Ecological Constraints Assessment

8A, 14, and 16 Buckingham Road, Killara

Gelder Architects

12 May 2022 Final

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Report No. 19064RP1

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Position:	Director
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1. Introduction

Cumberland Ecology was commissioned by Gelder Architects on behalf of the clients (the owners of the properties forming the subject site) to prepare an ecological assessment for the proposed rezoning of land located at 8A, 14, and 16 Buckingham Road, Killara (hereafter collectively referred to as the 'subject site'). This report will form part of a planning proposal being prepared by Gelder Architects to support an application for rezoning of the subject site.

1.1. Purpose

The purpose of this report is to document and describe the current biodiversity values of the subject site and to identify any impacts that may constrain future development as a result of a planning proposal. In particular impacts on threatened species, populations and communities that are listed under the New South Wales (NSW) *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) will be assessed.

The specific objectives of this report are to:

- Describe the vegetation communities of the subject site (**Section 3.1**);
- Describe fauna habitats and fauna usage of the subject site (**Section 3.3**);
- Identify any threatened species, populations or ecological communities (as listed under the BC Act and/or EPBC Act) existing within the subject site (**Chapter 3**);
- Assess the likelihood of occurrence of threatened species, populations or communities (as listed under the BC Act and/or EPBC Act) within the subject site (**Chapter 3**);
- Provide an assessment of the ecological constraints to future development that are present in the subject site (**Chapter 4**); and
- Where relevant, recommend mitigation measures to reduce the impacts of future development on biodiversity values (**Chapter 5**).

1.2. Background

1.2.1. Site Description

The subject site is located at 8A, 14, and 16 Buckingham Road, Killara comprising Lot 2 DP414101 (8A), Lot 4 DP520573 (14) and Lot 3 DP520573 (16) (**Figure 1.1**). The subject site encompasses an area of approximately 0.48 ha and is currently zoned as R2 Low Density Residential under the Ku-ring-Gai Local Environmental Plan 2015 (Ku-ring-gai LEP).

The subject site lies wholly within the Ku-ring-gai Council Local Government Area (LGA) and is bound by Killara Golf Club to the south and existing residential dwellings to the north, east and west. The subject site currently contains three existing residential dwellings.

The adjacent area occupied by two bowling greens administered by Killara Golf Club has recently been rezoned for high density development (see **Figure 1.1**).

1.2.2. Description of the Planning Proposal

Gelder Architects have been commissioned by the clients to prepare a planning proposal seeking to rezone the subject site from its current R2 Low Density Residential zoning to R4 High Density Residential.

A development has not yet been proposed and therefore an impact assessment relating to future development has not been provided within this report. The purpose of this report is to detail the ecological constraints of the site in order to guide design of a future development.

1.3. Relevant Legislation

1.3.1. Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW. This act provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the protection of the environment, including the protection and conservation of native animals and plants. This includes threatened species, communities, habitat and processes as listed under the BC Act and *Fisheries Management Act 1994*.

1.3.2. Environment Protection and Biodiversity Conservation Act 1999

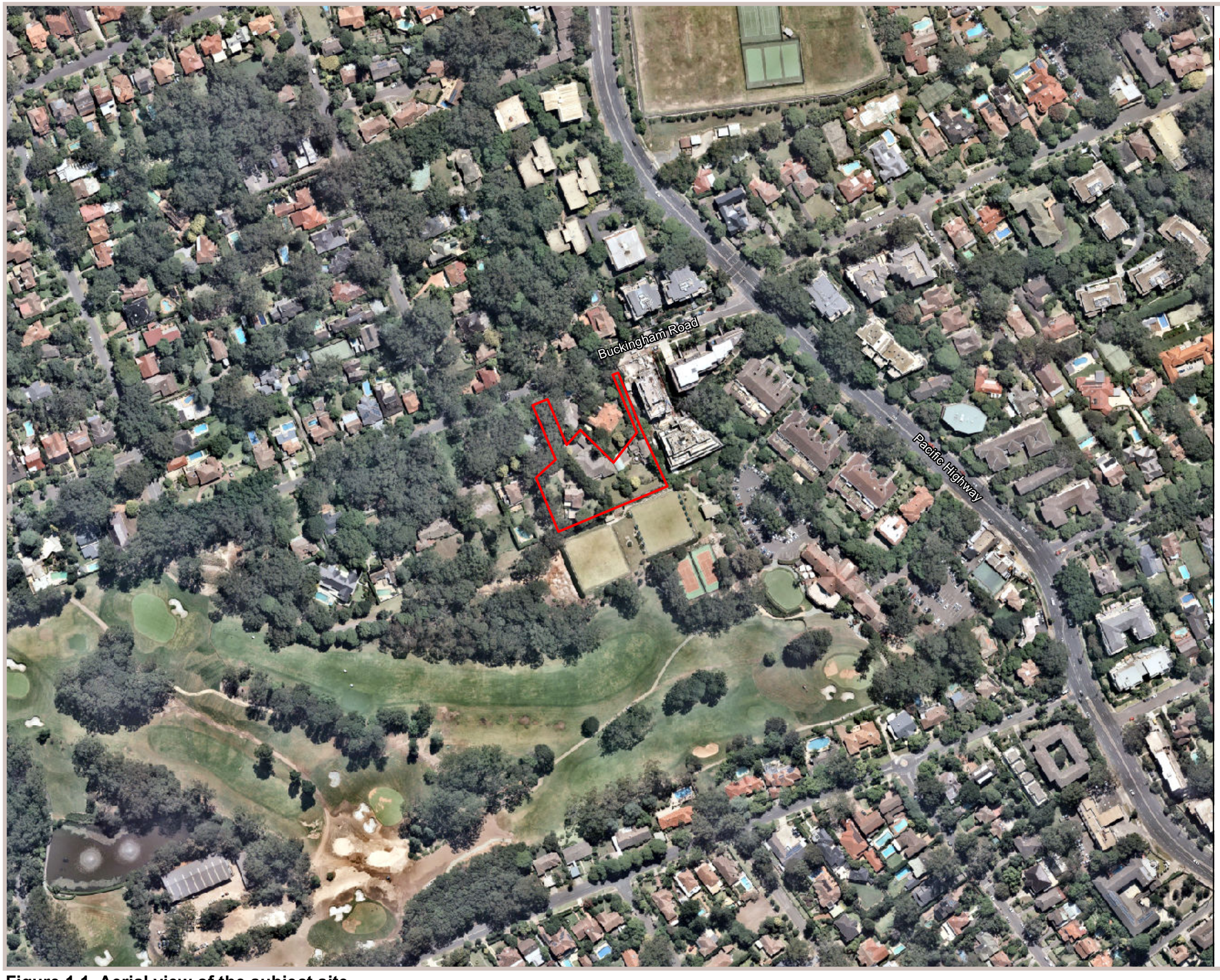
The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the EPBC Act as Matters of National Environmental Significance (MNES). Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES (including nationally listed threatened ecological communities and species, and listed migratory species) must be referred to the Australian Government Minister for the Environment (the Minister). The purpose of the referral is to allow a decision to be made about whether an action requires approval on a Commonwealth level. If an action is declared a "controlled action", then Commonwealth approval is required.

