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Flora and Fauna Assessment

MASTER PLAN PLANNING PROPOSAL FOR 1-31 WALTER STREET AND 452- 462 WILLOUGHBY ROAD WILLOUGHBY

13th September 2019

SUMMARY

Fraser Ecological Consulting has been contracted by Walter Projects Pty Ltd ATF/Walter Developments Trust (c/o Architecture Urbaneia P/L) to prepare an assessment of ecological impacts to accompany the planning proposal to change the zone from R3 Medium density to R4 High density residential for sites 1-31 Walter Street and 452-462 Willoughby Road Willoughby.

This assessment has been conducted in accordance with State legislation (*Environmental Planning and Assessment Act 1979*) which requires that actions judged to significantly impact upon threatened species, populations or ecological communities, or their habitats listed under the *Biodiversity Conservation Act (2016)* trigger the preparation of a Species Impact Statement.

The proposal does not trigger the requirement for a Biodiversity Assessment Report for the following reasons:

- The total area of native vegetation (locally indigenous vegetation) does not exceed the BOS threshold.
- The site is not listed under the Sensitive Biodiversity Values Map.

The major conclusion arising from this Assessment is that the proposed development is unlikely to result in a significant impact on any listed species or communities providing that the applicant actively implements the recommendations from this assessment. Therefore in accordance with the EPA Act (1979), BC Act (2016) and FM Act (1994), a Species Impact Statement is not required.

Licensing When conducting flora and fauna surveys, consultants are required to possess licences to ensure that works are completed in an appropriate manner. Fraser Ecological Consulting is licensed under s.132c and s.91 of the NSW National Parks and Wildlife Act (1974) from the NSW NPWS. This allows Alex Fraser to undertake scientific investigations, collect specimens of protected flora and fauna across NSW in service and non-service areas and undertake bushland restoration works in EECs. This licence requires that all survey results are reported to the NSW NPWS for inclusion into the Atlas of NSW Wildlife.

Alex Fraser also holds an Animal Research Authority under the Animal Research Act (1995), as administered by NSW Agriculture. Surveys are approved and supervised by an Animal Care and Ethics Committee, applying the standards as detailed in the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes (NHMRC 1997).

Definition of terms

Development: has the same meaning as defined in the *EP&A Act 1979*

Activity: has the same meaning as defined in the *EP&A Act 1979*

Proposal: is the development, activity of action proposed

Threatened, species, population and ecological communities: has the same meaning as defined in the *Biodiversity Conservation Act 2016*.

Subject site: the area directly affected by the proposal

Study area: the subject site and any additional areas, which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account.

Locality: the area within a 5km radius of the subject site.

Direct impacts: those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.

Indirect impacts: occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.

1.0 Introduction

1.1. Introduction

This terrestrial ecological assessment was commissioned by *Walter Projects Pty Ltd ATF/Walter Developments Trust (c/o Architecture Urbaneia P/L)* to accompany the planning proposal to Willoughby Council for a high density multi-unit residential development at 1-31 Walter Street and 452-462 Willoughby Road Willoughby.

The terrestrial ecological assessment:

- Identifies key vegetation communities occurring within the subject site;
- Reviews literature and databases relevant to the subject site;
- Describes the methodology and results of the survey;
- Addresses potential ecological impacts resulting from the proposed development;
- Proposes appropriate mitigation measures; and
- Provides an assessment of the likelihood of significant impacts on threatened species and populations, and endangered ecological communities, according to Section 5A of the NSW EPA Act and BC ACT. This was done to determine the need for an SIS or an application under the BC Act.

Activities specifically related to the preparation of this report included:

- Assessment of the ecological impacts of the proposed development
- Threatened species Assessment of Significance in accordance with state and federal legislation where relevant

1.2 Site characteristics

The study site is located approximately 5km north of the Sydney CBD situated in the Willoughby Council LGA and within the Sydney Basin Bioregion (Figure 1 and 2).

The surrounding area is highly urbanised yet characterised by a mixture of some remnant native trees and introduced garden plantings (Figure 3).

The climate of the area is temperate with mild to hot summers and cool to cold winters. The mean annual rainfall for the area is relatively high at 1065.7mm (Bureau of Meteorology 2019).

1.3 Proposed development

The proposed development includes:

- demolition of the existing dwellings
- construction of new residential apartments
- underground basement car parking
- landscape areas

Please refer to Figure 3 for specific properties assessed within this proposal.

The proposed Landscape Masterplan is provided in Appendix A.

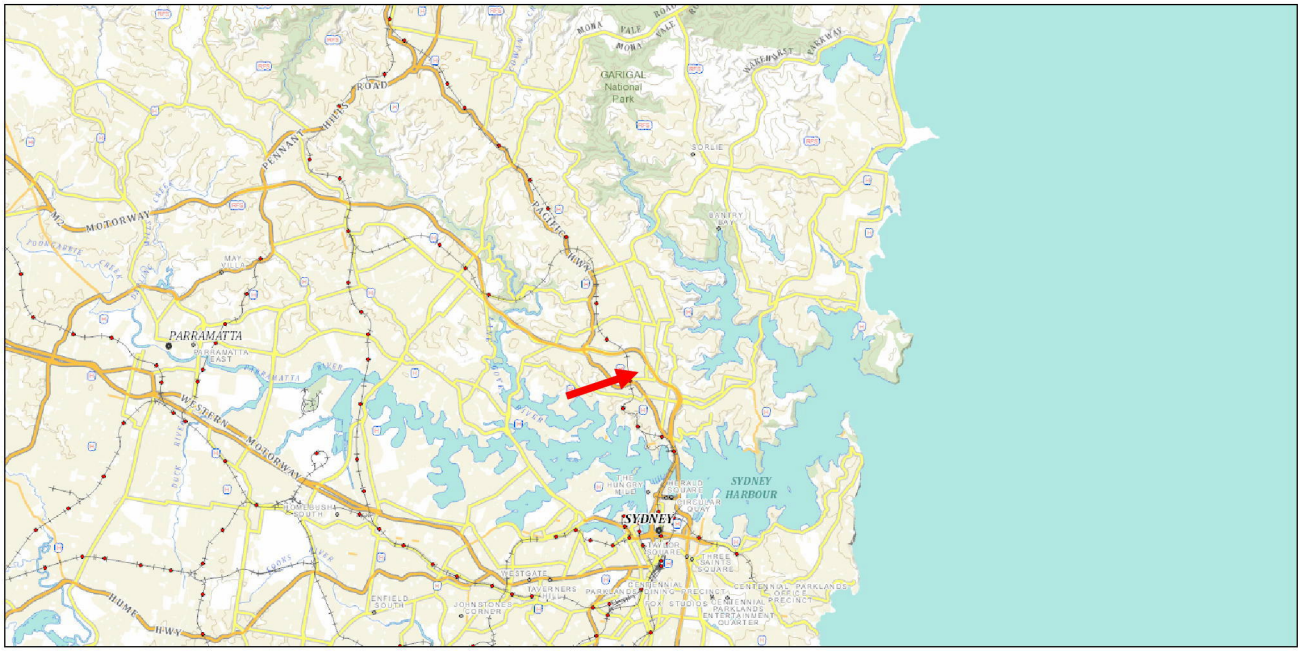


Figure 1: The site in context the wider locality of Sydney Metropolitan Region (red marker). Aerial Source: Department of Lands SIX Maps.com

Figure 2: Nearmap aerial imagery of the catchment in relation to the development site

Figure 3: The subject site at 1-31 Walter Street and 452-462 Willoughby Road Willoughby

2.2. State

Local Government Act 1993

The Act sets out the responsibilities of Councils including public land management, activity approvals, corporate and operation planning, orders and enforcement powers, setting rates and charges (LGSA 2009). Section 7(e) of the Act requires Councils, Councillors and Council employees to have regard to the principles of ecologically sustainable development in carrying out their responsibilities. The Charter (Section 8) also requires Councils to properly manage, develop, protect, restore, enhance and conserve the environment of the area for which it is responsible, in a manner that is consistent with and promotes the principles of ecologically sustainable development. Under this Act, Councils are required to have Plans of Management for all Council owned land.

Biodiversity Conservation Act 2016

The Biodiversity Offsets Scheme Threshold is a test used to determine when is necessary to engage an accredited assessor to apply the Biodiversity Assessment Method (the BAM) to assess the impacts of a proposal.

It is only used for local developments (development applications submitted to councils) and clearing that does not require development consent in urban areas and areas zoned for environmental conservation (under the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017).

The Biodiversity Conservation Regulation 2017 sets out threshold levels for when the Biodiversity Offsets Scheme will be triggered. The threshold has two elements:

- Whether the amount of native vegetation being cleared exceeds a threshold area, or

- Whether the impacts occur on an area mapped on the Biodiversity Values map published by the Chief Executive of the NSW Office of Environment and Heritage.

