Test of Significance - Pittwater and Wagstaffe Spotted Gum Forest

61 Dress Circle Road Avalon Beach

Final

By Ecological Consultants Australia Pty Ltd TA

Kingfisher Urban Ecology and Wetlands

July 2020

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Statement of Authorship

This study and report was undertaken by Ecological Consultants Australia at Studio 1/33 Avalon Parade, Avalon. The author of the report is Geraldene Dalby-Ball with qualifications BSc. majoring in Ecology and Botany with over 20 years' experience in this field, Lisa Jones and Julian Reyes with qualifications BSc. Majoring in Ecology.

Limitations Statement

Information presented in this report is based on an objective study undertaken in response to the brief provided by the client. Any opinions expressed in this report are the professional, objective opinions of the authors and are not intended to advocate any particular proposal or pre-determined position.

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Signed: Geraldene Dalby-Ball – Director of Ecological Consultants Australia

Executive Summary

Introduction

- The development proposal includes the construction of a driveway and garage extension to an existing dwelling.
- NBC has requested a 5-part test for Pittwater and Wagstaffe Spotted Gum Forest (PWSGF) be submitted with the development application.
- Recommendations have been provided to reduce the likelihood of impact and mitigate loss on this Endangered Ecological Community.

Methods

- On-ground survey took place on the 1st of July 2020 by Senior Ecologist Geraldene Dalby-Ball.
- Flora and fauna observations were recorded on-site using binoculars and physical examination. Notes, photos and samples of flora species were taken to assess ecological health and value of the site.
- Bionet searches were performed for flora, fauna and endangered populations to identify if there were previous records of threatened species occurring within the local area using a 10km radius around the site.
- DPIE mapping was consulted via SEED Portal particularly Sydney Metro Area v3.1 2016 E - VIS 4489

Results

- The site is within PWSGF EEC however it has also been planted with species not locally native and the under and mid-story is dominated by landscaped exotics.
- Two trees are proposed for removal – Tree 1 :*Angophora costata* and Tree 2: *Syagrus spp*.
- Tree one is in marginal condition and native landscaping post development will offset its removal from the site. Tree two is an exotic species and not protected under legislation.
- No threatened flora or fauna species were found on-site during on site searches.
- Test of significance has been conducted for PWSGF – while it resulted in a 'not significant' impact for this community recommendations have been made to assists the long-term sustainability of this community. Appendix III contains the 5 Part Test for PWSGF
- The PWSGF can be in better condition due to the landscaping and on-going maintenance than it currently is.

Mitigation Measures

Before works:

- Tree Protection as per Arborist report by Growing My Way Tree Services 2020.
- Effective site management to ensure sediment and erosion are managed appropriately.
- Seed collection and propagation

During works:

- Dead wood including upright dead trees and fallen logs on the ground should be retained and protected during works as they provide high quality habitat for threatened fauna species, refer to Arborist report.
- Bush hygiene protocols should be followed to prevent the spread of pathogens including *Phytophthora*.

After completion of works:

- Planting works will be conducted as per Landscaping Plan for flora species, including locally native species.
- Optional installation of micro-bat nest box.

Legislation: Various pieces of legislation apply to this location and the proposed works are in keeping with the objective of the Acts. Key acts are listed below.

- *Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- *Environmental Planning and Assessment Act 1979 (EP&A Act).*
- *Biodiversity Conservation Act 2016 (BC Act).*
- *National Parks & Wildlife Act 1974 (NP&W Act).*
- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*

Conclusions and Recommendations

- No significant impact on PWSGF EEC – see appendix III.
- Ecologists recommend that canopy species including; *Corymbia sp* and *Eucalyptus sp* (as per Appendix V) be included in the planting schedule to support canopy diversity at the site.
- Arborist report recommendations to be applied
- Landscaping plan to be implemented.
- Microbat nest boxes (x 1) is recommended

Table of Contents

1 Introduction

Ecological Consultants Australia (ECA) has been contracted by Haidee & Simon Keegan (property owners) to provide a "Test of Significance" to assess potential direct and indirect impacts on Pittwater Wagstaff Spotted Gum Forest EEC (PWSGF). – as per request by NB Council and as per section 5A of the Environmental Planning & Assessment Act 1979. The 'test of significance' has been undertaken in accordance with the NSW Department of Planning, Industry and Environment (DPIE) 'threatened species test of significance'. The test of significance is set out in s. 7.3 of the Biodiversity Conservation Act 2016 (BC Act).

1.1 Site Location

The study area is 61 Dress Circle Road Avalon Beach. Lot 55 – DP 11462. (see Figure 1-1).

Figure 1-1. Location of the site. Source: SEED/Six Maps, 2020.

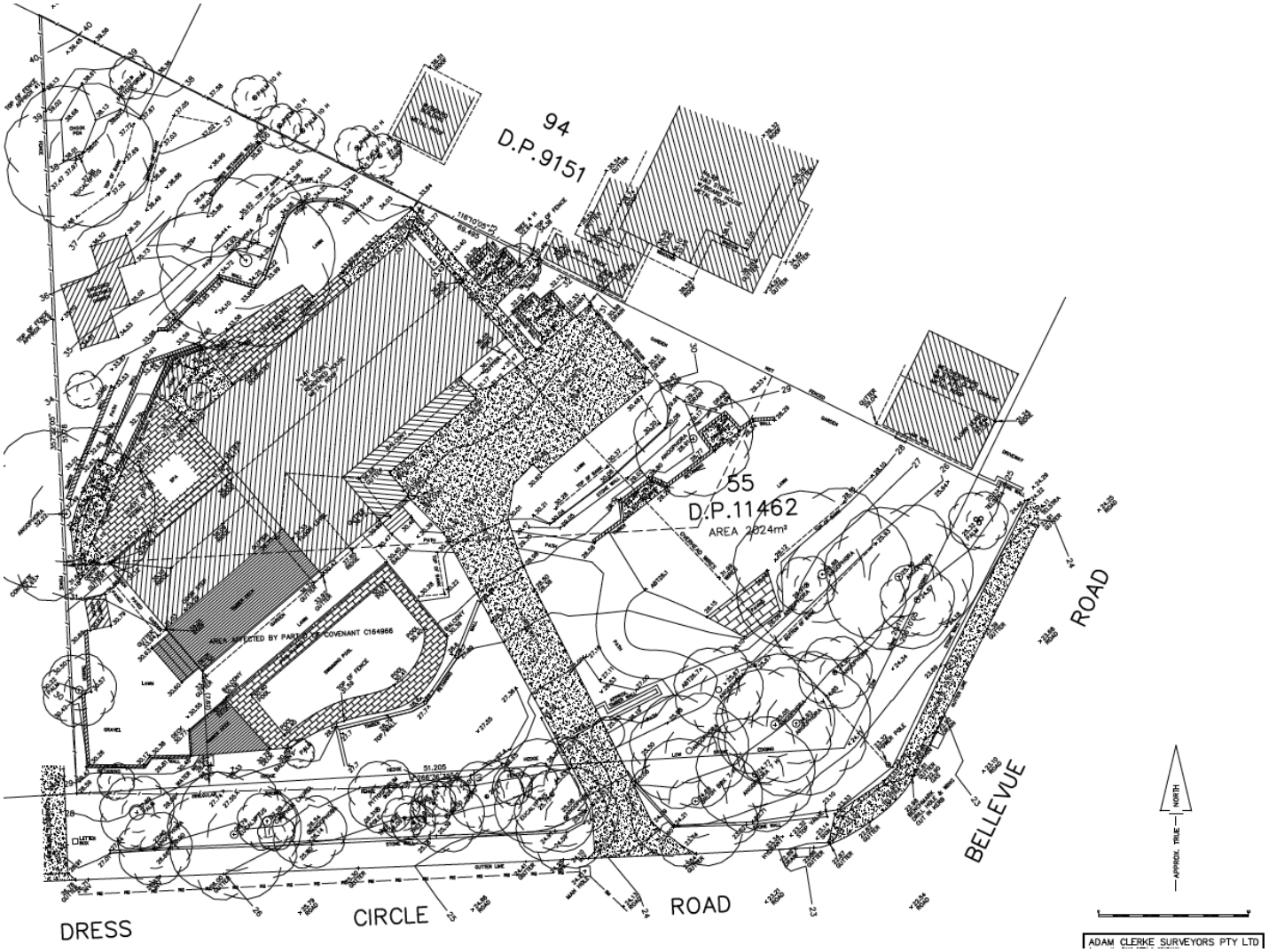


Figure 1-2. Site survey for 61 Dress Circle Road Avalon Beach. Lot 55 – DP 11462. Source -Adam Clerke Surveyors Pty Ltd, 2020.