1.3.3. Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by a number of regulations, including the *Biodiversity Conservation Regulation 2017* (BC Regulation).

The BC Act requires consideration of whether a development or an activity is likely to significantly affect threatened species. For Part 4 local developments, projects that significantly affect threatened species trigger the Biodiversity Offsets Scheme (BOS). The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. The BOS requires an assessment following the Biodiversity Assessment Methodology (BAM) by an accredited BAM assessor and the preparation of either a Biodiversity Development Assessment Report (BDAR) or Biodiversity Certification Assessment Report (BCAR).

As the development footprint is not yet known it is not possible to identify whether a development will trigger the BOS.



Legend

Subject Site

Image Source:
NearMap
(dated 4-3-2019)

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 50 100 m

I:\...\19064\Figures\RP1\20190814\Figure 1.1. Aerial View_Subject Site

Figure 1.1. Aerial view of the subject site

2. Methodology

2.1. Desktop Assessment

2.1.1. Database Analysis

Previous broad-scale vegetation mapping for the Sydney Metropolitan Area (OEH 2016) was reviewed to determine potential vegetation communities likely to occur within the subject site.

A database analysis was conducted for the locality using both the NSW Office of Environment and Heritage (OEH) NSW BioNet Atlas (OEH 2019) and the Commonwealth Department of Energy and the Environment Protected Matters Search Tool (DotEE 2019). The locality is defined as the area within a 5 km radius of the subject site. The NSW BioNet Atlas search was used to generate records of threatened flora and fauna species listed under the BC Act within the locality. The Protected Matters Search Tool generated a list of Matters of National Environmental Significance listed under the EPBC Act potentially occurring within the locality. The lists generated from these databases were reviewed against available knowledge of the subject site, in conjunction with the abundance, distribution and age of records, to ascertain the likelihood of occurrence of threatened species within the subject site.

A review of the OEH's Biodiversity Values Map through the Sharing and Enabling Environmental Data (SEED) Portal was undertaken to determine whether land present within the subject site has been mapped as having high biodiversity values that is particularly sensitive to impacts from development and clearing. The map generated provides an outline of areas that fall within this classification.

2.2. Flora Survey

Flora surveys were undertaken throughout the subject site by Cumberland Ecology on 8 August 2019. Surveys included vegetation mapping, random meander surveys, flora plots and targeted threatened flora searches.

2.2.1. Vegetation Mapping

The vegetation within the subject site was ground-truthed to examine and verify the existing mapping of vegetation communities. The subject site's vegetation was mapped following a walkthrough of all vegetated areas while identifying and recording the condition and extent of vegetation.

The resultant information was synthesised using a Geographic Information System (GIS) to create a spatial database that was used to interpret and interpolate the data to produce a vegetation map of the subject site.

Native vegetation communities identified were assigned to Plant Community Type (PCT). PCTs are the master-level vegetation units at the NSW state level utilised in planning and assessment tools and vegetation mapping.

2.2.1.1. Classification of Threatened Ecological Communities

Following review of potentially occurring Threatened Ecological Communities (TECs), the plant communities identified within the study area were examined against the listings of TECs listed under the BC Act and EPBC Act.

For TECs listed under the BC Act, vegetation communities were examined against the final determinations prepared by OEH for potentially occurring TECs. A component of this analysis was to compare the species listed from the locally defined communities with the species lists provided in the final determinations. Additional

information such as location and soil, geology and landform detailed in each final determination was also taken into account in the assessment.

For TECs listed under the EPBC Act, vegetation communities were examined against the Approved Conservation Advice prepared by the Threatened Species Scientific Committee.

2.2.2. Flora Plots

A plot-based survey following the BAM was undertaken within the subject site which includes the establishment of a 20 m x 50 m plot. However, due to limitations relating to accessibility and dimensions of the subject site, the 20 m x 20 m required for the composition assessment under the BAM was altered to a 40 m x 10 m plot. The assessment of function attributes was undertaken within the required 20 m x 50 m plot. Within the 40 x 10m plot the following data was collected:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 10 m x 40 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 10 m x 40 m plot; and
- Cover of High Threat Exotic weed species.

Assessment of function attributes within a 20 m x 50 m plot, including:

  - Count of number of large trees;
  - Tree stem size classes, measured as 'diameter at breast height over bark'(DBH);
  - Regeneration based on the presence of living trees with steams <5cm DBH; and
  - The total length in metres of fallen logs over 10 cm in diameter.
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

2.2.3. Random Meander Surveys

A Random meander survey (RMS) was undertaken to identify native and exotic weed species not recorded during quadrat sampling for future management. The RMS was undertaken throughout the entirety of the subject site. A total of three RMS transects were traversed within the subject site.

