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Revised Vegetation Management Plan
1, 1A, 3 and 5 Avon Road, and 4 and 8 Beechworth Road, Pymble

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1.0 Introduction

This Vegetation Management Plan (VMP) has been prepared to conserve and enhance the degraded *Blue Gum High Forest in the Sydney Basin Bioregion* (BGHF) located on the Site with an at least 10 m wide upslope managed bushland buffer. The VMP is directed to re-establishing long-term viable natural ecosystems as part of the proposed development on the approximately 2.5 ha Site. The Site comprises 1, 1A, 3 and 5 Avon Road, and 4 and 8 Beechworth Road, Pymble (Figures 1A to 1C).

Land and Environment Court of New South Wales issued on 19 December 2014 a Court Order as part of Approval (Case number 10648 of 2013), including Part B modifications to the VMP (Appendix 1).

The VMP has been planned in consultation with:

- Paolo Salotto of Marchese + Partners International Pty Ltd;
- Ross Shepherd of Site Image Landscape Architects;
- Graham Swain of Australia Bushfire Protection Planner Pty Ltd;
- Mark Tooker of National Project Consultants;
- Richard Higgins of Higgins Surveyors;
- Dr Peter Smith of P & J Smith Ecological Consultants (expert for the Department of Planning); and
- Ian Francis, Team Leader Landscape Assessment of Ku-ring-gai Council.

The VMP has been prepared with reference to the Department of Infrastructure, Planning and Natural Resources "Guideline for Preparation of Environmental Management Plans" (2004), the "NSW National Parks and Wildlife Service - General Guidelines for Environmental Management Plans", and with regard to Ku-ring-gai Bushland Reserves Plan of Management (Ku-ring-gai Council 2013), "Protecting and Restoring Blue Gum High Forest" (DECC 2008A) and "Best practice guidelines for Blue Gum High Forest" (DECC 2008B).

The VMP has:

- Clear aims and objectives;
- Realistic targets associated with each objective; and
- Reporting and checking implementation of any corrective action requests issued.

The duration of the VMP is the life of the proposed development with:

- the VMP being administered and funded by the developer/land owner during the building construction phase, with monitoring and reporting in Month 1, Month 3, Month 6, Month 12, then yearly.
- the Conservation Area would be administered and funded by a single entity such as a Body Corporate or Community Association in the long-term, with yearly monitoring and reporting by the Environmental Manager. Any future land transfer of the Conservation Area to Council, including funding, would be a matter for elected members of Council, the relevant departments and staff.

I, and those who assisted me in the preparation of this report have experience in rehabilitation of highly degraded sites utilising onsite equipment, as well as bush regeneration of more intact sites. Brief CVs and major projects are given in Appendix 2.

It should be noted in the VMP that the term "weed" refers to all exotic and non-local native species.

1.1 Location of the BGHF onsite

Benson and Howell (1990, page 110) state that:

> *From Roseville to Wahroonga the central spine ridge is covered by fertile clay soils developed from the Wianamatta Shale. Here, with the highest rainfall in Sydney (Pymble receives 1,444 mm per annum), were magnificent stands of the Blue Gum High Forest …*
>
> *The tall straight trees of Sydney Blue Gum,* Eucalyptus saligna*, and Blackbutt,* Eucalyptus pilularis*, soon attracted timber getters. In 1805 the botanist George Caley described the North Shore timber as being very suitable for building Sydney town. …*
>
> *Only tiny remnants of the ridge-top High Forest exist today.*

The High Forest vegetation is listed as the critically endangered ecological community *Blue Gum High Forest in the Sydney Basin Bioregion* (BGHF) and endangered ecological community Sydney Turpentine Ironbark Forest, and their intergrades under the NSW *Threatened Species Conservation Act 1995* (TSC Act).

The legal definition in the final determination for BGHF includes:

> Paragraph 4
> *…dominated by a tall canopy of eucalypts that may exceed 30 m in height.*
>
> Paragraph 9
> *Highly modified relics of the community also persist as small clumps of trees without a native understorey.*

The BGHF onsite was identified as stands of remnant trees of the canopy eucalypts occurring in the gully and on the north-western slope.

Currently, the vegetation in the gully and on the north-western slope does not meet the listing for *Blue Gum High Forest of the Sydney Basin Bioregion* under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) based on the Habitat description from the Commonwealth listing advice:

> *dominated by either Blackbutt (Eucalyptus pilularis) or Sydney Blue Gum (*E. saligna*).*
>
> *Single isolated trees or stands of trees, characteristic of the canopy of Blue Gum High Forest of the Sydney Basin Bioregion, without a native understorey ….. fall outside the definition of this ecological community and therefore do not form part of this listing.*

Although the vegetation in the gully does not currently meet the criteria for recognition as Blue Gum High Forest under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, it may meet those criteria if successfully rehabilitated, i.e. the Conservation Area has potential high conservation significance at national level as well as state level.

The canopy eucalypts of the identified BGHF onsite are at least 15 m tall and generally over 25 m tall. The locations of the trees on and adjoining the Site have been plotted on plan (Figure 2A), with tree height, breast height diameter and canopy spread estimated by Higgins Surveyors (local native trees are listed in Table 1). All

tree numbers in this report relate to those shown on the Higgins Surveyors' plan (Figures 2B to 2G).

Trees within 10 m of the proposed buildings have been assessed by the arborist, Peter Castor of Tree Wise Men (dated September 2014).

Onsite, there are 56 local native trees and an additional 3 possibly local native trees located within the landscape area. Of these, 53 are native eucalypt canopy BGHF trees (Figures 2A to 2G, Table 1). An additional Tree 230 has been recorded offsite in the adjacent Rail corridor.

