



TERRESTRIAL BIODIVERSITY REPORT
&
THREATENED SPECIES ASSESSMENT FOR THE
NORTH HEAD LONG-NOSED BANDICOOT
AT
7 BOWER STREET, MANLY

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FLORA AND FAUNA BIODIVERSITY

1 Introduction

1.1 Background

Elements of Terrestrial Diversity (Clause 6.5 Sections [3] & [4] of MLEP - 2013) are required to be addressed and qualified before a development application can be sought on land that has been mapped as having 'terrestrial biodiversity significance' (MLEP – 2013). Manly Council has requested this information in regard to a development application for 7 Bower Street, Manly.

Figure 1 indicates that the entire southern section of the Manly locality, south of Addison Road, that is contiguous with Sydney Harbour National Park, including the area containing Bower Street, is mapped by Manly Council LEP 2013 as having Terrestrial Biodiversity provisions. The site has been identified as containing habitat for the endangered population of Long-nosed Bandicoot (*Perameles nasuta*).



Figure 1 - Section of mapping by MLEP 2013 indicating elements of 'terrestrial biodiversity' (shaded in green) occurring contiguously over the southern section of the Manly LGA south of Ashburner Street.

1.2 Literature review

Existing information on 'Threatened Flora and Fauna of the Locality' was accessed from the Department of Planning, Industry and Environment (DPIE) Bionet Atlas - (June 2020), Department of Agriculture, Water and Environment (DAWE) Commonwealth Protected Matters Environmental Reporting Tool (June 2020), and RoTAP (Briggs and Leigh, 1996) databases. Other literature detailing regionally and locally threatened and significant flora

and fauna, as well as endangered populations and plant communities of the study area, included NSW Scientific Committee Final Determinations (1996 - 2020), The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area (2016), Benson and Howell (1994), and the Manly Council Website (2020).

1.3 Existing development

The subject land at 7 Bower Street, Manly, has a total site area of about 700m². It is located on the south-eastern side of Bower Street. The land has a north-westerly aspect. The existing dwelling is a two-storey detached building with single garage. Figure 2 indicates the location of the property amongst established residences on Bower Street. Figure 3 is an image of the street view of the front facade of the dwelling with an unmanaged area of lawn grass and perimeter plantings of mostly ornamental small trees and shrubs.



Figure 2 - Aerial view of location of 7 Bower Street, Manly, (bounded in red outline) amongst surrounding residential development. Note slight inaccuracy in positioning of side boundaries in the image (SIXmaps DPIE 2020)



Figure 3 View of front facade of current dwelling and unmanaged grassed front yard with perimeter ornamental plantings and rockeries on the RHS side of the yard. Existing vegetation indicated above includes a mature tree of Frangipani, Oleander, Hibiscus, Amaranthus and other plantings

The rear (south-eastern) yard consists of an unmanaged exotic grassland of Buffalo Grass, Kikuyu and Common Couch with exposed sandstone outcrops and some perimeter plantings of ornamental small trees, shrubs and ground cover plants. Figure 4 indicates the view to the rear of the dwelling.

The range of ornamental and some indigenous plant species occurring at the front garden, side gardens and rear yard are listed in Appendix 1.



Figure 4 View of rear facade of current dwelling and unmanaged grassed rear yard with perimeter ornamental plantings on the LHS side of the yard. Existing vegetation indicated above includes a mature tree of European Olive, Red Flowering Gum, Camellia, White Cedar and other plantings

1.4 Proposed development

The Development Application proposes:

The proposed development is to demolish the existing house and locate a new two-storey dwelling at the site.

Also proposed is a single storey pavilion, a partially excavated double garage and a new natural pool of length 15m and width 2.6m, constructed along the northern side of the site partially excavated into bedrock, with stream to biofilter the proposed ponds.

Figure 5 indicates the proposed site plan for the development and Figure 6 indicates the proposed ground floor plan for the development.

Figures 7 & 8 indicate the landscape plan for the front garden and street verge of the property and rear garden and pool area respectively, the landscape plans indicating the designed and dedicated Bandicoot corridors that extend along both sides of the length of the property.

