

BICENTENNIAL PARK, WEST PYMBLE

PROPOSED RE-DEVELOPMENT OF WEST PYMBLE POOL  
AND ADDITIONAL CARPARKING

ASSESSMENT OF SIGNIFICANCE

April 2011





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#### **ASSESSMENT OF SIGNIFICANCE**

This assessment has been prepared by:

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29<sup>th</sup> April 2011

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Date

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## **1 INTRODUCTION**

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### **1.1 Background**

Ku-ring-gai Council propose to improve and extend the existing West Pymble Pool Complex, and to increase the number of car parking spaces available within Bicentennial Park.

Bicentennial Park is approximately 15 hectares in size. Much of the site has been substantially disturbed for previous quarry and recreational developments. These developments fragmented the original native vegetation of the site (refer to Figure 1).

Extensive planting of native trees has occurred within Bicentennial Park, including within areas of remnant native vegetation. It is often difficult to distinguish between trees that have been planted on the site, and trees which have self-sown, and which are part of the natural recruitment process.

Two tributaries of Quarry Creek drain through the site, one aligned north-south in the western part of the site, and one aligned approximately east-west, in the southern part of the site.



**Figure 1** Aerial view of Bicentennial Park (source – Dept Lands SIX Viewer).

Native vegetation across the site has been mapped by Ku-ring-gai Council as predominantly Sydney Turpentine Ironbark Forest (STIF), on the basis of information and scientific analyses presented in Tozer (2003). Refer to Figure 2 below. Gardens and planted areas were mapped as 'other vegetation'.

Whelans InSites Pty Ltd prepared an Ecological & Riparian Assessment Report (6 Dec 2010), which addresses the upgrade of the West Pymble Pool Complex. Within this report, some vegetation within the fenced boundary of the West Pymble Pool Complex was identified as remnant Blue Gum High Forest (BGHF), or possibly a transitional community between BGHF and STIF.

EcoLogical Australia Pty Ltd conducted a separate assessment of vegetation in the vicinity of the West Pymble Pool Complex (7 Dec 2010), and concluded that all vegetation in the vicinity of the West Pymble Pool Complex was STIF, consistent with Council's mapping.

Hayes Environmental prepared a Flora and Fauna Assessment report for proposed modifications to the carparking (Dec 2010). Hayes Environmental also prepared a peer review (Feb 2011) of the previous Whelans Insites and Ecological reports. On the basis of field inspections and consideration of previous reports, Hayes Environmental concluded that all vegetation in the vicinity of the West Pymble Pool Complex should be regarded as STIF for assessment purposes, consistent with Council's mapping.

## 1.2 Objectives

The purpose of this report is to conduct assessments of significance that consider the impacts of all of the proposed re-development works, including proposed modifications to carparking.

The proposed development is shown on Figure 3 below.

## 2 FIELD SURVEYS AND DATA

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This report relies on field surveys and data documented in:

- Whelans Insites (6 Dec 2010) *Ecological & Riparian Assessment Report, Proposed Upgrade of the West Pymble Pool Complex, Ku-ring-gai Bicentennial Park, West Pymble.*
- Hayes Environmental (Dec 2010) *Flora and Fauna Assessment, Proposed modifications to carparking, Bicentennial Park, West Pymble. Desktop research for this report included DECCW database searches for threatened fauna and flora species within 10km of the site, and a search for all fauna species within 5km of the site (as a precaution to identify any species listed under the EPBC Act and not listed under the TSC Act);*
- Updated consideration of threatened fauna – Appendix 1 of this report.

The proposed re-development at Bicentennial Park will affect some areas of Sydney Turpentine Ironbark Forest (STIF). STIF is listed as an 'endangered ecological community' under the NSW TSC Act and as a 'critically endangered ecological community' under the Commonwealth EPBC Act.

The proposed re-development at Bicentennial Park could also affect individuals of some microchiropteran bat species listed as threatened under the TSC Act and/or EPBC Act.

The proposed re-development at Bicentennial Park would not be likely to affect any other threatened fauna species (refer to Appendix 1), nor any threatened flora species.

The proposed re-development at Bicentennial Park would not be likely to affect any flora or fauna species being part of a relevant endangered population listed under the TSC Act.

### 3 NSW TSC ACT 1995

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The *NSW Threatened Species Conservation Act 1995* (TSC Act) modified the *NSW Environmental Planning & Assessment Act 1979* (EP&A Act) by including in Section 5A eight factors which were to be considered when determining “*whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats*”. The *NSW Threatened Species Legislation Amendment Act 2004* has further modified the EP&A Act such that the eight factors have been replaced by a set of seven factors.

These seven factors “*must be taken into account*” by a consent or determining authority when considering a development proposal or Development Application, particularly in administering Sections 78, 79 and 112 of the EP&A Act.

#### 3.1 Relevant Threatened Biota

Sydney Turpentine Ironbark Forest (STIF) is listed as an “*endangered ecological community*” under the TSC Act. This community occurs across Bicentennial Park with a distribution illustrated on Figure 2.

The proposed re-development at Bicentennial Park would have the following impacts on this community (as illustrated on Figure 4):

- loss of 3 juvenile indigenous trees from the edge of an area of STIF at the entrance of Prince of Wales Drive from Lofberg Road.
- minor disturbance to less than 1 hectare of STIF within a 40m APZ around the proposed new infrastructure at West Pymble Pool;
- loss of 11 indigenous trees which are not within an area of STIF but which probably provide a supporting role to STIF, from within and adjacent to the West Pymble Pool Complex;
- loss of approximately 27 indigenous trees which are not located within areas of STIF<sup>1</sup> but which probably provide a supporting role to STIF, for car park modifications (including 5 trees for car park 1, 4 trees for car park 2, and approximately 18 planted indigenous trees for car park 4);

The proposed re-development at Bicentennial Park could also affect individuals of tree-roosting microchiropteran bat species listed as threatened under the TSC Act and known to occur in the locality (Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Eastern Freetail Bat *Mormopterus norfolkensis*).

The significance of potential impacts of the re-development as a whole, including proposed modifications to carparking, have been assessed pursuant to s.5A of the EP&A Act. Details are provided in Chapter 3.2 below.

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<sup>1</sup> Refer to the Hayes (Dec 2010) report for photographs and descriptions of each car park area. These field-based descriptions are the basis for opinions as to whether STIF is present and would be affected or not.





## **Explanatory Note for Figure 2: West Pymble Pool & Vegetation Mapping**

*The plan is based on Council's vegetation mapping which in certain areas requires further ground truthing (see limitations statement). Hence discrepancies may be found between the Sydney Turpentine Ironbark Forest shown on maps provided and that identified within consultant's reports.*

*Known errors within the mapping include the presence of flooded gum in the carpark above the bowling green and the inclusion of planted vegetation (eg *Lomandra* spp) within the garden adjacent to the car park and the pool entrance road.*

*Penny Colyer*

*Team Leader Natural Areas, Strategy and Environment, Ku-ring-gai Council*

### **3.2 Assessment of Significance**

#### **3.2.1 Sydney Turpentine Ironbark Forest**

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

STIF is not a *"threatened species"*.

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

The TSC Act defines an *"endangered population"* as *"a population specified in Part 2 of Schedule 1"* of the Act.

STIF is not an *"endangered population"*.

- (c) *"in the case of a critically endangered or 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"*

- (i) extent

The local occurrence of STIF is at least 6 hectares in size, based on vegetation mapping conducted by Ku-ring-gai Council. The majority of this local occurrence is protected within Bicentennial Park.

The proposed development would result in loss of approximately 38 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from previously cleared areas within Bicentennial Park, and loss of 3 juvenile indigenous trees from the edge of an area of STIF at the entrance to the site.

The proposed development would require less than 1 hectare of STIF to be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

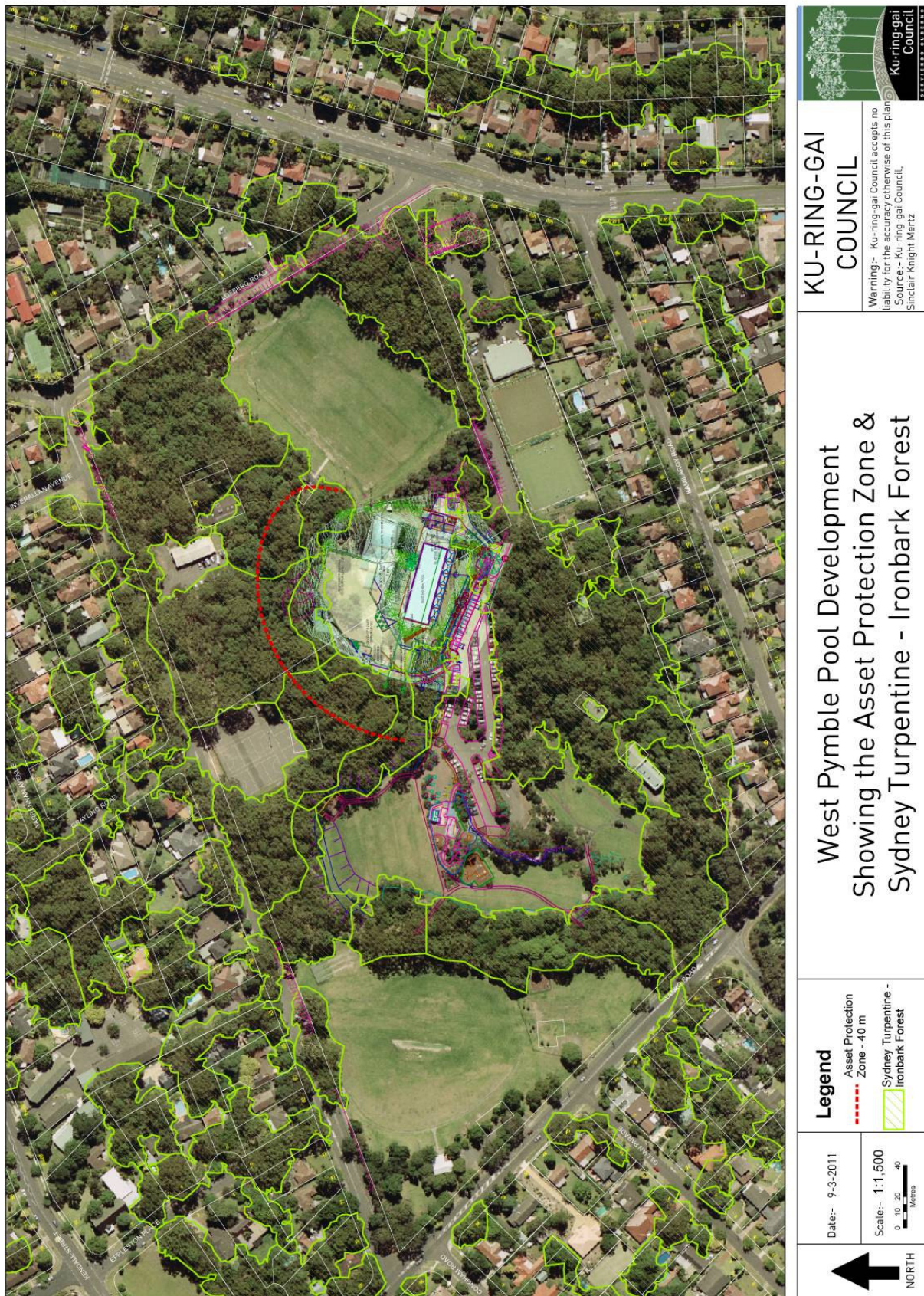
Maintenance of the asset protection zone would first involve removal of weeds within this area. There may not be any need for additional removal of STIF understorey vegetation.





