owl is a highly mobile species that accesses resources from across a wide area and this species would not depend upon resources contained on the subject site for its survival. The proposal is not considered to affect the life cycle of this species such that a viable local population is placed at risk of extinction.

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

Not applicable.

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

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

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

Not applicable.

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

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

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

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

Effectively 0.027 ha of potential native foraging habitat will be removed as part of the proposed development. This habitat exists a single *Eucalyptus paniculata* trees above mown grass beside a pavement. A further 0.095 ha of foraging habitat composed of exotic planted species will also be removed as part of the proposed development.

The native habitat proposed for removal is already relatively isolated and exists along a streetscape within a developed urban area. Similar habitat connectivity through the locality is by scattered remnant patches which extend through a large area of the locality. The proposal will cause minor further fragmentation of its scattered distribution within the locality.

As the potential habitat on the subject site represents only a very small area available to the species in the locality and the species is mobile, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations.

The proposal would remove only a small area of potential habitat for the species in relation to the habitat available within the locality. For this reason, clearance of habitat from the subject site is not considered significant in a local context as the subject site is likely to only provide minimal foraging habitat for the species. Habitat of greater significance is available in larger areas of bushland within Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. These areas are more likely to provide roosting and foraging habitat for this species. It is therefore considered that the habitat provided on the subject site is not important for the long-term survival of the species in the wider locality. The Offset Area proposed would provide higher quality habitat with greater long-term security than that currently provided on the subject site.

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

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

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

A recovery plan has been prepared for large forest owls, including the Powerful Owl. The ultimate aim of the recovery plan is to ensure that the species it covers persist in the wild in NSW in each region where they presently occur (DEC (NSW) 2006). The proposal is not considered to threaten the objectives of the Recovery Plan. No Threat Abatement Plan exists for this species.

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

The proposal's actions would constitute the key threatening process of "Clearing of native vegetation". As the vegetation to be removed on the subject site is highly modified by its current context being buildings around it and pavement beneath, it only constitutes marginal habitat for the Powerful Owl. Therefore, the process of "Clearing of native vegetation" on the subject site is not likely to significantly affect this species. The Offset Area proposed would provide a higher quality remnant and in the long-term act to negate the impact or exacerbation of the key threatening process "Clearing of native vegetation".

Conclusion

The proposed development would result in the removal of a very small area of relatively degraded native vegetation that potentially provides some foraging habitat for the Powerful Owl. Any local population of this species is unlikely to depend on the resources contained on the subject site for its survival and large areas of suitable habitat remain in the locality with much of that being in conservation reserves. Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the subject site. An Offset Area compensating for the loss of vegetation is also proposed and in the long term will provide higher quality and more secure habitat than currently exists within the subject site. Accordingly, the proposal is not considered to significantly impact the Powerful Owl.

8.2.3 Grey-headed Flying-fox

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the TSC Act and the EPBC Act. The Grey-headed Flying-fox is distributed along the east coast of Australia from Bundaberg in Queensland to Melbourne, Victoria. It occurs as far west as the western slopes of the Great Dividing Range in northern NSW in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Grey-headed Flying-foxes migrate according to the availability of native fruits, nectar and pollen. They roost in large "camps" which are generally within 20 km of a food source (OEH 2014d).

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

There are numerous records of the Grey-headed Flying-fox in the locality. Grey-headed Flying-foxes roost in colonies known as 'camps'. This species has a strong fidelity to camps and there are three camps that occur around the Sydney metropolitan area: Ku-ring-gai Flying-fox Reserve at Gordon, the Royal Botanic Gardens and Cabramatta Creek Flying-fox Reserve. The closest camp to the subject land is at Gordon and it is likely that any records of the species within the locality are Flying-foxes foraging from this camp.

The Grey-headed Flying-fox is a highly mobile species and utilises resources from across a wide area and if a population did utilise resources on the subject site periodically, it would not be dependent on this for their survival. The removal of relatively small area of highly modified vegetation within the subject site will not place a viable local population at risk of extinction.

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

Not applicable.

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

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

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

Not applicable.

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

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

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

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

Effectively 0.027 ha of potential native foraging habitat will be removed as part of the proposed development. This habitat exists a single *Eucalyptus paniculata* trees above mown grass beside a pavement. A further 0.095 ha of foraging habitat composed of exotic planted species will also be removed as part of the proposed development.

The native habitat proposed for removal is already relatively isolated and exists along a streetscape within a developed urban area. Similar habitat connectivity through the locality is by scattered remnant patches which extend through a large area of the locality. The proposal will cause minor further fragmentation of its scattered distribution within the locality.

As the potential habitat on the subject site represents only a very small area available to the species in the locality and the species is mobile, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations.

The proposal would remove only a small area of potential habitat for the species in relation to the habitat available within the locality. For this reason, clearance of habitat from the subject site is not considered significant in a local context as the subject site is likely to only provide minimal foraging habitat for the species. Habitat of greater significance is available in larger areas of bushland within Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. These areas are more likely to provide roosting and foraging habitat for this species. It is therefore considered that the habitat provided on the subject site is not important for the long-term survival of the species in the wider locality. The Offset Area proposed would provide higher quality habitat with greater long-term security than that currently provided on the subject site.

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

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

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

A draft national recovery plan has been prepared for the Grey-headed Flying-fox. The overall objectives are: are: to reduce the impact of threatening processes; to arrest decline throughout their range; to conserve their functional roles in seed dispersal and pollination of native plants; and to improve the comprehensiveness and reliability of information available to guide recovery. The proposed project will contribute to the threatening process of "Clearing of native vegetation".

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

The proposal's actions would constitute the key threatening process of "Clearing of native vegetation". As the vegetation to be removed on the subject site is highly modified by its current context being buildings around it and pavement beneath, it only constitutes marginal habitat for the Grey-headed Flying-fox. Therefore, the process of "Clearing of native vegetation" on the subject site is not likely to significantly affect this species. The Offset Area proposed would provide a higher quality remnant and in the long-term act to negate the impact or exacerbation of the key threatening process "Clearing of native vegetation".

Conclusion

The proposed development would result in the removal of a very small area of relatively degraded native vegetation that potentially provides some foraging habitat for the Grey-headed Flying-fox. Any local population of this species is unlikely to depend on the resources contained on the subject site for its survival and large areas of suitable habitat remain in the locality with much of that being in conservation reserves. Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the subject site. An Offset Area compensating for the loss of vegetation is also proposed and in the long term will provide higher quality and more secure habitat than currently exists within the subject site. Accordingly, the proposal is not considered to significantly impact the Grey-headed Flying-fox.

8.2.4 Eastern Bentwing-bat

The Eastern Bentwing-bat is found along the east and north-west coasts of Australia and primarily roosts in caves, but also utilises derelict mines, stormwater tunnels, buildings and other man-made structures. It forages above the canopy in forested areas. The Eastern Bentwing-bat forms maternity colonies in caves and populations usually centre on such caves (OEH 2014b).

(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 Eastern Bentwing-bat is a cave-dwelling species and whilst the subject site does provide some foraging habitat, no suitable roosting habitat was observed. The habitat to be removed as part of the proposal represents a small portion of potential foraging habitat available in the locality.

There are numerous records of the Eastern Bentwing-bat in the locality, these records are scattered throughout the locality but most commonly occurring within the suburban areas to the west of the subject site. Due to the large size of breeding colonies, it is likely that these records are from the same population or from several locally roosting colonies.

The removal of a small area of degraded vegetation from the subject site will not place a viable local population at risk of extinction. The Eastern Bentwing-bat is a highly mobile species that accesses resources from across a wide area and it is not expected that this species would depend upon resources contained in the study area or subject site for its survival. It is not considered likely that the proposal will affect the life cycle of this species such that a viable local population is placed at risk of extinction.

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

Not applicable.

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

(iii) 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

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

Not applicable.

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

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

b) 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

c) 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.

Effectively 0.027 ha of potential native foraging habitat will be removed as part of the proposed development. This habitat exists a single *Eucalyptus paniculata* trees above mown grass beside a pavement. A further 0.095 ha of foraging habitat composed of exotic planted species will also be removed as part of the proposed development.

The native habitat proposed for removal is already relatively isolated and exists along a streetscape within a developed urban area. Similar habitat connectivity through the locality is by scattered remnant patches which extend through a large area of the locality. The proposal will cause minor further fragmentation of its scattered distribution within the locality.

As the potential habitat on the subject site represents only a very small area available to the species in the locality and the species is mobile, the proposal is not likely to decrease the movement of individuals and gene flow between areas of potential habitat throughout the locality or within or between local populations.

The proposal would remove only a small area of potential habitat for the species in relation to the habitat available within the locality. For this reason, clearance of habitat from the subject site is not considered significant in a local context as the subject site is likely to only provide minimal foraging habitat for the species. Habitat of greater significance is available in larger areas of bushland within Dalrymple-Hay Nature Reserve to the north east, Lane Cove National Park to the west, Garigal National Park to the north-east and Berowra Valley Regional Park to the north-west of the study area. Smaller tracts of bushland occur in reserves around Gordon such as Twin Creeks Reserve and Bushrangers Reserve which also provide habitat. These areas are more likely to provide roosting and foraging habitat for this species. It is therefore considered that the habitat provided on the subject site is not important for the long-term survival of the species in the wider locality. The Offset Area proposed would provide higher quality habitat with greater long-term security than that currently provided on the subject site.

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

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

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

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

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

The proposal's actions would constitute the key threatening process of "Clearing of native vegetation". As the vegetation to be removed on the subject site is highly modified by its current context being buildings around it and pavement beneath, it only constitutes marginal habitat for the Eastern Bentwing-bat. The Offset Area proposed would provide a higher quality remnant and in the long-term act to negate the impact or exacerbation of the key threatening process "Clearing of native vegetation". Therefore, the process of "Clearing of native vegetation" on the subject site is not likely to significantly affect this species.

Conclusion

The proposed development would result in the removal of a very small area of relatively degraded native vegetation that potentially provides some foraging habitat for the Eastern Bentwing Bat. Any local population of this species is unlikely to depend on the resources contained on the subject site for its survival and large areas of suitable habitat remain in the

locality with much of that being in conservation reserves. Such reserves will remain in perpetuity and contain far higher habitat value than the marginal habitat proposed to be removed from the subject site. An Offset Area compensating for the loss of vegetation is also proposed and in the long term will provide higher quality and more secure habitat than currently exists within the subject site. Accordingly, the proposal is not considered to significantly impact the Eastern Bentwing-bat.

Chapter 9

Additional Information

This chapter covers the following Director General's Requirements:

DGR 9 ADDITIONAL INFORMATION

9.1 Qualifications and Experience

DGR 9.1 Qualifications and experience

> *A species impact statement must include details of the qualifications and experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement (Section 110(4)).*

The SIS project team included key personnel listed in **Table 9.1**. Experience and qualifications of each team member are provided in **Appendix E**.

Table 9.1 Project team

Personnel	Company	Role	Contact Details
Dr David Robertson	Cumberland Ecology	Director	(02) 9868 1933
Dr. Gitanjali Katrak	Cumberland Ecology	Project Manager/Ecologist	(02) 9868 1933
Cecilia Phu	Cumberland Ecology	Senior Ecologist/Reviewer	(02) 9868 1933
Bryan Furchert	Cumberland Ecology	Botanist	(02) 9868 1933
Michelle Frolich	Cumberland Ecology	GIS Specialist	(02) 9868 1933

9.2 Other Approvals

DGR 9.2 Other approvals required for the development or activity

> *A list of any approvals that must be obtained under any other Act or law before the action may 'be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the species or population or ecological community (Section 110(2)(j) and Section 110(3)(g)).*

Consent is required under Part 4 of the EP&A Act. The consent authority is Ku-ring-gai Council.

No referral to the Department of Sustainability, Environment, Water, Population and Communities regarding the EPBC Act listed communities is required. The total area of the STIF community on site is less than one hectare, and the low condition of the understorey means that the vegetation on site does not qualify for consideration under the EPBC Act.

9.3 Licensing Matters Relating to Conducting Surveys

DGR 9.3 *Licensing matters relating to the survey*

All flora work was carried out under New South Wales Office of Environment Heritage Scientific Licence number SL-100103 and New South Wales Department of Primary Industries Animal Research Authority Trim File No.11/5111.

9.4 Section 110(5) Reports

DGR 9.4 *Section 110(5) Reports*

Information contained in the profiles of the affected species was used in the preparation of this SIS. The documentation listed in the References Section was also considered.

Chapter 10

Conclusion

This SIS has been prepared to assess an occurrence of the endangered ecological community STIF, and threatened species, which may be affected by the proposal. The proposal will require the clearing of one tree of STIF origin and amounting to an impact entailing the removal of 0.027 ha of low condition habitat without understorey. In its current condition the STIF cannot self-regenerate in the long term. Although there will be an impact to the community within the subject site and study area, the overall impact on the community in the wider locality is not considered to be of major ecological significance.

The remnant within the subject site has relatively low conservation significance. While the STIF community conforms with the EEC listing under the TSC Act, its small patch size and degraded nature prevents it from qualifying under the EPBC Act listing. Although there will be an impact to the community within the subject site and study area, the overall impact on the community in the wider locality is not considered to be of great significance.

No naturally occurring threatened flora species were recorded within the subject site. Three planted individuals of *Syzygium paniculatum* (Endangered – TSC Act, Vulnerable – EPBC Act) present within the subject site are to be retained with appropriate tree protection measures during construction works.

