Terrestrial Biodiversity Report

for a

Replacement House

at

32 Bower Street, Manly

by

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and

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March 2019

Prepared for
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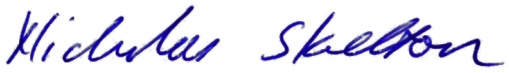

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1 Introduction

1.1 Background

This report identifies the ecological values and constraints at 32 Bower Street, Manly, then assesses the likely impact of a proposed development on the terrestrial flora, fauna and ecological communities, in particular, the Endangered Long-nosed Bandicoot population on North Head. The NSW Scientific Committee and OEH Profile has identified loss of habitat and change to habitat access as potential impacts and Key Threatening Processes to the Endangered Long-nosed Bandicoot population. This report also makes recommendations on ways to avoid or reduce impacts caused by the development.

1.2 Legislation Addressed by this Report

This section describes the Local, State and Federal legislation that provide the legal framework for approval of development and the protection and conservation of native flora and fauna that are relevant to this site.

1.2.1 NSW Environment Planning and Assessment Act 1979, EP&A Act

The NSW Environment Planning and Assessment Act 1979 is the framework for approval of development in NSW. This proposal will be assessed under Part 4 of the EP&A Act which requires the determining authority (usually Council) to not approve local development (Development Applications, DA's) without considering the heads of consideration in section 4.15 which requires the assessment of relevant legislation (SEPP, LEPs, DCPs ect.)(4.15a), the environmental impact of the proposal (4.15b) and the suitability of the site for development (4.15c). Section 4 of this report addresses the BC Act and the relevant heads of consideration.

1.2.2 Biodiversity Conservation Act 2016

Section 7.2 of the Biodiversity Conservation Act requires that all local developments (Development Applications DAs, Part 4 EP&A Act):

- Implement the core purpose of the Act is a hierarchy to "Avoid" and "Minimise" impacts; only then can "Offsets" be used for any residual impacts.
- Be assessed to determine whether they trigger the BOS Threshold Test specified in the Biodiversity Conservation Regulation 2017, which has two parts; the area of native vegetation that the proposal will impact and a check of whether the impact is within an area of mapped "biodiversity" on the Biodiversity values map; and
- Be assessed by a qualified ecologist to determine if there may be a positive a 5-Part Test of Significance as outlined in part 7.3 of the BC Act for each Threatened species or ecological community (listed in the schedules of the BC Act) or their habitats (listed in the schedules of the BC Act) that may occur on the site.
- Be assessed to determine if the proposal may impact on an Area of Outstanding Biodiversity Value (AOBV).

Developments that trigger the Threshold Test or have a positive 5-Part Test of Significance or impact on an AOBV need to enter the Biodiversity Offset Scheme (BOS) and require the Biodiversity Assessment Method (BAM) to be applied and include a Biodiversity Development Assessment Report (BDAR) with the DA application. The proposal also needs to be assessed to determine if it may result in a Serious and Irreversible Impact (SAII).

If a development application does not meet the threshold or any other triggers, then a smaller report is still required to address the "heads of consideration" (section 4.15 of the EP&A Act),

5-part Test of Significance as required by the Manly DCP, SEPPs and Local Council's LEP/DCP requirements.

The Threshold Test, 5-Part Test, assessment of AOBV, heads of consideration, SEPP LEP/DCP requirements are all assessed in section 4 of this report.

1.2.3 Manly Local Environment Plan, LEP

The Manly (Northern Beaches Council) Local Environment Plan's (2013) 'Terrestrial Biodiversity Map' identifies this property as having high terrestrial biodiversity value. Development applications in the mapped area require consideration of Clause 6.5 (3) and (4) 'Terrestrial Biodiversity' (Manly LEP 2013). Development proposals need to be consistent with the objectives of this Clause and include appropriate measures to avoid, minimise or mitigate possible impacts of the development on biodiversity.

Extract from MLEP 2013

6.5 Terrestrial biodiversity

(1) The objective of this clause is to maintain terrestrial biodiversity by:

(a) protecting native fauna and flora, and

(b) protecting the ecological processes necessary for their continued existence, and

(c) encouraging the conservation and recovery of native fauna and flora and their habitats.

(2) This clause applies to land identified as "Biodiversity" on the Terrestrial Biodiversity Map.

(3) Before determining a development application for development on land to which this clause applies, the consent authority must consider:

(a) whether the development is likely to have:

(i) any adverse impact on the condition, ecological value and significance of the fauna and flora on the land, and

(ii) any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna, and

(iii) any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and

(iv) any adverse impact on the habitat elements providing connectivity on the land, and

(b) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.

(4) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:

(a) the development is designed, sited and will be managed to avoid any significant adverse environmental impact, or

(b) if that impact cannot be reasonably avoided by adopting feasible alternatives—the development is designed, sited and will be managed to minimise that impact, or

(c) if that impact cannot be minimised - the development will be managed to mitigate that impact.

These sections of the Manly LEP are addressed within this report.

1.2.4 Manly Development Control Plan, DCP

Manly Development Control Plan 2013 Section 2.1.15 'Threatened Flora and Fauna Assessment of Significance Report, including the Long-nosed Bandicoot, and Little Penguins' requires the assessment of the significance of impact on threatened species, populations or ecological communities or their habitats.

Manly DCP 2013

DCP extract 2.1.15 'Threatened Flora and Fauna Assessment of Significance Report'

Objective 1) To ensure the assessment of any significant effect on threatened species, populations or ecological communities or their habitats (as listed in the Threatened Species Conservation Act

1995) in accordance with Section 5A of the Environmental Planning and Assessment Act 1979 (now superseded by section 7.3 of the Biodiversity Conservation Act 2016).

DCP extract 5.4.2 'Threatened Species and Critical Habitat'

Any development of land with known habitat for threatened species must consider the likely impacts of the development and whether further assessment needs to be undertaken by a Species Impact Statement.

DCP Extract - Schedule 1 - Map D - Areas where Assessment of Significance is required (for Little Penguins and/or Long Nosed Bandicoots)

This report includes a Test of Significance (5-part test) for the Endangered Long-nosed Bandicoot population at North Head and other Threatened Species, Populations or Endangered Ecological Communities that may be impacted by the proposal. The Impact Assessment section of this report addresses these clauses.

1.2.5 State Environmental Planning Policies and Sydney Regional Environmental Plans

The SEPPs and SREPs which are relevant to Northern Beaches LGA and which may be relevant to this proposal are SEPP 19 Bushland in Urban Areas and Sydney Regional Environmental Plan (Sydney Harbour Catchment) (SREP SHC) 2005 (which amends SEPP No 56 Sydney Harbour Foreshores and Tributaries).

State Environmental Planning Policy No 19—Bushland in Urban Areas

State Environmental Planning Policy 19 – Bushland in Urban Areas (SEPP 19) is an NSW government policy that aims to protect and preserve bushland within urban areas. The policy applies to naturally vegetated land adjacent to Council reserves.

Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The plan aims to establish a balance between promoting a prosperous working harbour, maintaining a healthy and sustainable waterway environment and promoting recreational access to the foreshore and waterways. It establishes planning principles and controls and

consolidates and replaces the following instruments: - Sydney Regional Environmental Plan No. 22 - Parramatta River (SREP 22); - Sydney Regional Environmental Plan No. 23 - Sydney and Middle Harbour (SREP 23); and amends State Environmental Planning Policy No. 56 Sydney Harbour Foreshores and Tributaries (SEPP 56).

The area to the south of the heavy black boundary line on the figure below is within the Foreshores and Waterways Area and includes the whole of North Head, St Patrick's Estate, Manly Boatshed and Manly Wharf. See image below. The whole of Manly Cove is zoned as W2 Environment Protection Zone. Wetlands are mapped along the majority of Manly Coves' foreshore.

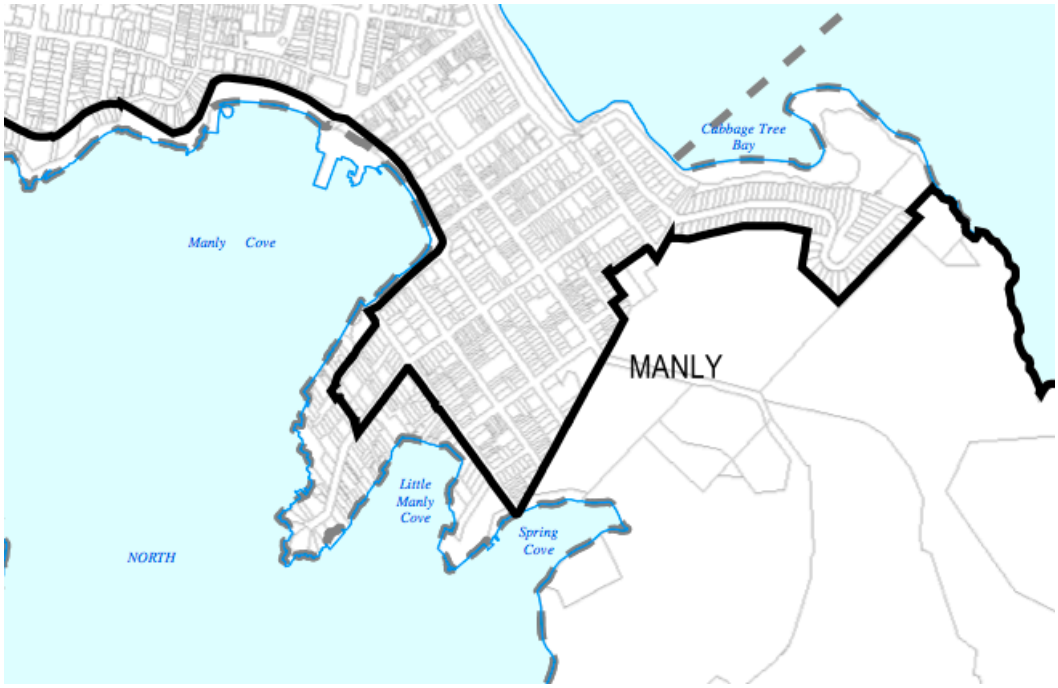


Image: Strategic Foreshores and Waterways Area – Part of Sheet 4 SREP SHC

The ecological Aim of the SREP is to ensure the protection, maintenance and rehabilitation of watercourses, wetlands, riparian lands, remnant vegetation and ecological connectivity.