Targeted threatened flora searches were undertaken using random meander surveys within areas of suitable habitat for threatened flora species with the potential to be present.

2.3. Fauna Survey

Fauna surveys were undertaken within the subject site by Cumberland Ecology on 8 August 2019. The survey consisted of a fauna habitat assessment and incidental observations. Further details of each of the survey methods are provided below.

2.3.1. Habitat Assessments

The fauna habitat assessment included consideration of important indicators of habitat condition and complexity including the occurrence of micro-habitats such as tree hollows, fallen logs, bush rock and wetland areas such as creeks and soaks. Structural features considered included the nature and extent of the understorey and the extent of canopy. The survey also included an assessment of the presence of habitat features suitable for use by threatened fauna species with the potential to be present.

2.3.2. Incidental Fauna Observations

Any incidental fauna species that were observed, heard calling, or otherwise detected on the basis of tracks, scats or other or signs, were recorded.

2.4. Limitations

The weather conditions at the time of the flora surveys were generally favourable for plant growth and production of features required for identification of most species. Shrubs, grasses, herbs and creepers were readily identifiable in most instances. It is expected that not all flora species present would have been recorded during surveys. Despite this, it is considered that sufficient information has been collected to assess issues including detection of threatened flora species and to map vegetation communities.

Opportunistic observations of fauna provide a "snapshot" of some of the fauna present on a site that were active during the time of the survey. The data produced by the survey is intended to be indicative of the types of species that could occur and not an absolute census of all vertebrate fauna species occurring within the subject site. Therefore not all fauna utilising the subject site are likely to have been recorded during surveys. An assessment of the likelihood of occurrence of threatened and migratory fauna species listed for the locality in the database searches was undertaken to supplement the fauna surveys. The combination of these techniques is considered appropriate for assessing the habitat values of the site for threatened fauna within the subject site.

3. Results

3.1. Vegetation Communities

The subject site is located adjacent to existing residential dwellings to the north, east and west and Killara Golf Club to the south. The subject site has been subject to clearing of native remnant vegetation for urban development and comprises a mixture of planted urban natives and exotics among a few remnant tree stands. These few remnant trees are scattered across the subject site and occur above a significantly modified understory.

Previous broad-scale mapping for Sydney Metropolitan Area (OEH 2013) indicates the presence of Blue Gum High Forest (BGHF) within the subject site. The BGHF community is listed as a Critically Endangered Ecological Community (CEEC) under both the BC Act and the EPBC Act. Surveys undertaken by Cumberland Ecology confirm the presence of this community, represented as isolated remnant *Eucalyptus saligna* (Sydney Blue Gum) trees.

The extent and distribution of vegetation communities within the subject site is provided in **Figure 3.1**. The remainder of the subject site contains Urban Native/Exotic vegetation and Exotic Grassland. The vegetation communities within the subject site are discussed in more detail in following subsections of this report.

3.1.1. Blue Gum High Forest

BC Act Status: CEEC

EPBC Act Status: Does not conform

PCT ID: 1237 - Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion

The TEC BGHF (0.06 ha) occurs as remnant stands of isolated trees within the subject site comprising canopy species *Eucalyptus saligna* (Sydney Blue Gum). The subcanopy and understory of this community is highly modified due to previous suburban clearing and planting of exotic species including *Jacaranda mimosifolia* (Jacaranda), *Cinnamomum camphora* (Camphor Laurel), *Monstera deliciosa* (Monstera), *Lantana camara* (Lantana), *Ligustrum lucidum* (Large-leaved Privet), *Ehrharta erecta* (Panic Veldtgrass) and *Asparagus aethiopicus* (Ground Asparagus).

This community corresponds to the CEEC listing under the BC Act in accordance with the BGHF Final Determination (NSW Scientific Committee 2011). Under the Final Determination for BGHF, a form of the community is stated to persist as highly modified relics consisting of clumps of trees without a native understorey. Remnant stands of BGHF in urban areas are described as having highly modified understories in which the native woody species have largely been replaced by exotic species. Exotic species noted as being problematic within Blue Gum High Forest include *Asparagus asparagoides*, *Cinnamomum camphora, Lantana camara* and *Ligustrum lucidum*. The BGHF present within the subject site corresponds to the criteria of a highly modified relic without a native understorey..

This community does not correspond to the CEEC listing under the EPBC Act in accordance with the Approved Conservation Advice (DoE 2014) for the community which details condition thresholds for the community to be considered as the EPBC Act listed community. The criteria used to determine if occurrences of BGHF can be nationally listed states they are the EPBC listed community if they are greater than one hectare in size and:

- have a canopy cover greater than 10%; or

- have a canopy cover less than 10% and occur in areas of native vegetation in excess of five hectares.

The BGHF within the subject site covers a patch size of 0.04ha and occurs in an area primarily dominated by exotic and highly modified vegetation. An example of this community is provided in **Photographs 1 - 2** below

Photograph 1 Blue Gum High Forest represented as an isolated *Eucalyptus saligna* (Sydney Blue Gum) within the subject site

Photograph 2 Blue Gum High Forest with highly modified understorey within the subject site