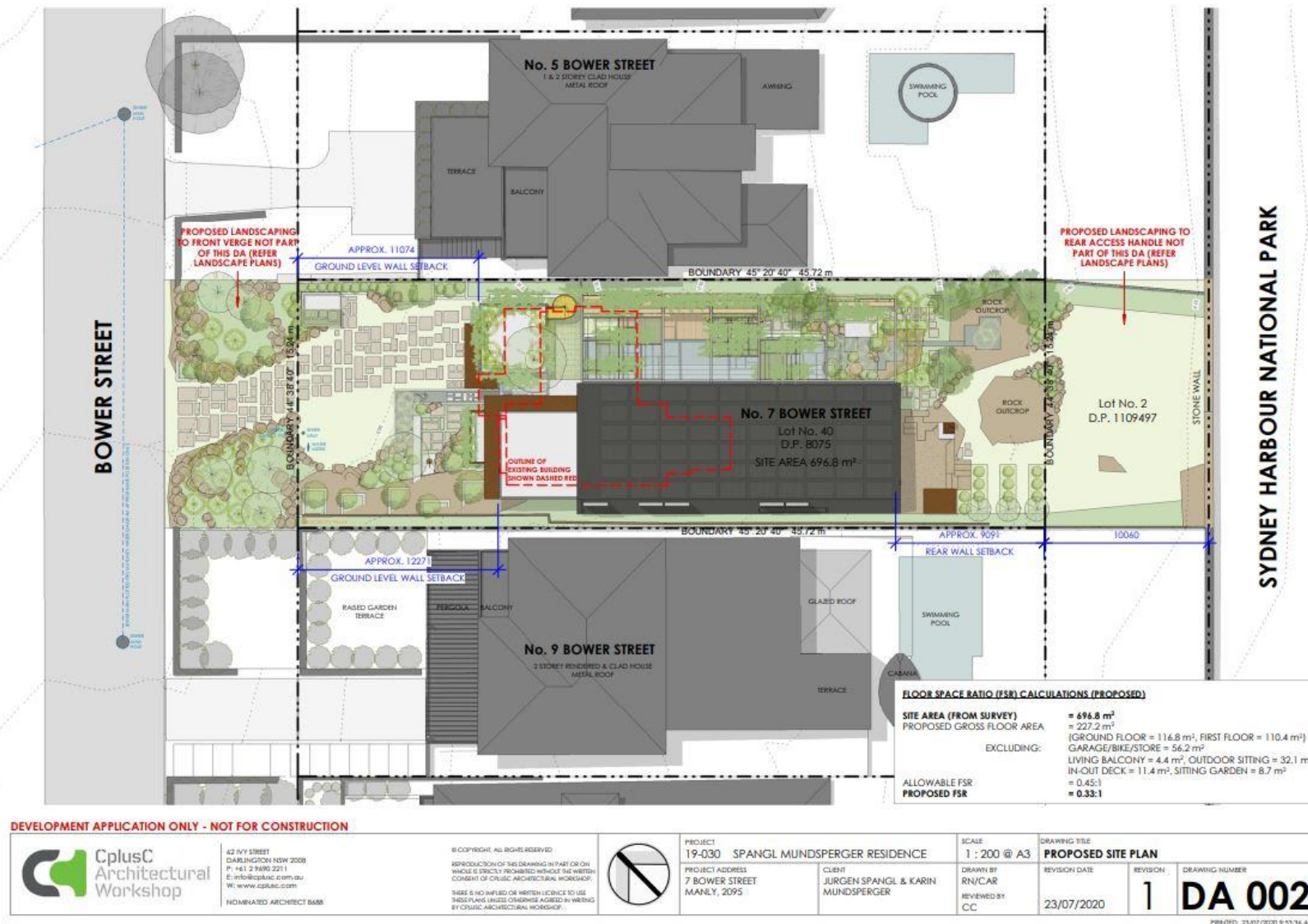


Figure 5 - Site plan of proposed new dwelling house at 7 Bower Street, Manly (see final architectural plans from CplusC Architectural Workshop Revision 1 (2020))

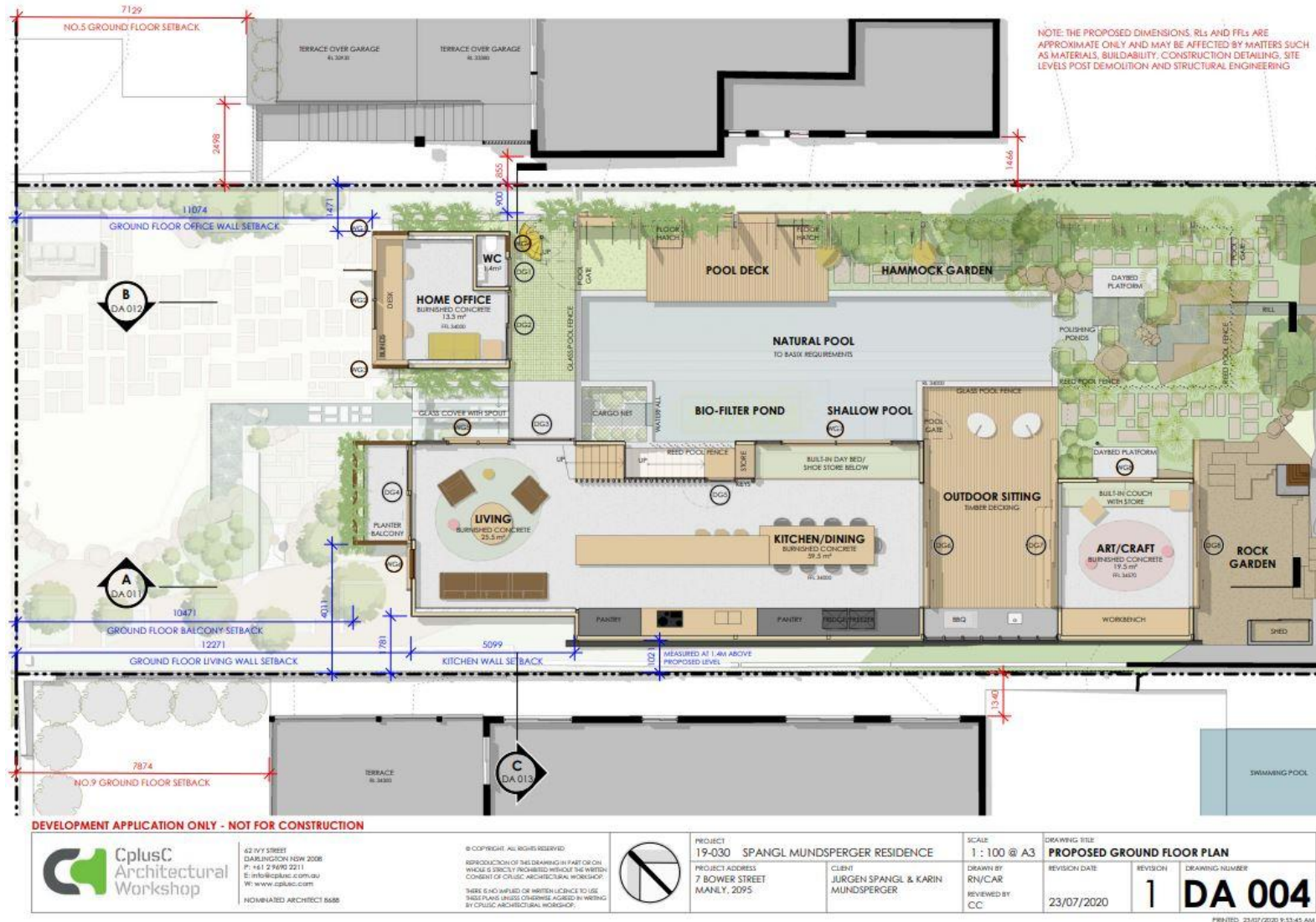


Figure 6 - Ground Floor plan of proposed new dwelling house at 7 Bower Street, Manly (see final architectural plans from CplusC Architectural Workshop Revision 1)