The Impact Assessment section of this report assesses the specific ecological matters that are to be considered. The Impact Assessment section of this report also addresses the objectives of the W2 zoning.

Coastal Management SEPP 2018

The new SEPP Coastal Management 2018 combines SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection) and clause 5.5 of the Standard Instrument into one integrated policy. These policies have been repealed. This SEPP defines four coastal management areas and specifies the assessment of development within these management areas.

The Coastal Management SEPP also maps Coastal Wetlands and Littoral Rainforest (EEC) and areas within proximity of Coastal Wetland and Littoral Rainforest and includes controls for development within those areas.

1.2.6 Federal Environment Protection and Biodiversity Conservation Act 1999, EPBC Act

There is currently no memorandum of understanding agreement between the State and Federal government regarding the need to apply the EPBC Act 1999.

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) will need detailed assessment if the proposal is considered likely to have an impact on a 'Matter of National Environmental Significance (MNES), thus providing a trigger for referral of the proposal to the Department of the Environment and Water Resources. Matters of national environmental significance identified in the Act are; world heritage properties; national heritage places; RAMSAR wetlands; nationally threatened species and communities; migratory species protected under international agreements; the Commonwealth marine environment; and nuclear actions.

Section 4 of this report addresses this requirement.

1.3 General Definitions

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. The minister has provided a guide under 7.3(2) titled Threatened Species Assessment Guidelines.

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 Biodiversity Offset Scheme (BOS). There are associated Biodiversity Conservation regulations which refers to the BAM.

Clearing – clearing of native vegetation including; cutting down, felling, uprooting, thinning or otherwise removing native vegetation, killing destroying, poisoning, ringbarking or burning native vegetation and includes and includes establishment and maintenance of bushfire protection Asset Protection Zones (APZ) inner and outer zones.

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 2018 Threatened Species Assessment 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, includes the requirement to consider SEPPs, LEPs, DCPs, BC Act 2016.

EPBC Act – Federal Environment Protection and Biodiversity Conservation Act 1999.

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)

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

Native Vegetation - is defined in the LLS Act as any plants native to NSW including trees, understory plants or groundcover plants including wetland. Marine vegetation is protected by the Fisheries Act.

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

Property – The lot(s) that are the subject of the proposal. In this report, this is the same as the Study Area, the Subject Site and "site".

Proposal – The works/actions that are proposed on the property that is the subject of the development application.

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

Site - In this report this is the same as the Study Area and the Subject Site and the property.

Study Area - means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area should extend as far as is necessary to take all potential impacts into account. In this report, this is the same as the Subject Site, the property and "site".

Subject Site - means the area directly affected by the proposal. In this report, this is the same as the Study Area, the property and "site".

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

For definitions that are relevant to the Assessment of Significant test see the Appendices.

1.4 Assumptions and Limitations

- This document only assesses the impacts of the proposal described in this report and shown on Map 1 and the cited plans.
- This report does not take into account the cumulative impact of other developments on this property or on adjacent land.
- This report does not include assessment of soil suitability or European/Aboriginal heritage.
- It can never be proven that other Threatened Species have not, do not or will not use the site as habitat. The conclusions drawn in this report are a result of testing, observation and experience.
- This report describes the habitat and species of the site at the time of the field survey. Vegetation, habitat and legislation will change over time and therefore the findings of this report are only relevant for 6 months.
- 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.

1.5 Endangered Bandicoot Population at North Head

The main species of interest on this site is the Long-nosed Bandicoot, *Perameles nasuta*, (Geoffrey 1804) and in particular, the Endangered population at North Head, Manly, which is known to occur in the vicinity of the Subject Site.

The Final Determination (TSC Act Scientific Committee 1997) for the listing of this population in the schedules of the Threatened Species Conservation Act described the population as:

> *"P. nasuta was once widespread in the Sydney region but many formerly recorded populations have become extinct. The North Head population is now isolated and disjunct."*
>
> *"…the North Head population of P. nasuta is in immediate danger of extinction."*
>
> *"…the North Head P. nasuta population is of significant conservation value on the grounds that it is:*
>
> - *A disjunct population*
> - *One of the few surviving populations within the Sydney region*
> - *A population which has been the subject of a number of scientific studies, and is thus an important reference population*
> - *Accorded considerable value by the local community, and thus serves to promote conservation more generally"*

The Office of Environment and Heritage has identified 25 priority actions to help recover the Long-nosed Bandicoot population on North Head in New South Wales (as of July 2013). These priority actions relate to OEH, Northern Beaches Council and other determining authorities developing, implementing and continuing the fox, feral cat and rabbit control program, weed control program, monitoring program, community awareness program, collecting mortality data, finalising and reviewing Long-nosed Bandicoot Recovery Plan, and Sydney Harbour National Park Fire Management Strategy and Plan of Management.

1.5.1 Long-nosed Bandicoot (Perameles nasuta) Biology

Description: The Long-nosed Bandicoot (*Perameles nasuta*) is a solitary nocturnal marsupial that grows to a size of between 850 and 1100 g, 310 to 425 mm in head and body length, and with a tail length of 120 to 155 mm (Stoddart 1995). The males are larger than females. These bandicoots characteristically dark, greyish-brown above and creamy white below. The forefeet and upper surfaces of the hind feet are also creamy white (NPWS 2000b). The muzzle is long and pointed and the ears are markedly larger and more pointed than short-nosed bandicoots of the genus Isoodon, such as the other bandicoot that lives in Sydney, the Southern Brown Bandicoot (Stoddart 1995).

Distribution: Long-nosed Bandicoots are locally common along the east coast of Australia and adjacent mountains from north-eastern Queensland to south-western Victoria. This Endangered population is restricted to the relatively isolated area of habitat on North Head in the Manly Local Government Area, south of Addison Road (NSW Scientific Committee 2003). See above the DCP extract, Schedule 1 - Map D - Areas where Assessment (test) of Significance is required. There is another Threatened population in the inner western part of Sydney.

Habitat: At North Head, Long-nosed Bandicoots inhabit, to varying extents, all of the habitat types available including woodlands, scrub, heath open areas and the urban landscape. Recent research indicates that urban areas are important for the population and that there are individuals who live their entire lives within the urban area. Long-nosed Bandicoots prefer sites with sandy soils, as well as with low undergrowth and leaf litter cover and does not have a particular preference for proportion of canopy cover (Chambers & Dickman 2002). This species depends on a mosaic of vegetation types at a landscape level, including feeding grounds in patches of moist, soft soil located close to shelter with an abundance of invertebrates (Scott et al. 1999). These types of habitat can be found in both bushland and urban environments including native vegetation and residential gardens. Resting and nesting habitat is low, dense vegetation or litter where a bandicoot can take shelter in during the day. Bandicoot diggings are more abundant in areas of moist, soft soils close to cover (Hughes and Banks 2010).

Individuals build diurnal nests that are typically made in a shallow hole or depression on ground surface and are lined with leaf litter and dry grasses. The entrance to each nest is closed when occupied making them generally difficult to locate. Nests on North Head have been found in a variety of habitat types, such as at the base of large trees and within tall grasses including residential backyards (Scott 1995; Scott *et al.* 1999). Long-nosed Bandicoots typically have more than 1 nest that is in regular use within their territory (Chambers & Dickman 2002). It is expected that bandicoots in the wild may live up to 2 to 2.5 years.

Diet: Long-nosed Bandicoots feed on invertebrates, plants, tubers, fungi and vertebrates (Menkhorst & Knight 2004, Scott et al. 1999, Claridge 1993). Invertebrates mostly include insects from the orders Coleoptera and Hymenoptera (> 80%). Plants preferred are mainly the leaves and stems of monocotyledons (>76%). Fungi are consumed in a high proportion (> 63%), mostly those hypogeal from the family Zygomicetes, in particular the species *Glomus fueglanum*. Vertebrates, even though contribute little to bandicoots' diet include skinks, birds and sometimes eggs of the Eastern Water Dragon (Scott et al. 1999).

Breeding: At North Head, Long-nosed Bandicoots were recorded breeding from June to March (Scott 1995), however mating can occur throughout the year. The average recorded litter size for the North Head population is 2.3 babies (Stoddart 1995). In productive years, females may have up to 4 litters.

Litters are typically 2-3 (>76%), with the young weaned at about 7 weeks and reaching maturity at 20 weeks. Females tend to overlap their home ranges (i.e., 1.7 ha) throughout the year, as well as to reduce their size during the breeding season. By contrast, home ranges of males (i.e., 4.4 ha) only overlap during the breeding season, as they also enlarge their home ranges (Scott et al. 1999, Menkhorst & Knight 2004).

1.5.2 Population Viability

There have been many studies on this population over the last 20 years including; micro-chipping, radio tracking, extensive trapping, diet analysis, population viability estimation (Banks, 2000; Banks, 2004; Chambers and Dickman, 2002; Hughes and Banks, 2006; Hughes and Banks, 2010; Lenehan and Banks, 2004; Scott, Hume, and Dickman, 1999). There is ongoing biannual monitoring program by the Office of Environment and Heritage (OEH; formerly DECCW, DECC and NPWS) in collaboration with Manly Council and Sydney University.

Every two years there is a more extensive Long-nosed Bandicoot trapping survey conducted in the bushland part of North Head. This survey does not include the urban environment part of North Head, which is now known to have permanent bandicoot residence. These areas are

likely to be the same population. Population viability estimates within the urban environment most recently occurring in November 2012 and March 2013. This urban study utilised 14 transects across Eastern Hill and used the same methods as the current study by NPWS within the bushland habitat on North Head (Hughes and Banks, 2010).