No threatened fauna species were recorded within the subject site. However, some highly mobile threatened fauna, such as birds and bats, have the potential to pass through the site as part of a wider foraging range and some potential, albeit marginal, habitat for a number of threatened fauna species will be removed. However, the removal of habitat is not considered likely to have a significant impact on these species.

After considering the material analysed in the SIS and the ecological value of the vegetation and habitat to be removed, at a small scale focussing only on the subject site, a technically significant impact upon vegetation communities present will occur, as trees from an EEC will be removed. However, at a broader scale within the locality, the proposal will only minimally impact the occurrence of STIF.

Notwithstanding the small scale of impact to STIF from the proposed development, offsetting is warranted to prevent a small cumulative loss of the community from the locality. If the proposed Offset Area is implemented and maintained as proposed, this impact will be compensated for by the creation of an area of STIF with an understorey and with greater long-term security, maintaining the presence of STIF in the study area and, and contributing to its maintenance in the locality.

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Appendix A

Compliance with DGRs

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
FORM OF THE SPECIES IMPACT STATEMENT	1			
A species impact statement must be in writing	1.1			Section 109 (1)
A species impact statement must be signed by the principal author of the statement and by:	1.2	(a) the applicant for the licence, or (b) if the species impact statement is prepared for the purposes of the Environmental Planning and Assessment Act 1979, the applicant for development consent or the proponent of the activity proposed to be carried out (as the case requires). The applicant or proponent must sign the following declaration: " I...[insert name], of...[address], being the applicant for the development consent at [insert DA number, Lot and DP numbers, street, suburb and LGA names] have read and understood this species impact statement. I understand the implications of the recommendations made in the statement and accept that they may be placed as conditions of consent or concurrence for the proposal."	Certification	Section 109 (2)
CONTEXTUAL INFORMATION	2	The description must include information of the following forms or types:	Chapter 2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
Description of the proposal, subject site and study area	2.1	The following are further requirements related to your obligation under Section 110(1) to address the following: A species impact statement must include a full description of the action proposed, including its nature, extent, location, timing and layout. A comprehensive description of the nature, extent, and timing of all components and associated or consequent actions of the proposal must be provided, including actions that have effects both on and off the subject land as a result of the proposal. These actions described must include but are not restricted to construction, provision or ongoing use and maintenance of proposed: • buildings or other structures; • utilities such as for sewage, electricity, gas or water; • routes for access and egress; drainage infrastructure and changes made to surface water flows; • bush fire hazard reduction; and • landscaping.	Section 2.1	Section 110 (1)
Land tenure information	2.2	Information must be provided about the land tenure across the study area.	Section 2.2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
Vegetation	2.3	Vegetation present within the locality must be mapped and described, including documentation of the aerial extent of each vegetation community. Vegetation descriptions should match (or at least refer to) those in the Vegetation Types Database (available at www.environment.nsw.gov.au/resources/nature/Biometric_Vegetation_Type_CMA.xls). Reference should also be made to "the Draft Native Vegetation of the Sydney Metro Catchment Area" mapping (DECCW 2009) and the descriptions of endangered or critically endangered ecological communities as determined by the Scientific Committee. Classification must have regard to both structural and floristic elements.	Section 2.3	
Plans and maps	2.4	An aerial photograph (or reproduction of such photograph) (preferably colour) of the locality must be provided, indicating scale, and clearly delineating the subject site.	Section 2.4	
		A map or maps must be provided, showing:		
		• in the locality		
		→ land tenures and uses including parks and reserves, and areas of high human activity such as townships, regional centres and major roads.	Figure 2.4	
		→ any locally significant areas for threatened biodiversity.	Figure 2.6	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		→ the locations of any previously known threatened species or endangered populations.	Figures 3.1 and 3.2	
		→ the locations and types of vegetation and cleared areas (with reference to the description required in section 2.3).	Figure 2.3	
		• in the study area		
		→ the location, size and dimensions of the study area.	Figure 2.1	
		→ the full extent of the proposed works as described in section 2.1 at a scale of not less than 1:1000.	Figure 2.1	
		→ topography of the site and immediate surrounds at a scale of not less than 1:3000.	Figure 2.2	
		→ the locations and types of vegetation and cleared areas (with reference to the description required in section 2.3).	Figure 2.3	
		→ the current activities/usage of this land.	Figure 2.4	
		All maps must indicate scale and have an explanatory legend of any symbols used.		
INITIAL ASSESSMENT	3	The following are further requirements related to your obligation under Section 110(2)(a) to address the following:	Chapter 3	Section 110 (2)(a)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		a general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action.		
		and the requirements under Section 110(3)(a) to address the following:		Section 110 (3)(a)
		a general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action.		
Identifying subject threatened species, populations and ecological communities	3.1		Section 3.1	
Assessment of available information	3.1.1	In determining the subject threatened species, populations and ecological communities likely to be present (the subject species), a full list of threatened species, populations and ecological communities within a 10 km x 10 km radius of the subject site must first be compiled. Contact DECCW Wildlife Data Unit to obtain a full Atlas report under licence for a 10 km x 10 km area around the study site. Use of the BioBanking Credit Calculator is also recommended to supplement the list of threatened species that possibly occur on the site (see guidelines at www.environment.nsw.gov.au/threatenedspecies/surveymethods fauna.htm#4).	Section 3.1	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		Flora and fauna databases such as the OEH Atlas of NSW Wildlife, and those held by local government, the Australian Museum, the CSIRO, Forests NSW and the Botanic Gardens Trust Sydney must be consulted to assist in compiling the list. The SIS must include the compiled list of threatened species, populations and ecological communities likely to be present at the site or in the locality. Note that the OEH Atlas only holds records for which the OEH is the custodian and does not include records held in other databases, where the conditions of data licences or data exchange agreements prevent the OEH from distributing such information. In many cases, the OEH Atlas may only contain a small subset of the available data. Hence, other databases must also be consulted to assist in making an adequate determination of subject species. A list of subject threatened species, populations and ecological communities likely to be present (the subject species) must then be developed from recent records obtained from the data sources above, as well as any other species likely to be present that may not have been recorded. In developing the list of subject species, populations and ecological communities, consideration must be given to the habitat types present within the study area and the known distribution of threatened species, populations and ecological communities in the locality. The guidelines at www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm#3 for habitat assessment must be followed.		

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		The following vulnerable, endangered or critically endangered species must be considered as a subject species: *Callocephalon fimbriatum* *Ninox strenua* *Miniopterus schreibersii oceanensis* *Mormopterus norfolkensis* *Pteropus poliocephalus* *Saccolaimus flaviventris* Endangered populations: Gang-gang Cockatoo (*Callocephalon fimbriatum*) population in the Hornsby and Ku-ring-gai Local Government Areas Endangered or critically endangered ecological communities: Sydney Turpentine Ironbark Forest* * indicates species or communities that are listed on the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. This list is not exhaustive. One of the roles of a SIS is to determine which species may be utilising a development site given the limitations of existing databases.		

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		The proponent should be aware that additional species, populations and ecological communities could be added to the schedules of the TSC Act between the issue of these requirements and the granting of consent. If this occurs, these additional matters will need to be addressed in the SIS and considered by the consent, determining, or concurrence authority.		
SURVEY	4		Chapter 4	
Requirement to survey	4.1	A fauna and flora survey is to be conducted in the study area. Targeted surveys must be conducted for all subject threatened species, populations, and ecological communities determined in accordance with section 3 and for species, populations and ecological communities identified in section 4.3. The techniques and timing of these surveys should be commensurate with the biology/ecology of these species and ecological communities in order to maximise the likelihood and accuracy of detection. Survey requirements for certain species are identified in section 4.3. Guidance on appropriate methodologies and level and timing of survey efforts for some other species can be obtained from environmental impact assessment guidelines (see section 9.4), draft or approved recovery plans, scientific or environmental management	Section 4.1	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		journals, biodiversity surveys and other sources. The information required to identify the type of impacts and assess their significance on threatened species is the key determinant for the level of survey effort required. Appropriate justification for reducing otherwise recommended levels of survey effort is required to show that impacts are not likely to be significant. Previous surveys and assessments may contribute to addressing this requirement if they have been conducted and documented in accordance with the following provisions. Species of taxonomic uncertainty must have their identification confirmed by a recognised authority such as the Australian Museum or National Herbarium at the Royal Botanic Gardens, Sydney.		
Documentation	4.2		Section 4.2	
Description of survey techniques and survey locations	4.2.1	Survey technique(s) must be described and, where possible, a reference supporting the survey technique employed is to be provided. The size, orientation and dimensions of quadrats or lengths of transects should be clearly documented for each type of survey technique undertaken. Full AMG grid references for the survey site(s) should be noted. Survey site(s) should be shown on a map or maps, which indicate scale and have an explanatory legend	Section 4.2.1 - Section 4.2.4	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		of any information showing symbols used.		
Documenting survey effort and results	4.2.2	Attachment 1 contains survey proformas for a range of standard fauna survey techniques. Digital copies of these proformas are available by electronic mail and should be obtained by the nominated contact officer. These proformas should be used by field staff when undertaking fauna surveys and completed data sheets are to be included as an appendix to the SIS. Name(s) and contact phone number(s) of surveyor(s) and other personnel must be recorded. Other persons who identified records (e.g., by analysis of Anabat recordings, hair tubes, scats) should also be named. The date and time and environmental conditions experienced during each survey must be documented. The time invested each time a survey technique is applied must be summarised in the SIS, based on completed proformas. e.g. - number of person hours/transect, duration of call playback, number of nights traps set. It is not sufficient to aggregate all time spent on all survey techniques. Effort must be expressed each time a survey technique is applied. Any limitations (e.g. denied access to private land) to sampling across the study area are to be documented.	Section 4.3	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
Description and mapping of results of vegetation, flora and fauna surveys	4.2.3	The locations of any newly recorded threatened species or endangered populations resulting from additional surveys must be mapped and described. The mapping of vegetation required under section 2.3 must reflect any new information resulting from additional surveys.	Section 4.4	
ASSESSMENT OF LIKELY IMPACTS ON THREATENED SPECIES AND POPULATIONS	5	Assessment of impacts must consider the nature, extent and timing of the proposal and all associated actions, including but not restricted to construction, provision and ongoing maintenance of approved or proposed: • buildings or other structures; • utilities such as for sewage, electricity, gas or water; • routes for access and egress; • dams and associated infrastructure; • pipelines; • drainage infrastructure and changes made to surface water flows; • bush fire hazard reduction; and • landscaping. Assessment must include the direct and indirect impacts of these activities which	Chapter 5	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		may occur both on or off the subject site.		
Assessment of species likely to be affected	5.1	The following are further requirements related to your obligation under Section 110(2)(b) to address the following: an assessment of which threatened species or population known or likely to be present in the area are likely to be affected by the action. This requires you to refine the list of subject threatened species and populations (given the outcome of survey and analysis of likely impacts) in order to identify which threatened species or endangered populations may be affected directly or indirectly (including cumulatively), by the proposal. This is to be done taking account of the requirements outlined previously in section 4 of these requirements and information in any relevant Scientific Committee determinations, DECCW threatened species profiles, recovery plans and draft recovery plans, and vegetation assessment and mapping (including the 'Draft Native Vegetation of the Sydney Metropolitan Catchment Management Area' mapping DECCW 2009). Detailed rationale should be provided to demonstrate how the list was derived. If adequate surveys/studies have been undertaken to categorically demonstrate the species does not occur in the study area, or if not resident, will not utilise habitats on site on occasion, or if offsite, be influenced by offsite impacts of the activity, that species does not have to be considered further.	Section 5.2	Section 110 (2)(b)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		Otherwise all species/populations likely to occur in the study area (based on general species distribution information), and known to utilise those habitat types, should be assessed as if present. The requirements in the remainder of this section need only be addressed for those species that are likely to be affected by the proposal. Subsequently this information should be used in an Assessment of Significance (as required in section 8) for each of those species or populations.		
Discussion of local and regional abundance and distribution	5.2	The following are further requirements related to your obligation under section 110(2)(d) to address the following: an estimate for the local and regional abundance of those species or populations	Section 5.3	Section 110 (2)(d)
Discussion of other known local populations	5.2.1	A discussion of other known populations in the locality must be provided. An estimate of the numbers of individuals of each threatened species or population utilising the area and the relative significance of the population(s) in the study are to the populations in the locality must be included.	Section 5.3	
Assessment of habitat	5.3	The following are further requirements related to your obligation under Section 110(2)(f) to address the following:	Section 5.3	Section 110 (2)(f)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		a full description of the type, location, size and condition of the habitat (including critical habitat) of those species and populations and details of the distribution and condition of similar habitats in the region		
Description of habitat values	5.3.1	Specific habitat features must be described (eg frequency and location of stags, hollow bearing trees, culverts, rock shelters, rock outcrops, crevices, caves, drainage lines, soaks etc) and the density of understorey vegetation and groundcover. The condition of the habitat within the study area must be discussed, including the prevalence of introduced species, species of weeds present and an estimate of the total weed cover as a percentage of each vegetation community, whether trampling or grazing is apparent, effects of erosion, prevalence of rubbish dumping, history of resource extraction or logging and proximity to roads. Details of the subject site's history (eg frequency, time since last fire, intensity) and the source of the fires history (eg observation, local records), must be provided.	Section 5.3	
Discussion of habitat utilisation	5.3.2	A discussion of how individuals use the area (eg residents, transients, adults, juveniles, nesting, foraging) and discussion of the significance of the habitat of	Section 5.3	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		the study area to the viability of the threatened species or endangered population in the locality must be included.		
Discussion of conservation status	5.4	The following are further requirements related to your obligation under Section 110(2)(c) to address the following:	Section 5.3	Section 110 (2)(c)
		for each species or population likely to be affected, details of its local, regional and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or threat abatement plan applying to it		
		and to your obligation under Section 110(2)(e) to address the following:		Section 110 (2)(e)
		an assessment of whether those species or populations are adequately represented in conservation reserves (or other similar protected areas) in the region		
		and to your obligation under Section 110(2)(e1) to address the following:		Section 110 (2)(e1)
		an assessment of whether any of those species or populations is at the limit of its known distribution		
		The relative significance of the subject site for threatened species or endangered		