2 Proposed Actions

The development proposal includes the construction of a driveway and garage extension to an existing dwelling, see DA submission and Figure 2.

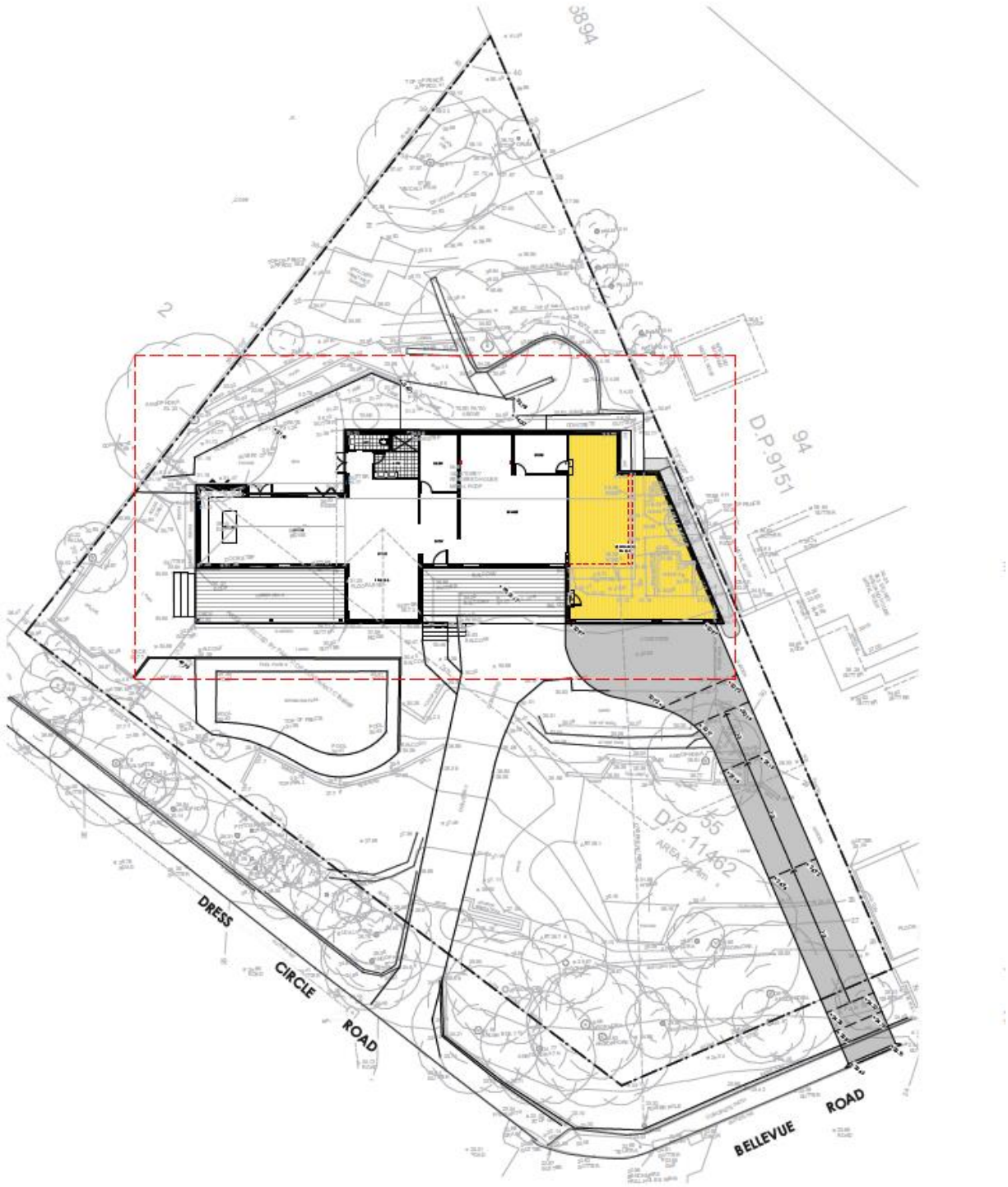


Figure 2-1. Proposed construction layout. The proposed driveway (grey) and garage extension (yellow) are highlighted. Source: Jamie King Landscape Architect, *2020.*

Landscaping

Proposed Landscaping

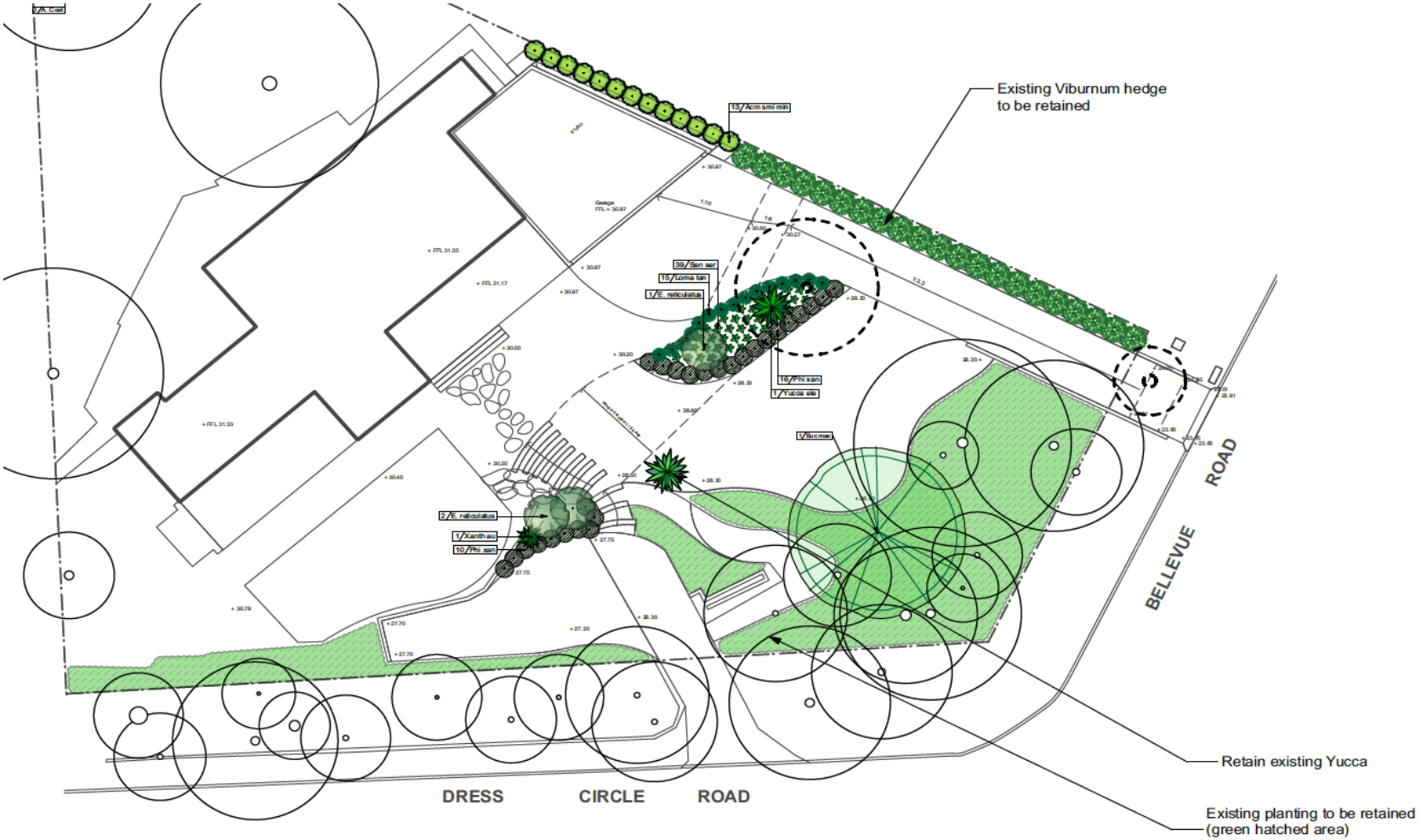


Figure 2-2. Proposed landscape/planting layout, locally native species used throughout. Source: Jamie King Landscape Architect, *2020.*

