Biodiversity Development Assessment Report

for a

New Dwelling

at

9 Minkara Road, Bayview

By

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and

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December 2018

Prepared for

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Executive Summary

Essential Background Information

GIS Environmental Consultants have been contracted to prepare a Biodiversity Development Assessment Report for a Development Application (DA) for a new dwelling at 9 Minkara Rd, Bayview. The Development Site is a large (21864m^2) ridgetop bushland property, as shown in Figure 1.4.

When the first field survey was conducted on the 29th of August 2018, the central part of the site had recently been cleared, and the current soil surface was crushed sandstone/fill. This report does not map, describe or assess the clearing that has recently occurred (Recent Clearing), this report only addresses the impact due to this DA proposal, that would have occurred on the land, before this Recent Clearing.

When aerial photographs of the site from 2015 were viewed, it was apparent that there had been a small area (578m^2) of clearing on the property more than three years ago. This area is within the area of the Recent Clearing. This older clearing is referred to in this report as the pre-December 2015 clearing and is shown on Figure 3.1.

The **brief** for this report was to assess the impact of the DA proposal on the bushland that was present in December 2015 (i.e. as the land was before the recent clearing) as shown on Figure 1.1.

The proposal is shown on the DA plans provided; Site Plan (S Crosby August 2018) and a bushfire APZ sketch (J Delany 29th November 2018) the outline of the proposal components and the Development Footprint are reproduced in Figures 1.4 and 1.5.

The DA assessed in this report is for a new; house, terrace, pool and spa, driveway, carport, onsite wastewater disposal area and bushfire Asset Protection Zone as shown of Figures 1.4 and 1.5.

Summary Of Areas

	Description	Area (m^2)	% of Development Site	Figure
Proposal				
Development Site (property)	Property, land and subject to the DA, 9 Minkara Rd, Bayview	21,862	100%	1.1
Development Footprint	Part of site impacted by construction and APZ	5,283	24%	1.4
Vegetation Communities PCT (on Development Site)				
CSGF	Coastal Sandstone Gully Forest (PCT 1250)	10,619	49%	3.1
SNESW (dominant)	Sydney North Exposed Sandstone Woodland (PCT 1783)	10,665	49%	3.1
Cleared prior to Dec 2015	Not a PCT	578	2%	3.1
Vegetation Zones (within the Development Footprint)				
Vegetation Zone 1	High resilience SNESW, within the Development Footprint	3,999	18%	3.1
Management (Impact) Zones within Vegetation Zone, area offset				
Management Zone 1 (MZ1)	Construction Site, future integrity score 0, removal of vegetation, within Vegetation Zone 1.	3,481	16%	6.1
Management Zone 2 (MZ2)	Bushfire Asset Protection Zone (APZ) estimated future integrity score 30.3, disturbance to vegetation within Vegetation Zone 1.	518	2%	6.1

Summary of the Ecological Assessment

This BDAR report does not assess the ecological values at the site at the time of the field surveys but instead, aims to describe, quantify and assess the impact of the proposed development as if the clearing had not occurred.

High-resolution aerial photographs from the before the recent clearing, are used to map the vegetation types on the site and condition pre-December 2015. The Threatened species survey, vegetation plots and

general habitat searches were conducted in the uncleared areas of bushland habitat that appeared to be the same vegetation type (PCT) and condition. On the parts of the site where searches for candidate Threatened species and specific habitat features could not be conducted a precautionary approach was taken. Potential candidate species that have a very low likelihood of occurring were excluded from the BDAR assessment in accordance with the BAM, and the justifications are given.

There are two vegetation types on the property (Development Site). The dominant PCT within the Development Footprint is Sydney North Exposed Sandstone Woodland (PCT 1783). Coastal Sandstone Gully Forest (PCT 1250) also occurs on the lower parts of the property, but the proposed APZ and driveway will impact only a small area of this community. Neither community at the site is representative of a Threatened Ecological Community. The proposal qualifies for the small area Streamlined Assessment Module, and therefore only the dominant PCT within the Development Footprint requires offsetting. Section 4.7 of this BDAR discusses the methods used to avoid and minimise impacts.

Due to the use of the Streamlined Assessment module and the uniformity of the vegetation condition across dominant PCT (as can be seen on the Aerial Photo Figure 1.1), only one Vegetation Zone is needed within the Development Footprint. The proposal will result in 2 types of impact (Management Zones); total clearance (MZ1) and Asset Protection Zone disturbance (MZ2).

Summary of Impacts and Offsetting

The impact to Vegetation Zone 1 (3999m^2) within the dominant PCT Sydney North Exposed Sandstone Woodland (PCT 1783) parts of the site will require 10 ecosystem credits and 107 Species Credit Species credits. See table below. This can be offset by making a payment to the Biodiversity Conservation Trust.

The proposal will also impact 718m^2 of Coastal Sandstone Gully Forest (non-dominant PCT, 1250) and Prescribed Impacts including impact to; a cliff, sandstone rocks and boulders, wildlife connectivity and hydrological processes. These impacts are not included in the BAM calculator assessment offset and are described in section 4.8 of this report as required by the Biodiversity Assessment Method (Aug 2017) and the BAM Operational Manual (May 2018).

This report makes further recommendations to ameliorate ecological impacts during and after construction.

Offset Summary

Biota	Total Credits required	Offset Price (ex GST)
Ecosystem Credits		
PCT 1783 - Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast	10	$34,842.01
Species Credits		
Netted Bottle Brush	2	$398.83
Glossy Black Cockatoo	3	$1,800
Eastern Pygmy Possum	14	$7,415.37
Large-eared Pied Bat	20	$20,787.03
Leafless Tongue Orchid	14	$3,134.25
Giant Burrowing Frog	3	$1,589.01
Deane's Paperbark	12	$5,132.86
Squirrel Glider	14	$7,415.37
Red-crowned Toadlet	8	$5,015.94
Tetratheca glandulosa	14	$993.61
Masked Owl	3	$1,880.98
	Total (incl GST)	**$99,534.93**

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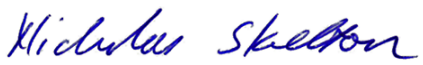
Required Licences:
NSW Department of Primary Industries, Animal Research Authority: 12/4838
Office of Environment and Heritage, Section 132C Scientific Licence: SL101070
Office of Environment and Heritage, BAM Assessor: BAAS17083
Office of Environment and Heritage, Data Licence Agreement: CON97043

Approved for release by Director:



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Approval Date: 6th December 2018

File Number: MRBDAR1218

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Context

Background

This report describes the ecological values and constraints that occur at 9 Minkara Road, Bayview (Lot 40 DP 28908) in the Northern Beaches Local Government Area. Then the importance of the land to the conservation of Threatened flora and fauna species, and ecological communities is determined, then finally the likely impacts of the proposed development on terrestrial biodiversity is assessed and the required offsets are calculated as required by Federal, State and Local Government legislation.

An accurate description of the flora and fauna and an assessment of the ecological impact of the proposed development is required when submitting development applications to allow assessment of the application in relation to the following legislation; the NSW *Environmental Planning and Assessment Act 1979* and the *Biodiversity Conservation Act 2016*. In addition, the information in this report is likely to be needed to assess this development with respect to other acts, SEPPs, local government plans (LEPs, DCPs) regulations, orders and policies.

Aims of this Report

The aims of this Biodiversity Development Assessment Report are to:

- Determine the site context including native vegetation in the locality and landscape features on the site.
- Record the **findings of an ecological survey** (flora, fauna and ecological communities, and their habitats and vegetation integrity) of the area likely to be impacted by the proposal;
- Provide **ecological information** and **assessment** regarding the importance of the habitat on the site to the conservation of native flora and fauna.
- Determine the ecological constraints of the site and provide advice to the applicant on ways the impact can be **avoided** and **minimised** before finalising the proposal plans as required by the mitigation hierarchy of the Biodiversity Conservation Act regulation 2017;
- To **Assess** the likely **impact** of the proposal on the ecological values of the site in particular the significance of the impact to Threatened species, populations and ecological communities or their habitats in accordance with the requirements of the *Environment Planning and Assessment Act* (EP&A Act) Sections 4.15 (1) a, b and c, the *Biodiversity Conservation Act 2016* and determination of compliance with other relevant NSW legislation including; Acts, regulations SEPPs, LEP and DCPs;
- Determine if the proposal needs **referral** to the Federal government for assessment under the EPBC Act;
- Assess if potential Serious and Irreversible Impacts (SAII) may result from the proposal.
- Determine areas that require **offsetting** under the Biodiversity Conservation Act and calculate the number of offsetting **credits** required and the **cost**.
- Recommend ways the ecological **impacts** can be further **ameliorated** and prescribe appropriate ecological management actions during construction and for the life of the development.
- This report addresses Council legislation (LEP, DCP), the “heads of consideration” in section 4.15 (1) a, b, c of the EP&A Act, SEPPs, other NSW environmental Acts and the Federal EPBC Act 1999.

Legislation Addressed by the Report

I. Environment Planning and Assessment Act 1979

The NSW Environment Planning and Assessment Act 1979 is the framework for approval of development in NSW. The proposed development will be assessed under Part 4 of the NSW Environmental Planning and Assessment Act. Section 4.15 (a)(formerly 79C(a)) of the Act requires that consent authorities must take into consideration any environmental planning instruments, LEP, DCP, SEPPs and regulations. Section 4.15 (c) requires assessment of the suitability of the land for development.

Section 4.15 (b) (formerly 79C (b)) requires the assessment of the likely impacts of a development, including environmental impacts on both the natural and built environments including the BC Act threshold test and if necessary a BAM assessment and any required offsetting.

II. Biodiversity Conservation Act 2016

The primary requirement of the BC Act is that ecological impact are to be Avoided and Minimised during planning of a proposal and then any remaining impact are to be offset according to the Biodiversity Offset Scheme (BOS).

The Schedules of the BC Act list Threatened flora and fauna species and define Endangered ecological communities.

Section 7.2 of the BC Act states that a development is likely to have a significant affect and will require assessment and offsetting if any of the following triggers are met;

- the BOS threshold test is triggered (area of disturbance or affecting mapped Biodiversity value) (see below for details), or
- mapped as Biodiversity Value in the Biodiversity Values Map or
- a Test of Significance (5 part test) for potential threatened species or ecological communities is positive (see below for details), or
- an Area of Outstanding Biodiversity Value is affected by the proposal (see below for details).

The **BOS Threshold test** is triggered if the area of native vegetation (any plant native to NSW, as defined in the LLS Act) will be disturbed (including bushfire APZ and other disturbance) is more than 0.25ha where the LEP minimum lot size is less than 1ha or if the disturbance area is equal or greater than 0.5ha where the lot size is larger 1ha (section 7.2 of the BC Act regulation). Mapped on the Biodiversity Values Map is triggered if the proposal will have a direct or indirect impact on an area mapped as "Biodiversity Value" on the Biodiversity Values map.

The **Test of Significance** (section 7.3 of the BC Act) is used to determine if a proposed development or activity is likely to significantly affect Threatened species or ecological communities, or their habitats. Section 7.3 (2) of the BC Act provides guidance on the assessment of the Test of Significance in a guideline document (2018). https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/threatened-species-test-significance-guidelines-170634.pdf

Areas of Outstanding Biodiversity Value are currently mostly also mapped on the Biodiversity Values map.

If any of the triggers are met then the Biodiversity Assessment Method (BAM) must be applied, the ecological impact must be avoided and minimised then, the residual impact of the DA will be offset in accordance with the Biodiversity Offset Scheme and the Biodiversity Assessment Method (BAM) needs to be applied to determine the types of surveys and assessment required and the amount of offsetting. Proposals also needs to be assessed to determine if they may cause a Serious And Irreversible Impacts may occur (SAII) as a result of the proposal.

If a Development Application does not meet the threshold or any other triggers, then a smaller ecological report is still required to address the ecologically relevant "heads of consideration" in the section 4.15 (formerly 79C) of the EP&A Act, SEPPs and LEP/DCP requirements. Other Acts such as Federal EPBC Act, Fisheries Act, Water Management Act and Local Land Service's Act requirements may also require an ecological assessment report.

III. Federal Environment Protection and Biodiversity Conservation Act, EPBC Act

This report also identifies "matters of national environmental significance", relevant to the site that are listed under Part 13 Division 1 of the *Environment Protection & Biodiversity Conservation Act 1999 (Cwlth)* (EPBC). Species or communities listed in the Act are considered to be "matters of national environmental significance" and consideration needs to be given as to whether the proposed development will or is likely to have a "significant impact" on any "matters of national environmental significance". In determining whether a "significant impact" will occur, consideration is given to the EPBC Act Administrative guidelines on significance (DEH 2006)

Should the assessment in this report determine that a "significant impact" will occur or is likely to occur on "matters of national environmental significance" the proposed development will need to be referred to the Minister (Cwlth) to determine as to whether or not the proposed development is a "controlled action".

Assessment of a Development Application with respect to the EPBC Act 1999 is not a Council issue but is the responsibility of the proponent. Proponents should be advised by their ecological consultant whether a referral is necessary.

This report addresses the requirements of this legislation.

Definitions and Acronyms

5-Part Test of Significance (5-Part Test) - Assessment under Section 7.3 of the BC ACT to determine whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. Only used in the BOS Threshold Test.

APZ – Bushfire hazard fuel reduction Asset Protection Zone, defined in the document '*Planning for Bushfire Protection 2006*' by the NSW Rural Fire Service. Usually consisting of an Inner Protection Area (**IPA**) and an Outer Protection Area (**OPA**)

BAM - Biodiversity Assessment Method is the ecological survey and assessment technique that is required to be used for the **BOS** and it is described in a document by Office of Environment and Heritage **OEH** (August 2017) and referred to by the **BC Act** regulation. The Biodiversity Assessment Reports (**BAR**) that the BAM methods produces are a **BDAR**, **BSSAR** and a **BCAR**.

BC Act - NSW Biodiversity Conservation Act 2016 contains the lists of threatened species, the definitions of the threatened ecological communities, the 5-part Test of Significance and the BOS. There are associated Biodiversity Conservation regulations which refers to the BAM.

BOS – Biodiversity Offset Scheme the system of trading biodiversity offset credits or paying for offsets to the Biodiversity Trust.

DCP - Development Control Plan, a local planning instrument for each LGA.

Development Site (Subject Land, property): an area of land that is subject to a proposed **Development Application** for works or an activity within the meaning of Part 5 of the EP&A Act. The term development also includes establishment or maintenance of a bushfire hazard reduction APZ area or environment management area. The Development Site includes the development footprint and any area that is part of the DA, including areas that will have lot boundaries adjusted.

Development Footprint: the area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials. The term *development footprint* is also taken to include clearing footprint except where the reference is to a small area development or a major project development.

Ecosystem Credits: a measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.

Direct Impacts - are impacts that directly affect habitat, ecosystems and individuals. They include, but are not limited to, death, trampling, poisoning of the animal/plant itself and the removal of vegetation and suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development during construction. As defined by the 2006 DECC Assessment of significance guidelines.

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. Indirect impacts may occur after construction during the life of the development, e.g. escape of garden plants, excess nutrients and changes in fire frequency and grazing. As with direct impacts, consideration must be given, to all of the likely indirect impacts of the proposed activity or development (2006 DECC Assessment of Significance Guidelines)

DPI – NSW government of Department of Primary Industries

EPA Act (EP&A Act) – NSW Environment Planning and Assessment Act 1979, controls development in NSW.

EPBC Act – Federal Environment Protection and Biodiversity Conservation Act 1999

IBRA region: a bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system3, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.

IBRA subregion: a subregion of a bioregion identified under the IBRA system.

IPA – Bushfire hazard Inner Protection Area, defined in the document '*Planning for Bushfire Protection 2006*'.

LEP – Local Environment Plan, a local planning instrument for each LGA.

LGA- Local Government Area.

OEH – NSW Office of Environment and Heritage, formerly NPWS, DEC, DECC and DECCW. Department responsible for the conservation of native flora and fauna.

OPA – Bushfire hazard Outer Protection Area, defined in the document '*Planning for Bushfire Protection 2006*'.

Property – Adjacent or nearby lot(s) that have the same ownership.

Protected Fauna - refers to any native bird, mammal, reptile or frog in NSW.

TBDC- Threatened Biodiversity Database Collection from OEH Database within BioNet.

Threatened Species or Ecological Community - refers to those biotas listed in the schedules of the Biodiversity Conservation Act 2016 as "Critically Endangered ", "Endangered" or "Vulnerable".

The Impact Mitigation Hierarchy

In managing adverse impacts on Biodiversity from development, an important frameworks is required this is called the mitigation hierarchy where the proponent needs to consider, in order, actions to avoid, mitigate and offset impacts. This Hierarchy is described in the Biodiversity Assessment Method document and is established in caselaw.

> The Chief Justice of the NSW Land and Environment Court has made the following statement (Preston, B J, Biodiversity offsets: adequacy and efficacy in theory and practice (2016) 33 EPLJ 93 at 95-96)
>
> *Avoidance and mitigation measures should be the priority strategies for managing the potential adverse impacts of a proposed development. Avoidance and mitigation measures directly reduce the scale and intensity of the potential impacts of the development. Only then are offsets used to address the residual impacts that remain after avoidance and mitigation measures have been put in place. Adherence to the mitigation hierarchy is central to biodiversity offsetting. Without prior application of the mitigation hierarchy, conservation actions would not qualify as offsets.*

Application of the mitigation hierarchy is described in the LEC cases Bulga Milbrodale progress Association Inc v Minister for Planning and Infrastructure and Warkworth Mining Limited 2013 NSW LEC 48 (Bulga) at 147 – 153.

Assumptions and Limitations

- The Threatened species habitat within the area that has been recently cleared cannot be mapped and has been estimated using the surrounding habitat, detailed historic aerial photographs and local ecological experience.
- The brief for this report was to assess the impact of the DA on the bushland that was present in December 2015 (shown on Figure 1.1). This report only assesses the impact of the Development Footprint shown on Figure 1.4.
- Where there is uncertainty regarding the habitat values in the area that has been cleared I am required to take a precautionary approach and assume that the cleared part of the site is suitable habitat or that a species occurred.
- The extent of the Development Footprint is contained within the driveway route of the and the extent of the APZ. It is assumed that the construction and ongoing use will not impact beyond the this footprint.
- This report only addresses the impacts of the proposal described and shown on the maps in this report. If there are changes to the DA plans that alter the ecological impact of the proposal, then this report is likely to require recalculating and updating.
- There may be flora and/or fauna species present within the study area that may not have been recorded because they are seasonal, cryptic and/or have large home ranges. Some threatened species may only use the study area as habitat at specific times. Assessment of habitat potential is used to address this uncertainty. The conclusions drawn in this report are a result of testing, observation and experience.
- This report assesses only the current proposal and does not consider the cumulative impact of other developments on this property or on adjacent land or the potential edge effects or impacts caused by the occupation of the land.
- This report should be read in its entirety and no part should be taken out of context.

- No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

Qualifications and Experience of the Field Ecologist and Authors

Nicholas Skelton's formal qualifications include a Bachelor of Science with Honours (B. Sc. (Hons) USyd) and a Masters in Applied Science (M. App. Sc. in Vegetation Management UNSW). Nick has been an environmental scientist for 25 years, including a university lecturer, research ecologist and a bush regenerator for 8 years. His work is focused on the Sydney bioregion and he has published many papers in independently reviewed journals on the ecology of NSW. He has expert knowledge of the local soils, the climate of this area and the local indigenous plants and animals as a result of over 900 ecological surveys. Nick is a member of the relevant professional organisations including: a practising member of the Ecological Consultants Association of NSW and Royal Zoological Society. He is licensed by NSW OEH and NSW Department of Primary Industries to carry out surveys on threatened plants and animals and he is a qualified Biodiversity Assessor under the BC Act 2016. Nick was the principle ecologist on all field surveys and was responsible for map making and report editing. Further details can be found at www.ecology.net.au.

Sophia Mueller Sewell has a Bachelor of Science (Environmental Biology UTS). Sophia has been working with GIS Environmental Consultants for over 2 years and has assisted with many ecological surveys and written over 50 reports. Sophia was responsible for project management, assisting with fauna survey, application of the BAM method, recording data for field surveys and report writing.

BOS Threshold Assessment

This BDAR is being carried out at the request of Council. The amount of clearing of the native vegetation is 4717m^2, the Development Footprint less the area pre 2015 clearing.

BAM Assessment Type

There are two types of BDAR assessment that can be used for Part 4 assessments (local developments, DA's); the General Module and the Streamlined Module (which includes Small Area Developments and Paddock Trees sub types). Using the Streamlined Assessment Module reduces the amount of field survey and offsetting required.

"The assessor must use the streamlined assessment module for small area development in the BAM Credit Calculator as part of the assessment of biodiversity values for developments that require consent in the NSW planning system."

A proposal "must" be assessed by the Streamline (small area) Module if it must meets the following requirements as specified in Appendix 2 of the Biodiversity Assessment Method.

- Where the minimum lot size (in the LEP mapping) is less than 1ha the maximum vegetation clearing must be ≤1ha, or where the minimum lot size (in the LEP mapping) is less than 40ha but not less than 1ha, then he maximum clearing must be ≤2ha ect. and
- The streamlined assessment module for small area developments cannot be used to assess the biodiversity values of land that is located within an area shaded on the biodiversity values map.

The Streamlined Assessment Module must be used for this proposal as the clearing for this proposal is less than 1ha which is below the maximum clearing threshold and the Development Footprint is not within the area mapped on the biodiversity values map.

Stage 1: Biodiversity Assessment

1 Introduction

1.1 Description of Existing Site

For this report the impact being assessed is the disturbance due to the DA that would have occurred before the clearing of the central part of the property. The report will be written and the property will be assessed as the site shown in Google Earth aerial photograph dated 6/12/15 and shown in Figure 1.1. Vegetation plots and fauna surveys were carried out in areas of the site that were not disturbed or least impacted by the clearing.

For this proposal the Property and Development Site (Site) are the same and are Lot 40 DP 28908, known as 9 Minkara Road, Bayview in the Northern Beaches LGA. The property is irregular in shape and is approximately 2.19ha in size as can be seen on Figure 1.1. Minkara Road forms the curved eastern boundary and a straight unmade road reserve forms the western boundary. The site is currently accessed from Walter Rd to the south.

The site is on the eastern side of the ridge top and there is small drainage and seepage lines flowing east along both the northern and southern boundaries of the property, see Figure 6.1.

The site assessed is a vacant bushland block with bushland to the north, south and east, to the west on the opposite side of the road reserve is a cleared paddock. See locality in Figure 1.1. There has been recent clearing and earthworks mostly along the upper ridgetop part of the site that contains woodland. Small parcels of the woodland remains. The lower eastern side of the site is mostly covered in gully forest that is good condition. The Site is mapped as bush fire prone and fuel hazard reduction will be required.

An aerial photograph of the Development Site is provided in Figure 1.1.

1.1.1 Location Geographic Co-ordinates

The latitude and longitude of the Study Area is -33.662167° S and 151.283710 °E.

1.1.2 Topography

The Site is on the eastern side of a ridgetop. The site contains extensive areas of exposed sandstone bedrock and a 3-4m high cliff line runs north-south through the northern part of the property. The site slopes east to Minkara Road. 10m contours of the site are shown in red on Figure 1.3.