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		populations in the locality must be. discussed. In particular, discussion of other known populations must be provided. Such an assessment must consider and compare the differences in the type, condition, and tenure and long-term security of other areas of known habitats in the locality with those in the study area. Known occurrences in the locality and region of the extinction or degradation of local populations of each affected threatened species or population and of fragmentation, decrease in extent or degradation of its habitat should be documented.		
Discussion of the likely affect of the proposal at local and regional scales	5.5	The following are further requirements related to your obligation under Section 110(2)(g) to address the following: a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region	Section 5.3	Section 110 (2)(g)
Significance within a local context	5.5.1	Provision of information to allow adequate determination of the significance of the effects of the proposal in accordance with Section 5A of the EP&A Act is required. The significance of impacts in the study area for conservation of affected threatened species or endangered populations in the locality must be	Section 5.3	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		discussed. An assessment of the significance of such impacts must compare and take into account the differences in the type, condition, and the tenure and long-term security, of other areas of known habitats in the locality with those in the study area.		
Discussion of connectivity	5.5.2	The potential of the proposal to increase fragmentation of the habitat or decrease the ability for movement of individuals and/or gene flow between habitats or populations of a threatened species or population must be appraised.	Section 5.3	
Consideration of threatening processes	5.5.3	Assessment of effects must not be limited only to threats that are recognised as key threatening processes, but must include other threatening processes that are generally accepted by the scientific community as affecting the species or populations and are likely to be caused or exacerbated by the proposal. Assessment should also include consideration of information in the Priorities Action Statement and any approved of draft recovery plans or threat abatement plans which may be relevant to the proposal.	Section 5.3	
Description of feasible alternatives	5.6	The following are requirements related to your obligation under section 110(2)(h) to address the following:	Section 5.4	Section 110 (2)(h)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development. Where a Statement of Environmental Effects, Environmental Impact Statement or Review of Environmental Factors deals with these matters, the SIS may refer to the relevant section of the SEE, EIS or REF as long as the document referred to is provided with the SIS. The SIS must include details of the condition and use of other parts of the subject area and why these can or cannot be considered as feasible alternatives.		
ASSESSMENT OF LIKELY IMPACTS ON ENDANGERED ECOLOGICAL COMMUNITIES	6	Assessment of impacts must consider the nature, extent and timing of the proposal and all associated actions, including but not restricted to construction, provision and ongoing maintenance of approved or proposed: • buildings or other structures; • utilities such as sewerage, electricity, gas or water; • routes for access and egress; • dams and associated infrastructure;	Chapter 6	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		• pipelines; • drainage infrastructure and changes made to surface water flows; • bush fire hazard reduction; and • landscaping Assessment must include the direct and indirect impacts of these activities which may occur both on or off the subject land. To assess the impacts from the provision of bushfire protection (e.g. if there will be a requirement to provide fuel free and/or fuel reduced zones in retained bushland), proponents should consider recommendations in 'Planning for Bushfire Protection' (NSW Rural Fire Service 2006) and consider the use of situating required access roads around the roads as an option to meet those requirements but reduce impacts on retained bushland. The impacts to endangered ecological communities from the proposed residential sub-division are likely to arise from: § fragmentation and isolation of habitat and an incremental decline in its quality and extent; § loss of locally significant vegetation; § loss of foraging habitat for threatened fauna and a reduction in their local abundance and distribution;		

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		§ indirect effects of urbanisation e.g. tree removal, rubbish dumping, soil compaction, erosion, weed invasion as well as altered drainage patterns and nutrient levels resulting from increased runoff; and		
Assessment of endangered ecological communities likely to be affected	6.1	The following are further requirements related to your obligation under Section 110(3)(a) to address the following: a general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action. This requires you to refine the list of subject ecological communities (given the outcome of survey and analysis of likely impacts) in order to identify which endangered or critically endangered ecological communities (C) EECs may be affected, directly or indirectly (including cumulatively), by the proposal. This must include reference to the (C) ECCs as described by the NSW Scientific Committee, and to the requirements outlined previously in section 4 of these requirements, and take into account information in any relevant recovery plans and draft recovery plans and vegetation assessment and mapping. Adequate rationale should be provided to demonstrate how the list was derived. If adequate surveys/studies have been undertaken to categorically demonstrate the EEC does not occur in the study area, or will not utilise habitats on site, or if off-site, be influenced by off-site impacts of the activity, that EEC does not have to be	Section 6.1	Section 110 (3)(a)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		considered further. Otherwise all (C)EECs likely to occur in the study area (based on general distribution information), and known to occupy those habitat types, should be assessed as if present. The requirements in the remainder of this section need only be addressed for those (C)EECs that are likely to be affected by the proposal. subsequently this information should be utilised in an Assessment of Significance (as required in section 8) for each of those (C)EECs.		
Description of habitat	6.2	The following are further requirements related to your obligation under section 110(3)(c) to address the following: a full description of the types, location, size and condition of the habitat of the ecological community and details of the distribution and condition of similar habitats in the region.	Section 6.2	Section 110 (3)(c)
Study area	6.2.1	An assessment of the habitat of the study area is required and must include: • a description of each (C)EEC, including: → a description of those areas where the community may only be represented by soil stored seed with no or few above-ground components, and → description of disturbance history and recovery capacity. If the site shows	Section 6.2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		signs of disturbance, details should be provided of the site's disturbance history. An assessment should be made of the ability of the (C)EECs to recover to a state representative of its pre-disturbance condition. This assessment will include consideration of the site's in-situ and migratory resilience and will be accompanied by a map of the recovery capacity of the (C)EECs across the site. Consideration should be given to the results (preliminary or otherwise) of restoration projects being undertaken at other sites that contain the (C)EECs when assessing its recovery capacity. • comparison of the affected community with the ©EECs as determined by the NSW Scientific Committee. • reference to any relevant available recovery plans and draft recovery plans and vegetation assessment and mapping. • maps, consistent with the descriptions provided, showing the extent and condition of the community.		
Locality	6.2.2	A discussion of other occurrences of each (C)EECs populations in the locality must be provided. This must include: • a comparison of other known occurrences and their habitats with those of the study area in terms of remnant sizes, connectivity, species diversity and	Section 6.2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		abundances, quality and condition (including levels of disturbances, weed diversity and abundances). • the tenure and long-term security of other occurrences and its habitat. • the relative significance of the subject site of each (C)EECin the locality and region.		
Discussion of conservation status	6.3	The following are further requirements related to your obligation under Section 110(3)(b) to address the following: for each ecological community present, details of its local, regional and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or any threat abatement plan applying to it.	Section 6.2	Section 110 (3)(b)
		The following are further requirements related to your obligation under Section 110(3)(b1) to address the following: an assessment of whether those ecological communities are adequately represented in conservation reserves (or other similar protected areas) in the region.		Section 110 (3)(b1)
		The following are further requirements related to your obligation under Section 110(3)(b2) to address the following:		Section 110 (3)(b2)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		an assessment of whether any of those ecological communities is at the limit of its known distribution. The relative significance of the subject site for each threatened ecological community in the locality must be discussed. In particular, discussion of other known occurrences of each affected threatened ecological community must be provided. Such an assessment must consider and compare the differences in remnant sizes, connectivity, species diversity and abundances, quality and condition (including levels of disturbances, weed diversity and abundances), tenure and long-term security of other known occurrences and habitats in the locality with those in the study area. Known occurrences in the locality and region of fragmentation, decrease in extent or degradation of each ecological community or its habitat should be documented.		
Discussion of the likely effect of the proposal at local and regional scales	6.4	The following are further requirements related to your obligation under Section 110(3)(g) to address the following: a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region.	Section 6.2	Section 110 (2)(g)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
Significance within a local context	6.4.1	Provision of information to allow adequate determination of the significance of the effects of the proposal in accordance with Section 5A of the EP&A Act (see section 8 of these requirements below) is required. The significance of impacts in the study area for conservation of affected (C)EECs in the locality must be discussed. An assessment of the significance of such impacts must compare and take into account the differences in remnant sizes, connectivity, species diversity and abundances, quality and condition (including levels of disturbances, weed diversity and abundances), tenure and long-term security of other known occurrences and habitats in the locality with those in the study area.	Section 6.2	
Extent of habitat removal or modification	6.4.2	The location, nature and extent of habitat removal or modification which may result from the proposed action including the cumulative loss of habitat from the study area (including all proposed DAs and those areas in the subject area already with development consent or identified for development) and the impacts of this on the viability of the (C)EECin the locality. This must include an assessment of the proportion of the (C)EEC to be affected by the proposal, in relation to the total extent of the (C)EEC, and the impact of this on the viability of the endangered ecological community at the local level.	Section 6.2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
Discussion of connectivity	6.4.3	The potential of the proposal to increase fragmentation of each (C)EEC, its relation to adjoining vegetation and to exacerbate edge effects or to decrease the ability for movement of individuals and/or gene flow between habitats must be discussed. If connectivity between adjacent remnants of endangered ecological communities is likely to be affected, the impact of the proposal on connectivity must also be discussed.	Section 6.2	
Consideration of threatening processes	6.4.4	Assessment of effects must not be limited to threats that are recognised as key threatening processes, but must include threatening processes that are generally accepted by the scientific community as affecting the species or population and are likely to be caused or exacerbated by the proposal. Assessment should also include consideration of information in the Priorities Action Statement and any approved or draft recovery plans or threat abatement plans which may be relevant to the proposal.	Section 6.2	
Description of feasible alternatives	6.5	The following are further requirements to your obligation under section 110(3)(e) to address the following:	Section 6.3	Section 110 (3)(e)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development. Where a Statement of Environmental Effects, Environmental Impact Statement or Review of Environmental Factors deals with these matters, the SIS may refer to the relevant section of the SEE, EIS or REF. The SIS must include details of the condition and use of other parts of the subject area and why these can or cannot be considered as feasible alternatives.		
AMELIORATIVE MEASURES	7		Chapter 7	
Description of ameliorative measures	7.1	The following are further requirements related to your obligation under Sections 110(2)(i) and 110(3)(f) to address the following: a full description and justification of the measures proposed to mitigate any adverse effect of the action on the species and populations [s.110(2)(i)] [or] ecological community [s.110(3)(f)] including a compilation (in a single section of the statement) of those measures.	Section 7.1	Section 110 (2)(i) and Section (110 (3)(f)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		Ameliorative or compensatory measures proposed to reduce or offset the level of impact should only be considered where it can be shown that they have been successfully applied elsewhere. The likely efficacy of such measures with respect to. the current proposal should be assessed in detail.		
Long term management strategies	7.1.1	Consideration must be given to developing long term management strategies to protect areas within the study area which are of particular importance for the threatened species or endangered populations likely to be affected. This may include proposals to restore or improve habitat on site where possible.	Section 7.1.1	
Compensatory strategies	7.1.2	Where significant modification of the proposal to minimise impacts on threatened species or endangered communities is not possible. then compensatory strategies should be considered. These may include other offsite or local area proposals that contribute to long term conservation of the threatened species, population or endangered ecological community. Any proposed offsetting measures should be developed in accordance with the "Principles for the Use of Biodiversity Offsets in NSW" (www.environment.nsw.gov.au/biocertification/offsets.html). The Biobanking Assessment Methodology	Section 7.1.2	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		(www.environment.nsw.gov.au/biobanking/assessmethodology.htm) could also be used to assess the adequacy of any proposed offsetting measures. Where such proposals involve other lands, or where the involvement of community groups is envisaged in such proposals, such groups are to be consulted arid proposals should contain evidence of support from these stakeholders and relevant land managers. Compensatory benefits likely to result from such measures proposed for alternative sites are to be discussed and evaluated along with a discussion of mechanisms of how they might best occur.		
Ongoing monitoring	7.1.3	Any proposed pre-construction monitoring plans or on-going monitoring of the effectiveness of the mitigation measures must be outlined in detail, including the objectives of the monitoring program, method of monitoring, reporting framework, duration and frequency. Generally, ameliorative strategies which have not been proved effective should be undertaken under experimental design conditions and appropriately monitored.	Section 7.1.3	
Translocation	7.1.4	The OEH does not consider that translocation of threatened species, populations and ecological communities is an appropriate ameliorative strategy for the	Section 7.1.4	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		purposes of considering impacts of a particular development/activity. The OEH strongly supports the view that development proposals which may impact on a significant local population of threatened species, populations or ecological communities as determined by the SIS should aim to: i. minimise the impacts by considered all possible alternatives to the development, such that a significant impact is not likely; and ii. manage the remaining habitat (if any) to ensure that the local populations continues to exist in the long term. The translocation of threatened species, populations and ecological communities is only supported by the DECC in specific conservation programs (eg. recovery planning) but only as a last resort, and only when in-situ conservation options have been exhausted. Such programs should only be reconsidered following extensive investigation of a demonstrated long term financial commitment on behalf of the applicant.		
ASSESSMENT OF SIGNIFICANCE OF LIKELY EFFECT OF PROPOSED ACTION	8	Based on the detailed SIS assessment and consideration of alternatives and/or ameliorative measures proposed in the SIS, a re-assessment of the significance of impact (section 5A EP&A Act) is to be carried out for each of the entities (threatened species, population or ecological community) identified in this SIS as being likely to be affected. This assessment must be carried out in accordance	Chapter 8	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		with the Threatened species assessment guidelines (DECCW 2007) (www.environment.nsw.gov.au/threatenedspecies/tsaguide.htm) and must incorporate the relevant information from sections 5.1 to 7 of these SIS requirements. For each entity an overall conclusion must be drawn as to whether the proposal is still considered likely to have a significant effect.		
ADDITIONAL INFORMATION	9		Chapter 9	
Qualifications and experience	9.1	The following is your obligation under Sections 110(4) to address the following: a species impact statement must include details of the qualifications and experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement.	Section 9.1	Section 110 (4)
Other approvals required for the development or activity	9.2	The following are further requirements related to your obligation under Sections 110(2)(j) and 110(3)(g)) to address the following: a list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any	Section 9.2	Section 110 (2)(j) and Section 110 (2)(g)