Property	Local native trees recorded
Onsite	
1 Avon Road	None
1A Avon Road	**42 local native trees,** with: **39 native eucalypt canopy BGHF trees** (Trees 61, 69, 70, 72, 74, 78, 81, 83, 87, 89, 93, 94, 94a, 96, 96a, 98, 102, 119, 122, 124, 128, 129, 175, 180, 182, 184, 185, 188, 197 (formerly 196), 199, 208 (formerly 214), 209, 210, 226 (formerly 227), 228, 229, Tree 331 (*Angophora floribunda*), 331a, 332) **plus** Tree 85 – *Ficus rubiginosa* Tree 136 – *Acmena smithii* Tree 344 – *Pittosporum undulatum*.
3 Avon Road	None Trees 264, 265, 266, 267 - row planted (not local native) *Syncarpia glomulifera* along the western boundary adjoining the swimming pool
5 Avon Road	**3 possibly local native trees** in the existing landscaping Tree 327a – *Acmena smithii* in the landscaping and Tree 329 – *Acmena smithii* in the street front landscaping; and Tree 328 – *Ficus rubiginosa* – to the south of the existing building.
8 Beechworth Road	**13 native eucalypt canopy BGHF trees** (Trees 23, 24, 37, 39, 44, 49, 50, 52, 53, 201, 203, 211, 222)
4 Beechworth Road	**1 native eucalypt canopy BGHF tree** (Tree 343)

Offsite	
Railway corridor to the north	**1 native eucalypt canopy BGHF tree** (Tree 230)

In March 2014, the previously healthy Tree 49 on the property boundary of 8 and 10B Beechworth Road appears to be dying. This tree has been drilled and is likely to have been poisoned. A new discharge pipe has been installed next to this tree and nearby (see Arborist's report on Tree 49 in Appendix 3).

The impact of the proposed development on the Blue Gum High Forest was assessed using a 7-part test and is not likely to be significant (Appendix 4).

2.0 VMP Considerations

2.1 Ku-ring-gai Local Environmental Plan (Local Centres) 2012 and Local Centres Development Control Plan

The Ku-ring-gai Local Environmental Plan (Local Centres) 2012 (LEP) was gazetted on 25 January 2013 and Ku-ring-gai Council's Local Centres Development Control Plan was adopted by Council, effective from 7 June 2013.

2.1.1 Ku-ring-gai Local Environmental Plan (Local Centres) 2012

The Site includes land mapped on the LEP 2012 Natural Resources as:

- Biodiversity Significance on the Biodiversity Maps (Figure 3A-1 (with other Greenweb maps shown on Figure 3A-2 and 3A-3); and
- Category 3 Riparian Land on the Riparian Lands Map (Figure 3B).

The VMP has addressed the objectives for Clauses 6.3 and 6.4 of the LEP 2012 (Appendix 5).

2.1.2 Ku-ring-gai Council's Local Centres Development Control Plan

Part 6 of the DCP refers to Biodiversity Controls. This part applies to development on areas identified as the Greenweb in the DCP.

Biodiversity Significance Land mapped on the Site is also mapped on the Pymble Greenweb Map as Category 2 – Support for Core Biodiversity Land (Figures 3A-2, 3A-3).

The objectives for Category 2 land include:

> *Vegetation retention and rehabilitation must be designed to enhance and link existing vegetation and habitat within the site and within adjacent sites, biodiversity corridors and riparian lands.*

Under the Controls for Category 2 lands:

> 5 *Planting within land identified as Category 2 is to consist of not less than 70% locally native tree species and 30% locally native understorey species. Species are to reflect the relevant vegetation communities within the area. A mix of groundcover, shrubs and trees is desirable.*

The VMP has addressed the objectives for Category 2 Land (Appendix 6).

2.2 Climate

In planning ecosystem restoration, it is important to understand that climate influences the quality and quantity of local native seed availability, the timing of seed collection and planting, the survival rate of plantings, the need for additional watering during plant establishment phases and the potential erosion risk from high rainfall events.

The nearest meteorological station to the Site for rainfall data is at Gordon Golf Club (Station 66120), located approximately 2 km south-east of the Site. This station opened in 1906 and has continued to record rainfall irregularly over the past 10 years. The nearest meteorological station with regular temperature and rainfall records is Macquarie Park (Willandra Village) (Station 066156), located approximately 4.5 km south-west of the Site.

At Macquarie Park, the annual mean maximum temperature is 22.8°C, with the highest monthly mean maximum in January (27.7°C). The annual mean minimum is 11.4°C, with the lowest monthly mean minimum in July (4.9°C) (Bureau of Meteorology website www.bom.gov.au accessed 2 July 2014).

The mean annual rainfall at Gordon Golf Club (1242 mm) is higher than the mean annual rainfall at Macquarie Park (1152 mm), with the highest mean monthly rainfall in February of 133 mm at Gordon and 144 mm at Macquarie Park. The lowest mean

monthly rainfall is in September (68 mm) at Gordon and in August (54 mm) at Macquarie Park (Bureau of Meteorology website www.bom.gov.au accessed 2 July 2014), namely:

Mean rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Gordon	125	133	138	118	111	123	86	78	68	81	90	92	1242
Macquarie Park	117	144	132	110	84	118	56	54	60	85	94	85	1152

Over a 10 year period at Gordon Golf Club (January 2003 and August 2013), the monthly rainfall recorded varied from 2 mm (August 2005) to 373 mm (February 2010). Similarly over the last ten years (January 2004 to May 2014) at Macquarie Park, the monthly rainfall recorded has varied from 3 mm (August 2005) to 430 mm (June 2007) (Bureau of Meteorology website www.bom.gov.au, accessed 2 July 2014).

Periods of low monthly rainfall (<10 mm) and high monthly rainfall (>200 mm) are expected and are planned for during the implementation of the VMP.

2.3 Elevation, drainage and downslope offsite watercourse

The Site is in a gully head between two descending spurs roughly following Beechworth Road and Avon Road, Pymble. The elevation of the Site varies from approximately 130 m AHD in the centre of the gully in the south west to 150 m AHD along the railway corridor to the north-east (Figure 1A).

The gully is surrounded by urban/suburban land use and receives nutrient enriched stormwater runoff from the non-porous surfaces and gardens upslope.

There is no mapped creekline onsite, with the nearest mapped creekline in the gully downslope of Arilla Road offsite to the south-west (Figure 1A).