If clearing and other impacts exceeds either trigger, the Biodiversity Offset Scheme applies to the proposed development including biodiversity impacts prescribed by clause 6.1 of the Biodiversity Regulation 2017.

If the Biodiversity offsets scheme is not triggered, the test of significance detailed in section 7.3 of the Biodiversity Conservation Act 2016 must be used to determine whether a local development is likely to significantly affect threatened species.

Proponents will need to supply evidence relating to the triggers for the Biodiversity Offsets Scheme Threshold and the test of significance when submitting their application to the consent authority. This tool can be used as a guide to decide whether or not you as the proponent (or agent of the proponent) would be required to enter the Biodiversity Offsets Scheme.

A user guide for this tool is also available at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/biodiversity-values-map-threshold-tool-user-guide. **The proposal does not trigger the requirement for a Biodiversity Assessment Report.**

3.0 Methodology

This chapter presents the methods used in conducting the ecological survey and assessment of the conservation importance of the study area.

3.1 Desktop survey

A desktop survey was performed to ensure all relevant documentation is considered when preparing the plan. Documents and other information resources utilised include:

- Aerial photographs
- Native Vegetation of the Cumberland Plain Maps (Tozer 2003)
- Sydney Soil Landscape Series Sheet 9130 (Chapman and Murphy 1998)

Consultant plans and reports used in this assessment:

- Survey Plan prepared by Peak Surveying Services Plan No. 16-798 Dated 17.4.2016
- Architectural Master Plans prepared by AU Architecture Urbaneia (Appendix A)
- Arborist Impact Assessment Report prepared by Redgum Horticultural and Tree Management Plan (dated 29th August 2019)

3.2 Field Surveys

A visual inspection was undertaken on the 24th January 2017 and 10th August 2019 to identify and evaluate the current vegetation community occurring on the subject site, identify any threatened flora and fauna species and assess the current nature and extent of fauna habitats.

Given the relatively small size of the site a day of surveying was considered an appropriate period of time to assess the native flora and fauna habitat values of the site. Features of the vegetation including floristics, structure, extent, type and projective foliage cover, presence of weed species and other significant features were noted and recorded.

Targeted fauna surveys were not considered necessary.

Dependent upon access to sites, fora recorded were predominantly identified to family, genus and species level with confirmation according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), *Weeds of the south-east: an identification guide for Australia* (Richardson, 2006*), Native Plants of the Sydney District* (Fairly and Moore 2000) and the Botanic Gardens Trust (2009) *PlantNET* flora database.

3.3 Assessment of conservation value

Conservation value parameters

The conservation value of flora and fauna habitats on the subject site was determined by reference to the following criteria:

- Representativeness - whether the vegetation communities of the site are unique, typical or common in the bioregion. In addition the criteria takes into account whether or not such vegetation units are presently held in conservation reserves;
- the presence of threatened or regionally significant species on the site; the extent of human influence on the natural environment of the site and the condition of habitats (e.g. the presence of weeds, fire frequency, etc.);
- the uniqueness of the natural values of the site;
- the amount of native vegetation to be cleared or modified by the proposed development in relation to what remnant vegetation will remain in the locality; and
- the relative importance of the site as a corridor for the movement of wildlife.

4.0 Field Observations

The site for the proposed development comprises of introduced trees and landscaped gardens. The understorey plantings are typical garden planting characteristic of the North Shore including and small areas of grass turf amongst hard surface areas within existing private open space areas.

A fully structured native vegetation community was not observed on-site.

Some planted native tree species were observed, and therefore, this ecological assessment has been undertaken as a precautionary measure.

A summary of the specific findings of the Arboricultural Impact Assessment Report prepared Redgum Horticultural (dated 29th August 2019) involved the assessment of 133 trees. It considered the removal of one hundred and four (104) trees within the property and on the Walter Street road reserve and the retention of twenty-nine (29) trees within the site, neighbouring property and adjacent on the road reserve.

Locally / indigenous native trees are proposed for removal included the following species:

- *Angophora costata (Smooth-barked Apple)*
- *Pittopsorum undulatum (Sweet Pittosporum) Tree*
- *Allocasuarina littoralis (Black She oak)*
- *Glochidion ferdinandi (Cheese Tree)*
- *Acacia decurrens (Green Wattle)*
- *Elaeocarpus reticulatus* (Blueberry Ash)

Planted native species that have established themselves over time as larger specimens that were recorded on site included:

- *Casuarina glauca (Swamp She Oak)*
- *Banksia marginata (Silver Banksia)*
- *Eucalyptus microcorys (Tallowwood)*
- *Tristaniopsis laurina (Water Gum)*
- *Archontophoenix cunninghamiana (Bangalow Palm)*
- *Corymbia maculata (Spotted Gum)*
- *Ficus benjamina* (Hills Weeping Fig) x 3 - introduced species
- *Araucaria heterophylla Norfolk Island Pine*
- *Syzygium luehmannii Small Leafed Lilly Pilly*
- *Lophostemon confertus Brush Box*

Introduced exotic species recorded on-site included:

- *Camellia japonica* Camellia
- *Tristaniopsis collina* Hill Water Gum
- *Callistemon 'Harkness'* Harkness Bottlebrush
- *Lagerstroemia indica* Crepe Myrtle
- *Callistemon viminalis* 'Hanna Ray' Hanna Ray Bottlebrush

- *Juniperus sabina* Savin Juniper
- *Fraxinus griffithi*i Evergreen Ash
- Yucca sp. Yucca
- *Butia capitata* Jelly Palm
- *Cupressus macrocarpa* 'Leightons Green'
- *Acer palmatum* Japanese Maple
- *Viburnum odoratissimum* Sweet Viburnum
- *Cupressus macrocarpa* 'Brunniana' Brunnings Cypress

Opposite the proposed development site, the southern side of Walter Street are connected to native vegetation occurring within Council - managed bushland of Flatrock Creek which is a combination of a planted bushland buffer adjoining a man-made drainage canal. Introduced plantings with mowed understorey dominate both the road frontage and rear yards of 2-18 Walter Street. Some of the introduced vegetation recorded in these properties comprise of *Cinnamomum camphora* (Camphor laurel), *Celtis sinensis* (Chinese Celtis), *Liquidambar styraciflua* (Liquid Ambar), *Arauja sericifera* (Moth Vine), *Cedrus deodara* (Himalayan Cedar) and *Eriobotrya japonica* (Loquat). A few locally indigenous *Angophora costata* (Sydney Red Gum) were recorded along the rear property boundaries adjoining Flatrock Creek. None of this vegetation will be impacted by the proposal.

The planted native vegetation adjoining Flatrock Creek includes comprised of locally native plantings including *Lomandra longifolia*, *Dianella caerulea*, *Kunzea ambigua*, *Eucalyptus punctata*, *Eucalyptus saligna*, *Syncarpia glomulifera*, *Hakea salicifolia*, *Pittosporum undulatum*, *Dodonaea triquerta*, *Omalanthus populneus*, *Imperata cylindrica*, *Tristaniopsis laurina*, *Allocasuarina littoralis*, *Breynia oblongifolia*, *Casuarina cunninghamiana*, *Melaleuca* spp. and *Histiopsteris incisa*.
None of this vegetation will be impacted by the proposal.

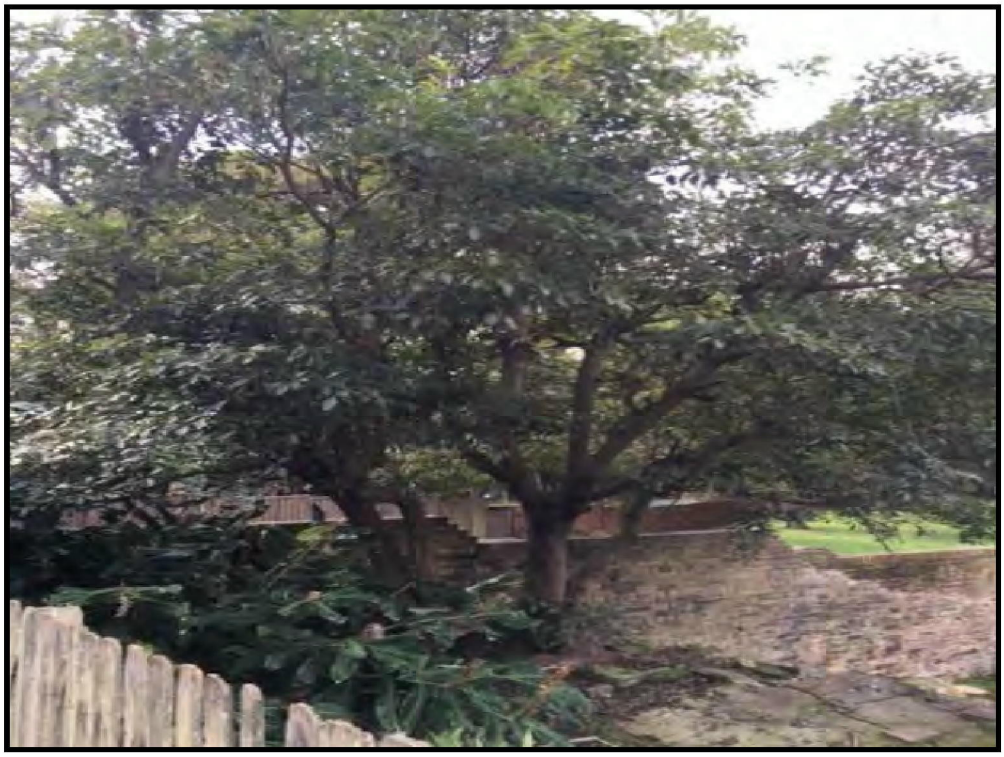
Photograph 1: Eastern view along Walter Street (taken by Alex Fraser 24/1/17)