2.1 Photos

The whole site is landscaped, with a high abundance of exotic species in the landscaped areas. The site is mapped as Pittwater and Wagstaffe Spotted Gum Forest EEC. However, the proposed development area is primarily located within current landscaped areas which do not reflect the natural attributes of the EEC. See photos below for a visual overview of the site.

Figure 3.0. Looking northeast at the proposed development area.

Figure 3.1. Current landscaping on site

Figure 3.2. Current driveway and site landscaping.

Figure 3.3. *Angophora spp being retained.*

2.2 Legislation and policy

The implications for the proposal were assessed in relation to key biodiversity legislation and policy including:

- *Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

  Proposed development is compliant with the EPBC Act and does not impact any threated species. A Matters of National Environmental Significance search has been conducted and results included in appendix IV.

- *Environmental Planning and Assessment Act 1979 (EP&A Act).*

  The EPA Act requires that the assessing body, in this case local government, consider the impact of the development on the surroundings – with respect to this ecology report the impacts on the environment are assessed. The proposal indicate no significant impact on threatened species, populations or communities.

- *Biodiversity Conservation Act 2016 (BC Act).*

  The *Biodiversity Conservation Act 2016* (BC Act 2016) is the key legislation that enables the conservation of biodiversity within the state of New South Wales. The BC Act 2016 facilitates the assessment and on-going protection of flora and fauna, including threatened species and ecological

communities. The BC Act 2016 outlines assessment and offsetting requirements for activities with the potential to impact on threatened species and ecological communities in NSW, and the clearing of native vegetation which exceeds the threshold.

The BC Act also:

- Outlines the licences required under the BC Act to harm protected flora and fauna;
- Lists Threatened species and ecological communities in Schedules 1 and 2;
- Sets out monetary and imprisonment penalties for offences relating to the harming of protected flora and fauna;
- Under Part 7 (s7.4), introduces a list of activities/proposal that exceeds the biodiversity offsets scheme threshold (BOS)

The NSW *Biodiversity Conservation Regulation 2017* sets out the Biodiversity Offsets Scheme entry threshold for Part 4 developments under the EP&A Act 1979. If the development triggers as least one (1) entry threshold, the development must be assessment under The BC Act using the Biodiversity Assessment Method (BAM) (OEH 2017). See also https://www.environment.nsw.gov.au/biodiversity/entryrequirements.htm

BOS Threshold

The proposal does not trigger the biodiversity offsets scheme threshold. It does not exceed the clearing area threshold nor is it located on the BV Map.

- *National Parks & Wildlife Act 1974 (NP&W Act).*

The proposed development is complaint with the NP&W Act.

- *Biosecurity Act (superseding the Noxious Weed Act 1993) (NW Act).*

The Biosecurity Act replaced the Noxious Weeds Act and the objectives of this Act is to manage, and eradicate and Weeds that cause a high level of environmental, economic or social harm. The site and associated works will be complaint with the objectives of this Act.

- Northern Beach Council DCP and LEP

The proposal satisfies provisions outlined in both the Pittwater Local Environmental Plan 2014 -7.6 (Biodiversity protection) and Pittwater Development Control Plan 21 - DCP - B4.7 (Pittwater Spotted Gum Forest).

2.3 Scope of works

To provide a test of significance for PWSGF. Works included a site survey/assessment, review of project design the arborist assessments and any additional reports and review of available literature to produce site specific ecological and environmental effects report.

2.4 Limitations of the Study

Limitations of the study may arise where certain cryptic species of plants may occur as soil-stored seed or as subterranean vegetative structures. Some species are identifiable above-ground only after particular

environmental circumstances related to factors such as periodic fire frequency, intensity or seasonality, soil moisture regime, biological life-cycle patterns as in the case of small plants such as species of orchids etc. No specific invertebrate surveys were conducted.

Surveys at one time of the year cannot be expected to detect the presence of all species occurring, or likely to occur, in the study area. This is because some species may (a) occur seasonally, (b) utilise different areas periodically (as a component of a more extensive home range), or (c) become dormant during specific periods of the year. Rather, the survey provides the opportunity to sample the area, search specifically for species likely to be encountered within the available time frame and assess the suitability of habitat for particular species.

Considering the site and habitat availability ECA are confident that this survey is representative of the likely species and vegetation community and that future studies at other times would not change the conclusions in this report.

3 Methods

3.1 Site Inspections

Senior Ecologist Geraldene Dalby-Ball assessed the site in July 2020. Weather was fine and sunny during the daytime survey. During site visits, notes and photos were taken of the vegetation types, flora and fauna present. Due to the small area of proposed impacts, detailed or systematic surveys were not performed. An opportunistic survey which was based off the BAM methodology was used to gather ecological information about the site. The included a fauna survey, a single vegetation survey and a general habitat survey in which fauna habitat resources were identified.

3.2 Previous studies

Bionet, previous studies and the author's knowledge of the local area, were used to determine the possible occurrence of endangered ecological communities and threatened plant species on-site. The Bionet records accessed cover a 10km^2 area extending from the site and include recordings from 1990 to the present day.

Records from the following databases were collated and reviewed:

- Atlas of NSW Wildlife (Bionet). New South Wales, Office of Environment and Heritage (OEH).
- NSW Threatened Species Information (DPIE).
- VIS – Vegetation Mapping information NSW.
- PlantNET (The Royal Botanic Gardens and Domain Trust 2014).
- Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the Cwlth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The following reports were also reviewed:

- Construction Impact & Management Statement. ("Arborist Report") (Growing My Way Tree Services - May 2020)

- Report and designs submitted with this DA
    - Site Plans – 61 Dress Circle Road Avalon Beach (Revision D) 20/6/20) Jamie King Landscape Architect, 2020.
- Office of Environment and Heritage and National Parks & Wildlife Service documents and mapping were also consulted.

4 Flora

The purpose of the flora work was an investigation to determine the flora composition of the site, particularly vulnerable and endangered species. It also included an assessment of the flora as habitat. Furthermore, an assessment of potential impact of the development with a determination of native ground and shrub was conducted.

The site is located within a mapped area of *PCT 1241; Spotted Gum - Grey Ironbark open forest in the Pittwater and Wagstaffe area, Sydney Basin Bioregion, (Pittwater and Wagstaffe Spotted Gum Forest in the Sydney Basin Bioregion - Endangered Ecological Community).*

Several *Angophora costata spp* are present in the eastern portion of the site, with *Corymbia maculata spp* primarily excluded to the western portion of the site. Additionally, the whole site is landscaped, with a high abundance of exotic species in the landscaped areas. Thus, the site does not accurately represent PWSGF EEC in a near natural state. Impacts are expected to be negligible, see appendix III – Test of Significance for details.