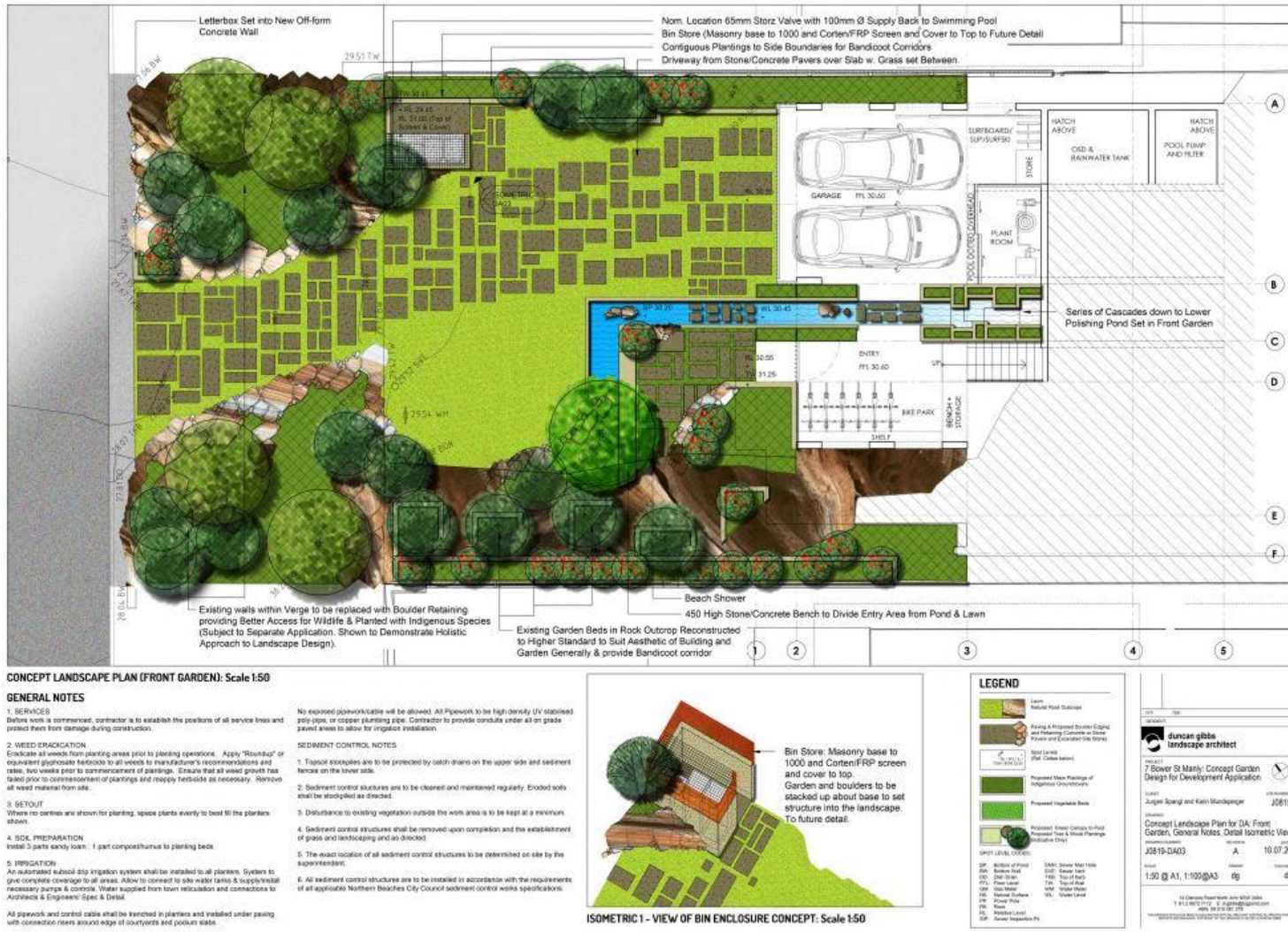


Figure 7 - Landscape Concept plan for Front Garden for 7 Bower Street, Manly (see detailed final landscape plans from Duncan Gibbs Landscape Architect 10/07/2020)

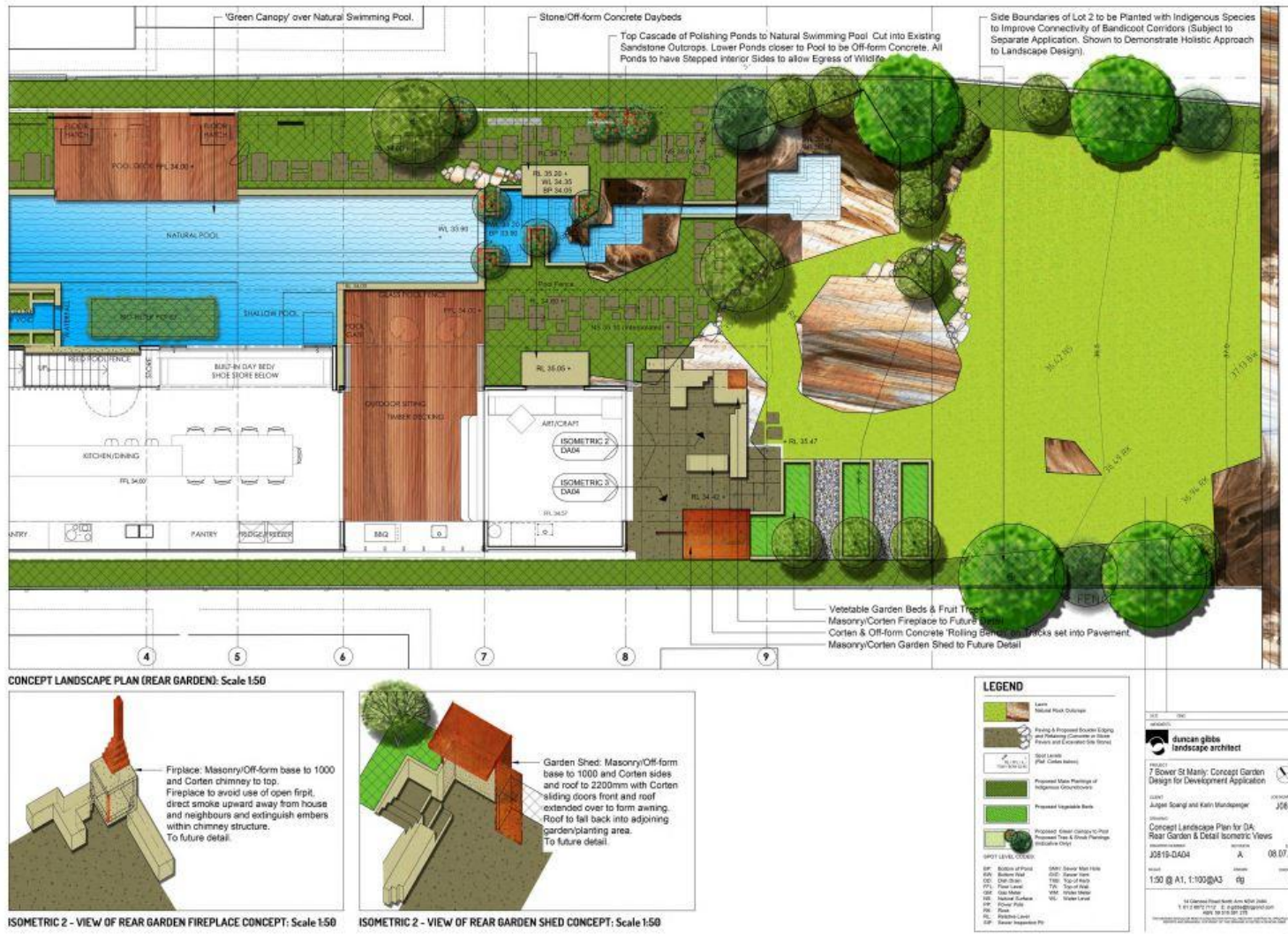


Figure 8 - Landscape Concept plan for Rear Garden & Pool Area for 7 Bower Street, Manly (see detailed final landscape plans from Duncan Gibbs Landscape Architect 8/07/2020)

2 PART A - FLORA AND FAUNA BIODIVERSITY

2.1 Biodiversity survey

The subject site was inspected by ACS Environmental on the 17nd of June 2020.

