

30 August 2018

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**ST JOSEPH'S COLLEGE PHYSICAL EDUCATION AND SPORTS
PRECINCT PROJECT: RELEVANCE OF THE BIODIVERSITY OFFSETS
SCHEME**

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Dear Peter,

The purpose of this letter is to assess the need for formal biodiversity assessments to support the proposed infill development application for St Joseph's College (hereafter referred to as the 'project'). This assessment considers the entire land area covered by the School Campus (Lot 2 DP 527024), hereafter referred to as the 'subject land' with particular respect to the areas to be impacted by the project (see **Figure 1**).

Our assessment is set out below, with figures provided in **Appendix A**, flora species lists provided in **Appendix B** and threatened species records and likelihood of occurrence summarised in **Appendix C**. Based on our assessment of biodiversity at St Joseph's College, we recommend that a waiver for the preparation of a Biodiversity Development Assessment Report (BDAR) be sought from the Department of Planning and Environment.

1. Background

1.1 The Proposed Development

Project Name: Physical Education and Sports Precinct Project (PESPP)

Standard description:

1. Demolition of the following existing buildings (which are not heritage significant) near the intersection of Luke Street and Gladesville Road:
 - a. College Shop

- b. Healy Gym and Maintenance Workshop
 - c. Outdoor Sports Courts
 - d. Workshop/Storage and Shed.
2. Construction of the Physical Education and Sports Precinct Project (PESPP) comprising the following facilities:
- a. Lower Ground Floor: New car parking, maintenance workshops, storage, offices, amenities etc. A net increase of 55 car parking spaces is proposed (85 new spaces to be provided in the SCP basement less 30 at grade spaces to be removed)
 - b. Ground floor: Three indoor sports courts, amenities, kitchen and entry lobbies
 - c. First Floor: Void over sports courts, bench seating (180 seats), staff facilities, two general learning areas and foyer
 - d. Driveway entry to the PESPP (no new vehicular cross overs)
 - e. Landscaping and tree removal/replacement.
3. Construction of a new single storey building to accommodate the relocated Healy Gym in the north-western corner of the site near the intersection of Mary Street and Mark Street.
4. New kiosk substation and landscaping in the north-eastern corner of the site
5. Use of the completed works as an educational establishment.
6. Staging which would facilitate completion of the PESPP in up to two stages (noting that the entire project may be completed in one stage).

1.2 Assessment Requirements for State Significant Development

The project is classified as Stage Significant Development under Clause 15 of Schedule 1 of State Environmental Planning Policy (State and Regional Development) 2011, as the Capital Investment Value (CIV) exceeds \$20 million for the purpose of alterations or additions to an existing school.

Section 7.9 of the NSW *Biodiversity Conservation Act 2016* (BC Act), requires all development applications for State Significant Development to be accompanied by a Biodiversity Development Assessment Report (BDAR) unless both the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.

The main steps in the biodiversity assessment process for State Significant Development are as follows:

1. The Planning Agency Head and the Environment Agency Head determines if the Biodiversity Offsets Scheme applies to the State Significant Development and specifies the environmental assessment requirements;
2. The proponent engages an accredited person to assess the development site using the Biodiversity Assessment Method (BAM) and a BDAR is prepared;
3. The approval authority considers any serious and irreversible impacts and determines whether there are additional and appropriate measures to minimise impacts;
4. The approval authority sets an offset obligation as part of the Conditions of Approval; and
5. The proponent meets their offset obligation and begins their development.

The Biodiversity Assessment Method (BAM) sets out clear and repeatable methods to conduct an assessment of direct and indirect impacts. The BAM is supported by the BAM Tool, which is a web-based tool that quantifies direct impacts using 'biodiversity credits'. Two types of credits are generated by the BAM Tool, ecosystem credits and species credits. Ecosystem credits are calculated based on a number of variables including landscape features, native vegetation and ecosystem credit species (species that are reliably predicted by habitat surrogates). Species credits are calculated based on the number of individuals (flora) or the area of habitat (fauna) of species credit species (species that are not reliably predicted by habitat surrogates).

The BAM includes a requirement to prepare a BDAR for the development site. The BDAR must be prepared by an accredited assessor. A proponent is required to submit the BDAR as part of an Environmental Impact Statement for a State Significant Development.

1.3 Waiver of requirement to prepare a Biodiversity Development Assessment Report

Section 7.9 of the BC Act indicates that there are some circumstances in which the Planning Agency Head and the Environment Agency Head will determine that a proposed development is not likely to have a significant impact on biodiversity values and as such, a BDAR is not required to be prepared. Biodiversity values are defined under the BC Act and the *Biodiversity Conservation Regulation 2017* (BC Regulation), and include:

- Vegetation integrity—being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state;
- Habitat suitability—being the degree to which the habitat needs of threatened species are present at a particular site;

- Threatened species abundance—being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site;
- Vegetation abundance—being the occurrence and abundance of vegetation at a particular site;
- Habitat connectivity—being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range;
- Threatened species movement—being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle;
- Flight path integrity—being the degree to which the flight paths of protected animals over a particular site are free from interference;
- Water sustainability—being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.

For a waiver to be applied for future development at the subject site, it needs to be demonstrated that the above listed biodiversity values will not be significantly impacted.