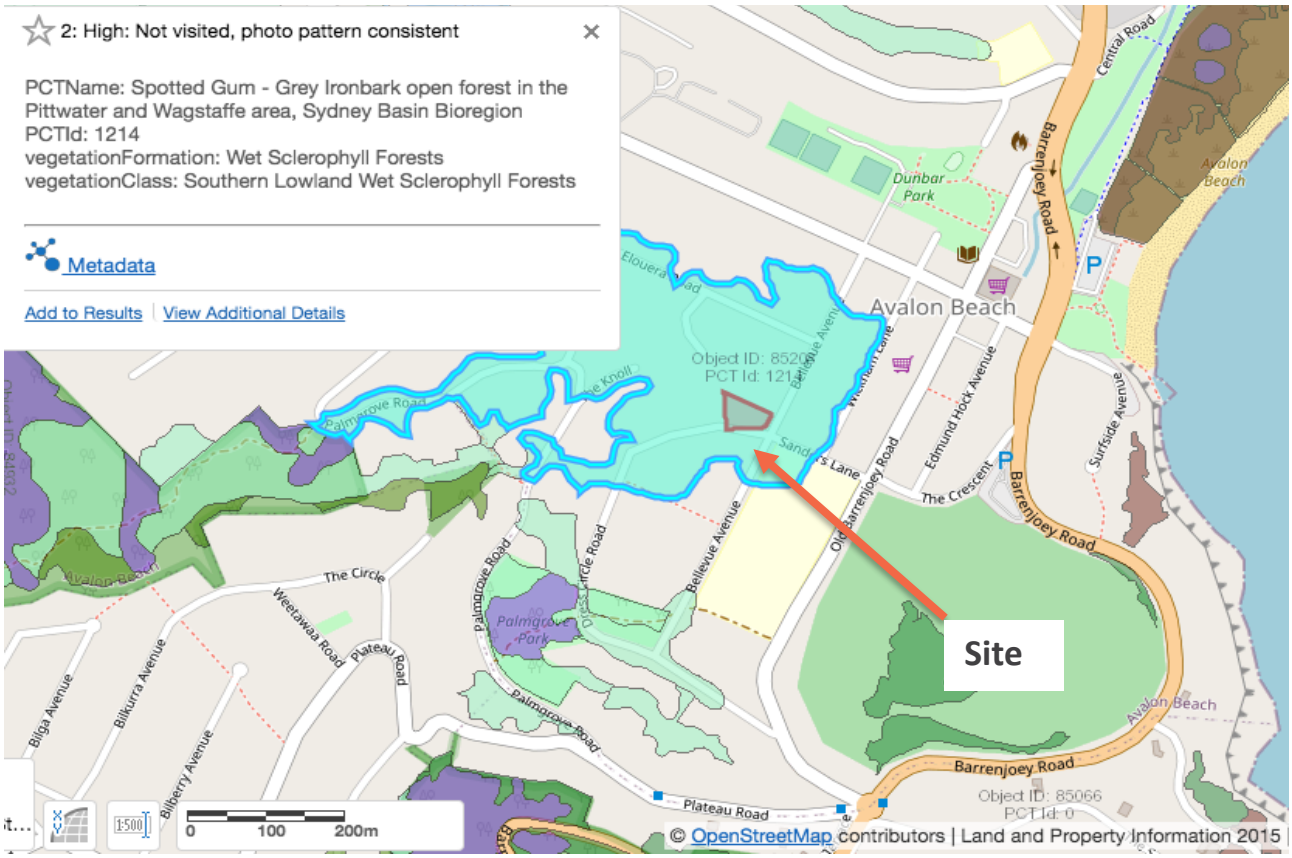


Figure 4-1 Desk top results – Pittwater Spotted Gum Forest

4.1 Threatened flora

BioNet records within 10km of the study site had 12 flora species currently listed as vulnerable or endangered under state and/or commonwealth legislation. The vulnerable and endangered species to focus on-site searches for can be seen in **Table 1** below.

Table 1. Threatened flora recorded within a 10km radius since 1990. Source: NSW OEH Bionet 2020.

Family	Scientific Name	Common Name	NSW status	Comm. status	Records
Elaeocarpaceae	Tetratheca glandulosa		V		14
Euphorbiaceae	Chamaesyce psammogeton	Sand Spurge	E1		5
Malvaceae	Lasiopetalum joyceae		V	V	1
Myrtaceae	^^Callistemon linearifolius	Netted Bottle Brush	V,3		3
Myrtaceae	Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	V	4
Myrtaceae	Kunzea rupestris		V	V	1
Myrtaceae	Rhodamnia rubescens	Scrub Turpentine	E4A		18
Myrtaceae	Syzygium paniculatum	Magenta Lilly Pilly	E1	V	16
Orchidaceae	^Genoplesium baueri	Bauer's Midge Orchid	E1,P,2	E	1
Proteaceae	^^Persoonia hirsuta	Hairy Geebung	E1,P,3	E	5
Rutaceae	Asterolasia elegans		E1	E	1
Thymelaeaceae	Pimelea curviflora var. curviflora		V	V	1

Note: E = Endangered, V = Vulnerable, P = Protected.

Search criteria: Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Plants in selected area [North: -33.59 West: 151.27 East: 151.37 South: -33.69] recorded since 01 Jan 1990 until 01 Jul 2020 returned a total of 70 records of 12 species. Report generated on 1/07/2020 12:36 PM.

4.2 Flora Findings from Site Investigations

4.2.1 Threatened plant species findings

No threatened plant species were found during site assessments.

4.2.2 Arborist report findings

Tree Removal

Two trees are proposed for removal – Tree 1: Angophora *costata* and Tree 2: *Syagrus spp.*

Tree one is in marginal condition, the following in an extract from the arborist report:

Tree one is acknowledged as being of High Significance & High Retention value by size, species, condition &/or presence. However, by actual specimen these ratings are significantly exaggerated by virtue of the 'body language' of its trunk base. The southern side of the trunk base is quite deformed. Only two trunk base points of origin for 'Structural Supporting Roots' were able to be obviously confirmed.

Native landscaping post development will offset its removal from the site.

Tree two is an exotic species and not protected under legislation. See the arborist report by Growing My Way Tree Services (May 2020) for trees being retained and trees which will require protection during works.