3.1.2. Urban Native/Exotic

BC Act Status: Not listed

EPBC Act Status: Not listed

PCT ID: None

Urban Native/Exotic vegetation exists throughout the majority of the subject site (0.19 ha) as planted garden beds comprising exotic species, non-endemic natives and exotic weed infestations. This vegetation community is present as a result of ongoing disturbance as a result residential development and through planting. Exotic canopy species include *Jacaranda mimosifolia* (Jacaranda), *Liquidambar styraciflua* (Liquidambar), *Ligustrum lucidum* (Large-leaved Privet). Native planted canopy and shrub species include *Brachychiton acerifolius* (Illawarra Flame Tree), *Alectryon tomentosus* (Hairy Birds Eye), *Grevillea robusta* (Silky Oak) and *Corymbia ficifolia*. The understory of this community is largely degraded and modified and consists primarily of exotic species including *Ochna serrulata* (Mickey Mouse Plant), *Aloe vera* (Aloe), *Yucca aloifolia* (Yucca) and *Lantana camara* (Lantana). Groundcover species of this community similarly comprises exotic species such as *Asparagus aethiopicus* (Asparagus fern), *Tradescantia fluminensis* (Wandering Jew), *Cerastium glomeratum* (Mouse Ear Chickweed), *Conyza sumatrensis* (Tall Fleabane), *Oxalis corniculata* (Oxalis), *Ehrharta erecta* (Panic Veldtgrass), *Hedera helix* (English Ivy). Scattered opportunistic native species are present in the ground layer including

Cotula australis (Common Cotula), *Oplismenus aemulus* (Basket Grass) and *Entolasia marginata* (Bordered Panic).

An example of this community is provided in **Photographs 3 – 4** below.

Photograph 3 Urban Native/Exotic vegetation within the subject site

Photograph 4 Urban Native/Exotic vegetation within the subject site

3.1.3. Exotic Grassland

BC Act Status: Not listed

EPBC Act Status: Not listed

PCT ID: None

Exotic Grassland represents an area of approximately 0.07 ha within the subject site. This community occurs as residential lawns comprising planted exotic grass species such as *Cenchrus clandestinus* (Kikuyu Grass) and *Stenotaphrum secundatum* (Buffalo Grass).

An example of this community is provided in **Photograph 5** below

Photograph 5 Exotic Grassland within the subject site

3.2. Flora Species

3.2.1. General Species

A total of 123 flora species were recorded within the subject site during site surveys. The dominant plant families encountered were the Poaceae and Asteraceae families. Species present within the subject site consist of a mix of exotic species (80%) and native species (20%) (a mix of endemic, planted local natives, and non-endemic species). A complete flora species list is provided in **Appendix A**.

3.2.2. Threatened Species

No threatened flora species have been recorded within the subject site. Due to the historical modification of the subject site, none were expected to occur. Furthermore, due to the lack of suitable habitat and the degraded and disturbed nature of the subject site, no threatened flora species have been considered to potentially occur within the subject site.

3.3. Fauna Habitat

The vegetation within the subject site provides marginal potential habitat for native fauna known to occur within the locality. Microhabitats that are present within the subject site include hollow-bearing trees, log piles, culverts/drainage lines and vine thickets. Details of habitat items present within the subject site are provided in **Table 3.1** below. Their locations are provided in **Figure 3.2**. **Photographs 6 - 8** show details of the fauna habitat recorded within the subject site.

Table 3.1 Habitat features within the subject site

Habitat ID	Easting	Northing	Species	Common Name	Habitat Features
H1	329357	6261930	-	-	Drainage line, leaf Litter
H2	329329	6261944	*Hedera helix**	English Ivy	Vine thicket
H3	329277	6261977	*Eucalyptus saligna*	Sydney Blue Gum	2 small hollows
H4	329334	6261909	-	-	Drainage line, leaf Litter
H6	329321	6261902	*Pittosporum undulatum*	Sweet Pittosporum	1 small hollow in decaying limb
H7	329269	6261917	-	-	Log pile

*Note: * = Exotic species infestation*

Photograph 6 Drainage line/culvert serving potential habitat to urban adapted reptile and amphibian species

Photograph 7 Log Pile providing habitat for urban adapted reptiles such as the common garden skink (*Lampropholis* sp.)

Photograph 8 English Ivy thicket - potential habitat for urban adapted arboreal mammals such as Ringtail and Brushtail Possums

3.3.1. General Species

Incidental observations occurred throughout the subject site and adjacent residential dwellings. The species recorded included one reptile species, the Common Garden Skink (*Lampropholis* sp). Urban adapted bird species identified throughout the subject site and surrounding locality include Rainbow Lorikeets (*Trichoglossus moluccanus*), Noisy Miners (*Manorina melanocephala*), Galahs (*Eolophus roseicapillus*) and exotic Indian Miners (*Acridotheres tristis*).