Photograph 2: Western view along Walter Street (taken by Alex Fraser 24/1/17)

Photograph 3: Western view from beginning of Walter Street (Source: Google Maps Streetview)

Photograph 4: Western view along Walter Street from No.9 (Source: Google Maps Streetview)

Photograph 5: Western view along Walter Street from No.15 (Source: Google Maps Streetview)



Photograph 6: Native *Pittosporum undulatum* within yard of 5-9 Walter Street

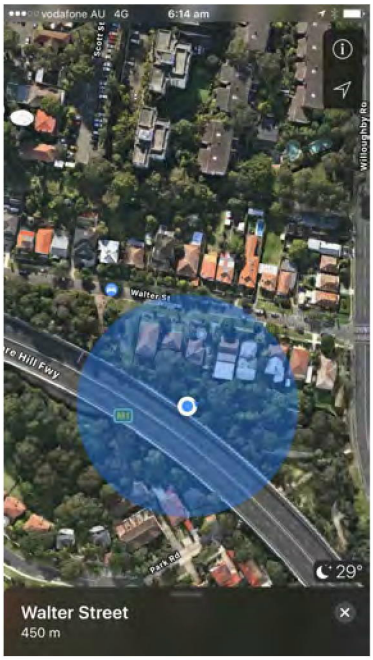
Photograph 7: Manicured yard of 5-9 Walter Street

Photograph 8: Native *Callstemon tree* within yard of 21-27 Walter Street

Photograph 9: Native *Casuarina cunninghamia* tree within yard of 21-27 Walter Street

Photograph 10: Vacant lots adjacent to 18 Walter Street

Photograph 11: Native *Callstemon tree* within yard of 21-27 Walter Street

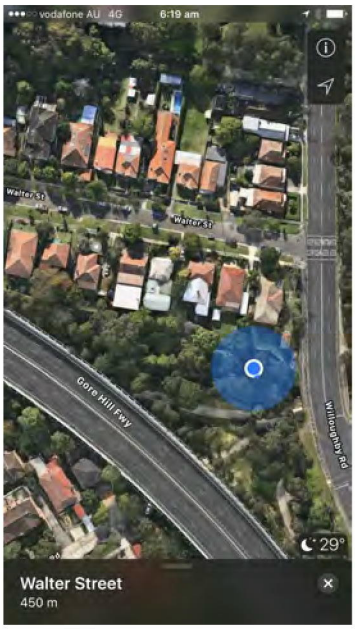


Photograph 12: Rear of 14 Walter Street

Photograph 13: Flatrock Creek

Photograph 14: Rear of 12 Walter Street backing on Flatrock Creek

Photograph 15: Rear of 10 Walter Street backing on Flatrock Creek



Photograph 16: Rear of 4 Walter Street backing on Flatrock Creek

Photograph 17: Cycleway backing onto Flatrock Creek

Photograph 18: Planting of native *Casuarina cunninghamiana* trees adjacent to no. 460 Willoughby Road that will be nominated for removal (Source: Google Maps Streetview)

Photograph 4: Western view along Walter Street from No.9 (Source: Google Maps Streetview)

5.0 Assessment of species likely to be affected

The *Biodiversity Conservation Act 2016* requires assessment of impacts to consider the nature, extent and timing of the proposal and all associated actions, including but not restricted to construction, provision and ongoing maintenance of approved or proposed:

- buildings
- utilities
- access/ egress routes
- pipelines
- drainage infrastructure and changes made to surface water flows
- landscaping

Assessment must include the direct and indirect impacts of these activities which may occur both on and off the subject land. The impacts on threatened species and populations from the proposed residential development are likely to arise from:

- Fragmentation and isolation of habitat
- Loss of locally significant vegetation
- Loss of foraging and roosting habitat and a reduction in their local abundance and distribution
- Changes in hydrological regime
- Deterioration in water quality
- Increased susceptibility on site and on adjacent and downstream areas, to competition, disease, predation, insect attack, and other disturbances due to increased access and a reduction in vegetative cover
- Indirect effects of urbanisation e.g. tree removal, rubbish dumping, soil compaction, erosion, weed invasion as well as altered drainage patterns and nutrient levels resulting from increased runoff; and
- Clearing, modification and long term degradation of habitat associated with the provision of asset protection zones
- Of the threatened species recorded in the locality, the likelihood of occurrence of each species in or near the subject site was determined by survey results in conjunction with analysis of their habitat requirements, the habitats on site and the nature and extent of adjacent habitats.
- Each species has been assigned to one of four groups according to their likelihood of occurring on the subject site or within adjacent habitats likely to be impacted by the proposed works:

    - No likelihood to occur – these are generally aquatic or marine species.
    - Low likelihood to occur - species with specific terrestrial niches and habitat requirements that generally do not occur on or near the subject site.

- Moderate likelihood to occur - species whose preferred habitat features in a strict sense occur on or near to the site but are considered generally unlikely to occur. This may be due to such things as the nature of habitats and disturbances between confirmed locations and the subject site, its movement patterns, the extensive and common nature of the available habitat in the local area, the rarity of the species and the size of its home range.
- High likelihood to occur – species whose preferred habitat features occur on the site and / or have been recorded close by in similar habitat, and / or are able to reach the subject site from other known and confirmed locations.

These analyses for both threatened flora and fauna are detailed in Appendix B and C.

Determinations of the NSW Scientific Committee Http://www.environment.nsw.gov.au/committee/FinalDeterminations.htm) were made subsequent to the issue of the Director-general's requirements were reviewed as were the relevant databases to ascertain whether anymore species, populations and communities need to be considered.

5.1 Database results

A full Atlas report with point records from OEH Wildlife Data Unit were obtained from NSW OEH on the 10/09/2019. Data obtained from the OEH Wildlife Data Unit and the Bionet database for a 10km x 10km area of the site was compiled to obtain threatened species records within that area. Bionet includes records provided by the Australian Museum, State Forest, the Department of Primary Industries and the Royal Botanic Gardens as well as generalised records from the Atlas of Willdlife.

Further review of the suitability of the site for these species is found in Appendix B and C.

5.1.1 Threatened plants previously recorded within 10km of the site

(Bionet accessed August 2019)

Previous records of threatened plants recorded within 10km of the site include:

- *Tetratheca glandulosa*
- *Epacris purpurascens var. purpurascens*
- *Acacia bynoeana*
- *Acacia terminalis subsp. terminalis*
- *Haloragodendron lucasii*
- *Prostanthera marifolia*
- *Callistemon linearifolius*
- *Darwinia biflora*
- *Eucalyptus camfieldii*
- *Eucalyptus nicholii*
- *Leptospermum deanei*
- *Melaleuca deanei*
- *Syzygium paniculatum*
- *Genoplesium bauera*

- *Deyeuxia appressa*
- *Grevillea caleyi*
- *Persoonia hirsuta*
- *Pimelea curviflora var. curviflora*

5.1.2 Threatened fauna previously recorded within 10km of the site (Bionet accessed August 2019)

- *Heleioporus australiacus* Giant Burrowing Frog
- *Pseudophryne australis* Red-crowned Toadlet
- *Litoria aurea* Green and Golden Bell Frog
- *Varanus rosenbergi* Rosenberg's Goanna
- *Nettapus coromandelianus* Cotton Pygmy-Goose
- *Ptilinopus superbus* Superb Fruit-Dove
- *Ephippiorhynchus asiaticus* Black-necked Stork
- *Botaurus poiciloptilus* Australasian Bittern
- *Ixobrychus flavicollis* Black Bittern
- *Hieraaetus morphnoides* Little Eagle
- *Pandion cristatus* Eastern Osprey
- *Callocephalon fimbriatum* Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
- *Callocephalon fimbriatum* Gang-gang Cockatoo
- *Calyptorhynchus lathami* Glossy Black-Cockatoo
- *Glossopsitta pusilla* Little Lorikeet
- *Lathamus discolour* Swift Parrot
- *Polytelis swainsonii* Superb Parrot
- *Ninox connivens* Barking Owl
- *Ninox strenua* Powerful Owl
- *Anthochaera Phrygia* Regent Honeyeater
- *Daphoenositta chrysoptera* Varied Sittella
- *Petroica boodang* Scarlet Robin
- *Dasyurus maculatus* Spotted-tailed Quoll
- *Isoodon obesulus obesulus* Southern Brown Bandicoot (eastern)
- *Phascolarctos cinereus* Koala
- *Cercartetus nanus* Eastern Pygmy-possum
- *Petaurus australis* Yellow-bellied Glider
- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Mormopterus norfolkensis* Eastern Freetail-bat
- *Chalinolobus dwyeri* Large-eared Pied Bat
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Miniopterus schreibersii oceanensis* Eastern Bentwing-bat.