For flora, a comprehensive survey of the area was undertaken for indigenous and exotic species in the front and side and garden sections.

For fauna, an opportunistic survey of all species utilising resources on the subject land was undertaken. Scats or other signs of fauna activity were noted. Potential habitat for threatened fauna species known to occur within the immediate area was assessed.

2.2 Vegetation description and ecological status

All of the outside areas of this property have been landscaped utilising mostly exotic species (see Section 1.3).

Areas of unmanaged exotic lawngrass typically occur in central section of the front and rear yards (Figure 2). Exotic grass cover is mostly afforded by Buffalo Grass with Kikuyu and Common Couch also prevalent (Figures 3 & 4).

Species occurring in the currently unmanaged perimeter landscaped areas and within rockeries include Abelia (*Abelia chinensis*), White Cedar, European Olive, Agave, Bird-of-Paradise Flower, Travellers Palm, Oleander, Hydrangea, Frangipani, Madagascar Periwinkle, Azalea, Cotoneaster, Camellia (*Camellia japonica* and *Camellia sasanqua*), Chinese Hibiscus (*Hibiscus rosa-sinensis*), Dieffenbachia and Red Amaranthus (*Amaranthus caudatus*) among others (see Section 1.3).

A total of 15 native species were also recorded at the property including White Cedar, Port Jackson Fig, Lemon-scented Bottlebrush, Coast Banksia, Scurvy Weed, Common Rush and Common Maidenhair Fern among others.

All flora species identified at the subject property are listed in Appendix 1.

2.3 Vegetation status

2.3.1 Ecological community status

The structure and composition of the vegetation at 7 Bower Street, Manly, is a currently unmanaged ornamental vegetation community with some commonly occurring native species planted or naturalised among the ornamental suite of species. The community is not listed as having conservation value either by the NSW Biodiversity Conservation Act (*BC Act*) (2016) or

by the Commonwealth Environment Protection and Biodiversity Conservation Act (*EPBC Act*) (1999).

2.3.2 Plant species status

None of the individual native species recorded on site are listed as threatened under the NSW *BC Act* or the Commonwealth *EPBC Act*.

2.4 Description of fauna habitat

Fauna habitat present on the unmanaged subject land was rated fair to good for some native species, particularly Bandicoots, Brush-tail Possums, birds and reptiles. The fauna habitat however lacks a layered vegetation structure, includes mostly introduced flora species and lacks habitat features such as tree hollows, hollow logs and significant depth of leaf litter.

Habitat that was present, such as small trees, shrubs and garden areas with exposed friable soils, was considered suitable for native species that have adapted to urban environments, such as the native Brush-tail Possum (*Trichosurus vulpecula*), as well as several species of parrots such as Rainbow Lorikeet, Crimson Rosella and Sulphur-crested Cockatoo and honey-eaters such as Wattle Birds and Noisy Miners. Large birds foraging in grassy areas such as the Australian Magpie and Galah would also be expected to occur at the subject site.

With very few exceptions, threatened fauna species rarely benefit from urban development.

The North-Head population of Long-nosed Bandicoot however actively forage within urban environments and in Manly are known to use council grassed roadside verges at night as movement corridors in search of food.

For Long-nosed Bandicoots, extensive areas of unmanaged exotic grassland as well as the many open garden areas with friable soils occur at the front and rear of the property. These unmanaged garden and grassy areas provide ideal foraging habitat for the Long-nosed Bandicoot.

The rear yard particularly was evidenced as a primary source of foraging resource for the Bandicoot. Much of the back section of the rear yard indicated active foraging activity by Bandicoots and characteristic fresh Bandicoot diggings were prevalent. The property at No. 7 Bower Street, Manly, has been uninhabited since December 2019 and the animals have freely and actively foraged within the property since at least that time. Figures 9 & 10 indicate examples of relatively fresh characteristic Bandicoot digging patterns, particularly more prevalent in the more shorter depth Buffalo Grass.



Figure 9 Section of relatively short Buffalo Grass at back section of rear yard showing extensive Bandicoot foraging activity characterised by many small conical holes.



Figure 10 Close up image of characteristic Bandicoot diggings characterised by small conical holes.

2.5 Fauna status

Undisturbed bush-land on North-Head provides habitat for to 14 mammal species, 87 bird species, 21 reptile species and 5 frog species (Manly Council 2013).

Further, a total of 21 threatened fauna species recorded by the Bionet Atlas (DPIE 2020) as occurring within the Manly locality are listed in *Appendix 2*. Some of these species are also covered by the Commonwealth Department of Agriculture, Water and Environment (DAWE) threatened species *Environment Protection and Biodiversity Conservation Act (EPBC Act)*.

The subject land was assessed for potential for the listed species to occur. One population, the North-Head population of Long-nosed bandicoot was assessed as having potential to utilise resources on the subject land due to its close proximity to North-Head reserves and the presence of contiguous council managed roadside verges (*Appendix 3*). There is no natural or other potential habitat present for any of the other listed threatened species.

There is no habitat on the site for any migratory bird species such as the White-bellied Sea-eagle or the White-throated Needletail but some may fly overhead as part of a wider foraging range.

2.6 Fauna recorded utilising resources within the property

Bird species including the Rainbow Lorikeet (*Trichoglossus haematodus*), Sulphur-crested Cockatoo (*Cacatua galerita*) and Noisy Miner (*Manorina melanocephala*), were noted either flying overhead or foraging for nectar and other food resources in shrubs within the property. Other bird species such as the Little Wattlebird, Red Wattlebird, Australian Magpie and galah would be expected to occur from time to time. These bird species are common in the Manly locality.