1.1.3 Drainage

Stormwater currently drains to the east to Cahill Creek and then to Winneremy Bay by flowing under Minkara Road. There are two seepage lines flowing east along the northern and southern parts of the site.

1.1.4 Riparian Land

The site is not mapped as Riparian Land and is more than 50m from any permanent waterbody or Creekline.

1.1.5 Geology and Soils

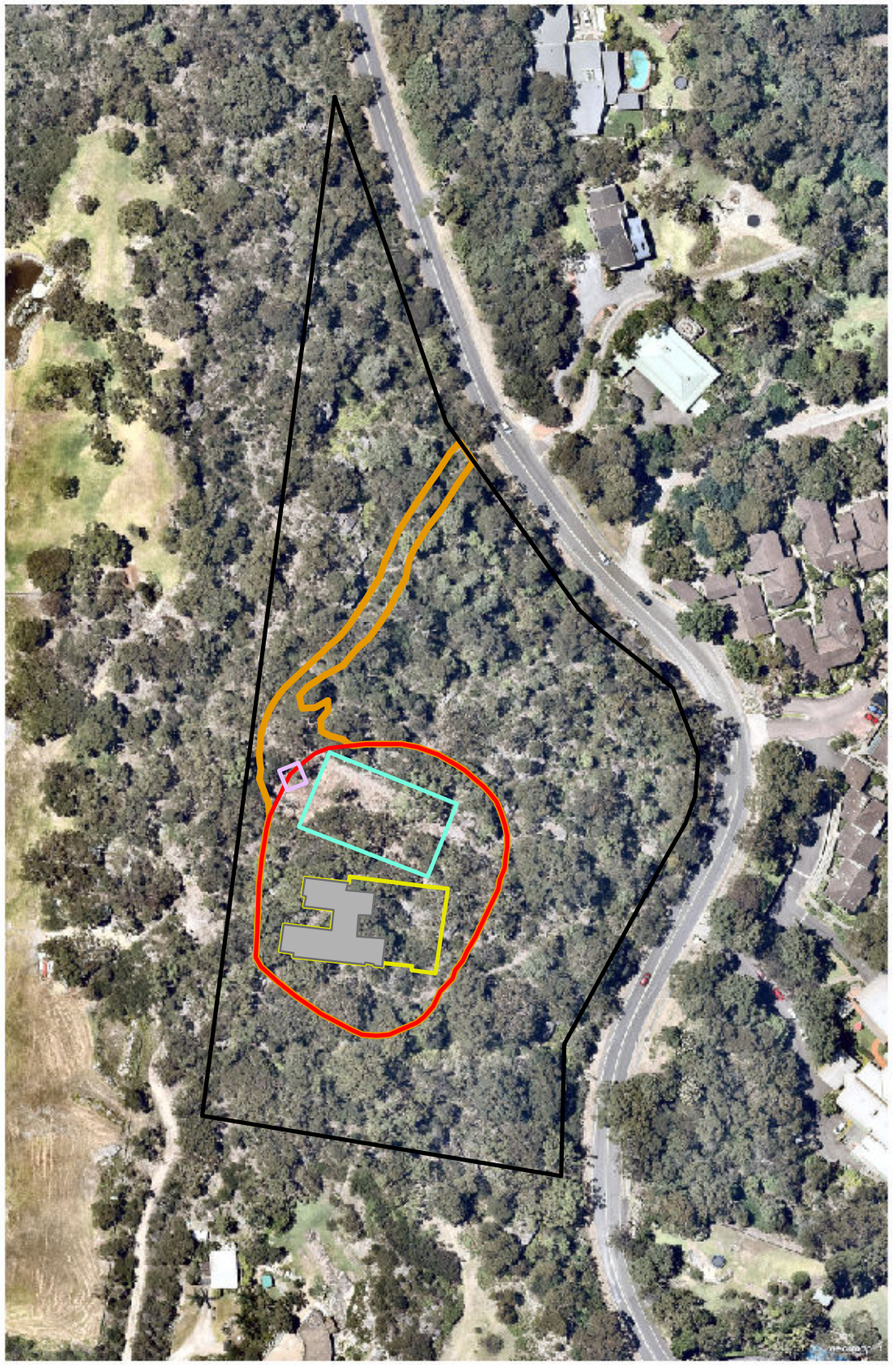
The western part of the site is mapped as the Oxford Falls soil type and the eastern and northern parts of the site are the Gymea soil type. Both of which consist of sandy soils derived from Hawkesbury Sandstone with minor shale and laminite lenses. This fits the soil observed at the site. The soils in the locality are shown in light blue boundaries in Figure 2.1.

1.1.6 Fire History

The vegetation on the site shows signs of not being burnt in over 15 years.

1.1.7 Disturbance History

There is a 578m^2 disturbed area in the central part of the site where vegetation has been slashed, see Figure 3.1.



Legend

9 Minkara Rd, Bayview (21862sqm)

Proposal

- House Pool and Deck (900sqm)
- Sewage Disposal (850sqm)
- Garage (34sqm)
- House Only
- APZ
- Development Footprint (5283sqm 24%)

Aerial Photograph
Dated: 6 December 2015

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by Nicholas Skelton

Date: 05/12/2018

1:1,700 at A3

0 15 30 60 Meters

N

Figure 1.1
Aerial Photograph of the Site

Legend

- Development Site, 9 Minkara Rd, Bayview
- Buffer 1.5km
- National Park

Figure 1.2
Locality Aerial Photograph

9 Minkara Rd, Bayview

Date: 06/12/2018

N

0 125 250 500 Meters

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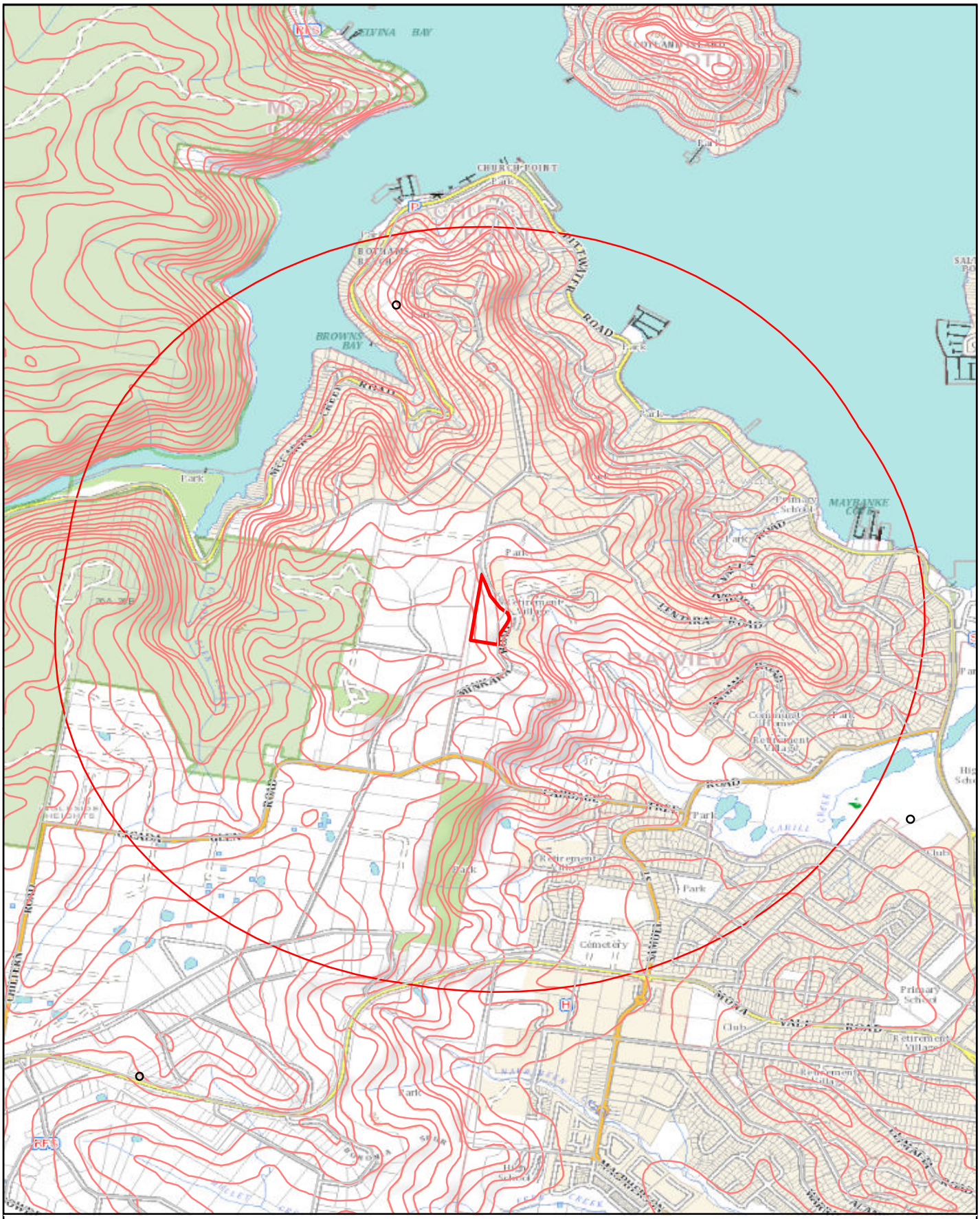

Legend

- Development Site, 9 Minkara Rd, Bayview
- Buffer 1.5km
- Contours 10m
- National Park

Figure 1.3
Locality, Topography and Features

9 Minkara Rd, Bayview

Date: 06/12/2018

N

0 125 250 500 Meters

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1.2 Development Footprint

The Development Footprint is the area that will be directly impacted by the proposal and includes the building footprint, carport, driveway, terraces, landscaping area and APZ. The Development Footprint is approximately 5283m^2 in size and is shown on the maps in Figure 1.1, 1.4 and 6.1. This assessment assumes there will not be any sediment, nutrients or weeds spreading downslope from the development.

The operational footprint is not likely to extend further than the Development Footprint for this development as long as hard landscaping, wastewater disposal and stormwater are correctly installed and maintained and the parts of the site to be retained as bushland are appropriately maintained in the long term.

1.3 General Description of the Proposal

The proposal that is shown on Site Plan (S Crosby August 2018) and the APZ Sketch (J Delany 29 November 2018) provided by the owner, are reproduced as an outline in Figures 1.4 and 1.5, include;

- Construction of a new two storey dwelling plus a basement floor in the central part of the site
- Construction of a terrace, pool and spa on the eastern side of the new dwelling.
- Construction of a carport at the top of the proposed new driveway.
- Construction a new concrete driveway from Minkara Road in the north-east to the central upper part of the site.
- Construction of a retaining wall
- Onsite waste water disposal system including a treatment system and treated wastewater dispersal area to the north of the proposed dwelling.
- An Asset Protection Zone (APZ).

1.1.8 Building Footprint

The two level house on a basement storey. The location and extent of the building footprint is shown on Figure 1.1 and 1.4.

1.1.1 Landscaping Area

The site plan shows a lawn, retaining wall, masonry wall, and small garden within the Development Footprint, see Figure 1.4.

1.1.9 Driveway

The driveway will be 3m wide and run 125m from Mikara Road south-west to the carport. The new driveway alignment in relation to the aerial photo of the site is provided in Figure 1.4.

1.1.10 Carport

The carport and turning circle will be 6m by 6m and will be located and the end of the driveway. The carport will have a path connecting it to the house.

1.1.11 Pool and Spa and Terrace

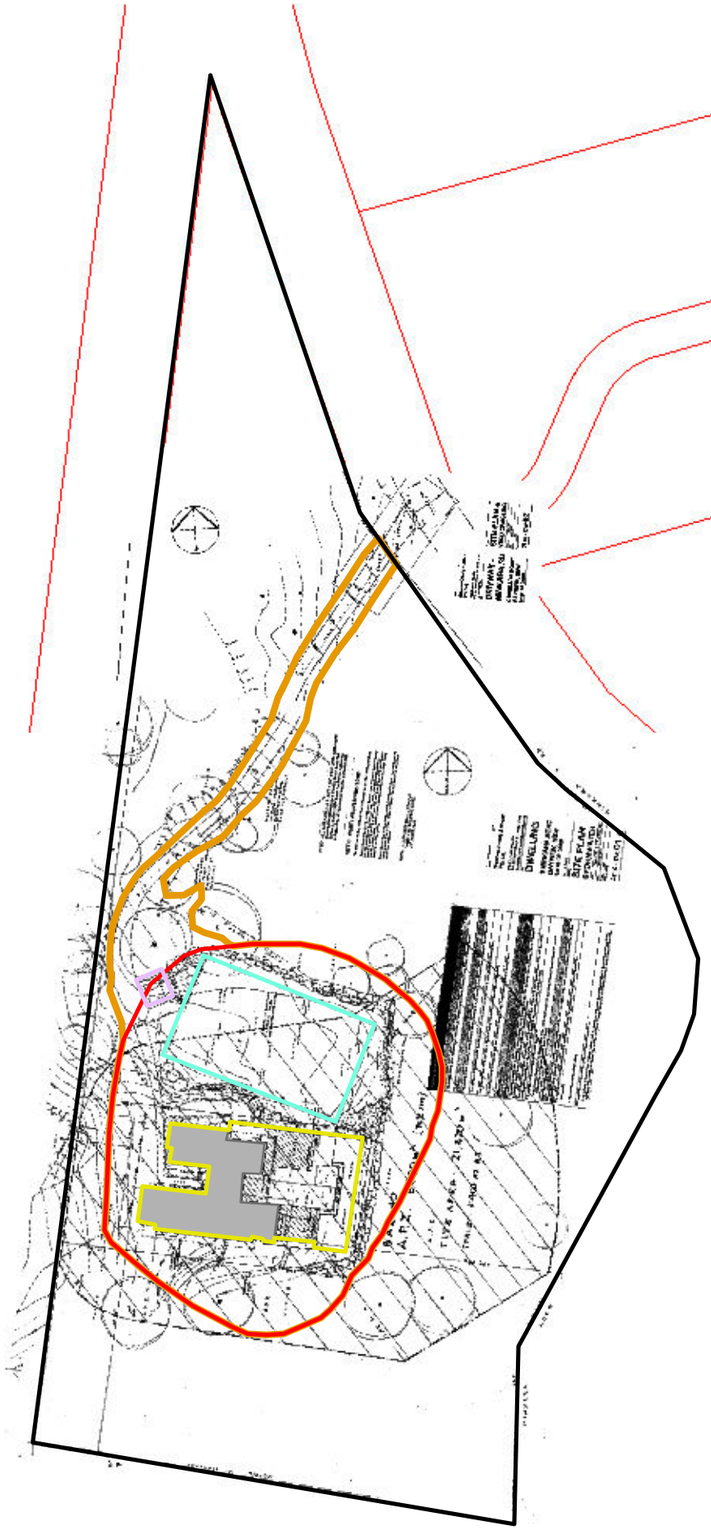
The pool, spa and surrounding terrace will be 87m^2 in size and will be located on the eastern side of the house. The pool, spa and terrace is to be included in the landscaping area. See Figure 1.4.

1.1.12 Wastewater and Stormwater

The wastewater (sewage) will be evaporated from a wastewater disposal area to the north of the house. This area must have a bund mound 0.5m high totally surrounding the area to prevent nutrient spills that often occur due to equipment failure, see Figure 1.4. The stormwater will be collected and stored in two stormwater tanks located below the building then to be piped to Minkara Road.

1.1.13 Plans and Documents Used for this Report

Title	Author	Rev	DWG./Doc. No./Ref.	Date
Survey Plan	CMS Surveyors	4	16787 detail	19/03/18
Site Plan & Stormwater	Stephen Crosby & Associates	-	2416-DA 01 A	August 2018
Driveway Plan	Stephen Crosby & Associates	-	2416-DW 02	June 2017
Sewerage and Waste water	Geological and Environmental Services Pty. Ltd	-	-	6/07/18
APZ sketch	John Delany, Australian Bushfire Safety & Planning	-	Email attachment sketch	29/11/18



Legend

Development Site, 9 Minkara Rd, Bayview (21862sqm)

Proposal

- House Pool and Deck (900sqm)
- Wastewater Dewatering (850sqm)
- Garage (34sqm)
- House Only
- APZ (4375sqm)
- Development Footprint (5283sqm 24%)

Underlay: Site Plan S Crosby August 2018

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by Nicholas Skelton

Date: 07/12/2018

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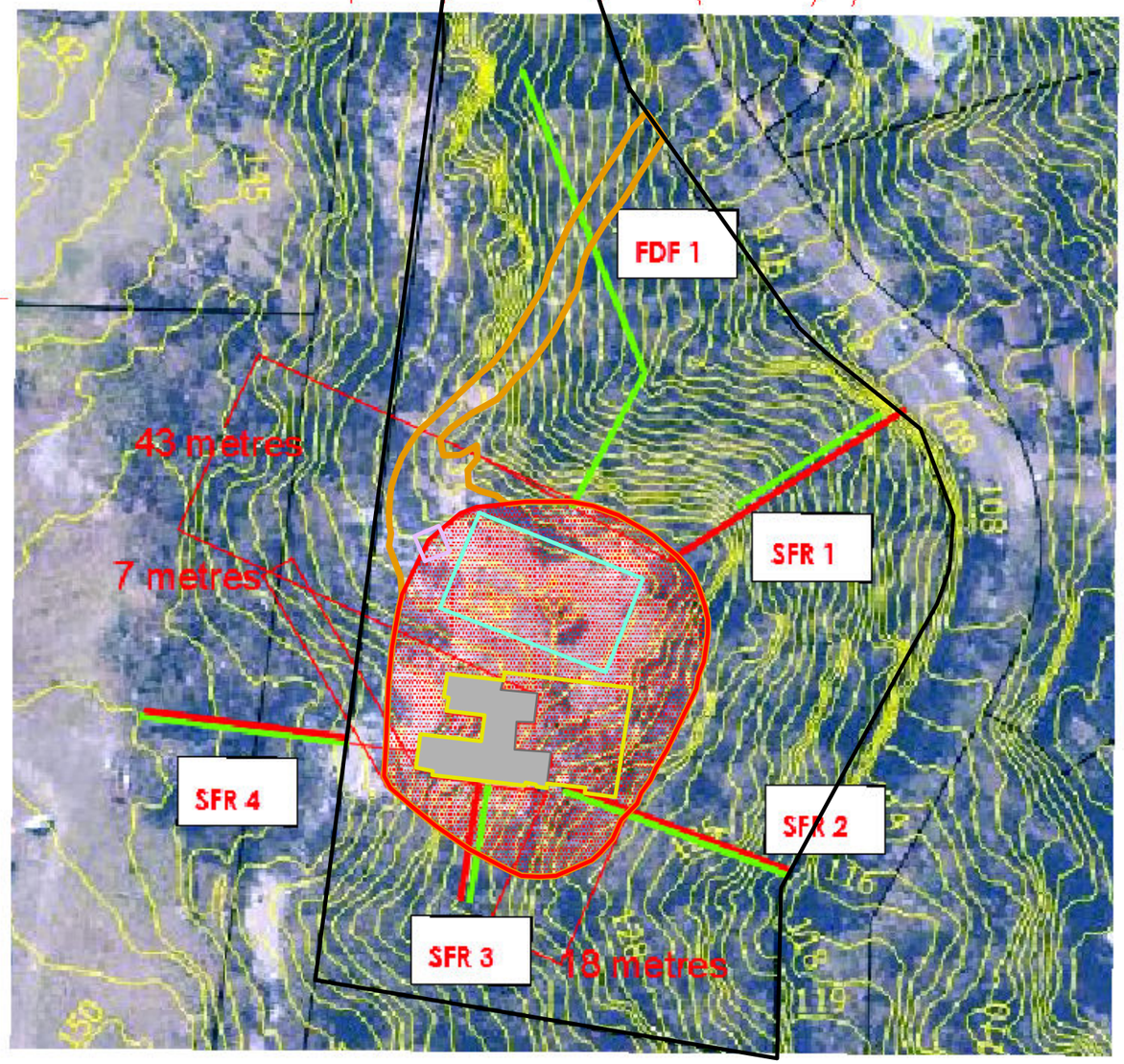
Figure 1.4
Proposal and Development Footprint



Legend

Development Site, 9 Minkara Rd, Bayview (21862sqm)

Proposal

- House Pool and Deck (900sqm)
- Wastewater Dewatering (850sqm)
- Garage (34sqm)
- House Only
- APZ (4375sqm)
- Development Footprint (5283sqm 24%)

Underlay: APZ Sketch, dated 29 November 2018

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by Nicholas Skelton

Date: 07/12/2018

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Figure 1.5
Bushfire APZ Location

1.4 Literature and Database Search

Relevant information was obtained from literature, local knowledge and established sources such as scientific journals, electronic databases and reports. The data in databases that were consulted included BioNet (5km search area) (including NPWS Atlas of NSW Wildlife records, Australian Museum specimen records and the Royal Botanic Gardens records), the Threatened Species Database Collection (TBDC), BAM Calculator, ROTAP records and Birds Australia Atlas. Searches were also undertaken on the DOEE – 'protected matters search tool' website to generate a report that will help determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur in the area of interest.

This information was used to ascertain which Threatened species are known to occur in or near the study area. The data from within a 5km search area and the Species Credit Species produced by the BAM calculator were then combined with local knowledge and the habitat conditions within the study area to compile a list of Threatened plant and animal candidate species for specific targeting during the fieldwork.

1.5 Field Survey Method

Ecological field survey was carried out for the following purposes:

- general ecological site survey including observations across the whole of the site,
- mapping the extent of native vegetation
- to determine Vegetation Type (PCT) and resilience (condition) to determine the Vegetation Zones
- a formal plot based survey of the vegetation zones using the BAM method and
- targeted Threatened species surveys.

See sections 3 and 4 for detailed field survey effort, season, weather etc. for plot and targeted survey methods.

1.1.14 General Field Survey

The general field survey involved the following procedures that were carried out throughout the Development Site:

- Initial familiarisation with the Development Site and its extent and surrounding land;
- Assessment of the physical characteristics of the Development Site and location of the proposal;
- Mapping the extent of the existing native vegetation;
- Mapping of each vegetation zone;
- Classification of any vegetation into communities according to their structural and floristic attributes for each vegetation (PCT) and condition type;
- Identification and recording of all flora species within each 400m^2 plot and within the Subject Site by a random meander across the Development Site;
- Identification of fauna and habitats through sightings, calls and potential habitat;
- Search for scats, remains, nests, dreys, bones, feathers, fur, diggings, scratches, tracks, owl white-wash and food sources. Examination of trees for scratchings, sap-feeding notches and hollows;
- Assessment of the extent of disturbance and weed invasion;
- Photography of the Development Site

1.1.15 Extent of Native Vegetation

The extent of native vegetation was determined using aerial photography and on ground field verification.

The definition of native vegetation is the same as in the LLS Act 2017 as required. The location and extent of native vegetation on the Development Site is shown on Figure 3.1.

1.1.16 Determining the Plant Community Type (PCT)

The vegetation within the study area was classified using structural and floristic indicators and was compared with the description for Threatened Ecological Communities listed in Schedule 2 of the BC Act 2016 and with the vegetation classification titled The Native Vegetation of the Sydney Metropolitan Area V3 Volume 2 (OEH 2016) and the PCT VIS vegetation type database (OEH online).