5.2 Fauna species

5.2.1 Habitat description

The subject site is essentially comprises urban backyards that contains an upper canopy (both native and non-native trees) and introduced horticultural shrubs and groundcovers).

The most significant fauna habitat present on site is primarily marginal foraging and roosting habitat resources for mobile fauna groups including birds, bats and other mammals including Common Brushtail Possum.

The trees throughout all lots of the subject site provide upper canopy inter-connectivity including canopy contact with introduced and remnant trees on the adjacent property.

No habitat hollows were recorded on site, and therefore, the habitat on-site is not considered to provide critical breeding habitat resources.

5.2.2 Threatened fauna species

This section describes fauna species that require further consideration and assessment.

All threatened fauna species that have been previously recorded within 10km of the site or from database searches were considered in this assessment. All such subject species that have been identified as containing potential habitat and their habitat utilisation of the site's habitat features (as described above) are provided in Appendix E.

From the review of databases and other records in relation to species habitat requirements, it is considered that the following threatened fauna species are likely to occur in the study area, and may potentially use the site for foraging and roosting despite not being recorded during recent surveys:

- Little Lorikeet
- Grey-headed Flying Fox.

The species listed above do not rely upon habitats on site that form critical breeding resources that are essential to maintain the lifecycle of a local population, and therefore, Assessments of Significance ('seven part tests') were not required as part of this assessment.

Refer to Appendix C for all other threatened fauna considered and justification for these species not be considered further.

6.0 Proposed impacts

6.1 Tree removal

The tree impacts of the proposal are limited to the removal of predominantly exotic or the occasional non locally native tree species. No trees containing significant habitat (e.g. such as hollows) occur on site or are proposed for removal.

The Arboricultural Impact Assessment Report prepared Redgum Horticultural states the following with regards to specific tree impacts:

This report considers 133 trees, 109 trees within the site, 4 trees on a neighbouring property and 20 trees on the adjacent road reserve with Trees 2, 3, 4, 5, 27, 64 to 69x4, 70x5, 71 to 74, 78, 79, 80, 83 & 92x2 to be retained and protected and Trees 1, 6 to 26 & 28 to 47x2, 48, 49, 50x6 to 58x3, 59x7, 60 to 63x3, 75 to 78, 81, 82, 84 to 87x2, 88 to 91 & 93x2, 94, 95x2, 96 to 102x3, 103 & 104 are recommended to be removed. For Tree 2, 3, 5, 27, 64, 65, 66, 67, 68, 69, 78, 80, 83 & 92x2; the alignment of the development is sufficiently setback to not affect these specimens. Tree 4; the alignment of the basement and children's play area are a major encroachment to this specimen. The section of the development within the TPZ of this specimen is to be constructed using tree sensitive excavation and construction techniques such as a vertical cut with shotcrete and contiguous pilings for the basement to reduce any impact on its stability. Root Mapping may be required due to the proposed positioning of Play area and possible level changes within tree protection zones of Neighbouring property retained specimens. Tree 71, 72, 73, 74 & 79, these specimens will be subject to a major encroachment by the proposed retaining wall.

As the proposed excavation for the retaining wall is on down slope or across slope side of trees the potential is increased for tensile roots to the north of the site; therefore root mapping is recommended to ascertain if significant woody (above 30mm) would be impacted by the retaining wall otherwise redesign within the TPZ to reduce the encroachment to minor would be required.

The boundary fences and retaining wall within the tree protection zone of the retained specimens are to be constructed using tree sensitive excavation and construction techniques such as pier and beam construction with suspended sections to reduce any impact on their stability, with piers to be dug by hand using non-motorised machinery to further assist in their protection.

All trees on no. 462 are proposed for removal.

6.2 Impacts upon habitat connectivity

The vegetation on site does not provide an important connective function between other patches of adjacent native vegetation and does not form part of important habitat corridor. Therefore, the removal of this vegetation will not further fragment other local populations of threatened species, communities or ecological communities.

The proposed removal of the vegetation on site will not exacerbate edge effects to other areas of native vegetation in the locality. Mobile vectors (such as insects, birds, possums and bats) required for the cross-pollination and exchange of genetic material between similar isolated areas of native vegetation and fauna habitats. EECs in the locality will not have their ability to perform these functions disrupted as a result of the proposal.

The connectivity between other remnants in the locality will not be impacted by the proposal particularly Flatrock Creek.

The proposed development includes landscaping and are likely to include locally indigenous species to offset the proposed loss of trees. The proposed landscape re -design is to improve the urban forest values of the site ensuring the new tree planting will provide sustainability into the foreseeable future (Appendix A).

6.3 Consideration of threatening processes

The proposal does not require the removal of native vegetation. However, this development application has considered the Key Threatening Process "Clearing of Native Vegetation" as a precautionary consideration.

NSW OEH has identified the following actions to help in the recovery of this endangered ecological community in NSW:

1. Develop and implement Cumberland Plain Reservation Strategy and create a protected bushland network through targeted land acquisition as land becomes available (high priority).
2. Encourage and promote best-practice management of EECs on private land (medium priority).
3. Encourage planning authorities to address EECs in development of environmental planning instruments and, where possible, seek biodiversity certification (medium priority).
4. Ensure the consideration of impacts on EECs when enforcing noxious weed or pest species control in EECs (medium priority).
5. Finalise the multi-EEC recovery plan as a State priority in accordance with contractual obligations with DEH, by July 2007 (medium priority).

6. Incorporate consideration of EEC protection in regional open space planning (high priority).
7. Investigate the development of a regular monitoring program to assess the change in extent of vegetation across the Cumberland Plain (medium priority).
8. Investigate the preparation of a recommendation for the declaration of critical habitat (low priority).
9. Liaise with institutions to facilitate research relevant to the recovery of Cumberland Plain EECs (low priority).
10. Local Govt prepare plans of management in accordance with the Local Government Act for reserves containing EECs, which have conservation as a primary objective, or where conservation is compatible (high priority).
11. Manage, to best practice standards, areas of EECs which have conservation as a primary objective, or where conservation is compatible. Priorities are to be based on DEC conservation significance assessment (high priority).
12. Management of EECs is to be included in school environmental management plans where the school land contains EECs (medium priority).
13. Management of EECs to be included in the conditions for Crown land trusts, lease and licence holders (medium priority).
14. Prepare and implement community awareness, education and involvement strategy (medium priority).
15. Promote best practice management guidelines (medium priority).
16. Public authorities will promote management agreements to landholders through their ongoing land use planning activities (medium priority).
17. Support community conservation by providing nursery or other facilities, for regeneration activities (low priority).

7.0 Conclusion

The major conclusion arising from this Assessment is that the proposed development is unlikely to result in a significant impact on any listed species or communities providing that the applicant actively implements the recommendations from this assessment. Therefore, in accordance with the EPA Act (1979), BC Act (2016) and FM Act (1994), a Species Impact Statement is not required.