In May 2015, a total of 152 individual Long-nosed Bandicoots were trapped at North Head, compared to 99 in 2014, and 71 in 2010. The sex ratio of the bushland population is relatively even. Under current conditions, the North Head Long-nosed Bandicoot population has a 62% chance of persisting after 50 years. This figure has dropped from 80% in since the previous PVA, due to the slightly higher sex specific adult mortality rates used in the current PVA's (Price & Banks, 2015). The latest PVA analysis determined that the population is stable and has been for the last few years. It has been calculated that only a small loss to the population could cause the local population to become extinct.

1.5.3 Previous Years Survey Results for the Bushland Area of Habitat

See below text results from the Long-Nosed Bandicoot Urban Monitoring Program (Cumberland Ecology) 2016.

- A total of 34 (14 males and 19 females, adults 72%) individual Long-nosed Bandicoots were trapped in the urban area of Manly, in May 2016, compared with 31 (19 males and 12 females, 75% adult) in March 2013.
- Four of the females captured had 1-2 young in their pouch.
- 25% of the total population on North Head are living within the urban environment with 28 – 45 individuals in the **urban** environment compared with 120 - 140 individuals in the **bushland** environment (NPWS).
- There are individuals with their home range within the urban environment
- Individuals were trapped across Eastern Hill and down to Ashburner Street.

1.5.4 Threats to the North Head Population

The major threats to this population are thought to be vehicle traffic, loss of habitat through development and, to a lesser degree, predation by dogs, cats and foxes. Other threats include inbreeding depression, loss of genetic variation, the risk of catastrophic events (such as bushfires or disease), inappropriate fire regimes, clearing of native vegetation and invasion of native plant communities by Bitou Bush. Bandicoots are also susceptible to infection by cats carrying the disease toxoplasmosis. If urban developments keep reducing the area of accessible habitat available it is likely to result in population decrease and the likelihood of the population becoming extinct in the near future (i.e., 20 years) range between 31% and 46%.

The removal of habitat or prevention of access to habitat on a site may constitute a significant impact to the conservation of the threatened population and may require modifications to the development so there is no significant impact or a more extensive assessment in the form of a Species Impact Statement, a Section 91 licence or modification of the proposal.

1.6 The Study Site

The Site is the whole of Lot 28 D.P. 8075, known as 32 Bower St Manly, which is irregular in shape and has an area of 1853m^2. The property slopes steeply to the north and the east. The site currently contains a two-storey house, a carport, boat shed, driveway, retaining walls, sandstone boulders, terraced gardens with some large trees including native fig trees and extensive patches of lawn/weedy vegetation in both the front and rear yards. The site is densely vegetated. The front yard (south) contains patches of retained and unmaintained gardens, lawn, a carport, garage and a paved path from the driveway to the house. The rear yard (north) is large and multi-levelled and contains paved areas, large sandstone boulders,

steps and patches of lawn as well as gardens, a boat shed at the bottom (northern) end and retaining walls. See Map 1 for plans showing the existing site, habitat and access.

There are areas of urban habitat surrounding the site (see cover photo), and extensive areas of bushland reserve on North Head, mostly Sydney Harbour National Park and Sydney Harbour Federation Trust land to the east of the property. Bower Streets runs along the southern border and a residential property borders the site to the west. The property backs onto Shelly's beach to the north, and a council bushland/drainage reserve borders the full length of the eastern boundary. The site is located approximately 200m to the west of the 2.5m high stone wall that roughly forms the boundary between St Patricks Estate and Sydney Harbour National Park.

The geographic co-ordinates of the site are -33.801294 º S and 151.297825º E.

1.7 The Proposed Development

This report addresses a DA for:

- Demolition of the existing house, garage and driveway and landscaping.
- Construction of a new house, guest house, driveway, underground parking,
- New pedestrian access from the south-west corner of the property adjoining Bower Street.
- Two new swimming pools; one, a raised lap pool between main house and guest house and the other a pool in the north of the property.
- Remove 13 trees and transplant 9 trees.
- Excavation and landscaping across the property. The landscaping as per the Landscape Plan (Secret Gardens 12/03/19) includes hard landscaping (retaining walls), planting local native species and lawn.
- Replacement of eastern boundary fence.

For further information on locations, extent of the development and details of the proposal, see Map 1.

The plans and documents used for this report are:

1.7.1 Plans and Documents Used

Title	Author	Rev	DWG./Doc. No./Ref. No.	Date Modified or Accessed
Survey Plan	CMS Surveyors	2	17886detail	12/07/18
Construction Impact Assessment and Management Plan and Tree Table	Botanics, Tree Wise People Pty Ltd	2	-	01/2019
Elevation West & Section A	Campbell Architecture	A	DA09	22/03/19
Elevations North & South	Campbell Architecture	A	DA08	22/03/19
Plan Level 1- 4	Campbell Architecture	A	DA04-07	22/03/19
Plan Site & Roof	Campbell Architecture	A	DA01	22/03/19
Landscape Level 1- 4	Secret Gardens	A	DA-01-DA-04	12/03/19

2 Methods

The site was inspected on the 12th of February by qualified ecologists Sophia Mueller Sewell, Joshua Drane and Sarah Tuxworth and the experienced and qualified ecologist Nicholas Skelton for a total of 6-person hours. This locality has been visited on many previous occasions by the authors for various other ecological survey projects. Nicholas Skelton has 20 years of experience in Flora and Fauna surveys in the Sydney Metropolitan area and has completed over 200 bandicoot surveys and assessments in Manly for NPWS, Council, SHFT and private landowners. The field survey searched for evidence of all Threatened Species, Populations and Endangered Ecological Communities that are known to, or that may have potential habitat within the site, especially the Endangered population of Long-nosed Bandicoot.

Existing and potential foraging, resting, and nesting Long-nosed Bandicoot habitat was determined and quantified and is shown on Map 1. Existing bandicoot access to, from and within the site was also identified and mapped.

The plans referenced within this report were assessed to determine the amount and type of habitat and the access that would be altered as a result of the proposal. Map 1 shows the change in the amount of habitat and access.

The habitat potential of the site for bandicoots was determined by detailed onsite assessment of the access, shelter and food sources. The recent use of the property by bandicoots was determined by an ecologist with extensive experience in bandicoot survey in urban environments, by searching for diggings, scats, frequently used trails and boundaries were thoroughly searched for accessibility by bandicoots. The road reserve and accessible parts of nearby properties were searched for evidence of bandicoot activity and habitat value. Photographs were taken of the site. The findings from other reports from nearby surveys and studies were also used to provide additional habitat use information. Habitat for other Threatened species was searched for. Field notes are available for scrutiny.

3 Findings

3.1 Long-nosed Bandicoot Use of Adjacent Land

During the field survey evidence was found of Bandicoots using the site and adjacent Bower Street road reserve. It is likely that bandicoots also use the adjacent properties and nearby bushland areas for resting and breeding as well as foraging due to the good quality habitat. Bandicoots have been recorded regularly in the locality. These animals are all from the Endangered Long-nosed Bandicoot population at North Head.

3.2 Existing Bandicoot Habitat and Access

The site currently contains 1071m^2 of bandicoot foraging habitat (57% of the site) in the lawn and garden areas. The large patches of dense ground cover vegetation provide potential nesting and resting habitat for the bandicoots. No resting or nesting bandicoots were observed on the property during the site survey. During the survey, bandicoot diggings were found in the gardens at the front and rear of the property.

Access to the habitat on the site is through various openings in the fence along the eastern side of the property and the ungated driveway at the front of the property. Access can also be gained through the gate at the rear of the property backing onto Shelley Beach. The adjacent property to the west can be accessed via a gap in the fence in the north-western corner of the property. See Map 1.

Lawns and garden beds in the front and rear yards can be accessed internally by the pathway along the western boundary next to the house and a vegetated corridor along the east of the property. There is no access to the raised garden bed at the south-western corner of the site.

See Map 1 for a diagram showing the existing bandicoot access to, from and within the site and a comparison with the proposed and recommended access.

3.2.1 Existing Bandicoot Access to, and from, Adjacent Land

See Dark Blue arrows on Map 1 that show proposed bandicoot access and Red lines that show bandicoot access barriers.

Adjacent Land	Bandicoot Access and Habitat
South – Bower St.	Good quality habitat – Road reserve, footpath and council reserve to the south east, access through ungated driveway.
North – Shelley Beach	Good quality habitat – Public grass area and bushland on the opposite side of Shelley Beach, access underneath and through gaps in pedestrian gate.
East – Bower St Reserve	Extensive excellent quality habitat – Bushland, good access through dilapidated fence.
West – Neighbouring property	Good quality habitat – Open grass lawn with garden beds, access limited to a few small holes in northern section of the concrete block fence.

3.3 Proposed Bandicoot Habitat and Access

Map 1 summarises the existing and proposed bandicoot habitat and access to, from and within the site.

The proposal will result in a permanent loss of 353m^2 of foraging habitat from with the property. There will also be temporary (during construction) removal of most of the habitat as a result of demolition, excavation, storage of materials and stockpiling.

The proposal will provide 718m^2 (38% of the site) of potential foraging habitat in the form of landscaped areas in the front, rear and sides of the property.

The proposal will not change access for bandicoots. The following recommendations are made to maintain or provide access (see Magenta arrows and Light Blue lines on Map 1). These recommendations have been adopted in the Landscape Plan (Secret Garden 22/01/19).

- Access is to be maintained to and from the Shelley Beach habitat at the north of the property through gaps under the gated pedestrian access in the northern boundary of the property.
- Access is to be maintained to the property to the west from the existing gap in the northern section of the fence along the western boundary.
- Access is to be provided to habitat along the southern boundary (Bower St) through 150mm gaps under any pedestrian gates and driveway gate.
- Access is to be provided from the front to the rear yard along the eastern and western boundaries.
- Access is to be maintained to and from the property to the west from the rear yard.
- Replacement boundary fences along the are to have 150mm-300mm gaps every two metres along the fence.
- It is recommended that any new replacement internal gates or external have gaps of at least 150mm under the full length of the gate.