1.4 Native Vegetation definition

For the purpose of the BC Act, native vegetation has the same definition as per the *Local Land Services Act 2013*. The definition of native vegetation is as follows:

60B Meaning of “native vegetation”

(1) *For the purposes of this Part, native vegetation means any of the following types of plants native to New South Wales:*

- (a) *trees (including any sapling or shrub or any scrub),*
- (b) *understorey plants,*
- (c) *groundcover (being any type of herbaceous vegetation),*
- (d) *plants occurring in a wetland.*

(2) *A plant is native to New South Wales if it was established in New South Wales before European settlement. The regulations may authorise conclusive presumptions to be made of the species of plants native to New South Wales by adopting any relevant classification in an official database of plants that is publicly accessible.*

(3) *For the purposes of this Part, native vegetation extends to a plant that is dead or that is not native to New South Wales if:*

- (a) *the plant is situated on land that is shown on the native vegetation regulatory map as category 2-vulnerable regulated land, and*
- (b) *it would be native vegetation for the purposes of this Part if it were native to New South Wales.*
- (4) *For the purposes of this Part, native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). A declaration under section 14.7 of the Biodiversity Conservation Act 2016 that specified vegetation is or is not marine vegetation also has effect for the purposes of this Part.*

2. Methods

2.1 Site Inspection

Ecologists Bryan Furchert and Michael Davis of Cumberland Ecology visited the subject land on Tuesday, 14 August 2018. The subject land was inspected by traversing the external landscape around St Joseph's College with records of flora species and potential fauna habitat noted. Vegetation within the subject land was assessed in relation to Plant Community Types (PCTs) known to occur within the locality. Four random meander surveys, in which flora species encountered were recorded, were undertaken within the subject land. During the site inspection, notes and photographs were taken documenting vegetation and habitat features throughout the subject land.

2.2 Database Analysis

Database searches were conducted to identify threatened species, populations, that occur within the locality (5 km) using the NSW Office of Environment and Heritage (OEH) BioNet Atlas database (OEH 2018a). The BioNet Atlas search facility was used to generate records of threatened flora and fauna species and populations listed under the BC Act within the search area. The number, age, and location of such records were considered to provide an indication of the species that could have the potential to occur on or around the subject land.

2.3 GIS Mapping

A desktop analysis was completed to identify whether any vegetation communities were present on or nearby the subject land. To do this, the subject land was plotted against the broad scale mapping compiled by the OEH for the Sydney Metropolitan area (OEH 2016). A vegetation map of the subject land was then produced based upon observations of vegetation during the site inspection.

The results from the OEH BioNet Atlas search were downloaded and plotted onto an aerial image (Nearmap; dated 04/08/2018) corresponding to the subject land. This subsequently displayed any threatened species within the locality to determine the potential for the species to be present within the subject land.

3. Key findings

The subject land is predominantly an artificial landscape with planted garden beds and isolated trees situated throughout the campus.

3.1 Native Vegetation Desktop Study

As shown in **Figure 2**, the subject land was predominantly cleared of native vegetation prior to 1943 and further clearing has occurred in the decades since. Current aerial photography and recent vegetation mapping indicates that the subject land has been maintained in a predominantly cleared state with additional plantings established.

The desktop study of the broad scale native vegetation mapping of the Sydney metropolitan area revealed that a number of native vegetation communities exist within the locality; however none have been mapped as occurring within the subject land as shown in **Figure 3** (OEH 2016). The entirety of the vegetation within the subject land and the majority of the vegetation of the immediate surrounds are mapped as “Urban Exotic/Native”. Coastal Enriched Sandstone Dry Forest is the most abundant community within the locality occupying a total area of approximately 137 ha, followed by Coastal Sandstone Foreshores Forest occupying a total area of 119 ha (OEH 2016).

The closest mapped occurrence of native vegetation is a small patch located approximately 250 m to the south of the subject land adjacent to Riverglade Reserve. This patch of native vegetation is comprised of Sydney Turpentine Ironbark Forest and Coastal Sandstone Foreshores Forest whilst the banks of Tarban Creek are dominated by Estuarine Mangrove Forest (OEH 2016). A larger patch of native vegetation exists within and adjacent to Boronia park located approximately 400 m north of the subject land. This patch is comprised of Coastal Sandstone Foreshores Forest, Coastal Enriched Sandstone Dry Forest, Hornsby Enriched Sandstone Exposed Woodland, Sydney Turpentine Ironbark Forest, Riverflat Paperbark Swamp Forest and Estuarine Mangrove Forest (OEH 2016).

3.2 Vegetation of the Subject Land

The majority of the vegetation within the subject land has been planted within recent decades. Whilst some of the vegetation within the subject land may have been planted prior to 1943, it is difficult to determine which individual trees may have persisted since this time (see **Figure 2**).

All of the plants described as being ‘native’ meet the definition of native vegetation as defined in **Section 1.4**. Species that are not locally endemic to the Sydney region have been noted as such in the following descriptions of vegetation within the subject land.

Generally, the composition, structure and function of vegetation within the subject land and the surrounding landscape have been altered significantly from a near natural state and do not resemble any naturally occurring PCTs. Subsequently, the woody vegetation within the subject land has been condensed into single mapping unit as described below and as shown in **Figure 4**.

i. Urban Exotic/Native

Common native canopy tree species planted throughout the areas mapped as Urban Exotic/Native include *Corymbia citriodora* (Lemon-scented Gum), *Eucalyptus bicostata* (Eurabbie), *Eucalyptus microcorys* (Tallow Wood), and *Lophostemon confertus* (Brush Box). *Eucalyptus microcorys* is a commonly planted locally endemic species however it does not represent any locally occurring PCTs. The remaining species are native to NSW but are not locally endemic and do not represent any locally occurring PCTs. **Photograph 1** displays a typical Urban Exotic/Native planting within the subject land.