The vegetation on the site was also classified according to Threatened Ecological Communities as listed in the schedules of the BC Act. A detailed description of how the importance of the habitat on the site for Threatened Ecological Communities (EEC) was determined, is given in Section 4.4.

1.1.17 BAM Plot Survey

A BAM plot survey was used to determine the integrity (condition) of the vegetation in each vegetation zone. The location of the sample locations are shown on Figure 3.1. The landscape features, vegetation type (PCT) and condition were surveyed using the Biodiversity Assessment Method (BAM) (OEH 2016).

1.1.17.1 Vegetation Integrity (condition) Assessment

A BAM survey was conducted to quantify vegetation integrity for the vegetation zone, including the following plot types:

- 400 m^2 plot (20 m x 20 m), used to assess the composition and structure;
- 1000 m^2 (20 m x 50 m) plot was used to assess functional attributes of the site; and
- 1 m^2 subplots (x5) nested within the 1000m^2 plot used to assess the average percentage leaf litter cover;
- The weeds on the site were also recorded.

1.1.17.2 Composition and Structure

The floristic composition and relative cover was surveyed in the 20m x 20m plot. Information for each plant species within the plots were recorded including: species name and the percent projected foliage cover across the plot for each species rooted in or overhanging the plot.

This information was then used to assist in determining the most likely Plant Community Types (PCTs) present and the presence of any endangered ecological communities (EECs) listed in schedule 2 of the BC Act 2016.

1.1.17.3 Function

The number of large trees, the presence of tree stem size class, tree regeneration and total fallen log length were recorded in the 20m x 50m plot. The DBH of live trees was measured and trees were assigned to a tree stem size classes from <5, 5-9, 10-19, 20-29, 30-49, 50-79, and 80+cm until all stem size classes were present or all tree measured. Where a tree had multiple stems, the largest stem was measured.

The number of large trees was recorded within the 20m x 50m plot. The definition of a “large tree” varies depending on the PCT that occurs within the plot.

The length of all fallen logs greater than 10 cm in diameter was measured. Only logs that were dead, on the ground, either in part or entirely were measured, and only the part of the log that was inside the plot was measured if the log extended out of the plot.

The percentage litter cover was measured within five 1m x 1m plots. The percentage litter cover includes dead leaves, seeds, twigs, branchlets and branches (<10 cm diameter).

1.1.18 Vegetation Integrity Score

The plot and transect survey data were then used to determine the; composition score, the structure score and function scores, which are used to determine the overall vegetation integrity score.

1.1.19 Targeted Threatened Species Surveys

All sections of the study area and some of the surrounding land were traversed on foot.

- The study area was searched for the presence of the Candidate Threatened flora and fauna species and their habitats using the published OEH guidelines.
- Bat Survey Guidelines, ‘Species credit’ Threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method OEH 2018
- Plant Survey Guidelines, NSW Guide to Surveying Threatened Plants OEH 2016
- Amphibian and Reptile Survey Guidelines, Threatened species survey and assessment guidelines: field survey methods for fauna, Amphibians DECC 2009
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft DEC 2004

See section 4 for targeted field survey method and field survey effort for Threatened Flora and Fauna species and Section 3 for field survey effort for the vegetation survey.

2 Landscape Features

2.1 IBRA Bioregion/Subregion and Landscape Region

Bioregion: Sydney Basin
Sub-region: Pittwater
Mitchel Landscape Region: Belrose Coastal Slopes

2.2 Locality and Adjacent Ecological Values

The adjacent allotments to west, south and north-west are of large partly cleared lots single residential dwellings. To the east and north east is a large retirement village on a mostly bushland block. The bushland on the land to the south and to the north-west connect the site to Ku-ring-gai Chase National Park. The proximity of the site to the National Park, Development Site and nearby bushland is shown in Figure 1.2.

2.3 Native Vegetation Extent in Locality

In accordance with 4.3.2. of the BAM (OEH, Aug 17) the percentage cover of native woody and non-woody vegetation within the 1.5km buffer area around the site was determined, see Figure 1.2. The percent native vegetation cover was estimated by using the most up to date native vegetation mapping in combination with recent aerial photograph imagery (Google Earth).

Native Vegetation of the Sydney Metropolitan Area V3 2016 is currently the best vegetation mapping for this area. It is a compilation of the best available vegetation maps by various authors. The boundaries of many of the vegetation patches were mostly determined between 2 and 15 years ago. Figure 3.1 shows the vegetation types (ecological communities) in the locality that have been mapped at the regional scale. Table 1 summarises the proportion of each vegetation type.

The total amount of mapped native woody and non-woody vegetation within the buffer area is **377.5ha,** this is **51%** of the 750ha buffer area. A large proportion of the buffer area is the estuary Pittwater.

Table 1. Native Vegetation Mapped in Buffer

PCT	Name on Map (from NVSMA V3)	Associated TEC	Area (ha) in 1.5km buffer area	Percent of buffer area
881	Coastal Sandstone Rock Plate Heath	N/A	0.6	0.08%
905	Coastal Warm Temperate Rainforest	N/A	12.71	1.7%
920	Estuarine Mangrove Forest	N/A	1.6	0.2%
1214	Pittwater Spotted Gum Forest	Pittwater and Wagstaff Spotted Gum Forest in the Sydney Basin Bioregion	54.43	7.2%
1234	Estuarine Swamp Oak Forest	Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions EEC	0.96	0.13%
1250	Coastal Sandstone Gully Forest	N/A	53.23	7.1%
1565	Central Coast Escarpment Moist Forest	N/A	92.82	12.4%
1776	Coastal Enriched Sandstone Dry Forest	N/A	43.11	5.7%

1783	Sydney North Exposed Woodland	N/A	63.62	8.5%
1795	Coastal Flats Swamp Mahogany Forest	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions	4.76	0.63%
1803	Coastal Upland Damp Heath Swamp	Coastal Upland Swamp in the Sydney Basin Bioregion	0.002	0.0003%
1824	Coastal Sandstone Heath-Mallee	N/A	28.97	3.87%
1833	Coastal Escarpment Littoral Rainforest	Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions	3.15	0.42%
1841	Coastal Enriched Sandstone Moist Forest	N/A	17.58	2.3%
1913	Seagrass Meadows	N/A	5.77 (excluded from final calculations)	0.77% (excluded from final calculations)

1.1.20 Differences between Mapped Vegetation Extent and Aerial Imagery

There was good correlation between the mapped vegetation and aerial photography (dated Dec 2015) that was used to make an assessment of the vegetation extent on the site and in the locality. No modifications were made to the extent of native vegetation in the locality. See Figure 2.1 for the field and aerial photo verified extent of the vegetation types at the site.

2.4 Cleared Areas

When the first field survey was conducted on the 29th of August 2018, the central part of the site had recently been cleared, and the current soil surface was crushed sandstone/fill. This report does not map, describe or assess the clearing that has recently occurred (Recent Clearing), this report only addresses the impact due to this DA proposal, that would have occurred on the land, before this Recent Clearing.

When aerial photographs of the site from 2015 were viewed, it was apparent that there had been a small area (578m^2) of clearing on the property more than three years ago. This area is within the area of the Recent Clearing. This older clearing is referred to in this report as the pre-December 2015 clearing and is shown on Figure 3.1.

2.5 Rivers and Streams

The site contains two small natural seepage lines running west to east across the site along the southern boundary of the site and just north of the proposed driveway. See Figure 6.1. In the north-west of the site is a rainwater seepage area. There are no permanent waterbodies at the site. Waterbodies and hydrological processes are a type of Prescribed Impact and need to be specifically addressed in accordance with the BAM.

The impact of the proposal on waterbodies and hydrological process is described in the Prescribed Impact section in Table 16.

2.6 Wetlands

There is no wetland on or immediately adjacent to the property. Waterbodies and hydrological processes are a type of Prescribed Impact and need to be specifically addressed in accordance with the BAM.

The impact of the proposal on waterbodies and hydrological process is described in the Prescribed Impact section in Table 16.

2.7 Connectivity Features (Wildlife Corridors)

The site has good north-south wildlife corridor value and medium east-west corridor value. See Figures 1.1 and 1.2. There is a large cleared patch with rural properties to the west. The site is connected to the vegetation to the south through a thin corridor near Walter Road and along Minkara Road. To the east is bushland that also connects to bushland to the east and south of the site. There is an intact native canopy on the surrounding residential properties that connects the tree canopy at the site to areas of native vegetation in the locality including Ku-ring-gai Chase National Park west of the site.

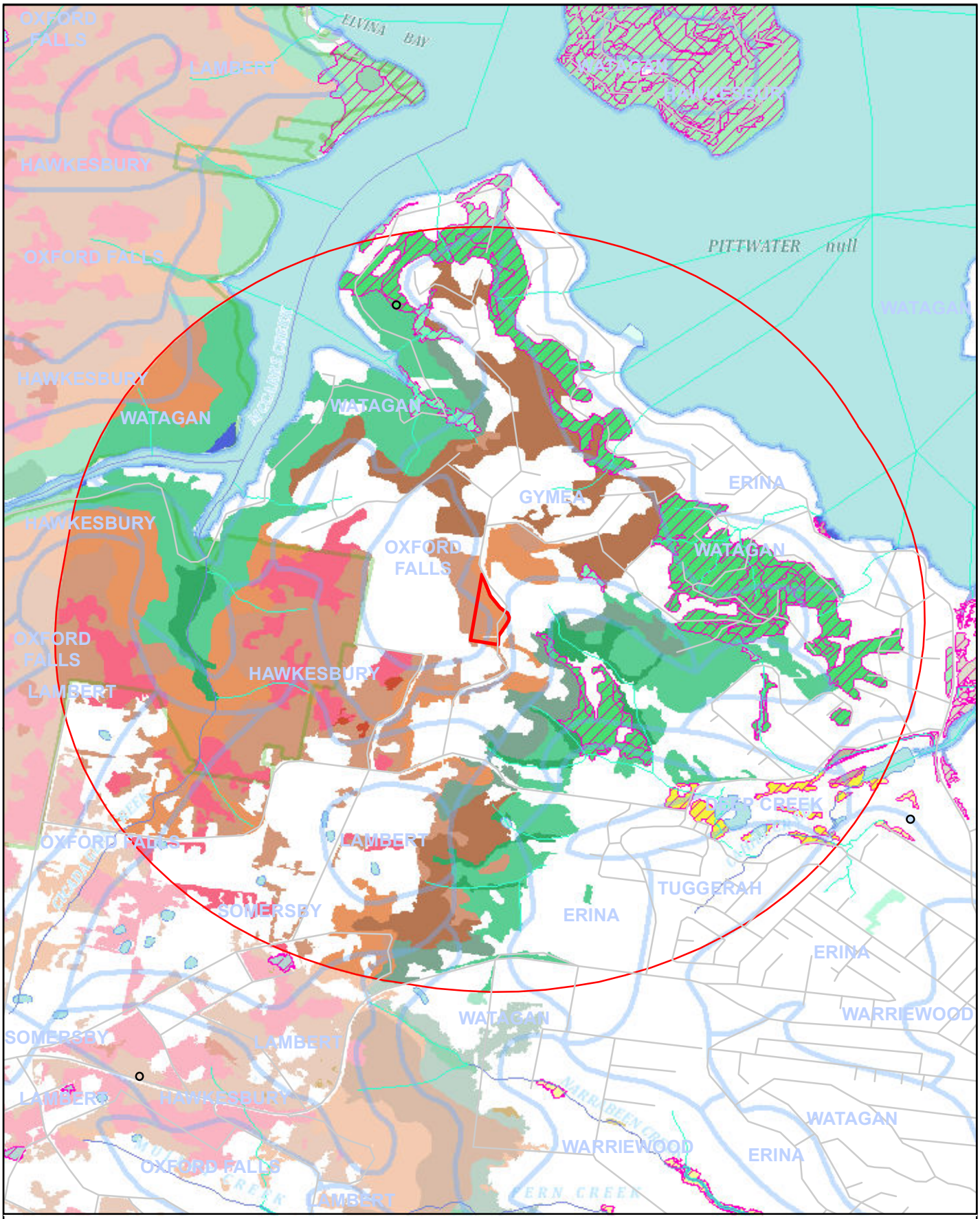
The impact of the proposal on connectivity is described in the Prescribed Impact section in Table 16.

2.8 Areas of Geological Significance

There is an exposed sandstone bedrock cliff running north-south through the centre if the property. There are some cervices that are close to the base of the cliff. There are also sandstone, boulders, plateaus and benching on the site. There is similar sandstone rocks features in the surrounding locality.

No soil hazard features were identified at the site.

The impact of the proposal on karsts, caves, cliffs and rocks is described in the Prescribed Impact section in Table 16.



Legend

- Development Site, 9 Minkara Rd, Bayview
- Buffer 1
- Soils Sydney ed4
- National Park

Threatened Vegetation Communities

Threatened Ecological Community

- Coastal Saltmarsh
- Coastal Upland Swamp
- Littoral Rainforest
- Pittwater Spotted Gum Forest
- Swamp Oak Floodplain Forest
- Swamp Sclerophyll Forest on Coastal Floodplains

Vegetation in Locality

- S_DSF04: Coastal Enriched Sandstone Dry Forest
- S_DSF09: Coastal Sandstone Gully Forest
- S_DSF11: Sydney North Exposed Sandstone Woodland
- S_FoW02: Coastal Flats Swamp Mahogany Forest
- S_FoW08: Estuarine Swamp Oak Forest
- S_FrW01: Coastal Upland Damp Heath Swamp
- S_HL08: Coastal Sandstone Heath-Mallee
- S_HL09: Coastal Sandstone Rock Plate Heath
- S_RF03: Coastal Warm Temperate Rainforest
- S_RF07: Coastal Escarpment Littoral Rainforest
- S_SW01: Estuarine Mangrove Forest
- S_SW03: Seagrass Meadows
- S_WSF02: Coastal Enriched Sandstone Moist Forest
- S_WSF11: Pittwater Spotted Gum Forest
- S_WSF33: Central Coast Escarpment Moist Forest

Figure 2.1
Locality, Mapped Vegetation Types and Soils

Vegetation Data from; The Native Vegetation of the Sydney Metropolitan Area V3 2016

9 Minkara Rd, Bayview

Date: 06/12/2018

N

0 125 250 500 Meters

Disclaimer: Mapping is indicative and may contain errors from the source of the data. Information on these maps should only be used at the scale provided. Dimensions need to be determined by a registered surveyor.

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3 Native Vegetation

3.1 Vegetation Class

The vegetation on the site is from the vegetation class Sydney Coastal Dry Sclerophyll Forests (Kieth, 2004).

3.2 Native Vegetation Type Classification

The vegetation that occurs on the site was classified using three separate methods;

1. Using the indicator species in the classification system in Native Vegetation of the Sydney Metropolitan Area (OEH 2016)
2. VIS vegetation classification database which gives PCT and
3. The definitions of Threatened Ecological Communities in the Scientific Committee's determinations from the schedules of the Biodiversity Conservation Act which describes Endangered Ecological Communities.

Field survey collected floristics (species mixture and relative abundance) and structure of the vegetation on from the 400m^2 plots and also the site 3 methods were used to classify the vegetation into types. The results are described in the following sections.

3.3 Plant Species List

The plant species that occur in each of the plots and vegetation type on the site are listed in the following table.

Table 2. Plant Species on the Site

9 Minkara Road, Bayview
4-Dec-18
by Nicholas Skelton, GIS Environmental Consultants

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Genus and Species	Common Name	Growth Form	Family	Status
Acacia linifolia	Flax-leaved Wattle	Shrub	FABACEAE	Local Native Species
Acacia suaveolens	Sweet Scented Wattle	Shrub	FABACEAE	Local Native Species
Acacia terminalis subsp. angustifolia	Sunshine Wattle	Shrub	FABACEAE	Local Native Species
Acacia ulicifolia	Prickly Moses	Shrub	FABACEAE	Local Native Species
Acacia undoolyana	Sickle Leaf Wattle	Shrub	FABACEAE	Local Native Species
Actinotus helianthi	Flannel Flower	Herb	APIACEAE	Local Native Species
Actinotus minor	Lesser Flannel Flower	Herb	APIACEAE	Local Native Species
Allocasuarina distyla	Scrub She-oak	shrub	CASUARINACEAE	Local Native Species
Allocasuarina littoralis	Black She-oak	Tree	CASUARINACEAE	Local Native Species
Angophora costata	Smooth-barked Apple	Tree	MYRTACEAE	Local Native Species
Banksia ericifolia	Heath Leaved Banksia	Shrub	PROTEACEAE	Local Native Species
Banksia serrata	Old Man Banksia	Tree	PROTEACEAE	Local Native Species
Banksia spinulosa var. spinulosa	Hairpin Banksia	Shrub	PROTEACEAE	Local Native Species
Baumea acuta	Pale Twig-rush	Sedge	CYPERACEAE	Local Native Species
Billardiera scandens	Apple Berry, Dumplings	Vine	PITTOSPORACEAE	Local Native Species
Boronia ledifolia	Sydney Boronia	Shrub	RUTACEAE	Local Native Species
Cassytha pubescens	Hairy Devil's Twine	Vine	LAURACEAE	Local Native Species
Caustis flexuosa	Old Man's Beard	Sedge	CYPERACEAE	Local Native Species
Ceratopetalum gummiferum	NSW Christmas Bush	Tree	CUNONIACEAE	Local Native Species
Corymbia gummifera	Bloodwood	Tree	MYRTACEAE	Local Native Species
Cryptostylis erecta	Tartan Tongue Orchid	Herb	ORCHIDACEAE	Local Native Species
Cymbidium suave	Snake Orchid	Herb	ORCHIDACEAE	Local Native Species
Dianella caerulea var. producta	Blue Flax Lily	Herb	PHORMIACEAE	Local Native Species
Dillwynia floribunda	Flowery Parrot Pea	Shrub	FABACEAE - FABOIDEAE	Local Native Species
Dillwynia retorta	Eggs and Bacon	Shrub	FABACEAE	Local Native Species
Elaeocarpus reticulatus	Blueberry Ash	Tree	ELAEOCARPACEAE	Local Native Species
Empodisma minus	Spreading Rope-rush	Rush	RESTIONACEAE	Local Native Species
Entolasia marginata	Bordered Panic	Grass	POACEAE	Local Native Species
Entolasia stricta	Wiry Panic	Grass	POACEAE	Local Native Species
Epacris longiflora	Fuchsia Heath	Shrub	EPACRIDACEAE	Local Native Species
Epacris pulchella	Wallum Heath	Shrub	EPACRIDACEAE	Local Native Species
Eriostemon australasius ssp. australasius	Wax Plant	Shrub	RUTACEAE	Local Native Species
Eucalyptus haemastoma	Scribbly Gum	Tree	MYRTACEAE	Local Native Species
Eucalyptus piperita	Sydney Peppermint	Tree	MYRTACEAE	Local Native Species
Eucalyptus punctata	Grey Gum	Tree	MYRTACEAE	Local Native Species
Eucalyptus umbra	Bastard Mahogany	Tree	MYRTACEAE	Local Native Species
Gahnia sieberiana	Cut Grass	Sedge	CYPERACEAE	Local Native Species
Gleichenia dicarpa	Pouched Coral Fern	Fern	GLEICHENIACEAE	Local Native Species
Gonocarpus teucrioides	Germander Raspwort	Herb	HALORAGACEAE	Local Native Species
Grevillea buxifolia ssp. buxifolia	Grey Spider Flower	Shrub	PROTEACEAE	Local Native Species
Grevillea linearifolia	White Spider Flower	Shrub	PROTEACEAE	Local Native Species
Grevillea sericea	Pink Spider Flower	Shrub	PROTEACEAE	Local Native Species
Hakea bakerana	Hakea	Shrub	PROTEACEAE	Local Native Species
Hakea teretifolia	Dagger Hakea	Shrub	PROTEACEAE	Local Native Species
Hemigenia purpurea	Common Hemigenia	Shrub	LAMIACEAE	Local Native Species
Hibbertia bracteata	Guinea Flower	Shrub	DILLENIACEAE	Local Native Species
Hibbertia linearis	Guinea Flower	Shrub	DILLENIACEAE	Local Native Species
Isopogon anethifolius	Drumsticks	Shrub	PROTEACEAE	Local Native Species
Kunzea ambigua	Tick Bush	Shrub	MYRTACEAE	Local Native Species
Lambertia formosa	Mountain Devil	Shrub	PROTEACEAE	Local Native Species

Lasiopetalum ferrugineum var. ferrugineum	Rusty Petals	Shrub	STERCULIACEAE	Local Native Species
Lepidosperma laterale	Variable Sword Edge	Sedge	CYPERACEAE	Local Native Species
Leptospermum trinervium	Paperbark Tea Tree	Shrub	MYRTACEAE	Local Native Species
Lepyrodia scariosa	Scale-rush	Rush	RESTIONACEAE	Local Native Species
Leucopogon juniperinus	Prickly Beard-heath	Shrub	EPACRIDACEAE	Local Native Species
Lindsaea linearis	Screw Fern	Fern	LINDSAEACEAE	Local Native Species
Lindsaea microphylla	Lacy Wedge Fern	Fern	LINDSAEACEAE	Local Native Species
Lomandra filiformis ssp. filiformis	Wattle Mat-rush	Herb	LOMANDRACEAE	Local Native Species
Lomandra longifolia	Spiny-headed Mat-rush	Herb	LOMANDRACEAE	Local Native Species
Lomandra obliqua	Fish Bones	Herb	LOMANDRACEAE	Local Native Species
Ozothamnus diosmifolius	Rice Flower	Herb	ASTERACEAE	Local Native Species
Patersonia sericea	Silky Purple Flag	Herb	IRIDACEAE	Local Native Species
Persoonia lanceolata	Lance-leaved Geebung	Shrub	PROTEACEAE	Local Native Species
Pimelea linifolia	Rice Flower	Shrub	THYMELAEACEAE	Local Native Species
Pittosporum revolutum	Rough-fruit Pittosporum	Tree	PITTOSPORACEAE	Local Native Species
Platylobium formosum	Handsome Flat-pea	Shrub	FABACEAE	Local Native Species
Platysace linearifolia	Carrot Tops	Herb	APIACEAE	Local Native Species
Psilotum nudum	Skeleton Fork-Fern	Fork Fern	PSILOTACEAE	Local Native Species
Pteridium esculentum	Bracken	Fern	DENNSTAEDTIACEAE	Local Native Species
Pultenaea daphnoides	Bush Pea	Shrub	FABACEAE	Local Native Species
Pultenaea elliptica	Bush Pea	Shrub	FABACEAE	Local Native Species
Schoenus melanostachys	Black Bog-rush	Sedge	CYPERACEAE	Local Native Species
Smilax glyciphylla	Native Sarsaparilla	Vine	SMILACACEAE	Local Native Species
Sticherus flabellatus	Umberella Fern	Fern	GLEICHENIACEAE	Local Native Species
Stylidium graminifolium	Trigger Plant	Herb	STYLIDIACEAE	Local Native Species
Syncarpia glomulifera	Turpentine	Tree	MYRTACEAE	Local Native Species
Woollsia pungens	Snow Wreath	Shrub	EPACRIDACEAE	Local Native Species
Woollsia pungens	Snow Wreath	Shrub	EPACRIDACEAE	Local Native Species
Xanthorrhoea media/resinifera	Forest Grass Tree	Grass Tree	XANTHORRHOEACEAE	Local Native Species
Xanthosia pilosa	Wooly Xanthosia	Herb	APIACEAE	Local Native Species
Zieria pilosa	Hairy Zieria	Shrub	RUTACEAE	Local Native Species