**Figure 3** Aerial view of Bicentennial Park, showing the proposed development, including additional carparking.





**Figure 4** Aerial view of Bicentennial Park, with mapped areas of Sydney Turpentine Ironbark Forest and showing the proposed development, including additional carparking.



(ii) composition

The proposed development would not directly affect the composition of retained areas of the local occurrence of STIF.

The proposed development would not introduce new indirect pressures upon the composition of the local occurrence of STIF. Indeed, the proposed development would be likely to result in a reduction in the weed component of the understorey of STIF within the asset protection zone.

The proposed development would not be likely to significantly increase existing indirect pressures upon the composition of the local occurrence of STIF such that the local occurrence would be placed at further risk of extinction.

Conclusion

The proposed development would not affect either the extent or the composition of STIF such that the local occurrence of the community would 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"*

(i) extent

The extent of habitat for STIF within Bicentennial Park is estimated to be the same area that is currently occupied by the community. Habitat for STIF does not include paved or compacted gravel areas or lawn containing indigenous trees. Refer to part (c)(i) above.

(ii) fragmentation

The trees that would be removed are all located either within previously cleared lands outside of the community, or on the fringe of the community. The proposed development would not cause an area of habitat for STIF to become fragmented or isolated from other areas of habitat for STIF.

(iii) importance

Habitat for STIF within Bicentennial Park is regarded as important to the long-term survival of this community in the locality.

Loss of habitat as a result of the proposed development would be limited to a few square metres on the corner of Prince of Wales Drive and Lofberg Road at the entrance to the site.

Less than 1 hectare of habitat for STIF would be maintained as an asset protection zone for the proposed development. There would be negligible modification to this area.

The proposed development would not affect the long-term survival of STIF either within Bicentennial Park or in the locality.

Conclusion

The proposed development would result in loss of a few square metres of habitat for STIF, and negligible modification to less than 1 hectare of STIF. The proposed development would not contribute to further fragmentation of habitat for STIF, nor would affect the long-term survival of STIF in the locality.

- (e) “whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly)”

The TSC Act 1995 defines “critical habitat” as “habitat declared to be critical habitat under part 3” of the Act.

There is no declared “critical habitat” of relevance to Bicentennial Park. The proposed development would not adversely affect any area of “critical habitat”.

- (f) “whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan”

DECCW have prepared a Cumberland Plain Recovery Plan (2011), including non-specific actions for the recovery of STIF. The plan does not encompass land within the Ku-ring-gai Local Government Area.

The plan advocates protection of ‘priority conservation lands’ which are identified in the plan. Bicentennial Park is not part of any area identified as ‘priority conservation land’.

The proposed development would not interfere with implementation of the DECCW (2011) Cumberland Plain Recovery Plan.

No threat abatement plans are of specific relevance to the proposed development.

- (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”

There are several key threatening processes which have previously occurred within Bicentennial Park, some of which are likely to be ongoing.

Of relevance to the proposed development, ‘Clearing of native vegetation’ is listed as a Key Threatening Process under the TSC Act.

The proposed development would result in loss of approximately 38 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from previously cleared areas within Bicentennial Park, and loss of 3 juvenile indigenous trees from the edge of an area of STIF at the entrance to the site, near Prince of Wales Drive and Lofberg Road.

The proposed development would require less than 1 hectare of STIF to be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

In summary, the loss of STIF from Bicentennial Park as a result of the proposed development would be insignificant in relation to the extent of this community that would be retained within Bicentennial Park, and in the locality.

### 3.2.2 Microchiropteran Bats

(Yellow-bellied Sheath-tail Bat *Saccolaimus flaviventris*, Eastern False Pipistrelle *Falsistrellus tasmaniensis*, Eastern Freetail Bat *Mormopterus norfolkensis*)

- (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”*

Bicentennial Park contains approximately 6 hectares of native vegetation providing potential habitat for microchiropteran bats.

The proposed development would result in loss of approximately 41 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from the study area. This includes the large mature Sydney Blue Gum located on the northern boundary of the pool complex area (Tree No 25).

The proposed development would require minor modification to less than 1 hectare of native vegetation.

No notable large hollow-bearing trees would be removed for the proposed development. Tree No 25 is mature and contains some hollows, but does not contain large hollows nor numerous hollows. It is not notable as a large hollow-bearing tree.

The proposed development may result in loss of some roosting trees for these three tree-roosting microchiropteran bat species, which could adversely affect some individuals. However, microchiropteran bats are known to change roost sites frequently, and are not likely to be particularly dependent upon any of the trees that would be removed.

The proposed development would not be likely to have an adverse effect on the life cycle of any of the three threatened microchiropteran bat species, such that a viable local population of any of the species would be 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”*

The TSC Act defines an “*endangered population*” as “*a population specified in Part 2 of Schedule 1*” of the Act.

None of the three threatened microchiropteran bat species are part of any relevant “*endangered population*” listed under the TSC Act.

- (c) *“in the case of a critically endangered or 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”*

None of the three threatened microchiropteran bat species are an ecological community.

- (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”*



(i) extent

Bicentennial Park contains approximately 6 hectares of native vegetation providing potential habitat for microchiropteran bats.

The proposed development would result in loss of approximately 38 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from previously cleared areas within Bicentennial Park, and loss of 3 juvenile indigenous trees from the edge of an area of STIF at the entrance to the site.

The proposed development would require less than 1 hectare of STIF to be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

Maintenance of the asset protection zone would first involve removal of weeds within this area. There may not be any need for additional removal of STIF understorey vegetation.

(ii) fragmentation

The trees that would be removed are all located either within previously cleared lands outside of the community, or on the fringe of the community. The proposed development would not cause an area of habitat for microchiropteran bats to become fragmented or isolated from other areas of habitat.

(iii) importance

Habitat for microchiropteran bats within Bicentennial Park is regarded as important to the long-term survival of the three microchiropteran bat species in the locality.

Conclusion

The proposed development would result in loss of approximately 41 indigenous trees, and minor modification to less than 1 hectare of potential habitat for microchiropteran bats. The proposed development would not contribute to further fragmentation of habitat for microchiropteran bats, nor would affect the long-term survival of the three microchiropteran bat species in the locality.

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

The TSC Act 1995 defines "*critical habitat*" as "*habitat declared to be critical habitat under part 3*" of the Act.

There is no declared "*critical habitat*" of relevance to Bicentennial Park. The proposed development would not adversely affect any area of "*critical habitat*".

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

There are no Recovery Plans for any of the three threatened microchiropteran bat species.

No threat abatement plans are of specific relevance to the proposed development.

(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"*

There are several key threatening processes which have previously occurred within Bicentennial Park, some of which are likely to be ongoing.

Of relevance to the proposed development, 'Clearing of native vegetation' is listed as a Key Threatening Process under the TSC Act.

The proposed development would result in loss of approximately 38 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from previously cleared areas within Bicentennial Park, and loss of 3 juvenile indigenous trees from the edge of an area of STIF at the entrance to the site.

The proposed development would require less than 1 hectare of STIF to be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

In summary, the loss of vegetation and habitat from Bicentennial Park as a result of the proposed development would be insignificant in relation to the extent of vegetation and habitat that would be retained within Bicentennial Park, and in the locality.

### 3.3 Conclusion

Based upon the considerations detailed above, and on the basis of data and information provided in previous Whelans Insites (Dec 2010) and Hayes Environmental (Dec 2010) reports, and an updated consideration of threatened fauna (Appendix 1), the proposed re-development at Bicentennial Park, West Pymble, would not be "*likely*" to impose "*a significant effect*" upon any "*threatened species, population or ecological community*" listed on the schedules of the NSW TSC Act.

Consequently, a Species Impact Statement is not required for this proposal.

There remains a difference of opinion between ecological experts as to whether the isolated remnant trees that would be affected by the proposed development constitute part of the STIF EEC or not. To resolve this issue, an alternate assessment of significance has been conducted for STIF, in which all remnant trees are included within the community. This is attached as Appendix 2.