The Site includes land mapped Category 3 on the Riparian Lands Map on the Ku-ring-gai LEP 2012 Natural Resources (Figure 3B), discussed in Part 5 of the Ku-ring-gai Local Centres DCP and in Ku-ring-gai Water Management Control Plan DCP 47 dated 2005 (Figure 3C).

The objectives for *Category 3 Bank stability and water quality* under the Ku-ring-gai LEP 2012 are:

1. *To protect and/or provide bank and bed stability.*
2. *To contribute to improved water quality within the catchment.*

Category 3 Riparian Land is described in Part 5 of the Ku-ring-gai Local Centres DCP as:

> *includes a 10 m setback from the top of each bank which, together with the waterway (as defined in KLEP (Local Centres) 2012), forms the core riparian zone (CRZ). Refer to Figure 5.3-1.* [see Appendix 7].

Category 3 riparian zone in Ku-ring-gai DCP 47 is described as:

> *Typically these would be narrow zones along highly modified streams that may have no indigenous vegetation. These streams would be difficult, and in some cases not possible, to rehabilitate to a natural state.*

2.4 Geology and soil landscapes

The geology was mapped at a scale of 1:100 000 by Herbert and West (1983), with the major part of the Site mapped as Ashfield Shale of the Wianamatta Group and the downslope southern section, Hawkesbury Sandstone (Figure 4A).

The soil landscapes of the Site was mapped at a 1:100 000 scale by Chapman *et al.* (1989) as West Pennant Hills on the major part of the Site, with the downslope southern section mapped as Glenorie (Figure 4B). The listed limitations for these Soil Landscapes are described in Chapman and Murphy (1989) as:

Soil Landscape	Listed limitations
West Pennant Hills	mass movement hazard, steep slopes, high soil erosion hazard, localised seasonal waterlogging, impermeable plastic shrink-swell subsoil.
Glenorie	high soil erosion hazard, localised impermeable highly plastic subsoil, moderately reactive

2.5 Existing vegetation

2.5.1 Onsite

It was found that:

- A total of 48 species (15 local natives, 2 non-local native, and 31 exotic) were recorded in June 2012 in the 100 m long and 10 m wide Transect 1 and the 60 m long and 10 m wide Transect 2 and an additional Spot location A at the north-west end of Transect 2 (Figure 5A, Tables 2A, 2B, Appendix 8). Of the 15 native species, *Eucalyptus saligna* (Sydney Blue Gum) was the dominant local native tree of the gully and the adjoining slope to the north west. From survey data and tree survey, there were occasional *Angophora floribunda, Eucalyptus pilularis*, *Eucalyptus paniculata, Ficus rubiginosa* and *Acmena smithii*. The other native component of the vegetation in the gully was a small number of ferns (*Adiantum formosum*, *A. hispidulum*, *Christella dentata*, *Doodia aspera*, *Microsorum pustulatum* and *Pteris tremula*) persisting as scattered individuals or small colonies amongst the dense weedy growth.

- The native understorey of the gully and adjoining slope to the north west has been replaced by exotic weed species including *Ligustrum lucidum* and *L. sinense* (Broad-leaved and Small-leaved Privet), *Erythrina* x *sykesii* (Coral Tree), *Lantana camara* (Lantana) and *Ipomoea indica* (Blue Morning glory). From the two long transects surveyed in June 2012, there were high projected foliage covers of *Lantana camara* and *Ligustrum lucidum.* From the contiguous 10 m x 10 m quadrats (1, 2, 3, …), the highest weed occurrences were in the sheltered gully habitat, with the major weeds being:

  Transect 1 (east to west)

Species	% projected foliage cover in Quadrats									
	1	2	3	4	5	6	7	8	9	10
Cinnamomum camphora					10					
Delairea odorata								2	10	10
Erythrina x sykesii							25	10	10	
Ipomoea indica	20	20	50	40	45	60	50	80	80	80
Lantana camara		20	50	50	45	10	10	20	30	

Species	% projected foliage cover in Quadrats									
	1	2	3	4	5	6	7	8	9	10
Ligustrum lucidum	5	5	15	25	25		10		2	3
Tradescantia fluminensis	40	10			5	30	80		40	20

Transect 2 (east to west)

Species	% projected foliage cover in Quadrats						
	1	2	3	4	5	6	A
Ipomoea indica			5	1	3		5
Lantana camara			5	2			
Ligustrum lucidum	60	50	80	70	70	60	X
Ligustrum sinense	2	2	3	1	5	10	X
Tradescantia fluminensis					30	80	95

- There were landscaped areas associated with existing houses with non-local native and exotic plantings, stone retaining walls, garden beds and a former tennis court overgrown by exotic weed species.

- No communities listed under the EPBC Act were recorded because of extensive weed occurrence. Single isolated trees or stands of trees, characteristic of the canopy of Blue Gum High Forest of the Sydney Basin Bioregion, without a native understorey are not included in the Commonwealth listing. However, successful weed control and restoration of a native understorey may mean that the vegetation may in future correspond to BGHF as listed under the EPBC Act.'

- The critically endangered ecological community, *Blue Gum High Forest in the Sydney Basin Bioregion* listed under the TSC Act was recorded as a highly modified relic of the community persisting as canopy trees without a native understorey.

- No Commonwealth nor State listed threatened species were recorded, nor are any likely to occur.

- Of the surveyed trees recorded on and adjoining the Site, including those assessed by Peter Castor of Tree Wise Men (2014), 61 are classified in Ku-ring-gai Local Government Area as one of the following:
    - A - Noxious Weed under the Noxious Weed Act 1993;
    - B - Urban Environmental Weeds under Ku-ring-gai Weed Management;
    - C - Nuisance Plants under Ku-ring-gai Weed Management; and
    - D - Exempt from Ku-ring-gai Council Tree Preservation Order.