- The corridor that extends east to west along the northern part of the property is to be maintained.

If the recommendations of this report are followed there will be no change in access to habitat on the property as a result of the proposal.

3.3.1 Proposed Bandicoot Access to, and from, Adjacent Land

See Dark Blue arrows on Map 1 that show proposed bandicoot access and Red lines that show bandicoot access barriers and Magenta arrows that show recommended bandicoot access and Light Blue lines that show where access is recommended to be added.

Adjacent Land	Bandicoot Access and Habitat
East– Bower St Reserve	Access is shown on Map 1. Access to be maintained along fence line of property. Good quality habitat in the Reserve.
South– Bower Street	Access is shown on Map 1. Access to be maintained to habitat in front of property under gates.
North–Shelley Beach	Access is shown on Map 1. Good quality habitat. Access to be maintained to habitat in rear of property under gates.
West – Neighbouring property	Access is shown on Map 1. Likely habitat in neighbouring property. Access to be maintained in northern section of western boundary.

3.3.2 During Construction Impacts to Bandicoots

Likely impacts during construction are:

- Temporary restriction of access to habitat for bandicoots and other fauna due to skips, site fences and storage of materials. **Medium impact**;
- Temporary potential hazards to bandicoots and other fauna including falling into open pits and drowning hazards. **Low risk**, this is not very likely at this site;
- Temporary additional traffic movement around the street. **Low risk**.

The proposal will temporarily remove most of the habitat on the site during construction due to demolition, excavation and material storage.

Measures to ameliorate these potential impacts are discussed in the Recommendations and Ameliorative Conditions sections of this report.

3.4 Trees

The Arborist Tree Table by Botanics Tree Wise People Pty Ltd identified 39 trees on or immediately adjacent to the site, of which 14 the trees were local native species and 25 were exotics or planted. The Construction Impact Assessment and Management Plan by Botanics Tree Wise People Pty Ltd recommends the removal of 13 trees, 5 of which are native species, that occur in the footprint of the proposal.

There are three *Ficus rubiginosa* trees on site that provide foraging habitat for birds and fruit bats. One of the figs (T32) on the site is a young tree growing as an epiphyte on the dead stump of a tree and will require removal as part of the proposal. Tree 17 is a large *ficus ribiginosa* and contains small hollows that may provide habitat for fauna in the area. This tree has been recommended by the arborist for removal as there is evidence of surface decay and the canopy is supported by poorly structured forks. There is also a fig growing in the concrete fence on the northern boundary of the property. The plans do not show any works along the northern boundary.

The native trees to go on the site are a Pittosporum undulatum (T6), Melaluca quinquenervia (T7), Glochidion ferdinadii (T10) and two Ficus rubiginosa (T17 and T32). The Melaleucas on the site are potentially part of a large community that exists in the locality, from St Patricks on Darley Road to Shelley Beach, and not planted.

The canopy of the trees (T29,T30, T31) along the north of the property provide important connectivity to other areas of habitat for birds and some marsupial species on the adjacent reserve and property.

3.5 Habitat and Presence of Other Flora and Fauna Species

Non threatened Fauna

The site contains habitat for a wide range of non-threatened fauna including reptiles (Water Skinks and Garden Skinks), birds and mammals. Brush Turkeys (*Alectura lathami*), Eastern Water Dragons (Physignathus lesueurii), and Pied Currawong (*Strepera graculina*) were observed during the site survey. A Brush Turkey nest was found on the site and four young Brush Turkeys were observed on the site and the adjacent property to the west. Brush Turkey nests were also found in the council reserve to the east of the property. European Rabbits (*Oryctolagus cuniculus*) were observed on the site. The *Melaleuca quinquenervia,* and *Banksia integrifolia* on the site provide suitable foraging habitat for possums, bats and lorikeets in the area.

Grey-headed Flying-fox and Superb Fruit Dove

Threatened Grey-headed Flying-foxes and micro-bats regularly fly over this property, and there are OEH BioNet records of these species occurring in the locality. There is a large fig tree (T17) and two smaller fig trees, one growing on top of a stump as an epiphyte (T32) and one growing in the concrete fence on the northern boundary of the property, that are suitable food sources for Grey-headed Flying Foxes and Superb Fruit Doves. The proposal will remove the large fig and small fig growing on top of the stump. More than ten fig trees occur on the adjacent reserve, and many of these are large, well-formed trees. There are also many other food trees in the locality and on the site such as the Melaleuca (T31) and Banksia (T16). Fig trees are an important food source for the Vulnerable Grey-headed Flying-fox (Pteropus poliocephalus) and Superb Fruit Doves, the large trees on the site are currently foraging habitat. There is a local Grey-headed Flying Fox colony at Fairlight, approximately 1.5km to the west of the site. This species is highly mobile and likely to use these trees for foraging; therefore, the loss of the fig trees on the site and any potential impact to habitat on the site are considered to be a sufficient impact to warrant an Assessment of Significance (5-Part Test).

Microbats

There is good foraging habitat in the adjacent reserve for microbats including the Southern Myotis. The existing dwelling has many crevices and areas of potential roosting habitat. There are also potential roosting spots within crevices in the sandstone boulders and dry sandstone retaining walls. The garage/boat shed in the north of the site is potential microbat roosting habitat. The plans show no change to the structure and therefore there is no further mention in this report. Potential roosts were inspected with a torch for the presence of microbats during the survey. No microbats were observed. Microbats are highly mobile, and there is likely to be roosting habitat in the locality including in the National Park. The demolition of the existing house and landscaping is considered an impact on microbat species and warrants an Assessment of Significance (5-Part Test). The sandstone boulders on the property are proposed to be retained.

Eastern Pygmy Possum

Approximately ten years ago, the local population of Eastern Pygmy Possum and Brown Antechinus became extinct, and the local population of native Bush Rat population became non-viable or locally extinct. The Sydney Harbour Federation Trust employed the conservation group, Australian Wildlife Conservancy to manage the fauna on part of North Head. As part of their management, in collaboration with Sydney University, they reintroduced the Eastern Pygmy Possum, Brown Antechinus and the native Bush Rat to North Head. The three species are all breeding, and the local populations are becoming established, with the Bush Rat population being the most successful. So far as they are out-competing the introduced Black Rat and now the population covers most of North Head.

The native Bush Rat can possibly be found in the urban area; however, it is unlikely that the Antechinus or the Pygmy Possum occur in the urban area yet.

Threatened Plants

There are local populations of the endangered Magenta Lillypilly, *Syzygium paniculatum and* Sunshine Wattle (*Acacia terminalis subsp. terminalis*) on North Head and the Magenta Lillypilly has been recorded in the adjacent Bower Street Gully Reserve but it does not occur on this site.

No evidence was found of any other Threatened Species, Population or Endangered Ecological Community on this property at the time of the survey. None of the other six (6) endangered and twenty-eight (28) vulnerable fauna species that occur in the Manly area where found on the site or have important habitat on the site.

3.6 Ecological Communities

The NSW Threatened Species Conservation Act (TSC), 1995 and the Federal Environment Protection and Biodiversity Conservation (EPBC) Act 1999, both list Threatened Ecological Communities. Threatened ecological communities can be either Vulnerable (VEC) or Endangered (EEC) or Critically Endangered (CEEC) Ecological Communities under the TSC Act. The Federal Act lists only Endangered or Critically Endangered Ecological Communities. These communities are likely to become extinct in nature unless the circumstances and factors threatening their survival cease to operate. The listing is most commonly referred to as a determination, which is a several page definition of the community written by a scientific committee and listed in the schedules of the Act.

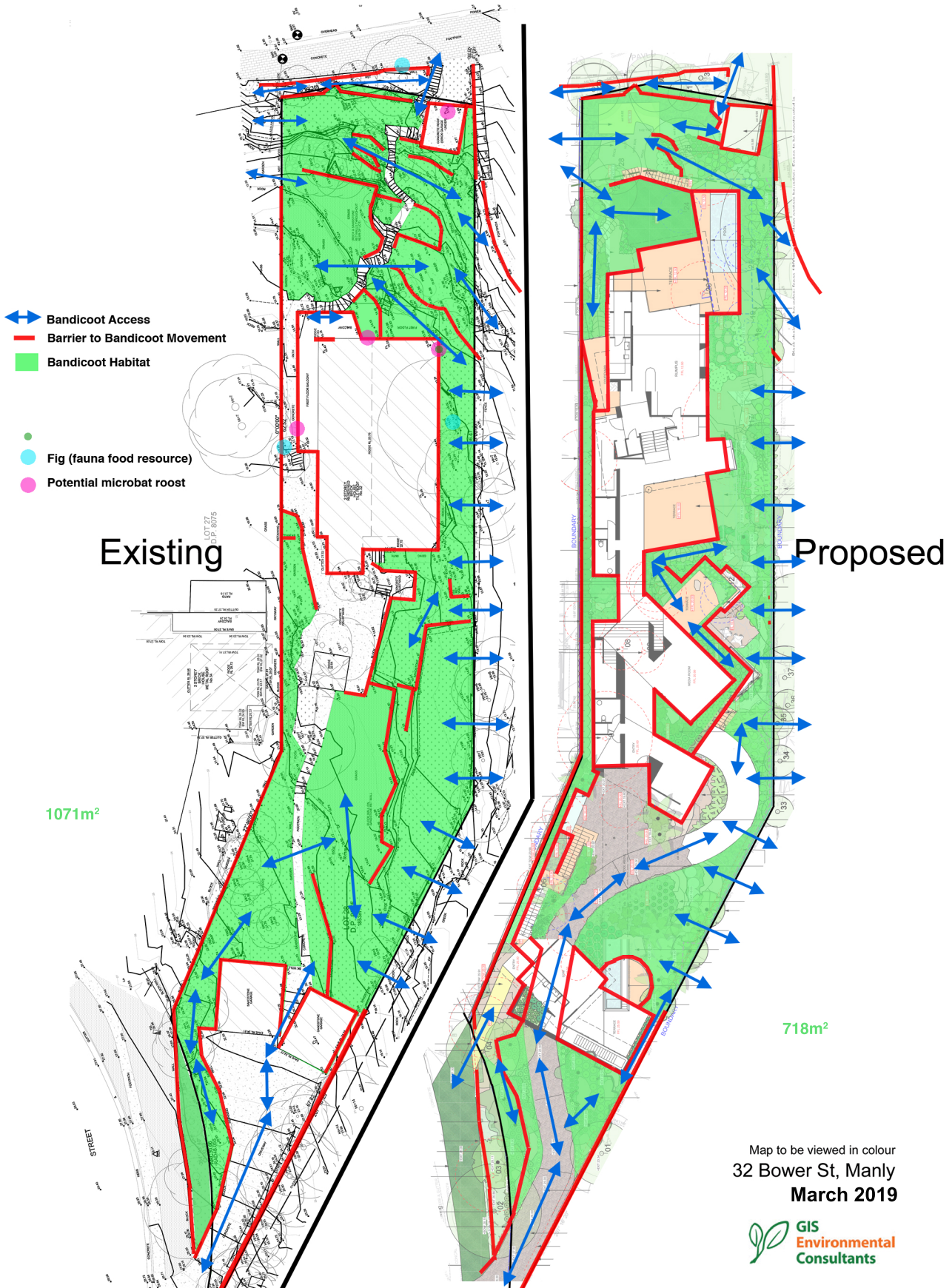
During the site survey, the likelihood of Endangered Ecological Communities occurring on the site was determined using a three-step approach: 1. Has the community been recorded in the locality? 2. Is there a sufficient density of characteristic species on the site? 3. Does the environmental description in the Determination fit the site?