Due to the extent of STIF occurring across Bicentennial Park, and the relatively small footprint of the development, this alternate assessment also concludes that the proposed re-development at Bicentennial Park would not be "*likely*" to impose "*a significant effect*" upon STIF.

## 4 COMMONWEALTH EPBC ACT 1999

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The *Commonwealth Environment Protection & Biodiversity Conservation Act 1999* requires that an action which has, will have or is likely to have a significant impact upon one or more matters of National Environmental Significance (NES) must be referred to the Commonwealth Minister for Environment & Heritage for approval. These actions are referred to as 'controlled actions'.

Matters of NES include World Heritage properties, listed Ramsar Wetlands of international importance, listed threatened species and communities, listed migratory species, nuclear actions and Commonwealth marine areas.

## 4.1 Matters of National Environmental Significance

12 fauna species listed as threatened under the EPBC Act are known to occur in the locality, as listed in Appendix 1. Based on considerations in Appendix 1, none of these species would be likely to be affected by the proposed development.

23 bird species listed as migratory under the EPBC Act are known to have occurred either within Bicentennial Park or in the locality (Appendix 2 of Hayes 2010). None of these species are likely to be affected by the proposed development.

Sydney Turpentine Ironbark Forest is listed as a 'critically endangered ecological community' under the EPBC Act. The proposed development would result in removal of 3 juvenile trees from the edge of this community at the entrance of Prince of Wales Drive, loss of approximately 38 indigenous trees that are outside of this community but which would provide genetic support to this community, and minor modification to less than 1 hectare of this community.

No other matters of NES are likely to be affected by the proposed development.

## 4.2 Requirement for Referral to the Commonwealth

### 4.2.1 Critically Endangered Ecological Community – Sydney Turpentine Ironbark Forest

According to the administrative guidelines on significance, the proposed development would be likely to have a significant impact upon an endangered ecological community if it does, will or is likely to:

- lead to a long term adverse effect on an ecological community; or
- reduce the extent of a community; or
- fragment an occurrence of the community; or
- adversely affect habitat critical to the survival of an ecological community; or
- modify or destroy abiotic (non-living) factors (such as water, nutrients, soil) necessary for the community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns; or
- result in invasive species that are harmful to the endangered community becoming established in an occurrence of the community; or
- cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting; or
- interfere with the recovery of an ecological community.

The proposed development would not be likely to impose a significant impact upon STIF on the basis that:

- the proposed development would involve a relatively minor loss of trees, and minor modification to less than 1 hectare of STIF. This is not a significant extent of disturbance within a local occurrence of STIF of approximately 6 hectares;
- the STIF that would be removed would not isolate an area of habitat for STIF from other areas of habitat for this community;
- the proposed development would not affect critical habitat for this community;
- the proposed development would not alter existing drainage patterns other than at a micro-scale, nor would involve clearing to an extent likely to affect groundwater levels;

- the proposed development would not be likely to exacerbate existing pressure on the local occurrence of the community from invasive weeds, and would not be likely to place the local occurrence at further risk of extinction;
- the proposed development would not alter the existing floristic composition of the ecological community;
- the proposal would not interfere with the recovery of STIF, as set out in the DECCW (2011) Cumberland Plain Recovery Plan.

#### **4.3 Conclusion**

The proposed re-development at Bicentennial Park, West Pymble would not be likely to impose a significant impact upon any matter of NES.

On this basis, referral to the Commonwealth Minister for Environment and Heritage under the EPBC Act is not required.

## **5 CONCLUSIONS**

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### **5.1 NSW Threatened Species Conservation Act 1995**

The proposed re-development at Bicentennial Park, West Pymble, would not be “*likely*” to impose “*a significant effect*” upon any “*threatened species, population or ecological community*” listed on the schedules of the NSW TSC Act.

Consequently, a Species Impact Statement is not required for this proposal.

### **5.2 Commonwealth Environment Protection & Biodiversity Conservation Act 1999**

The proposed re-development at Bicentennial Park, West Pymble would not be likely to impose a significant impact upon any matter of NES.

On this basis, referral to the Commonwealth Minister for Environment and Heritage under the EPBC Act is not required.

## 6 RECOMMENDATIONS

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The re-development proposal involves some replanting of STIF trees and shrubs, to off-set vegetation losses. Details of the proposed revegetation works are provided on a separate landscape plan.

The trees to be removed are generally located on previously cleared land. The only occurrence of functional native vegetation that would be removed is a few square metres at the entrance to Prince of Wales Drive.

Bicentennial Park is already largely vegetated, with limited space for additional planting, particularly with regard to large canopy eucalypts.

On the basis of the above, it would be reasonable for off-set planting to occur at a ratio of 1.2 trees planted for each tree removed, to achieve a final survival ratio of at least 1:1.

Minor modifications to STIF within the asset protection zone could be effectively compensated through implementation of a weed control strategy, to substantially reduce weed occurrences within STIF around the re-developed areas. Any reduction in fuel loads within the asset protection zone should first target weeds and exotic species, then native non-indigenous species and cultivars, before any removal of STIF understorey plants.

Removal of larger trees with extensive canopies and/or hollows should follow a tree removal protocol, to minimise the potential for injury to native fauna. Measures should include:

- mechanical bumping of trees prior to removal to encourage fauna to leave;
- consideration of the appropriate season for removal to avoid disturbance to nesting birds and hibernating bats; and
- consideration of the appropriate time of day for removal, to avoid evicting nocturnal fauna into broad daylight.



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BICENTENNIAL PARK, WEST PYMBLE

PROPOSED RE-DEVELOPMENT OF WEST PYMBLE POOL  
AND ADDITIONAL CARPARKING

ASSESSMENT OF SIGNIFICANCE

APPENDIX 1

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Threatened fauna species known from the locality

April 2011

## APPENDIX 1

Threatened fauna species known to have occurred within 10km of the subject site since 1980 (DECCW Atlas, data obtained December 2010).

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<b>BIRDS</b>		
Australasian Bittern <i>Botaurus poiciloptilus</i> V (TSC)	<p>Widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west (DEC Profile). Common in the wetlands of the Murray-Darling basin (Lindsey 1992). Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp) and spikerushes (<i>Eleocharis</i> spp) (DEC Profile).</p> <p>Hides during the day amongst dense reeds or rushes, and feeds mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird, and are often littered with prey remains (DEC Profile)</p> <p>Breeding occurs in summer from October to January. Nests are built in secluded places in densely-vegetated wetlands on a platform of reeds (DEC Profile).</p> <p>2 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Black Bittern <i>Ixobrychus flavicollis</i> V (TSC)	<p>A wide distribution across Australia. In NSW, the species is scattered along the east coast, with individuals rarely being recorded south of Sydney or inland. Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves (DEC Profile). Inhabits quiet pools and backwaters of meandering densely wooded coastal streams, always with dense vegetation (Lindsey 1992).</p> <p>Feeds on frogs, reptiles, fish and invertebrates, including snails, dragonflies, shrimps and crayfish, with most feeding done at dusk and at night. During the day, roosts in trees or on the ground amongst dense reeds. When disturbed, freezes in a characteristic bittern posture (stretched tall, bill pointing up, so that shape and streaked pattern blend with upright stems of reeds), or will fly up to a branch or flush for cover where it will freeze again (NPWS Profile).</p> <p>Generally solitary, but occurs in pairs during the breeding season, from December to March. Nests are built on a branch overhanging water and consist of a bed of sticks and reeds on a base of larger sticks.</p> <p>4 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Black-necked Stork <i>Ephippiorhynchus asiaticus</i> E (TSC)	<p>Usually inhabits swamps associated with river systems and large permanent pools (Blakers <i>et al</i> 1984). Inhabits tropical to warm temperate wetlands, lagoons, swamps, mud-flats and irrigated cropland (Lindsey 1992).</p> <p>Feeds in shallow water for fish and frogs (Blakers <i>et al</i> 1984). Nests high in a tree in a secluded swamp (Lindsey 1992).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Black-tailed Godwit <i>Limosa limosa</i> V (TSC)	<p>The Black-tailed Godwit is a migratory wading bird that breeds in Mongolia and Eastern Siberia, and flies to Australia for the summer (August to March). In NSW, it is most frequently recorded at Kooragang Island, with occasional records elsewhere. Records in western NSW indicate that a regular inland passage is used by the species, as it may occur around any of the large lakes in the western areas during summer, when the muddy shores are exposed (DEC Profile).</p> <p>Usually found in coastal sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Individuals have been recorded in wet fields and sewerage treatment works (DEC Profile).</p> <p>Forages for insects, crustaceans, molluscs, worms, larvae, spiders, fish eggs, frog eggs and tadpoles in soft mud or shallow water. Roosts and loafs on low banks of mud, sand and shell bars. Frequently recorded with Bar-tailed Godwits (DEC Profile).</p> <p>6 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Bush Stone-curlew <i>Burhinus grallarius</i> E (TSC) E (EPBC)	<p>Distribution has contracted to isolated areas on the central and mid-north coast of NSW, and the western slopes and plains of the Great Dividing Range and the Riverina district of central NSW (NPWS 1999).</p> <p>Inhabits lightly timbered open forest and woodland areas with a grassy understorey (NPWS 1999; Blaker <i>et al</i> 1984). Preferred habitat is often associated with casuarina, eucalypts, acacia or eucalyptus. Will also use dry open grassland and cropland with cover nearby (NPWS 1999).</p> <p>Nests in a shallow scrape on the ground (Lindsey 1992), near dead timber, usually under trees in open woodland with a short grassy understorey (NPWS 1999).</p> <p>Nocturnal, especially active on moonlit nights (NPWS 1999). Pairs probably occupy 10-20ha when breeding. Small flocks may roam over 100km<sup>2</sup> in the non-breeding season (Blakers <i>et al</i> 1984).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Broad-billed Sandpiper <i>Limicola falcinellus</i> V (TSC)</p>	<p>The eastern form of this species breeds in northern Siberia before migrating southwards in winter to Australia. In Australia, Broad-billed Sandpipers overwinter on the northern coast, particularly in the north-west, with birds located occasionally on the southern coast. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW (DEC Profile).</p> <p>Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches (DEC Profile).</p> <p>The species is an active forager, typically feeding by rapidly and repeatedly jabbing its bill into soft wet mud. Feeding also occurs while wading, often in water so deep that they have to submerge their heads and necks in order to probe the underlying mud. Their diet includes insects, crustaceans, molluscs, worms and seeds (DEC Profile).</p> <p>Individuals are strongly migratory and only mildly gregarious when not breeding. Large flocks are seldom recorded and birds are often either encountered alone or feeding with other waders such as Red-necked Stints or Curlew Sandpipers (DEC Profile).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>
<p>Cotton Pygmy-Goose <i>Nettapus coromandelianus</i> E (TSC)</p>	<p>Inhabits freshwater lakes, lagoons, swamps and dams, particularly those vegetated with waterlilies and other floating and submerged aquatic vegetation (DEC Profile).</p> <p>The Cotton Pygmy-goose uses standing dead trees with hollows close to water for roosting and breeding (DEC Profile).</p> <p>Although once found from north Queensland to the Hunter River in NSW, the Cotton Pygmy-goose is now only a rare visitor to NSW (DEC Profile)</p> <p>4 records in the locality since 1980 (DECCW Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>



Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Diamond Firetail <i>Stagonopleura guttata</i> V (TSC)	<p>Inhabits eucalypt woodland, forests and mallee where there is a grassy understorey, including agricultural land, mainly inland of the Great Dividing Range (Lindsey 1992; Blakers <i>et al</i> 1984; NSW Scientific Committee).</p> <p>Generally sedentary, lives in pairs or small groups, consolidating into flocks during winter (Lindsey 1992; Blakers <i>et al</i> 1984; NSW Scientific Committee). Forages on the ground for grass seeds, other plant material and insects (NSW Scientific Committee; Lindsey 1992; Blakers <i>et al</i> 1984).</p> <p>Nests in a bulky flask-shaped structure with a side entrance approached by a woven tunnel, usually placed in dense foliage in a bush or mistletoe clump, several metres from the ground (Lindsey 1992).</p> <p>1 record in the locality since 1980 (DECC Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>However, it is generally a sedentary species, and has not been recorded in Bicentennial Park.</p> <p>Whilst it is theoretically possible that the Diamond Firetail could occur in the park, it is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones which would result from the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Freckled Duck <i>Stictonetta naevosa</i> V (TSC)	<p>Inhabits a variety of plankton-rich wetland types, including swamps heavily vegetated with Cumbungi, Lignum, Canegrass or Ti-tree (in coastal areas), large open lakes and their shores, creeks, farm dams, sewage ponds and floodwaters (NPWS 1999).</p> <p>A typically gregarious species which regularly forms congregations of 10-100 birds. Found during nonbreeding periods in both small and large groups on permanent open water bodies, resting on fallen trees, sand spits or on flattened down platforms of Cumbungi in dense cover over deep water (NPWS 1999).</p> <p>Feeds at wetland edges or in shallow waters at dusk on algae, seeds of aquatic grasses and sedges, small invertebrates, small fish and the vegetative parts of aquatic plants (NPWS 1999).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>
Gang Gang Cockatoo <i>Callocephalon fimbriatum</i> V (TSC) E2	<p>Inhabits tall montane forests and woodlands in summer, particularly heavily timbered mature wet sclerophyll forests. Also occurs in sub-alpine Snow Gum woodland and occasionally in temperate rainforests. Undertakes nomadic and seasonal movements, and in winter tends to occur at lower altitudes in drier, more open eucalypt forest and woodland, particularly Box-Ironbark associations, and in dry forest in coastal areas (NSW Scientific Committee).</p> <p>Feeds on green acacia seeds, eucalypt seeds, fruits and berries, including seeds, fruits and berries of introduced plant species (Lindsey 1992; Blakers <i>et al</i> 1984). Tends to exhaust one food supply before moving to another (Blakers <i>et al</i> 1984).</p> <p>Nests in hollows in large old trees, usually close to water. Shows strong nest site fidelity. Breeding occurs mainly in tall mature wet sclerophyll forests with a dense understorey (NSW Scientific Committee).</p> <p>45 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>The Gang Gang Cockatoo is likely to occur within Bicentennial Park on occasions.</p> <p>No large hollow-bearing trees would be removed for the proposed development.</p> <p>The proposed development would result in loss of a minor extent of potential foraging resource for this species.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Glossy Black Cockatoo <i>Calyptorhynchus lathami</i> V (TSC)	<p>Inhabits drier eucalypt forest and woodland, characteristically on sites with low soil nutrient status (Blakers <i>et al</i> 1984; NPWS 1999; DEC 2004a). Prefers intact landscapes (NPWS 1999; DEC 2004a).</p> <p>Feeds almost exclusively on seeds of <i>Allocasuarina</i> spp - predominantly <i>A littoralis</i> and <i>A torulosa</i> (Lindsey 1992; Blakers <i>et al</i> 1984; NPWS 1999). Inland birds use a more diverse range of species, including <i>A cristata</i> (Blakers <i>et al</i> 1984). In the central west of NSW they also eat the seeds of Cypress Pine (DEC 2004a). Birds favour individual trees which produce seeds with high nutrient content, and may sample a few trees before selecting one to feed in (DEC 2004a).</p> <p>Lives in loose groups which occupy an area permanently (Blakers <i>et al</i> 1984)</p> <p>Nests in a large tree hollow (Lindsey 1992; NPWS 1999).</p> <p>37 record in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species, albeit modified and subject to much human disturbance.</p> <p>Based on the number of records in the locality, the Glossy Black Cockatoo may occur within Bicentennial Park on occasions.</p> <p>No large hollow-bearing trees would be removed for the proposed development.</p> <p>Only a few <i>Allocasuarina</i> spp trees would be removed. This loss of extent of potential foraging habitat is insignificant to that being retained on the site and in the locality.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Little Lorikeet <i>Glossopsitta pusilla</i> V (TSC)	<p>Mostly occurs in dry, open eucalypt forests and woodlands, from just north of Cairns, around the east coast of Australia, to Adelaide. In NSW they occur in forests and woodlands from the coast to the western slopes of the Great Dividing Range, extending westwards to the vicinity of Albury, Parkes, Dubbo and Narrabri (NSW Scientific Committee).</p> <p>Occurs in both old-growth and logged forests in the eastern part of their range, and in remnant woodland patches and roadside vegetation on the western slopes. In a SE Qld study, they were more likely to occupy forest sites with relatively short to intermediate logging rotations (15–23 years) and sites that have had short intervals (2.5– 4 years) between fires (NSW Scientific Committee).</p> <p>Feeds primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on melaleucas and mistletoes. On the western slopes and tablelands White Box <i>Eucalyptus albens</i> and Yellow Box <i>E. melliodora</i> are particularly important food sources. They are also reported as feeding on fruits, particularly those of mistletoes (NSW Scientific Committee).</p> <p>Apparently nomadic, related to food availability (NSW Scientific Committee).</p> <p>12 records in the locality since 1980 (DECC Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>The Little Lorikeet may occur within Bicentennial Park on occasions.</p> <p>However, only a few hollow-bearing trees would be removed for the proposed development, and loss of extent of potential foraging resource for this species would be minor.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Swift Parrot <i>Lathamus discolor</i> E (TSC) E (EPBC)</p>	<p>Breeds only in Tasmania, (Lindsey 1992, Blakers <i>et al</i> 1984; NSW Scientific Committee). Occurs in forests and woodlands of NSW from May to August (NSW Scientific Committee).</p> <p>Forages in the upper tree canopy for nectar, pollen and lerps (Blakers <i>et al</i> 1984). Lives in small flocks which appear in areas where eucalypts are flowering in profusion (Blakers <i>et al</i> 1984). Dependent on flowering resources across a wide range of habitats in its wintering grounds of NSW (NSW Scientific Committee).</p> <p>17 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential winter foraging habitat only for this species.</p> <p>The Swift Parrot may occur within Bicentennial Park on occasions.</p> <p>The Swift Parrot would not breed within Bicentennial Park.</p> <p>The loss of extent of potential foraging habitat is insignificant to that being retained on the site and in the locality</p> <p>It is not likely that this species would be affected by the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
<p>Superb Parrot <i>Polytelis swainsonii</i> V (TSC) V (EPBC)</p>	<p>The Superb Parrot predominantly inhabits woodland dominated by River Red Gum in the interior of NSW (Lindsey 1992; Blakers <i>et al</i> 1984). In the west of its range it is restricted to near watercourses due to the dry plains in between. In the east of its range it may range into lightly timbered areas between watercourses (Blakers <i>et al</i> 1984). Also occurs in box or mixed box woodlands, and White Cypress Pine woodlands (Lindsey 1992).</p> <p>Lives in small flocks foraging on the ground or in trees. Feeds on seeds, nectar, blossoms, fruits and insects, and also on spilled cereal grains (Lindsey 1992).</p> <p>Nests in a deep tree hollow, high in a large River Red Gum, near water (Lindsey 1992)</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>The study area does not contain typical habitat for this species.</p> <p>It is theoretically possible that the Superb Parrot could occur within Bicentennial Park on occasions.</p> <p>However, only a few hollow-bearing trees would be removed for the proposed development, and loss of extent of potential foraging resource for this species would be minor.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Scarlet Robin <i>Petroica boodang</i> V (TSC)</p>	<p>Found in south-eastern Australia and south-west Western Australia. In NSW, it occupies open forests and woodlands from the coast to the inland slopes. Some dispersing birds may appear in autumn or winter on the eastern fringe of the inland plains.</p> <p>Breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat.</p> <p>In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. It forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris.</p> <p>Nest is an open cup of plant fibres and cobwebs in the fork of tree (often a dead branch in a live tree, or in a dead tree or shrub), usually more than 2 m above the ground.</p> <p>It is sensitive to habitat degradation and overgrazing.</p> <p>5 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species, although it has not been recorded in Bicentennial Park.</p> <p>Whilst it is theoretically possible that the Scarlet Robin could occur in the park, it is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones which would result from the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
<p>Flame Robin <i>Petroica phoenica</i> V (TSC)</p>	<p>Found across south-eastern Australia. In NSW, it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey.</p> <p>Migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains (Higgins and Peter 2002). There may be two disjunct breeding populations in NSW, on the Northern Tablelands and the Central–Southern Tablelands. (DECCW Profile).</p> <p>Forages from low perches, feeding on invertebrates taken from the ground, tree trunks, logs and other coarse woody debris. Nest is an open cup nest of plant fibres and cobweb, often near the ground in a sheltered niche, ledge or shallow cavity in a tree, stump or bank (DECCW Profile).</p> <p>Key threats are clearing and degradation of breeding habitat, and degradation of wintering habitat.</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species, although it has not been recorded in Bicentennial Park.</p> <p>Whilst it is theoretically possible that the Flame Robin could occur in the park, it is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones which would result from the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Powerful Owl <i>Ninox strenua</i> V (TSC)	<p>Inhabits tall moist productive eucalypt forests of the eastern tableland edge, and the mosaic of wet and dry sclerophyll forests occurring on undulating, gentle terrain near the coast. Ideally with a tall shrub layer and/or abundant hollows supporting a high density of arboreal marsupials (DEC 2005a; Blakers <i>et al</i> 1984; Lindsey 1992).</p> <p>A nocturnal sedentary species which lives alone or in pairs, occupies permanent territories up to 1500 ha in size which contain several roost sites (Blakers <i>et al</i> 1984; Lindsey 1992; DEC 2005a).</p> <p>Roosts by day in dense foliage of mid-canopy trees (including <i>Allocasuarina</i> spp, rainforest species, Turpentine and eucalypts), often amongst groves of up to 2ha of similar-sized trees in the height range of 3-15m (DEC 2005a), in sheltered gullies, often along streams and wide creek flats between ridges covered with eucalypt forest (DEC 2005a; Blakers <i>et al</i> 1984).</p> <p>Prefers to forage in moist unlogged forest in gully systems, but also forages in dry and regrowth forest. Preys on arboreal mammals (80% of diet), birds (18%) and insects and some terrestrial mammals (2%) (Blakers <i>et al</i> 1984). The Common Ringtail Possum is a primary prey species in lowland areas, and the Greater Glider in highland areas (DEC 2005a).</p> <p>Nests in a large tree-hollow (greater than 45cm wide and 100cm deep), usually high (at least 20m from the ground) in a very large eucalypt (with a DBH of at least 80cm) (Lindsey 1992; DEC 2005a). Nesting sites are typically in unlogged unburnt gullies and lower slopes, within 100m of streams, and surrounding by trees or tall shrubs (DEC 2005a).</p> <p>190 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>The Powerful Owl would probably forage across Bicentennial Park on occasions.</p> <p>The Powerful Owl would not be likely to roost or breed within Bicentennial Park.</p> <p>No medium or large hollow-bearing trees would be removed for the proposed development.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Grass Owl <i>Tyto capensis</i> V (TSC)	<p>Most common in northern and north-eastern Australia. In NSW they are more likely to be resident in the north-east. DECCW Profile.</p> <p>Grass Owl numbers can fluctuate greatly, increasing especially during rodent plagues.</p> <p>Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains.</p> <p>They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth.</p> <p>If disturbed they burst out of cover, flying low and slowly, before dropping straight down again into cover.</p> <p>Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.</p> <p>1 record in the locality since 1980 (DECC Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>



Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Barking Owl <i>Ninox connivens</i> V (TSC)	<p>Lives in pairs in forests and woodlands typically dominated by eucalypts, often Red Gum species in temperate and semi-arid areas (Blakers <i>et al</i> 1984; NPWS 2003b). Has been recorded in remnant patches on farms and golf courses (NPWS 2003b).</p> <p>Usually roosts in or under dense foliage in large trees including rainforest species, <i>Casuarina</i> and <i>Allocasuarina</i> spp, eucalypts, <i>Angophora</i> spp or <i>Acacia</i> spp. Roost sites are often near watercourses or wetlands (NPWS 2003b).</p> <p>Forages from dusk to dawn (occasionally in daylight) for a variety of birds, mammals and insects (Blakers <i>et al</i> 1984; Lindsey 1992; NPWS 2003b). Most prey birds and mammals are hollow-dependent, prefers native arboreal mammals, but will also prey on rabbits (NPWS 2003b; Lindsey 1992).</p> <p>Nests in a large open hollow, often vertical or sloping, in large eucalypts or paperbarks. Nest entrances are usually 2-35m above the ground, with a diameter of 20-46cm and depth of 20-300cm (NPWS 2003b). Nests are usually near watercourses or wetlands (NPWS 2003b).</p> <p>Presumed to breed in traditional permanent territories ranging in size from 30ha up to 200ha in southern Qld (Blakers <i>et al</i> 1984; NSW Scientific Committee; NPWS 2003b). Forages over a larger area (Blakers <i>et al</i> 1984).</p> <p>9 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>The Barking Owl would probably forage across Bicentennial Park on occasions.</p> <p>The Barking Owl would not be likely to roost or breed within Bicentennial Park.</p> <p>No medium or large hollow-bearing trees would be removed for the proposed development.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Masked Owl <i>Tyto novaehollandiae</i> V (TSC)	<p>Inhabits eucalypt forest and woodland from the coast to the western plains (DEC 2005a). It is most abundant within 300km of the coast (DEC 2005a; Blakers <i>et al</i> 1984). Optimal habitat includes a mosaic of sparse (grassy) and dense (shrubby) groundcover on gentle terrain (DEC 2005a).</p> <p>A sedentary species which occupies permanent territories 500-1000 ha in size (Blakers <i>et al</i> 1984).</p> <p>Nocturnal, roosts by day in hollows, in cover of dense vegetation in gullies or in caves (Blakers <i>et al</i> 1984; Lindsey 1992; DEC 2005a). Roosts at least 5m above the ground (DEC 2005a). Forages at forest edges or in partial clearing for small terrestrial mammals including rabbits, supplemented by some arboreal mammals, bats and birds (Blakers <i>et al</i> 1984; Lindsey 1992; DEC 2005a).</p> <p>Nests in tree hollows greater than 40cm wide and greater than 100cm deep. No relationship with distance to streams. Entrances are at least 3m above the ground in trees with DBH of at least 90cm. Generally faithful to traditional hollows (DEC 2005a).</p> <p>6 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential habitat for this species.</p> <p>The Masked Owl may forage across Bicentennial Park on occasions.</p> <p>The Masked Owl would not roost or breed within Bicentennial Park.</p> <p>No medium or large hollow-bearing trees would be removed for the proposed development.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Little Eagle <i>Hieraaetus morphnoides</i> V (TSC)</p>	<p>Distributed throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. DECCW Profile.</p> <p>Occurs in habitats rich in prey, within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.</p> <p>Requires a tall living tree for nesting, within a remnant patch, where pairs build a large stick nest in winter and lay in early spring. Young fledge in early summer.</p> <p>Feeds on birds, reptiles and mammals, occasionally large insects and carrion. Formerly heavily dependent on rabbits. DECCW Profile.</p> <p>Most of its former native mammalian prey species in inland NSW are extinct (terrestrial mammals of rabbit size or smaller, e.g. large rodents, bandicoots, bettongs, juvenile hare-wallabies and nailtail wallabies).</p> <p>Main threats are inferred to be clearing and degradation of its foraging and breeding habitat.</p> <p>8 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area theoretically contains habitat for this species.</p> <p>The Little Eagle may forage across Bicentennial Park on occasions, but would not be likely to roost or breed within Bicentennial Park.</p> <p>No medium or large hollow-bearing trees would be removed for the proposed development.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
<p>Osprey <i>Pandion heliaetus</i> V (TSC)</p>	<p>The Osprey occurs around the entire coastline of Australia. The species is common around the northern coast, especially on rocky shorelines, islands and reefs, and uncommon to rare or absent from closely settled parts of south-eastern Australia (DEC Profile).</p> <p>It favours coastal areas, especially the mouths of large rivers, lagoons and lakes, and feeds on fish over clear, open water (DEC Profile).</p> <p>Nests high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. Breeds from July to September in NSW (DEC Profile).</p> <p>3 records in the locality since 1980 (DECCW Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Varied Sittella <i>Daphoenositta chrysoptera</i> V (TSC)</p>	<p>Inhabits eucalypt forests and woodlands, Mallee and Acacia woodland. Occurs throughout most of mainland Australia, except the treeless deserts and open grasslands (NSW Scientific Committee).</p> <p>A sedentary species. Feeds on arthropods gleaned from crevices in rough or decorticating bark, and from dead twigs, branches or dead trees.</p> <p>Builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years (NSW Scientific Committee).</p> <p>Population viability is sensitive to habitat isolation, reduced patch size and habitat simplification, including reductions in tree species diversity, tree canopy cover, shrub cover, ground cover, logs, fallen branches and litter (NSW Scientific Committee). Adversely affected by the dominance of Noisy Miners in woodland patches.</p> <p>Current threats include habitat degradation through small-scale clearing for fence lines and road verges, rural tree decline, loss of paddock trees and connectivity, 'tidying up' on farms, and firewood collection.</p> <p>3 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area theoretically contains potential habitat for this species.</p> <p>However, it is a sedentary species, and has not been recorded in Bicentennial Park.</p> <p>Whilst it is theoretically possible that the Varied Sittella could occur in the park, it is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
<p>Regent Honeyeater <i>Xanthomyza phrygia</i> E (TSC) E (EPBC)</p>	<p>Semi-nomadic, usually recorded on western slopes of the Great Dividing Range, in open eucalypt forest and woodland. Usually recorded in box-ironbark associations, also wet lowland coastal forests.</p> <p>Forages in the upper canopy of flowering eucalypts for nectar, fruits and insects (NPWS 1999; Lindsey 1992; Blakers et al 1984). Nectar taken from approximately 16 species of eucalypt (NPWS 1999).</p> <p>A noisy, aggressive and conspicuous species, gregarious when not breeding. Observed bathing in roadside puddles.</p> <p>Nests in the fork of a tree 1-20m above the ground (Lindsey 1992). Specific requirements in mature Ironbark and Red-Yellow Box communities (NPWS 2003).</p> <p>2 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area contains potential opportunistic foraging resources for this species.</p> <p>The Regent Honeyeater may occur within Bicentennial Park on occasions.</p> <p>The Regent Honeyeater would not breed within Bicentennial Park.</p> <p>It is not likely that this species would be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Greater Sand Plover <i>Charadrius leschenaultii</i> V (TSC)	<p>Commonly recorded in parties of 10-20 on the west coast of Australia, with the far northwest being the stronghold of the population. The species is apparently rare on the east coast, being found usually singly. In NSW, the species has been recorded between the northern rivers and the Illawarra, with most records coming from the Clarence and Richmond estuaries (DEC 2005).</p> <p>Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks (DEC 2005).</p> <p>Roosts during high tide on sandy beaches and rocky shores, forages on wet ground at low tide, usually away from the edge of the water. Diet includes insects, crustaceans, polychaete worms and molluscs.</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Lesser Sand Plover <i>Charadrius mongolus</i> V (TSC)	<p>Breeds in central and north-eastern Asia, migrates south for winter. In Australia occurs around the entire coast, but is most common in the Gulf of Carpentaria, and along the east coast of Queensland and northern NSW. Individuals are rarely recorded south of the Shoalhaven estuary, and there are few inland records (DEC 2005).</p> <p>Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats, occasionally occurs on sandy beaches, coral reefs and rock platforms.</p> <p>Roosts during high tide on sandy beaches, spits and rocky shores, forages individually or in scattered flocks on wet ground at low tide, usually away from the waters edge. Diet includes insects, crustaceans, molluscs and marine worms.</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Superb Fruit-dove <i>Ptilinopus superbus</i> V (TSC)	<p>Inhabits rainforest and similar closed forests principally from NE Queensland to NE NSW. It is much less common further south, where it is largely confined to pockets of suitable habitat as far south as Moruya (DEC Profile).</p> <p>Forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees (DEC Profile).</p> <p>Part of the population is migratory or nomadic. At least some of the population, particularly young birds, moves south through Sydney, especially in autumn.</p> <p>Nests usually 5-30 metres up in rainforest and rainforest-edge tree and shrub species. Breeding takes place from September to January</p> <p>14 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Wandering Albatross <i>Diomedea exulans</i> E (TSC) V (EPBC)	<p>Visits Australian waters extending from Fremantle, Western Australia, across the southern water to the Whitsunday Islands in Queensland between June and September. It has been recorded along the length of the NSW coast. At other times birds roam the southern oceans and commonly follow fishing vessels for several days. DECCW Profile.</p> <p>Wandering albatross spend the majority of their time in flight, soaring over the southern oceans.</p> <p>They breed on a number of islands just north of the Antarctic Circle: South Georgia Island (belonging to the UK), Prince Edward and Marion Islands (South Africa), Crozet and Kerguelen Islands (French Southern Territories) and Macquarie Island (Australia).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Little Tern <i>Sterna albifrons</i> E (TSC)	<p>A coastal species which occurs on open surf beaches, in sheltered inlets, estuaries, occasionally lakes and sewage farms (Lindsey 1992).</p> <p>Feeds mainly on fish taken in a dive from above the surface of the water. Nesting colonies are established on sand or shingle beaches, and are threatened by encroaching vegetation as well as human activities and predation (Blakers et al 1984).</p> <p>2 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
White-fronted Chat <i>Epthianura albifrons</i> V (TSC)	<p>Found in damp open habitats, particularly wetlands containing saltmarsh areas that are bordered by open grasslands or lightly timbered lands (Higgins <i>et al.</i> 2001). Along the coastline, White-fronted Chats are found in estuarine and marshy grounds with vegetation less than 1 m tall. NSW Scientific Committee.</p> <p>The species is also observed in open grasslands and sometimes in low shrubs bordering wetland areas. Inland, the White-fronted Chat is often observed in open grassy plains, saltlakes and salt pans that are along the margins of rivers and waterways (North 1904; Higgins <i>et al.</i> 2001; Barrett <i>et al.</i> 2003).</p> <p>The species is sensitive to human disturbance and is not found in built areas.</p> <p>22 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<b>REPTILES</b>		
Rosenberg's Goanna <i>Varanus rosenbergi</i> V (TSC)	<p>Occurs in heath, open forest and woodland, on the Sydney Sandstone in Wollemi National Park to the north-west of Sydney, in the Goulburn and ACT regions, and near Cooma in the south. There are records from the South West Slopes near Khancoban and Tooma River (DEC Profile).</p> <p>Individuals require large areas of habitat, and shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens (DEC Profile).</p> <p>Feeds on carrion, birds, eggs, reptiles and small mammals (DEC Profile).</p> <p>Nests in termite mounds, and these are a critical habitat component (DEC Profile).</p> <p>Is generally slow moving, and on the tablelands is likely only to be seen on the hottest days. Runs along the ground when pursued (as opposed to the Lace Monitor, which climbs trees) (DEC Profile).</p> <p>31 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
<b>AMPHIBIANS</b>		
Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Red-crowned Toadlet <i>Pseudophryne australis</i> V (TSC)	<p>Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones, within the Sydney Basin (Pokolbin in the north, the Nowra area to the south, and west to Mt Victoria in the Blue Mountains) (DEC Profile).</p> <p>Inhabits periodically wet drainage lines below sandstone ridges, that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter (DEC Profile).</p> <p>Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters (DEC Profile).</p> <p>134 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area does not contain typical habitat for this species.</p> <p>This species is not likely to occur, nor would be likely to be affected by the proposed development.</p>



Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Green &amp; Golden Bell Frog <i>Litoria aurea</i> E (TSC) E (EPBC)</p>	<p>Has been recorded in a wide variety of both ephemeral and permanent water bodies, including marshes, dams and stream-sides (NPWS 2005; NPWS 1999).</p> <p>Prefers unshaded water with plenty of emergent vegetation, particularly bullrushes <i>Typha</i> spp or spikerushes <i>Eleocharis</i> spp (NPWS 2005, NPWS 1999, Robinson 1998; Cogger 1996), with nearby grassy areas and diurnal sheltering sites such as rocks or tussocky vegetation (NPWS 1999).</p> <p>Does not usually occur in conjunction with the predatory fish Plague Minnow <i>Gambusia holbrooki</i> (NPWS 1999). It usually breeds in ponds that are smaller than 1000 square metres in area, less than a metre deep, that are either ephemeral or fluctuate substantially in water level, are free of predatory fish, and have emergent aquatic vegetation (Pyke &amp; White 2002).</p> <p>Sites which supported breeding populations were found to contain water bodies which were still, shallow, ephemeral, unpolluted, unshaded, with aquatic plants and free of Mosquitofish and other predatory fish, with terrestrial habitats that consisted of grassy areas and vegetation no higher than woodlands, and a range of diurnal shelter sites (Pyke &amp; White 1996).</p> <p>A study in 2002 on Kooragang Island in the Hunter River estuary found that the diversity of vegetation on the banks of waterbodies was positively associated with the presence of Green and Golden Bell Frogs, and that the frogs were more likely to occur together with the plants <i>Juncus kraussii</i> (a rush), <i>Schoenoplectus litoralis</i> (a sedge), and <i>Sporobolus virginicus</i> (a grass). Green and Golden Bell Frogs were found sheltering in and basking on these plants (Pyke &amp; White 2002).</p> <p>710 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area does not contain typical habitat for this species.</p> <p>This species is not likely to occur, nor would be likely to be affected by the proposed development.</p>
<p>Giant Burrowing Frog <i>Heleioporus australiacus</i> V (TSC) V (EPBC)</p>	<p>In the Sydney area there is a marked preference for sandstone ridgetop habitat and broader upland valleys. In these locations the frog is associated with small headwater creeklines and along slow flowing to intermittent creeklines. The vegetation is typically woodland, open woodland and heath, and may be associated with 'hanging swamp' seepage lines and where small pools form from the collected water. They have also been observed occupying artificial ponded structures such as fire dams, gravel 'borrows', detention basins and box drains that have naturalised over time and are still surrounded by other undisturbed habitat (DEC Profile).</p> <p>Limited observations on this species suggest an ability to range widely, frequently being observed on roads at considerable distance from suitable riparian breeding, or other moist habitat (DEC Profile).</p> <p>4 records in the locality since 1980 (DECCW Atlas).</p>	<p>The study area does not contain typical habitat for this species.</p> <p>This species is not likely to occur, nor would be likely to be affected by the proposed development.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<b>MAMMALS</b>		
Southern Right Whale <i>Eubalaena australis</i> V (TSC)	<p>A marine mammal. Southern Right Whales visit southern Australia during the winter months, and are increasingly found in NSW waters. The whales are often seen in very shallow water, including estuaries and bays. They have even been known to swim in the surf zone (DECC Profile).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
Australian Fur-seal <i>Arctocephalus pusillus doriferus</i> V (TSC)	<p>A marine mammal. The Australian Fur-seal breeds at only ten locations on Victorian and Tasmanian islands in Bass Strait. There is some evidence that a breeding colony once occurred at Seal Rocks in NSW (DECC Profile).</p> <p>Although the species no longer breeds in NSW, habitat and resources within the state remain important to non-breeding individuals: Montague Island (near Narooma) is the main haul-out site for the species in NSW where individuals are present throughout the year in varying numbers. In addition, Steamers Beach (south of Jervis Bay) and Green Cape (far south coast) are regular haul-out sites, and various locations along the NSW coast are used irregularly (DECC Profile). The species utilises rocky sites that are open with flat or sloping rocks for breeding and as haul-out sites.</p> <p>The Australian Fur-seal preys on squid and school fish, bottom-dwelling fish, octopus and crustaceans.</p> <p>2 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.
New Zealand Fur-seal <i>Arctocephalus forsteri</i> V (TSC)	<p>2 records in the locality since 1980 (DECCW Atlas).</p>	No habitat for this species occurs in the study area.