The Dark-flecked Skink (*Lampropholis delicata*) was observed in the rockery gardens at the front of the property. Another reptilian species which has potential to be present in the shaded areas of the garden is the Eastern Water Skink (*Eulamprus quoyii*).

The Common Brushtail Possum (*Trichosurus vulpecular*) would be expected to occur.

Plentiful evidence of diggings of Long-nosed Bandicoot activity were observed in patches of friable soil in the formal garden areas and in the exotic Buffalo Grass grassland within the front, and particularly, at the rear of the property (Figures 9 & 10).

2.7 Long-nosed Bandicoot activity and access to the property

No. 7 Bower Street occurs in proximity to undisturbed bush-land on North-Head where good quality habitat exists for the population of Long-nosed Bandicoot to breed and forage.

At night Long-nosed Bandicoots are known to forage from North-Head at Sydney Harbour National Park into an area of parkland occurring to the north-west of the subject site traversing via grassed roadside verges and contiguous garden scapes.

Bandicoots are able to access the rear gardens, primarily through and beneath the side gate at the north-eastern side of the property (Figure 11), allowing access to foraging resources within the rear yard grassed and garden areas of the property. Attempts have been made to block entry to Bandicoots from entering through the rear fence and from the north-western side of the building.



Figure 11 - Gaps of approximately 5cm occur beneath the side gate along the north-eastern side of the current residence to the rear yard, sufficient to allow entry to Bandicoots which may forage continuously between grassed council verges and grassland patches within properties on Bower Street.

The areas of grassed lawns comprised of Buffalo Grass potentially make ideal foraging habitat for the Bandicoot.

3 Addressing Clause 6.5 'Terrestrial Biodiversity' sections (3) & (4) of MLEP 2013

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

(a) *Whether the proposed development is likely to have:*

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

Comment – It is considered that the proposal will not significantly alter the potential foraging habitat in the locality for the Bandicoot, though the current status of the currently available grassy lawn and garden habitats may be reduced by the construction of the new residence (Figures 5, 6, 7 & 8). Currently, it is estimated that there is about 440m² of potential foraging habitat including areas of unmanaged exotic grassland dominated by Buffalo Grass occurring at the front and rear of the property, as well as garden beds and rockeries occurring along the perimeters of the property at the front and rear yards (Figures 2 & 3).

Designated Bandicoot foraging corridors will be landscaped along each of the longitudinal sides of the land with low steppers for ease of access to Bandicoots. The proposed development will provide for about 184m² of dedicated Bandicoot foraging habitat (Figures 7 & 8). As such, there will be about 42% of current foraging habitat designated for Bandicoot foraging activity resulting from the development.

Landscape design as detailed in Section 3.1.1 of MLEP 2013 should include native plant species to provide new and/or improved low dense clumping habitat to provide for potential Bandicoot foraging and nesting. The planting schedule should include species such as *Lomandra* sp., *Dianella* sp., *Banksia spinulosa*, *Banksia integrifolia*, *Caustis* sp., *Xanthorrhoea* sp., *Isolepis* sp., *Juncus* sp., *Adiantum* sp., *Calochlaena* sp., *Callistemon* sp., *Gleichenia* sp., and tussocky native grasses (eg. Kangaroo Grass) (MLEP 2013).

Landscaped areas should be capable of supporting new native tree species that are typically expected to reach a mature height of 5 - 10m (MLEP 2013). The use of locally occurring native plant species is preferred to assist in providing habitat for local fauna (see Appendix 1) and the preservation of threatened native plants.

There are also extensive areas of foraging and breeding habitat in the adjacent Sydney Harbour National Park at the rear of the subject land, along grassy Council verges and within large parkland areas to the north-west of the surveyed site. It would be recommended to allow access to Bandicoots to the rear yard areas of the subject land from natural areas of bushland at the rear of the land through designated access portals constructed in the rear fence.

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

Comment – Fauna habitat present on the subject land is rated as fair to good for some native species, particularly mammals such as the Bandicoot, Brush-tail Possum, birds and some reptiles, as there are intermittent patches of vegetation providing cover and food resources as well as crevices and friable loamy soils in rockeries at the front and rear gardens of the property.

The fauna habitat however lacks a layered vegetation structure, includes mostly introduced flora species and lacks habitat features such as tree hollows, hollow logs and significant depth of leaf litter.

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

Comment – As the vegetation on site is mostly exotic and provides no specific habitat features for local fauna, there is no potential to fragment, disturb or diminish any biodiversity structure of the current vegetation that occurs at the subject land.

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

Comment – The exotic vegetation at the front, sides and rear of the subject site is contiguous with other such managed landscapes and has no connectivity with areas of natural vegetation.

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

Comment – The proposed development is for the demolition of the current dwelling and replacement of a new residence (Figures 5, 6, 7 & 8). The current assemblage of mainly exotic ornamental plants appears tolerant of the seaside conditions and appears to attract nectar feeding avifauna thus maintaining the sites biodiversity. New landscaping (Figures 7 & 8) may enhance the potential for nectivorous feeding.

3.2 Clause (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 sited and will be managed to avoid any significant adverse environmental impact:*

Comment – The development design is in accordance with Manly Council's LEP and will not contribute to any adverse environmental impact.

(b) *If the impact cannot reasonably be avoided by adopting feasible alternatives – the development is designed, sited and will be managed to minimise the impact:*

Comment – Not applicable, as the development will not contribute to any adverse environmental impact.

(c) *If the impact cannot be minimised – the development will be managed to minimise the impact:*

Comment – Not applicable, as the development will not contribute to any adverse environmental impact.

4 PART B ASSESSMENT OF SIGNIFICANCE (5-part Test)

Assessment of the impact on the North Head Long-nosed Bandicoot population under Schedule 1 Part 1 of the BC Act by the demolition of an existing residence and construction of a new dwelling at No. 7 Bower Street, Manly.

In 1997 the NSW Scientific Committee made a final determination that the North Head population of Long-nosed Bandicoots should be listed as an endangered population on Part 2 of Schedule 1 of the *Biodiversity Conservation Act 2016*.

No. 7 Bower Street falls within the mapped area in MLEP 2013 as requiring an assessment of significance (5-part Test) for any works that may potentially affect Long-nosed bandicoot habitat.

Under the NSW [Biodiversity Conservation Act 2016](#) populations will now be defined as 'part of a species'.

- A population of a species will only be eligible to be listed as 'threatened' if the species is not already listed.
- Endangered populations currently listed under the *Threatened Species Conservation Act 1995* will be carried over to the NSW *Biodiversity Conservation Act 2016*. The NSW Threatened Species Scientific Committee will review listings and determine when changes to listings are necessary.