:

Species recorded	Tree Number	A	B	C	D
Acer negundo	153, 160		Yes		Yes
Brachychiton acerifolius	169a, 345			Yes	
Cinnamomum camphora	65, 67, 68, 131, 134, 141, 142, 143, 144, 218, 224, 225	Yes			Yes
Erythrina x *sykesii*	5, 6, 7, 8, 9, 31, 32, 33, 40, 41, 54, 214, 325				Yes
Grevillea robusta	260			Yes	
Ligustrum lucidum	27, 28, 29, 30, 34, 79, 84, 86, 90, 125, 126, 127, 130, 132, 133, 137, 138, 139, 140, 285	Yes			Yes*
Liquidambar	11, 176, 176A, 320, 322, 324a			Yes	Yes

stryraciflua					
Phoenix canariensis	1, 250, 309			Yes	
Schefflera actinophylla	47				Yes
Syagrus romanzoffiana	91				Yes

* if under 12 metres in height

Non-native trees in the Conservation Area and the managed bushland buffer are considered as "weed" in the VMP.

2.5.2 BGHF reference site

Dalrymple Hay Nature Reserve in St Ives and Sheldon Forest in Pymble in Ku-ring-gai Local Government Area were formerly highly degraded BGHF sites (McDonald *et al.* 2002, DECC 2008A, 2008B). The BGHF in both of these reserves has been successfully restored and managed by Ku-ring-gai Council (see photographs of restored areas of Sheldon Forest in Appendix 10).

Sheldon Forest is located less than 1 km north of the Site (Figure 1A). Like the Site, the BGHF area in Sheldon Forest is in a head gully on shale-derived soils and downslope of urban/suburban development. The stormwater issues are being progressively addressed by Council.

In November 2013 and January 2014, flora surveys undertaken as part of the OEH Linking Landscapes for Local Action project surveyed nine 20 m x 20 m quadrats in Sheldon Forest (Atlas of NSW Wildlife, VIS Bionet accessed 4 July 2014, locations on Figure 5B, data in Table 3), with the abundance of species recorded being as assigned a cover score from 1-8. The corresponding percent cover for the assigned cover scores are:

Score	Percent cover
1	rare
2	occasional
3	common but less than 5%
4	very common but less than 5%
5	5-25%
6	26-50%
7	51-75%
8	76-100%

(Atlas of NSW Wildlife, VIS Bionet accessed 4 July 2014).

These quadrats are located as follows (Figures 4A, 5B, 5C).

Site	Location description In Sheldon Forest	Mapped Geology (Chapman *et al.* 1989)	Mapped vegetation (OEH 2013)
SHEL-01	Weed plume behind houses near SE boundary of the reserve	Hawkesbury Sandstone	Coastal Shale/Sandstone Forest
SHEL-02	Upper slope above eastern side of main creek	Hawkesbury Sandstone	Coastal Shale/Sandstone Forest
SHEL-03	Mid-slope in southern part of reserve; western side of main	Hawkesbury Sandstone	Coastal Enriched Sandstone Dry Forest

Site	Location description In Sheldon Forest	Mapped Geology (Chapman *et al.* 1989)	Mapped vegetation (OEH 2013)
	creek		
SHEL_04	Near NE corner of reserve	Ashfield Shale	Blue Gum High Forest
SHEL_05	Just below scout hall off Warragul Road	Ashfield Shale	Blue Gum High Forest
SHEL_06	West of Jubilee Ave access to park	Ashfield Shale	Blue Gum High Forest
SHEL_07	150m SW of scout hall	On boundary of Ashfield Shale and Hawkesbury Sandstone	Sydney Turpentine Ironbark Forest
SHEL_08	50m SW Kimbarra Road	Hawkesbury Sandstone	Coastal Shale/Sandstone Forest
SHEL-09	50m SE of Swindon Close	Hawkesbury Sandstone	Coastal Shale/Sandstone Forest

Of these nine quadrats surveyed in Sheldon Forest (Figure 5B), four (SHEL_04, 05, 06, 07) are in the head gully (Figure 1A), and on and adjacent to the shale geology (Figures 4A), with the following species composition recorded.

Site	Date	Number of exotic species recorded	Number of native species recorded
SHEL_04	30/1/2014	8	30
SHEL_05	19/11/2013	18	44
SHEL_06	19/11/2013	8	44
SHEL_07	19/11/2013	8	42
Total recorded		**21**	**77**

Of these four quadrats, SHEL-04 had a high percent weed recorded with 5-25% cover by *Ligustrum lucidum* and 26-50% cover by *Lantana camara* and *Ligustrum sinense* (Table 3). The high weed abundances closest to railway line and the Pacific Highway are likely to be related to stormwater inputs, currently being addressed by Council.

In the relatively weed-free quadrats (SHEL_05, 06, 07), there were seven weed species recorded with a score of 3 (common but less than 5%) or higher. Six of these weed species have edible fruits and are known to be spread by birds. *Tradescantia fluminensis* occurs on moist, nutrient-rich soils.

Exotic species	SHEL_05	SHEL_06	SHEL_07
Asparagus aethiopicus	3	3	0
Asparagus scandens	1	3	1
Ligustrum sinense	0	4	3
Ochna serrulata	3	4	3
Pyracantha angustifolia	0	3	0
Rhaphiolepis indica	2	3	1
Tradescantia fluminensis	3	0	0

In terms of native species recorded in the mapped BGHF and immediately adjoining mapped Sydney Turpentine Ironbark Forest (Figure 5C), species recorded in the structural layers in the 20 m x 20 m quadrats are as follows.