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
<p>Southern Brown Bandicoot  <i>Isodon obesulus obesulus</i>  E (TSC)  E (EPBC)</p>	<p>Generally only found in heath or open forest with a heathy understorey, on sandy or friable soils. Has a patchy distribution, and in NSW is found in the south-east, east of the Great Dividing Range and south from the Hawkesbury River (DEC Profile).</p> <p>Southern Brown Bandicoots are largely crepuscular (DEC Profile), and prefer to stay close to cover (Braithwaite 1995). Males have a home range of approximately 5-20 hectares whilst females forage over smaller areas of about 2-3 hectares.</p> <p>Feeds on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogeous (underground-fruited) fungi. Their searches for food often create distinctive conical holes in the soil (DEC Profile; Braithwaite 1995). Relies on the high abundance of insects present in vegetation newly regenerating after fire, and therefore requires a mosaic of areas being burnt regularly (Braithwaite 1995).</p> <p>Nests in a shallow depression in the ground covered by leaf litter, grass or other plant material (DEC Profile; Braithwaite 1995). Nests may be located under Grass trees <i>Xanthorrhoea</i> sp., blackberry bushes and other shrubs, or in rabbit burrows. The upper surface of the nest may be mixed with earth to waterproof the inside of the nest (DEC Profile).</p> <p>34 records in the locality since 1980 (DECCW Atlas).</p>	<p>No habitat for this species occurs in the study area.</p>
<p>Long-nosed Bandicoot  <i>Perameles nasuta</i>  E pop (TSC)  E pop (EPBC)</p>	<p>Essentially a solitary animal that occupies a variety of habitats.</p> <p>Forages mainly at or after dusk, digging for invertebrates, fungi and tubers. The conical holes it leaves in the soil are often seen at the interface of naturally vegetated and areas of open grass.</p> <p>Shelters during the day in a well-concealed nest based on a shallow hole lined with leaves and grass, sometimes under debris, sometimes hidden with soil and with the entrance closed for greater concealment.</p> <p>3 records in the locality since 1980 (DECCW Atlas).</p>	<p>The Endangered Populations of the Long-nosed Bandicoot do not occur in the Ku-ring-gai LGA, and are not of relevance to the proposed development.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Spotted-tailed Quoll <i>Dasyurus maculatus</i> V (TSC) E (EPBC)	<p>Variety of habitats including sclerophyll forest and woodlands, coastal heathlands and rainforest (NPWS 1999; Edgar &amp; Belcher 1995). Occasionally sighted in open country, grazing lands, rocky outcrops and other treeless areas (NPWS 1999).</p> <p>Usually nocturnal, partly arboreal (Edgar &amp; Belcher 1995; NPWS 1999). Apparently defines its territory with 'latrines' (Edgar &amp; Belcher 1995).</p> <p>Requires suitable den sites (eg hollow logs, tree-hollows, rock crevices or caves), an abundance of food (small terrestrial birds and mammals, up to the size of small wallabies), and relatively large areas of intact vegetation for foraging (NPWS 1999; Edgar &amp; Belcher 1995).</p> <p>Uses numerous den sites within its home range, which is estimated to be between 800ha and 20km<sup>2</sup> (NPWS 1999). A highly mobile species recorded travelling several kilometres overnight (NPWS 1999).</p> <p>21 records in the locality since 1980 (DECCW Atlas).</p>	<p>No evidence of this species was recorded during the field surveys.</p> <p>The Spotted-tailed Quoll may occur within Bicentennial Park on occasions, but is not resident within Bicentennial Park and would not be likely to be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Yellow-bellied Glider <i>Petaurus australis</i> V (TSC)	<p>Inhabits tall mature forests in areas of high rainfall along the east coast of Australia (Menkhorst &amp; Knight 2001). Prefers areas where year-round food resources are available from a mixture of eucalypt species (NPWS 1999).</p> <p>Plant and Insect exudates make up the bulk of its diet (Russell 1995). Makes characteristic triangular or V-shaped incisions in tree trunks to obtain sap (NPWS 1999; Menkhorst &amp; Knight 2001).</p> <p>Nocturnal, it rests by day in a den in a hollow branch. Usually occurs in very low densities. Its home range is in the order of 30-65ha (NPWS 1999; Russell 1995).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>No evidence of this species was recorded during the field surveys.</p> <p>The trees that would be removed do not show evidence of use as feed trees, for den sites, or as regular movement paths.</p> <p>The Yellow-bellied Glider may occur within Bicentennial Park on occasions, but would not be likely to be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Koala <i>Phascolarctos cinereus</i> V (TSC)	<p>In NSW the Koala occurs mainly on the north coast and central coast, extending west of the Great Dividing Range along inland rivers (NPWS 1999). Koalas inhabit eucalypt forest and woodland, and are influenced in distribution by size and species of tree present, soil nutrients, climate, rainfall, and size and disturbance history of habitat patches (NPWS 1999).</p> <p>Although solitary in appearance, Koalas live in complex groups with individuals having overlapping territories (NPWS 1999). Koalas are relatively sedentary, and spend the majority of their time resting in the forks of trees (NPWS 1999; Martin &amp; Handasyde 1995). Koalas are generally most active at dusk (NPWS 1999).</p> <p>Koalas feed almost exclusively on the leaves of a wide range of eucalypts, although within any one area Koalas will prefer only a small number of species (NPWS 1999; Martin &amp; Handasyde 1995).</p> <p>2 records in the locality since 1980 (DECCW Atlas).</p>	<p>No evidence of this species was recorded during the field surveys.</p> <p>The Koala is not likely to occur in Bicentennial Park.</p>
Eastern Pygmy-possum <i>Cercartetus nanus</i> V (TSC)	<p>Inhabits rainforest, sclerophyll forest, and tree heath in coastal areas and at higher elevations in NSW (Strahan 1995; NSW Scientific Committee).</p> <p>The Eastern Pygmy-possum is an agile climber, and feeds mainly on pollen and nectar from banksias, eucalypts and understorey plants, and also insects (NSW Scientific Committee; Strahan 1995). Trapping is most successful in areas of flowering banksias (NSW Scientific Committee).</p> <p>A nocturnal species which shelters and nests in very small spaces during the day, in tree hollows, disused bird nests, shredded bark in the forks of tea-trees etc (Strahan 1995).</p> <p>13 records in the locality since 1980 (DECCW Atlas).</p>	<p>The Eastern Pygmy-possum may occur within Bicentennial Park, in areas which contain native understorey vegetation.</p> <p>The Eastern Pygmy-possum would not be likely to be affected by the loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Grey-headed Flying-fox <i>Pteropus poliocephalus</i> V (TSC) V (EPBC)	<p>Occurs in rainforest, tall sclerophyll forests and woodlands, heaths and swamps along the east coast of Australia from Bundaberg to Melbourne, generally to the east of the Great Dividing Range (NPWS 2001). Also recorded in urban gardens and cultivated fruit crops (NPWS 2001).</p> <p>Forages on pollen, nectar and fruits of native trees (in particular Melaleuca, Eucalyptus and Banksia), and is an important pollinator and seed-disperser of native trees (NPWS 2001). Partly migratory in response to food availability.</p> <p>Roosts in large congregations or 'camps' during the day (NPWS 2001; Strahan 1995), which are generally located within 20km of a regular food source, in stands of riparian rainforestm paperbark or casuarina forest (NPWS 2001). Camp site fidelity is high.</p> <p>Recorded on the CSIRO site in 1997 and 2002.</p> <p>1019 records in the locality since 1980 (DECC Atlas).</p>	<p>Bicentennial Park provides foraging habitat for this species.</p> <p>The Grey-headed Flying-fox is extremely wide-ranging and is known to utilise vegetation in Bicentennial Park for foraging.</p> <p>No 'camps' are known within the park.</p> <p>This species would not be likely to be affected by the very minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Large-eared Pied Bat <i>Chalinolobus dwyeri</i> V (TSC) V (EPBC)	<p>Inhabits dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range, from Queensland to Bungonia. Has also been recorded occasionally in sub-alpine woodlands above 1500m, and at the edge of rainforest and moist eucalypt forest (Hoye &amp; Dwyer 1995). First recorded in a dis-used mine tunnel near Copeton, NSW in early 1960's.</p> <p>Probably forages for insects below the forest canopy (Hoye &amp; Dwyer 1995).</p> <p>Roosts by day in tree-hollows, caves and dis-used mine-tunnels (DEC NRMAS-7 2004; Hoye &amp; Dwyer 1995). In caves it often selects positions close to the entrance in the 'twilight zone'. Appears to hibernate during winter (Hoye &amp; Dwyer 1995).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential habitat for this species.</p> <p>No caves, tunnels, or notable hollow-bearing trees would be removed for the proposed development.</p> <p>The Large-eared Pied Bat could occur within the study area, but would not be likely to be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Yellow-bellied Sheath-tail Bat <i>Saccolaimus flaviventris</i> V (TSC)	<p>Occurs throughout eastern and northern Australia, foraging above the canopy in eucalypt forests, and closer to the ground in mallee or open country (Richards 1995a).</p> <p>Usually solitary, occasionally occurring in colonies of less than 10 individuals (Richards 1995a).</p> <p>Roosts in tree hollows (Richards 1995a), occasionally in caves (DEC NRMAS-7 2004), and has been found in the abandoned nests of Sugar Gliders (Richards 1995a).</p> <p>Possibly migratory in southern Australia (Richards 1995a).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential habitat for this species.</p> <p>No notable hollow-bearing trees would be removed for the proposed development.</p> <p>However, it is possible that roosting trees for this species would be removed, and that this species could be affected by the proposed development.</p> <p>This species has been assessed further in Chapter 3 of the main report.</p>
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i> V (TSC)	<p>Thought to forage above the forest canopy, in open woodland or over water. Occurs along the Great Dividing Range of SE Australia, and east to the coast. Is more common at cooler elevations (Phillips 1995).</p> <p>Has been recorded roosting in tree hollows (Phillips 1995). Occasionally found in caves (DEC NRMAS-7 2004). Apparently hibernates during winter, and may sexually segregate for part of the year (Phillips 1995).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential habitat for this species.</p> <p>No notable hollow-bearing trees would be removed for the proposed development.</p> <p>However, it is possible that roosting trees for this species would be removed, and that this species could be affected by the proposed development.</p> <p>This species has been assessed further in Chapter 3 of the main report.</p>