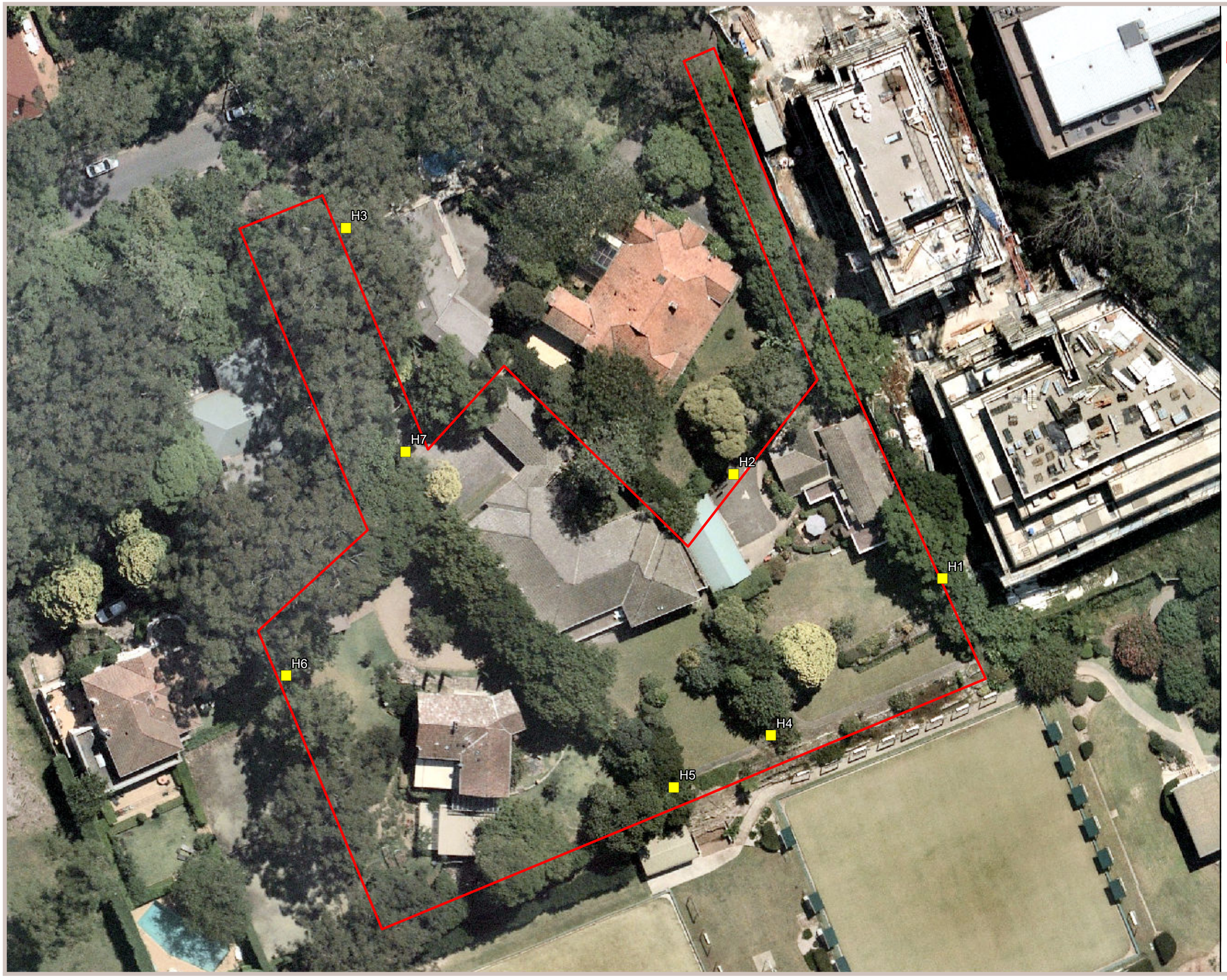
3.3.2. Threatened Species

No threatened fauna species were recorded within the subject site. A review of the OEH BioNet Atlas (OEH, 2019) indicates that several threatened fauna have been recorded within the locality (5km radius). **Table 3.2** below provides a list of the species and their respective records that have the potential to occur within the subject site due to the presence of marginally important habitat.

Table 3.2 Threatened species with the potential to occur within the subject site

Class	Family	Scientific name	Common Name	No. Records (5km Locality)	BC Act Status	EPBC Act Status
Amphibia						
	Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	49	V	
Aves						
	Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	27	V	Mig
	Apodidae	*Hirundapus caudacutus*	White-throated Needletail	31		Mig
	Cacatuidae	*Callocephalon fimbriatum*	Gang-gang Cockatoo	53	V	
	Strigidae	*Ninox strenua*	Powerful Owl	314	V	
Mammalia						
	Miniopteridae	*Miniopterus australis*	Little Bent-winged Bat	14	V	
	Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	75	V	
	Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	16	V	
	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	1208	V	V

Figure 3.1. Vegetation communities within the subject site



Legend

Subject Site

Habitat Feature

Image Source:
NearMap
(dated 4-3-2019)

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 10 20 m

I:\...\19064\Figures\RP1\20190814\Figure 3.2. Habitat Features_Subject Site

Figure 3.2. Habitat features within the subject site

4. Discussion

This chapter provides a brief summary of the ecological constraints contained within the subject site that have the potential to impact on future development of the subject site. The associated approval pathway applicable to any future development within the subject site is also provided in this chapter. Please note that a detailed project specific assessment has not been prepared as a development footprint is not known.

4.1. Potential Ecological Impacts

The subject site is proposed to be rezoned from R2 Low Density Residential to R4 High Density Residential. Following the site inspection, majority of the subject site is comprised primarily of Urban Native/Exotic Vegetation (0.19 ha) with isolated patches of BGHF (0.06 ha) comprised of remnant *Eucalyptus saligna* trees.

4.2. Assessment Requirements Under the BOS

Assessment of ecological impacts for future development applications within the subject site will require assessment in accordance with the BC Act. It is intended that any proposed development within the subject site will be assessed under Part 4 (Local Development) of the EP&A Act.

To determine the type of assessment required for a project under Part 4 (Local Development), it is necessary to determine whether the project triggers the BOS. For a project to trigger the BOS, it would need to be considered as likely to significantly affect threatened species or communities, which can occur through the following mechanisms:

- It is likely to significantly affect threatened species or ecological communities, or their habitats, according to the Test of Significance in Section 7.3 of the BC Act; or
- It exceeds the BOS clearing threshold; or
- It is carried out in an area mapped on the Biodiversity Values Map (BVM); or
- It is carried out in a declared Area of Outstanding Biodiversity Value (AOBV).

If any of these criteria are triggered, then the project must be assessed under the BOS. Assessment under the BOS requires an assessment following the BAM by an accredited BAM assessor and the preparation of a BDAR. The BAM will require detailed field surveys to be undertaken within the subject land including further vegetation mapping, plot/transect based flora surveys, and targeted threatened species surveys. The project would also need to demonstrate avoidance and mitigation measures. The requirement for offsets is determined using BAM. Any one or a combination of the following options outlined within the *Biodiversity Conservation Regulation 2017* can be used to meet the offset obligations:

- The retirement of the required number and class of like-for-like biodiversity credits;
- The retirement of the required biodiversity credits in accordance with the variation rules;
- The funding of a biodiversity conservation action that would benefit the relevant threatened species or ecological community and that is equivalent to the cost of acquiring the required like-for-like biodiversity credits as determined by the offsets payment calculator; and
- The payment of an amount into the Biodiversity Conservation Fund determined in accordance with the offsets payment calculator to satisfy the requirement to retire biodiversity credits.