Small stands and isolated trees are situated throughout the campus including species such as *Elaeocarpus reticulatus* (Blueberry Ash), *Melaleuca bracteata* (Black Tea-tree), *Melaleuca quinquenervia* (Broad-leaved Paperbark), *Melaleuca styphelioides* (Prickly-leaved Paperbark), *Banksia integrifolia* (Coast Banksia), and *Macadamia integrifolia* (Macadamia Nut). Other than *Macadamia integrifolia*, all of these species are locally endemic, however, due to their position within garden beds, surrounding buildings and in planting rows, they are not remnant trees, nor are they considered to represent locally occurring PCTs.

Common exotic tree species featured in landscaping throughout the campus include *Prunus* spp., *Phoenix canariensis* (Canary Island Date Palm), *Lagerstroemia indica* (Crepe Myrtle), *Magnolia grandiflora* (Southern Magnolia), *Fraxinus* spp. (Ash), *Cedrus* spp. (Cedar), *Pinus* spp. (Pine), *Acer palmatum* (Japanese Maple) and *Ulmus parvifolia* (Chinese Elm).

Native shrubs, ferns and groundcover species planted throughout the subject land include *Crinum pedunculatum* (Swamp Lily), *Asplenium australasicum* (Bird's Nest Fern), *Cyathea cooperi* (Straw Treefern), *Callistemon salignus* (Willow Bottlebrush) and *Callistemon viminalis* (Weeping Bottlebrush). All of these species are endemic to the Sydney region other than *C. cooperi* and *C. viminalis* which are endemic to the NSW north coast. Due to their position within garden beds, these locally endemic plants are unlikely to be remnant individuals and are not considered to represent locally occurring PCTs.

Exotic shrubs, ferns and groundcover species planted throughout the subject land include *Agapanthus praecox* subsp. *orientalis* (Agapanthus), *Nerium oleander* (Oleander), *Monstera deliciosa* (Fruit Salad Plant), *Cordyline australis* (Cabbage Tree), *Bromelia* spp. (Bromeliad), *Buxus microphylla* (Japanese Boxwood), *Rhododendron* spp. (Azalea), *Camellia* spp. (Camellia), *Photinia serratifolia* (Chinese Photinia) and *Nandina domestica* (Japanese Sacred Bamboo).



Photograph 1 Typical Urban Exotic/Native plantings throughout the subject land

ii. Exotic Grass

The areas described as Exotic Grass are dominated by exotic turf species such as *Cenchrus clandestinum* (Kikuyu Grass) and *Stenotaphrum secundatum* (Buffalo Grass), the native species *Cynodon dactylon* (Couch Grass) which is widely planted as a turf species, whilst one area was dominated by the exotic *Poa annua* (Winter Grass). These areas were scattered with weedy herbaceous species such as *Cardamine hirsuta* (Common Bittercress), *Lepidium* spp. (Peppercress), *Sonchus asper* (Prickly Sowthistle), *Sonchus oleraceus* (Common Sowthistle), *Cerastium glomeratum* (Mouse-ear Chickweed) and *Stellaria media* (Common Chickweed).

Photograph 2 displays a typical area of Exotic Grass within the subject land.



Photograph 2 Exotic grass vegetation of the subject land

3.3 Fauna Habitat of the Subject Land

The primary habitat for native fauna within the subject land is the native and exotic plantings throughout the campus. This vegetation may fall within the foraging range of a number of non-threatened highly mobile or aerial groups of species including birds such as birds, microchiropteran bats and arboreal mammals. This vegetation may form part of the foraging range of a number of threatened highly mobile or aerial species including birds such as the Powerful Owl (*Ninox strenua*), the Grey-headed Flying Fox (*Pteropus poliocephalus*) and threatened microchiropteran bats as discussed below.

Nectivorous and frugivorous species may utilise the native and exotic vegetation within the subject land to feed on blooms and fruit whilst insectivorous species such as microchiropteran bats may forage for insects throughout the canopy layer. The blooms of the numerous planted *Eucalyptus bicostata* (Eurabbie) and *Corymbia citriodora* (Lemon-scented Gum) within the subject land would be expected to provide ample foraging resources for common species such as the Rainbow Lorikeet (*Trichoglossus moluccanus*) which were observed within the subject land.

No hollow-bearing trees were observed, ruling out the possibility of species requiring such features to roost within the subject land.

The subject land does not contain roosting habitat for small or large birds, arboreal mammals or microchiropteran bats species requiring hollows with the potential to occur such as the Powerful Owl as no tree hollows were observed.. The subject land may provide roosting habitat for threatened and non-threatened microchiropteran bats. These species may roost in the small crevices observed in some of the buildings throughout the subject land (as shown in **Photograph 3**). This habitat is quite limited as only a small number of suitable features were observed.



Photograph 3 **Crevice in a building comprising potential and marginal microchiropteran bat roosting habitat**

3.4 **Threatened Communities and Species**

3.4.1 *Threatened Ecological Communities*

As the vegetation within the subject land is of a planted origin situated throughout garden beds and rows of trees, it has been assessed as not conforming to any Threatened Ecological Communities listed under either the BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) known from the locality.

3.4.2 *Threatened Flora*

No existing records of threatened flora species are present on the subject land, other than a single *Macadamia integrifolia* (Macadamia Nut) of planted origin. *Macadamia integrifolia* is not endemic to the Sydney region or NSW and is commonly planted. This species occurs in Queensland and is listed as Vulnerable under the EPBC Act (DotE 2014).

Threatened species are known to occur within the locality (see **Appendix C**). Due to the lack of nearby records and the highly developed nature of the subject land, it is considered unlikely that

any threatened flora species would occur within the subject land. Additionally, the site inspection did not reveal any locally endemic threatened flora species within the subject land.