Species	Habits/Requirements/Records in the locality	Occurrence in the study area
Eastern Freetail Bat <i>Mormopterus norfolkensis</i> V (TSC)	<p>Usually recorded in dry eucalypt forest and woodland east of the Great Dividing Range, but has also been recorded in rainforest and wet sclerophyll forest (Allison &amp; Hoyer 1995).</p> <p>Apparently solitary. Predominantly tree-dwelling, but has been recorded roosting in the roof of a hut (Allison &amp; Hoyer 1995).</p> <p>5 records in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential habitat for this species.</p> <p>No notable hollow-bearing trees would be removed for the proposed development.</p> <p>However, it is possible that roosting trees for this species would be removed, and that this species could be affected by the proposed development.</p> <p>This species has been assessed further in Chapter 3 of the main report.</p>
Eastern Bent-wing Bat <i>Miniopterus schreibersii oceanensis</i> V (TSC)	<p>Typically inhabits well-timbered valleys where it forages above the tree canopy (Dwyer 1995b).</p> <p>Roosts in caves, old mines, stormwater channels and comparable structures (DEC NRMAS-7 2004; Dwyer 1995b). In SE Australia it seeks cold roosts through winter to allow hibernation. Depends upon specific mass nursery sites in Spring to rear its young (Dwyer 1995b), thus prone to mass damage from catastrophic events (DEC NRMAS-7 2004).</p> <p>44 records in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential foraging habitat for this species.</p> <p>No caves, tunnels, etc would be removed for the proposed development.</p> <p>The Eastern Bent-wing Bat could occur within the study area, but would not be likely to be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>
Little Bent-wing Bat <i>Miniopterus australis</i> V (TSC)	<p>Forages beneath the tree canopy of well-timbered habitats including rainforest, <i>Melaleuca</i> swamps and dry sclerophyll forests (Dwyer 1995a).</p> <p>Roosts in caves and old mines, depends upon specific nursery sites to rear its young (Dwyer 1995a), thus prone to mass damage from catastrophic events (DEC NRMAS-7 2004).</p> <p>1 record in the locality since 1980 (DECCW Atlas).</p>	<p>Bicentennial Park provides potential foraging habitat for this species.</p> <p>No caves, tunnels, etc would be removed for the proposed development.</p> <p>The Little Bent-wing Bat could occur within the study area, but would not be likely to be affected by the minor loss of trees and minor disturbance to vegetation for asset protection zones as a result of the proposed development.</p> <p>On this basis a formal s.5A assessment of significance is not required.</p>

BICENTENNIAL PARK, WEST PYMBLE

PROPOSED RE-DEVELOPMENT OF WEST PYMBLE POOL  
AND ADDITIONAL CARPARKING

ASSESSMENT OF SIGNIFICANCE

APPENDIX 2

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Alternate s.5A assessment for Sydney Turpentine Ironbark Forest

April 2011

## APPENDIX 2

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Alternate Assessment of significance pursuant to s.5A of the EP&A Act for Sydney Turpentine Ironbark Forest

There remains a difference of opinion between ecological experts as to whether the isolated remnant trees that would be affected by the proposed development constitute part of the STIF EEC or not. To resolve this issue, an alternate assessment of significance has been conducted for STIF, in which all remnant trees are included within the community.

### Sydney Turpentine Ironbark Forest

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

STIF is not a *“threatened species”*.

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

The TSC Act defines an *“endangered population”* as *“a population specified in Part 2 of Schedule 1”* of the Act.

STIF is not an *“endangered population”*.

- (c) *“in the case of a critically endangered or 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”*

- (i) extent

The local occurrence of STIF is at least 6 hectares in size, based on vegetation mapping conducted by Ku-ring-gai Council, which has been validated by previous consultant reports. The majority of this local occurrence is protected within Bicentennial Park.

The proposed development would result in loss of approximately 41 indigenous trees from highly degraded fringe areas of STIF within Bicentennial Park. Refer to Figure 4 of the main report.

The proposed development would also require an area of STIF less than 1 hectare in size be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

Maintenance of the asset protection zone would first involve removal of weeds within this area. There may not be any need for additional removal of STIF understorey vegetation.

(ii) composition

The proposed development would not directly affect the composition of retained areas of the local occurrence of STIF.

The proposed development would not introduce new indirect pressures upon the composition of the local occurrence of STIF. Indeed, the proposed development would be likely to result in a reduction in the weed component of the understorey of STIF within the asset protection zone.

The proposed development would not be likely to significantly increase existing indirect pressures upon the composition of the local occurrence of STIF such that the local occurrence would be placed at further risk of extinction.

Conclusion

The proposed development would not affect either the extent or the composition of STIF such that the local occurrence of the community would 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"*

(i) extent

The extent of habitat for STIF within Bicentennial Park is estimated to be the same area that is currently occupied by the community. Refer to part (c)(i) above.

(ii) fragmentation

The 41 trees that would be removed are all located on the fringe of the community. 38 of the trees are located within highly degraded and previously cleared lands. The proposed development would not cause an area of habitat for STIF to become fragmented or isolated from other areas of habitat for STIF.

(iii) importance

Habitat for STIF within Bicentennial Park is important to the long-term survival of this community in the locality.

However, the majority of areas that would be affected by the proposed re-development are so highly degraded that they would be unlikely to regenerate to a functioning STIF community. These areas are not regarded as of importance to the long-term survival of STIF in the locality

Loss of important habitat as a result of the proposed development would be limited to a few square metres on the corner of Prince of Wales Drive and Lofberg Road at the entrance to the site.

Less than 1 hectare of habitat for STIF would be maintained as an asset protection zone for the proposed development. There would be negligible modification to this area.

The proposed development would not affect the long-term survival of STIF either within Bicentennial Park or in the locality.

## Conclusion

The proposed development would result in loss of a few square metres of important habitat for STIF, and negligible modification to less than 1 hectare of STIF. The proposed development would not contribute to further fragmentation of habitat for STIF, nor would affect the long-term survival of STIF in the locality.

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

The TSC Act 1995 defines “critical habitat” as “habitat declared to be critical habitat under part 3” of the Act.

There is no declared “critical habitat” of relevance to Bicentennial Park. The proposed development would not adversely affect any area of “critical habitat”.

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

DECCW have prepared a Cumberland Plain Recovery Plan (2011), including non-specific actions for the recovery of STIF. The plan does not encompass land within the Ku-ring-gai Local Government Area.

The plan advocates protection of ‘priority conservation lands’ which are identified in the plan. Bicentennial Park is not part of any area identified as ‘priority conservation land’.

The proposed development would not interfere with implementation of the DECCW (2011) Cumberland Plain Recovery Plan.

No threat abatement plans are of specific relevance to the proposed development.

- (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”*

There are several key threatening processes which have previously occurred within Bicentennial Park, some of which are likely to be ongoing.

Of relevance to the proposed development, ‘Clearing of native vegetation’ is listed as a Key Threatening Process under the TSC Act.

The proposed development would result in loss of approximately 41 indigenous trees (planted, regrowth and remnant, including juvenile trees and one dead tree) from fringe areas of STIF within Bicentennial Park.

The proposed development would also require an area of STIF less than 1 hectare in size to be maintained as an asset protection zone around the northern side of the proposed new buildings. The STIF that would be affected has been previously disturbed, and essentially already meets the asset protection zone requirement of less than 5 tonnes/hectare in the understorey.

In summary, the loss of STIF from Bicentennial Park as a result of the proposed development would be insignificant in relation to the extent of this community that would be retained within Bicentennial Park, and in the locality.

## Conclusion

Based upon the considerations detailed above, and on the basis of data and information provided in previous Whelans Insites (Dec 2010) and Hayes Environmental (Dec 2010) reports, the proposed re-development at Bicentennial Park, West Pymble, would not be “*likely*” to impose “*a significant effect*” upon Sydney Turpentine Ironbark Forest.