4.2.1. Tests of Significance

The fauna species identified in **Table 3.2** (**Section 3.3.2**) have been identified to have the potential to occur within the subject site due to marginal available habitat. No threatened flora species have been considered likely to occur within the subject site due to its degraded nature. The BGHF CEEC is known to occur within the subject site. A Test of Significance as under the BC Act has not been prepared at this stage as insufficient information on the scale of future impacts is known. That notwithstanding, if it is determined that a significant impact is likely to occur due to any proposed development, the BOS will be triggered by impacts to this ecological community. It is likely that a proposal which seeks to clear the majority of the BGHF within the subject site would be considered a significant impact to the community.

4.2.2. Native Vegetation Clearance Threshold

Any development being assessed under Part 4 of the EP&A Act that clears native vegetation above a threshold specified based on minimum lot size would automatically enter into the BOS. The threshold levels of clearing for each minimum lot size are shown in **Table 4.1** below. As the development footprint is not yet known, an assessment for this BOS threshold cannot be undertaken.

Under the Ku-ring-gai Council LEP, the minimum lot size for R4 High Density Residential is 0.12 ha. Accordingly, any clearance works associated with a future development will enter into the BOS if >0.25ha of native vegetation is removed.

Any proposed development would not exceed the native vegetation clearing threshold even if all vegetation on site were cleared, as the BGHF covers only 0.04 ha of the site and the majority of the coverage of 0.21 ha of Urban Native/Exotic Vegetation is comprised of exotic species.

Table 4.1 Native Vegetation Clearing Thresholds

Minimum lot size of the land	Area of clearing
Less than 1 hectare	0.25 hectare or more
Less than 40 hectares but not less than 1 hectare	0.5 hectare or more
Less than 1,000 hectares but not less than 40 hectares	1 hectare or more
1,000 hectares or more	2 hectares or more

4.2.3. Biodiversity Values Map

Any development being assessed under Part 4 of the EP&A Act that occurs within areas mapped on the Biodiversity Values Map (BVM) would automatically trigger entry into the BOS, and therefore any future development on the subject site will need to be assessed under the BOS.

The subject site does not include any areas on the BVM.

4.2.4. Serious and Irreversible Impact

If a significant impact were to be predicted to occur to BGHF as a result of future development, the development would also need to consider whether the impacts result in a serious and irreversible impact (SAII)

to BGHF, which has been identified as a candidate SAII entity. If such impacts will result in an SAII, this will trigger entry into the BOS.

Under the BOS, a consent authority (i.e. Council) is required to reject a Part 4 development that is considered to have an impact that is serious and irreversible on an SAII entity. Principles for determining whether or not an impact is considered to be serious and irreversible include the following four principles (clause 6.7 of the BC regulation):

- Will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or
- Will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or
- Impact on the habitat of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or
- Impact on a species or ecological community that is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.

The consent authority (i.e. Council) can determine that a proposed development is not considered to be an SAII. In order for this to occur, an assessment would be required that demonstrates that the development is not in conflict with any of the four principles (clause 6.7 of the BC regulation) provided above.

4.3. Commonwealth Assessment Requirements

Threatened species, populations and communities listed under the EPBC Act that are considered to be directly or indirectly impacted by the project should be assessed in accordance with the *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DoE 2013). If a development is considered to significantly impact any MNES, then a referral would be required to be submitted to the Commonwealth Minister for the Environment and Energy. Should the Minister determine the project to be a controlled action, then approval under the EPBC Act would be required.

4.4. Ecological Constraints

Key Ecological Constraints identified within the subject site include:

- Presence of native vegetation, including a TEC;
- Presence of a Serious and Irreversible Impact (SAII) entity; and
- Potential habitat for threatened species.

4.4.1. Native Vegetation

One TEC, BGHF has been identified as occurring within the subject site, represented as isolated trees (*Eucalyptus saligna*). This community is listed as a CEEC under both the BC Act and EPBC Act. A higher level of conservation significance is attributed to this vegetation community and impacts, both direct and indirect should be avoided and mitigated where possible.

Any impacts on native vegetation within the subject site, including BGHF and planted species native to NSW occurring within the the Urban Native/Exotic vegetation community may require offsetting under the BAM. This is dependent on whether a significant impact is expected to occur to BGHF and/or the native vegetation clearing threshold (0.25 ha) is exceeded.

4.4.2. Serious and Irreversible Impact (SAII)

The BGHF has been listed as a candidate SAII entity as under the BC Act (See **Section 4.2.4**). If Council determines any proposed development results in a SAII upon the BGHF within the subject site, a future development may not be approved.

4.4.3. Potential Habitat for Threatened Species

A number of threatened species have been considered to have potential utilise the subject site and surrounding land (**Table 3.2**). The main areas of habitat for these species is the BGHF and native planted vegetation containing suitable foraging habitat.

Any future assessment would need to consider the significance of impacts to any threatened species that have the potential to utilise the subject site.

4.5. Summary and Classification of Ecological Constraints

This ecological assessment has identified three levels of ecological constraint: high and moderate. The rationale for each level of constraint is provided below and **Figure 4.1** indicates where they occur within the subject site.

- **High Constraint:** Areas containing the TEC, BGHF. Impacts to these areas have the potential to trigger entry into the BOS, and potentially be determined to result in a SAII. Any project which is determined to be a SAII to the community is required to be denied consent by the consent authority. Removal of small areas of the community that is not considered to be a SAII may require high cost offsetting.
- **Moderate Constraint:** Areas containing urban native/exotic vegetation not listed as a TEC as well as microhabitats suitable for native fauna. Impacts to threatened fauna species in this area may require low offsetting costs if it is determined there is likely to be a significant impact to any species. There is unlikely to be a significant impact to any threatened species due to the availability of similar habitats throughout the locality.
- **Low Constraint:** Areas comprised of Exotic Grassland that do not provide significant habitat for threatened species. Impacting these areas is unlikely to significantly impact the biodiversity values of the subject site.