3.4.3 *Threatened Fauna and their Habitat*

A limited number of threatened fauna species are known to occur within the locality of the subject land (see **Appendix C**). No existing BioNet Atlas records of threatened fauna species are present on the subject land, however a number of records occur within the locality. The only threatened fauna that would be expected to occur within the subject land and immediate surrounds are highly mobile, aerial species. The Grey-headed Flying-fox (*Pteropus poliocephalus*) and Powerful Owl (*Ninox strenua*) and are amongst the most notable threatened fauna that occur in the North Shore and Northern Suburbs areas of Sydney and there are records within 500 metres of the subject land. The Grey-headed Flying Fox is listed as Vulnerable under the BC Act and the EPBC Act whilst the Powerful Owl is listed as Vulnerable under the BC Act.

There are many records of Grey Headed Flying Fox near within the locality as there has been a substantial colony of the species roosting in the Royal Botanic Gardens, (located approximately 8km to the southwest) for many years. Additionally, there is a small camp located at Huntley's Cove, approximately 250 m to the south of the subject land and another larger camp at Parramatta approximately 13 km to the west (Department of the Environment and Energy 2015). The Grey Headed Flying Fox is known to forage within 20km of a camp site and may fly over the subject land in search of foraging resources such as nectar and pollen (OEH 2018c). Whilst Grey-headed Flying Foxes are likely to occur, the subject land does not contain a roosting camp however the Grey Headed Flying Fox may occasionally and opportunistically utilise the foraging resources within the subject land.

The Powerful Owl occupies a territory of up to 4000 ha and may occasionally and opportunistically hunt for arboreal mammal prey species such as the Common Ringtail Possum (*Pseudocheirus peregrinus*) within the subject land as part of a larger foraging range (OEH 2018e); however the subject land would not be expected to support an abundance of prey species. Nonetheless, the Powerful Owl may utilise the limited foraging values within the subject land to hunt for prey such as Ring-tailed Possums (*Pseudocheirus peregrinus*) which have the potential to occur.

Some microchiropteran bats are also known to forage in urban areas. These include but are not limited to Bentwing-bats (*Miniopterus australis* and *Miniopterus schreibersii oceanensis*) which are both listed as Vulnerable under the BC Act. These two species of bats are insectivorous cave roosting bats that often frequent buildings and infrastructure, sheltering in roofs, pipes and culverts, etc. (OEH 2018d, b) It is conceivable that these species could occupy nooks and crannies in the buildings of the subject land and may occasionally and opportunistically forage within the vegetation present.

Of the threatened fauna species, only the microchiropteran bats (particularly Bentwing-bats) have any chance of roosting within the subject land. These bats could infiltrate small cracks, crevices and other openings in the buildings to roost (as shown in **Photograph 3**). However,

given the observed condition and maintenance of the buildings, colonies are unlikely to be supported.

3.5 Impacts to Biodiversity

The approximate areas of impact for the construction of the Physical Education and Sports Building, Healy Gymnasium and Substation are shown on **Figure 5**.

i. Physical Education and Sports Building

To make way for the proposed Physical Education and Sports Building, a row of existing structures are to be removed including the College Shop, Healy Gym, Maintenance Workshop and Storage sheds. These structures may contain marginal potential microchiropteran bat roosting habitat as shown in **Photograph 3**.

The construction of the new Physical Education and Sports Building will require the removal of a row of planted street trees along Luke Street. Trees to be impacted include one *Ulmus parvifolia* (Chinese Elm), one *Robinia pseudoacacia* 'Frisa' (Golden Robinia), five *Callistemon viminalis* (Weeping Bottlebrush), one *Jacaranda mimosifolia* (Jacaranda), one *Camellia sasanqua* (Camellia), one *Lophostemon confertus* (Brush Box), three *Ficus benjamina* (Weeping Fig), one *Agonis flexuosa* (Weeping Myrtle), two *Syzygium* sp. (Lilly Pilly), two *Hymenosporum flavum* (Native Frangipani), two *Melaleuca quinquenervia* (Broad-leaved Paperbark), two *Triadica sebifera* (Chinese Tallow), one *Araucaria heterophylla* (Norfolk Island Pine) and one *Viburnum odoratissimum* (Sweet Viburnum).

Additionally, two garden beds are anticipated to be removed adjacent to the existing buildings to be demolished. These garden beds contain a row of *Callistemon salignus* (Willow Bottlebrush) and a mixed planting of *Camellia* sp. (Camellia), *Cupressus* sp. (Cypress), *Buxus microphylla* (Japanese Boxwood), *Liriope muscari* (Lilyturf) and other exotic garden species.

ii. Healy Gymnasium

The construction of the Healy Gymnasium will involve the removal of a single *Phoenix cariensis* (Canary Island Date Palm) and a small portion of the Exotic Grass within the building impact footprint.

iii. Substation

The construction of the substation will require the removal of a garden bed containing Urban Exotic/Native planted vegetation. Species likely to be impacted include *Strelitzia reginae* (Bird of Paradise), *Rhododendron* sp. (Azalea), *Pinus* sp. (Pine) and *Buxus microphylla* (Japanese Boxwood). A single tree is anticipated to be removed in this area.

4. Biodiversity Values Assessment

The BC Act and the BC Regulation list a suite of biodiversity values that are relevant to assessments that must take place under the BC Act. To demonstrate that the project at St Joseph's College will not impact upon biodiversity, **Table 1** systematically comments upon the relevance of each value.