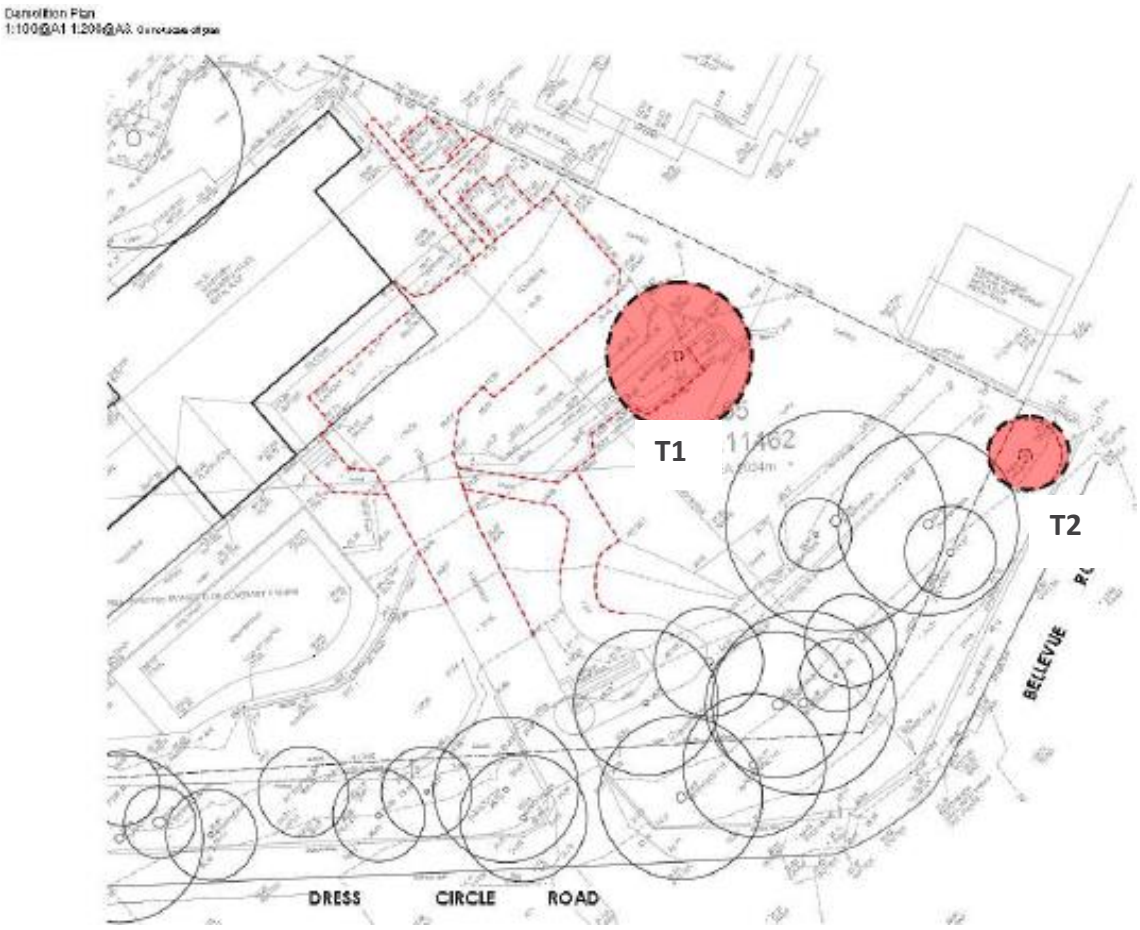


Figure 4-2. Trees proposed for removal.

5 Fauna

5.1 Threatened fauna

During the survey, no threatened species were observed on-site. However, marginal/ refugee habitat was identified for various Microbat species, Forest Owls and Grey-headed Flying-fox in the form of canopy trees.

However, the trees on site are not considered significant towards the long-term survival of threatened species. It is expected that vegetation on site would be used occasionally or opportunistically by these highly mobile species.

59 fauna species are currently Bionet listed as vulnerable or endangered under state and/or commonwealth legislation within a 10km radius of the activity site. The vulnerable and endangered species can be seen in Table 2 below.

Table 2. Threatened fauna observed in previous ecological surveys within a 10km radius since 1990. Source: NSW OEH Bionet 2020.

Class	Scientific Name	Common Name	NSW status	Comm. status	Records
Amphibia	Heleioporus australiacus	Giant Burrowing Frog	V,P	V	15
Amphibia	Pseudophryne australis	Red-crowned Toadlet	V,P		36
Amphibia	Litoria aurea	Green and Golden Bell Frog	E1,P	V	2
Reptilia	Caretta caretta	Loggerhead Turtle	E1,P	E	4
Reptilia	Chelonia mydas	Green Turtle	V,P	V	8
Reptilia	Eretmochelys imbricata	Hawksbill Turtle	P	V	1
Reptilia	Varanus rosenbergi	Rosenberg's Goanna	V,P		14
Aves	Ptilinopus regina	Rose-crowned Fruit-Dove	V,P		3
Aves	Ptilinopus superbus	Superb Fruit-Dove	V,P		2
Aves	Hirundapus caudacutus	White-throated Needletail	P	V,C,J,K	6
Aves	Diomedea exulans	Wandering Albatross	E1,P	E,J	1
Aves	Diomedea gibsoni	Gibson's Albatross	V,P	V	1
Aves	Thalassarche cauta	Shy Albatross	V,P	V	3
Aves	Thalassarche melanophris	Black-browed Albatross	V,P	V	1
Aves	Ixobrychus flavicollis	Black Bittern	V,P		1
Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P	C	39
Aves	Hieraaetus morphnoides	Little Eagle	V,P		4

Aves	^^Lophoictinia isura	Square-tailed Kite	V,P,3		2
Aves	^^Pandion cristatus	Eastern Osprey	V,P,3		3
Aves	Burhinus grallarius	Bush Stone-curlew	E1,P		50
Aves	Esacus magnirostris	Beach Stone-curlew	E4A,P		1
Aves	Haematopus fuliginosus	Sooty Oystercatcher	V,P		6
Aves	Numenius madagascariensis	Eastern Curlew	P	CE,C,J,K	7
Aves	^^Callocephalon fimbriatum	Gang-gang Cockatoo	V,P,3		1
Aves	^Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P,2		54
Aves	Glossopsitta pusilla	Little Lorikeet	V,P		5
Aves	^^Lathamus discolor	Swift Parrot	E1,P,3	CE	9
Aves	^^Neophema pulchella	Turquoise Parrot	V,P,3		1
Aves	^^Ninox connivens	Barking Owl	V,P,3		21
Aves	^^Ninox strenua	Powerful Owl	V,P,3		252
Aves	^^Tyto novaehollandiae	Masked Owl	V,P,3		2
Aves	^Dasyornis brachypterus	Eastern Bristlebird	E1,P,2	E	1
Aves	Anthochaera phrygia	Regent Honeyeater	E4A,P	CE	2
Aves	Artamus cyanopterus cyanopterus	Dusky Woodswallow	V,P		1
Aves	Petroica boodang	Scarlet Robin	V,P		1
Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	V,P	E	4
Mammalia	Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	E1,P	E	3

Mammalia	Phascolarctos cinereus	Koala in the Pittwater Local Government Area	E2,V,P	V	2
Mammalia	Phascolarctos cinereus	Koala	V,P	V	2
Mammalia	Cercartetus nanus	Eastern Pygmy-possum	V,P		260
Mammalia	Petaurus norfolcensis	Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	E2,V,P		1
Mammalia	Petaurus norfolcensis	Squirrel Glider	V,P		5
Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	132
Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P		1
Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P		9
Mammalia	Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V	11
Mammalia	Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P		2
Mammalia	Myotis macropus	Southern Myotis	V,P		14
Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	V,P		7
Mammalia	Vespadelus troughtoni	Eastern Cave Bat	V,P		1
Mammalia	Pseudomys novaehollandiae	New Holland Mouse	P	V	1
Mammalia	Dugong dugon	Dugong	E1,P		1
Mammalia	Arctocephalus forsteri	New Zealand Fur-seal	V,P		1
Mammalia	Arctocephalus pusillus doriferus	Australian Fur-seal	V,P		1
Mammalia	Eubalaena australis	Southern Right Whale	E1,P	E	3
Mammalia	Megaptera novaeangliae	Humpback Whale	V,P	V	8

Mammalia	Physeter macrocephalus	Sperm Whale	V,P		2
Mammalia	Miniopterus australis	Little Bent-winged Bat	V,P		39
Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P		62

Note: *E = Endangered, V = Vulnerable, P = Protected.*

Search criteria: Public Report of all Valid Records of Threatened (listed on BC Act 2016) or Commonwealth listed Animals in selected area [North: -33.59 West: 151.27 East: 151.37 South: -33.69] recorded since 01 Jan 1990 until 01 Jul 2020 returned a total of 1,132 records of 59 species. Report generated on 1/07/2020 12:22 PM.

5.2 Endangered populations

Two endangered populations have been recorded to occur within 10km of the site. Squirrel Gliders may be present on the peninsula but not recorded for in the past 10 years – Sugar Gliders have been reported. No Koalas in this area anymore (past 20 years).

Table 5. Endangered Populations in the LGA. Source NSW OEH Bionet 2020.

Endangered Population	Scientific Name	NSW Status	Comth. Status	No. of records
Koala in the Pittwater Local Government Area	*Phascolarctos cinereus*	E2,V,P	V	2
Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill	*Petaurus norfolcensis*	E2,V,P		1

5.3 Fauna findings from site assessment

No threatened fauna identified onsite.

6 Impacts

6.1 Direct Impacts

6.1.1 Vegetation disturbance and loss

Two trees are proposed for removal – Tree 1: Angophora *costata* and Tree 2: *Syagrus spp.*

Tree one is in marginal condition and Tree two is an exotic species and not protected under legislation. Native landscaping post development will offset tree removal from the site. See the arborist report by Growing My Way Tree Services (May 2020) for trees being retained and trees which will require protection during works. Removal of the two trees will not result in significant ecological impacts on site or to PWSGF EEC.