Table 3. Plant Species and Cover Plots Only

9 Minkara Road, Bayview

4-Dec-18

by Nicholas Skelton, GIS Environmental Consultants

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Summary of Growth Form

Row Labels	Plot 1 Ridge	Plot 2 Gully
Fern	1	3
Grass	1	1
Grass Tree	1	1
Herb	8	5
Rush	1	1
Sedge	2	2
Shrub	17	23
Tree	9	4
Vine		2
Total	**40**	**43**

Part of Site	Genus and Species	Common Name	Group	Family	Growth Form	Status	Cover
Plot 1	*Acacia suaveolens*	Sweet Scented Wattle	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.2
Plot 1	*Acacia terminalis subsp. angustifolia*	Sunshine Wattle	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	1
Plot 1	*Actinotus helianthi*	Flannel Flower	DICOTYLEDON	APIACEAE	Herb	Local Native Species	0.5
Plot 1	*Allocasuarina distyla*	Scrub She-oak	DICOTYLEDON	CASUARINACEAE	Shrub	Local Native Species	5
Plot 1	*Allocasuarina littoralis*	Black She-oak	DICOTYLEDON	CASUARINACEAE	Tree	Local Native Species	2
Plot 1	*Angophora costata*	Smooth-barked Apple	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	10
Plot 1	*Banksia serrata*	Old Man Banksia	DICOTYLEDON	PROTEACEAE	Tree	Local Native Species	0.5
Plot 1	*Baumea acuta*	Pale Twig-rush	MONOCOTYLEDON	CYPERACEAE	Sedge	Local Native Species	0.1
Plot 1	*Boronia ledifolia*	Sydney Boronia	DICOTYLEDON	RUTACEAE	Shrub	Local Native Species	0.5
Plot 1	*Ceratopetalum gummiferum*	NSW Christmas Bush	DICOTYLEDON	CUNONIACEAE	Tree	Local Native Species	2
Plot 1	*Corymbia gummifera*	Bloodwood	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	0.1
Plot 1	*Cryptostylis erecta*	Tartan Tongue Orchid	MONOCOTYLEDON	ORCHIDACEAE	Herb	Local Native Species	0.1
Plot 1	*Dianella caerulea var. producta*	Blue Flax Lily	MONOCOTYLEDON	PHORMIACEAE	Herb	Local Native Species	0.5
Plot 1	*Dillwynia retorta*	Eggs and Bacon	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.7
Plot 1	*Empodisma minus*	Spreading Rope-rush	MONOCOTYLEDON	RESTIONACEAE	Rush	Local Native Species	0.1
Plot 1	*Entolasia stricta*	Wiry Panic	MONOCOTYLEDON	POACEAE	Grass	Local Native Species	4
Plot 1	*Epacris longiflora*	Fuchsia Heath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	0.2
Plot 1	*Epacris pulchella*	Wallum Heath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	0.1
Plot 1	*Eriostemon australasius ssp. australasius*	Wax Plant	DICOTYLEDON	RUTACEAE	Shrub	Local Native Species	0.2
Plot 1	*Eucalyptus haemastoma*	Scribbly Gum	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	5
Plot 1	*Eucalyptus piperita*	Sydney Peppermint	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	2
Plot 1	*Eucalyptus punctata*	Grey Gum	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	5
Plot 1	*Grevillea sericea*	Pink Spider Flower	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	2
Plot 1	*Isopogon anethifolius*	Drumsticks	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	0.2
Plot 1	*Kunzea ambigua*	Tick Bush	DICOTYLEDON	MYRTACEAE	Shrub	Local Native Species	10
Plot 1	*Lambertia formosa*	Mountain Devil	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	8
Plot 1	*Lepidosperma laterale*	Variable Sword Edge	MONOCOTYLEDON	CYPERACEAE	Sedge	Local Native Species	0.5
Plot 1	*Leptospermum trinervium*	Paperbark Tea Tree	DICOTYLEDON	MYRTACEAE	Shrub	Local Native Species	8
Plot 1	*Leucopogon juniperinus*	Prickly Beard-heath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	0.1
Plot 1	*Lomandra longifolia*	Spiny-headed Mat-rush	MONOCOTYLEDON	LOMANDRACEAE	Herb	Local Native Species	0.5
Plot 1	*Patersonia sericea*	Silky Purple Flag	MONOCOTYLEDON	IRIDACEAE	Herb	Local Native Species	0.1
Plot 1	*Platysace linearifolia*	Carrot Tops	DICOTYLEDON	APIACEAE	Herb	Local Native Species	1
Plot 1	*Pteridium esculentum*	Bracken	FERN	DENNSTAEDTIACEAE	Fern	Local Native Species	0.1
Plot 1	*Syncarpia glomulifera*	Turpentine	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	1
Plot 1	*Woollsia pungens*	Snow Wreath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	1.1
Plot 1	*Xanthorrhoea media/resinifera*	Forest Grass Tree	MONOCOTYLEDON	XANTHORRHOEACEAE	Grass Tree	Local Native Species	0.1
Plot 1	*Xanthosia pilosa*	Wooly Xanthosia	DICOTYLEDON	APIACEAE	Herb	Local Native Species	0.1
Plot 1	*Zieria pilosa*	Hairy Zieria	DICOTYLEDON	RUTACEAE	Shrub	Local Native Species	0.1
Plot 2	*Acacia suaveolens*	Sweet Scented Wattle	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.1
Plot 2	*Acacia undoolyana*	Sickle Leaf Wattle	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.1
Plot 2	*Actinotus minor*	Lesser Flannel Flower	DICOTYLEDON	APIACEAE	Herb	Local Native Species	0.1
Plot 2	*Allocasuarina littoralis*	Black She-oak	DICOTYLEDON	CASUARINACEAE	Tree	Local Native Species	2
Plot 2	*Angophora costata*	Smooth-barked Apple	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	0.5
Plot 2	*Banksia ericifolia*	Heath Leaved Banksia	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	2
Plot 2	*Banksia spinulosa var. spinulosa*	Hairpin Banksia	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	2
Plot 2	*Baumea acuta*	Pale Twig-rush	MONOCOTYLEDON	CYPERACEAE	Sedge	Local Native Species	0.1
Plot 2	*Billardiera scandens*	Apple Berry, Dumplings	DICOTYLEDON	PITTOSPORACEAE	Vine	Local Native Species	0.1
Plot 2	*Boronia ledifolia*	Sydney Boronia	DICOTYLEDON	RUTACEAE	Shrub	Local Native Species	0.1
Plot 2	*Cassytha pubescens*	Hairy Devil's Twine	DICOTYLEDON	LAURACEAE	Vine	Local Native Species	0.1
Plot 2	*Dillwynia floribunda*	Flowery Parrot Pea	DICOTYLEDON	FABACEAE - FABOIDEAE	Shrub	Local Native Species	1
Plot 2	*Entolasia marginata*	Bordered Panic	MONOCOTYLEDON	POACEAE	Grass	Local Native Species	0
Plot 2	*Epacris longiflora*	Fuchsia Heath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	0.1
Plot 2	*Epacris pulchella*	Wallum Heath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	1
Plot 2	*Eucalyptus piperita*	Sydney Peppermint	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	5
Plot 2	*Grevillea buxifolia ssp. buxifolia*	Grey Spider Flower	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	1
Plot 2	*Grevillea linearifolia*	White Spider Flower	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	5
Plot 2	*Grevillea sericea*	Pink Spider Flower	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	2

Plot 2	*Hakea bakerana*	Hakea	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	0.1
Plot 2	*Hakea teretifolia*	Dagger Hakea	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	0.1
Plot 2	*Hibbertia bracteata*	Guinea Flower	DICOTYLEDON	DILLENIACEAE	Shrub	Local Native Species	1
Plot 2	*Kunzea ambigua*	Tick Bush	DICOTYLEDON	MYRTACEAE	Shrub	Local Native Species	2
Plot 2	*Lasiopetalum ferrugineum var. ferrugineum*	Rusty Petals	DICOTYLEDON	STERCULIACEAE	Shrub	Local Native Species	1
Plot 2	*Lepidosperma laterale*	Variable Sword Edge	MONOCOTYLEDON	CYPERACEAE	Sedge	Local Native Species	5
Plot 2	*Leptospermum trinervium*	Paperbark Tea Tree	DICOTYLEDON	MYRTACEAE	Shrub	Local Native Species	1
Plot 2	*Lepyrodia scariosa*	Scale-rush	MONOCOTYLEDON	RESTIONACEAE	Rush	Local Native Species	5
Plot 2	*Lindsaea linearis*	Screw Fern	FERN	LINDSAEACEAE	Fern	Local Native Species	0.1
Plot 2	*Lindsaea microphylla*	Lacy Wedge Fern	FERN	LINDSAEACEAE	Fern	Local Native Species	0.1
Plot 2	*Lomandra filiformis ssp. filiformis*	Wattle Mat-rush	MONOCOTYLEDON	LOMANDRACEAE	Herb	Local Native Species	0.1
Plot 2	*Lomandra longifolia*	Spiny-headed Mat-rush	MONOCOTYLEDON	LOMANDRACEAE	Herb	Local Native Species	0.5
Plot 2	*Lomandra obliqua*	Fish Bones	MONOCOTYLEDON	LOMANDRACEAE	Herb	Local Native Species	0.1
Plot 2	*Ozothamnus diosmifolius*	Rice Flower	DICOTYLEDON	ASTERACEAE	Herb	Local Native Species	0.1
Plot 2	*Persoonia lanceolata*	Lance-leaved Geebung	DICOTYLEDON	PROTEACEAE	Shrub	Local Native Species	0.5
Plot 2	*Pimelea linifolia*	Rice Flower	DICOTYLEDON	THYMELAEACEAE	Shrub	Local Native Species	0.2
Plot 2	*Platylobium formosum*	Handsome Flat-pea	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.1
Plot 2	*Pteridium esculentum*	Bracken	FERN	DENNSTAEDTIACEAE	Fern	Local Native Species	0.5
Plot 2	*Pultenaea daphnoides*	Bush Pea	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.1
Plot 2	*Pultenaea elliptica*	Bush Pea	DICOTYLEDON	FABACEAE	Shrub	Local Native Species	0.1
Plot 2	*Syncarpia glomulifera*	Turpentine	DICOTYLEDON	MYRTACEAE	Tree	Local Native Species	7
Plot 2	*Woollsia pungens*	Snow Wreath	DICOTYLEDON	EPACRIDACEAE	Shrub	Local Native Species	0.1
Plot 2	*Xanthorrhoea media/resinifera*	Forest Grass Tree	MONOCOTYLEDON	XANTHORRHOEACEAE	Grass Tree	Local Native Species	0.1

3.4 Justification for PCT (Vegetation Classification)

1.1.21 Candidate Vegetation Communities

The two most likely vegetation communities (PCTs) and the ones that have been mapped as occurring on or near the site are:

Note: Each PCT has been referred to within each reference with a different name. Therefore each PCT has two different names. This report assess each PCT using two different references (OEH NVSMA, and VIS). The name that each reference uses, is used when assessing under that reference.

- **PCT 1783**
  - **Sydney North Exposed Sandstone Woodland** (NVSMA OEH V3 2016 mapping name, see Figure 2.1)
  - **Red Bloodwood - Scribbly Gum / Old-man Banksia Open Forest on Sandstone Ridges of Northern Sydney and the Central Coast** (VIS Classification, PCT name, name in BAM Calculator)
- **PCT 1250**
  - **Coastal Sandstone Gully Forest** (NVSMA OEH V3 2016 mapping name, see Figure 2.1)
  - **Sydney Peppermint – Smooth-barked Apple – Red Bloodwood Shrubby Open Forest on Slopes of Moist Sandstone Gullies, Eastern Sydney Basin Bioregion** (VIS Classification, PCT Name, name in BAM Calculator).

Figure 2.1 shows the location and abundance of vegetation communities (using NVSMA).

1.1.22 Assessment using the VIS and the NVSMA 2016

Sydney North Exposed Sandstone Woodland (PCT 1783)

The species and relative abundance information from one 400m^2 plot within different levels of disturbance (Plot 1) and was used for the following assessment. The location of Plot has previously been mapped as this community (OEH NVSMA V3 2016).

The positive diagnosis test for Sydney North Exposed Sandstone Woodland in the Native Vegetation of the Sydney Metropolitan Area (OEH 2016) requires 27 or more positive diagnostic in a 400m^2 plot for a positive diagnosis, provided that there are 41 or more native species within the plot. Plot 1 was located in an area that was mapped as North Sydney Exposed Sandstone Woodland and had 38 species recorded of which 16 were positive diagnostic species. There was not enough native species or diagnostic species in the plot for a positive diagnosis for North Sydney Exposed Sandstone Woodland. The vegetation on site best fits the Sydney North Exposed Sandstone Woodland community.

VIS Classification

This exposed heathy woodland is widespread across the Hawkesbury sandstone plateau of northern Sydney and the hinterland of the Central Coast. The eucalypt canopy is typically low in height with a structure that varies between an open woodland and an open forest. In long unburnt sites the dry shrub layer is thick and impenetrable, whereas elsewhere it is less dense. The ground layer comprises sedges and grasses. The canopy consistently includes red bloodwood (Corymbia gummifera) and scribbly gums (Eucalyptus haemastoma or Eucalyptus racemosa) with old-man banksia (Banksia serrata) present in the lower canopy. Other eucalypts include smooth-barked apple (Angophora costata) and broad-leaved white mahogany (Eucalyptus umbra) with yellow bloodwood (Corymbia eximia) occurring in the Cowan catchment in Ku-ring-gai Chase NP. The shrub layer comprises a diverse range of sclerophyllous plants such as banksias, tea-tree, wattle, geebungs and peas.

It occurs on free-draining sandy soils in exposed locations such as crests, ridges and exposed gully slopes. Soil development is generally poor. This is coastal woodland occurring within areas that receive more than 900 millimetres of mean annual rainfall. It is restricted to elevations between 200 and 500 metres above sea level. See Figure 3.1.

Coastal Sandstone Gully Forest (PCT 1250)

The species and relative abundance information for this community was collected from one 400m^2 plot (Plot 2) and was used for the following assessment. The location of Plot has previously been mapped as this community (OEH NVSMA V3 2016).

The positive diagnosis test for Coastal Sandstone Gully Forest in the Native Vegetation of the Sydney Metropolitan Area (OEH 2016) requires 32 or more positive diagnostic in a 400m^2 plot for a positive diagnosis, provided there are 45 or more native species within the plot. Plot 2 was located in an area that was mapped as Coastal Sandstone Gully Forest, 40 native species were recorded, of which 26 were positive diagnostic species for the community. There was not enough native species or positive diagnostic species record in the plot but the vegetation community on site best fits the Coastal Sandstone Gully Forest.

The lower, north-eastern section of the site corner of the site has a native tree canopy consistent with the Coastal Sandstone Gully Forest. (PCT Sydney Peppermint – Smooth-barked Apple – Red bloodwood Shrubby Open Forest on Slopes of Moist Sandstone Gullies, Eastern Sydney Basin Bioregion)

The document Native Vegetation of the Sydney Metropolitan Area V3 (OEH 2016) describes Coastal Sandstone Gully Forest as occurring on sheltered aspects on infertile Hawsbury Sandstone. Sydney Peppermint (*Eucalyptus piperita)* and Smoothed-barked Apple (*Angophra costata*) form a moderately tall open canopy. The rocky understorey is a diverse mix of heath and shrub species such as banksoas, tea-trees and wattles. The lower, north eastern area of the site is suitable habitat for this community and it generally fits the description of this community provided in the NVSMA (2016). A good quality form of Coastal Sandstone Gully Forest is considered to occur in the lower parts of the site.

Photo Page 1. Vegetation Plot Photos

Plot 1, looking south-west (from pink stake) along centre line of the plot.

Plot 2, looking south-south-west (from pink stake) along the centre line of the plot.

3.5 Presence of Threatened Ecological Communities

1.1.23 Threatened Ecological Communities in the Locality

The NSW Biodiversity Conservation Act, 2016 lists Threatened Ecological Communities (TECs) and Threatened Species that are likely to become extinct in nature unless the circumstances and factors threatening their survival cease to operate. The Threatened communities that are known to occur in the locality are shown with a red diagonal hash pattern on Figure 2.1. Drainage and soil types in the locality are shown on the Figure 2.1 and 1.3. Abiotic factors and the site survey were used to determine targeted Threatened Ecological Communities.

1.1.24 Method of Establishing if EEC's Occur on this Study area

To establish if any endangered ecological community occurs within the study area and combination of three separate methods were used:

Mapping Method: The most accurate and up-to-date vegetation maps that are available were used to determine what is already known about the distribution of vegetation types in the locality. Where more accurate local maps are not available, the 'Vegetation of the Sydney Metropolitan Area' Figure and classification (OEH, 2016) are used. Vegetation mapping has inherent errors such as the spatial accuracy of the mapping, how old the mapping is and classification accuracy, which is limited, due to the amount of field verification that was carried out when they were made. Vegetation maps do not provide a sufficient level of spatial accuracy for the assessment of the impact at the scale of this proposal but are useful in determining the ecological communities that are likely to occur in the vicinity. Fieldwork is necessary to determine the site-specific accurate vegetation mapping.

Correlation Method: Correlations between the species that occur in the study area and the listed characteristic species for the Endangered Ecological Community in; the Final Determination listed in the Biodiversity Conservation Act 2016. TECs are now listed Biodiversity Conservation Act 2016. The floristics were also compared to the document 'Vegetation of the Sydney Metropolitan Area V3' by OEH 2016.

Comparison Method: Comparison of the ecological features on the site to the environmental description in the legal definition of the Threatened Ecological Community in the Final Determination in Biodiversity Conservation Act (2016). This comparison is essential when determining if the type of ecological community that occurs within a study area is an endangered community. Not all the sections of the determinations need to apply to the study area and the earlier sections are more important and should be given more weight (Preston and Adams).

1.1.25 Occurrence of TECs in this Study Area

Mapping Result

There was no Threatened Ecological Communities mapped on or adjacent to the Development Site. The two vegetation communities that occur on the site are not part of Threatened Ecological Communities.

Correlation Result – Listed Characteristic Species within the BC Final Determination

The vegetation on any part of the site is not likely to floristically fit the descriptions in the Final Determination of any listed Threatened Ecological Community.

Comparison Result – Ecological Features within the BC Final Determination

Serval TECs occur in the locality of the site. The vegetation on any part of the site is not likely to structurally fit the descriptions in the Final Determination of any listed Threatened Ecological Community that occurs in the locality.

Conclusion regarding occurrence of TECs on the Site

The vegetation at the site is considered to be representative of any Threatened Ecologically Community listed in Schedule 2 of the BC Act 2016.

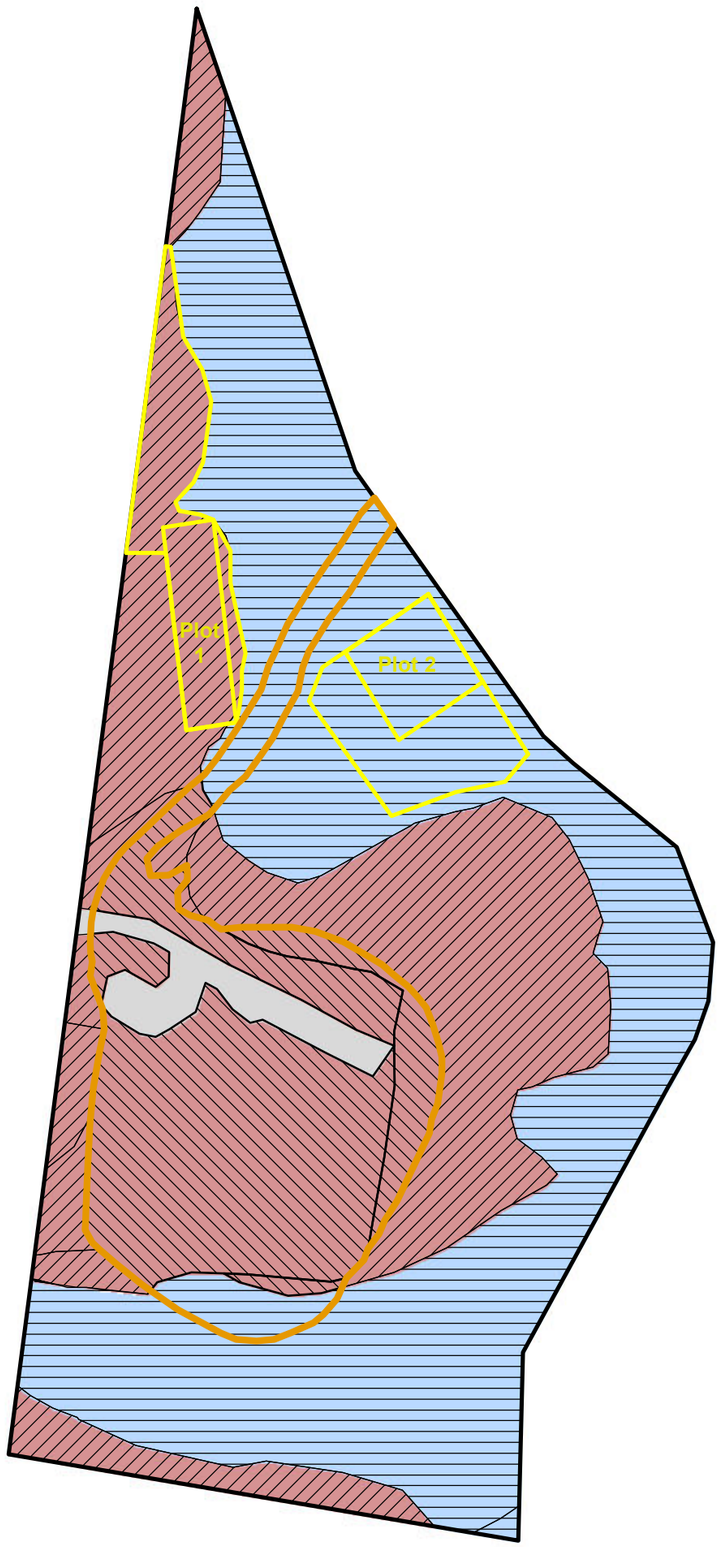
3.6 Conclusion Regarding the Vegetation Community Types Present

When the methods were applied it was determined that the site contains 2 PCTs, Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (Sydney North Exposed Sandstone Woodland, PCT 1783) and Sydney Peppermint – Smooth-barked Apple – Red bloodwood Shrubby Open Forest on Slopes of Moist Sandstone Gullies, Eastern Sydney Basin Bioregion (Coastal Sandstone Gully Forest, PCT 1250). There is a small are in the central part of the site that has been previously cleared (prior Dec 2015) and does not represent a native vegetation community.