Table 1 Assessment of biodiversity values within the subject land

Biodiversity Value	Assessment within subject land
BC Act - Part 1 Section 1.5 (2)	
(a) vegetation integrity—being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state,	Based upon analysis of historic aerial photography, it is difficult to determine whether remnant vegetation occurs on the subject land. Based upon the results of floristic surveys, it has been concluded that the existing vegetation is comprised predominantly of planted exotic and native species within garden beds and in rows. The composition, structure and function of vegetation within the subject land and the surrounding landscape are considered to have been altered significantly from a near natural state and do not resemble any naturally occurring PCTs known from the locality.
(b) habitat suitability—being the degree to which the habitat needs of threatened species are present at a particular site,	As discussed above, St Joseph's College has little potential to provide habitat for threatened species other than highly mobile, aerial species. Threatened species with the highest likelihood to utilise the subject land include the Grey Headed Flying Fox and the Powerful Owl. Additionally, microchiropteran bats may roost within small crevices throughout the buildings. These highly mobile species may occasionally and opportunistically utilise the limited foraging resources of the subject land as part of a larger foraging range.
(c) biodiversity values, or biodiversity-related values, prescribed by the regulations.	See below.
BC Regulation - Part 1 Clause 1.4	
(a) threatened species abundance—being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site,	No threatened species were observed during the site inspection other than a single <i>Macadamia integrifolia</i> of planted origin and as described above, only highly mobile, aerial species would be expected to utilise the subject land occasionally and opportunistically.
(b) vegetation abundance—being the occurrence and abundance of vegetation at a particular site,	As described above, the subject land is predominantly cleared and contains scattered plantings consisting of exotic and native species. The project is expected to result in the clearing of garden bed plantings and rows of planted trees mostly comprised of exotic and non-endemic species native to NSW. The vast majority of planted

Table 1 Assessment of biodiversity values within the subject land

Biodiversity Value	Assessment within subject land
	trees, shrubs and groundcover are to be retained throughout the subject land.
(c) habitat connectivity—being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range,	St Joseph's College may contribute to the habitat connectivity throughout the largely cleared and artificial landscape that dominates the suburb of Hunters Hill. Trees within the subject land and its immediate surroundings may function as stepping stone habitat for highly mobile fauna, providing a degree of habitat connectivity between the small parks and reserves of the locality such as Riverglade Reserve in the south and Boronia Park in the north.
(d) threatened species movement—being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle,	As above, the subject land does not contribute to the movement of threatened species other than highly mobile, aerial species. Impacts within the subject land would not be expected to have any impact on the lifecycle of such species,
(e) flight path integrity—being the degree to which the flight paths of protected animals over a particular site are free from interference,	St Joseph's College will be changed externally with two infill developments and associated landscaping. The infill developments are not anticipated to exceed the height of existing structures throughout the subject land. Subsequently the project is not expected to impact upon free-flying animals (threatened or otherwise) by interfering with flight paths.
(f) water sustainability—being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site.	St Joseph's College is located sufficiently far away from the Lane Cove River and Tarban Creek to rule out impacts upon the marine environment.

5. Conclusion

Little scope occurs for redevelopment of St Joseph's College to have significant impacts upon defined biodiversity values as a result of the proposed project involving infill developments and associated landscaping. At most, such redevelopment could impact mixed native and exotic planted vegetation comprising potential, marginal habitat within the broad habitat ranges of highly mobile threatened species such as the Grey-headed Flying Fox, microchiropteran bats and the Powerful Owl.

When assessing impacts likely from the project at St Joseph's College there is limited justification for considering impacts to threatened species with the detail required under the BAM. The project may result in marginal reduction in the foraging habitat of highly mobile, aerial

threatened species. When assessing impacts likely from the project in its current form, there is very little likelihood of significant impacts to threatened species.

On the basis of our investigations, we believe that the preparation of a BDAR is not necessary due to the low likelihood of impacts to biodiversity. Therefore, we recommend that a waiver for the preparation of a BDAR be sought from the Department of Planning and Environment for the proposed project at St Joseph's College, constituting State Significant Development.

If any further information is required, or if you have any questions, please do not hesitate to call me on (02) 9868 1933.

Yours sincerely



Dr. David Robertson

Director

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6. References

- Department of the Environment and Energy. 2015. National Flying-fox Monitoring Viewer. Canaberra, ACT.
- DotE. 2014. *Macadamia integrifolia* in Species Profile and Threats Database. Commonwealth Department of the Environment, Canberra.
- OEH. 2016. The Native Vegetation of the Sydney Metropolitan Area - VIS_ID 4489. Office of Environment and Heritage, Sydney.
- OEH. 2018a. BioNet Atlas. Office of Environment and Heritage.
- OEH. 2018b. Eastern Bentwing-bat - profile. Office of Environment and Heritage, Hurstville.
- OEH. 2018c. Grey-headed Flying-fox - profile. NSW Office of Environment and Heritage., Hurstville.
- OEH. 2018d. Little Bentwing-bat - Profile. NSW Office of the Environment and Heritage, Hurtsville.
- OEH. 2018e. Powerful Owl - profile. Office of Environment and Heritage, Hurstville.