The following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species, populations or ecological communities or their habitats:

The factors of assessment:

(a) in the case of a threatened species, whether the proposed development or activity proposed 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,

Comment: The Long-nosed Bandicoot population of North-head is now presumed to be listed as a 'threatened' species under the BC Act.

The Development Application proposes:

Demolition of existing house and construction of new two-storey dwelling on the land. Also proposed is a single storey pavilion, a partially excavated double garage and a new natural pool of length 15m and width 2.6m, constructed along the northern side of the site partially excavated into bedrock, with stream to biofilter the proposed ponds. (Figures 5 & 6).

There will be enhanced plantings in the garden areas as well as designated Bandicoot corridors along either longitudinal side of the land (Figures 7 & 8). The total area of foraging potential including areas of grassed lawns (about 80m²) and accessible garden areas (about 105m²) as part of the proposed development is about 185m².

Access to foraging resources within the rear yard through access portals in the rear fence is recommended to maintain potential foraging habitat.

As such, it is considered that the proposed works are highly unlikely to have a significant impact on the life cycle of the Long-nosed Bandicoot or place the local population at risk of extinction.

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

- (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,***

Comment: Not applicable. No threatened ecological community will be affected by the proposal.

(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***

Comment: Bandicoot foraging activity was recorded primarily within grassy lawns and unmanaged formal garden areas occurring at the rear of the current dwelling (Figures 9 & 10). The proposal will maintain designated Bandicoot corridors providing potential foraging resources for Bandicoots (Figures 7 & 8), such that, although current habitat may be modified, suitable habitat in grassed and garden areas comprising an area of some 185m²

will be provided to compensate for this loss. It is recommended that 3 to 4 access portals for Bandicoots be provided through the rear fence to provide continuity with bushland areas to the rear of the subject land.

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

Comment: Potential Bandicoot foraging and nesting habitat is present on the subject land and it is considered that the proposed design of dedicated Bandicoot corridors along either longitudinal length of the land would adequately compensate for any loss of current habitat and there would be no fragmentation of habitat or isolation of potential habitat as a result of the proposal (See Figures 7 & 8).

(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, long-term survival of the species,

Comment: Areas of foraging habitat were recorded particularly at the rear sections of the subject land (Figures 9 & 10). However, with the design of designated Bandicoot foraging corridors along each side of the land, the proposal is not considered to significantly decrease the extent of or fragment or isolate any area of recorded foraging habitat for the Long-nosed Bandicoot. It is strongly recommended that the owners also construct access portals through the rear fence to allow direct access from areas of National Park at the rear of the property.

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

Comment: No area of **outstanding biodiversity** has been declared for the North-Head population of Long-nosed Bandicoot, and the development proposal will not maintain designated foraging habitat along both longitudinal sides of the property (Figures 7 & 8). The proposed removal of current dwelling and replacement with new residence is considered unlikely to have any adverse effect, either directly or indirectly on the local population of Long-nosed Bandicoot.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Comment: There are three main Key Threatening Processes listed under the BC Act (2016) directed solely towards the North-Head population of Long-nosed Bandicoot.

1. Predation by the domestic cat and dog (OEH 2020 - Species profiles).

2. Predation by the European Red Fox (*Vulpes vulpes*).
3. Clearing of native bush-land and fragmentation of habitat, as it leads to a loss of biodiversity.

The development proposal does not involve removal of significant extents of native vegetation or fragmentation of habitat and is unlikely to contribute to the operation of, or increase the impact of any of the key threatening processes listed. If the new owners of the subject land were to own any companion dogs, it would be recommended that any dogs are kept inside after dusk and if entering the yard after dusk, to be accompanied by owners and to be restrained by a leash.

Assessment of Significance Conclusion

The subject land at 7 Bower Street contains a double storey brick building situated on the southern side of Bower Street (Figures 3 & 4). The Development Application proposes demolition of the existing residence and construction of a new two-storey residence at the location (Figures 5, 6, 7 & 8).

At present the planted garden areas do not provide specific habitat features for the bandicoot, though the unmanaged garden areas with open areas of highly friable soils and the extensive areas of exotic grassland dominated by Buffalo Grass, provide suitable foraging habitat. The Long-nosed Bandicoot forages mainly at or after dusk, digging for invertebrates, fungi and tubers (DPIE 2020). During this survey evidence of bandicoot activity was noted in the front yard and within grassy Council verges, but primarily at the rear of the property (Figures 9 & 10).

The proposed construction design includes dedicated Bandicoot foraging corridors with raised stepper platforms running along each longitudinal length of the land (Figures 7 & 8). It is recommended that several access portals are also provided for access to Bandicoots from the adjacent Sydney Harbour National Park at the rear of the property, hence optimising foraging potential in relation to the proposed development.

Given recommendations to manage the proposal to demolish the existing residence and construct a new dwelling house with the proposed mitigating provisions, it is considered unlikely that there would be a significant impact on the life cycle of the North Head Population of Long-nosed Bandicoot.

The five factors requiring consideration, in determining '*whether there is likely to be a significant effect on threatened species or their habitats*', concluded that there should be no significant effect on the North-Head Long-nosed Bandicoot population by the proposed

alterations and additions. As a consequence further assessment in the form of a 'Species Impact Statement' is considered not warranted.

5 GENERAL CONCLUSIONS

No. 7 Bower Street, Manly is situated within mapped Long-nosed Bandicoot habitat and it is therefore required that an Assessment of Significance be undertaken to determine if any part of the proposed development application would impact on the life-cycle or integrity of threatened fauna species that occur in the immediate area.

Manly Council has also requested additional information in regard to the proposed development, in particular, elements of Terrestrial Biodiversity (Clause 6.5 Sections [3] & [4] of Manly Local Environment Plan (MLEP) - 2013) which is required to be addressed before a development application can be considered.

All garden areas of this property have been landscaped mostly utilising exotic species (see Section 1.3). Unmanaged exotic lawn areas occur at the front and rear of the property (Figures 3 & 4).

The planted gardens with a variety of flowering plant species, including trees and shrubs, provide foraging resources for avian fauna and suitable foraging habitat occurs for common reptile species observed or expected to occur at the subject site, as well as for populations of the local Long-nosed Bandicoot.

The North-Head population of Long-nosed Bandicoot was assessed as having potential to enter the property from the Council verge at the front boundary and beneath and through the gate at the eastern side of the residence (Figure 11). There is no suitable habitat present for any of the other 20 listed threatened fauna species (Appendix 2). There is also no habitat on the site for any migratory bird species but some may fly overhead as part of a wider foraging range (Appendix 2).