Native species	SHEL_04	SHEL_05	SHEL_06	SHEL_07
Canopy trees				
Angophora costata			2	1
Angophora floribunda		2		
Eucalyptus pilularis	5	6	6	5
Eucalyptus saligna	6			
Syncarpia glomulifera				6
Sub-canopy				
Acacia elata		1		
Acacia floribunda		1	1	
Acacia implexa			1	
Acacia longifolia	1		2	
Acacia parramattensis	1		2	
Acacia stricta		1	1	
Acmena smithii		1		
Brachychiton acerifolius		1		
Elaeocarpus reticulatus	1	3	1	3
Glochidion ferdinandi		2		1
Notelaea longifolia			1	3
Pittosporum revolutum	3			
Pittosporum undulatum	2	5		3
Syzygium spp.			1	
Shrubs				
Breynia oblongifolia	3	3	4	2
Bursaria spinosa	1			
Clerodendrum tomentosum	3	1		
Cordyline stricta		2		1
Exocarpos cupressiformis			1	
Homalanthus populifolius		2		3
Lepidosperma laterale			3	
Leucopogon juniperinus	2	1	3	2
Leucopogon lanceolatus			1	2
Maytenus silvestris			1	
Ozothamnus diosmifolius	1		3	1
Polyscias elegans	1	5	1	
Polyscias sambucifolia	2	2	4	2
Persoonia linearis		1		
Platylobium formosum		3	4	3
Trochocarpa laurina		1		
Creepers and climbers				
Billardiera scandens			4	
Cassytha pubescens				2
Cissus hypoglauca			4	
Clematis aristata	3	5	5	3
Desmodium varians	1	4	3	3
Eustrephus latifolius	3	5	5	4

Native species	SHEL_04	SHEL_05	SHEL_06	SHEL_07
Glycine clandestina	2			3
Glycine spp.		3	3	
Hardenbergia violacea		1		2
Marsdenia rostrata		3		
Morinda jasminoides		5		
Pandorea pandorana	3	4	4	4
Parsonsia straminea				5
Smilax glyciphylla	1	1		3
Tylophora barbata	3	4	3	
Ferns				
Blechnum cartilagineum	4		1	
Pteridium esculentum		1	2	
Groundlayer (not grasses)				
Dianella caerulea var. *producta*	1			3
Dianella caerulea		3	3	
Dichondra repens		4		5
Geranium homeanum				2
Gonocarpus teucrioides				1
Goodenia hederacea				1
Hibbertia aspera			4	3
Hibbertia dentata	2	2	3	3
Lomandra filiformis				1
Lomandra longifolia	2		5	1
Oxalis spp.			1	
Oxalis perennans				3
Pomax umbellata				3
Pratia purpurascens			1	3
Pseuderanthemum variabile	4	3	4	4
Rubus parvifolius		1		
Vernonia cinerea		1		
Grasses				
Echinopogon ovatus		1		
Entolasia marginata	3	3	4	
Entolasia stricta		3	4	5
Imperata cylindrica	2	1	1	4
Microlaena stipoides	3	4	3	5
Oplismenus imbecillis	4	5	5	4
Poa affinis		1	1	5
Poaceae indeterminate			1	

2.6 Fauna

A narrow range of fauna species was recorded by Aquila Ecological Surveys (2009), their paucity due to the degraded habitat on the Site. Species recorded included Common Brushtail Possum (*Trichosurus vulpecula*), Rainbow Lorikeet

(*Trichoglossus haematodus*), Crimson Rosella (*Platycercus elegans*), Noisy Miner (*Manorina melanocephala*), Eastern Whipbird (*Psophodes olivaceus*), Pied Currawong (*Strepera graculina*) and Yellow-throated Scrubwren (*Sericornis citreogularis*).

During the flora inspection in October 2012 and May, June 2014, a Brush-turkey (*Alectura lathami*) was observed raking up leaf litter.

In paragraph 5 of the Final Determination, it is stated that:

> *5. While no systematic fauna surveys have been carried out across the range of Blue Gum High Forest a number of mammal and bird species listed as threatened in NSW have been recorded as resident or transient in the community. These include the Grey-headed Flying Fox (*Pteropus poliocephalus*), Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*), Glossy Black cockatoo (*Calyptorhynchus lathami*) and the Powerful Owl (*Ninox strenua*).*

The fauna habitat requirements in the approximately 28.3 ha St Ives Blue Gum High Forest, discussed in Department of Environment and Climate Change (DECC) (2008A), are likely to be applicable to the Conservation Area and the adjoining at least 10 m wide managed bushland buffer.

Powerful owl (*Ninox strenua*) is the top native predator of the St Ives Blue Gum High Forest, preying on ringtail possums. The landscape plant selection needs to consider food sources for ringtail possums. A threat to the Powerful Owl is the loss of hollow-bearing trees used for nesting, and habitat fragmentation (Department of Environment and Conservation 2005 cited DECC 2008A).

Sugar glider (*Petaurus breviceps*) prefers mature forests with many tree hollows to nest in. They are active at night, gliding from tree to tree and feeding on nectar, pollen and the sap of certain eucalypt and wattle trees (Department of Environment and Conservation 2004a cited DECC 2008A). Domestic cats have been reported to be preying on sugar gliders.

Grey-headed flying-fox (*Pteropus poliocephalus*) is Australia's largest bat. In Blue Gum High Forests, flying-foxes feed on the pollen and nectar of flowering *Angophora costata, Eucalyptus pilularis* and *Eucalyptus saligna*. Blossoms containing pollen and nectar are their main diet. These flying-foxes can travel up to 50 km in a night to forage on nectar, pollen and fruits of native trees. By dispersing seeds and pollen, flying-foxes play an essential role in maintaining forest ecosystem health and biodiversity (Department of Environment and Conservation 2005 cited DECC 2008A). Flying foxes would benefit from the provision of long ponds as to drink they skim the water surface of a river or pool then land in a tree to lick their wet fur (Ku-ring-gai Bat Conservation Society website: www.sydneybats.org.au, accessed 20 November 2012).

As flying-foxes are highly mobile, seeds and pollen can be moved locally and over great distances. High mobility also makes flying-foxes very effective as forest pollinators (www.ehp.qld.gov.au/wildlife/livingwith/flyingfoxes/importance.html, accessed 4 August 2014).

Glossy black cockatoo (*Calyptorhynchus lathami*) feeds on seeds extracted from the woody cones of *Casuarina* and *Allocasuarina* trees in forests including Blue Gum High Forest. Glossy black cockatoos rely on tree hollows in live or dead eucalypt trees for nesting. The destruction of these trees and their casuarina food trees are

threatening this bird (Department of Environment and Conservation 2004a cited DECC 2008A).

Swamp wallaby (*Wallabia bicolor*) is not as common in Sydney as it once was, but can still be found in its preferred habitat of thick forest undergrowth such as the undergrowth in the St Ives Blue Gum High Forest. It feeds on various plants including introduced and native shrubs, grasses and ferns (Australian Museum 2007 cited DECC 2008A).