8.0 References

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APPENDIX A

WALTER STREET LANDSCAPE MASTERPLAN

MASTER PLAN PLANT SCHEDULE

Botanical Name	Common Name	Hgt	spg'	Qty	Size
TREES					
Acer palmatum 'Omurayama'	Maple	4m			100L
Acer palmatum 'Disectum Seiryu'	Maple	3m			100L
Citrus (lime, lemon, orange, grapefruit)	Citrus	5m			100L
Corymbia maculata	Spotted Gum	20m			45L
Cupaniopsis anacardiodes	Cupania	5m			100L
Elaeocarpus reticulatus	Blue Berry Ash	8m			100L
Ficus rubiginosa	Port jackson Fig	12m			100L
Lagerstroemia indica "Mauve"	Crepe Mrytle	6m			100L
Magnolia denudata	Yulan Magnolia	8m			200L
Magnolia grandiflora	Evergreen Magnolia	10m			100L
Magnolia 'Little Gem'	Dwarf Magnolia	4m			75L
Magnolia x soulangeana 'Lennei Alba'	Magnolia	4m			100L
Malus floribunda	Crab Apple	4m			100L
Prunus 'Shirotae'	Flowering Cherry	4m			100L
Pyrus calleryana 'Chanticleer'		8m			100L
Sapium		8m			100L
Tristaniopsis laurina	Water Gum	10m			100L
Waterhousia floribunda		6m			100L
SHRUBS					
Acmena smithii 'Hedgemaster'	Lilly Pilly	1m	2/m2		300mm
Callistemon 'Scarlet Flame'		1m	2/m2		200mm
Camellia sasanqua 'Simply Red'	Camellia	2m	2/m2		300mm
Cyathea	Rough Tree Fern	1m	1/m2		300mm
Cycas revoluta	Cycad	1m	2/m2		300mm
Erisotemon	White Flax Flower	1m	2/m2		140mm
Escallonia 'Gwendolyn Anley'	Pink Escallonia	1.5m	2/m2		250mm
Gardenia 'Professor Pucci'	Gardenia	1m	2/m2		250mm
Grevillea rosmarinifolia 'Crimson Villea'		1m	2/m2		140mm
Helioborus orientalis	Winter Rose	1m	3/m2		140mm
Hydrangea macrophylla	Hydrangea	1.5m	2/m2		250mm
Lavandula stoechas	French Lavender	1m	2/m2		200mm
Leptospernum		2m	2/m2		140mm
Lonicera nitida	Boxleaf Honeysuckle	1.5m	2/m2		250mm
Loropetalum chinense 'China Pink'	Fringe Flower	1.5m	2/m2		250mm
Murraya paniculatum	Orange Jessamine	2m	2/m2		300mm
Osmanthus fragrans	Sweet Osmanthus	2m	2/m2		300mm
Pittosporum 'Gold Star'	Pittosporum	1m	2/m2		250mm
Rhapis excelsa	Lady Palm	3m	2/m2		300mm
Rhaphiolepsis "Cosmic White"		0.75m	2/m2		300mm
Rosmarinus officinalis 'Prostratus'	Creeping rosemary	1m	2/m2		200mm
Syzygium 'Royal Flame'	Lilly Pilly	2m	2/m2		300mm
Syzygium francisii 'Hobbit'		1.5m	2/m2		300mm
Tibouchina 'Jules'	Tibouchina	1m	2/m2		300mm
Viburnum odoratissum	Sweet Viburnum	2m	2/m2		300mm
Viburnum tinus	Laurustinus	2m	2/m2		300mm
Westringia 'Blue Gem'		0.75m	2/m2		300mm
GRASSES and GROUNDCOVERS					
Arthropodium cirrhatum		0.75m	3/m2		140mm
Bergenia cordifolia	Elephant's Ears	0.5m	5/m2		140mm
Blechnum		0.5m	5/m2		140mm
Brachyscome multifida	Cut-leafed Daisy	0.3m	5/m2		140mm
Cistus pulverulentus	Rock Rose	0.5m	3/m2		140mm
Cordyline fruticosa 'Rubra'	Cordyline	1m	3/m2		140mm
Ctenanthe		0.75m	5/m2		140mm
Cuphea 'Tiny Mice'	Cuphea	0.5m	3/m2		140mm
Dianella revoluta 'Revelation'	Flax Lily	0.75m	5/m2		140mm
Dianthus caryophyllus	Carnation	0.3m	5/m2		140mm
Dipladenia 'Scarlet Pimpernel'	Dipladenia	0.5m	5/m2		140mm
Doodia aspera	Rasp Fern	0.75m	5/m2		140mm
Gardenia radicans	Prostrate Gardenia	0.3m	5/m2		140mm
Gaura lindheimeri	Butterfly Bush	1m	5/m2		140mm
Gaura lindheimeri 'Passionate Pink'	Butterfly Bush	0.5m	5/m2		140mm
Gazania rigens	Yellow Gazania	0.3m	5/m2		140mm
Grevillea 'Jelly Baby'	Prostrate Grevillea	0.3m	5/m2		140mm
Hardenbergia 'Meema'	False Sasparilla	0.5m	5/m2		140mm
Heliotropium arborescens 'Cherry Pie'	Heliotrope	0.75m	3/m2		140mm
Heliotropium 'Marine'	Heliotrope	0.3m	5/m2		140mm
Liriope 'Just Right'	Liriope	0.75m	5/m2		140mm
Lomandra longifolia 'Tanika'	Fine-leafed Matt Rush	0.5m	5/m2		140mm
Microlaena stipoides	Weeping Meadow Grass	0.5m	5/m2		140mm
Pelargonium x domesticum	Regal Geranium	0.5m	5/m2		140mm
Pennisetum alopecuroides 'Nafray'	Swamp Foxtail	1m	5/m2		140mm
Philodendron 'Xanadu'	Philodendron	0.5m	3/m2		140mm
Phormium tenax 'Bronze Baby'	NZ Flax	0.5m	3/m2		140mm
Poa labillardierei 'Eskdale'	Tussock Grass	0.5m	5/m2		140mm
Scaevola 'Aussie Salute'	Fan Flower	0.3m	5/m2		140mm
Trachelospermum jasminoides	Star Jasmine	0.3m	5/m2		140mm
Vinca minor	Periwinkle	0.5m	5/m2		140mm

PLANT SCHEDULE- NATIVE

Botanical Name	Common Name	Hgt	spg'	Qty	Size
Trees					
Acmena smithii		6m			25L
Angophora costata		15m			25L
Callicoma serratifolia		8m			25L
Ceratopetalum gummiferum		8m			25L
Elaeocarpus reticulatus		8m			25L
Eucalyptus globoidea		15m			25L
Eucalyptus gummifera		20m			25L
Glochidion ferdinandi		8m			25L
Syncarpia glomulifera		20m			25L
Shrubs					
Acacia elata		4m	2/m2		140mm
Banksia integrifolia		6m	2/m2		140mm
Banksia serrata		6m	2/m2		140mm
Bauera rubioides		1.5m	2/m2		140mm
Breynia oblongifolia		3m	2/m2		140mm
Cyathea australis		3m	2/m2		140mm
Dodonaea triquetra		2m	2/m2		140mm
Grevilliea linearifolia		2m	2/m2		140mm
Hakea sericea		4m	2/m2		140mm
Indigofera australis		2m	2/m2		140mm
Kunzea ambigua		2m	2/m2		140mm
Leptospermum polygalifolium		4m	2/m2		140mm
Leucopogon juniperinus		2m	2/m2		140mm
Lomatia silaifolia		1m	2/m2		140mm
Omalanthus populifolius		2m	2/m2		140mm
Ozothamnus diosmifolium		1m	2/m2		140mm
Persoonia linearis		2m	2/m2		140mm
Polyscias sambucifolia		5m	2/m2		140mm
Prostanthera ovalifolia		1m	2/m2		140mm
Pultenaea daphnoides		2m	2/m2		140mm
Woollsia pungens		2m	2/m2		140mm
Xanthorrhoea media		2m	2/m2		140mm
Groundcovers and Climbers					
Adiantum aethiopicum			5/m2		100mm
Alternanthera denticulata			5/m2		100mm
Asplenium australasicum			5/m2		100mm
Billardiera scandens			5/m2		100mm
Blechnum cartilagineum			5/m2		100mm
Dianella revoluta var. revoluta			5/m2		100mm
Dichondra repens			5/m2		100mm
Doodia caudata			5/m2		100mm
Geranium homeanum			5/m2		100mm
Glycine clandestine Glycine			5/m2		100mm
Hardenbergia violacea			5/m2		100mm
Hydrocotyle peduncularis			5/m2		100mm
Hypericum gramineum			5/m2		100mm
Lepidosperma laterale			5/m2		100mm
Lobelia alata			5/m2		100mm
Lomandra filiformis ssp. filiformis			5/m2		100mm
Pratia purpurascens			5/m2		100mm
Pseuderanthemum variabile			5/m2		100mm
Pteridium esculentum			5/m2		100mm
Pteris tremula			5/m2		100mm
Schoenus apogon			5/m2		100mm
Senecio hispidula			5/m2		100mm
Smilax australis			5/m2		100mm
Solanum aviculare			5/m2		100mm