6.2 Indirect Impacts.

6.2.1 Weed growth and invasion

Weed species may arise within the direct works zone and surrounding areas through soil disturbance or by being brought in as seed on work machinery, tools, equipment and worker clothes (e.g. boots). Soil disturbance combined with the elevated nutrients and increased light exposure may result in increased weed growth, aggravated by the high abundance of weeds present pre-works.

6.2.2 Introduction of pathogens

The introduction of pathogens may occur into the site, and surrounding remnant bushland, via machinery, tools, equipment and worker clothing (e.g. boots). Diseases to watch out for include Phytophthora (also known as Root Rot – type of water mold) and Myrtle Rust (*Puccinia psidii* – type of fungus). See Appendix for methods to control selected pathogens.

6.3 Assessment of Significance (5-part tests) Summary

See Appendix III for full 5-Part Test.

Pittwater Wagstaff Spotted Gum Forest EEC

Ecologists have concluded that there will be no significant impact upon Pittwater Wagstaff Spotted Gum Forest EEC as a result of this development. The proposed development area is highly modified, with exotic species in abundance throughout existing landscaped gardens. The site does not accurately represent PWSGF EEC in a near natural state. The inclusion of canopy tree planting and planting of locally native mid and understory species will be a benefit to the EEC and native fauna which may use the area.

7 Recommendations

7.1 Mitigation Measures

7.1.1 Delineation of work areas and vegetation clearing

During construction, impacts on the site and adjacent vegetation should be minimized by the delineation of works zones. Most of the vegetation planned for clearing are landscaped gardens. In this case, no vegetation clearing control measures are necessary. Refer to Arborist report for tree protection measures.

7.1.2 Tree Protection

Tree protection will be consistent with the Arborist report.

7.1.3 Landscaping -weed management and planting

Weed management and planting will occur as per the Landscaping Plan by Jamie King Landscape Architect (2020). Landscaping with locally native flora is recommended. Ecologists recommend that canopy species including; *Corymbia sp* and *Eucalyptus sp* (as per Appendix V*)* be included in the planting schedule to support canopy diversity at the site. Additionally, any flora species added to the planting schedule should be selected from the PWSGF species list, included in appendix V.

7.1.4 Weed Removal Techniques

Weed removal proposed for the site will consist of hand removal techniques, manual/mechanical removal using bush regenerator tools and winter thermal (flame) weeding. This approach will reduce the amount of herbicide used and reduce the amount of off-target damage through spot on application.

Woody perennial weeds less than 2 metres in height will require cut and paint or scrape and paint bush regenerator techniques based on the germinating/epicormic behaviour of the plant (especially plants that tend to coppice or sucker).

It is recommended that seed heads are removed prior to commencement of primary works. This would be best performed carefully by hand with secateurs with the aim of avoiding the spread flowers or seeds into planting zones.

See Appendix III for further details. For key weed photo guide see Appendix VIII.

7.1.5 Native Seed Collection

Any native trees or shrubs being removed for the construction works should be checked for seeds during removal works. If seeds are present, they should be collected and used off-site, location to be determined with council.

Seed collection must be undertaken in accordance with Florabank Guidelines by an appropriately experienced bush regeneration contractor with appropriate licences and permits under the *National Parks and Wildlife Act 1974,* to collect seed from protected flora.

7.1.6 Plant propagation

Plants may be propagated by a local nursery or the bush regeneration contractors if they have the appropriate facilities. In either case, plants must be propagated by an organisation that is a member of a recognised industry association.

7.1.7 Nest boxes

Although it is not critical, installation of a single nest box designed for microbats should be added to the site to replace potential loss of roosting habitat.

Image from: nestboxes.com.au

7.1.8 Pathogen prevention

To prevent the introduction of pathogens, Bushland Hygiene Protocols outlined in Appendix V should be followed. The site is considered to be an area which may promote the spread of Phytophthora (a group of fungus-like diseases affecting plants) due to its moist soil and proximity to water. It is recommended that Bushland Hygiene Protocols be followed closely.

Phytophthora infected vegetation. (Image by Rasbak, licensed under the Creative Commons Attribution-Share Alike 3.0 Unported, 2.5 Generic, 2.0 Generic and 1.0 Generic license.)

Myrtle Rust generally infects new leaf growth. (Image by John Tann, licensed under the Creative Commons Attribution 2.0 Generic license.)

7.1.9 Vertebrate Pests

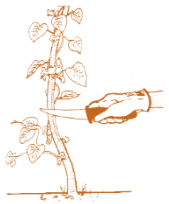
Vertebrate pests (cats, dogs, foxes) are a significant problem in this area. Cats to be kept in at night and not able to enter any bushland at any time. Dogs to be restrained from entering bushland unsupervised.

Foxes – NB Council has a program in place to manage foxes.

7.2 Appendix I – Key Weed Removal Methods

Physical removal

Technique	Method	Equipment
Hand Removal 	Seedlings and smaller weed species where appropriate will be pulled out by hand, without risk of injury to workers. The size that this can occur varies throughout the treatment area. Generally, it ranges from post seed to approximately 300mm in height. Rolling and raking is suitable for larger infestations of Wandering Jew. The weed can be raked and stems and plants parts rolled. The clump of weed material can then be bagged and removed from site.	Tools: Gloves, Rakes, Knife and Weed Bags
Crowning 	Plants that possess rhizomes or bulbs might not respond to various removal techniques and may need to be treated with crowning. A knife, mattock or trowel is to be driven into the soil surrounding the bulb or rhizome at an angle of approximately 45 degrees with surrounding soil, so as to cut any roots that may be running off. This is to occur in 360 degrees around the bulb/rhizome. The rhizome or bulb is to be bagged and removed from the site and disposed of at an appropriate waste recycling facility Soil disturbance is to be kept to a minimum when using this technique.	Tools: Knife, mattock, trowel, impervious gloves, and all other required P.P.E.
Cut and Paint Stems 	Weed species deemed unsuitable for hand removal shall be cut. Those that have persistent of vigorous growth will be cut and painted with Roundup® Biactive Herbicide or equivalent. Juvenile and smaller weed species will be cut with secateurs at base of plant, and herbicide applied via applicator bottle. Stem to be cut horizontally as close to the ground as possible, using secateurs, loppers or a pruning saw. Horizontal cuts to be made on top of stem to prevent the herbicide running off the stump. Apply herbicide to the cut stem immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Herbicide is not to reach sediment or surrounding non-targeting plants.	Tools: loppers, secateurs, pruning saw, herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide and all other required P.P.E.

Technique	Method	Equipment
Scrape and Painting 	More resilient weed species, where other techniques are less reliable are to be scraped with a knife or chisel and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current herbicide license. Weed species will be scraped with a knife or chisel up the length of the trunk, and herbicide applied via applicator bottle. Scrape the trunk from as close to the ground as possible to approximately ¾ of the plants height. Where trunk diameters exceed approximately 5 cm a second scrape shall be made on the other side of the trunk. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants. Follow up treatment may be required. If plants resprout, scrape and paint the shoots using the same method after sufficient regrowth has occurred.	Tools: knife, chisel, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.
Cut with a Chainsaw and Paint 	Larger size weed species, too large for cutting with hand tools, shall be cut with a chainsaw and painted with undiluted Roundup® Biactive Herbicide. Works to be carried out by a contractor with a current chainsaw and herbicide license. Larger weed species will be cut with a chainsaw at base of plant, and herbicide applied via applicator bottle. Cut the stem horizontally as close to the ground as possible, using the chainsaw. Remove upper branches to reduce bulk of plant. If cutting at the base is impractical, cut higher to get rid of the bulk of the weed, then cut again at the base and apply herbicide. Make cuts horizontal to prevent the herbicide running off the stump. Apply undiluted herbicide to the cut trunk immediately, within 10-20 seconds, before the plant cells close and the translocation of the herbicide is limited. Ensure there is no runoff of poison. All care must be taken by the contractor not to spill herbicide into water, onto sediment, or surrounding non-targeting plants. Follow up treatment will be required. If plants resprout, cut and paint the shoots using the same method.	Tools: chainsaw, ear muffs, protective clothing, safety glasses herbicide applicator/sprayer, impervious gloves, Roundup® Biactive Herbicide, and all other required P.P.E.