3.7 Area of Each Vegetation Type

Table 4. The Area of Each Native Vegetation Type

Vegetation Community	PCT Number	Area (On Site)m^2	Percent Cleared
Sydney North Exposed Sandstone Woodland	1783	3481	30%
Coastal Sandstone Gully Forest	1250	518	30%



Legend

- Development Footprint (5283sqm 24%)
- Plot
- 9 Minkara Rd, Bayview (21862sqm)

Development Footprint

Zones

- Vegetation Zone 1, Offset is Needed (3999sqm, 18%)
- Not the Dominant PCT, Not Offset (10619sqm)
- Dominant PCT, Not in Footprint, Not Offset (6666sqm)
- Cleared prior to December 2015, Not Offset(578sqm)

Vegetation Type PCT

- Bloodwood - Scribbly Gum Open Forest (PCT 1783) (10665sqm)
- Peppermint - Apple - Shrubby OF (PCT 1250) (10619sqm)
- Cleared prior to December 2015 (578sqm)

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by Nicholas Skelton

Date: 05/12/2018

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Biodiversity Development Assessment Report (BDAR)

9 MINKARA RD, BAYVIEW

Figure 3.1
Vegetation Type, Zones and Plot Survey

3.8 Vegetation Integrity Assessment

This assessment type is the small area Streamlined Assessment Module, therefore only the dominant PCT in the Development Footprint requires assessment under the BAM. The dominant PCT in the Development Footprint is Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast (Sydney North Exposed Sandstone Woodland PCT 1783). From this part of the document onwards the dominant PCT at the site will be referred to as Sydney North Exposed Sandstone Woodland or SNESW. There is only disturbance type within the SNESW; Zone one has a native canopy, midstorey and understorey and is not disturbed.

Table 5. Vegetation Zones and patch size

Vegetation Zone	PCT	Area of Zone (m^2)	Patch Size (ha)
Zone 1- SNESW	1783	3999 (0.4ha)	4ha

Table 6. Vegetation Survey Effort

Date	Person Hours	Weather	Type	Location
29 August 2018	1 hours	Fine/windy 16 - 17°C	Random Meander (Cropper (1993) across each vegetation type	Across the whole of the Study Site
29 August 2018	2 hours	Fine/windy 16 - 17°C	Plot 1 x 20m x 20m plot and a 10x 40 plot, 20m x 50m plots, and five 1m^2 plots around two 50m transects	See Figure 3.1
29 August 2018	2 hours	Fine/windy 16 - 17°C	Plot 2 x 20m x 20m plot and a 10x 40 plot, 20m x 50m plots, and five 1m^2 plots around two 50m transects	See Figure 3.1

1.1.26 Composition and Structure

A total of 39 plant species were recorded in Plot 1, of which all were local native species. In plot 2 a total of 41 plant species were recorded, of which all were native local species. An additional 21 native species were recorded outside of the plots. (See plant list in Table 2). The occurrence of only local native species reflects the high quality of the vegetation at the site. The summary of the floristics and structure of the 20x20m plots are given in Table 3.

1.1.27 Function-Habitat Value

The results for tree width diversity, log length and ground cover for the 20m x 50m plot are recorded in the table below.

Table 7. Fauna Habitat Function Summary for Plots

Plot 1 (Zone 1) Function Results		
Tree Stem Size Class		**Log Length Total (m)**
Width Class (cm)		36.5
<5	present	
5 to 9	present	**Number of large trees (50cm+)**

10 to 19	present	5
20 to 29	present	
30 to 49	present	**Av Leaf Litter % Cover (1m² plots)**
50 to 79	present	81.6
80+	present	

Table 8. Vegetation Integrity Scores

Vegetation Zone	Composition Score	Structure Score	Function Score	Integrity Score
Zone 1	72	53.8	96.9	72.2

4 Threatened Species

4.1 Requirement for Ecosystem and Species Credit Species

Extract from Section 6.4.1.3 of the BAM (Aug 17)

The assessor must first use the following criteria to predict the threatened species that require assessment at the site:

(a) the distribution of the species includes the IBRA subregion which the subject land is, in the opinion of the assessor, mostly located within, and

(b) the subject land is within any geographic constraints of the distribution of the species within the IBRA subregion, and

(c) the species is associated with any of the PCTs identified by the assessor under Chapter 5 as occurring within the subject land, and

(d) the native vegetation cover within an assessment area 1500m wide surrounding the boundary of the subject site as determined by the assessor in accordance with Subsection 4.3.2 is equal to or greater than the minimum class that is required for the species (unless the development is, or is part of, a linear shaped development), and

(e) the patch size which the vegetation zone is part of, as identified in Subsection 5.3.2 is equal to or greater than the minimum specified for that species, and

(f) the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

A threatened species is predicted as requiring assessment if that species meets all of the criteria a) – f) that are relevant to the species. A criterion is not relevant to a species if the species' profile in the Threatened Biodiversity Data Collection does not contain information for that criterion

If any past surveys undertaken on the subject land, regardless of whether or not the data is within BioNet, have recorded the presence of a threatened species, this species must be identified as being a species that requires assessment at the subject land.

4.2 Ecosystem Species Assessment & Justification

The list of ecosystem credit species derived (predicted) from the BAM calculator for this proposal are listed below in Table 9. Additional Threatened ecosystem credit species are to be added where they occur on the site, or have been recorded previously at the site or when listed criteria are met.

Ecosystem credit species are those where their likely occurrence can be predicted by habitat surrogates (such as PCT) and landscape features, or for which a targeted survey has a low probability of detection. A targeted survey is not required for ecosystem species.

The listed Threatened species are assessed in accordance with section 6.4 (Steps 1 and 2) of the BAM, to identify any species that should be excluded from the BAM calculation and subsequent ecosystem (PCT, vegetation type) credit generation. The reasons for any exclusions or additions are given in the final column of Table 9. Information for habitat constrains (requirements) habitat preferences were obtained from the Threatened Species Database Collection (TBDC).

4.3 Candidate Species Assessment & Justification

The predicted (potential) candidate Threatened flora and fauna credit species derived from the BAM calculator for this proposal, are listed below in Tables 10 and 11 respectively. Additional Threatened species are to be added where they are likely to occur on the site or when the site contains suitable habitat.

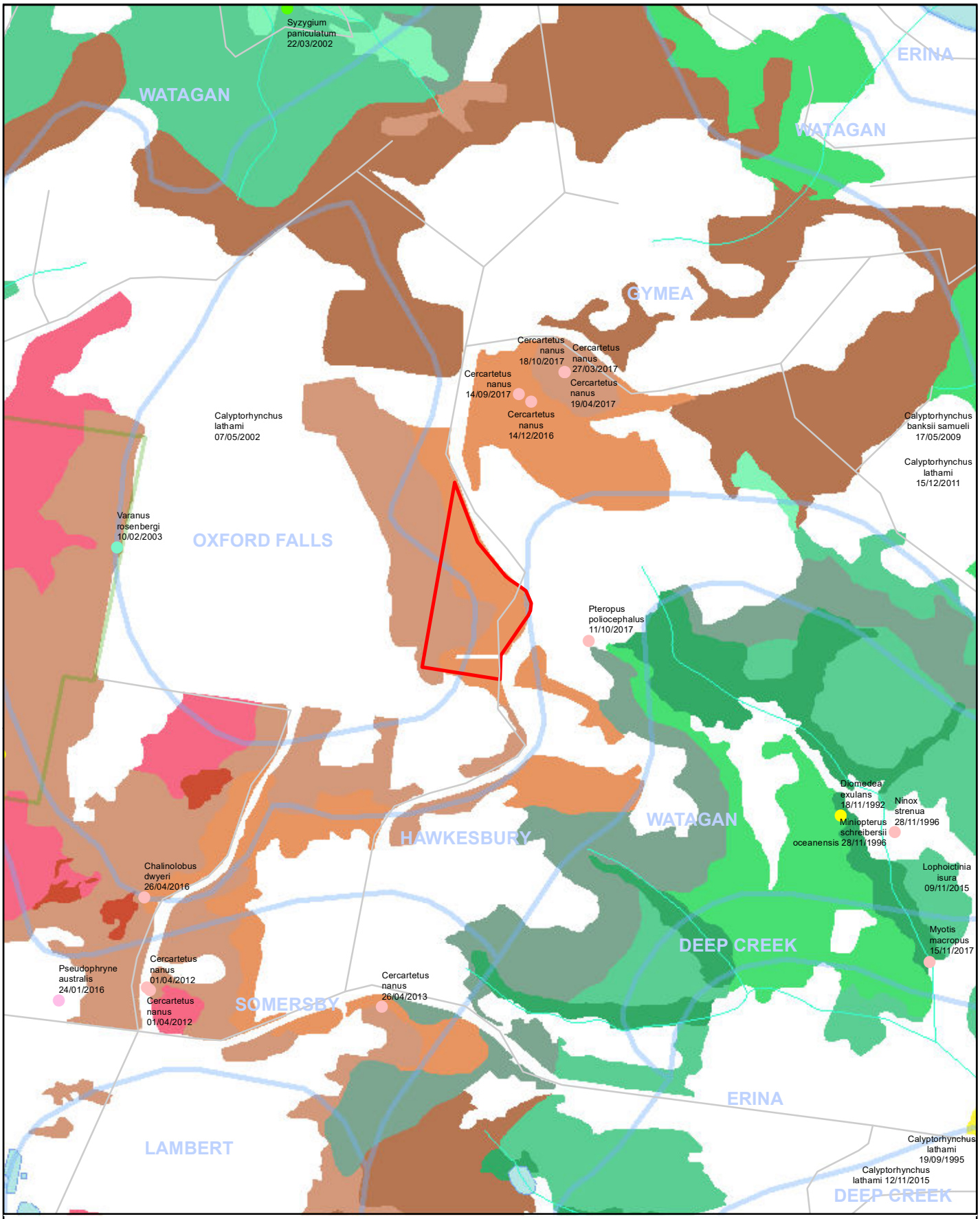
The habitat suitability and geographic constraints for potential candidate flora and fauna species credit species is assessed in the Tables 10 and 11 below. The criteria for identifying the Threatened species that should be added or excluded from further assessment are described in Sections 6.4 of the BAM. The reasons for any exclusions or additions are given in the final column.

1.1.29 Assessment to Determine Candidate Species Credit Species

The BAM calculator takes into consideration the location of the site and the vegetation community, to create the predicted candidate Threatened Species Credit Species list which is the basis of table below.

Section 6.4 of the BAM method (OEH 2017) requires 4 steps to be taken to confirm which of these species are Candidate species credit species to target for further assessment. The table below summarises the habitat preferences and requirements for each species, based on information from the Threatened Species Database Collection and other scientific references. The table applies the 4 steps by assessing the suitability of the habitat on the Site based on the findings of the field survey, then provides a justification for including or excluding each species as a Candidate species credit species for the Development Site.

Figure 4.1 shows the location, distribution and abundance of historic records for each predicted Threatened candidate species.



Legend

Threatened Species Records

- Plant
- Bird
- Frog
- Mammal
- Reptile

Sensitive Species (Not Shown)

- Development Site, 9 Minkara Rd, Bayview
- Soils Sydney ed4
- National Park

Vegetation in Locality

- S_DSF04: Coastal Enriched Sandstone Dry Forest
- S_DSF09: Coastal Sandstone Gully Forest
- S_DSF11: Sydney North Exposed Sandstone Woodland
- S_FoW02: Coastal Flats Swamp Mahogany Forest
- S_HL08: Coastal Sandstone Heath-Mallee
- S_HL09: Coastal Sandstone Rock Plate Heath
- S_RF03: Coastal Warm Temperate Rainforest
- S_RF07: Coastal Escarpment Littoral Rainforest
- S_WSF02: Coastal Enriched Sandstone Moist Forest
- S_WSF11: Pittwater Spotted Gum Forest
- S_WSF33: Central Coast Escarpment Moist Forest

Threatened species records from NSW Office of Environment and Heritage BioNet Atlas which holds data from a number of custodians.

Figure 4.1
Threatened Species Records

Vegetation Data from; The Native Vegetation of the Sydney Metropolitan Area V3 2016

9 Minkara Rd, Bayview

Date: 06/12/2018

N

0 50 100 200 Meters

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Table 9. Ecosystem Species Exclusion

9 Minkara Road, Bayview

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Scientific Name	Common Name	Vegetation Zone	Exclude as Ecosystem Credit Species	Justification
Anthochaera phrygia	Regent Honeyeater	Zone 1	No change	
Callocephalon fimbriatum	Gang-gang Cockatoo	Zone 1	No change	
Calyptorhynchus lathami	Glossy Black-Cockatoo	Zone 1	No change	
Daphoenositta chrysoptera	Varied Sittella	Zone 1	No change	
Dasyurus maculatus	Spotted-tailed Quoll	Zone 1	No change	
Glossopsitta pusilla	Little Lorikeet	Zone 1	No change	
Haliaeetus leucogaster	White-bellied Sea-Eagle	Zone 1	Excluded	No foraging habitat on site.
Hieraaetus morphnoides	Little Eagle	Zone 1	No change	
Lathamus discolor	Swift Parrot	Zone 1	No change	
Lophoictinia isura	Square-tailed Eagle	Zone 1	No change	
Miniopterus australis	Little Bentwing-bat	Zone 1	No change	
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Zone 1	No change	
Mormopterus norfolkensis	Eastern Freetail-bat	Zone 1	No change	
Neophema pulchella	Turquoise Parrot	Zone 1	No change	
Ninox strenua	Powerful Owl	Zone 1	No change	
Pandion cristatus	Eastern Osprey	Zone 1	Excluded	No foraging habitat on site.
Petroica boodang	Scarlet Robin	Zone 1	No change	
Phascolarctos cinereus	Koala	Zone 1	No change	
Pteropus poliocephalus	Grey-headed Flying-fox	Zone 1	No change	
Tyto novaehollandiae	Masked Owl	Zone 1	No change	
Varanus rosenbergi	Rosenberg's Goanna	Zone 1	Included	Ridge top, boulders and cliff present on site and a recent record 300m to the west.

Table 10. Candidate Credit Species Assessment, Flora

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Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Astrotricha crassifolia Thick-leaf Star-hair *Vulnerable*	**Habitat Requirements:** Locally endemic to two areas in NSW, a 'northern metapopulation' near Gosford, north of Sydney, and a 'southern metapopulation' near Sutherland, south of Sydney (DEE, 2018). **Habitat Preferences:** This species grows on dry ridgetops to 300 m altitude. It is associated with rich heath or dry sclerophyll woodland on sandy sandstone soils in heath, woodland and open forests (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	The site does not occur within the known population areas.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Callistemon linearifolius Netted Bottlebrush *Vulnerable*	**Habitat Requirements:** This species is mainly confined to Hawkesbury Sandstone, however isolated specimens have been observed between Sydney and Nelson Bay, Georges River to Hawkesbury River. **Habitat Preferences:** Found in damp places in woodland and sclerophyll forest usually in gullies (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	Site occurs within predicted distrubution area.	Suitable habitat occurs on site.	None documented	6 records	1 record 2km south of the site and 1 record south west of the site in Ku-ring-gai Chase NP. See Figure 4.1.	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur
Cryptostylis hunteriana Leafless Tongue Orchid *Vulnerable*	**Habitat Requirements:** The larger populations typically occur in woodland dominated by Scribbly Gum (Eucalyptus sclerophylla), Silvertop Ash (E. sieberi), Red Bloodwood (Corymbia gummifera) and Black She Oak (Allocasuarina littoralis). It appears to prefer open areas in the understorey and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta). **Habitat Preferences:** Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	Site contains suitable vegetation type.	Suitable habitat occurs on site.	None documented	1 record	None nearby	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

9 Minkara Road, Bayview

Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Darwinia glaucophylla Darwinia glaucophylla *Vulnerable*	**Habitat Requirements:** Occurs between Gosford and the Hawkesbury River around Calga, Kariong and Mt Karing. **Habitat Preferences:** Occurs in sandy heath, scrub and woodlands often associated with sandstone rock platforms or near hanging swamps and friable sandstone shallow soils. **Disturbance Factors:** None documented.	None	Site does not occur in known distribution.	Suitable habitat does not occur on site.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Darwinia peduncularis *Vulnerable*	**Habitat Requirements:** Occurs in coastal NSW with a couple of isolated populations in the Blue Mountains. It has been recorded from Brooklyn, Berowra, Galston Gorge, Hornsby, Bargo River, Glen Davis, Mount Boonbourwa and Kings Tableland. **Habitat Preferences:** Usually grows on or near rocky outcrops on sandy, well drained, low nutrient soil over sandstone. **Disturbance Factors:** Disadvantaged by frequent fire.	None	Site does not occur in known distribution.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Diuris bracteata A Donkey Orchid *Endangered*	**Habitat Requirements:** Dry schlerophyll woodland. All known extant plants occur in the Gosford and Wyong LGAs. **Habitat Preferences:** Dry sclerophyll woodland and forest with a predominantly grassy understorey. Several Occurences on the side of roads (DEE, 2018). Cryptic and sporadic species. **Disturbance Factors:** None documented.	None	Outside known range.	Not a grassy understorey.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Hibbertia puberula *Endangered*	**Habitat Requirements:** Early records of this species are from the Hawkesbury River area and Frenchs Forest (1946) in northern Sydney, South Coogee (1954) in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. **Habitat Preferences:** Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied. Occurs on sandy soil often associated with sandstone, or on clay. Cryptic and sporadic species (Benson & McDougall, 1993). **Disturbance Factors:** None documented.	None	Not in likely distribution.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Pittwater Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Lasiopetalum joyceae *Vulnerable*	**Habitat Requirements:** Has a restricted range occurring on lateritic to shale ridgetops on the Hornsby Plateau south of the Hawkesbury River. **Habitat Preferences:** Grows in heath on sandstone. **Disturbance Factors:** None documented.	None	The soil landscape on the site is not suitable.	Suitable habitat does not occur on site.	None documented	1 record	None nearby	None	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Microtis angusii Angus's Onion Orchid *Endangered*	**Habitat Requirements:** Currently known from only several sites at Ingleside, north of Sydney. **Habitat Preferences:** The Ingleside population occurs on soils that have been modified but were originally those of the restricted ridgetop lateritic soils in the Duffys Forest - Terrey Hills - Ingleside and Belrose areas. Cryptic and sporadic species. **Disturbance Factors:** Occurs on disturbed areas.	None	The site does not occur on lateritic soil.	Suitable habitat does not occur on site.	There is a small site has a small area of distunce at	82 records	1 record on the side of Monavale Road from 2014 many recent records in Inglside but Ecological Austraia Pty have not put them in the Atlas again. See Figure 4.1.	None	**Not a Candidate Species:** No species requirements (constraints) occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Melaleuca deanei Deane's Paperbark *Vulnerable*	=B40:B41ents: Occurs in two distinct areas, in the Ku-ring-gai/Berowra, St Ives and Holsworthy/Wedderburn areas respectively. Habitat Preferences: Usually found in heath or woodland on sandstone or clay (Benson & McDougall, 1993). Flowers between October and early December. Disturbance Factors: None documented.	None	Site occurs close to known population.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

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		Pittwater Sub Region	Habitat Suitability from TBDC, literature or calculator tick boxes			Proximity of Historic Records			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Melaleuca groveana Grove's Paperbark *Vulnerable*	**Habitat Requirements:** Widespread, scattered populations in coastal districts north of Yengo National Park to southeast Queensland. **Habitat Preferences:** Grove's Paperbark grows in heath and shrubland, often in exposed sites, in low coastal hills, escarpment ranges and tablelands on outcopping granite, rhyolite and sandstone on rocky outcrops and cliffs. It also occurs in dry srubby open forest and woodlands. **Disturbance Factors:** None documented.	None	Site not in known distribution.	Suitable habitat occurs on site.	None documented	No nearby records	None nearby	None	**Not a Candidate Species:** The site is not within the geographic restriction and the species is unlikely to occur. No further assessment is required for this species.
Tetratheca glandulosa Glandular Pink Bell *Vulnerable*	**Habitat Requirements:** Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. **Habitat Preferences:** Found in Sydney Sandstone Ridge top Woodland in sandy or rocky heath scrub. Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge.. Resprouts from a woody root following fire. Flowers July to November. Seasonal and cryptic. **Disturbance Factors:** None documented.	None	Developments Site is within Pittwater LGA.	Suitable habitat occurs on site.	None documented	42 records	10 records within 1km from 1997-2001 to the south-east of the development site. See Figure 4.1.	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur

4.4 Candidate Species Credit Species & Justification: Fauna

1.1.30 Existing Fauna Habitat at Development Site

The site contains fully structured native vegetation that provides suitable habitat for a range of native and Threatened species. There are many flowering trees and shrubs, particularly in the lower gully forest on the site, that provide foraging habitat for honeyeater birds and possums. A Ringtail possum drey was observed in the lower part of the site. There are several trees that are potential glider sap trees and one tree contains many glider chew marks was observed just outside of the western boundary of the site. The site contains a high density of hollow bearing trees including large tree hollows that are potentially suitable for Glossy-black Cockatoos. A eucalypt tree was observed with a large area of whitewash from a roosting bird.

The lower gully part of the site has a high density of shrubs and small trees and many small birds such as a flock of silvereyes and fairy wren were observed in this part of the site.

There are two drainage/seepage lines running east along the northern and southern parts of the site. Red-crowned Toadlet were heard along the northern drainage line. These are also potentially suitable for Giant Burrowing Frog an other non-threatened frog species.

The rock boulders and plateaus are good habitat for reptiles and there are many potentially burrows in between the rock boulders. There are some cervices within the cliff line running through the northern part of the property. These are not considered to be suitable for bats as they are close to ground level and are easily accessible by predators such as goannas and cats.

Microbats and Grey-headed Flying foxes are likely to regularly fly over the site.

1.1.31 Habitat Trees

The site contains a high density and variety of hollows including large tree hollows that are suitable for Cockatoos (such as Sulphur Crested Cockatoos and Glossy Black Cockatoos) and small hollows suitable for gliders and Eastern Pygmy Possums. It assumed that the bushland that existed in the footprint (prior to recent clearing) of the development contains a similar high density and diversity of hollow bearing trees.

A glider sap tree was observed just outside of the western boundary of the site. It is assumed that the vegetation in Development Footprint also contained suitable glider sap trees.