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		existing approvals that are relevant to the species or population or ecological community. Other approvals under NSW law In providing a list of other approvals the following must be included: • Where a consent is required under Part 4 of the Environmental Planning and Assessment Act 1979, the name of the consent authority and the timing of the development application should be included; or • Where an approval(s) is required under Part 5 of the Environmental Planning and Assessment Act 1979, the name of the determining authority(ies), the basis for the approval and when these approvals are proposed to be obtained should be included. Approval under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) An action will require referral to, and may require the approval of, the Federal Minister for the Environment and Water Resources (in addition to any local or state government consent or approval) if that action will have, or is likely to have, a significant impact on the environment or on a matter of national environmental significance. Threatened species and communities listed in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are considered to be matters of national environmental significance, as are migratory species and a		

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		number of other matters. Information regarding matters of national environmental significance may be obtained from www.environment.gov.au/epbc/matters/index.html, on the website of DEWHA or by contacting DEWHA on 1800 803 772. Further information regarding the operation of the EPBC Act in NSW can be found on the NSW Dept of Planning's website at EPBC Act Guide to Implementation in NSW (available at http://www.planning.nsw.gov.au/assessingdev/environmentalassessment.asp) and on the DEW website at www.environment.gov.au/epbc/about/index.html.		
Licensing matters relating to conducting surveys	9.3	Persons conducting flora and fauna surveys must have appropriate licences or approvals under relevant legislation. The relevant legislation and associated licences and approvals that may be required are listed below: National Parks and Wildlife Act 1974: • General Licence (Section 120) to harm or obtain protected fauna (this may include . threatened fauna). • Licence to pick protected native plants (Section 131). • Scientific Licence (Section 132C) to authorise the carrying out of actions for scientific, educational or conservation purposes. Threatened Species Conservation Act 1995:	Section 9.3	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		• Licence to harm threatened animal species, and/or pick threatened plants and/or damage the habitat of a threatened species (Section 91). Animal Research Act 1985: • Animal Research Authority to undertake fauna surveys.		
Section 110(5) reports	9.4	Section 110(5) of the Threatened Species Conservation Act 1995 has the effect of requiring OEH to provide that information regarding the State-wide conservation status of the subject species as it has available, in order to satisfy ss.110(2) & (3) of the Act. To this end, a number of publications have been produced: i. OEH has produced a set of profiles for a number of threatened species, populations and ecological communities and are available on OEH website (www.threatenedspecies.environment.nsw.gov.au). Some of these may be relevant to the subject species for this development. ii. The Metropolitan Branch Biodiversity Conservation Section has produced a number of profiles and environmental impact assessment guidelines for species, populations and ecological communities. These are also on the DECCW Threatened Species website. Proponents and consultants should note that OEH has no further published	Section 9.4	

Table A.1 Compliance with DGRs

Matters to be addressed	Section within DGRs	Detail	Location within the SIS	TSC Act Section 109/110
		information available to satisfy s.110(5) of the Act and that purchase or receipt and use of the above profiles can be taken to have satisfied the requirements of ss.110(2) & (3) in relation to the State-wide conservation status of the listed species, populations and ecological communities.		

Appendix B

Arborist Report

EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

DEVELOPMENT IMPACT ASSESSMENT REPORT

PROPOSED MIXED-USE DEVELOPMENT

17-23 MERRIWA STREET, GORDON

November 2013

Prepared for: Mr Hugh Colless
Brewster Murray Pty Ltd
99 York Street
SYDNEY NSW 2000

Ph:- 02 9299 0988

Prepared by: Andrew Morton
Dip. (Arboriculture) [AQF Level 5]
B. App. Sci. (Horticulture)
A. Dip. App. Sci. (Landscape)

EARTHSCAPE HORTICULTURAL SERVICES
Ph: - 0402 947 296

Member of Arboriculture Australia
Member International Society of Arboriculture - Australian Chapter (ISAAC)
Member Local Government Tree Resources Association (LGTRA)

PO Box 364, BEROWRA NSW 2081
Ph: (02) 9456 4787 Mobile: 0402 947 296 Fax: (02) 9456 5757
Email: earthscape@iinet.net.au

TABLE OF CONTENTS

1 INTRODUCTION

1.1.1 This report was commissioned by the Brewster Murray Pty Ltd to assess the health and condition of thirty-eight (38) trees located within or immediately adjacent 17-23 Merriwa Street, Gordon. The report has been prepared to aid in the assessment of a Development Application (DA) for the demolition of the existing commercial office building and construction of a new mixed-use development within the property.

1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

1.1.3 This report has been prepared in accordance with Ku-ring-gai Council's guidelines for preparation of Arborists Reports as outlined in Section 5 of Council's Development Application Guide dated October 2010 and Sections 2.3.2 -2.3.5 of the Australian Standard for *Protection of Trees on Development Sites* (AS 4970:2009).

2 THE SITE

2.1.1 The subject property is known as Lot 40 in DP 803006, being 17-23 Merriwa Street, Gordon. For the purposes of this report, the subject allotment will be referred to as "the Site". The total area of the site is 4,320 m². The site is zoned Mixed Use (B4) under the Ku-ring-gai Local Environmental Plan (Local Centres) 2012. The site contains an existing commercial office building complex with basement car parking facilities located centrally within the lot. The site exhibits a moderate south-westerly gradient, containing garden areas and a variety of mature trees around the periphery of the site. The trees include a variety of locally-indigenous, non-local native and exotic (introduced) species.

2.1.2 Soils of this area are typical of the Glenorie Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of "shallow to moderately deep (less than 1000mm) *Red Podzolic Soils* on crests, moderately deep (700 – 1500 mm) *Red & Brown Podzolic Soils* on upper slopes and deep (greater than 2000mm) *Yellow Podzolic Soils* on lower slopes". Soil materials are derived from Wianamatta shales. The landscape of the area generally consists of undulating to rolling low hills with slopes of 5-20%.[1]

2.1.3 The original vegetation of this area consisted of tall open forest (Blue Gum High Forest) which was logged early in the nineteenth century then cleared for agricultural and later residential development.[2] Dominant locally-indigenous tree species formerly found in this area included *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus pilularis* (Blackbutt). Other species occurring in this association may include *Syncarpia glomulifera* (Turpentine), *Eucalyptus paniculata* (Grey Ironbark), *Angophora floribunda* (Rough Barked Apple), *Eucalyptus acmenoides* (White Mahogany), *Angophora costata* (Sydney Red Gum), *Eucalyptus resinifera* (Red Mahogany) and *Allocasuarina torulosa* (Forest Oak).

3 SUBJECT TREES

3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 22nd October 2013. Each tree has been provided with an identification number for reference purposes denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by M. U. XU & Co., Dwg. Ref No. 13207 dated 09/09/2013. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T23a, T23b, T29a, T30a, T30b & T30c were not shown on the original survey and have been plotted on the drawing in their approximate positions by taking offsets from existing features.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.[3] All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name);
- Approximate height;
- Canopy spread; measured using a metric tape and an average taken.
- Trunk diameter (measured at 1.4 metres from ground level);
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).
- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

This information is presented in a tabulated form in **Appendix 3.**

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy[4] of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3.**

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its amenity, environmental and heritage values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure in a consistent approach, the assessment criterion shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 Tree Preservation Order

A Tree Preservation Order (TPO) applies to all land within the Municipality of Ku-ring-gai, made under Clause 42 (4) of the Ku-ring-gai Planning Scheme Ordinance and adopted by Council on 12th December 2006 and gazetted 25th January 2007. The TPO generally protects all trees of a height of five (5) metres or greater or with a trunk diameter of 150mm or greater. Some exemptions apply. However all of the subject trees are protected under the provisions of Ku-ring-gai Council's Tree Preservation Order.

5.2.2 Wildlife Habitat

Angophora costata (Sydney Red Gum) [T22 & T23a], *Syncarpia glomulifera* (Turpentine) [T23 & T31] and *Eucalyptus paniculata* (Grey Ironbark) [T32] are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. However, none of the trees contain cavities suitable as nesting hollows for arboreal mammals or birds. T23 (a Magenta Cherry) contains a Ringtail Possum nest (Dray) at 11 metres and T24 (Turpentine) shows evidence of bark harvesting (for nesting material) by Ringtail Possums at 6 metres. There were no other visible signs of wildlife habitation.

5.2.3 Noxious Plants & Environmental Weeds

None of the trees assessed are scheduled as Noxious Weeds under the meaning of *Noxious Weeds Act* (NSW) 1993. *Cotoneaster sp.* (Cotoneaster) [T21] is considered to be an Environmental Weed Species within the Ku-ring-gai Local Government Area (LGA). Note that this tree may still be afforded some protection under Section 138 (c) of the *Roads Act* (NSW) 1993 and Section 629 of the *Local Government Act* (NSW) 1993, being located within the adjoining Road Reserve.

5.2.4 Threatened Species & Ecological Communities

Syzygium paniculatum (Magenta Cherry or Lilly Pilly) [T17, T19 & T23] is listed as a Vulnerable Species on Schedule 2 of the *Threatened Species Conservation Act* 1995 (NSW) and a Nationally Vulnerable species under the *Environmental Protection and Biodiversity Conservation Act* 1999. Whilst this species is listed as vulnerable, it is a commonly planted ornamental tree and is not endemic to this area. As such, it does not have any ecological significance in the context of this site.

The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain)[5] indicates that the dominant remnant native vegetation community within the area occupied by the site is Turpentine Ironbark Margin Forest (TIMF) [Map Unit 43]. TIMF is a sub-group of Sydney Turpentine Ironbark Forest (STIF). STIF is listed as an Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act* 1995 (NSW) and a Critically Endangered Ecological Community under the *Environmental Protection and Biodiversity Conservation Act* 1999. *Syncarpia glomulifera* (Turpentine) [T23 & T31] and *Eucalyptus paniculata* (Grey Ironbark) [T32] are both Positive Diagnostic Species of this vegetation community.[6] *Angophora costata* (Sydney Red Gum) [T22 & T23a] is an associated canopy species. It should be noted that T22, T23 & T23a appear to have been planted within the site. T31 & T32 may be remnant of the original vegetation community.

5.2.5 Biodiversity
The site does not contain any 'Areas of Biodiversity Significance' as indicated on Council's Biodiversity Map forming part of the Ku-ring-gai Local Environmental Plan (Local Centres) 2012.

5.3 Heritage Significance

5.3.1 Heritage Items
The subject property is *not* listed as a Heritage under Schedule 7, Part 1 of the Ku-ring-gai Planning Scheme Ordinance (KPSO). There is no known or suspected heritage significance of any of the subject trees.

5.3.2 Heritage Conservation Area
The site is *not* located within a Heritage Conservation Area under the Ku-ring-gai Local Environmental Plan (Local Centres) 2012.

5.3.3 Significant Tree Register
Ku-ring-gai Council does not currently maintain a Register of Significant Trees.

5.4 Amenity Value

5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE RETENTION VALUES

6.1.1 The Retention Values shown in **Appendix 3** and **Appendix 5** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table One**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

	Landscape Significance Rating						
Estimated Life Expectancy	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Long - Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short - 5 to 15 years				Low Ret. Value			
Transient - Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

7 TREE PROTECTION ZONES

7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).[7]

7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 4**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).

7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Incursions to the Tree Protection Zone.

7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.

7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable.

7.1 Acceptable Incursions to the Canopy.

7.1.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as "lopping" and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.

7.1.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the demolition of the existing commercial office building and construction of a new mixed used development within the site.

9 IMPACT ASSESSMENT

9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No.	Date
Basement Floor Plans2A, 1a & 1B	Brewster Murray	13_5472 PRE04-06	August 2013
Ground Floor Plan	Brewster Murray	13_5472 A2.05 Rev. A	22/11/2013
Level 1 – Level 6 Floor Plans	Brewster Murray	13_5472 PRE08-13	August 2013
Roof Plan	Brewster Murray	13_5472 PRE14	August 2013
Section 1 & 2	Brewster Murray	13_5472 PRE15-16	August 2013
Elevations	Brewster Murray	13_5472 PRE17-22	August 2013
Ground Floor Stormwater	J & M Group	1333 H5504 Rev B	19/11/2013

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will necessitate the removal of two (2) trees of low and very low retention value. These include Tree No.s T27 (Western Red Cedar) and T28 (Swamp Oak). Neither of these trees are considered significant or worthy of special measures to ensure their preservation.