Littoral Rainforest Endangered Ecological Community

Littoral rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions endangered Ecological Community (EEC) is generally a closed forest, the structure and composition of which is strongly influenced by proximity to the ocean. The plant species in this ecological community are predominantly rainforest species with evergreen mesic or coriaceous leaves.

There are not enough native species on the site or the correct structure for the vegetation on the site to represent any native vegetation community (See Plant List in Appendix A). No Endangered Ecological Community occurs on the site.

Map 1: Changes to Bandicoot Habitat and Access



Map to be viewed in colour

32 Bower St, Manly

March 2019

GIS Environmental Consultants

4 Impact Assessment

This Test of Significance is in accordance with the Threatened Species Assessment Guidelines recommended for use by Manly Development Control Plan 2013 (MDCP 2013) in section 2.1.15.2 (a).

4.1 Test of Significance (5-part test) for the Long-nosed Bandicoot Population

Part 7.3 of the BC Act, Test of Significance (5-part test) for impact of the proposed development on the Long-nosed Bandicoot Population at North Head

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

Response:

The Long-nosed Bandicoot population on North Head is listed in Schedule 1, Part 2, Division 4 of the BC Act 2016 as an Endangered Species Population.

The local population is viable at least in the short term. In May 2015, a total of 152 individual Long-nosed Bandicoots were trapped at North Head, compared to 99 in 2014, and 71 in 2010. The sex ratio of the bushland population is relatively even. Under current conditions, the North Head Long-nosed Bandicoot population has a 62% chance of persisting after 50 years. This figure has dropped from 80% in since the previous PVA, due to the slightly higher sex specific adult mortality rates used in the current PVA's (Price & Banks, 2015). The latest PVA analysis determined that the population is stable and has been for the last few years.

The study site currently provides 1071m^2 (or 57% of the site) of good quality foraging habitat in the front and rear yards. The proposal will result in a permanent loss of 353m^2 of foraging habitat from with the property. The proposal will provide 718m^2 (38% of the site) of potential foraging habitat in the form of landscaping in the front, rear and side of the property. (See before and after Green areas on Map 1).

Access to habitat on the property (See Dark Blue arrows on Map 1) will not be changed by the proposal. See Map 1 for proposed bandicoot habitat and access to, from and within the site.

This population is restricted to North Head, which has an area of 385 ha, of which only a negligible amount will be lost due to the proposed development. The change in bandicoot habitat is of a scale that is not likely to lead to the reduction in the population size or reproduction success of individuals, the population or their habitat. The proposal is not likely to have a significant negative effect on the life cycle of this population such that the viability of the population is compromised and placed at risk of extinction.

> *(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:*
>
> > *(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
> >
> > *(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

Response:

The Long-nosed Bandicoot Population at North Head is listed as a threatened population and not an Endangered or Critically Endangered Ecological Community; therefore, this question is not applicable.

(c) in relation to the habitat of a threatened species, population, or ecological community:

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

Response:

The study site currently provides 1071m^2 (or 57% of the site) of good quality foraging habitat in the front and rear yards. The proposal will result in a permanent loss of 353m^2 of foraging habitat from with the property. The proposal will provide 718m^2 (38% of the site) of potential foraging habitat in the form of landscaping in the front, rear and side of the property. (See before and after Green areas on Map 1).

This population is restricted to North Head, which has an area of 385 ha, of which only a negligible amount will be lost due to the proposed development.

This population and a large part of the suitable habitat on North Head is situated within Sydney Harbour National Park and land managed by the Sydney Harbour Federation Trust as a conservation area. A significant proportion of this population also occurs on St Patrick's Estate and other private urban land on North Head.

The change in the **extent** of bandicoot habitat is of a scale that is not likely to lead to the reduction in the population size or reproduction success of individuals, the population or their habitat. If the recommendations of this report are followed, the proposed development will not change the access to this habitat .

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

Response:

Access to habitat on the property (See Dark Blue arrows on Map 1) will not be changed by the proposal. See Map 1 for proposed bandicoot habitat and access to, from and within the site. If the recommendations are not followed, then the proposal will prevent access to the habitat on the property.

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

Response:

This population is restricted to North Head, which has an area of 385 ha, of which only a negligible amount will be lost due to the proposed development.

The change in bandicoot habitat is of a scale that is not likely to lead to the reduction in the population size or reproduction success of individuals, the population or their habitat. The proposal is not likely to have a significant negative effect on the life cycle of this population such that the viability of the population is compromised and placed at risk of extinction.

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

Response:

There is no Area of Outstanding Biodiversity on the site. The proposal will not directly or indirectly effect any Area of Outstanding Biodiversity Value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Response:

The following Key Threatening Processes are relevant to the Site and/or the proposal

Clearing of native vegetation: The proposal will not remove native vegetation. Therefore, the proposal will not to the increase of this or any other listed Key Threatening Process.

Competition and Grazing by the European Rabbit: There are European Rabbits on the site. The proposal the amount of habitat available for the European Rabbit.

Conclusion to the 5-Part Test of Significance on the Endangered populations of Long-nosed Bandicoots.

It is not likely that the proposal will have a significant impact on the Endangered Long-nosed Bandicoot population at North Head. Entry into the Biodiversity Offset Scheme (BOS) and further assessment in the form of a Biodiversity Development Assessment Report (BDAR) is not considered necessary for this population.

4.2 Test of Significance (5-part test) for the Grey-headed Flying-fox (*Pteropus poliocephalus)*

Part 7.3 of the BC Act, Test of Significance (5-part test) for impact of the proposed development on the Grey-headed Flying-fox.

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

Response:

The proposal will not remove or modify any native bushland. The proposed dwelling is located within the footprint of existing disturbed areas. This site does not contain any roosting camps. The nearest Grey-headed Flying fox colony is at Fairlight, approximately 1.5km to the west of the site. There are two fig trees that provide suitable foraging habitat for this species, tree 17 has surface decay and tree 32 is growing as an epiphyte and both require removal as part of the proposal. The site is likely to be part of a large foraging home range of the Grey-headed Flying-fox. There are more than ten (10) large Fig trees and other food trees adjacent to the property within the Council reserves, including some extremely large trees. This species is highly mobile. It is unlikely that the proposed development will have an adverse effect on the life cycle of this species such that the viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

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

Response:

Grey-headed Flying-foxes are not an Endangered or Critically Endangered Ecological Community; therefore, this question is not applicable.

(c) in relation to the habitat of a threatened species, population, or ecological community:

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

Response:

Trees 17 and 32 are fig trees on the site that will be impacted. The proposal will not remove any breeding habitat. There is suitable foraging habitat in the locality including in the reserve adjacent to the site. The change in the **extent** of Flying-fox habitat is of a scale that is not likely to lead to the reduction in the population size or reproduction success of individuals, the population or their habitat. If the recommendations of this report are followed, the proposed development will not change the access to this habitat .

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

Response:

The vegetation on the property is likely part of a large foraging range. Grey-headed Flying-foxes are a highly mobile species that travel up to 50km per night from the main roost, the proposal will not fragment or isolate areas of habitat for this species.

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

Response:

There are three fig trees that provide suitable foraging habitat for this species and two will be removed as part of the proposal. The site is likely to be part of a large foraging home range of the Grey-headed Flying-fox. There is a local Grey-headed Flying fox colony at Fairlight, approximately 1.5km to the west of the site. There is no roosting colony on the site. There are more than ten (10) large Fig trees and other food trees adjacent to the property within the Council reserves, including some extremely large trees. This species is highly mobile. It is unlikely that the proposed development will have an adverse effect on the life cycle of this species such that the viable local population is likely to be placed at risk of extinction.

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

Response:

There is no Area of Outstanding Biodiversity on the site. The proposal will not directly or indirectly effect any Area of Outstanding Biodiversity Value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Response:

The following Key Threatening Processes are relevant to the Site and/or the proposal

Clearing of native vegetation: The proposal will not remove native vegetation. Therefore, the proposal will not to the increase of this or any other listed Key Threatening Process.

Competition and Grazing by the European Rabbit: There are European Rabbits on the site. The proposal the amount of habitat available for the European Rabbit.

Conclusion to the 5-Part Test of Significance on the Threatened species Grey-headed Flying-fox

It is not likely that the proposal will have a significant impact on the Grey-headed Flying-fox. Entry into the Biodiversity Offset Scheme (BOS) and further assessment in the form of a Biodiversity Development Assessment Report (BDAR) is not considered necessary for this population.