KEY

- EXISTING TREES TO REMAIN
- EXISTING TREES TO BE REMOVED
- EUCALYPTS + NATIVE SCREEN PLANTING
- TREES
- SHRUBS
- LAWN
- FLAGSTONE PAVING
- WATER FEATURE
- PLANTER
- TIMBER DECK
- OUTDOOR FURNITURE
- PAVING
- FEATURE POT PLANTS
- PERGOLA
- GRAVEL
- STEPPING STONES
- CONCRETE PAVING
- PORPHYRY DRIVEWAY PAVING

revision	description	date
B	COUNCIL ISSUE	05-09-2019
A	PRELIMINARY ISSUE	20-08-2019

client:
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WALTER DEVELOPMENTS TRUST

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0 5 10 20 30 50 m

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Walter Street Willoughby
MASTER PLAN - PLANNING PROPOSAL

LANDSCAPE MASTER PLAN

scale : 1:500 @ A1
1:1000 @ A3

date : 08-08-2019

drawing no. : **2334 LP - 00**

APPENDIX B

Threatened flora species previously recorded within 10 kilometres of the subject site. Source: BioNet (NSW Wildlife Atlas), August 2019

Family	Species Code	Scientific Name	Common Name	NSW status	Comm. status	Records	
Dilleniaceae	14733	*^Hibbertia spanantha*	Julian's Hibbertia	E4A,P,2	CE	1	Grows in forest with canopy species including Eucalyptus pilularis, E. resinifera, Corymbia gummifera and Angophora costata. The understorey is open with species of Poaceae, Orchidaceae, Fabaceae and Liliaceae. Flowering in October and November, but with an odd flower throughout the year. The soil is identified as a light clay occuring on a shale sandstone soil transition.
Elaeocarpaceae	6205	*Tetratheca glandulosa*		V,P		12	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops. Vegetation structure varies from heaths and scrub to woodlands/open woodlands, and open forest. Vegetation communities correspond broadly to Benson & Howell's Sydney Sandstone Ridgetop Woodland (Map Unit 10ar). Common woodland tree species include: Corymbia gummifera, C. eximia, Eucalyptus haemastoma, E. punctata, E. racemosa, and/or E. sparsifolia, with an understorey dominated by species from the families Proteaceae, Fabaceae, and Epacridaceae.

Elaeocarpaceae	6206	*Tetratheca juncea*	Black-eyed Susan	V,P	V	1	It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While some studies show the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites below 200m elevation and annual rainfall between 1000 - 1200mm. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral. It usually spreads via underground stems which can be up to 50 cm long. Consequently, individual plants may be difficult to identify. It also reproduces sexually but this requires insect pollination. Large populations of this species are particularly important.
Ericaceae	7752	*Epacris purpurascens var. purpurascens*		V,P		8	Found in a range of habitat types, most of which have a strong shale soil influence. Lifespan is recorded to be 5-20 years, requiring 2-4 years before seed is produced in the wild. Killed by fire and re-establishes from soil-stored seed.
Fabaceae (Mimosoideae)	3728	*Acacia bynoeana*	Bynoe's Wattle	E1,P	V	7	Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple

Fabaceae (Mimosoideae)	9672	*Acacia terminalis subsp. terminalis*	Sunshine Wattle	E1,P	E	29	Coastal scrub and dry sclerophyll woodland on sandy soils . Habitat is generally sparse and scattered. Most areas of habitat or potential habitat are small and isolated. Most sites are highly modified or disturbed due to surrounding urban development. Flowers in autumn. Small birds and bees are natural pollinators. Seeds mature in November and are dispersed by ants. Seed viability is high and recruitment occurs mainly after fire. A fire temperature of 60 degrees is required for optimum germination. Although plants are killed by fire, they have been recorded sprouting from the base.
Lamiaceae	9884	*Prostanthera junonis*	Somersby Mintbush	E1,P	E	2	The species is restricted to the Somersby Plateau. It occurs on both the Somersby and Sydney Town soil landscapes on gently undulating country over weathered Hawkesbury sandstone within open forest/low woodland/open scrub. It occurs in both disturbed and undisturbed sites. The dominant flowering period for this species is October to mid-December depending on weather/site conditions. The plant is very difficult to identify outside of this time. While mature plants appear to be incapable of resprouting after fire, it may trigger seed germination.
Lamiaceae	3418	^^*Prostanthera marifolia*	Seaforth Mintbush	E4A,P,3	CE	2	Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has

							been extensively urbanised.
Malvaceae	6140	*Lasiopetalum joyceae*		V,P	V	1	Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest. Seventeen of these are reserved. Grows in heath on sandstone.
Myrtaceae	4007	*^^Callistemon linearifolius*	Netted Bottle Brush	V,P,3		4	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. For the Sydney area, recent records are limited to the Hornsby Plateau area near the Hawkesbury River. The species was more widespread in the past, and there are currently only 5-6 populations remaining from the 22 populations historically recorded in the Sydney area. Three of the remaining populations are reserved in Ku-ring-gai Chase National Park, Lion Island Nature Reserve and Spectacle Island Nature Reserve. The species has also been recorded from Yengo National Park. Grows in dry sclerophyll forest on the coast and adjacent ranges. Flowers spring – summer.
Myrtaceae	4024	*Darwinia biflora*		V,P	V	128	Occurs on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone. Associated overstorey species include Eucalyptus haemastoma, Corymbia gummifera and/or E. squamosa. The vegetation structure is usually woodland, open forest or scrub-heath. Longevity is thought to be 15-20 years. Flowering occurs throughout the year but is concentrated in autumn, with mature fruits being produced from May to August. Self-pollination is the usual form of pollination. Flowers and fruit are produced 18 months after germination, though at this stage few reach maturity. Maturation rates are higher for plants older than 5 years. Seed viability is high (up to 99%).

							Fire is an important factor in the life cycle of this species. Fire kills all plants, but also produces a flush of germination from seed stored in the soil. The number of individuals at a site then declines with time since fire, as the surrounding vegetation develops.
Myrtaceae	4067	*Eucalyptus camfieldii*	Camfield's Stringybark	V,P	V	14	Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of E. oblonga Narrow-leaved Stringybark, E. capitellata Brown Stringybark and E. haemastomaScribbly Gum. Population sizes are difficult to estimate because its extensive lignotubers may be 20 m across. A number of stems arise from these lignotubers giving the impression of individual plants. Flowering period is irregular, flowers recorded throughout the year. Poor response to too frequent fires.
Myrtaceae	4134	*Eucalyptus nicholii*	Narrow-leaved Black Peppermint	V,P	V	5	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire. Tends to grow on lower slopes in the landscape
Myrtaceae	8314	*Leptospermum deanei*		V,P	V	1	Woodland on lower hill slopes or near creeks. Sandy alluvial soil or sand over sandstone. Occurs in Riparian Scrub - e.g. Tristaniopsis laurina, Baechea myrtifolia; Woodland - e.g. Eucalyptus haemstoma; and Open Forest - e.g. Angophora

							costata, Leptospermum trinervium, Banksia ericifolia. Flowers October-November. Probably killed by fire.
Myrtaceae	4248	*Melaleuca deanei*	Deane's Paperbark	V,P	V	9	The species occurs mostly in ridgetop woodland, with only 5% of sites in heath on sandstone. Flowers appear in summer but seed production appears to be small and consequently the species exhibits a limited capacity to regenerate.
Myrtaceae	4293	*Syzygium paniculatum*	Magenta Lilly Pilly	E1,P	V	10	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.
Orchidaceae	4386	*^Caladenia tessellata*	Thick Lip Spider Orchid	E1,P,2	V	5	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. Flowers appear between September and November (but apparently generally late September or early October in extant southern populations).
Orchidaceae	4464	*^Genoplesium baueri*	Bauer's Midge Orchid	E1,P,2	E	2	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March.