Brush-turkey (*Alectura lathami*) feeds on insects, seeds and fallen fruits, which they expose by raking up leaf litter. Raking up leaf litter and exposing bare soil under mature Blackbutt trees will promote the germination of their seeds (DECC 2008A). Brush-turkey have been sighted onsite in dense *Ligustrum* thickets, especially in the south of the Site.

2.7 Bushfire requirements for the proposal

The bushfire requirements are outside the proposed Conservation Area. Graham Swain of Australian Bushfire Protection Planner Pty Limited has specified an at least 10 m wide managed buffer zone to the Conservation Area downslope of the proposed buildings. The at least 10 m wide managed buffer zone to the Conservation Area is to comply with the management prescriptions of an Inner Protection Area.

2.8 Sunlight for the residential buildings

The leaf orientation of eucalypts tends toward vertical, unlike that of most exotic trees which spread their leaves in a more horizontal plane. The canopy of a eucalypt forest will thus shade the ground less than a canopy of exotics. Currently the floor of the gully is dark with dense growth of the exotic *Ligustrum lucidum,* in some parts exceeding 15 m in height. With their sparser canopies the native eucalypts, although ranging in height from 20 to 40 m, will allow more light to reach windows in lower floors of the proposed development than would the *Ligustrum* if left in its present state.

2.9 Formalised walking paths

In order to maximise the appreciation of and minimise risk of fragmentation and disturbance to the Conservation Area, a formalised path and/or boardwalk and seating area form part of the consideration in the VMP.

Formalised walking paths and boardwalks are widely utilised in Conservation Areas including through endangered ecological communities such as Eastern Suburbs Banksia Scrub at Jennifer Street, Botany Bay National Park, and Sydney Coastal Estuary Swamp Forest Complex at the Warriewood wetlands (Appendix 9).

The formalised path also provides access for maintenance and monitoring of the Conservation Area.

3.0 Threats to the vegetation

3.1 Existing threats to the vegetation

The listed threats to BGHF in the Final Determination are given in paragraphs 1, 11, 12, namely:

1. … Small-scale clearing associated with residential subdivision, road upgrading, extension and maintenance of service easements, etc. pose a threat of ongoing decline in the extent of the community. Clearing of native vegetation is listed as a Key threatening Process under the Threatened Species Conservation Act 1995.

11. Changes in structure of Blue Gum High Forest have occurred as a consequence of the extensive removal of large old trees. A number of stands of Blue Gum Forests have highly modified understoreys, in which the native woody component has been largely replaced by woody exotic species or by increased abundance of native and exotic grasses. Continued underscrubbing, frequent burning and mowing may maintain the understorey in an artificially open state and prevent recruitment of species with the community. The loss of large trees removes essential habitat for a range of tree dependant fauna (Gibbons and Lindenmeyer 1996). The reduction of understorey complexity, through the reduction of native shrub cover, degrades habitat for a range of bird and mammal species (Catling 1991). These processes contribute to a very large reduction in the ecological function of the community.

12. The influx of stormwater, which brings excessive moisture, pollutants and nutrients to the remnant forests from surrounding urban areas, is a significant ongoing threat to the ecological integrity of Blue Gum High Forest. This, together with the legacy of past disturbances and the abundance and dispersal of weed propagules from nearby urban areas, results in the invasion, establishment and spread of weeds ...

Pathogen risks, such as from the microscopic soil-borne organism *Phytophthora cinnamomi* and air-borne Myrtle Rust (*Uredo rangelii*), are listed Key Threatening Processes under the NSW Threatened Species Conservation Act 1995.

3.2 Managing potential threats to vegetation

Threats to the vegetation will be managed by actions to maintain and improve existing vegetation by:

- Controlling weeds, especially weed growth surrounding the local native trees;
- Re-establishment of local native understorey;
- Stormwater management;
- Increasing awareness of the value of the vegetation;
- Controlling access to the Conservation Area;
- Minimising pathogen risks; and
- Improving habitat for the fauna species associated with the BGHF vegetation community, including removal of impediments to glide paths for birds and bats.

Ongoing monitoring will be conducted to assess progress of the rehabilitation and to ensure that corrective actions are undertaken promptly as required.

4.0 Vegetation Management Plan

4.1 Aims of the Vegetation Management Plan

The aims of the Vegetation Management Plan (VMP) are to:

- Conserve and enhance the local native vegetation;

- Establish a long-term, ecologically viable BGHF ecosystem in the gully upslope of the mapped upper tributary of the Lane Cove River; and
- Protect water quality flowing through and from the Site via a series of constructed ephemeral ponds.

The long-term aims of conservation and enhancement of the existing local native vegetation and protection of water quality will be achieved by amelioration of potential threats and the implementation of management objectives with realistic targets.

The VMP is not only directed towards weed removal, but also the management of water quality, nutrient input, re-establishment of nutrient cycling and development of habitat for the long-term survival of the BGHF onsite. In this head gully, the natural nutrient cycles of the BGHF have been disrupted by nutrient-enriched stormwater and sewer overflows. This has resulted in the smothering of native species by weeds, weed dominant nutrient cycling, and lack of sufficient native groundlayer for natural nutrient cycling. Currently the native understorey is almost entirely absent. Progressive re-establishment of the natural nutrient cycling is dependent on re-establishment of the native understorey. The disrupted nutrient cycles favour weeds and place the remnant trees at risk of extinction (Hazelton and Clements in press).

The factors adversely affecting the Conservation Area will be progressively addressed. On-going maintenance-level weeding is expected to be required. Weeds may continue to germinate from the soil seed bank and/or from bird drop, but are unlikely to thrive once the adverse stormwater and nutrient cycling factors are addressed. Presence of weed plumes is indicative of nutrient enrichment, hence the need for long-term monitoring of weed occurrence and on-going maintenance in the Conservation Area.

Without addressing the adverse factors such as nutrient enrichment, weeds and the weed dominant nutrient cycling, the existing BGHF is expected to further deteriorate and become extinct on the Site.