Figure 4.1. Ecological constraints within the subject site

5. Conclusion and Recommendations

Gelder Architects on behalf of the clients has proposed to rezone the entirety of the subject site from R2 Low Density Residential zoning to R4 High Density Residential. Rezoning of the subject site has the potential to facilitate the redevelopment of the land.

This assessment included an ecological investigation of the subject site to determine ecological constraints to the proposed development. The key ecological constraints identified are summarised below:

- Presence of native vegetation, including a TEC – the subject site comprises three vegetation communities, Urban Native/Exotic (0.19 ha), Exotic Grassland (0.07 ha) and BGHF (0.06 ha), a CEEC listed under the BC Act. A significant impact to the BGHF community would require offsetting under the BOS and preparation of a BDAR.
- Presence of a Serious and Irreversible Impact (SAII) entity - The BGHF community has been listed as a SAII entity as under the BC Act. If Council determines any proposed development results in a SAII upon the BGHF within the subject site, the proposed development will be denied consent.
- Potential habitat for threatened species - clearing of such habitat may require the provision of offsets (i.e. species credits) to compensate for the loss of habitat. The offset liability required will need to be determined utilising the BAM calculator.

In order to minimise impacts on the ecological constraints identified above it is recommended that impacts to all areas of BGHF be avoided where possible, as any impacts on this community may result in an SAII if determined by Ku-ring-gai Council. Although all clearance of native vegetation, if the BOS is triggered, will need to be offset, avoidance of BGHF will likely reduce offsetting costs and avoid triggering entry into the BOS.

Any future development within the subject site should implement appropriate mitigation measures to minimise direct and indirect impacts to TEC's and threatened species habitat. Mitigation measures should include exclusion fencing around areas of BGHF to be retained during construction, and monitoring of retained vegetation to ensure the implemented mitigation measures are effective.

6. References

DoE. 2013. Matters of National Environmental Significance. Significant impact guidelines 1.1. *Environment Protection and Biodiversity Conservation Act 1999*. Department of the Environment, Canberra.

DoE. 2014. Approved Conservation Advice for Blue Gum High Forest of the Sydney Basin Bioregion. Department of the Environment, Canberra.

DotEE. 2019. EPBC Protected Matters Search Tool. Department of the Environment and Energy, Canberra.

NSW Scientific Committee. 2011. Blue Gum High Forest in the Sydney Basin Bioregion - Determination to make a minor amendment to Part 2 of Schedule 1A of the Threatened Species Conservation Act.

OEH. 2016. The Native Vegetation of the Sydney Metropolitan Area - VIS_ID 4489. Office of Environment and Heritage, Sydney.

OEH. 2019. BioNet Atlas. Office of Environment and Heritage.

APPENDIX A :
Flora Species List

Table A.1 Flora species identified within the subject site

Stratum	Family	Scientific Name	Common Name	Exotic
Canopy				
	Bignoniaceae	*Jacaranda mimosifolia*	Jacaranda	*
	Cupressaceae	*Cupressus spp.*		*
	Hamamelidaceae	*Liquidambar styraciflua*	Sweetgum	*
	Lauraceae	*Cinnamomum camphora*	Camphor Laurel	*
	Malvaceae	*Brachychiton acerifolius*	Illawarra Flame Tree	
	Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum	
	Myrtaceae	*Syzygium luehmannii*	Small-leaved Lilly Pilly	
	Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush	
	Myrtaceae	*Corymbia ficifolia*	Red-flowering Gum	*
	Proteaceae	*Grevillea robusta*	Silky Oak	
	Sapindaceae	*Alectryon tomentosus*	Hairy Bird's Eye	
	Ulmaceae	*Celtis* spp.		*
Fern				
	Adiantaceae	*Adiantum aethiopicum*	Common Maidenhair	
	Aspleniaceae	*Asplenium australasicum*	Bird's Nest Fern	
	Davalliaceae	*Nephrolepis cordifolia*	Fishbone Fern	
Grasses				
	Lomandraceae	*Lomandra longifolia*	Spiny-headed Mat-rush	
	Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass	*
	Poaceae	*Cenchrus clandestinus*	Kikuyu Grass	*
	Poaceae	*Cynodon dactylon*	Common Couch	
	Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*
	Poaceae	*Oplismenus aemulus*		
	Poaceae	*Poa annua*	Winter Grass	*
	Poaceae	*Paspalum dilatatum*	Paspalum	*
	Poaceae	*Entolasia marginata*	Bordered Panic	
	Poaceae	*Stenotaphrum secundatum*	Buffalo Grass	*
	Poaceae	*Cenchrus setaceus*		*
Groundcover				
	Agavaceae	*Yucca aloifolia*	Spanish Bayonet	*
	Alliaceae	*Agapanthus praecox* subsp. *orientalis*		*
	Amaryllidaceae	*Clivia miniata*		*
	Amaryllidaceae	*Nothoscordum gracile*		*