9.1.4 The proposed development will also necessitate the removal of eleven (11) trees of moderate retention value. These include Tree No.s T4 (Lemon-scented Gum), T9, T10, T11 & T12 (Broad-leaved Paperbark), T13, T14 & T15 (Bangalow Palm), T23a (Sydney Red Gum) and T25 & T26 (Swamp Oak). These trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. In order to compensate for loss of amenity, consideration should be given to replacement planting within the site in accordance with Section 11.

9.1.5 The proposed development will also necessitate the removal of a further two (2) trees of High Retention Value. These include Tree No.s T24 (Turpentine) and T32 (Grey Ironbark), both of which are constituents of STIF, an EEC. Of these, T24 appears to have been planted and T32 may be remnant. Given the land zoning, the extent of development proposed and existing site constraints, there are no feasible alternatives that would permit the retention of these trees. In order

to compensate for loss of amenity, consideration should be given to replacement planting within the site in accordance with Section 11.

9.1.6 The removal of T21 (a Cotoneaster on the nature strip) is also recommended. This tree is considered to be an Environmental Weed Species. Replacement planting should be undertaken elsewhere on the nature strip with a more appropriate species in accordance with Council's Street Tree Master Plan.

9.1.7 A proposed pedestrian ramp is located within the TPZs of T1 & T2 (Tallowwood), T3 & T5 (Lemon-scented Gum) and T17 & T19 (Magenta Cherry). Given that the ramp will be elevated and supported by piers within the TPZ, these works should not result in any adverse impact on these trees provided that all excavations for the pier foundations are undertaken in accordance with Section 10.6. The ramp to the east of T17 is located beyond an existing retaining wall and as such will not result in any encroachment to the root zone of this tree.

9.1.8 The proposed basement is located within the TPZs of T3 & T5 (Lemon-scented Gums), T17 & T19 (Magenta Cherry), T29 (Swamp Oak), T30 (Himalayan Cedar) and T31 (Turpentine). In all cases, the proposed basement is within the footprint of the existing building. Assuming that the basement will be constructed using a soldier pier shotcrete panel method, the proposed works will not result in any actual incursion to the root zones of these trees. As such, the proposed works should not result in any adverse impact on these trees provided that the existing buildings within the TPZs are demolished in accordance with Section 10.5 and all excavations for the basement within the TPZs are undertaken in accordance with Section 10.6.

9.1.9 A proposed at grade pedestrian pathway is located within the TPZs of T16 (Melaleuca), T29 (Swamp Oak), T30 (Himalayan Cedar) and T31 (Turpentine). Excavations and compaction for the proposed pathway has the potential to result in some soil disturbance wand compaction within the TPZs of these trees and therefore could result in some adverse impact. However, provided that the pathway is installed slightly above grade in accordance with Section 12.8, the proposed pathway should not result in any adverse impact on these trees. All excavations for the pathway sub-grade within the TPZs should be undertaken in accordance with Section 10.6.

9.1.10 The proposed basement ramp from Merriwa Street is located within the TPZs of T23b (Broad-leaved Paperbark) and T23 (Magenta Cherry). In both cases, the extent of the encroachment to the TPZ exceeds acceptable limits under AS 4970:2009. It should be noted that the ramp is within an existing concrete paved area within the TPZ of T23 and will be close to existing grade within most of the TPZ of T23b. In order to minimise any adverse impact on these trees, all excavations for the basement ramp and associated kerbs and retaining walls within the TPZs of these trees should be undertaken in accordance with Section 10.6

9.1.11 Trenching for proposed stormwater pipelines are located within the TPZs of Tree No.s T17, T19 & T23 (Magenta Cherry), T30 (Himalayan Cedar and T29 (Swamp Oak). Open trenching within the TPZs of these trees has the potential to result in root damage and severance, resulting in an adverse impact on these trees. In order to minimise and adverse impact, the proposed pipelines should be offset as far from these trees as possible and all trenching within the TPZs should be carried out in accordance with Section 10.7.

9.1.12 Minor canopy pruning of Tree Nos T2, T5, & T7 may be required to clear the building envelope and temporary scaffolding. The pruning should not result in any adverse impact provided that it is undertaken in accordance with Section 12.10. In order to minimise pruning, temporary scaffolding within the TPZs of these trees should be installed in accordance with Section 10.13

9.1.13 No other trees will be adversely affected by the proposed development.

10 RECOMMENDED TREE PROTECTION MEASURES

10.1 Tree Protection Plan

10.1.1 The following Tree Protection Measures should be read in accordance with the Tree Protection Plan (**Appendix 6**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained as part of the proposed development.

10.2 Prohibited Activities

10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-

- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
- Soil disturbance, surface grading, compaction, tyning, ripping or cultivation of soil;
- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)
- Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
- Erection of site sheds (except where approved by the site arborist);
- Affixing of signage, barricades or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Stockpiling of spoil or fill;
- Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
- Stockpiling of demolition waste;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

10.3 Tree Protection Fencing

10.3.1 All trees within the site to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy to the full extent of the Tree Protection Zone, excluding the footprint of the proposed works and areas within adjoining properties, as indicated on the Tree Protection Plan. As a minimum, the fence should consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.

10.3.2 Appropriate signage shall be installed on the fencing to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone.

10.3.3 A 50mm layer of woodchip mulch shall be installed to the full extent of the Tree Protection Zone of all trees to be retained. Mulch shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone.

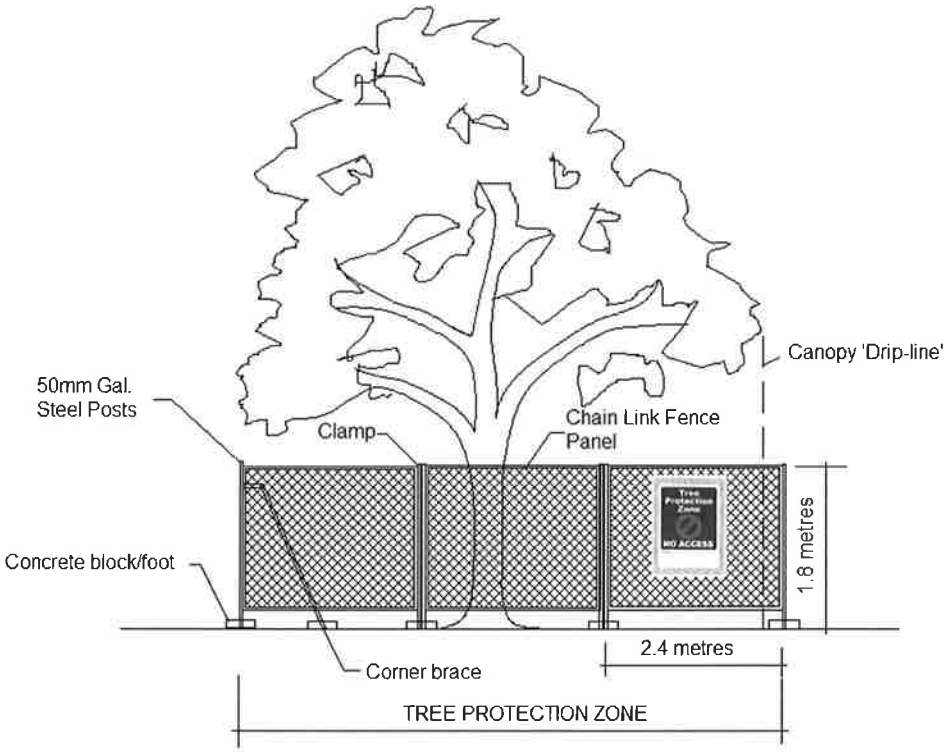


Figure 1 – Detail of Tree Protection Fence

10.4 Tree Protection Signs

10.4.1 Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009 as shown in **Figure 2**.

Figure 2 – Detail of Tree Protection Sign

10.5 Demolition Works within Tree Protection Zones

10.5.1 Demolition of paved areas within the Tree Protection Zones of trees to be retained shall be undertaken under the supervision of the Site Arborist. The pavement surface and sub-base within the TPZ shall be gradually removed in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise disturbance and compaction of the underlying soil profile. The machine shall work within the footprint of the existing paved surfaces to avoid compaction of the underlying soil. The final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and damage to woody roots.

10.5.2 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels within new landscape areas. Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile. Where there is insufficient recovered site topsoil for this purpose, any imported

material shall be free of rocks, vegetation, heavy clay or other extraneous matter. Any imported soil material should be similar in texture to the existing site topsoil.

10.5.3 Demolition of existing walls, kerbs and other structures within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The structures shall be demolished using equipment on stationed outside the TPZ where possible or within the footprint of existing hardstand areas. Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the structures during demolition works, with special attention required during demolition of the footings and other sub-surface members to avoid damage to woody roots.

10.6 Excavations within Tree Protection Zones

10.6.1 Prior to any mechanical excavations for building foundations or pavement sub-grade within the Tree Protection Zone of all trees nominated for retention, exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade® device) or water pressure. The exploratory excavation shall be undertaken along the perimeter of the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots prior to any mechanical excavation. All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 50mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree.

10.6.2 Where large woody roots (greater than 50mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance.

10.6.3 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars. For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation where large woody roots are found within the sub-base.

10.7 Underground Services

10.7.1 All proposed stormwater lines and other underground services should be located as far away as practicable, or suspended beneath the floor of the building where possible, to avoid excavation within the Tree Protection Zone of trees to be retained.

10.7.2 For underground services, where the incursion to the root zone is less than 20% of the total TPZ, mechanical excavation may be undertaken under the supervision of an arborist. A skid steer loader is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (e.g. by sub-surface boring beneath roots or re-routing the service etc).

10.7.3 Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring (Horizontal Directional Drilling). The

Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the arborist to determine continued health and stability of the subject tree.

10.8 Pavements

10.8.1 Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage. Pavement sub-base material should be as per Section 10.9.

10.9 Fill Material

10.9.1 Placement of fill material within the Tree Protection Zone of trees to be retained should avoided wherever possible. Where placement of fill is unavoidable, the material should be a well-drained friable material, equivalent in texture to the existing site topsoil material. The fill should be free from rocks, vegetation and other extraneous material. The fill may be consolidated but should not be compacted to engineering standards. No fill material should be placed in direct contact with the trunk.

10.9.2 Where placement of fill is required for pavement sub-grade is required within TPZs of trees to be retained, a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent shall be used to provide some aeration to the root zone. Note that Roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade.

10.10 Canopy & Root Pruning

10.10.1 All canopy pruning work required shall be carried out in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees. Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a qualified and experienced arborist or tree surgeon [Australian Qualification Framework Level 3] in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). No branches of greater than 100mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework Level 5].

10.10.2 Where root pruning is required, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

10.11 Tree Damage

10.11.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

10.11.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and

provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

10.12 Tree Removal

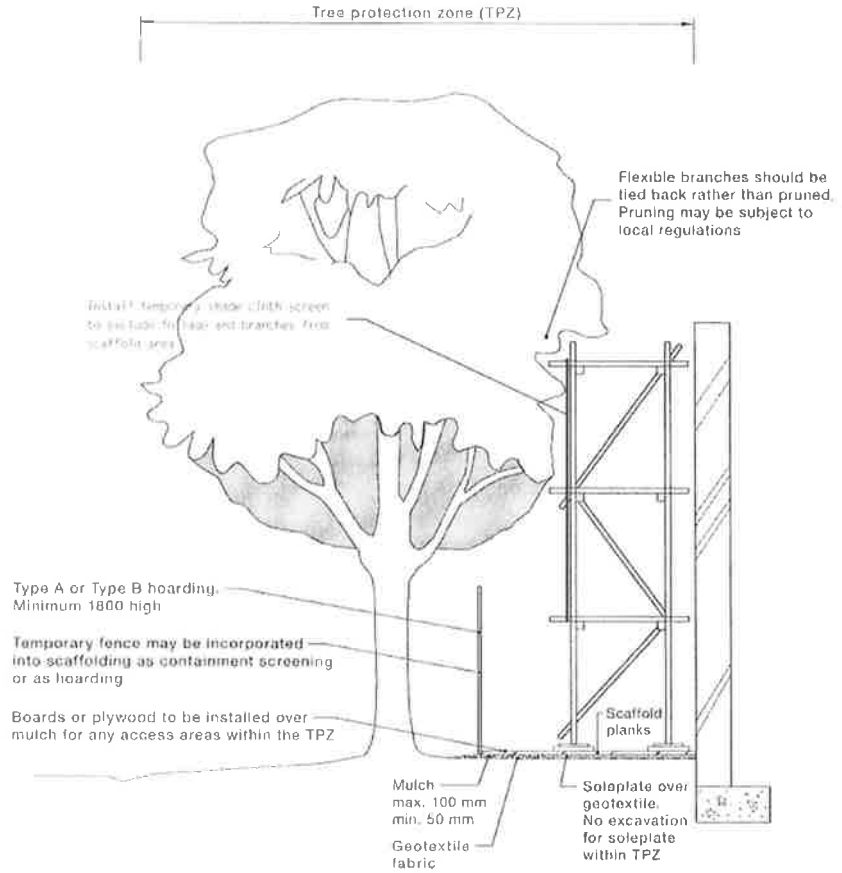
10.12.1 The approval of Ku-ring-gai Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

10.12.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

10.12.3 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

10.13 Temporary Scaffolding

10.13.1 Where temporary scaffolding must be erected within the TPZ of trees to be retained (as indicated in **Appendix 6**), the scaffold shall be erected in accordance with **Figure 5**. Where foliage or branches project through the scaffold and create a safety hazard, this foliage and branches shall be temporarily excluded from the inner part of the scaffold by affixing a shade cloth screen on the outside of the scaffold (refer to **Figure 5)**, or alternatively temporarily tying back branches where required. The pruning or removal of branches to accommodate the scaffold should be avoided wherever possible. Suitable ground protection shall be installed beneath the scaffold as shown in **Figure 5** to prevent contamination, disturbance and compaction of the soil profile within the scaffold zone during construction.