Orchidaceae	4584	*^Sarcochilus hartmannii*	Hartman's Sarcochilus	V,P,2	V	1	Favours cliff faces on steep narrow ridges supporting eucalypt forest and clefts in volcanic rock from 500 to 1,000 m in altitude. Also found occasionally at the bases of fibrous trunks of trees, including cycads and grass-trees.
Poaceae	4875	*Deyeuxia appressa*		E1,P	E	1	Given that D. appressa hasn't been seen in over 60 years, almost nothing is known of the species' habitat and ecology. Flowers spring to summer and is mesophytic (grows in moist conditions).
Proteaceae	5365	*^^Grevillea caleyi*	Caley's Grevillea	E4A,P,3	E	4	All natural remnant sites occur within a habitat that is both characteristic and consistent between sites. All sites occur on the ridgetop between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by Eucalyptus sieberi and E. gummifera. Commonly found in the endangered Duffys Forest ecological community. Killed by fire and relies entirely on seed that is stored in the soil for regeneration. Generally seedlings do not flower and produce seed before 2-5 years of age. Flowering is sporadic throughout the year, but with a definite spring pulse. Fecundity is low with only about 3% of flowers result in seed. Seed dispersal is low and predation is high, therefore it is estimated that 8-12 years is required to develop a sufficient seedbank to replace a population. Seed dormancy mechanisms are not fully understood, however it is thought that smoke and perhaps heat may play a role in breaking dormancy. Pollination is by birds although it is thought that this species may be self compatible.
Proteaceae	5458	*^^Persoonia hirsuta*	Hairy Geebung	E1,P,3	E	3	The Hairy Geebung is found in sandy soils in dry sclerophyll open forest,

							woodland and heath on sandstone. It is usually present as isolated individuals or very small populations. It is probably killed by fire (as other Persoonia species are) but will regenerate from seed.
Santalaceae	5871	*Thesium australe*	Austral Toadflax	V,P	V	1	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (Themeda australis). A root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass.
Thymelaeaceae	6965	*Pimelea curviflora var. curviflora*		V,P	V	6	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawaraa coastal plain. Flowers October to May. Has an inconspicuous cryptic habit as it is fine and scraggly and often grows amongst dense grasses and sedges. It may not always be visible at a site as it appears to survive for some time without any foliage after fire or grazing, relying on energy reserves in its tuberous roots. Likely to be fire tolerant species capable of resprouting following fire due to the presence of a tap root. Seedlings have been observed following fire.

APPENDIX E

Threatened fauna species recorded within 10 kilometres of the subject site. Source: BioNet (NSW Wildlife Atlas), August 2019

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
Amphibian	*Litoria aurea*	Green and Golden Bell Frog	E	V	Inhabits marshes, dams and stream-sides.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Amphibian	*Heleioporus australiacus*	Giant Burrowing Frog	V	V	Found in heath, woodland and open forest with sandy soils. Critical feature of habitat is fish-free pools with sandy soils nearby. Emerges to feed/breed after rain; travels hundreds of metres to creeks to breed.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Amphibian	*Pseudophryne australis*	Red-crowned Toadlet	V	Restricted to heads of periodically wet drainage lines below sandstone ridges that often have shale caps. Needs rocks and dense vegetation or litter for shelter.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Reptile	*Varanus rosenbergi*	Rosenberg's Goanna	V	-	Found in heath, open forest and woodland; termite mounds are a critical habitat component for nesting. Shelters in hollow logs, rock crevices and in burrows.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
						required.
Bird	*Diomedea exulans*	Wandering Albatross	E	V	Terrestrial habitat confined to offshore islands just north of the Antarctic circle.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Pterodroma leucoptera leucoptera*	Gould's Petrel	E	M	Terrestrial habitat confined to offshore islands.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Botaurus poiciloptilus*	Australasian Bittern	E	E	Favours permanent freshwater wetlands.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Ixobrychus flavicollis*	Black Bittern	V	-	Occurs in freshwater and estuarine wetlands.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Ephippiorhynchus asiaticus*	Black-necked Stork	E	-	Inhabits permanent freshwater wetlands.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur.
Bird	*Pandion cristatus*	Eastern Osprey	V	-	Favours coastal areas, especially the mouths of large rivers, lagoons and	No potential habitat on the site or near to the site within the zone of

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
					lakes.	influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Hieraaetus morphnoides*	Little Eagle	V	-	Seen over woodland and forested lands and open country, extending into the arid zone; tends to avoid rainforest and heavy forest. Nest in mature living trees in open woodland or tree-lined watercourses; rarely in isolated trees.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. Low likelihood to occur. No further consideration required.
Bird	*Haemotopus longirostris*	Australian Pied Oystercatcher	E	-	Favours intertidal flats of inlets and bays, open beaches and sandbanks.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Haemotopus fuliginosus*	Sooty Oystercatcher	V	-	Occurs on rocky headlands and exposed reefs, beaches and muddy estuaries.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Limicola falcinellus*	Broad-billed Sandpiper	V	-	Favours sheltered parts of coast (estuarine sandflats, mudflats, harbours, lagoons, saltmarshes, reefs) for feeding / roosting. Occasionally seen in sewage farms or shallow freshwater lagoons. Roosts on banks on sheltered sand, shell or shingle beaches.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
Bird	*Burhinus grallarius*	Bush Stone-curlew	E	-	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Esacus neglectus*	Beach Stone-curlew	CritE	-	Occurs on open, undisturbed beaches and estuaries.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Charadrius mongolus*	Lesser Sand-plover	V	-	Occurs on beaches, harbours and estuaries with large intertidal sand flats or mudflats.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Limosa limosa*	Black-tailed Godwit	V	-	Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats along coast.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur.
Bird	*Sternula albifrons*	Little Tern	E	-	Prefers sheltered coastal environments; may occur several kms from the sea in harbours, inlets and rivers. Nests in small colonies in low dunes or on sandy beaches just above high tide mark near estuary mouths or adjacent to coastal lakes and islands.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Onchyprion fuscata*	Sooty Tern	V	-	Terrestrial habitat confined to offshore islands.	No potential habitat on the site or near to the

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
						site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Callocephalon fimbriatum*	Gang-gang Cockatoo	V, EPop	-	In summer, generally found in montane forests and woodlands; in winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas. Breeds in large and old hollow-bearing trees in forest.	Marginal potential foraging habitat occurs on the subject site. Moderate likelihood to occur. Further impact assessment required.
Bird	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V	-	Breeds in large hollow-bearing trees in forest and forages on *Allocasuarina* species.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. Low likelihood to occur. No further consideration required.
Bird	*Glossopsitta pusilla*	Little Lorikeet	V	-	Mostly in dry open eucalypt forests and woodlands. Feeds on tree nectar and pollen, particularly profusely-flowering eucalypts, but also melaleucas and mistletoes and mistletoe fruit. Nomadic, movements probably related to food availability.	Potential foraging habitat occurs on the subject site. Moderate likelihood to occur. Further impact assessment required.
Bird	*Polytelis swainsonii*	Superb Parrot	V	-	Inhabits grassy box woodland throughout eastern inland NSW. Nest in small colonies, often with more than one nest in a single tree and breed	No potential habitat on the site or near to the site within the zone of influence of the proposed works. Low likelihood to occur.

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
					between Sept and Jan. Coastal records likely to be aviary escapes.	No further consideration required.
Bird	*Ninox connivens*	Barking Owl	V	-	Occurs in eucalypt woodland, open forest, swamp woodlands and timbered watercourses. Occasionally uses dense vegetation for roosting. Breeds in hollows in large old trees.	Marginal potential foraging habitat occurs on the subject site. Moderate likelihood to occur. Further impact assessment required
Bird	*Ninox strenua*	Powerful Owl	V	-	Usually roosts in dense vegetation and hunts for arboreal mammals across large home range. Urban records usually associated with large areas of adjacent vegetation.	Marginal potential foraging habitat occurs on the subject site. Moderate likelihood to occur. Further impact assessment required
Bird	*Petroica boodang*	Scarlet Robin	V	-	Occurs in open forests and woodlands. During winter, will visit more open habitats such as grasslands, farmland and urban parks and gardens but abundant logs and coarse woody debris are important structural components of its habitat.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. Low likelihood to occur. No further consideration required.
Bird	*Daphoenositta chrysoptera*	Varied Sittella	V	-	Found in eucalypt woodlands and forests, preferring rough-barked trees or mature trees with hollows or dead branches.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Bird	*Anthochaera phrygia*	Regent Honeyeater	CritE	E	Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Occasionally	No potential habitat on the site or near to the site within the zone of influence of the proposed works.