Anacardiaceae	*Harpephyllum caffrum*		*
Anthericaceae	*Chlorophytum comosum*	Spider Plant	*
Apiaceae	*Centella asiatica*	Indian Pennywort	
Araceae	*Colocasia esculenta*	Taro	*
Asparagaceae	*Asparagus aethiopicus*	Asparagus Fern	*
Asparagaceae	*Sansevieria* sp.		*
Asphodelaceae	*Aloe vera*	Aloe vera	*
Asphodelaceae	*Phormium tenax*	New Zealand Flax	*
Asteraceae	*Cirsium vulgare*	Spear Thistle	*
Asteraceae	*Conyza sumatrensis*	Tall fleabane	*
Asteraceae	*Cotula australis*	Common Cotula	
Asteraceae	*Sonchus asper*	Prickly Sowthistle	*
Asteraceae	*Facelis retusa*		*
Asteraceae	*Taraxacum officinale*	Dandelion	*
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*
Asteraceae	*Senecio madagascariensis*	Fireweed	*
Asteraceae	*Gazania* spp.	Gazania	*
Asteraceae	*Erigeron karvinskianus*	Bony-tip Fleabane	*
Asteraceae	*Tagetes minuta*	Stinking Roger	*
Asteraceae	*Gamochaeta americana*		*
Brassicaceae	*Camellia* spp.		*
Brassicaceae	*Cardamine hirsuta*	Common Bittercress	*
Bromeliaceae	*Aechmea gamosepala*	Matchstick Bromeliad	*
Bromeliaceae	*Vriesea* sp.		*
Buxaceae	*Buxus microphylla*		*
Caryophyllaceae	*Cerastium glomeratum*	Mouse-ear Chickweed	*
Commelinaceae	*Tradescantia fluminensis*	Wandering Jew	*
Commelinaceae	*Tradescantia pallida*	Purple Queen	*
Convallariaceae	*Ophiopogon japonicus*	Dwarf lilyturf	*
Crassulaceae	*Crassula multicava*		*
Crassulaceae	*Bryophyllum pinnatum*	Resurrection Plant	*
Cyatheaceae	*Cyathea cooperi*	Straw Treefern	
Euphorbiaceae	*Euphorbia peplus*	Petty Spurge	*
Fumariaceae	*Fumaria muralis* subsp. *muralis*	Wall Fumitory	*
Geraniaceae	*Geranium homeanum*		
Iridaceae	*Dietes grandiflora*		*

	Iridaceae	*Romulea rosea* var. *australis*	Onion Grass	*
	Iridaceae	*Freesia* hybrid	Freesia	*
	Lamiaceae	*Stachys arvensis*	Stagger Weed	*
	Lamiaceae	*Lavandula* sp.	Lavender	*
	Malvaceae	*Malva parviflora*	Small-flowered Mallow	*
	Moraceae	*Ficus pumila*	Creeping Fig	*
	Myrsinaceae	*Lysimachia arvensis*	Scarlet Pimpernel	*
	Orchidaceae	*Dendrobium speciosum*	Rock Lily	
	Oxalidaceae	*Oxalis corniculata*	Creeping Oxalis	*
	Oxalidaceae	*Oxalis purpurea*		*
	Phormiaceae	*Dianella caerulea* var. *producta*		
	Polygonaceae	*Acetosa sagittata*	Rambling Dock	*
	Polygonaceae	*Persicaria capitata*		*
	Rosaceae	*Potentilla indica*	Indian Strawberry	*
	Solanaceae	*Solanum seaforthianum*	Climbing Nightshade	*
	Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*
	Violaceae	*Viola odorata*	Sweet Violet	*
	Zingiberaceae	*Hedychium gardnerianum*	Ginger Lily	*
Shrub				
	Araceae	*Monstera deliciosa*	Fruit Salad Plant	*
	Arecaceae	*Syagrus romanzoffiana*	Cocos Palm	*
	Asteliaceae	*Cordyline rubra*	Palm-Lily	
	Asteliaceae	*Cordyline australis*	Cabbage Tree	*
	Asteraceae	*Rhododendron* spp.		
	Elaeocarpaceae	*Elaeocarpus reticulatus*	Blueberry Ash	
	Euphorbiaceae	*Euphorbia pulcherrima*	Poinsettia	*
	Fabaceae (Caesalpinioideae)	*Senna pendula* var. *glabrata*	Winter Cassia	*
	Fabaceae (Faboideae)	*Vicia sativa*	Common vetch	*
	Fabaceae (Faboideae)	*Lotus uliginosus*	Birds-foot Trefoil	*
	Geraniaceae	*Pelargonium* spp.		*
	Liliaceae	*Alstroemeria aurea*	Lily of the Incas	*
	Lythraceae	*Lagerstroemia indica*	Crepe Myrtle	*
	Magnoliaceae	*Magnolia* spp.	Magnolia	*
	Malaceae	*Cotoneaster glaucophyllus*		*
	Malaceae	*Photinia serratifolia*	Chinese Photinia	*
	Malvaceae	*Hibiscus* sp.		

	Myrtaceae	*Sannantha pluriflora*		
	Nandinaceae	*Nandina domestica*	Japanese Sacred Bamboo	*
	Ochnaceae	*Ochna serrulata*	Mickey Mouse Plant	*
	Oleaceae	*Jasminum polyanthum*	White Jasmine	*
	Oleaceae	*Olea europaea subsp. europaea*	African Olive	*
	Oleaceae	*Ligustrum sinense*	Small-leaved Privet	*
	Oleaceae	*Ligustrum lucidum*	Large-leaved Privet	*
	Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum	
	Proteaceae	*Grevillea 'Robyn Gordon'*		*
	Proteaceae	*Telopea "Braidwood Brilliant"*	"Braidwood Brilliant"	
	Rosaceae	*Rosa* sp.	Rose	*
	Rutaceae	*Murraya paniculata*	Orange Jessamine	*
	Rutaceae	*Citrus × limon*	Lemon	*
	Strelitziaceae	*Strelitzia nicolai*	Giant Bird of Paradise	*
	Verbenaceae	*Lantana camara*	Lantana	*
Vine				
	Apocynaceae	*Trachelospermum jasminoides*		*
	Araceae	*Syngonium podophyllum*	Arrowhead Vine	*
	Araceae	*Philodendron* x 'Xanadu'	Philodendron	*
	Araliaceae	*Hedera helix*	English Ivy	*