4.2 Areas to which the Vegetation Management Plan applies

The VMP applies to the BGHF Conservation Area (approximately 0.90 ha) and at least 10 m wide managed bushland buffer zone (approximately 0.22 ha in the east) (Figures 1A, 2G).

The western buffer zone (approximately 0.06 ha) is on House Blocks 2, 3 and 4. Works in the western buffer zone will be co-ordinates as required to carry the conservation work.

4.3 Management Objectives

The following management objectives have been set:

1. Protection of the Conservation Area.

2. Earthworks to remove introduced materials and create ephemeral ponds

3. Weed control.

4. Stimulate natural regeneration through managed disturbance.

5. Enhance the local native vegetation through revegetation and planting.

6. Increase awareness of the conservation value of the vegetation.

7. Monitoring and maintenance.

The satisfaction of each management objective will be contingent on meeting specific targets. The specific targets associated with each management objective as well as the outline of details of the vegetation management are presented in Table 4, with timeframes for completion of the tasks required to achieve each management objective.

The implementation of the VMP is to commence with the phase of initial seed collection, earthworks, primary weed removal, and planting – after which ongoing maintenance will be required, as specified by the Environmental Manager.

4.3.1 Management Objective 1 – Protection of the Conservation Area

The Conservation Area is to be protected from deliberate or accidental encroachment by persons or vehicles and from sediment and runoff from the works site, prior to, during, and after construction. The actions required to satisfy Objective 1 are also included in the Construction Plan of Management.

Prior to any construction onsite and prior to conservation earthworks within the Conservation Area

- The Site owner/ Manager is to appoint an Environmental Manager (EM), who is to be a responsible person with at least 5 years experience of supervising the restoration of degraded native ecosystems and with at least a university degree in natural sciences to supervise, co-ordinate and document conservation works;
- The Environmental Manager is to ensure that sufficient suitable tubestock, seed, brush matting and/or mulch material will be available to be placed/ planted over the worked soil surfaces;
- The Environmental Manager is to check water quality entering the Site in conjunction with the hydro-engineer and Site/Construction Manager. Sources of stormwater contaminants entering the Site are to be addressed as part of the site management;
- The Environmental Manager is to meet with the Site/Construction Manager as required about fencing, vehicle cleanliness and site induction;
- All site workers are to be inducted and made fully aware of the significance of the Conservation Area. This area is to be clearly identified on plans and marked on the Site as a “no-go” area to construction workers;
- Construction and Sediment fencing upslope of the Conservation Area is to be erected as required by the Construction Manager and Environmental Manager;
- The Construction Area fence is to clearly demarcate the limits of the construction activities;
- Existing native trees or tree groups to be retained in the Buffer Zone are to be clearly identified and protected as required by the Environmental Manager in consultation with the Arborist; and
- All machinery is to be cleaned prior to entry into the Conservation Area. The machinery and loading equipment is to be inspected and photographed as required by the Environmental Manager.

During the earthworks and removal of introduced materials and soil preparation

All earthworks in the Conservation Area and Buffer Zone are to be carried out under strict supervision of the Environmental Manager, in consultation with the Construction Manager (and the Hydro-engineer and the Arborist as required), to avoid damage to the remnant trees and scattered occurrences of native groundlayer (mainly ferns);

- Soils in the Conservation Area must be sufficiently dry at the time of earthworks, as specified by the Environmental Manager;
- Soil preparation should be directed to minimise erosion risk and compaction of the clay soil;
- A qualified fauna expert is to be consulted by the Environmental Manager if native fauna are located during earthworks;
- Construction earthworks should not be undertaken when soils are wet;
- For the onsite construction workers, the importance of the Conservation Area are to be discussed at the weekly toolbox talks;
- The Conservation Area is to be clearly identified on plan, clearly identified on the Site and marked with signs as specified by the Environmental Manager;
- The Construction Manager and Environmental Manager are to ensure that sediment fencing stays in place and is maintained; and
- Any requests for corrective actions are to be complied with promptly by the Site owner.

Once earthworks within the Conservation Area are complete

- Seed dispersal, brush matting, mulching and planting are to commence under the supervision of and as directed by the Environmental Manager;
- Buffer plantings are to be undertaken on the edge of the Conservation Area to assist in protection of the Conservation Area from weed invasion and nutrient, sediment and water runoff;
- For the onsite construction workers, the importance of the Conservation Area is to be discussed at the weekly toolbox talks;
- The Conservation Area is to be clearly identified on plans, and marked with signs on Site as specified by the Environmental Manager and Site/Construction Manager;
- Sediment fencing for preventing movement of sediment from the area of construction works toward Conservation Areas is to remain in place and be maintained until risk is considered low; and
- Any breaches of the Conservation Area during construction are to be immediately reported to the Environmental Manager and Construction Manager, and any requests for corrective actions are to be carried out promptly by the Site owner.

Prior to and at time of local provenance planting

To further minimise risk of pathogen introduction:

- Nurseries and nursery stock are to be routinely inspected by the Environmental Manager prior to delivery. The nurseries to be used for plant sourcing must have cleanliness and hygiene protocols and procedures in place; and
- Cleanliness onsite and adherence to nursery and bush regeneration protocols are critical to minimising pathogen risks.

The recommended procedures for managing *Phytophthora cinnamomi* are given in:

- Best Practice Guidelines for BGHF (DECC 2008B),
- Botanic Gardens website at: http://www.rbgsyd.nsw.gov.au/plant_info/pests_diseases/phytophthora_dieback/phytophthora_disinfection_procedures (accessed 26 March 2014), and

- Best Practice Management Guidelines for *Phytophthora cinnamomi* in the Sydney Metropolitan Catchment Management Authority (available at http://sydney.cma.nsw.gov.au/index.php?option=com_remository&Itemid=51&func=startdown&id=236.