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

Figure 5 - Detail of Temporary scaffolding within a Tree Protection Zone

10.13.2 Where pruning or removal of branches to accommodate temporary scaffolding is unavoidable, all such pruning work shall be undertaken in accordance with **Section 10.8**.

11 REPLACEMENT PLANTING

11.1.1 In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, a minimum of six (6) new trees capable of attaining a minimum height of thirteen (13) metres at maturity should be planted within the allotment in accordance with Council's Tree Replenishment Policy under the Ku-ring-gai Local Centres DCP. Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area.

Andrew Morton
EARTHSCAPE HORTICULTURAL SERVICES
25th November 2013

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National Herbarium of NSW, Botanic Gardens Trust, Sydney

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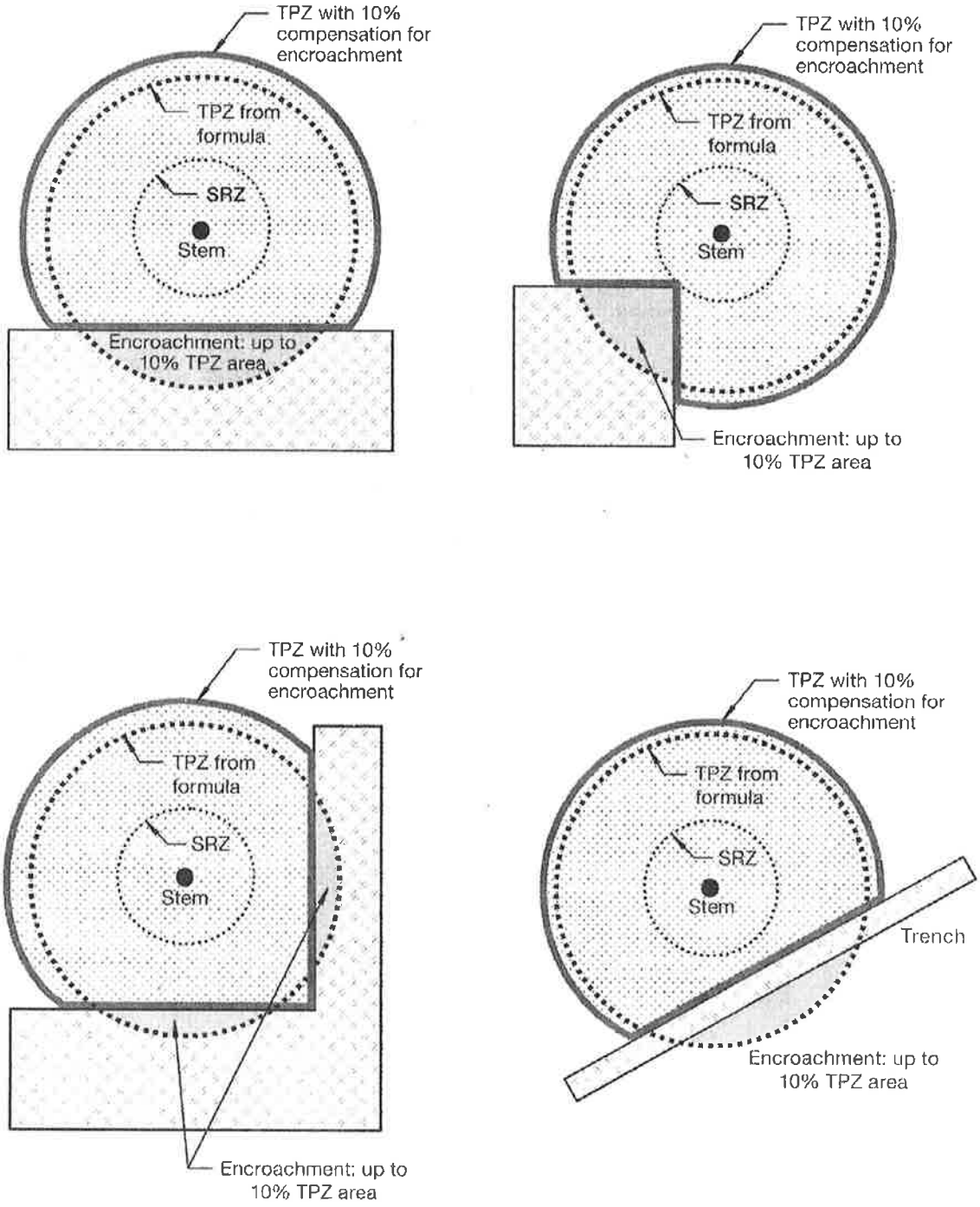
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the Leichhardt Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
Standards Australia, Sydney

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	***Eucalyptus microcorys*** (Tallowwood)	12	11	376	121	SM	Appears stable with sound branching structure. Crown suppressed on the west side due to overshadowing.	No Evidence	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	Adjoining property
2	***Eucalyptus microcorys*** (Tallowwood)	17	13	592	195	M	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 1.5 and 2.5 metres.	No Evidence	Good	No Evidence	Long - more than 40 years	3	**High**	On-site
3	***Corymbia citriodora*** (Lemon-scented Gum)	20	15	548	150	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	3	**High**	On-site
4	***Corymbia citriodora*** (Lemon-scented Gum)	18	18	548	108	M	Appears stable with sound branching structure. Growing through cut out in concrete vehicular access ramp with limited potential for future growth.	No Evidence	Good	No Evidence	Short 5-15 Years	3	**Moderate**	On-site
5	***Corymbia citriodora*** (Lemon-scented Gum)	18	12	414	84	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	3	**High**	On-site
6	***Melaleuca bracteata*** (Black Tea-tree)	8	5	140x2	30	SM	Appears stable with sound branching structure. Crown suppressed on western side due to overshadowing	No Evidence	Good	No Evidence	Medium 15-40 Years	5	**Low**	Adjoining property
7	***Corymbia maculata*** (Spotted Gum)	16	13	513	104	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	**High**	Adjoining property
8	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	9	6	200x2	45	SM	Appears stable with fair branching structure. Crown suppressed on south side due to overshadowing. Moderate bark inclusion at 1.5 metres.	No Evidence	Very Good	Moderate English Ivy infestation	medium 15-40 Years	4	**Moderate**	Adjoining property
9	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	10	5	250	30	SM	Appears stable with sound branching structure.	Crown lifted to 5 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
10	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	11	7	300	49	SM	Appears stable with sound branching structure.	Crown lifted to 5 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site
11	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	13	5	300	30	SM	Appears stable with sound branching structure.	Crown lifted to 5 metres	Good	No Evidence	Medium 15-40 Years	4	**Moderate**	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
12	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	14	8	450	80	M	Appears stable with fair branching structure. Multiple low bark inclusions at 2-3 metres.	No Evidence	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
13	***Archontophoenix cunninghamii*** (Bangalow Palm)	11	5	200	25	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
14	***Archontophoenix cunninghamii*** (Bangalow Palm)	10	4	150	16	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
15	***Archontophoenix cunninghamii*** (Bangalow Palm)	8	4	120	12	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	**Moderate**	On-site
16	***Melaleuca bracteata*** (Black Tea-tree)	11	7	320	63	M	Appears stable with fair branching structure. Crown suppressed on east side due to overshadowing.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	4	**Low**	Adjoining property
17	***Syzygium paniculatum*** (Magenta Cherry)	12	8	303	80	SM	Appears stable with sound branching structure.	Crown lifted to 3 metres	Good	No Evidence	medium 15-40 Years	4	**Moderate**	On-site
18	***Callistemon sp.*** (Bottlebrush)	4	4	90x3	8	SM	Appears stable with fair branching structure. Crown suppressed on the north side due to previous pruning.	Lopped at 3 metres to clear powerlines	Fair	No Evidence	Short 5-15 Years	5	**Low**	Nature strip
19	***Syzygium paniculatum*** (Magenta Cherry)	13	9	350	99	M	Appears stable with sound branching structure.	Crown lifted to 3 metres	Good	No Evidence	Long - more than 40 years	4	**Moderate**	On-site
20	***Callistemon sp.*** (Bottlebrush)	9	11	750	77	M	Appears stable with poor branching structure.	Topped and lopped to clear power lines (gully cut)	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	4	**Low**	Nature strip
21	***Cotoneaster sp.*** (Cotoneaster)	4	7	180 + 130x2	21	M	Appears stable with fair branching structure. Exhibits multiple small wounds due previous pruning with decay evident in lower trunk. 30% epicormic growth.	Crown lifted to 3 metres. Lopped at 3 metres to clear powerlines	Good	No Evidence	Short 5-15 Years	6	**very low**	Nature strip
22	***Angophora costata*** (Sydney Red Gum)	8	5	140	32.5	I	Appears stable with sound branching structure.	No Evidence	Very Good	Low foliar insect infestation.	Long - more than 40 years	5	**Moderate**	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
23	***Syzygium paniculatum*** (Magenta Cherry)	14	11	420	137.5	M	Appears stable with sound branching structure. Exhibits a low bark inclusion at 3 metres.	Crown lifted to 3 metres	Very Good	Low foliar insect infestation.	Long - more than 40 years	3	High	On-site
23a	***Angophora costata*** (Sydney Red Gum)	5	2	80	8	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	Moderate	On-site
23b	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	16	8	530	112	M	Appears stable with sound branching structure. Crown suppressed on western side due to overshadowing	No Evidence	Good	No Evidence	Long - more than 40 years	4	Moderate	Adjoining property
24	***Syncarpia glomulifera*** (Turpentine)	13	10	436	115	M	Appears stable with sound branching structure. Located close to existing concrete paved area.	No Evidence	Good	No Evidence	medium 15-40 Years	2	High	On-site
25	***Casuarina glauca*** (Swamp Oak)	18	7	490	105	M	Appears stable with fair branching structure. Twin trunked at 2 metres due suppressed leader with adaptive growth in primary limbs close to junction. Located close to existing concrete paved area. Roots visible in concrete joint lines.	Crown lifted to 3 metres	Good	No Evidence	medium 15-40 Years	4	Moderate	On-site
26	***Casuarina glauca*** (Swamp Oak)	16	9	471	126	M	Appears stable with sound branching structure. Located close to existing concrete paved area	Crown lifted to 3 metres	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site
27	***Thuja plicata*** (Western Red Cedar)	6	4	230	16	M	Appears stable with fair branching structure.	Crown lifted to 3 metres	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	5	Low	On-site
28	***Casuarina glauca*** (Swamp Oak)	16	5.5	201	77	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	5	Low	On-site
29	***Casuarina glauca*** (Swamp Oak)	14	4	191	52	SM	Appears stable with fair branching structure. Exhibits a prominent lean to the SE (self-corrected). Abrupt bend in main trunk.	No Evidence	Good	No Evidence	Medium 15-40 Years	5	Low	On-site
29a	***Jacaranda mimosifolia*** (Jacaranda)	7	9	236	27	SM	Stability suspect with sound branching structure. Exhibits a very prominent lean to the NW. Most of the crown distributed to the NW. Exhibits a large wound from GL to 1.2 metres with decay evident.	Crown lifted to 4 metres	Good	No Evidence	Short 5-15 Years	5	Low	Adjoining property

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m^2)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
30	***Cedrus deodara*** (Himalayan Cedar)	17	15	573	225	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Good	No Evidence	Long - more than 40 years	3	High	On-site
30a	***Callistemon viminalis*** (Weeping Bottlebrush)	6	7	300	28	M	Appears stable with fair branching structure. Crown suppressed on east side due to crowding.	Crown lifted to 2 metres	Fair	No Evidence	Short 5-15 Years	5	Low	On-site
30b	***Callistemon viminalis*** (Weeping Bottlebrush)	9	9	360 + 270	63	M	Appears stable with fair branching structure. Multiple moderate bark inclusions at GL to 1 metre. Lifting and displacing kerb.	Crown lifted to 2 metres	Fair	No Evidence	Short 5-15 Years	4	Low	On-site
30c	***Callistemon viminalis*** (Weeping Bottlebrush)	6	10	240	40	M	Appears stable with fair branching structure. Crown suppressed on west side due to crowding. Moderate wound at 2.5 metres due to branch loss.	Crown lifted to 2 metres	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	5	Low	On-site
31	***Syncarpia glomulifera*** (Turpentine)	15	15	500x2 + 650	180	M	Appears stable with fair branching structure. 10% deadwood.	Selectively pruned on the south side to clear the building.	Fair with slightly thinning crown	Moderate termite infestation	Long - more than 40 years	2	High	On-site
32	***Eucalyptus paniculata*** (Grey Ironbark)	15	18	678	198	M	Appears stable with sound branching structure. 15% epicormic growth.	Selectively pruned & deadwooded	Very Good	No Evidence	Long - more than 40 years	2	High	On-site