The proposal to demolish the existing building and construct a new residence will result in the establishment of new landscaped garden beds containing a mix of ornamental and native shrubs, ground cover plants and small trees, potentially enhancing the foraging potential for avian fauna, whilst providing suitable foraging areas for the Long-nosed Bandicoot. As such, this proposal is considered to have no adverse impact on the ecological value and significance of the site, notwithstanding that the majority of flora is not natural to the region.

During this survey, bandicoot activity was recorded in both the front and side yard and particularly the rear yard area of the subject land (see Sections 2.4 & 2.7) (Figures 9 & 10).

6 RECOMMENDATIONS

- 6.1 Work hours 7.00am to 6.00pm. No noisy construction work outside the hours of 7.30am and 4.30pm.
- 6.2 Builders and contractors should be made aware of the potential presence, activity and conservation significance of the North-Head population of Long-nosed Bandicoot.
- 6.3 The site manager should provide areas for the storage of hazardous materials; with an impermeable ground cover and an immediate supply of absorbent material for containment of spillage. No spillages are to enter any ponds occurring at the property or into the road drainage system in Bower Street. This prevents contamination of foraging habitat further afield.
- 6.4 All open footing trenches, pits and holes to have a secure cover at night. This prevents accidental drowning of bandicoots if the trenches or pool excavation areas were to fill following heavy rain.
- 6.5 Long-nose Bandicoots are nocturnal foragers. Outside lighting in the rear garden area should be the lowest level required for safety. Movement sensor lights should not be installed.
- 6.6 Care should be taken at night in the driveway when moving cars as bandicoots may seek shelter beneath stationary vehicles.

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Appendix 1 Flora species occurring at 7 Bower Street, Manly

<p>KEY</p> <p>Status</p> <p>* Exotic species Biosecurity Weed (Biosecurity Act 2015) *pl - planted ornamental</p> <p>Vegetation Landscaped ornamental gardens with exotic grassland yard areas</p>
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STATUS	SCIENTIFIC NAME	COMMON NAME	FRONT & SIDE YARD	REAR YARD
	FILICOPSIDA			
	Pteridaceae			
	<i>Adiantum aethiopicum</i>	Common Maidenhair		*
	<i>Pteris vitatta</i>	Chinese Brake	*	
	GYMNOSPERMAE: CONIFERALES			
	Cupressaceae			
*pl	<i>Cupressocyparis leylandii</i>	Leyland Cypress	*	
	Zamiaceae			
pl	<i>Macrozamia communis</i>	Burrawang	*	
	MAGNOLIOPSIDA: MAGNOLIDAE			
	Amaranthaceae			
*pl	<i>Amaranthus sp</i>	Amaranthus	*	

STATUS	SCIENTIFIC NAME	COMMON NAME	FRONT & SIDE YARD	REAR YARD
	Apocynaceae			
*pl	<i>Catharanthus roseus</i>	Madagascar Periwinkle	*	
*pl	<i>Nerium oleander</i>	Oleander	*	
*pl	<i>Plumeria acutifolia</i>	Frangipani	*	
	Asteraceae			
*	<i>Bidens pilosa</i>	Cobblers Pegs	*	*
Biosecurity Weed	<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Boneseed		*
*	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	*	*
*	<i>Hypochaeris radicata</i>	Cats Ears	*	*
*	<i>Sonchus oleraceus</i>	Common Sowthistle	*	*
	Caesalpinaceae			
*	<i>Senna pendula</i> var. <i>glabrata</i>	Common Cassia	*	*
	Caprifoliaceae			
*pl	<i>Abelia chinensis</i>	Abelia	*	
	Caryophyllaceae			
*	<i>Cerastium glomeratum</i>	Mouse-eared Chickweed		*
*	<i>Stellaria media</i>	Common Chickweed		*
	Crassulaceae			
*pl	<i>Crassula multicava</i>			*
	Ericaceae			
*pl	<i>Azalea indica</i>	Azalea	*	
*pl	<i>Nerium oleander</i>	Oleander	*	
	Fabaceae: Faboideae			
*	<i>Medicago polymorpha</i>	Burr Medic		*
*	<i>Vicia sativa</i> subsp. <i>nigra</i>	Narrow-leaved Vetch		*

STATUS	SCIENTIFIC NAME	COMMON NAME	FRONT & SIDE YARD	REAR YARD
	Geraniaceae <i>Pelargonium australe</i>	Native Storksbill		*
*pl	Hydrangeaceae <i>Hydrangea macrophylla</i>	Garden Hydrangea		*
	Malvaceae <i>Brachychiton acerifolius</i>	Illawarra Flame Tree		* (to 0.3m tall)
*pl	<i>Hibiscus rosa-sinensis</i>	Hibiscus	*	*
*	<i>Malva parviflora</i>	Small-flowered Mallow		*
	Meliaceae <i>Melia azederach</i>	White Cedar	*	* (to 9m tall)
	Mimosaceae <i>Acacia longifolia</i> subsp. <i>longifolia</i>	Sydney Golden Wattle		* (to 0.2m tall)
*	<i>Acacia saligna</i>	Golden Wreath Wattle		*
	Moraceae <i>Ficus rubiginosa</i>	Port Jackson Fig		* (to 7m tall)
	Myrtaceae <i>Callistemon citrinus</i>	Lemon-scented Bottlebrush	* (nat to 50cm tall)	
pl	<i>Callistemon viminalis</i>	Weeping Bottlebrush		*
*pl	<i>Corymbia ficifolia</i>	Red Flowering Gum		*
	<i>Melaleuca nodosa</i>	Ball Honey-myrtle		*
C4	Ochnaceae <i>Ochna serrulata</i>	Mickey Mouse Plant	*	

STATUS	SCIENTIFIC NAME	COMMON NAME	FRONT & SIDE YARD	REAR YARD
	Oleaceae			
*pl	<i>Olea europaea</i>	European Olive	*	*
*	<i>Olea europaea</i> var. <i>cuspidata</i>	African Olive	*	*
	Oxalidaceae			
*	<i>Oxalis latifolia</i>			*
	Phyllanthaceae			
	<i>Glochidion ferdinandi</i>	Cheese Tree		* (to 0.5m tall)
	Pittosporaceae			
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	*	
	Proteaceae			
	<i>Banksia integrifolia</i>	Coast Banksia		* (to 5m tall)
	Rosaceae			
*pl	<i>Cotoneaster glaucophyllous</i>	Cotoneaster		*
*pl	<i>Raphiolepis indica</i>	Indian Hawthorn		*
	Rubiaceae			
*pl	<i>Camellia japonica</i>	Camellia	*	*
*pl	<i>Camellia sasanqua</i>	Camellia	*	*
	Solanaceae			
*	<i>Solanum lycopersicum</i>	Tomato		* (nat)
*	<i>Solanum nigrum</i>	Black Nightshade	*	*
	MAGNOLOPSIDA: LILIDAE			
	Agavaceae			
*pl	<i>Agave americana</i>	Century Plant	*	*
	Anthericaceae			
*pl, nat	<i>Chlorophytum comosum</i>	Ribbon Plant		*