4.3 Test of Significance (5-part test) for Microbats

Part 7.3 of the BC Act, Test of Significance (5-part test) for impact of the proposed development on the Grey-headed Flying-fox.

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

Response:

The proposal will not remove or modify any native bushland. The proposed dwelling is located within the footprint of existing disturbed areas. This site does not contain any roosting camps. The Little Bentwing-bat and the Eastern Bentwing-bat are two species of microbats that forage for insects over the treetops of forested area, the vegetation on the site and adjacent reserve provide suitable foraging habitat for these species. The removal of eight trees on the site and small reduction in vegetation cover on the property is not likely to affect any foraging microbat species in the area. The Southern Myotis may forage in the creek line on the adjacent reserve. The proposal will not affect this habitat.

Microbat species such as the Eastern Bentwing-bat, Little Bentwing-bat and the Southern Myotis use caves as the primary roosting habitat but are also known to use buildings and hollow bearing trees. Rock features such as caves and rock crevices, hollows in the large fig (T17) and the several crevices and small openings in the existing house are all suitable roosting habitat for microbat species (see Photo Page 2). The rock features and opening in the house were thoroughly searched during the field survey on the 12th of February 2019 and no evidence of microbat species roosting was found. The fig tree (T17) with hollows has been recommended for removal in the report by Botanics, Tree Wise People Pty Ltd January 2019.

The Eastern Bentwing-bat and Little Bentwing-bat form large maternity roosts, it would be very obvious if the site was used as a maternity roost. The potential roosting habitat provided by the existing building will be demolished. The sandstone boulders will be retained. There is likely to be similar roosting habitat in the locality. It is not likely that the proposal will have any effect on the life cycle of microbat species and the proposal

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

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

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

Response:

Microbats are not an Endangered or Critically Endangered Ecological Community; therefore, this question is not applicable.

(c) in relation to the habitat of a threatened species, population, or ecological community:

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

Response:

The proposal will demolish the existing dwelling that contains crevices and small openings which are potential roosting habitat for microbat species. The sandstones boulders and outcrops are proposed to be retained. The house was searched during the field survey on the 12th of February 2019 and no evidence was found of microbat species using the house for roosting. The property is adjacent to a reserve and within 150m of North Head, both provide suitable foraging and roosting habitat for microbat species. The loss of habitat on the site is not likely to lead to the reduction in the population size or reproduction success of individuals, the population or their habitat.

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

Response:

The vegetation on the property is likely part of a large foraging range. Microbats are highly mobile species and the removal of the house and small area of vegetation on the property are not likely to fragment or isolate areas of habitat.

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

Response:

The house and sandstone rock features contain crevices and small openings, these were searched during the field survey and no evidence was found of microbats using these as

roosting habitats. Microbats have a number of temporary roosting sites and are not dependent on one. There is no known maternity roosts for microbat species in the locality and none were observed on the site. The site is likely to be part of a large home range. The proposal is not likely to impact the long term survival microbat species in the area such that the viable local population is likely to be placed at risk of extinction.

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

Response:

There is no Area of Outstanding Biodiversity on the site. The proposal will not directly or indirectly effect any Area of Outstanding Biodiversity Value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Response:

The following Key Threatening Processes are relevant to the Site and/or the proposal

Clearing of native vegetation: The proposal will not remove native vegetation. Therefore, the proposal will not to the increase of this or any other listed Key Threatening Process.

Competition and Grazing by the European Rabbit: There are European Rabbits on the site. The proposal the amount of habitat available for the European Rabbit.

Conclusion to the 5-part Test of Significance on Threatened Microbat species.

It is not likely that the proposal will have a significant impact on Microbat species. Entry into the Biodiversity Offset Scheme (BOS) and further assessment in the form of a Biodiversity Development Assessment Report (BDAR) is not considered necessary for this population.

4.4 Manly LEP 2013 Assessment of Clause 6.5 (3) & (4), Terrestrial Biodiversity

Manly LEP 2013 'Terrestrial Biodiversity Map' shows the subject property is located within an area identified as of 'Terrestrial Biodiversity'.

Therefore Clause 6.5 of MLEP 2013 applies to this Development Application and the objectives of the clause and in particular points (3) and (4) must be considered in regard to this proposal.

4.4.1 Clause 6.5 (3) Assessment

a) Whether the development is likely to have:

i. Any adverse impact on the condition, ecological value and significance of the fauna and flora on the land?

Response: The site survey found evidence of the Long-nosed Bandicoot utilising the site and adjacent land. It is likely that bandicoots use the adjacent properties and nearby bushland areas for foraging and probably resting and breeding, and they have been recorded regularly in the locality.

Other fauna that are likely to use site include possums, Rainbow Lorikeets, Noisy Minors, Sulphur Crested Cockatoo, Garden Skinks, Eastern Water Dragon and Brush turkeys, Crested Pigeon. Many Brush Turkeys and Eastern Water Dragons were observed on the site during the

survey. Brush Turkeys were observed nesting on the property and the adjacent bushland reserve and young Brush Turkeys were observed on the property.

The study site currently provides 1071m^2 (or 57% of the site) of good quality bandicoot and Brush turkey foraging habitat in the front and rear yard (See before and after Green areas on Map 1). The site contains some native tree species which have been recommended to stay or relocated within the site. The Site also contain three fig trees that are suitable foraging for Grey-headed Flying-fox. The sandstone boulders and retaining walls provide sheltering habitat for Eastern Water Dragon and microbats. The existing building is also potential microbat roosting habitat. No evidence of microbat roosting was observed during the site survey.

The proposal will remove 353m^2 of habitat from the front and rear of the property. This is a very small loss of habitat, considering the amount of similar or better-quality habitat in the locality. The proposal will provide 718m^2 (38% of the site) of potential habitat in the form of landscaping in the front, rear and side of the property.

The proposal will remove one exotic Dragon Tree (*Dracaena marginate*), Cocos Palm (*Syagrus romanzoffiana*) and Bhutan cypress (Cupressus torulosa) which are low value habitat and a Chinese Cabbage Palm (*Livistona chinensi*), Paperbark (*Melaleuca quinquenervia)*, Sweet Pittosporum (*Pittosporum undulatum*) and Cheese Tree (*Glochidion ferdinandi)* which provide some foraging habitat to native species. The proposal will remove a two fig trees that are suitable for Grey-headed Flying-foxes. The sandstone boulders on the site will be retained.

The Landscape Plan (Secret Garden 22/02/19) proposes to plant local native species.

Access to the habitat will not change for birds or arboreal mammals such as possums that are using the site.

Access to the habitat for bandicoots (See Dark Blue arrows on Map 1) will not be changed by the proposal. Recommendations have been made to maintain or provide access (see Magenta arrows on Map 1).

No evidence was found of any other Threatened Species, Populations or Endangered Ecological Communities utilising this property.

Based on the information gathered and the assessments of potential impacts of the proposal on flora and fauna in section 3 of this report, it is considered that the proposal will not have any adverse impact on the condition, ecological value and significance of the fauna and flora on the land.

ii. Any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna?

Response: The vegetation on the site is medium-low quality habitat for a wide range of fauna including reptiles, birds and mammals. Brush-tailed and Ring-tailed Possums are likely to occur. There is no native vegetation community on the property. The proposal will remove one exotic Dragon Tree (*Dracaena marginate*), Cocos Palm (*Syagrus romanzoffiana*) and Bhutan cypress (Cupressus torulosa) which are low value habitat and a Chinese Cabbage Palm (*Livistona chinensi*), Paperbark (*Melaleuca quinquenervia)*, Sweet Pittosporum (*Pittosporum undulatum*) and Cheese Tree (*Glochidion ferdinandi)* which provide some foraging habitat to native species. The Landscape Plan (Secret Garden 22/02/19) proposes to plant local native species.

Based on the findings and assessment of the impact of this proposal on flora and fauna in sections 3 and 4 of this report, fauna habitat is not likely to be adversely impacted by the proposal and the habitat is not likely to be important habitat for these species due to the higher quality bushland habitat to the east in Sydney Harbour National Park. The proposed

development will not have any adverse impact on the importance of the vegetation on the land to the habitat and survival of native fauna.

It is recommended that local native species be used in landscaping on the property to improve that habitat value of the vegetation to native fauna.

iii. Any potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land?

Response: Based on the findings and assessment of the impact of this proposal on flora and fauna in sections 3 and 4 of this report, the proposed development will not significantly fragment, disturb or diminish the current biodiversity structure, function and composition of the subject site. See section 4 for details.

Any adverse impact on the habitat elements providing connectivity on the land?

Response: The site is located in a residential area surrounded by other private properties with a dis-contiguous canopy of trees. The site is not part of an important wildlife corridor. Access to the habitat will not change for birds or arboreal mammals such as possums that are using the site. Access to the habitat for bandicoots (See Dark Blue arrows on Map 1) will be changed by the proposal. Recommendations have been made to maintain or provide access (see Magenta arrows on Map 1).

Based on the findings and assessment of the impact of this proposal on flora and fauna in sections 3 and 4 of this report, this proposal will not adversely impact on the habitat elements providing connectivity to other areas of suitable habitat.

b) Are there appropriate measures proposed to avoid, minimise or mitigate the impacts of the development?

Response: This report makes recommendations for appropriate measures to avoid, minimise or mitigate the impacts of the development. See the Ameliorative Conditions and Management Recommendations sections of this report for further information.

4.4.2 Clause 6.5 (4) Assessment

a) Is the development designed, sited and will be managed to avoid any significant adverse environmental impact? OR

Response: The development has been designed utilise the site topography and surrounding landscape. The proposal will retain access along all boundaries of the property for movement of bandicoot species. The proposal will retain the natural sandstone builders and outcrops on the site. The recommendations and ameliorative conditions in this report provide measures to manage and mitigate impacts.

b) If the impact cannot be reasonably avoided by adopting feasible alternatives—is the development designed, sited and will be managed to minimise that impact? OR

Response: The development has been designed utilise the site topography and surrounding landscape. The proposal will retain access along all boundaries of the property for movement of bandicoot species. The Landscape Plan (Secret Garden 22/02/19) proposes to plant local native species. The recommendations and ameliorative conditions in this report provide measures to manage and mitigate impacts.

c) If that impact cannot be minimised—will the development will be managed to mitigate that impact?