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	***Eucalyptus microcorys*** (Tallowwood)	P	5.6	2.2	99.8	Proposed pedestrian ramp offset 5.1 metres west at RL 110.319 (at grade to approximately 300mm above grade). Excavations for ramp foundations within TPZ. Encroachment to TPZ = 3%	Extent of encroachment to the root zone is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6.
2	***Eucalyptus microcorys*** (Tallowwood)	P	7.1	2.7	158.7	Existing suspended ramp offset 0.6 metres west to be demolished within TPZ. Proposed pedestrian ramp offset 3.7 metres west at RL 110.319 (at grade to 300mm above grade). Excavations for ramp foundations within TPZ. Encroachment to TPZ = 8%	Extent of encroachment to the root zone is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6.
3	***Corymbia citriodora*** (Lemon-scented Gum)	P	8.2	2.6	212.0	Existing suspended ramp offset 0.3 metres west to be demolished within TPZ. Proposed pedestrian ramp offset 3.1 metres west at RL 110.319 (at grade to 300mm above grade). Excavations for ramp foundations within TPZ. Proposed basement offset 4.6 metres west at RL 102.62 (7.5 metres below grade). Encroachment to TPZ = 21% (9% suspended, basement 8%).	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. However, much of the area of the encroachment consists of a suspended concrete ramp on piers. As such, actual incursion to the root zone is approximately 12%. The tree will tolerate this encroachment provided that the proposed works are carried out as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6.
4	***Corymbia citriodora*** (Lemon-scented Gum)	P	9.0	2.6	254.3	Within footprint of existing suspended ramp to be demolished within TPZ. Proposed pedestrian ramp offset 1.6 metres west at RL 110.319- (0.3 above grade to 0.9 above grade). Excavations for ramp foundations within SRZ. Basement offset 2.9 metres west at RL102.62 (7.5 metres below grade). Encroachment to TPZ = 20% (excluding ramp).	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. Proposed works will result in an adverse impact, necessitating removal	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
5	***Corymbia citriodora*** (Lemon-scented Gum)	P	6.2	2.3	121.1	Existing suspended ramp offset 0.8 metres west to be demolished within TPZ. Proposed pedestrian ramp offset 2.1 metres west at RL 110.319- (0.3 above grade to 0.9 above grade, partly beyond existing retaining wall). Excavations for ramp foundations within TPZ. Basement offset 4.0 metres west at RL102.62 (7.5 metres below grade). Encroachment to TPZ = 12% (excluding ramp)	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. However, much of the area of the encroachment consists of a suspended concrete ramp on piers. As such, actual incursion to the root zone is approximately 12%. The tree will tolerate this encroachment provided that the proposed works are carried out as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6.
6	***Melaleuca bracteata*** (Black Tea-tree)	M	3.2	1.7	31.2	No incursion to root zone or canopy.	No adverse impact	To be retained - no special Tree Protection Measure required.
7	***Corymbia maculata*** (Spotted Gum)	P	7.7	2.5	185.7	Proposed stairway and associated retaining wall offset 5.3 metres west at RL 105.955 to RL 104.414 (900mm above grade to 800mm below grade) - beyond existing retaining wall on boundary. Minor canopy pruning may be required to accomodate temporary scaffolding.	No adverse impact	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake demolition of existing concrete block retaining wall (where required) in accordance with Section 10.5. Erect temporary scaffolding within TPZ in accordance with Section 10.13. Undertake any required canopy pruning (to clear temporary scaffolding) in accordance with Section 10.10.
8	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.6	2.0	40.7	Proposed stairway and associated retaining wall offset 4.0 metres west at RL 105.955 to RL 104.414 (900mm above grade to 800mm below grade) - beyond existing retaining wall on boundary.	No adverse impact	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake demolition of existing concrete block retaining wall (where required) in accordance with Section 10.5.
9	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.0	1.8	28.3	Proposed stairway, path and associated retaining wall offset 1.2 metres west at RL 104.414 (800mm below grade). Excavations for wall foundations within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
10	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.6	2.0	40.7	Proposed stairway, path and associated retaining wall offset 1.1 metres west at RL 104.414 (800mm below grade). Excavations for wall foundations within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
11	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	3.6	2.0	40.7	Proposed stairway, path and associated retaining wall offset 1.5 metres west at RL 104.414 (800mm below grade). Excavations for wall foundations within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
12	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	5.4	2.4	91.6	Proposed stairway, path and associated retaining wall offset 1.3 metres west at RL 104.414 (800mm below grade). Excavations for wall foundations within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
13	***Archontophoenix cunninghamii*** (Bangalow Palm)	G	3.0	1.7	28.3	Located within footprint of proposed building & basement.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
14	***Archontophoenix cunninghamii*** (Bangalow Palm)	G	2.5	1.5	19.6	Located within footprint of proposed building & basement.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
15	***Archontophoenix cunninghamii*** (Bangalow Palm)	G	2.5	1.4	19.6	Located within footprint of proposed building & basement.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
16	***Melaleuca bracteata*** (Black Tea-tree)	M	3.8	2.1	46.3	Proposed pedestrian ramp offset 2.4 metres west at RL 104.414 (close to existing grade). Excavations for ramp foundations within TPZ. Encroachment to TPZ = 11%	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. No adverse impact provided that the proposed works are undertaken as recommended.	To be retained - no special Tree Protection Measure required.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
17	***Syzygium paniculatum*** (Magenta Cherry)	M	4.5	2.0	64.7	Proposed basement offset 2.4 metres west at RL 104.414 (close to existing grade, beyond existing retaining wall). Encroachment to TPZ = 15%. Proposed pedestrian ramp offset 2.4 metres north at RL 104.414 (5-600mm above grade). Proposed basement offset 3.1 metres NW. Excavations for basement within TPZ. Encroachment = 3%. Total encroachment (excluding ramp to north = 18%). Proposed stormwater line offset 3 metres SE. Trenching within TPZ.	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. However, much of the area of the encroachment consists of a suspended concrete ramp on piers or beyond existing structures. As such, actual incursion to the root zone is relatively minor. Trenching for stormwater line may result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6. Demolish existing concrete wall in accordance with Section 10.5.Relocate stormwater line outside TPZ if possible. Undertake all trenching for stormwater lines within TPZ in accordance with Section 10.7.
18	***Callistemon sp.*** (Bottlebrush)	M	2.7	1.6	22.9	No incursion to root zone or canopy.	No adverse impact	To be retained - no special Tree Protection Measure required.
19	***Syzygium paniculatum*** (Magenta Cherry)	M	5.3	2.1	86.7	Proposed basement offset 3.6 metres north at RL 98.50 (5.2 metres below grade). Encroachment to TPZ = 10%. Proposed pedestrian ramp offset 2.7 metres north at RL 104.414 to 103.87 (0.5-2.5 m above grade). Existing concrete ret. wall offset 2.3 metres west & building 2.7 metres north to be demolished within TPZ. Proposed stormwater line offset 4 metres south. Trenching within TPZ.	Extent of encroachment to the root zone (excluding pedestrian ramp) is 10% of the TPZ, which is considered within acceptable limits under AS4970:2009 - no adverse impact provided that the proposed works are undertaken as recommended. Trenching for stormwater line may result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the ramp foundations within the TPZ in accordance with Section 10.6. Demolish existing concrete wall in accordance with Section 10.5. Undertake all trenching for stormwater lines within TPZ in accordance with Section 10.7.
20	***Callistemon sp.*** (Bottlebrush)	M	6.0	2.9	113.0	No incursion to root zone or canopy.	No adverse impact	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the retaining wall foundations within the TPZ in accordance with Section 10.6.
21	***Cotoneaster sp.*** (Cotoneaster)	M	3.9	1.9	47.8	No incursion to root zone or canopy.	No adverse impact	Consider removal and replacement with a more appropriate species in accordance with Council's Street Tree Master Plan.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
22	***Angophora costata*** (Sydney Red Gum)	P	3.0	1.4	28.3	Proposed retaining walls offset 2.5 metres SW & 2.8 metres NE. Excavations for wall foundations within TPZ. Encroachment to TPZ = 5%. OSD tank offset 2.6 metres north. Excavations for OSD within TPZ.	Extent of encroachment to the root zone is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the retaining wall foundations & OSD within the TPZ in accordance with Section 10.6.
23	***Syzygium paniculatum*** (Magenta Cherry)	M	6.3	2.3	124.9	Proposed basement ramp and associated retaining wall offset 3.7 metres NW at RL 98.50. Excavations for wall foundations within TPZ. Encroachment to TPZ = 16%. Proposed stairs & asociated retaining wall offset 4.3 metres east at RL 100.80 to 102.81 (at grade to 1.6 metres above grade, within footprint of existing concrete pavement). Excavations for wall foundations within TPZ. Encroachment to TPZ 6%. Pathway offset 3.0 metres east at RL? (close to existing grade, within footprint of existing driveway). Encroachment to TPZ = 17%. Total 33%. Proposed stormwater line offset 3 metres NE.	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. Proposed works has the potential to result in some adverse impact, but all proposed works are within the footprint of existing structures and pavements. No adverse impact provided that all demolition works and all excavation works are undertaken as recommended. Trenching for stormwater line may result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the retaining wall foundations within the TPZ in accordance with Section 10.6. Undertake demolition of all existing structures and pavements in accordance with Section 10.5. Relocate stormwater line outside TPZ if possible. Undertake all trenching for stormwater lines within TPZ in accordance with Section 10.7.
23a	***Angophora costata*** (Sydney Red Gum)	P	1.5	1.1	7.1	Located within footprint of proposed basement ramp.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
23b	***Melaleuca quinquenervia*** (Broad-leaved Paperbark)	M	6.4	2.5	127.0	Proposed basement ramp and associated retaining wall offset 1.1 metres east at RL ? (close to grade to 0.5m below grade). Excavations for wall foundations within SRZ. Encroachment to TPZ = 39%.	Extent of encroachment to the root zone exceeds acceptable limits under AS 4970:2009. May result in some adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the basement ramp and kerbs/walls within the TPZ in accordance with Section 10.6.
24	***Syncarpia glomulifera*** (Turpentine)	M	5.2	2.3	86.1	Located within footprint of proposed basement ramp.	Proposed works will necessitate removal (high retention value)	Proposed to be removed. Undertake replacement planting elsewhere within the site in accordance with Section 11.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