Table 11. Candidate Credit Species Assessment, Fauna

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Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Anthochaera Phrygia Regent Honey Eater **(Breeding only)** *Critically Endangered*	**Habitat Requirements:** Main breeding sites in NSW are in Capertee Valley and Bundarra-Barraba Regions. **Habitat Preferences:** Inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Mainly feeds on the nectar from a wide range of eucalypts and mistletoes. When nectar is scarce lerp, honeydew and insects comprise a large proportion of the diet. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests. **Disturbance Factors:** None documented. **Breeding:** Main breeding sites in NSW are in Capertee Valley and Bundarra-Barraba Regions. A shrubby understorey is an important source of insects and nesting material.	None	The site does not fall within the two known breeding areas.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Callocephalon fimbriatum-endangered population Gang-Gang Cockatoo **(Breeding only)** *Vunerable*	**Habitat Requirements:** The only known breeding areas in the Sydney region are within the Hornsby and Kur-ring-gai LGAs which is also an endangered population. **Habitat Preferences:** Occurs in tall mountain forests and woodlands during spring and summer. In autumn and winter it moves to lower altitudes in drier more open eucalypt forests or in coastal areas. Often found in urban areas. **Disturbance Factors**: None documented. **Breeding:** Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.		The site does not fall within the two known breeding areas.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Callocephalon fimbriatum Gang-Gang Cockatoo **(Breeding only)** *Vunerable*	**Habitat Requirements:** The only known breeding areas in the Sydney region are within the Hornsby and Kur-ring-gai LGAs which is also an endangered population. **Habitat Preferences:** Occurs in tall mountain forests and woodlands during spring and summer. In autumn and winter it moves to lower altitudes in drier more open eucalypt forests or in coastal areas. Often found in urban areas. **Disturbance Factors**: None documented. **Breeding:** Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	None	The site does not occur within known breeding areas in the Sydney region.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

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		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Calyptorhynchus lathami Glossy Black-Cockatoo **(Breeding only)** Vunerable	**Habitat Requirements:** Dependent on large hollow-bearing eucalypts for nest sites. **Habitat Preferences:** Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. **Disturbance Factors:** None documented. **Breeding:** Nests in large hollow-bearing eucalypts close to food trees (Mooney & Pedler, 2005). A single egg is laid between March and May.	None	Large Hollows in eucalypts do occur within Development Site.	Suitable habitat occurs on site.	None documented	61 records	8 records from 2003-2015 surounding the site within 1km. See Figure 4.1.	2 records witin 250m of the site, 1 to the north-west recorded in 2002 and 1 in 2011 to the east. See Figure 4.1.	**Yes a Candidate species credit species**: This species has historically been found in or near this site, a targeted field survey is required or this species can be assumed to occur. Further assessment is required for this species.
Cercartetus nanus Eastern Pygmy-possum *Vunerable*	**Habitat Requirements:** Nesting sites. **Habitat Preferences:** Found in dense rainforests, wet and dry sclerophyll forests, woodlands, mallee scrub and coastal heathlands, but in most areas woodlands and heath appear to be preferred. Large foraging range and feeds largely on nectar and pollen collected from Banksias, Eucalypts and Bottlebrushes. Can be difficult to detect. **Disturbance Factors:** Disturbance to the midstorey. **Breeding:** Tree hollows are favoured for nesting but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Most births occur between late spring and early autumn.	None	Suitable nesting habitat occurs on the site.	Suitable food and breeding habitat present.	No disturbance to the midstorey habitat.	158 records	8 records to the north, south and west of the site recorded from 2005-2017. See Figure 4.1.	3 records within 200m of the site to the north recorded in 2016 and 2017. See Figure 4.1.	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.
Chalinolobus dwyeri Large-eared Pied Bat *Vunerable*	**Habitat Requirements:** Cliffs, within 2km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices and old mines or tunnels. **Habitat Preferences:** It is generally rare with a very patchy distribution in NSW. Found in well-timbered areas containing gullies. Probably forages for small, flying insects below the forest canopy. **Disturbance Factors:** None documented. **Breeding:** Roosts in caves, crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Hirundo ariel).	None	Cliffs. Within 2km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices or within 2km of old mines or tunnels.	A large forest canopy occurs on site which would be suitable for foraging.	None documented	7 records	5 records south-west of the site recorded from 2012-2016. See Figure 4.1.	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.

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		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Haliaeetus leucogaster White-bellied Sea-Eagle **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Large emergent eucalypts. Breeds in mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. **Habitat Preferences:** Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. **Disturbance Factors:** None documented. **Breeding:** Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'.	None	The site is not within 1km of a bay, estuary, dam or the sea.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Heleioporus australiacus Giant Burrowing Frog *Vulnerable*	**Habitat Requirements:** Found in heath, woodland and open forest with sandy soils. **Habitat Preferences:** Burrows into deep leaf litter or loose soil, emerging to feed or breed after rain. Spends more than 95% of its time in non-breeding habitat in areas up to 300 m from breeding sites. Home ranges are approximately 0.04 ha in size. Diet includes ground-dwelling invertebrates such as ants, beetles and spiders. It occurs in semi-permanent to ephemeral sand or rock based streams, and infrequently in semi-permanent to permanent constructed dams with a sandy silt or clay base (DEE, 2018). Giant Burrowing Frogs are not restricted to watercourses. Can be difficult to detect. **Disturbance Factors:** Leaf litter. **Breeding:** Generally travels several hundred metres to creeks to breed. Commonly recorded from 'hanging swamp' seepage lines and where small pools form from the collected water.	None	Suitable seepage line habitat present on the site. The site is within 400m of a larger stream that may be suitable for breeding. Suitable PCT.	The site has suitable habitat for foraging, burrowing and breeding.	The leaf litter is not to disturbed on the site.	24 records	2 records within 2km of the site from 1993 and 1997.	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.

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		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Hieraaetus morphnoides Little Eagle **(Breeding only)** *Vunerable*	**Habitat Requirements:** Nests in Tall trees. **Habitat Preferences:** Nests in tall trees in open eucalypt forest, woodland or open woodland. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion. **Disturbance Factors:** None documented. **Breeding:** Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Lays two or three eggs during spring, and young fledge in early summer.	None	Suitable large trees occur on the site.	Suitable large trees occur on the site.	None documented	8 records	1 record within 1km west of the site from 1995.	None	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. A targeted field survey is required or this species can be assumed to occur.
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern) *Endangered*	**Habitat Requirements:** Dense ground cover. Requires vegetation structure with 50-80% average foliage density in the 0.2-1m height range (DSEWPC, 2011). **Habitat Preferences:** Usually found in heath or open forest with a dense understorey on sandy or friable soils. Feeds on a variety of ground-dwelling invertebrates and the fruit-bodies of hypogenous (underground-fruiting) fungi. Home range vary from 0.5 to 9 ha (Copley et al, 1990, Heinsohn, 1966, Lobert, 1990, McKenzie, 1967, Moloney, 1982, Paull, 1993, Wilson, 2004 cited in DSEWPC, 2011). Connectivity is likely to be an important factor in the species survival in fragmented and isolated habitats (Brown & Main, 2010 cited in DSEWPC, 2011). Shelters during the day in a shallow depression in the ground covered by leaf litter, grass or other plant material. **Disturbance Factors:** Understorey and ground cover. Lack of suitable fire frequency and patchiness will reduce habitat suitability. Foxes and dogs are known to reguarly prey on bandocoots. **Breeding:** Mating occurs any time of the year, usually following heavy rain.	None	Only the lower part of the site contains suitable foliage density in the 0.2-1m range.	Suitable habitat occurs on site. This patch of habitat has limited connectivity to other nearby habitat and may not be large enough for a home range.	Appropriate fire frequencies are not likley to be able to be applied to this patch of vegetation. Due to paths in and around the site it is likely there is a high density of foxes which would have a negative influence on the suitability of habitat.	43 records	1 record to the west within 1km from 1995 and 1 record to the north within 1km from 2016. See Figure 4.1.	None	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

9 Minkara Road, Bayview

Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Lathamus discolor Swift Parrot **(Breeding only)** *Vunerable*	**Habitat Requirements:** Breeds in Tasmania. **Habitat Preferences:** On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Mugga Ironbark E. sideroxylon, and White Box E. albens. **Disturbance Factors:** Feed trees. **Breeding:** Breeds in Tasmania during spring and summer.	None	The site does not fall within the two known breeding areas.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Lophoictinia isura Square-tailed Kite **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Large trees for breeding. **Habitat Preferences:** Inhabits dry woodlands and open forest, in particular timbered watercourses. Feeds on passerines, insects in tree canopy. **Disturbance Factors:** None documented. **Breeding:** The Square-tailed Kite builds a large stick platform in a living tree, in open forest or woodland or near edges or openings in forest. Nests are predominatly sticks lined with green eucalyptus leaves. Usually nests nearby water. A clutch of one or two eggs is laid in winter, with a single attempt per season.	None	Large trees occur on site.	The site is within 5km of several creeks.	None documented	2 records	1 record within 1km to the east of the site from 2016. See Figure 4.1.	None	**Yes a Candidate species credit species:** This species has historically been found in or near this site, a targeted field survey is required or this species can be assumed to occur. Further assessment is required for this species.
Miniopterus australis Little Bentwing-bat **(Breeding only)** *Vunerable*	**Habitat Requirements:** Caves. **Habitat Preferences:** Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. **Disturbance Factors:** None documented. **Breeding:** Breeds in caves in large maternity colonies, often along side eastern bent wing bats.	None	No Caves occur or were likely to have occured on site.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

9 Minkara Road, Bayview

Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Miniopterus schreibersii oceanensis Eastern Bentwing-bat **(Breeding only)** *Vunerable*	**Habitat Requirements:** Caves. **Habitat Preferences:** Hunt in forested areas, catching moths and other flying insects above the tree tops. **Disturbance Factors:** None documented. **Breeding:** Caves are the primary maternity roosts but derelict mines, storm-water tunnels, buildings and other man-made structures will be used.	None	No caves or other breeding habitat occurs or was likely to have occured on site.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate Species.** Species constraints do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Myotis macropus Southern Myotis *Vunerable*	**Habitat Requirements:** Within 200m of suitable waterbody that is atleast 3m wide and can be a river, creek, billabong, lagoon, dam, estuary or coastal lake. It does not include ocean, beach or marine harbour. Hollow bearing trees, caves, bridges or artificial structures within 200m of suitable water body. **Habitat Preferences:** Forage over streams and pools, catching insects and small fish on the water surface. **Disturbance Factors:** None documented. **Breeding:** Generally roost in groups of 10-15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	None	The site is not within 200m of suitable waterbody.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate Species.** Species constraints do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Ninox strenua Powerful Owl **(Breeding only)** *Vunerable*	**Habitat Requirements:** Tree hollows within 100m of a creekline. **Habitat Preferences:** Inhabits large tracts (but can occur in fragmented landscapes) of forest in a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. **Disturbance Factors:** Most prey species require hollows and a shrub layer. **Breeding:** Nests in large tree hollows along creeks.	None	No large hollows within 100m of a creekline.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

9 Minkara Road, Bayview

Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Pandion cristatus Eastern Osprey **(Breeding only)** *Vunerable*	**Habitat Requirements:** Tall dead or live trees near foraging habitat. **Habitat Preferences:** Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. **Disturbance Factors:** None documented. **Breeding:** Breed from July to September in NSW. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea.	None	The site is not within 1km of a bay, estuary, dam or the sea.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Petaurus norfolcensis Squirrel Glider Vunerable	**Habitat Requirements:** Tree hollows. **Habitat Preferences:** Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey. Diet varies seasonally and consists of Acacia gum, Eucalypt sap, nectar, honeydew and manna, with invertebrates and pollen providing protein. Can be difficult to detect. **Disturbance Factors:** Midstorey abundance. **Breeding:** Require abundant tree hollows for refuge and nest sites.	None	Several hollows and suitable foraging habitat are present.	Acacia and Euclaypt species are a suitable food source on site.	Intact and good quality mid storey.	6 records	No records in locality.	No records on or near site.	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.
Phascolarctos cinereus Koala **(Breeding only)** *Vunerable*	**Habitat Requirements:** There needs to be a breeding colony. **Habitat Preferences:** Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, in larger areas it will select preferred browse species. Home range size varies with quality of habitat, ranging from less than 2ha to several hundred hectares in size. Females breed at two years of age and produce one young per year. **Disturbance Factors:** None documented. **Breeding:** Breeding relys on good quality suitable habitat.	None	No known breeding colony in locality within the last 20 years.	N/A	N/A	67 records	1 record within 1km to the east from 1967.	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.

9 Minkara Road, Bayview

Step 4 6.4.1.20-25

		Pittwater Sub Region	Habitat Suitability within Development Site, from TBDC, literature or calculator tick boxes			Proximity of Historic Records from past reports and databases			
		Determining Factor -ve	May be a Determining Factor		May be a -ve Determining Factor			Determining Factor +ve	
Derived (Predicted) Potential Candidate Species	**Habitat Requirements and Preferences (constraints) from species profile and literature**	**Geographic Restrictions (from TBDC)**	**Habitat Reqirements (constraints) within Development Site**	**Habitat Preferences within Development Site**	**Disturbance, Habitat Degredation existing within Development Site**	**Historic Occurance within 5km**	**Historic Occurance in locality (date, location and vegetation type)**	**Historic Occurance on or imediately adjacent to Development Site**	**Candidate Species Conclusion & Justification**
Pseudophryne australis Red-crowned Toadlet *Vulnerable*	**Habitat Requirements:** Periodically wet drainage line. **Habitat Preferences:** Occurs in open forests. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. **Disturbance Factors:** Water quality. **Breeding:** Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Eggs are laid in moist leaf litter, from where they are washed by heavy rain.	None	Periodically wet drainage lines occur on the site.	Suitable habitat occurs on site.	The water quality is not to low for the species to occur.	42 records	3 records within 1 km to the south-west of the site recorded in 2016. See Figure 4.1.	N/A	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.
Pteropus poliocephalus Grey-headed Flying-fox **(Breeding only)** *Vunerable*	**Habitat Requirements:** Breeds close to fresh water body. **Habitat Preferences:** Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. **Disturbance Factors:** None documented. **Breeding:** Site fidelity to camps is high. Individual camps may have tens of thousands of animals and are used for mating, and for giving birth and rearing young.	None	No breeding or roosting habitat close to or on a water body within site.	N/A	N/A	N/A	N/A	N/A	**Not a Candidate species credit species:** This species requirements (constraints) do not occur on this site and the species is unlikely to occur. No further assessment is required for this species.
Tyto novaehollandiae Masked Owl **(Breeding only)** *Vulnerable*	**Habitat Requirements:** Tree hollows greater than 40cm wide and 100cm deep and more than 3m above the ground, in Eucalypt trees atleast 90cm (DEC 2006) or caves. **Habitat Preference:** Lives in dry eucalypt forests and woodlands from sea level to 1100 m. Hunts tree-dwelling and ground mammals, especially rats along the edges of forests, including roadsides. **Disturbance Factors:** None documented. **Breeding:** Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting.	None	Suitable tree hollows occur on site.	Moist eucalypt forest occur on site.	None documented	3 records	No records in locality.	No records on or near site.	**Yes a Candidate species credit species:** This species is known to occur in general location, and suitable habitat occurs on the site, and the site is not too disturbed. Further assessment is required for this species.

4.5 Field Survey Effort

1.1.32 Threatened Flora Field Survey Effort

Date	Person Hours	Weather	Type	Location	Targeted species
28th August 2018	5	Fine 12-13°C	Threatened flora and habitat searches	Across the whole Development Site	All threatened flora that has suitable habitat.
12th October 2018	4	Fine 13-18°C	Threatened flora and habitat searches	Across the whole Development Site	All threatened flora that has suitable habitat.
22nd October 2018	4	Fine 18-23°C	Threatened flora and habitat searches	Across the whole Development Site	All threatened flora that has suitable habitat.
29th October 2018	2	Fine 19-20°C	Threatened flora and habitat searches	Across the whole Development Site	All threatened flora that has suitable habitat.

1.1.33 Threatened Fauna Field Survey Effort

Date	Time of day	Person Hours	Weather	Type	Location	Targeted Species
28th August 2018	Day	6	Fine 12-13°C	Threatened fauna habitat searches	Across the whole Development Site	All threatened fauna that has suitable habitat.
28th August 2018	Afternoon	2	Fine 12-13°C	Diurnal Survey	Across the whole Development Site	All threatened fauna that has suitable habitat.
28th August 2018	Day	2	Fine 12-13°C	Hollow Inspection	All hollows	Hollow using fauna
12th October 2018	4-5:30pm	3	1 hour after rain /overcast 13-18°C	Threatened fauna habitat searches	Across the whole Development Site	All threatened fauna that has suitable habitat.
12th October 2018	4:30-5:30pm	1	1 hour after rain /overcast 13-18°C	Targeted amphibian survey	All drainage lines and wet areas	Red-crowned Toadlet
12th-22nd October 2018	24 hours	10 trap nights	13-28°C	2 small sized and 5 large sized hair tube traps	See Figure 4.2	Southern Brown Bandicoot, New Holland Mouse
22nd-29th October 2018	24hours	7 trap nights	16-27°C	7 Motion Detecting Cameras	See Figure 4.2	Southern Brown Bandicoot, New Holland Mouse, Eastern Pygmy Possum, Squirrel Glider

4.6 Candidate Credit Species Presence

Step 5 of Section 6.4.1 determines if each species is present (or assumed present) on the Development Site, maps the location and quantifies the number of individuals or the amount of habitat present.

Table 12. Candidate Species Presence

9 Minkara Road, Bayview

Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	**Biodiversity Risk Weighting**	**Suitability of the Time of Year Surveyed**	**Presence On Site or Assumed Presence or Expert Report**	**Vegetation Zone**	**Habitat Component that is Present**	**Area of Habitat or Count Impacted including parts of buffers of features outside impact area**	**Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)**
Callistemon linearifolius Netted Bottlebrush *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable region and habitat.	1	Good
Calyptorhynchus lathami Glossy Black-Cockatoo **(Breeding only)** Vunerable	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Large forest canopy, within 2km of potential roosting habitat.	0.1ha	Good
Cercartetus nanus Eastern Pygmy-possum *Vunerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable hollows and foraging habitat.	0.4ha	Good
Chalinolobus dwyeri Large-eared Pied Bat *Vunerable*	3.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Potential roosting and foraging habitat.	0.4ha	Good
Cryptostylis hunteriana Leafless Tongue Orchid *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on site.	0.4ha	Good
Heleioporus australiacus Giant Burrowing Frog *Vulnerable*	1.50	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Breeding seepage lines and foraging habitat.	0.1ha	Good
Hieraaetus morphnoides Little Eagle **(Breeding only)** *Vulnerable*	1.50	Surveyed in suitable time of year.	No old or current nests present.	Zone 1	Tall trees	No nesting present.	N/A
Lophoictinia isura Sqaure tailed Kite **(Breeding only)** *Vulnerable*	1.50	Surveyed in suitable time of year.	No old or current nests present.	Zone 1	Tall trees	No nesting present.	N/A
Melaleuca deanei Deanes Paperbark *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable habitat on site.	0.3 ha	Good
Petaurus norfolcensis Squirrel Glider *Vunerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Hollows and foraging habitat.	0.4ha	Good
Pseudophryne australis Red-crowned Toadlet *Vulnerable*	1.50	Surveyed in suitable time of year.	The call was heard during two site visits.	Zone 1	Drainage and seepage lines, leaf litter.	0.3ha	Good

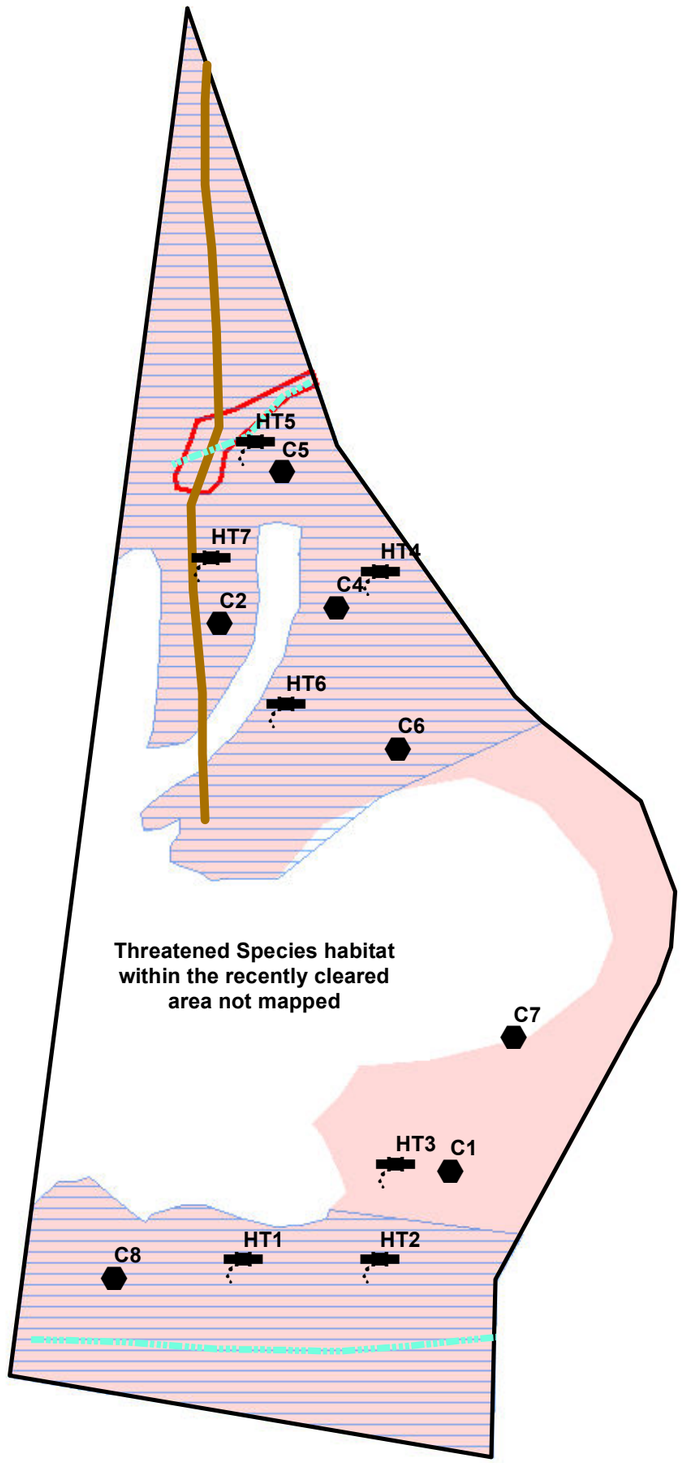
9 Minkara Road, Bayview

Step 5, 6.4.1.26-34 and Step 6. 6.4.1.35-37

					Development Site	Only in Impact Area	
Derived (Predicted) Potential Candidate Species	**Biodiversity Risk Weighting**	**Suitability of the Time of Year Surveyed**	**Presence On Site or Assumed Presence or Expert Report**	**Vegetation Zone**	**Habitat Component that is Present**	**Area of Habitat or Count Impacted including parts of buffers of features outside impact area**	**Step 6: Habitat Condition in Species Polygon (Integrity Score for each Zone)**
Tetratheca glandulosa Glandular Pink Bell *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Suitable region and habitat.	0.4ha	Good
Tyto novaehollandiae Masked Owl **(Breeding only)** *Vulnerable*	2.00	Assumed Present	Assumed present due to suitable habitat.	Zone 1	Tall trees in Eucalypt dominated Gullie (suitable habitat not within Development footprint).	0.1 ha	Good

Table 13. Non-Threatened Fauna Found

	Scientific Name	Evidence	Date
Birds			
Australian Magpie	*Cracticus tibicen*	Observed	29/08/18
Eastern Whipbird	*Psophodes olivaceus*	Observed	29/08/18
Galah	*Eolophus roseicapilla*	Observed	29/08/18
Laughing Kookaburra	*Dacelo novaeguineae*	Observed	29/08/18
Little Wattlebird	*Anthochaera chrysoptera*	Observed	29/08/18
Noisy Miner	*Manorina melanocephala*	Observed	29/08/18
Magpie-lark	*Grallina cyanoleuca*	Observed	29/08/18
Pied Butcherbird	*Cracticus nigrogularis*	Observed	29/08/18
Rainbow Lorikeet	*Trichoglossus haematodus*	Observed	29/08/18
Red Wattlebird	*Anthochaera carunculata*	Observed	29/08/18
Silvereye	*Zosterops lateralis*	Observed	29/08/18
Superb Fairy-wren	*Malurus cyaneus*	Observed, Camera 5, Camera 6	25/10/18, 28/10/18
Welcome Swallow	*Hirundo neoxena*	Observed	29/08/18
Mammals			
Brush-tailed Possum	*Trichosurus vulpecula*	Camera 8	22/10/18, 23/10/18, 25/10/18, 28/10/18
Common Ringtail Possum	*Pseudocheirus peregrinus*	Nest	29/08/18
Black Rat*	*Rattus rattus*	Bones	29/08/18
Long-nosed Bandicoot	*Perameles nastuta*	Bones & Hairtube	29/08/18
Sugar Glider	*Petaurus breviceps*	Camera 4	25/10/18 twice on this date 2 hours apart
Swamp Wallaby	*Wallabia bicolor*	Scat, Camera 1	24/10/18
Horse	*Equus ferus caballus*	Scat	29/08/18
Rabbit*	*Oryctolagus cuniculus*	Camera 8	22/10/18, 24/10/18, 26/10/18, 28/10/18



Legend

Traps

- Camera
- Hair Tube

Prescribed Impact Features

- Cliff
- Seepage
- Development Site, 9 Minkara Rd, Bayview (21862sqm)
- Giant Burrowing Frog Habitat
- Red-crowned Toadlet Location
- Red-crowned Toadlet Habitat

Large-eared Pied Bat, Pygmy-possum, Squirrel Glider and Rock Features (Prescribed Impact Feature) habitat occur across the whole of the Development Site.