Appendix A

Figures



Legend

Subject Land

Image Source:
Image © NearMap 2018
Dated: 4/8/2018



Coordinate System: MGA Zone 56 (GDA 94)

cumberland
ecology

0 50 100 m

Figure 1. Location of the subject land



Legend

 Subject Land

Image Source:
Image © SIXMaps 2018
Dated: 1943

Coordinate System: MGA Zone 56 (GDA 94)



cumberland
ecology

0 50 m

Figure 2. Historic aerial photograph of the subject site (1943 imagery)



Figure 3. Broad scale vegetation mapping of the subject land and surrounds (OEH 2016)



Figure 4. Vegetation of the subject land



Figure 5. Impacts to the vegetation of the subject land

Appendix B

Flora Species List

Table 1 **Flora species recorded within the subject land**

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	RMS1	RMS2	RMS3	RMS4
Alliaceae	<i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Agapanthus	*	-	-		X		
Amaryllidaceae	<i>Clivia miniata</i>		*	-	-		X	X	
Amaryllidaceae	<i>Crinum pedunculatum</i>	Swamp Lily		-	-	X			
Amaryllidaceae	<i>Nothoscordum gracile</i>	Onion Weed	*	-	-			X	
Amygdalaceae	<i>Prunus</i> spp.	Flowering Prunus	*	-	-		X		
Apiaceae	<i>Cyclospermum leptophyllum</i>	Slender Celery	*	-	-			X	
Apocynaceae	<i>Nerium oleander</i>	Oleander	*	-	-		X		
Apocynaceae	<i>Trachelospermum jasminoides</i>	Star Jasmine	*	-	-		X		
Araceae	<i>Monstera deliciosa</i>	Fruit Salad Plant	*	-	-	X	X		
Araceae	<i>Philodendron xanadu</i>	Philodendron		-	-		X		
Araceae	<i>Syngonium podophyllum</i>	Arrowhead vine	*	-	-			X	
Araliaceae	<i>Hedera helix</i>	English Ivy	*	-	-	X			
Araucariaceae	<i>Araucaria heterophylla</i>	Norfolk Island Pine	*	-	-		X	X	
Arecaceae	<i>Phoenix canariensis</i>	Canary Island Date Palm	*	-	-		X	X	X
Aspleniaceae	<i>Asplenium australasicum</i>	Bird's Nest Fern		-	-		X		
Asteliaceae	<i>Cordyline australis</i>	Cabbage Tree	*	-	-	X			
Asteraceae	<i>Gazania rigens</i>		*	-	-		X		
Asteraceae	<i>Sonchus asper</i>	Prickly Sowthistle	*	-	-			X	
Asteraceae	<i>Sonchus oleraceus</i>	Common Sowthistle	*	-	-			X	

Table 1 **Flora species recorded within the subject land**

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	RMS1	RMS2	RMS3	RMS4
Brassicaceae	<i>Cardamine hirsuta</i>	Common Bittercress	*	-	-			X	
Brassicaceae	<i>Lepidium</i>	Peppercress	*	-	-			X	
Bromeliaceae	<i>Bromelia spp.</i>	Bromeliad	*	-	-	X			
Buxaceae	<i>Buxus microphylla</i>	Japanese Boxwood	*	-	-	X		X	
Caprifoliaceae	<i>Abelia chinensis</i>		*	-	-		X		
Caryophyllaceae	<i>Cerastium glomeratum</i>	Mouse-ear Chickweed	*	-	-				X
Caryophyllaceae	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	*	-	-			X	
Caryophyllaceae	<i>Stellaria media</i>	Common Chickweed	*	-	-		X		
Cunoniaceae	<i>Ceratopetalum gummiiferum</i>	Christmas Bush		-	-		X		
Cupressaceae	<i>Cupressus spp.</i>	Cypress	*	-	-		X	X	
Cyatheaceae	<i>Cyathea cooperi</i>	Straw Treefern		-	-		X		
Elaeocarpaceae	<i>Elaeocarpus reticulatus</i>	Blueberry Ash		-	-	X			
Ericaceae	<i>Rhododendron spp.</i>	Azalea	*	-	-	X			
Euphorbiaceae	<i>Euphorbia peplus</i>	Petty Spurge	*	-	-			X	
Fabaceae (Mimosoideae)	<i>Acacia baileyana</i>	Cootamundra Wattle		-	-		X		
Iridaceae	<i>Dietes grandiflora</i>		*	-	-	X		X	
Lamiaceae	<i>Lavandula spp.</i>	Lavender	*	-	-		X		
Liliaceae	<i>Liriope muscari</i>	Lilyturf	*	-	-		X		
Lythraceae	<i>Lagerstroemia indica</i>	Crepe Myrtle	*	-	-			X	

Table 1 **Flora species recorded within the subject land**

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	RMS1	RMS2	RMS3	RMS4
Magnoliaceae	<i>Magnolia grandiflora</i>	Southern Magnolia	*	-	-		X	X	
Malaceae	<i>Photinia serratifolia</i>	Chinese Photinia	*	-	-		X	X	
Malvaceae	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree		-	-			X	
Malvaceae	<i>Malva parviflora</i>	Small-flowered Mallow	*	-	-			X	
Moraceae	<i>Ficus benjamina</i>	Weeping Fig	*	-	-			X	
Moraceae	<i>Morus alba</i>	White Mulberry	*	-	-		X		
Myrtaceae	<i>Callistemon salignus</i>	Willow Bottlebrush		-	-		X		
Myrtaceae	<i>Callistemon viminalis</i>	Weeping Bottlebrush		-	-		X		
Myrtaceae	<i>Corymbia citriodora</i>	Lemon-scented Gum	*	-	-		X		
Myrtaceae	<i>Eucalyptus bicostata</i>	Eurabbie		-	-	X			
Myrtaceae	<i>Eucalyptus microcorys</i>	Tallow Wood		-	-		X		
Myrtaceae	<i>Lophostemon confertus</i>	Brush Box		-	-	X		X	
Myrtaceae	<i>Melaleuca bracteata</i>	Black Tea-tree		-	-		X		
Myrtaceae	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark		-	-		X		
Myrtaceae	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree		-	-		X		
Nandinaceae	<i>Nandina domestica</i>	Japanese Sacred Bamboo	*	-	-	X		X	
Oleaceae	<i>Fraxinus spp.</i>	Ash	*	-	-		X		
Oleaceae	<i>Olea europaea</i> subsp. <i>cuspidata</i>	African Olive	*	-	-		X		
Pinaceae	<i>Cedrus spp.</i>	Cedar	*	-	-		X		