Response: N/A

Conclusion to the Assessment of Clause 6.5 of the MLEP

The proposal is consistent with the requirements of Clause 6.5 of the MLEP 2013 and is not considered to have a significant adverse impact on terrestrial biodiversity

4.5 State Environmental Planning Policies and Sydney Regional Environmental Plan

4.5.1 SEPP 19 Bushland in Urban Areas Assessment

The site does not contain natural vegetation with intact structure and floristics and therefore does not fit the definition of Bushland as described in SEPP 19 (Bushland in Urban Areas 1986).

The proposed works, with the amelioration recommendations described in this report, will have a very low impact on the environment, they will not disrupt any fauna corridor, they will not endanger and plant or animal species, they will not cause significant erosion and they will not change the accessibility or recreational value of bushland. The proposed works therefore are considered generally to meet the objectives of SEPP 19.

4.5.2 SREP Sydney Harbour Catchment 2005 Assessment

The site is not included within the Sydney Harbour Catchment Map and therefore assessment with respect to SREP Sydney Harbour Catchment is not required. However, this proposal is consistent with the matters to consider in respect to the biodiversity, ecology and environment protection of the site.

4.5.3 SEPP Coastal Management 2018 Assessment

The site is mapped as Costal Use Area in the Coastal Management SEPP 2018. There are no ecological requirements in the Coastal Use Area in Clause 14 of SEPP.

The site is not mapped as containing Littoral Rainforest, Coastal Wetland, Proximity to Littoral Rainforest or Proximity to Coastal Wetland.

4.6 EPBC Act 1999 Assessment

Flora, fauna and ecological communities within Manly, which are listed under the EPBC Act:

Eastern Suburbs Banksia Scrub is listed as Endangered.

Grey-headed Flying Fox (*Pteropus poliocephalus*) is listed as Vulnerable.

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia is listed as Critically Endangered.

Sunshine Wattle (*Acacia terminalis subsp. terminalis*) is listed as Endangered.

Seaforth Mintbush (*Prostanthera marifolia*) is listed as Critically Endangered.

Pimelea curviflora var. curviflora is listed as Vulnerable.

North Head is listed as a National Heritage Place. About 277ha, at Manly, comprising the whole of the headland, to Low Water, south of a line commencing at Low Water north of Collins Beach on the alignment of the north-west boundary of Lot 2763 DP752038, then easterly via that alignment and boundary and then following the north-westerly boundaries of Lot 2774 DP752038 Lot 2728 DP752038, Lot 2764 DP752038 and Lot 2763 DP752038 to the most northerly point of Lot 2763 DP752038, then generally easterly via the north-east and northern boundaries of Lot 2763 DP752038

and the alignment of the latter segment to Low Water. Excluded is the North Head Sewage Treatment Plant being the whole of Lot 1 DP604428.

The only matters of relevance to this proposal are migratory species, threatened species and communities and national heritage places. North Head is on the National Heritage List as of 12 May 2006 but the listing does not include this part of North Head. This Endangered Bandicoot Population is not listed in this Act. The relevant matters of National Environmental Significance have been considered. This proposal is not considered likely to have an impact on any matter of National Environmental Significance and referral is not required.

4.7 Biodiversity Conservation Act 2016, Threshold Test

This proposal is **not** considered to meet the BC Act threshold as;

1. The lot size is less than 1ha and there is less than 0.25ha of native vegetation being removed. **and**
2. The proposal will not directly or indirectly a declared Area or Outstanding Biodiversity Significance (AOBV) or an area mapped as having high biodiversity value on the "Biodiversity Values Map". **and**
3. There is not likely to be a significant affect (5-part test of significance test in Section 7.3, BC Act) on any Threatened species or ecological community or their habitat as has determined by this report.

Therefore, the proposal does not need a Biodiversity Development Assessment Report (BDAR).

5 Conclusions

The site surveys found evidence of the Long-nosed Bandicoot using the front and rear garden beds at the site. It is likely that bandicoots use the adjacent properties and nearby bushland areas for foraging and probably resting and breeding, and they have been recorded regularly in the locality.

The study site currently provides 1071m^2 (or 57% of the site) of good quality bandicoot foraging habitat in the front and rear yards. The proposal will result in a permanent loss of 353m^2 of foraging habitat from with the property. The proposal will provide 718m^2 (38% of the site) of potential bandicoot foraging habitat in the form of landscaping at the front, rear and side of the property. (See before and after Green areas on Map 1). (See before and after Green areas on Map 1).

Access to this habitat (See Dark Blue arrows on Map 1) will not be changed by the proposal. Recommendations have been made to maintain or provide access (see Magenta arrows on Map 1).

The site also provides suitable habitat for Threatened microbats and the Grey-headed Flying-fox and the native Water Dragon and Brush Turkey.

The development is unlikely to have a significant impact on the conservation of any Endangered Population, Threatened Species or Endangered Ecological Community. The proposal does not meet the BC Act Threshold Test. Further assessment of the impact of this proposal in the form of a Biodiversity Development Assessment Report (BDAR) not recommended in relation to this development application at this site.

The ecological impact is not considered an unacceptable impact under section 4.15 (79C(b)) of the Environmental Planning and Assessment Act 1979 or a significant impact under Section 7.3 of the Biodiversity Conservation Act 2016.

The proposal is not considered to be a 'matter of National Environmental Significance (NES)' EPBC Act referral of the proposal to the Department of the Environment and Water Resources is not considered necessary.

The proposal will not have a significant impact to terrestrial biodiversity and meets the requirement of clause 6.5 of the MLEP.

We recommend that the ameliorative conditions and management recommendations in this report be followed to limit disturbance during construction and to further reduce the impact of the proposal on potential bandicoot habitat and access.

6 Ameliorative Conditions

- Access is to be maintained along the east and west boundaries at the northern end of the property to maintain the east-west corridor.
- Access is to be maintained to and from the Shelley Beach habitat at the north of the property through gaps under the gated pedestrian access in the northern boundary of the property.
- Access is to be maintained to the property to the west from the existing gap in the northern section of the fence along the western boundary.
- Access is to be provided to habitat along the southern boundary (Bower St) through 150mm gaps under any pedestrian gates and driveway gate.
- Access is to be provided from the front to the rear yard along the eastern and western boundaries.
- Access is to be maintained to and from the property to the west from the rear yard.
- Replacement boundary fences are to have 150mm-300mm gaps every two metres along the fence. The Landscape Plan (Secret Garden 22/02/19) includes suitable gaps in the replacement fence along the eastern boundary.
- There is to be no access for bandicoots to the pool areas.
- It is recommended that any new replacement internal gates (excluding the pool gate) have gaps of at least 150mm under the full length of the gate.
- If any Bandicoot enters the site during works must be stopped until the Bandicoot has safely exited the site.
- Any injured or dead Long-nosed Bandicoots within the site must be reported National Wildlife Services or Northern Beaches Council.
- If the plans change from what is described in this report or what is shown on Map 1 then the impacts will change, and this report may need reviewing.
- In areas of habitat for the long-nosed bandicoot, landscape design should include native plant species to provide new and/or improved low dense clumping habitat to provide for potential foraging and nesting. The planting schedule should comprise species such as *Lomandra sp. Dianella* sp., *Banksia spinulosa, Caustis* sp., *Xanthorrhoea* sp., *Isolepis* sp., *Juncus* sp., *Calochlaena* sp., *Callistemon* sp., *Gleichenia sp.* and *Grevillea* 'Robyn Gordon' (Manly DCP 2013 Section 3.3.1 [a][iv]). This recommendation has been adopted in the Landscape Plan (Secret Garden 12/03/19).
- To the untrained eye an Endangered Long-nosed Bandicoot may be mistaken for a rat. To avoid direct physical harm to Long-nosed Bandicoots, it is important that workers on the site are aware of their presence and their conservation significance and the steps to take to protect them.

- While temporary fencing around the construction area is usually a standard requirement, even purpose-built fencing has been known to be ineffective in excluding bandicoots from construction sites. It is therefore essential that daily checks be undertaken to ensure the construction/works areas are free of bandicoot occupation including sheltering sites. All excavations and stockpiles of construction material are to be inspected daily prior to commencing operation to ensure that no bandicoots are sheltering in these areas. In the case that a Long-nosed Bandicoot is encountered within one of these work areas, no work shall proceed until the bandicoot has safely vacated the works area.
- **Noise and vibration** discourage bandicoot occupation of this and adjacent sites. Normal construction hours are to be adhered to, with no machinery to be used outside the hours of 7:30am and 4:30pm.
- **Bright lighting** discourages bandicoot occupation. No bright lighting or motion detectors are to be installed to illuminate the lawn or garden areas. A modest amount of low lighting is acceptable for safety purposes only.
- While bandicoots can swim short distances, they are not strong swimmers and as such pools and ponds, which present a fairly unnatural water body edge, can become a drowning hazard for bandicoots. The pool design should allow bandicoots to be able to climb out the water if necessary.