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
					non-breeding flocks forage in Swamp Mahogany and Spotted Gum forests on central and north coast and rarely on the south coast.	No likelihood to occur. No further consideration required.
Mammal	*Isoodon obesulus obesulus*	Southern Brown Bandicoot	E	E	Generally found in heath or open forest. Stronghold population in Ku-ring-gai NP and Garigal NPs.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Mammal	*Perameles nasuta*	Long-nosed Bandicoot, inner western Sydney	EPop	-	Restricted to North Head area or LGAs of Marrickville and Canada Bay, with the likelihood that it also includes Canterbury, Ashfield and Leichhardt LGAs. Inner western population uses highly modified urban habitat.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. Low likelihood to occur. No further consideration required.
Mammal	*Phascolarctos cinereus*	Koala	V, EPop	-	Occurs where suitable food trees present, generally on rich open valleys.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Mammal	*Petaurus australis*	Yellow-bellied Glider	V	-	Favours tall mature eucalypt forest in areas with high rainfall and nutrient rich soils.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Mammal	*Cercartetus nanus*	Eastern Pygmy-possum	V	-	Mostly found in woodland and heath with dense	No potential habitat on the site or near to the

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
					cover of flowering plants such as *Banksia, Eucalyptus* and *Callistemon*.	site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Mammal	*Pteropus poliocephalus*	Grey-Headed Flying-fox	V	V	Foraging habitat in flowering eucalypts, particularly winter-flowering species; camps in dense wet forest or rainforest gullies.	Subject site provides potential foraging habitat. High likelihood to occur – resident reported seeing this species foraging on native tree blossom. Further impact assessment required.
Mammal	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V	-	Roosts in tree hollows, buildings or terrestrial burrows in treeless areas. Forages high over forest canopy for insects.	Subject site provides potential foraging habitat. Low likelihood to occur. No further consideration required.
Mammal	*Mormopterus norfolkensis*	Eastern Freetail-bat	V	-	Occur in dry sclerophyll forest and woodland, roost in hollows and man-made structures.	Subject site provides potential foraging habitat. Moderate likelihood to occur. Further impact assessment required.
Mammal	*Miniopterus australis*	Little Bent-wing Bat	V	-	Roosts in caves and forages beneath tree canopies.	Low likelihood to occur. No further consideration required.
Mammal	*Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat	V	-	Roosts in caves and forages above tree canopies.	Subject site provides potential foraging habitat. Moderate likelihood to occur. Further impact assessment required.
Mammal	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	V	Roosts in caves and found mainly in areas with extensive cliffs and caves. Generally rare with a very	No potential habitat on the site or near to the site within the zone of influence of the proposed

Fauna Group	Scientific Name	Common Name	Status TSC Act (1995)	Status EPBC Act (1999)	Habitat requirements	Suitability of Site
					patchy distribution in NSW. Found in well-timbered areas containing gullies.	works. Low likelihood to occur. No further consideration required.
Mammal	*Myotis macropus*	Large-footed Myotis	V	-	Forages over large bodies of water and roosts in hollows or under old wooden bridges up to 10 km from foraging habitat.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.
Mammal	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V	-	Found in a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though most commonly found in tall wet forest. Roosts in tree hollows and forages over creeks and other corridors in forest.	No potential habitat on the site or near to the site within the zone of influence of the proposed works. No likelihood to occur. No further consideration required.

APPENDIX D

EPBC Protected Matters

Search Tool database results

(August 2019)

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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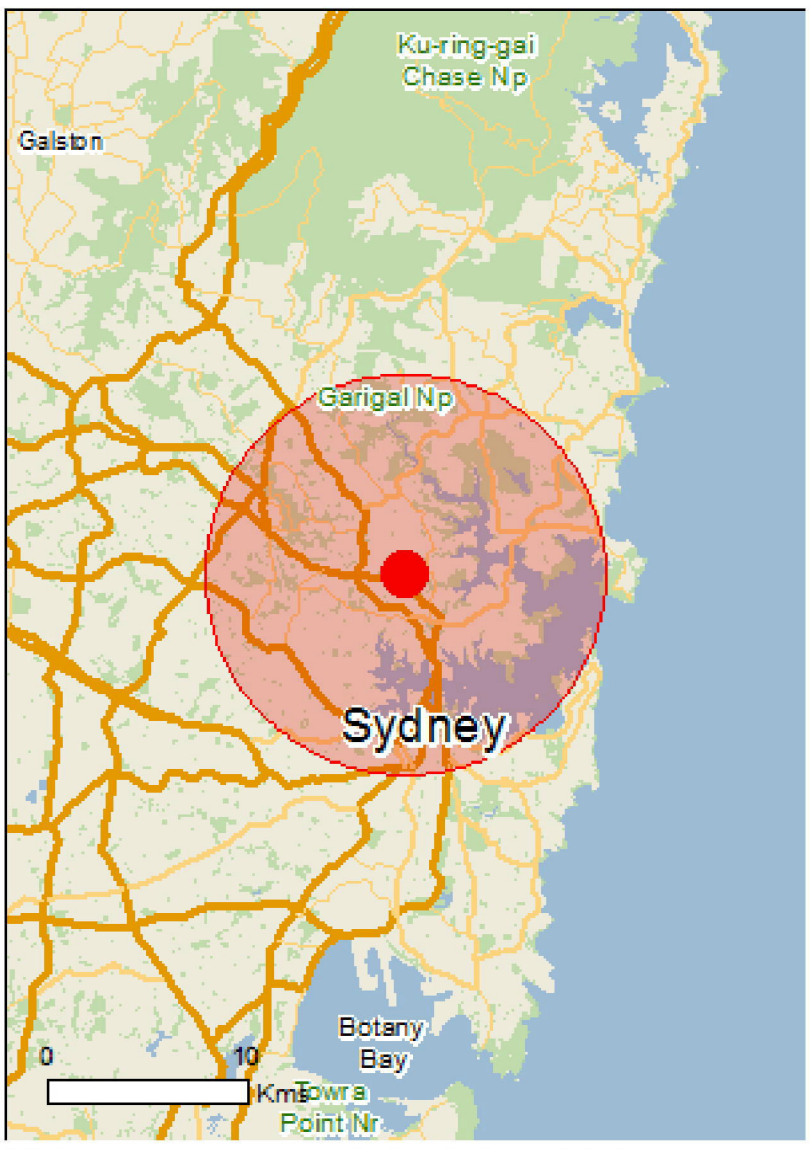

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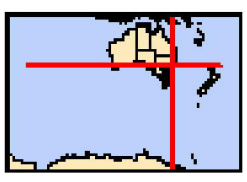

Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	6
National Heritage Places:	7
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	10
Listed Threatened Species:	90
Listed Migratory Species:	71

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	51
Commonwealth Heritage Places:	64
Listed Marine Species:	95
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	7
Regional Forest Agreements:	None
Invasive Species:	51
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
Australian Convict Sites (Cockatoo Island Convict Site Buffer Zone)	NSW	Buffer zone
Australian Convict Sites (Hyde Park Barracks Buffer Zone)	NSW	Buffer zone
Sydney Opera House - Buffer Zone	NSW	Buffer zone
Australian Convict Sites (Cockatoo Island Convict Site)	NSW	Declared property
Australian Convict Sites (Hyde Park Barracks)	NSW	Declared property
Sydney Opera House	NSW	Declared property

National Heritage Properties		[Resource Information]
Name	State	Status
Indigenous		
Cyprus Hellene Club - Australian Hall	NSW	Listed place
Historic		
Cockatoo Island	NSW	Listed place
First Government House Site	NSW	Listed place
Hyde Park Barracks	NSW	Listed place
North Head - Sydney	NSW	Listed place
Sydney Harbour Bridge	NSW	Listed place
Sydney Opera House	NSW	Listed place

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Blue Gum High Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community may occur within area
Coastal Upland Swamps in the Sydney Basin Bioregion	Endangered	Community likely to occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Eastern Suburbs Banksia Scrub of the Sydney Region	Endangered	Community known to occur within area
Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area

APPENDIX E

ECOLOGICAL QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Alex Fraser (Fraser Ecological Consulting) has over 10 years experience in ecological assessment and on-ground bushland restoration management. Previous work roles include ecological consulting with Parsons Brinckerhoff (large infrastructure), National Parks and Wildlife Service (NPWS estate biodiversity surveys), NSW Department of Environment and Climate Change (Atlas of Wildlife GIS Unit and Sydney Metro Biodiversity Officer – Compliance and SIS DGRs) and Local Government (ecological assessment) have focussed primarily on ecological survey, development assessment, project management and policy development for consent authorities. Alex also has practical experience in landscape construction, bushland restoration, topsoil translocation and asset protection zone establishment and maintenance.

A full list of flora and fauna assessments previously undertaken can be provided upon request.

Relevant qualifications and training:

- Bachelor of Applied Science – Coastal Resource Management (Honours)
- Certificate 3 Natural Area Restoration (Ryde Horticultural College)
- Chemcert (Department of Natural Resources)
- Chainsaw Cross Cutting Techniques (Ryde Horticultural College)
- Certificate 3 Vertebrate Animal Pest Control (NSW DPI, Orange)
- OH&S General Induction for Construction Work (Work Cover NSW)
- Senior First Aid (St. Johns Ambulance Australia)
- Frog, Bat and Reptile: species identification and survey skills (Forests NSW)
- Certificate 3&4 Japanese language proficiency (The Japan Foundation)
- Advanced Open Water SCUBA diver (PADI Australia)
- State Rail Contractor Safety Awareness (State Rail Authority)
- NPWS Scientific Licence - SL100329 (NSW Office of Environment and Heritage)
- Animal Ethics Approval (Animal Research Authority issued by NSW Department of Primary Industries (TRIM 11/4299)).