Table 1 **Flora species recorded within the subject land**

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	RMS1	RMS2	RMS3	RMS4
Pinaceae	<i>Pinus spp.</i>	Pine	*	-	-	X			
Pittosporaceae	<i>Hymenosporum flavum</i>	Native Frangipani		-	-			X	
Plantaginaceae	<i>Veronica arvensis</i>	Wall Speedwell	*	-	-				X
Platanaceae	<i>Platanus x acerifolia</i>	London Plane Tree	*	-	-		X		
Plumbaginaceae	<i>Plumbago auriculata</i>	Cape leadwot	*	-	-		X		
Poaceae	<i>Cenchrus clandestinum</i>	Kikuyu Grass	*	-	-		X		X
Poaceae	<i>Cynodon dactylon</i>	Common Couch		-	-				X
Poaceae	<i>Ehrharta erecta</i>	Panic Veldtgrass	*	-	-			X	
Poaceae	<i>Poa annua</i>	Winter Grass	*	-	-		X	X	X
Poaceae	<i>Sporobolus africanus</i>	Parramatta Grass	*	-	-		X		
Poaceae	<i>Stenotaphrum secundatum</i>	Buffalo Grass	*	-	-		X		
Polygalaceae	<i>Polygala myrtifolia</i>		*	-	-		X		
Proteaceae	<i>Banksia integrifolia</i>	Coast Banksia		-	-		X		
Proteaceae	<i>Macadamia integrifolia</i>	Macadamia Nut		-	V		X		
Rosaceae	<i>Rosa spp.</i>	Rose	*	-	-				X
Rubiaceae	<i>Gardenia spp.</i>		*	-	-		X		
Rutaceae	<i>Murraya paniculata</i>		*	-	-	X			
Sapindaceae	<i>Acer palmatum</i>	Japanese Maple	*	-	-	X			
Strelitziaceae	<i>Strelitzia reginae</i>		*	-	-	X			

Table 1 **Flora species recorded within the subject land**

Family	Scientific Name	Common Name	Exotic	BC Act Status	EPBC Act Status	RMS1	RMS2	RMS3	RMS4
Theaceae	<i>Camellia sp.</i>	Camellia	*	-	-	X		X	
Ulmaceae	<i>Ulmus parvifolia</i>	Chinese Elm	*	-	-			X	

Key: V = Vulnerable

Appendix C

Threatened Species Likelihood of Occurrence

Table 2 **Threatened flora species likelihood of occurrence summary**

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
Convolvulaceae	<i>Wilsonia backhousei</i>	Narrow-leafed Wilsonia	V	-	3	Nil	Nil
Dilleniaceae	<i>Hibbertia spanantha</i>	Julian's Hibbertia	E	CE	1	Nil	Nil
Elaeocarpaceae	<i>Tetradlea glandulosa</i>		V	-	2	Nil	Nil
Ericaceae	<i>Epacris purpurascens</i> var. <i>purpurascens</i>		V	-	11	Nil	Nil
Fabaceae (Faboideae)	<i>Dillwynia tenuifolia</i>		V	-	1	Nil	Nil
Fabaceae (Mimosoideae)	<i>Acacia bynoeana</i>	Bynoe's Wattle	E	V	1	Nil	Nil
Fabaceae (Mimosoideae)	<i>Acacia pubescens</i>	Downy Wattle	V	V	1	Nil	Nil
Fabaceae (Mimosoideae)	<i>Acacia terminalis</i> subsp. <i>terminalis</i>	Sunshine Wattle	E	E	4	Nil	Nil
Lamiaceae	<i>Prostanthera marifolia</i>	Seaforth Mintbush	E	CE	1	Nil	Nil
Lobeliaceae	<i>Hypsela sessiliflora</i>		-	X	1	Nil	Nil
Myrtaceae	<i>Callistemon linearifolius</i>	Netted Bottle Brush	V	-	7	Nil	Nil
Myrtaceae	<i>Darwinia biflora</i>		V	V	24	Nil	Nil
Myrtaceae	<i>Eucalyptus camfieldii</i>	Camfield's Stringybark	V	V	1	Nil	Nil
Myrtaceae	<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint	V	V	6	Nil	Nil

Table 2 Threatened flora species likelihood of occurrence summary

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
Myrtaceae	<i>Leptospermum deanei</i>		V	V	1	Nil	Nil
Myrtaceae	<i>Melaleuca biconvexa</i>	Biconvex Paperbark	V	V	1	Nil	Nil
Myrtaceae	<i>Melaleuca deanei</i>	Deane's Paperbark	V	V	3	Nil	Nil
Myrtaceae	<i>Syzygium paniculatum</i>	Magenta Lilly Pilly	E	V	6	Nil	Nil
Orchidaceae	<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E	V	1	Nil	Nil
Orchidaceae	<i>Genoplesium baueri</i>	Bauer's Midge Orchid	E	E	1	Nil	Nil
Orchidaceae	<i>Pterostylis saxicola</i>	Sydney Plains Greenhood	E	E	1	Nil	Nil
Proteaceae	<i>Persoonia hirsuta</i>	Hairy Geebung	E	E	1	Nil	Nil
Thymelaeaceae	<i>Pimelea curviflora</i> var. <i>curviflora</i>		V	V	3	Nil	Nil

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered, X = Extinct

Table 3 Threatened fauna species likelihood of occurrence summary

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
Amphibia							
Myobatrachidae	<i>Pseudophryne australis</i>	Red-crowned Toadlet	V	-	16	Nil	Nil
Aves							