The Threatened species habitat within the area that has been cleared between 2015 and the time of the field survey, can not be mapped.

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by Nicholas Skelton

Date: 07/12/2018

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Biodiversity Development Assessment Report (BDAR)
9 MINKARA RD, BAYVIEW

Figure 4.2
Threatened Species Survey, Habitat and Prescribed Impact Features

Stage 2: Impact Assessment

2 Avoidance and Minimisation of Impacts

4.7 Steps Taken to Avoid and Minimise Ecological Impact

The Biodiversity Conservation Act 2016 Biodiversity Conservation Regulation (2017) require that all developments "Avoid" and "Minimise" ecological impacts. Once all possible impact minimisation and avoidance has been undertaken, then offsetting can be used to mitigate the residual ecological impacts of the proposal. This report describes ecological constraints on this site and they were provided to the project planning team for use in planning and avoiding and minimising the impacts.

The main ecological constraints that have been identified at the site are the

- High quality native vegetation habitat
- Threatened species and their habitats
- Habitat trees such as hollow bearing trees & glider sap trees.
- Natural rock features such as cliffs, crevices, boulders and burrows, connectivity and hydrological processes.

Table 14. Steps Taken to Avoid and Minimise Impact

Avoid and Minimise	Outcome	Timing	Participants
Reducing the size of the Asset Protection Zone to approximately 1/3 of the original area	Reduced the impact to the high quality native vegetation and habitat at the site.	DA Design	Bushfire Consultant
Locating the development to include area (578m^2) of existing clearing (prior to Dec 2015) in the Development Footprint.	Including previously cleared area (prior to Dec 2015) will reduce the total amount of native vegetation clearance	DA Design	Architect
Sighting wastewater disposal area within the APZ area.	Reducing the total amount of native vegetation clearance	DA Design	Architect

Recommendations have been made in Part 3 of this report to further minimise the ecological impact from the proposal.

4.8 Residual (after avoiding and minimising) Direct and Indirect Impacts

Table 15. Summary of Residual Direct and Indirect Impacts

Type	Frequency	Intensity	Duration	Consequence
Construction of a new dwelling with attached terrace, pool and spa (see Figure 1.4)	Once, during construction only	Complete removal of vegetation	Impact permanent	Impact to high value native vegetation and habitat
Construction of new driveway to Minkara Road and carport (see Figure 1.4)	Once, during construction only	Complete removal of vegetation	Impact permanent	Impact to high value native vegetation and habitat including natural sandstone cliff
Bushfire Asset Protection Zone (see Figure 1.5)	Established during construction and managed regularly in the long term	Thinning of trees, removal of shrubs and leaf litter	Impact permanent	Impact to high value native vegetation and habitat

Onsite wastewater irrigation field (see Figure 1.4)	Once, during construction only, lawn mown regularly	Complete removal of vegetation	Impact permanent	Impact to high value native vegetation and habitat
Cut and fill for new driveway	Once during construction	Potential sediment and pollutants entering adjacent bushland	Impact ongoing	Impact to high value native vegetation and habitat including Red-crowned Toadlet habitat.

2.1.2 Vegetation Loss

There is approximately 21284m^2 (2.13ha) of good quality native vegetation at the site. This includes 10665m^2 of Sydney North Exposed Sandstone Woodland and 10619m^2 of Coastal Sandstone Gully Forest. A small area (578m^2) of the Development Footprint has been cleared previously (pre Dec 2015) does not contain any native vegetation. The Development Footprint will impact 4717m^2 of this vegetation including 3999m^2 of Sydney North Exposed Sandstone Woodland and 718m^2 of Coastal Sandstone Gully Forest (impact to CSGF not assessed in Streamlined assessment module). The footprints of the new dwelling including decking, pool and spa, landscaping and retaining walls, the wastewater irrigation field, carport and driveway will completely remove the native vegetation including trees, shrubs, groundcovers, leaf litter and topsoil. The additional area to be impacted by the bushfire Asset Protection Zone will have trees cover thinned, shrubs removed and the groundcover and leaflitter regularly maintained. Logs and bush rock within the APZ should be retained. Retaining bush rock will reduce the bushfire fuel loads.

The remaining native vegetation outside of the Development Footprint is not proposed to be directly impacted by the proposal.

2.1.3 Hollow loss

The site contains a high density and variety of hollows including large tree hollows that are suitable for Cockatoos (such as Sulphur Crested Cockatoos and Glossy Black Cockatoos) and small hollows suitable for gliders and Eastern Pygmy Possums. It is assumed that the bushland that existed in the footprint (prior to recent clearing) of the development contains a similar high density and diversity of hollow bearing trees and that tree hollows would be impacted by the proposed development. A glider sap tree was observed just outside of the western boundary of the site. It is assumed that the vegetation in Development Footprint also contained suitable glider sap trees.

2.1.4 Impact to Threatened Species and their Habitat

The vegetation to be removed is suitable foraging or breeding habitat for several Threatened fauna species (ecosystem credit species). Due to the recent disturbance at the site the impact to the candidate species credit Threatened species can only be estimated using experience and local knowledge of these species in their habitat. Detailed aerial photos of the site before the recent disturbance and habitat assessment of adjacent areas were used to assist in estimated habitat suitability. Threated species habitat in the part of the site outside of the recently cleared area in shown on Figure 4.2.

2.1.6 Potential Indirect Impacts

The new dwelling and wastewater irrigation area will be built on the ridgetop and will include cut and fill. The plans show a retaining wall proposed along the eastern edge of the development, however the details are unknown. There is the possibility of the spread of nutrients, sediment and weed propagules, into the adjacent bushland to the retained. This report includes recommendation to help avoid this impact

Sediment and pollutants from the proposed driveway are likely to enter the adjacent bushland.

2.1.7 Prescribed biodiversity Impacts

Prescribed impacts are impacts in addition to native vegetation clearing and can be used by the determining authority to make Conditions of Consent, add credits or refuse an application.

Prescribed Biodiversity Impacts are listed in section 6.7 of the BAM and including impact to cliffs, Karsts, caves, rocks, manmade structures, non-native vegetation, waterbodies & hydrological processes, connectivity features, wind turbine strikes and vehicle strikes. Prescribed Impacts are assessed in Table 16 below.

Table 16. Identificaton and Assessment of Prescribed Impacts

9 Minkara Road, Bayview

This table addresses section 9.2 of the BAM.
OEH species profile and TBDC were used to assess the impact on the species.

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Feature	Present	Prescribed Impact on Site	Species Likley to use Habitat	Importance of Habitat	Nature, Extent and Duration of Impacts	Prediction of Consequences of Impact	Justification of Prediction
Karst, caves, crevices, cliffs or other geologically significant feature	Yes	Cliff present on site that runs in a north to south direction along the ridgeline in the north of the site. See figure 4.2.	Large-eared Pied Bat, Heath Monitor and Red-crowned Toadlet.	The Large-eared Pied Bat is known to nest in the crevices in cliffs and escarpments. The crevices on the site are to low to the ground and are not suitable. The Red-crowned Toadlet is often found at the base of cliffs and relies on the collection of water to provide damp areas for habitat. The Heath Monitor uses rock crevices as sheltering sites. The cliff on the site is known the contain several crevices that would be suitable for the Heath Monitor. The cliff on site is only 3-4 metres in height. The site occurs on a ridgeline, and in the surrounding area, cliffs are thought to be a common part of the landscape.	A driveway will be built as part of the proposal that will require the removal of a small area of the cliff, this may impact areas of the cliff directly adjacent to the removal area and cause instability in the rockface. Removing the area of cliff may increase erosion, from water running off the driveway, to the area downslope.	Only a small area of the cliff will be required to be removed for the driveway. The removal of the small area of cliff is not likely to impact to the Large-eared Pied Bat as the crevices in the cliff are not suitable for sheltering or breeding. The cliff base contains suitable crevices and sheltering site for the Heath Monitor and Red-crowned Toadlet. Only a small area of the cliff will be impacted by the development and it is not likely to have detrimental effects on this species. The heath monitor is not heavily reliant on the cliffs as habitat and there is other suitable habitat on the site. The Red-crowned Toadlet also has other areas of suitable habitat on the site that will not be impacted by the proposal.	The large-eared Pied Bat roosting habitat is mostly known to occur near larger cliffs and escarpments (DEE, 2018). The Red-crowned Toadlet inhabits periodically wet drainage lines at the base of sandstone ridges (OEH, 2017). Heath Monitor shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows (OEH, 2017).
Rocks	Yes	Rock boulders and exposed bedrock shelving occur throughout the site. See Figure 4.2.	Red-crowned Toadlet and Heath Monitor.	The rock outcrops provide important sheltering habitat for the Red-crowned toadlet that is known to shelter under rocks and amongst dense vegetation or thick piles of leaf litter. The Heath Monitor uses rock crevices as sheltering sites, the rock shelving may contain suitable crevices.	The exposed bedrock that occurs on the area proposed for the house, driveway, sewerage disposal area and garage will be impacted and removed and levelled as part of this proposal. The rock boulders are in the lower part of the site and further from the proposed building areas and will not likely be impacted by the proposal. it is recommended that the boulders in the APZ are retained.	The site is on a slope and so levelling will be required as part of the propsal and consequently the exposed bedrock within the building areas will be impacted. The proposal will require the removal of all exposed bedrock habitat, within the building area, for the Red-crowned Toadlet and the Heath Monitor. Areas of exposed bedrock not within the building areas will not be impacted by this proposal and will remain as areas of intact habitat for these species. It is not likley the removal of the exposed bedrock will have any detrimental impacts on Heath Monitors using the site as this area is likely a small part of a large home range.	No justification required.
Human-made structure	No	There is no man-made structures present on the site.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	See section 9.2.1.3 of the BAM.	No justification required.
Non-native vegetation	No	There is no non-native vegetation on the site.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	See section 9.2.1.4 of the BAM.	No justification required.
Hydrological process sustaining/interacting with rivers, streams or wetlands and water bodies and water quality	Yes	Seepage lines and a small area of swamp occur on the site.	The Giant Burrowing Frog and the Red-crowned toadlet.	The smalll swamp area and seepage lines provide suitable vegetated soak areas and damp habitat for the Red-crowned Toadlet and Giant Burrowing Frog.	The proposal will not directly impact the seepage and swamp areas on the site. Sediment fences have been recommended as part of the propsal to reduce sediment and nutrient from entering these sensitive areas and impacting water and habitat quality.	Some small parts of the habitat areas surrounding the seepage lines and swamp areas will be cleared for the driveway. The removal of a small area of habitat will not have a detrimental impact on the populations of the Red-crowned Toadlet and Giant Burrowing Frogs.	No justification required.
Wind farm development	No	There is no windfarm present on the site.	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	See BAM section 9.2.1.8 of the Bam	No justification required.
Connectivity	yes	See section 2.1.5 of this document for a description of the connectivity features on the site.	All candidate species (see table table 12).	The site has good north-south wildlife corridor value and medium east-west corridor value. See Figures 1.1 and 1.2. There is an intact native canopy on the surrounding residential properties that connects the tree canopy at the site to areas of native vegetation in the locality including Ku-ring-gai Chase National Park west of the site.	As part of the proposal there will be approximatley 0.47ha of native vegetation on the site cleared for the development of a house, driveway, sewerage dispersal area and APZ.	The removal of the approximatley 0.47ha of bushland will have a negative impact on the movement of smaller less mobile species with small home ranges, such as the frogs, across the site and adjacent bushland. The removal of the bushland will not be as a significant impact for more mobile species, such as Sugar Gliders and Pygmy Possums, that can more easily move across the lower part of the site and adjacent bushland.	No Justification required.
Migration	No	The site is not a known habitat for migrating species.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	See section 9.2.1.6 of the BAM.	No Justification required.
Vehichle stikes (Road Proposals)	No	The DA is not for a road proposal and vehicle strikes is not an impact. See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	See BAM section 9.2.1.9 of the Bam	No Justification required.
Other	No	No other habitat features occur on the site	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No additonal prescribed impacts identified	No Justification required.

3 Impact Summary

4.9 Potential SAII Serious And Irreversible Impacts

A guide to assist a decision-maker to determine a serious and irreversible impact (OEH Aug 2017) lists 5 steps to determine whether an impact is classified as a potential Serious and Irreversible Impact (SAII).

Step 1. Identify Relevant Potential Entities

Potential SAII entities are species or ecological communities that meet the criteria in Appendix 1 of the Guide. Appendix 2 of the guide lists some potential entities that are considered to meet the criteria

The potential SAII entities that are likely to be impacted by this development include

- Large Eared Pied Bat (breeding habitat)

Step 2. Evaluate the nature of Impact on a Potential Entity

These are potential residual impacts on Potential Entities after steps have been taken to avoid and mitigate impact.

- Impact to 0.5ha of potential Large Eared Pied Bat foraging habitat but no impact to breeding habitat.

Step 3. Determine if Impacts Exceed Threshold

Impact assessment information form steps 1 and 2 can be compared to the impact threshold for the SAII entity. Impact thresholds are for potential SAII entities are in the Threatened Biodiversity Data Collection (not yet available).

- The proposal will not impact Large Eared Pied Bat breeding habitat and is therefore not considered to be an SAII for this entity.

Steps 4 and 5 *are for the decision-maker to decide whether they consider the potential SAII identified and describes above to be a SAII and the step required to be undertaken (such as refusing the Development Application) once that decision has been reached.*

4.10 Impacts Requiring Offset

Table 17. Impacts to Vegetation and Ecosystem Credit

PCT	Vegetation Zone	Existing Integrity Score	Management Zone	Area of Impact	Future Integrity Score
1783	1 (SNESW)	72.2	MZ1- Construction Footprint	0.35ha	0 (removal)
1783	1 (SNESW)	72.2	MZ2- Asset Protection Zone	0.05ha	30.3 (APZ)

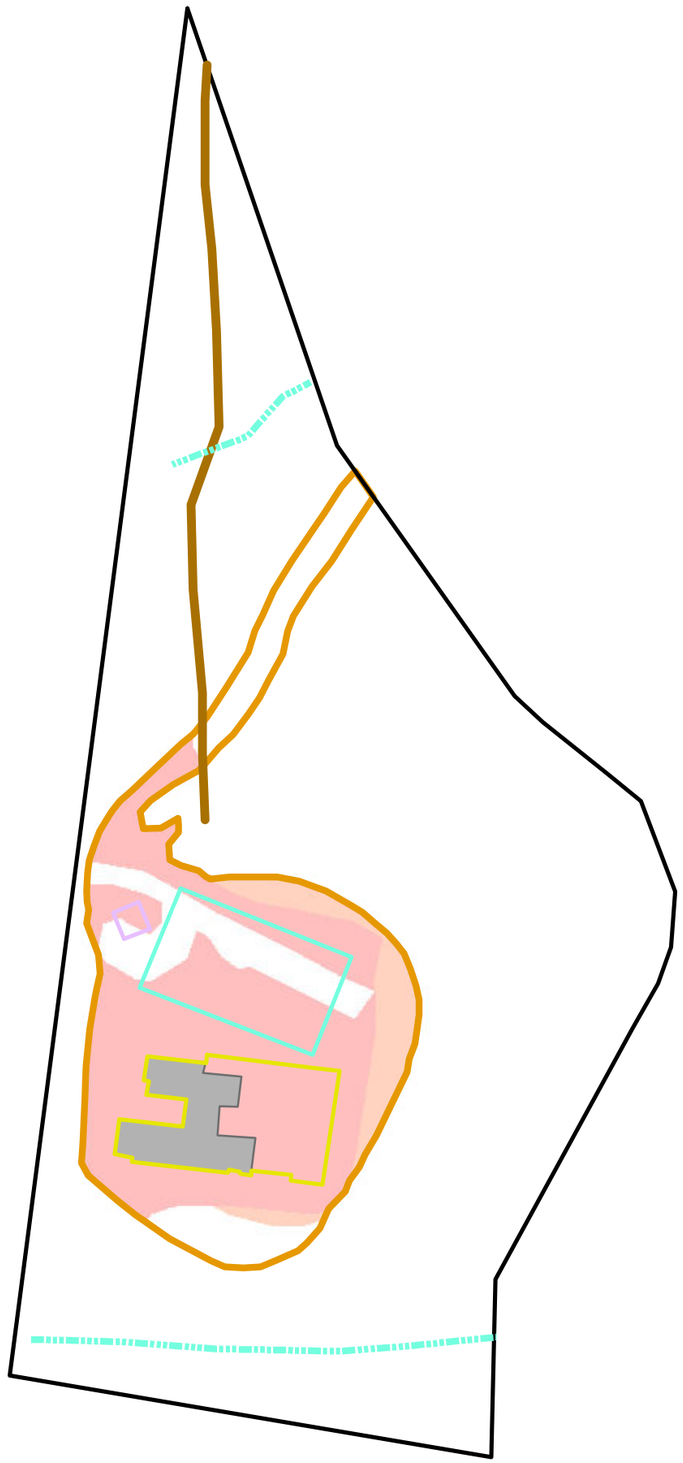
3.1.1 Justification for future integrity scores

Management Zones within Impact Area

- **Management Zone 1 within construction and landscape area (within Vegetation Zone 1)** the area in dark pink on Figure 6.1 will have a future integrity score of 0 as all habitat and all vegetation will be permanently removed from these areas.

- **Management Zone 2 bushfire Asset Protection Zone (within Vegetation Zone 1)** the area in light pink on Figure 6.1 is the area that will be established and managed as a fuel reduced bushfire Asset Protection Zone in accordance with the Bushfire Risk Assessment and is estimated to have a future integrity score of 30.3. The future integrity score was calculated by reducing the tree, shrub and leaflitter cover so that is complies with the requirement in the Planning for Bushfire Protection, Standards for Asset Protection Zones (NSW RFS). The tree cover was reduced to 20% cover, shrub cover to 0%, leaf litter to 20% and course woody debris (logs) is assumed completed removal. Groundcover will not need to be removed for the APZ.

Species Credit Species	Associated Vegetation Zone	Total Area of Impact or Count
Callistemon linearfolius Netted Bottle Brush	Zone 1	1 (count)
Glossy Black Cockatoo (breeding only)	Zone 1	0.1ha (1 hollow tree)
Eastern Pygmy Possum	Zone 1	0.4ha
Large-eared Pied Bat	Zone 1	0.4ha
Cryptostylis hunteriana Leafless Tongue Orchid	Zone 1	0.4ha
Giant Burrowing Frog	Zone 1	0.1ha
Deane's Paperbark	Zone 1	0.35ha
Squirrel Glider	Zone 1	0.4ha
Red-crowned Toadlet	Zone 1	0.3ha
Tetratheca glandulosa	Zone 1	0.4ha
Masked Owl (breeding only)	Zone 1	0.1ha (1 hollow tree)



Legend

Prescribed

- Cliff
- Seepage
- Development Site, 9 Minkara Rd, Bayview (21862sqm)

Proposal

- House Pool and Deck (900sqm)
- Wastewater Dewatering (850sqm)
- Garage (34sqm)
- House Only
- Development Footprint (5283sqm 24%)

Development Footprint

Impact Assessed

- MZ1 Removal (3481sqm)
- MZ2 Bushfire APZ (518sqm)

Large-eared Pied Bat, Pygmy-possum, Squirrel Glider and Rock Features (Prescribed Impact Feature) habitat occur across the whole of the Development Footprint

The Threatened species habitat within the area that has been cleared between 2015 and the time of the field survey, can not be mapped.

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by Nicholas Skelton

Date: 06/12/2018

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Figure 6.1
Impact To Be Offset including Threatened Species Polygons within Vegetation Zone

4.11 Impacts Not Requiring Offsetting

Impacts that do not require offsetting are when an integrity score for the Vegetation Zone does not meet the minimum requirements that are;

- An integrity score ≥15 where the PCT is representative of an Endangered or Critically Endangered Ecological Community
- An integrity score of ≥17 if the PCT is associated with Threatened species habitat (for ecosystem credit species) or is representative of a Vulnerable Ecological Community.
- An integrity score of ≥20 if the PCT is not representative of a TEC or Threatened species habitat.

Vegetation Zone 1 within the SNESW in the Development Footprint meets the minimum integrity score of 17 for PCT that is assorted with threatened species habitat (ecosystem credit species) and therefore requires offsetting.

4.12 Areas Not Requiring Assessment

The Development Site does not include any Bio certified Land. A small (578m^2) part of the Development Site contains old disturbance (prior to Dec 2015) and does not require assessment. No parts of the site are part of a subdivision after 2017.

4.13 Additional Impacts and Indirect Impacts that are not Offset

This assessment uses the Streamlined Assessment Module and therefore impacts to other PCTs that are not the dominant PCT are not offset. The proposal will impact up to 718m^2 of the PCT 1250 (Coastal Sandstone Gully Forest) that is not offset. The impact to this vegetation also includes habitat suitable for native and Threatened species including habitat for the Red-crowned Toadlet and habitat hollows.

The vegetation on the site to remain is downhill of the proposal, there is the possibility of the spread of nutrients, sediment and weed propagules, into the adjacent bushland to the retained. This report includes recommendation to help avoid this impact.

The assessment of **Prescribed Impacts** is in Table 16 of this report.

4.14 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) would only be relevant if the proposal was to be or impact a Matter of National Environmental Significance (MNES), thus triggering referral l to the Federal Department of the Environment and Water Resources.