7 Management Recommendations

- The Companion Animals Act 1998 requires that dog and cat owners ensure that their cat or dog does not threaten or harm a person or animals.
- Domestic cats and dogs should be kept indoors from dusk to dawn. Cats should only be allowed outside if in a sealed cat run. Example solutions can be seen at these internet addresses:

  http://www.catnip.com.au/design_ideas.html

  http://www.catnets.com.au/

  http://www.catcagesaustralia.com.au/gallery/index.html

  http://www.cat-world.com.au/cat-worldenclosures.htm

  http://www.catmax.com.au/photo-gallery.php
- Dog owners must take all reasonable precautions to prevent your dog from escaping from the property on which it is being kept. If you fail to comply with this requirement, you may be liable for a penalty of $880.
- **Cats should be kept indoors at night,** as there are benefits to both the cat and the community. Yowling and fighting is more of a problem at night. The noise is likely to be intrusive and may keep your neighbours awake. Keeping your cat indoors at night is recommended in the interests of both your cat's safety and community harmony. Many kinds of native wildlife are more active or more vulnerable to hunting at night. There is also evidence that cats hunt more during the night. By keeping your cat indoors, you can help reduce the number of native birds and animals that are killed in your area. Kittens can quickly become accustomed to staying indoors at night. Consider also containing your cat in a cat enclosure on your premises both during the day and during the night. Council Rangers can issue nuisance orders to cat owners.
- Injured bandicoots should be given expert care in order that they can be rehabilitated and returned to the population where possible. It is also important that any deceased bandicoots are reported, so that appropriate investigations can be undertaken to understand the cause of death to inform the future management and recovery of the endangered Long-nosed

bandicoot population. Any **injured or dead Long-nosed Bandicoots** should be reported by phoning Council on 9976 1500 or Office of the Environment and Heritage (OEH) on 131 555

- Modest, low external lighting in the garden should be used at the minimum level required for safety.
- Landscaping watering and additional cover in the form of planting low, dense vegetation will increase the value of the foraging habitat and facilitate bandicoot persistence in the urban mosaic.
- Bandicoots and other native animals should **not be fed artificial foods** as it may cause them nutritional problems and may increase predation.
- Feral animals including cats and/or foxes should never be fed, nor should food be left out where they can access it, such as rubbish bins without lids, or in pet food bowls, as these animals present a significant threat to Long-nosed Bandicoots and other wildlife.
- Rat baiting is to only occur within buildings. No Rat baiting should occur under or around houses.
- Temporary chain wire fencing (minimum 300mm in height is sufficient) is to be installed around all work areas prior to commencement of works. Fencing is to be maintained for the duration of the works. The fence is to be designed to minimise the possibility if Long-nosed Bandicoots accessing works areas.
- The use of insecticides, fertilisers, or snail baits should be avoided on the property. Garden insects will be kept in low numbers if Long-nosed Bandicoots are present.
- When the final North Head Long-nosed Bandicoot Recovery Plan is released it should be implemented where relevant.
- Care should be taken when driving in the area, especially at night as bandicoots have little road sense and cars are a major threat to bandicoots.
- Dead bandicoots should be reported by phoning Council on 9976 1500 as they will assist in monitoring the program.
- Please report all sightings of feral rabbits, feral or stray cats and/or foxes to Council on 9976 1500 or NPWS (OEH) on 9997 6102.

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Photo Page 1. Examples of Gaps in Boundary Fence

Figure 1. Example of gap under boundary fence for bandicoot access

Figure 2. Example of gap under boundary fence for bandicoot access

Figure 3. Example of gap under boundary fence for bandicoot access

Photo Page 2: Microbat habitat on the Property

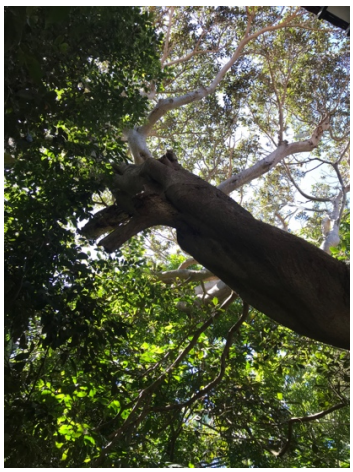
Disused drain pipe opening in the north eastern area on the house.

Opening in the roof tiles in the north facing wall of the house.

Cavernous opening in the north eastern area of the house.

Rock feature in the north of the site.

Cave like storage area on the bottom floor on the western side of the property (door was closed)



Large fig tree (T17) close to eastern boundary of the site

Appendix A - Plant Species List

32 Bower Street, Manly

Febuary 2019

by Nichlas Skelton, GIS Environmental Consultants

GIS Environmental Consultants
Ph: (02) 9939 5129, Mobile: 0419 438 672
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Growth Form	Local Native Species	Planted	Weed	Total
Fern	2		1	3
Grass			1	1
Herb	3	4	5	12
Palm	2	4		6
Scrambler		1		1
Shrub		4	5	9
Tree	6	8		14
Vine		1		1
Total	**13**	**22**	**12**	**47**

Genus and Species	Family	Habit	Order	Common Name	Status
?Cyptocarya triplinervis	LAURACEAE	Tree	DICOTYLEDON		Planted
Agapanthus praecox	AMARYLLIDACEAE	Herb	MONOCOTYLEDON	Agapanthus	Planted
Agave attenuata	AGAVACEAE	Herb	DICOTYLEDON	Century Plant	Weed
Allocasia brisbanensis	ARACEAE	Herb	MONOCOTYLEDON	Cunjevoi	Local Native Species
Archontophoenis cunninghamiana	ARECACEAE	Palm	MONOCOTYLEDON	Bangalow Palm	Local Native Species
Asparagus aethiopicus	ASPARAGACEAE	Herb	MONOCOTYLEDON	Asparagus Fern	Weed
Banksia integrifolia ssp. integrifolia	PROTEACEAE	Tree	DICOTYLEDON	Coastal Banksia	Local Native Species
Camellia sasanqua	THEACEAE	Tree	DICOTYLEDON	Camellia	Planted
Cestrum parqui	SOLANACEAE	Shrub	DICOTYLEDON	Green Cestrum	Weed
Chlorphytum comosum	LILLIACEAE	Herb	MONOCOTYLEDON	Spider Plant	Weed
Commelina cyanea	COMMELINACEAE	Herb	MONOCOTYLEDON	Creeping Christian	Local Native Species
Cordyline australis	LILIACEAE	Tree	DICOTYLEDON	New Zealand Cordyline	Planted
Cupressus sp.	CUPRESSACEAE	Tree	PINOPHYTA	Cypress	Planted
Cyathea cooperi	CYATHEACEAE	Fern	FERN	Straw Tree Fern	Local Native Species
Dianella caerulea var. producta	PHORMIACEAE	Herb	MONOCOTYLEDON	Blue Flax Lily	Local Native Species
Dicksonia antarctica	DICKSONIACEAE	Fern	FERN	Soft Tree Fern	Local Native Species
Dietes grandiflora	LILLIACEAE	Herb	MONOCOTYLEDON	Dietes	Planted
Dracaena marginata	DRACAENACEAE	Tree	MONOCOTYLEDON	Dracaena	Planted
Ehrharta erecta	POACEAE	Grass	MONOCOTYLEDON	Ehrharta	Weed
Elaeocarpus reticulatus	ELAEOCARPACEAE	Tree	DICOTYLEDON	Blueberry Ash	Local Native Species
Eucalyptus saligna	MYRTACEAE	Tree	DICOTYLEDON	Sydney Blue Gum	Planted
Euphorbia pulcherrima	EUPHORBIACEAE	Herb	DICOTYLEDON	Poinsettia	Planted
Euphorbia Tirucalli	EUPHORBIACEAE	Herb	DICOTYLEDON	Pencil Cactus	Planted
Ficus rubiginosa	MORACEAE	Tree	DICOTYLEDON	Port Jackson Fig	Local Native Species
Glochidion ferdinandi var. ferdinandi	EUPHORBIACEAE	Tree	DICOTYLEDON	Cheese Tree	Local Native Species
Hedera helix	ARALIACEAE	Vine	DICOTYLEDON	English Ivy	Planted
Hibiscus sp.	MALVACEAE	Shrub	DICOTYLEDON	Hibiscus	Planted
Howea forsteriana		Palm	MONOCOTYLEDON	Kentia Palm	Planted
Laurus nobilis	LAURACEAE	Shrub	DICOTYLEDON	Bay Tree	Planted
Livistona australis	ARECACEAE	Palm	MONOCOTYLEDON	Cabbage Tree Palm	Local Native Species
Melaleuca quinquenervia	MYRTACEAE	Tree	DICOTYLEDON	Broad-leaved Paperbark	Local Native Species
Monstera deliciosa	ARACEAE	Herb	MONOCOTYLEDON	Swiss Cheese Plant	Weed
Nandina domestica	BERBERIDACEAE	Shrub	MONOCOTYLEDON	Sacred Bamboo	Weed
Nephrolepis cordifolia	DAVALLIACEAE	Fern	FERN	Fishbone Fern	Weed
Olea europa ssp. africana	OLEACEAE	Shrub	DICOTYLEDON	African Olive	Weed
Philodendron bipinnatifidum	ARACEAE	Herb	MONOCOTYLEDON	Philodendron	Weed
Phoenix canariensis	ARECACEAE	Palm	MONOCOTYLEDON	Canary Island Date Palm	Planted

Phoenix roebelenii	ARECACEAE	Palm	MONOCOTYLEDON	Dwarf Date Palm	Planted
Photinia serratifolia		Shrub	DICOTYLEDON		Weed
Pittosporum undulatum	PITTOSPORACEAE	Tree	DICOTYLEDON	Sweet Pittosporum	Local Native Species
Plumeria lutea	APOCYNACEAE	Tree	DICOTYLEDON	Frangipanni	Planted
Rhododendron sp.	ERICACEAE	Shrub	DICOTYLEDON	Azalea	Weed
Rosmarinus officinalis	LAMIACEAE	Scrambler	DICOTYLEDON	Rosemary	Planted
Stenocarpus sinuatus	PROTEACEAE	Tree	DICOTYLEDON	Fire Wheel Tree	Planted
Strelitzia nicolai	MUSACEAE	Shrub	DICOTYLEDON	Travelers Palm	Planted
Syagrus romanzoffiana	ARECACEAE	Palm	MONOCOTYLEDON	Cocos Palm, Queen Palm	Planted
Tibouchina sp.	MELASTOMATACEAE	Shrub	DICOTYLEDON	Tibouchina, Lasiandra	Planted