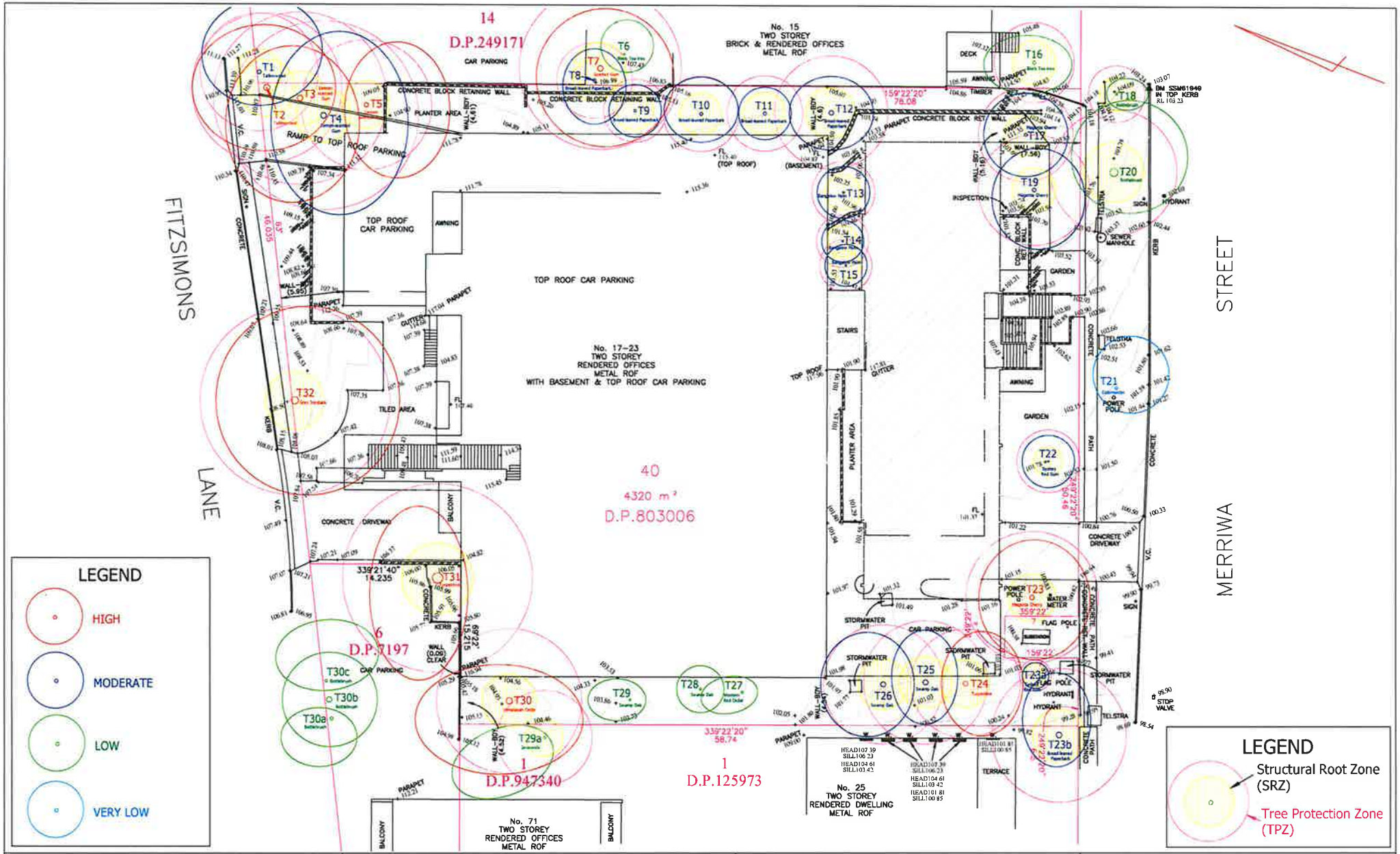
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
25	***Casuarina glauca*** (Swamp Oak)	M	5.9	2.5	108.8	Proposed basement ramp and associated retaining wall offset 1.5 metres SE at RL ? (2-3 m below grade). Excavations for wall foundations within SRZ. Encroachment to TPZ = 35%.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
26	***Casuarina glauca*** (Swamp Oak)	M	5.7	2.4	100.5	Proposed basement offset 0.9 metres east at RL 98.50. Excavations for basement within SRZ.	Proposed works will necessitate removal.	Remove tree. Undertake replacement planting elsewhere within the site in accordance with Section 11.
27	***Thuja plicata*** (Western Red Cedar)	M	2.8	1.8	23.9	Proposed basement offset 1.7 metres east at RL 98.50. Excavations for basement within SRZ.	Proposed works will necessitate removal.	Remove tree.
28	***Casuarina glauca*** (Swamp Oak)	M	3.0	1.7	28.4	Proposed basement offset 1.3 metres east at RL 98.50. Excavations for basement within SRZ.	Proposed works will necessitate removal.	Remove tree.
29	***Casuarina glauca*** (Swamp Oak)	M	2.9	1.7	25.8	Proposed basement offset 2.4 metres east at RL 98.50 (within footprint of existing building). Excavations for basement within TPZ. Encroachment to TPZ = 5%. Proposed pathway (at grade) offset 1.1 metres west. Excavations for pavement sub-grade within TPZ.	Extent of encroachment to the root zone from basement is less than 10% of the TPZ, which is considered within acceptable limits under AS 4970:2009. No adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the basement within the TPZ in accordance with Section 10.6.
29a	***Jacaranda mimosifolia*** (Jacaranda)	M	4.5	1.8	63.6	Proposed pathway (at grade) offset 1.3 metres east. Excavations for pavement sub-grade within TPZ.	Proposed works will not result in any adverse impact provided that the pathway is installed slightly above grade as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the pavement sub-grade within the TPZ in accordance with Section 10.6.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
30	***Cedrus deodara*** (Himalayan Cedar)	M	6.9	2.6	148.6	Proposed basement offset 2.7 metres south-east at RL 99.50 (5 metres below grade) - within footprint of existing building and basement. Demolition of existing building and basement within TPZ. Encroachment = 11%. Proposed pathway offset 1 metre west and 3.4 metres north at RL? (close to existing grade). Proposed stormwater line offset 6 metres south.	Extent of encroachment to the root zone from basement marginally exceeds acceptable limits under AS 4970:2009. No adverse impact provided that the pathway is installed slightly above grade as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for the basement within the TPZ in accordance with Section 10.6. Undertake demolition of existing building within TPZ in accordance with Section 10.5. Undertake all excavations for the pavement sub-grade within the TPZ in accordance with Section 10.6.
30a	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.6	2.0	40.7	No incursion to root zone or canopy.	No adverse impact	To be retained - no special Tree Protection Measure required.
30b	***Callistemon viminalis*** (Weeping Bottlebrush)	M	6.0	2.5	113.0	No incursion to root zone or canopy.	No adverse impact	To be retained - no special Tree Protection Measure required.
30c	***Callistemon viminalis*** (Weeping Bottlebrush)	M	3.6	1.8	40.7	No incursion to root zone or canopy.	No adverse impact	To be retained - no special Tree Protection Measure required.
31	***Syncarpia glomulifera*** (Turpentine)	M	9.0	3.4	254.3	Proposed basement offset 2.1 metres east (beyond existing retaining wall) - no incursion to root zone. Proposed basement offset 7.9 metres south (within footprint of existing building). Existing building offset 2.1 metres south and existing retaining wall offset 1.2 metres east to be demolished within TPZ. Proposed pathway (at grade) offset 1.3 metres east and 2.1 metres south. Excavations for pavement sub-grade within TPZ.	No adverse impact provided that the existing building and retaining wall are demolished as recommended and the pathway is installed slightly above grade as recommended.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake demolition of existing building and retaining wall within the TPZ in accordance with Section 10.5. Undertake all excavations for the pavement sub-grade within the TPZ in accordance with Section 10.6.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m^2)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
32	***Eucalyptus paniculata*** (Grey Ironbark)	P	9.0	2.8	254.3	Proposed basement offset 2.1 metres south at RL 102.62 (5.4 metres below grade). Excavations for basement foundations within TPZ/SRZ. Encroachment to TPZ = 31%. Proposed reatining wall offset 0.9 metres south. Excavations for wall foundations within SRZ. Proposed building will necssitate significant canopy pruning.	Proposed works will necessitate removal (high retention value).	Proposed to be removed. Undertake replacement planting elsewhere within the site in accordance with Section 11.



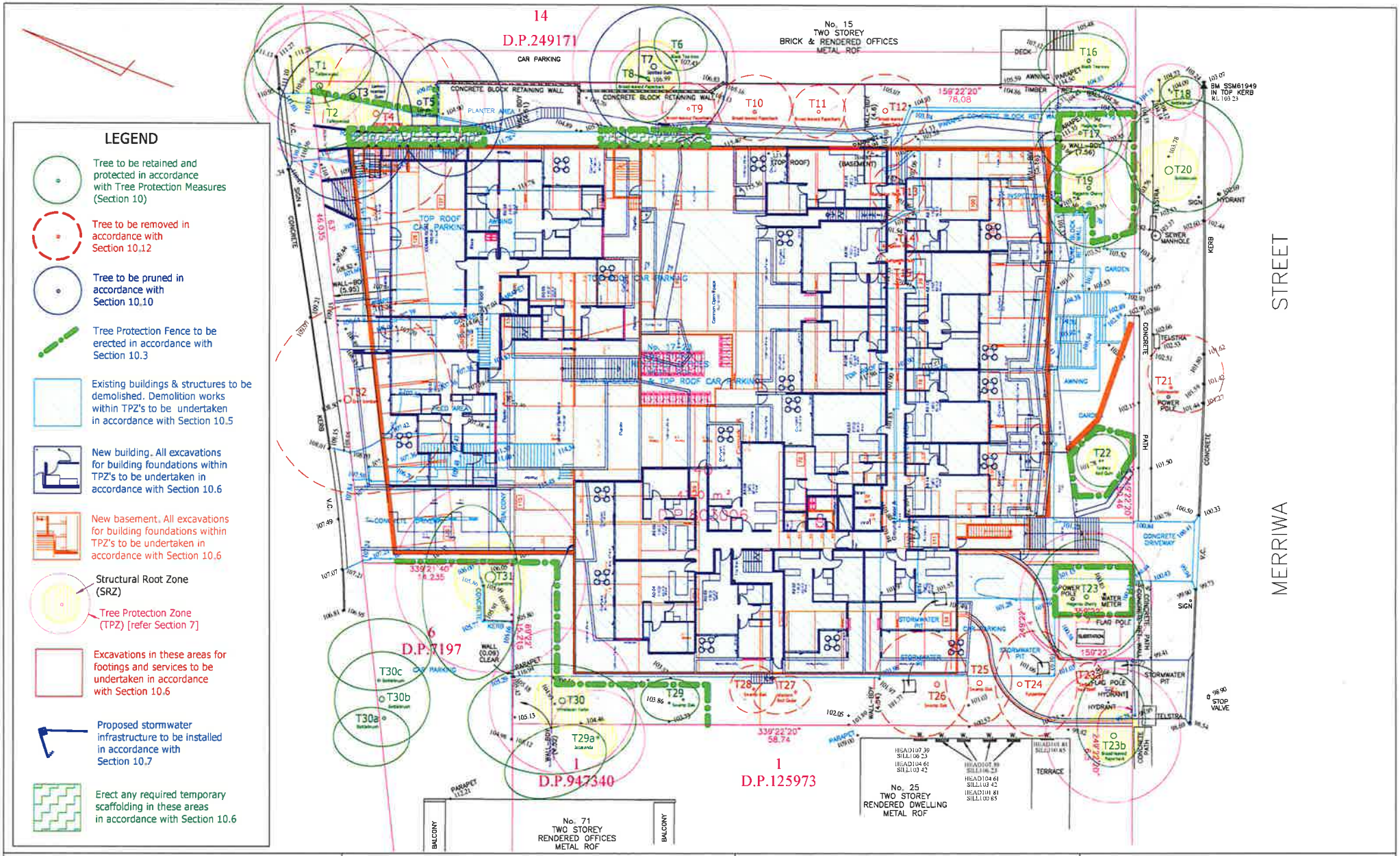
APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
17-23 Merriwa Street, GORDON

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
prepared by M. Y. XU & Co.
Dwg Ref No. 13207
Dated 09/09/2013

DWG No. T13-102501

DATE: 25/10/2013



APPENDIX 6
TREE PROTECTION PLAN

17-23 Merriwa Street, GORDON

Earthscape Horticultural Services
Arboricultural and Horticultural Consultants
PO Box 364
BEROWRA NSW 2081
Ph: 02 9456 4787
Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
prepared by M. Y. XU & Co.
Dwg Ref No. 13207
Dated 09/09/2013

DWG No. T13-102502

DATE: 25/11/2013

CUMBERLAND ECOLOGY

Appendix C

Architectural Plans

Sheet List

Sheet Number	Sheet Name	Current Revision
DA0.00	Merriwa Street	A
DA1.01	Merriwa Street Photomontage	A
DA1.02	Fitzsimons Lane Photomontage	A
DA1.03	Calculation Sheet	A
DA1.04	Existing Site Conditions	A
DA1.05	Site Anlalysis	A
DA2.01	Basement 2 A Floor Plan	B
DA2.03	Basement 1 A - Basement 2 B Floor Plan	B
DA2.04	Basement 1B	B
DA2.05	Ground Floor Floor Plan	B
DA2.06	Level 1 Floor Plan	B
DA2.07	Level 2 Floor Plan	B
DA2.08	Level 3 Floor Plan	B
DA2.09	Level 4 Floor Plan	B
DA2.10	Level 5 Floor Plan	B
DA2.11	Level 6 Floor Plan	B
DA2.12	Roof Plan	A
DA3.01	South Elevation & North Elevation	A
DA3.02	East Elevation & West Elevation	A
DA3.03	North Elevation (Building A) & South Elevation (Building B)	A
DA4.01	Sections 1 & 2	A
DA4.02	Longitudinal Sections	
DA5.01	3D Views South - Merriwa Street	A
DA5.02	3D Views North - Fitzsimons Street	A
DA5.03	23.5m Height Diagram	
DA6.01	Shadow Diagrams - Winter	A
DA6.02	Shadow Diagrams - Autumn	A
DA6.03	Shadow Diagrams - Spring	A
DA7.01	Area Schedule Plan	A
DA7.02	Area Schedule Plan	A
DA8.01	Solar Access	A
DA8.02	Solar Access	A
DA8.03	Natural Ventilation	A
DA8.04	Natural Ventilation	A
DA9.01	Deep Soil & Excavation Plan	A
DA9.02	Environmental Site Management Plan	A
DA10.01	Sample Board	A
DA10.02	Physical Model	A

Client:
Meissen Properties IB Pty. Ltd.

November 2013

Merriwa Street

Issue A

RESIDENTIAL DEVELOPMENT PROPOSAL

17-23 Merriwa Street, Gordon

Brewster Murray
Architects Interior and Urban Designers
99 York Street, Sydney NSW 2000 Australia
T +612 9299 0988 F+612 9299 0708

A	Issued for DA	29.11.13
Issue No.	Issue date	Drawn

Brewster Murray
Architects Interiors and Urban Designers
68 York Street, Sydney NSW 2000 Australia
T +612 9299 0588 F +612 9299 0106

DA Submission
17-23 Merriwa Street,
Gordon

Merriwa Street Photomontage

AUG 2013
13_5472

DA1.01 A

Brewster Murray
Architects Interiors and Urban Designers
59 York Street, Sydney NSW 2000 Australia
T +612 9299 8988 F +612 9299 0708

DA Submission
17-23 Merriwa Street,
Gordon

Fitzsimons Lane Photomontage

AUG 2013
13_5472

DA1.02 **A**

Site Area - 4320 sqm

Proposed Units - 117

	Allowable	Yield
FSR	2:1	2:1
FSA	8640 sqm	8640 sqm
Building Height	23.5m (7 Storeys)	23.5m (7 Storeys)
Common Open Space	10 sqm/Unit =1170 sqm	1263 sqm (29%)
Deep Soil	25% of Open Space (292.5 sqm) - RFDC	71.5% (903 sqm)
Car Parking	153	153
Bicycle Parking	36	36

Total number of units

	Comm.	1 bed 50sqm	1 bed 60sqm	2 bed 70sqm	2 bed 80sqm	3 bed 95sqm	visitor	Total	Area Building A (Total GFA per floor plate including common lobby)	Area Building B (Total GFA per floor plate excluding common lobby)	Total
GF	100sqm	6	7		2	2		17	947	410	1357
L1		6	7	3	4			20	947	460	1407
L2		6	7	3	4			20	947	460	1407
L3		6	7	3	4			20	947	460	1407
L4		4	4	6	2			16	835	385	1220
L5		4	4	6	2			16	839	385	1224
L6		1		2	3	2		8	405	213	618
Sub Total		**33**	**36**	**23**	**21**	**4**		**117**	**5867 sqm**	**2773 sqm**	
Percentage		**28%**	**31%**	**20%**	**18%**	**3%**		100%			
Total	100sqm	**69**		**44**		**4**		**117 Units**			**8640 sqm**
Parking Required	1/33sqm	0.6:1		1:1		2:1	1:6				
Parking Allowable	3	42 69		44 55		8	20				
Parking Proposed	4	69		52		8	20	153			