A Protected Matters search was conducted within a 10km radius of the site. A Protected Matters search is a broad scale assessment that includes World Heritage Properties, National Heritage Places, Wetlands of International Importance, Great Barrier Reef Marine Park, Commonwealth Marine Areas, Listed Threatened Ecological communities, Listed Threatened Species and Listed Migratory Species. The only relevant categories to this report are Threatened species, Threatened Ecological Communities and Migratory species.

The report lists the following ecologically relevant items:

- 5 Threatened Ecological Communities
- 81 Threatened species
- 57 Migratory Species

Most of the migratory and aquatic bird species, as well as the fish, sharks and marine mammals are not assessed in this report. This report addresses terrestrial species, which are likely to have potential habitat on the site.

The EPBC Act Threatened species that have potential habitat onsite have been assessed under BC Act criteria in this Biodiversity Development Assessment Report. The assessments concluded that no significant impacts are likely to occur to those species as a result of the proposal and a similar conclusion was also reached after consideration of the Commonwealth criteria. The vegetation on the site does not meet the definition of any EEC under the EPBC Act.

It is recommended that this proposal (see Figure 6) does not need to be referred to Environment Australia.

4 Offsets

4.15 Offset Credits Required

Ecosystem Credits

Vegetation Zone	PCT	Total Area of Impact	Change in Integrity Score	Credits Required
Zone 1	1783	0.4ha	-67.7	10
			Total	**10**

Species Credits

Species Credit Species	Associated Vegetation Zone	Area of Impact or Count	Credits Required
Callistemon linearfolius Netted Bottle Brush	Zone 1	1 (count)	2
Glossy Black Cockatoo (breeding only)	Zone 1	0.1ha (1 hollow tree)	3
Eastern Pygmy Possum	Zone 1	0.4ha	14
Large-eared Pied Bat	Zone 1	0.4ha	20
Cryptostylis hunteriana Leafless Tongue Orchid	Zone 1	0.4ha	14
Giant Burrowing Frog	Zone 1	0.1ha	3
Deane's Paperbark	Zone 1	0.35ha	12
Squirrel Glider	Zone 1	0.4ha	14
Red-crowned Toadlet	Zone 1	0.3ha	8
Tetratheca glandulosa	Zone 1	0.4ha	14
Masked Owl	Zone 1	0.1ha (1 hollow tree)	3

Stage 3. Ameliorative Conditions & Recommendations

- There is to be sediment fencing downslope from all earthworks and around all stockpiles, to prevent sediment from damaging the downslope bushland. Sediment control devices such as sediment fences, are to be in place prior to the commencement of works and should be in place and maintained for the duration of the works.
- There is to be temporary environment protection fencing and signage during construction to prevent damage to the bushland to be retained. The specifications and locations of the protection fencing is to be specified by the Site Ecologist.
- There is to be a masonry wall that is 1m above the lawn level on top of the retaining wall shown at the edge of the lawn, onsite irrigation field and building footprint. To prevent sediment, nutrients and weeds propagules from entering the downslope bushland to be retained.
- There will need to be a 1m high mound or 0.5m high retaining wall around the wastewater disposal area. To prevent nutrients escaping the sewage disposal area into the adjacent downslope bushland.
- The part of the site not built upon should be managed in the long-term as bushland habitat in accordance with a Biodiversity Management Plan.

- There is to be no disturbance to the soil surface within the bushland parts of the site.
- There is to be no disturbance to native species in the bushland parts of the site.
- Natural rock features are to be retained in the APZ and bushland parts of the site outside of the Development Footprint. Retaining rock within the APZ will reduce the bushfire fuel levels.
- Leaf litter and fine fuels are to be removed by hand to prevent disturbance ti the topsoil and native groundcover species.
- Weed control is to be carried out across the property to improve habitat and wildlife corridor value, reduce the medical conditions caused by weeds and to improve aesthetics. The presence of weeds in an area decreases the aesthetic and habitat value of the study area as weeds compete with the native plants and cause medical problems such as asthma, hay fever, allergies, ticks and the dense vegetation creates a fire hazard. The sight of weeds also decreases the perception of an areas value. Landowners are required by the Biosecurity Act to control weeds on their land. . There is to <5% weed cover within the bushland parts of the site. Weeds are to be controlled by qualified bush regenerators
- Any planting in the Development Footprint should be with suitable non-invasive native species. No environmental weeds are to be planted in any part of the property.
- There should be no lighting directed into the bushland habitat, any path lighting should be low intensity and only directed down.
- No pesticides or insecticides are to be used on the property as they are harmful to native flora and fauna species. There is to no rat baiting outside of buildings.

5 References

Australian Standard 4970 – 2009 Protection of Trees on Development Sites

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5 Appendix A- BAM Calculator Reports

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00012488/BAAS17083/18/00012489

Proposal Name
9 Minkara Rd Prior to clearing

BAM data last updated *
07/11/2018

Assessor Name
Nick Skelton

Assessor Number
BAAS17083

BAM Data version *
4

Proponent Names

Report Created
06/12/2018

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Like for like)

Name
Pandion cristatus / Eastern Osprey
Haliaeetus leucogaster / White-bellied Sea-Eagle

Ecosystem Credit Summary

PCT	TEC	Area	Credits
1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast	Not a TEC	0.4	10.00

Credit classes for 1783

Like-for-like options

Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
Sydney Coastal Dry Sclerophyll Forests (including PCT's 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787)	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 7 or higher).	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Area	Credits
Callistemon linearifolius / Netted Bottle Brush	1.0	2.00
Calyptorhynchus lathami / Glossy Black-Cockatoo	0.1	3.00
Cercartetus nanus / Eastern Pygmy-possum	0.4	14.00
Chalinolobus dwyeri / Large-eared Pied Bat	0.4	20.00
Cryptostylis hunteriana / Leafless Tongue Orchid	0.4	14.00
Heleioporus australiacus / Giant Burrowing Frog	0.1	3.00
Melaleuca deanei / Deane's Paperbark	0.4	12.00
Petaurus norfolcensis / Squirrel Glider	0.4	14.00
Pseudophryne australis / Red-crowned Toadlet	0.3	8.00
Tetratheca glandulosa / Tetratheca glandulosa	0.4	14.00
Tyto novaehollandiae / Masked Owl	0.1	3.00

Callistemon linearifolius/ Netted Bottle Brush	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Callistemon linearifolius/Netted Bottle Brush	Any in NSW

Calyptorhynchus lathami/ Glossy Black-Cockatoo	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW
Cercartetus nanus/ Eastern Pygmy-possum	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri/ Large-eared Pied Bat	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW
Cryptostylis hunteriana/ Leafless Tongue Orchid	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions

		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW
Heleioporus australiacus/ Giant Burrowing Frog	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Heleioporus australiacus/Giant Burrowing Frog	Any in NSW
Melaleuca deanei/ Deane's Paperbark	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Melaleuca deanei/Deane's Paperbark	Any in NSW
Petaurus norfolcensis/ Squirrel Glider	1783_RidgetopWoodland	**Like-for-like options**	
		Only the below Spp	In the below IBRA subregions
		Petaurus norfolcensis/Squirrel Glider	Any in NSW

Petaurus norfolcensis/ Squirrel Glider	1783_RidgetopWoodland	
Pseudophryne australis/ Red-crowned Toadlet	1783_RidgetopWoodland	**Like-for-like options**
		Only the below Spp / In the below IBRA subregions
		Pseudophryne australis/Red-crowned Toadlet / Any in NSW
Tetratheca glandulosa/ Tetratheca glandulosa	1783_RidgetopWoodland	**Like-for-like options**
		Only the below Spp / In the below IBRA subregions
		Tetratheca glandulosa/Tetratheca glandulosa / Any in NSW
Tyto novaehollandiae/ Masked Owl	1783_RidgetopWoodland	**Like-for-like options**
		Only the below Spp / In the below IBRA subregions
		Tyto novaehollandiae/Masked Owl / Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00012488/BAAS17083/18/00012489

Proposal Name
9 Minkara Rd Prior to clearing

BAM data last updated *
07/11/2018

Assessor Name
Nick Skelton

Assessor Number
BAAS17083

BAM Data version *
4

Proponent Name(s)

Report Created
06/12/2018

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Candidate Serious and Irreversible Impacts

Nil

Nil

Additional Information for Approval

PCTs With Customized Benchmarks

No Changes

Predicted Threatened Species Not On Site

BAM Biodiversity Credit Report (Variations)

Name
Pandion cristatus / Eastern Osprey
Haliaeetus leucogaster / White-bellied Sea-Eagle

Ecosystem Credit Summary

PCT	TEC	Area	Credits
1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast	Not a TEC	0.4	10.00

Credit classes for 1783	**Like-for-like options**			
	Any PCT in the below Class	And in any of below trading groups	Containing HBT	In the below IBRA subregions
	Sydney Coastal Dry Sclerophyll Forests (including PCT's 1083, 1138, 1156, 1181, 1183, 1250, 1253, 1619, 1620, 1621, 1623, 1624, 1625, 1627, 1632, 1636, 1638, 1642, 1643, 1681, 1776, 1777, 1778, 1780, 1782, 1783, 1785, 1786, 1787)	Sydney Coastal Dry Sclerophyll Forests - < 50% cleared group (including Tier 7 or higher).	Yes	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options			
	Any PCT in the below Formation	And in any of below trading groups	Containing HBT	In the below IBRA regions/subregions

	Dry Sclerophyll Forests (Shrubby sub-formation)	Tier 7 or higher	Yes (including artificial)	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Area	Credits
Callistemon linearifolius / Netted Bottle Brush	1.0	2.00
Calyptorhynchus lathami / Glossy Black-Cockatoo	0.1	3.00
Cercartetus nanus / Eastern Pygmy-possum	0.4	14.00
Chalinolobus dwyeri / Large-eared Pied Bat	0.4	20.00
Cryptostylis hunteriana / Leafless Tongue Orchid	0.4	14.00
Heleioporus australiacus / Giant Burrowing Frog	0.1	3.00
Melaleuca deanei / Deane's Paperbark	0.4	12.00
Petaurus norfolcensis / Squirrel Glider	0.4	14.00
Pseudophryne australis / Red-crowned Toadlet	0.3	8.00
Tetratheca glandulosa / Tetratheca glandulosa	0.4	14.00
Tyto novaehollandiae / Masked Owl	0.1	3.00

Callistemon linearifolius/ Netted Bottle Brush	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Callistemon linearifolius/Netted Bottle Brush	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Flora	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Calyptorhynchus lathami/ Glossy Black-Cockatoo	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Calyptorhynchus lathami/Glossy Black-Cockatoo	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions

		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cercartetus nanus/ Eastern Pygmy-possum	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Cercartetus nanus/Eastern Pygmy-possum	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Chalinolobus dwyeri/Large-eared Pied Bat	Any in NSW	

Chalinolobus dwyeri/ Large-eared Pied Bat	1783_RidgetopWoodland	**Variation options**		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Cryptostylis hunteriana/ Leafless Tongue Orchid	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Cryptostylis hunteriana/Leafless Tongue Orchid	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions

		Flora	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Heleioporus australiacus/ Giant Burrowing Frog	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Heleioporus australiacus/Giant Burrowing Frog	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Melaleuca deanei/ Deane's Paperbark	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Melaleuca deanei/Deane's Paperbark	Any in NSW	

Melaleuca deanei/ Deane's Paperbark	1783_RidgetopWoodland	**Variation options**		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Flora	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Petaurus norfolcensis/Squirrel Glider	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions

		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pseudophryne australis/ Red-crowned Toadlet	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Pseudophryne australis/Red-crowned Toadlet	Any in NSW	
		Variation options		
		Any Spp in the below Kingdom	Any species with same or higher category of listing under Part 4 of teh BC Act showb below	In the below IBRA subregions
		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Tetratheca glandulosa/ Tetratheca glandulosa	1783_RidgetopWoodland	**Like-for-like options**		
		Only the below Spp	In the below IBRA subregions	
		Tetratheca glandulosa/Tetratheca glandulosa	Any in NSW	

<table>
<tr><td rowspan="3">Tetratheca glandulosa/ Tetratheca glandulosa</td><td rowspan="3">1783_RidgetopWoodland</td><td colspan="3">Variation options</td></tr>
<tr><td>Any Spp in the below Kingdom</td><td>Any species with same or higher category of listing under Part 4 of teh BC Act showb below</td><td>In the below IBRA subregions</td></tr>
<tr><td>Flora</td><td>Vulnerable</td><td>Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo.
or
Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.</td></tr>
<tr><td rowspan="5">Tyto novaehollandiae/ Masked Owl</td><td rowspan="5">1783_RidgetopWoodland</td><td colspan="3">Like-for-like options</td></tr>
<tr><td colspan="2">Only the below Spp</td><td>In the below IBRA subregions</td></tr>
<tr><td colspan="2">Tyto novaehollandiae/Masked Owl</td><td>Any in NSW</td></tr>
<tr><td colspan="3">Variation options</td></tr>
<tr><td>Any Spp in the below Kingdom</td><td>Any species with same or higher category of listing under Part 4 of teh BC Act showb below</td><td>In the below IBRA subregions</td></tr>
</table>

		Fauna	Vulnerable	Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012488/BAAS17083/18/00012489	9 Minkara Rd Prior to clearing	07/11/2018
Assessor Name	**Report Created**	**BAM Data version ***
Nick Skelton	06/12/2018	4
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17083		

List of Species Requiring Survey

Name	Presence	Survey Months
Callistemon linearifolius Netted Bottle Brush	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Calyptorhynchus lathami Glossy Black-Cockatoo	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cercartetus nanus Eastern Pygmy-possum	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Chalinolobus dwyeri Large-eared Pied Bat	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Cryptostylis hunteriana Leafless Tongue Orchid	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Lophoictinia isura Square-tailed Kite	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Melaleuca deanei Deane's Paperbark	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Petaurus norfolcensis Squirrel Glider	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Pseudophryne australis Red-crowned Toadlet	Yes (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tyto novaehollandiae Masked Owl	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Hieraaetus morphnoides Little Eagle	No (surveyed)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Tetratheca glandulosa Tetratheca glandulosa	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heleioporus australiacus Giant Burrowing Frog	Yes (assumed present)	Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

List of Species Not On Site

Name
Astrotricha crassifolia Thick-leaf Star-hair
Hibbertia puberula Hibbertia puberula
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern)
Darwinia glaucophylla Darwinia glaucophylla
Darwinia peduncularis Darwinia peduncularis
Lasiopetalum joyceae Lasiopetalum joyceae
Lathamus discolor Swift Parrot
Melaleuca groveana Grove's Paperbark
Miniopterus australis Little Bentwing-bat
Miniopterus schreibersii oceanensis Eastern Bentwing-bat
Myotis macropus Southern Myotis

Ninox strenua Powerful Owl
Pandion cristatus Eastern Osprey
Phascolarctos cinereus Koala
Pteropus poliocephalus Grey-headed Flying-fox
Anthochaera phrygia Regent Honeyeater
Callocephalon fimbriatum Gang-gang Cockatoo
Diuris bracteata Diuris bracteata
Haliaeetus leucogaster White-bellied Sea-Eagle
Callocephalon fimbriatum - endangered population Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas
Microtis angusii Angus's Onion Orchid

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012488/BAAS17083/18/00012489	9 Minkara Rd Prior to clearing	07/11/2018
Assessor Name	Report Created	BAM Data version *
Nick Skelton	06/12/2018	4
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17083		

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	Vegetation integrity loss / gain	Area (ha)	Constant	Species sensitivity to gain class (for BRW)	Biodiversity risk weighting	Candidate SAII	Ecosystem credits
Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast								
1	1783_RidgetopWoodland	67.7	0.4	0.25	High Sensitivity to Potential Gain	1.50		10
							Subtotal	**10**
							Total	**10**

BAM Credit Summary Report

Species credits for threatened species

Vegetation zone name	Habitat condition (HC)	Area (ha) / individual (HL)	Constant	Biodiversity risk weighting	Candidate SAII	Species credits
Callistemon linearifolius / Netted Bottle Brush (Flora)						
1783_RidgetopWoodland	N/A	1	0.25	2	False	2
					Subtotal	**2**
Calyptorhynchus lathami / Glossy Black-Cockatoo (Fauna)						
1783_RidgetopWoodland	67.7	0.1	0.25	2	N/A	3
					Subtotal	**3**
Cercartetus nanus / Eastern Pygmy-possum (Fauna)						
1783_RidgetopWoodland	67.7	0.4	0.25	2	False	14
					Subtotal	**14**
Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)						
1783_RidgetopWoodland	67.7	0.4	0.25	3	True	20
					Subtotal	**20**

Cryptostylis hunteriana / Leafless Tongue Orchid (Flora)						
1783_RidgetopWoodland	67.7	0.4	0.25	2	False	14
					Subtotal	**14**
Heleioporus australiacus / Giant Burrowing Frog (Fauna)						
1783_RidgetopWoodland	67.7	0.1	0.25	1.5	False	3
					Subtotal	**3**
Melaleuca deanei / Deane's Paperbark (Flora)						
1783_RidgetopWoodland	67.7	0.35	0.25	2	False	12
					Subtotal	**12**
Petaurus norfolcensis / Squirrel Glider (Fauna)						
1783_RidgetopWoodland	67.7	0.4	0.25	2	False	14
					Subtotal	**14**

Pseudophryne australis / Red-crowned Toadlet (Fauna)						
1783_RidgetopWoodland	67.7	0.3	0.25	1.5	False	8
					Subtotal	**8**
Tetratheca glandulosa / Tetratheca glandulosa (Flora)						
1783_RidgetopWoodland	67.7	0.4	0.25	2	False	14
					Subtotal	**14**
Tyto novaehollandiae / Masked Owl (Fauna)						
1783_RidgetopWoodland	67.7	0.1	0.25	2	N/A	3
					Subtotal	**3**

Biodiversity payment summary report

Assessment Id	Payment data version	Revision number	Report created
00012488/BAAS17083/18/00012489	41	1	06/12/2018

PCT list

Include	PCT common name	Credits
Yes	**1783 -** Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast	10

Species list

Include	Species	Credits
Yes	***Callistemon linearifolius*** (Netted Bottle Brush)	2
Yes	***Calyptorhynchus lathami*** (Glossy Black-Cockatoo)	3
Yes	***Cercartetus nanus*** (Eastern Pygmy-possum)	14
Yes	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	20
Yes	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)	14
Yes	***Heleioporus australiacus*** (Giant Burrowing Frog)	3
Yes	***Melaleuca deanei*** (Deane's Paperbark)	12
Yes	***Petaurus norfolcensis*** (Squirrel Glider)	14
Yes	***Pseudophryne australis*** (Red-crowned Toadlet)	8
Yes	***Tetratheca glandulosa*** (Tetratheca glandulosa)	14
Yes	***Tyto novaehollandiae*** (Masked Owl)	3

Biodiversity payment summary report

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

IBRA sub region	PCT common name	Baseline price	Dynamic coefficient	Market coefficient	Risk premium	Administrative cost	Methodology adjustment factor	Price per credit	No. of ecosystem credits	Final credits price
Pittwater	**1783 -** Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast **Warning: This PCT has NO trades recorded**	$2,602.71			33.10%	$20.00	1.0000	$3,484.21	10	$34,842.07

Subtotal (excl. GST)	**$34,842.07**
GST	**$3,484.21**
Total ecosystem credits (incl. GST)	**$38,326.28**

Species credits for threatened species

Species profile ID	Species	Threat status	Price per credit	Risk premium	Administrative cost	No. of species credits	Final credits price
10129	***Callistemon linearifolius*** (Netted Bottle Brush)	Vulnerable	$143.68	24.8700%	$20.00	2	$398.83

Biodiversity payment summary report

10140	***Calyptorhynchus lathami*** (Glossy Black-Cockatoo)	Vulnerable	$486.10	24.8700%	$20.00	3	$1,880.98
10155	***Cercartetus nanus*** (Eastern Pygmy-possum)	Vulnerable	$408.16	24.8700%	$20.00	14	$7,415.37
10157	***Chalinolobus dwyeri*** (Large-eared Pied Bat)	Vulnerable	$816.33	24.8700%	$20.00	20	$20,787.03
10187	***Cryptostylis hunteriana*** (Leafless Tongue Orchid)	Vulnerable	$163.27	24.8700%	$20.00	14	$3,134.25
10398	***Heleioporus australiacus*** (Giant Burrowing Frog)	Vulnerable	$408.16	24.8700%	$20.00	3	$1,589.01
10515	***Melaleuca deanei*** (Deane's Paperbark)	Vulnerable	$326.53	24.8700%	$20.00	12	$5,132.86
10604	***Petaurus norfolcensis*** (Squirrel Glider)	Vulnerable	$408.16	24.8700%	$20.00	14	$7,415.37
10692	***Pseudophryne australis*** (Red-crowned Toadlet)	Vulnerable	$486.10	24.8700%	$20.00	8	$5,015.94
10798	***Tetratheca glandulosa*** (Tetratheca glandulosa)	Vulnerable	$40.82	24.8700%	$20.00	14	$993.61
10820	***Tyto novaehollandiae*** (Masked Owl)	Vulnerable	$486.10	24.8700%	$20.00	3	$1,880.98
						Subtotal (excl. GST)	**$55,644.23**
						GST	**$5,564.42**
					Total species credits (incl. GST)		**$61,208.65**

Biodiversity payment summary report

Grand total	**$99,534.93**

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00012488/BAAS17083/18/00012489	9 Minkara Rd Prior to clearing	07/11/2018
Assessor Name	**Report Created**	**BAM Data version ***
Nick Skelton	06/12/2018	4
Assessor Number	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BAAS17083		

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Eastern Bentwing-bat	Miniopterus schreibersii oceanensis	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Eastern Freetail-bat	Mormopterus norfolkensis	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Gang-gang Cockatoo	Callocephalon fimbriatum	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Glossy Black-Cockatoo	Calyptorhynchus lathami	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Grey-headed Flying-fox	Pteropus poliocephalus	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Koala	Phascolarctos cinereus	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Little Bentwing-bat	Miniopterus australis	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Little Eagle	Hieraaetus morphnoides	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast

Little Lorikeet	Glossopsitta pusilla	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Masked Owl	Tyto novaehollandiae	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Powerful Owl	Ninox strenua	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Regent Honeyeater	Anthochaera phrygia	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Scarlet Robin	Petroica boodang	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Spotted-tailed Quoll	Dasyurus maculatus	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Square-tailed Kite	Lophoictinia isura	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Swift Parrot	Lathamus discolor	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Turquoise Parrot	Neophema pulchella	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
Varied Sittella	Daphoenositta chrysoptera	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast

Threatened species not within the area of these PCT's

Common Name	Scientific Name	Vegetation Types(s)
Eastern Osprey	Pandion cristatus	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast
White-bellied Sea-Eagle	Haliaeetus leucogaster	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast

BAM Vegetation Zones Report

Proposal Details

Assessment Id
00012488/BAAS17083/18/00012489

Assessment name
9 Minkara Rd Prior to clearing

BAM data last updated *
07/11/2018

Assessor Name
Nick Skelton

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06/12/2018

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4

Assessor Number
BAAS17083

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Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1783_RidgetopWoodland	1783-Red Bloodwood - Scribbly Gum / Old-man Banksia open forest on sandstone ridges of northern Sydney and the Central Coast	RidgetopWoodland	0.41	1	APZ (0.06 ha) Remove (0.35 ha)