Technique	Method	Equipment
Spot Spraying	Spot spraying involves spraying non-seeding annuals and grasses, and for regrowth of weeds once an area has been cleared or brushcut. Works to be carried out by a contractor with a current herbicide license. Herbicide will be mixed up according to the manufacturer's directions for the particular weed species being targeted. Mixed herbicide shall be applied to the targeted weed species with a backpack sprayer. All care must be taken by the contractor not to spill herbicide onto sediment or surrounding non-targeting plants.	Tools: protective clothing, safety glasses, herbicide sprayer, impervious gloves, Herbicide, and all other required P.P.E.

Flame Weeding

Thermal (flame) weeding is a method where high temperatures are applied to weeds, causing the plant to die. Thermal weeding is particularly useful in situations where conservation or health considerations are high and weed density is low such as waterways where herbicide use is not permitted.
While flame weeding is not suited to most streetscapes due to the fire hazard nor can it be used on materials such as soft fall and similar playground equipment it is noted that 'flame' weeding in waterways allows weed management in areas where herbicides are not permitted.
Also for native vegetation areas thermal weeding, with a flame weeder, has been shown to stimulate germination of native plants while killing the seeds of annual weeds such as Devils Pitchfork, *Bidens pilosa*. Flame weeding is also effective in killing persistent weeds like
Mother of Millions.
Best results are obtained when follow up weed control is undertaken 4-6 weeks after treatment. In addition, weed control should be conducted periodically after that for example to control weeds over a period of a year it is likely that between 3-5 applications will be necessary, depending on rainfall and the extent of the weed seed bank. This method is most effective on young annual weeds and least effective on older perennial weeds. In some cases, control of perennial weeds will be ineffective however this depends on the species present and its age.

Images provided by Dragonfly Environmental

Flame weeding should be undertaken outside of the fire seasons. Flame weeding allows for the mimicking of a burn in areas where a control burn could not be undertaken. See native plants regenerating after flame weeding.

7.3 Appendix–II Bushland Hygiene Protocols for Phytophthora

- Always assume that the area you are about to work in is free of the disease and therefore needs to be protected against infection.
- And, always assume that the activity you are about to undertake has the potential to introduce the disease.
- Arrive at site with clean shoes, i.e.: no dirt encrusted on them.
- If you arrive with shoes that are encrusted with dirt, they will have to be completely soaked in metho or disinfectant and allow a few minutes to completely soak in. NEVER scrape untreated dirt off your shoes onto the ground.
- Before you move onto the site spray the bottom of your shoes with 70 % metho. Bleach solution (1% strength) or household/commercial disinfectant (as per label) are also suitable.
- Check all tools and equipment that comes in contact with soil are clean before entering the area (they should have been cleaned on site at the end of the previous work session). If there is any dirt on them, spray them with 70% metho.
- Clean all tools at the end of each work session while still on site ensuring this is done away from drainage lines and adjacent work areas. Knock or brush off encrusted dirt and completely spray with 70 % metho. Replace in storage/transport containers.
- Preferably compost all weed material on site.
- Never drag vegetation with exposed roots and soil through bushland.
- When removing weeds from site, remove as much soil as possible from them in the immediate work area and carefully place vegetative material into plastic bags.
- Try not to get the bag itself dirty; don't put it on/in a muddy area.
- Always work from the lower part of a slope to the upper part.
- Always work in areas known to be free of the pathogen before working in infected areas.
- Minimise activities wherever possible when the soil is very wet.
- Vehicles should not be driven off track or into reserves (unless vehicle decontamination is carried out before and after entering a single work site)
- Only accredited supplies of plants/mulch to be used.

Kit should contain: 1 bucket, 1 scrubbing brush, 1 spray bottle (metho 70% solution), 1 bottle tap water, 1 bottle methylated spirits.

Facts about Phytophthora

Phytophthora cinnamomi (Phytophthora) is a microscopic, soil borne, water-mould that has been implicated in the death of remnant trees and other plants in Australian bushland. Phytophthora is not native to Australia. It is believed to have been introduced sometime after European settlement. Phytophthora is a national problem and is listed as a key threatening process under the Commonwealth's Environmental Protection and Biodiversity Conservation Act 1999.

Symptoms including Dieback

"Dieback" simply means dying or dead plants. There are many causes of dieback; Phytophthora is just one of them. Often dieback is the result of a combination of factors such as; changed drainage patterns and nutrient loads (e.g.: increased stormwater run-off) or changed soil conditions (e.g.: dumped fill or excavation of/near root zone). Plants that are stressed are more vulnerable to Phytophthora.

Initial symptoms of Phytophthora include; wilting, yellowing and retention of dried foliage, loss of canopy and dieback. Infected roots blacken and rot and are therefore unable to take-up water and nutrients. Severely infected plants will eventually die. Symptoms can be more obvious in summer when plants may be stressed by drought. If you suspect that Phytophthora is on your site, please contact the Bushcare team to

collect a soil sample to be lab tested. This is usually done in the warmer months where conditions are optimum for the disease.

Infection

There is no way of visually telling if Phytophthora is present in the soil as its structures and spores are microscopic (invisible to the naked eye). Phytophthora requires moist soil conditions and warm temperatures for infection, growth and reproduction. Spores travel through moist soil and attach to plant roots. Once Phytophthora has infected a host plant it can grow inside plant root tissue independent of external soil moisture conditions. After infection, Phytophthora grows through the root destroying the tissue which is then unable to absorb water and nutrients.

7.4 Appendix III– Test of Significance

7.4.1 Pittwater Wagstaff Spotted Gum Forest EEC (PWSGF)

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

Not a Threatened Species

In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

The local occurrence of PWSGF is already at risk of extinction. The site is not accurately representative of PWSGF EEC. The site has been highly modified from its original state. Several *Angophora costata spp* are present in the eastern portion of the site, with *Corymbia maculata* primarily excluded to the western portion of the site. Additionally, the whole site is landscaped, with a high abundance of exotic species throughout the mid and understory. As such, the site does not accurately represent the PWSGF EEC in a near natural state.

The inclusion of canopy tree planting and planting of locally native mid and understory species will be a benefit to the community.

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

The proposed development area is highly modified – landscaped exotic species cover the gardens and have a low value for native fauna. The local occurrence is at risk of extinction and the proposed development, with appropriate landscaping and planting of canopy trees will be an improvement from the current situation.

b) In relation to the habitat of a threatened species or ecological community:

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

Works associated with the proposal may remove two trees from the site – Tree 1 :*Angophora costata* and Tree 2: *Syagrus spp.*

As discussed in the Arborist Report, regarding tree one:

It is acknowledged as being of High Significance & High Retention value by size, species, condition &/or presence. However, by actual specimen these ratings are significantly exaggerated by virtue of the 'body language' of its trunk base. The southern side of the trunk base is quite deformed. Only two trunk base points of origin for 'Structural Supporting Roots' were able to be obviously confirmed.

As such, the tree is in marginal condition and should be removed for health and safety reasons, irrespective of a development proposal. The proposal will not be a major impact on the PWSGF EEC.

The development area does not significantly reduce the habitat area or potential habitat area for PWSGF EEC.

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

Already is fragmented and the proposed will not increase this providing there is tree planting.