Table 3 Threatened fauna species likelihood of occurrence summary

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	M	25	Nil	Nil
Accipitridae	<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	1	Nil	Nil
Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey	V	-	3	Low	Nil
Anatidae	<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	E	-	4	Nil	Nil
Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail	-	M	6	Nil	Nil
Ardeidae	<i>Ardea ibis</i>	Cattle Egret	-	M	13	Nil	Nil
Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	2	Nil	Nil
Ardeidae	<i>Egretta sacra</i>	Eastern Reef Egret	-	M	1	Nil	Nil
Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V	-	3	Nil	Nil
Artamidae	<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	-	1	Nil	Nil
Burhinidae	<i>Burhinus grallarius</i>	Bush Stone-curlew	E	-	4	Nil	Nil
Cacatuidae	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V	-	4	Nil	Nil
Charadriidae	<i>Pluvialis fulva</i>	Pacific Golden Plover	-	M	14	Nil	Nil
Charadriidae	<i>Pluvialis squatarola</i>	Grey Plover	-	M	1	Nil	Nil
Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E	-	1	Nil	Nil
Haematopodidae	<i>Haematopus longirostris</i>	Pied Oystercatcher	E	-	1	Nil	Nil
Laridae	<i>Hydroprogne caspia</i>	Caspian Tern	-	M	2	Nil	Nil

Table 3 Threatened fauna species likelihood of occurrence summary

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
Laridae	<i>Sterna hirundo</i>	Common Tern	-	M	9	Nil	Nil
Laridae	<i>Sternula albifrons</i>	Little Tern	E	M	2	Nil	Nil
Meropidae	<i>Merops ornatus</i>	Rainbow Bee-eater	-	M	1	Nil	Nil
Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	1	Nil	Nil
Psittacidae	<i>Glossopsitta pusilla</i>	Little Lorikeet	V	-	2	Nil	Nil
Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	-	M	2	Nil	Nil
Scolopacidae	<i>Arenaria interpres</i>	Ruddy Turnstone	-	M	4	Nil	Nil
Scolopacidae	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	-	M	6	Nil	Nil
Scolopacidae	<i>Calidris canutus</i>	Red Knot	-	E,M	3	Nil	Nil
Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE,M	14	Nil	Nil
Scolopacidae	<i>Calidris ruficollis</i>	Red-necked Stint	-	M	10	Nil	Nil
Scolopacidae	<i>Limosa lapponica</i>	Bar-tailed Godwit	-	M	24	Nil	Nil
Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit	V	M	3	Nil	Nil
Scolopacidae	<i>Numenius madagascariensis</i>	Eastern Curlew	-	CE,M	2	Nil	Nil
Scolopacidae	<i>Numenius phaeopus</i>	Whimbrel	-	M	1	Nil	Nil
Scolopacidae	<i>Tringa brevipes</i>	Grey-tailed Tattler	-	M	3	Nil	Nil
Scolopacidae	<i>Tringa nebularia</i>	Common Greenshank	-	M	1	Nil	Nil
Strigidae	<i>Ninox connivens</i>	Barking Owl	V	-	2	Low	Nil
Strigidae	<i>Ninox strenua</i>	Powerful Owl	V	-	177	May occasionally and	Low likelihood of impact as the

Table 3 Threatened fauna species likelihood of occurrence summary

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
						opportunistically hunt for prey within the subject site as part of a large habitat range	removal of native trees is anticipated to result in a marginal reduction of potential foraging habitat.
Tytonidae	<i>Tyto tenebricosa</i>	Sooty Owl	V	-	1	Nil	Nil
Insecta							
Petaluridae	<i>Petalura gigantea</i>	Giant Dragonfly	E	-	1	Nil	Nil
Mammalia							
Emballonuridae	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V	-	3	Nil	Nil
Otariidae	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	V	-	1	Nil	Nil
		Long-nosed Bandicoot population in inner western Sydney	E	-	3	Nil	Nil
Peramelidae	<i>Perameles nasuta</i>						
Petauridae	<i>Petaurus australis</i>	Yellow-bellied Glider	V	-	1	Nil	Nil
			V	V	67	The species would be expected to be frequently seen overflying site associated with various camps within the foraging range of the species. May	Low likelihood of impact as the removal of native trees is anticipated to result in a marginal reduction of potential foraging habitat.
Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox					

Table 3 **Threatened fauna species likelihood of occurrence summary**

Family	Scientific Name	Common Name	BC Act Status	EPBC Act Status	No. Of Records	Likelihood of Occurrence	Likelihood of impacts from DA
						occasionally and opportunistically forage within the subject site as part of a large habitat range	
Vespertilionidae	<i>Miniopterus australis</i>	Little Bentwing-bat	V	-	1	Nil	Nil
							Low likelihood of impact if major works to the buildings are to occur. The removal of native trees is anticipated to result in a marginal reduction of potential foraging habitat.
	<i>Miniopterus schreibersii</i>		V	-	22	May occasionally and opportunistically forage within the subject site as part of a large habitat range	
Vespertilionidae	<i>oceanensis</i>	Eastern Bentwing-bat					
							Low likelihood of impact if major works to the buildings are to occur. The removal of native trees is anticipated to result in a marginal reduction of potential foraging habitat.
			V	-	5	May occasionally and opportunistically forage within the subject site as part of a large habitat range	
Vespertilionidae	<i>Myotis macropus</i>	Southern Myotis					result in a marginal reduction of potential foraging habitat.

Key: V = Vulnerable, E = Endangered, CE = Critically Endangered, M= Migratory