STATUS	SCIENTIFIC NAME	COMMON NAME	FRONT & SIDE YARD	REAR YARD
*pl	Arecaceae <i>Dieffenbachia sp</i>	Dumb Cane		*
	Commelinaceae <i>Commelina cyanea</i>	Scurvy Weed		*
*	Cyperaceae <i>Cyperus eragrostis</i>	Umbrella Sedge	*	
*pl	Haemodoraceae <i>Anigozanthos flavidus</i>	Tall Kangaroo Paw	*	
*pl	Iridaceae <i>Agapanthus praecox</i>	Agapanthus	*	*
	Juncaceae <i>Juncus usitatus</i>	Common Rush		*
	Poaceae			
*	<i>Andropogon virginicus</i>	Whiskey Grass		*
*	<i>Cynodon dactylon</i>	Couch	*	*
*	<i>Ehrharta erecta</i>	African Veldt Grass	*	*
*	<i>Paspalum urvillei</i>	Vasey Grass		*
*	<i>Pennisetum clandestinum</i>	Kikuyu		*
C4	<i>Phyllostachys aurea</i>	Fishpole Bamboo		*
*	<i>Stenotaphrum secundatum</i>	Buffalo Grass	* (10 - 30cm tall)	* (to 40cm tall)
	Strelitzaceae			
*pl	<i>Strelitzia nicolai</i>	Wild Banana		*
*pl	<i>Strelitzia reginae</i>	Crane Flower	*	*

Appendix 2 Threatened fauna species listed by the DPIE Bionet Atlas of NSW Wildlife (2020) for the Manly locality.

Class/Family	Common name	Scientific name	NSW status	Comm. status	No. of records
Amphibia Myobatrachidae	Red-crowned Toadlet	<i>Pseudophryne australis</i>	V		14
Reptilia Varanidae	Rosenberg's Goanna	<i>Varanus rosenbergi</i>	V		3
Aves Columbidae	Rose-crowned Fruit-Dove	<i>Ptilinopus regina</i>	V		2
	Superb Fruit-Dove	<i>Ptilinopus superbus</i>	V		1
Accipitridae	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	V	C	5
Burhinidae	Bush Stone-curlew	<i>Burhinus grallarius</i>	E1		4
Psittacidae	Little Lorikeet	<i>Glossopsitta pusilla</i>	V		2
	Swift Parrot	<i>Lathamus discolor</i>	E1	CE	4
Strigidae	Barking Owl	<i>Ninox connivens</i>	V		1
	Powerful Owl	<i>Ninox strenua</i>	V		81
Mammalia Peramelidae	Southern Brown Bandicoot (eastern)	<i>Isodon obesulus obesulus</i>	E1	E	2
	Long-nosed Bandicoot, North Head	<i>Perameles nasuta</i>	E2		2,272
Burramyidae	Eastern Pygmy-possum	<i>Cercartetus nanus</i>	V		352
Pteropodidae	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	V	V	193
Emballonuridae	Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	V		1
Vespertilionidae	Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	2
	Southern Myotis	<i>Myotis macropus</i>	V		18
	Greater Broad-nosed Bat	<i>Scoteanax rueppellii</i>	V		1
	Eastern Cave Bat	<i>Vespadelus troughtoni</i>	V		1
Miniopteridae	Little Bent-winged Bat	<i>Miniopterus australis</i>	V		9
	Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V		72

Legend

EPBC Act (1999) (Commonwealth Status)

C, J, K = China, Japan Korea Bi-lateral Bird Agreements

V=vulnerable

E=endangered

C E = Critically Endangered

BC Act (2016) (NSW Status)

V= Vulnerable

E1= endangered species, E2= endangered population

Appendix 3

The Population of threatened Long-nosed Bandicoot at North Head, Manly

Bandicoots in general are a vital part of our natural ecosystem and form an interdependent relationship that benefits both plant and animal. Bandicoots carry beneficial bacteria and fungi on their bodies that are able to act as antibiotics for plants, promoting plant growth and seed germination (Walton & Richardson 1989, Stoddart 1995).

Generally, the Long-nosed Bandicoot (*Perameles nasuta*) is classed as common along the eastern seaboard of Australia and is not listed as a threatened species under current Commonwealth or State legislation.

However, in Manly, the North Head population of Long-nosed Bandicoot has been isolated and separated from other populations, with the closest known surviving population occurring in the Pittwater Local Government Area. As such, it is important to halt actions or activities which may further jeopardize the survival of the population. The small size of the population at North Head, and its isolation from other Long-nosed Bandicoot populations, means that it may be prone to inbreeding depression and possible reduced genetic variability. Therefore the population of Long-nosed bandicoot at North Head may be genetically distinct from other populations, and as a result may be affected detrimentally by environmental change and is vulnerable to random or unplanned disturbances.

The Long-nosed Bandicoot is essentially a solitary animal that occupies a variety of habitats on North Head. Studies by the former Department of Environment, Climate Change and Water (DECCW) in 2002 recorded between 130-160 individuals. An increase in population size is considered to be a result of protection measures introduced by State government and Manly Council.

Scott (1995) found that the diet of Long-nosed Bandicoot at North Head consists primarily of beetles, larvae, ants, and to a lesser extent monocotyledonous leaf and stem and fungi. This diet is maintained throughout the year. The conical holes bandicoots leave in the soil are often seen at the interface of naturally vegetated and areas of open grass.

Bandicoots live up to three years. The home range for a female bandicoot is approximately 1.7 ha and 4.4 ha for males. Once mature, males will disperse to find their own territory. A female matures at 5 months and may have more than one litter per season of 2-3 young. A newborn weighs only 0.25g and is 13mm long.

Bandicoots will return to a nest site during the daylight hours. The nest is usually built in bushland but individuals may nest in urban areas if the conditions are suitable. The nest consists of a shallow depression covered with grass or leaves.