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

No core habitat will be removed or modified as a result of the proposed development.

c) Whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

Declared areas of outstanding biodiversity value have not yet been declared in this area.

d) Whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Land clearing is a key threatening process. Although the area of impact is small and does not significantly alter or impact the PWSGF EEC. The proposal will not cause an increase in any KTP.

Conclusion

Ecologists have concluded that there will be no significant impact upon Pittwater Wagstaff Spotted Gum Forest EEC as a result of this development. The proposed development area is highly modified, with exotic species in abundance throughout existing landscaped gardens. The site does not accurately represent PWSGF EEC in a near natural state. The inclusion of canopy tree planting and planting of locally native mid and understory species will be a benefit to the EEC and native fauna which may use the area.

7.5 Appendix IV– MNES

A Protected Matters Search was conducted. Ecologists have concluded there will be no significant impact upon Matters of National Environmental Significance.

Report Generation ID: 58WLZ5 Location: 61 Dress Circle Road Avalon Beach (1km buffer). The MNES document can be provided if applicable for council consideration.

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.

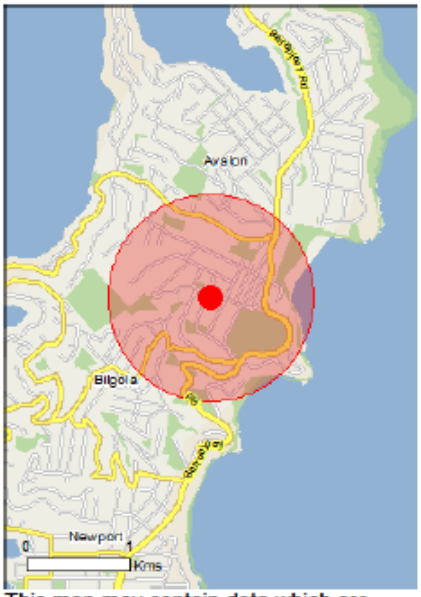
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 01/07/20 12:20:22

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 1.0Km

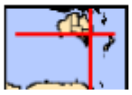


Figure 5-0. MNES summary results.

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:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	70
Listed Migratory Species:	58

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:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	77
Whales and Other Cetaceans:	14
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	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:	None
Regional Forest Agreements:	None
Invasive Species:	47
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Figure 5-1. MNES summary results.

7.6 Appendix V– 7.4.1 Pittwater Wagstaff Spotted Gum Community EEC species list.

The Pittwater Spotted Gum Forest is the name given to the plant community that is characterised by the following assemblage of species (DPIE, 2020).

Acacia floribunda	*Dodonaea triquetra*	*Lomandra longifolia*
Acrotriche divaricata	*Doodia caudata*	*Macrozamia communis*
Adiantum aethiopicum	*Eleocarpus reticulatis*	*Notelaea longifolia*
Allocasuarina litoralis	*Entolasia stricta*	*Oxylobium ilicifolium*
Allocasuarina torulosa	*Eucalyptus botryoides*	*Pandorea pandorana*
Angophora costata	*Eucalyptus paniculata*	*Pittosporum undulatum*
Angophora floribunda	*Eucalytpus punctata*	*Platylobium formosum*
Billardiera scandens	*Eucalyptus umbra*	*Pseuderanthemum variabile*
Breynia oblongifolia	*Eustrephus latifolius*	*Pteridium esculentum*
Cassytha paniculata	*Geitonoplesium cymosum*	*Pultenaea flexilis*
Cayratia clematidea	*Glochidion ferdinandi*	*Syncarpia glomulifera*
Cissus hypoglauca	*Gymnostachys anceps*	*Synoum glandulosum*
Corymbia gummifera	*Hakea sericea*	*Themeda australis*
Corymbia maculata	*Hydrocotyle peduncularis*	*Xanthorrhoea macronema*
Dianella caerulea	*Livistona australis*	

8 Expertise of authors

Geraldene Dalby-Ball
DIRECTOR

With over 20 years wetland and urban ecology experience, a great passion for what she does, and extensive technical and on-ground knowledge make Geraldene a valuable contribution to any project.

Geraldene has over 8 years local government experience as manager of environment and education for Pittwater Council. Geraldene presented papers on the topic at the NSW Coastal Conference, Sydney CMA and Hawkesbury Nepean forums. Geraldene is a Technical Advisor Sydney Olympic Park Wetland Education and Training (WET) panel.

Geraldene has up to date knowledge of environmental policies and frequently provides input to such works. Geraldene was a key contributor to the recent set of Guidelines commissioned by South East Queensland Healthy Waterways Water Sensitive Urban Design Guidelines. Geraldene's role included significant contributions and review of the Guideline for Maintaining WSUD Assets and the Guideline for Rectifying WSUD Assets.

Geraldene is a frequent contributor to many community and professional workshops on ecological matters particularly relating to environmental management. She is an excellent Project Manager.

Geraldene is a joint author on the popular book Burnum Burnum's Wildthings published by Sainty and Associates. Author of the Saltmarsh Restoration Chapter Estuary Plants of East Coast Australia published by Sainty and Associates (2013). Geraldene's early work included 5 years with Wetland Expert Geoff Sainty of Sainty and Associates. Geraldene is an expert in creating and enhancing urban biodiversity habitat and linking People with Place.

SPECIALISATIONS

- Urban Ecology – and habitat rehabilitation and re-creation.
- Urban waterway management – assessing, designing and supervising rehabilitation works
- Saltmarsh and Wetland re-creation and restoration – assessment, design and monitoring
- Engaging others in the area of environmental care and connection
- Technical Advisor – environmental design, guidelines and policies
- Sound knowledge and practical application of experimental design and statistics
- Project management and supervision
- Grant writing and grant assessment
- Budget estimates and tender selection
- Expert witness in the Land and Environment Court

CAREER SUMMARY

- **Director and Ecologist**, Ecological Consultants Australia. 2014-*present*
- **Director and Ecologist**, Dragonfly Environmental. 1998-2013
- **Manager** Natural Resources and Education, Pittwater Council 2002-2010
- **Wetland Ecologist** Sainty and Associates 1995-2002

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Science with 1st Class Honors**, Sydney University
- WorkCover WHS General Induction of Construction Industry NSW White Card.
- Senior First Aid Certificate.
- **Practicing member and vice president** Ecological Consultants Association of NSW

Jack is a passionate ecologist who has worked with various stakeholders across both the public and private sectors to deliver sustainable environmental outcomes. He has worked on projects with major construction contractors and has been able to deliver tailored environmental solutions on time and within budget.

As an undergraduate student, he published a study that examined the cost of revegetation across the Richmond River Catchment in NSW. This study provided Jack with a deep understanding of urban and landscape ecology and the environmental factors associated with habitat restoration.

He has advanced communication skills and can deliver professional ecological assessments. He has a thorough understanding of current NSW and Commonwealth environmental legislation. He is also competent in the practical application of flora and fauna surveying and monitoring techniques.

Jack would be a valuable addition to any ecology project as he is committed to achieving the best possible outcome for both the client and the environment.

Key Projects Include:

- Monitoring of Endangered Species, various locations
- Environmental consultant for many civil developments throughout the Sydney region
- Researching the On-farm costs of revegetation in the Richmond River Catchment
- Sustainable business transformation proposal for a retail store.

Jack Hastings

ECOLOGIST

SPECIALISATIONS

- Urban and landscape ecology – design and re-creation
- Environmental Impact Assessments (EIA)
- Review of Environmental Factors for development applications
- Flora and Fauna management plans
- Habitat tree assessment, marking and mapping
- GIS mapping
- Sound understanding and practical application of experimental design
- Grant writing and grant assessment

CAREER SUMMARY

- **Ecologist**, Ecological Consultants Australia. *2019-present*
- **Environmental Consultant,** BBN Consulting. *2018-2019*

QUALIFICATIONS AND MEMBERSHIPS

- **Bachelor of Environmental Science, Southern Cross University.**
- **Certificate II Agriculture.**
- **WHS General Induction of Construction Industry NSW White Card.**