The Best Practice management guidelines for *Phytophthora cinnamomi* are to be adopted on the Site. They include:

- *Provide hygiene protocols and induction to all new workers, contractors and volunteers*
- *Assume the area you are entering in is free of* P. cinnamomi *unless otherwise tested and understand that your activities have the potential to introduce* P. cinnamomi
- *To avoid introducing infection, before entering uninfected sites remove excess soil and mud and then spray boots, tools, gloves and small equipment with recommended disinfectant until runoff is clear*
- *To avoid spreading* P. cinnamomi*, when leaving infested sites remove excess soil and mud and then spray boots, tools, gloves and small equipment with methylated spirits or disinfectant until runoff is clear*
- *Plan works so they begin in non- infested sites and then move on to infested areas*
- *Use coloured tape to label tools when working in infested sites. Remove tape once tools have been cleaned*
- *Do not work on a site if the soil is saturated and mud is likely to adhere to footwear and tools*
- *Avoid unnecessary soil disturbance*
- *Do not import plants unless they are from nurseries accredited with Nursery Industry Accreditation Scheme Australia (NIASA)*
- *On infested revegetation sites, plant species known to be resistant to* P. cinnamomi
- *Use mulch sourced from disease free native trees and taken from at least one meter above ground level*
- *Never import soil or gravel unless it is certified to be free of* P. cinnamomi *by plant disease diagnostic laboratory*
- *All materials removed from a site must be bagged and taken to landfill*
- *Do not drive or park vehicles or trailers off established tracks*
- *Use vehicle wash down stations when available*
- *Ensure effluent from wash down stations does not drain into bushland*
- *Restrict access in high value areas, particularly if autonomous spread is unlikely to occur*

Myrtle Rust was gazetted as a key threatening process on 17 September 2010. In the final determination of the listing - *Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae* (http://www.environment.nsw.gov.au/determinations/exoticrustfungiFD.htm, accessed 21 March 2014), the naturalisation and potential threat of Myrtle Rust in Australia is discussed:

> *1. … One variant of the Puccinia psidii sens. lat. complex, Uredo rangelii, distinguished from P. psidii sens. strict. by morphological differences in the urediniospore stage, has recently arrived and naturalised in Australia, where it is referred to as 'Myrtle Rust'.*
>
> *2. The potential threat to the Australian biota of exotic rusts, other than those of the Puccinia psidii sens. lat. complex, is uncertain but all exotic myrtaceous rusts are to be considered part of this Key Threatening Process, and any rusts detected on myrtaceous species in Australia should be*

regarded as suspect and reported for prompt identification (see www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust).

It also states:

7. Wild native plants of New South Wales recorded as infected by U. rangelii *as at March 2011* (Industry & Investment NSW, Myrtle Rust update 2 Feb. 2011, http://www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust/update, accessed 7 March 2011) *are:* Anetholea anisata *(Ringwood, Aniseed Myrtle – also known as* Syzygium anisatum*),* Backhousia myrtifolia *(Grey Myrtle, Ironwood),* Callistemon salignus *(Sweet Willow Bottlebrush),* Choricarpia leptopetala *(Brown Myrtle, Rusty Turpentine),* Eucalyptus agglomerata *(Blue-leaved Stringybark),* Eucalyptus deanei *(Mountain Blue Gum),* Eucalyptus pilularis *(Blackbutt),* Lenwebbia prominens *(Southern Velvet Myrtle),* Leptospermum rotundifolium *(Round-leaved Tea Tree),* Melaleuca alternifolia *(Tea Tree),* Melaleuca quinquenervia *(Broad-leaved Paperbark),* Rhodamnia maideniana *(smooth scrub turpentine),* Rhodamnia rubescens *(Scrub Turpentine),* Rhodamnia whiteana *(White Malletwood),* Rhodomyrtus psidioides *(Native Guava),* Syzygium luehmannii *(Small-leaved Lilly Pilly, Riberry),* Syncarpia glomulifera *(Turpentine), and* Uromyrtus lamingtonensis.

Of the above list, *Eucalyptus pilularis* (Blackbutt) and *Syncarpia glomulifera* (Turpentine) have been recorded on the Site. The recorded *Syncarpia glomulifera* occur as a planted row on 3 Avon Road.

From the NSW Department of Primary Industries and Investment – Preventing Spread of Myrtle Rust in Bushland handout (2010/211), (http://www.dpi.nsw.gov.au/__data/assets/pdf_file/8/36296/preventing-spread-Myrtle-Rust-bushland.pdf accessed 9 April 2014), it states:

Myrtle Rust is an exotic plant fungal disease that can be spread in bushland containing plants from the Myrtaceae family. Myrtle Rust is spread by people moving infected plant material, dirty equipment including containers and tools, contaminated clothing and vehicles.

Bushland workers such as bushland regenerator groups, bush care groups, Landcare, forestry workers, and National Parks & Wildlife Services staff should take reasonable measures to prevent the spread of Myrtle Rust between and within areas of bushland. ….

However, it is now known that Myrtle Rust spores travel by wind, similar to Wheat Rust.

If Myrtle Rust is detected onsite, the advice from NSW Department of Primary Industry (http://www.dpi.nsw.gov.au/biosecurity/plant/myrtle-rust, accessed 4 August 2014) is to:

- *apply fungicides according to APVMA permits*
- *replace diseased plants with non-susceptible plants (for example plants not in the myrtaceae group)*
- *practise vehicle and personal biosecurity hygiene*.

The presence of Myrtle Rust is to be monitored onsite. Hygiene measures to minimise the risk of spread of pathogens are to be adhered to and monitored.

At time of occupancy

Prior to occupancy, an Environmental Awareness Kit is to be prepared in consultation with Council for all new residents of the buildings and the Body Corporate. It includes an explanation of the significance of the BGHF and the associated native fauna habitat value, especially of Powerful owl, Sugar glider, Grey-headed flying-fox, Glossy black cockatoo, Swamp wallaby and Brush-turkey.

Interpretive signs are to be installed adjoining pathways in the BGHF Conservation Area.

4.3.2 Management Objective 2 – Earthworks to remove introduced materials and create ephemeral ponds

Careful removal of dense weed growth in the Conservation Area will be required to expose any introduced materials:

- Works are to be carefully supervised by an experienced Restoration Ecologist/Environmental Manager;
- Weed removal and soil preparation should be directed to minimise erosion risk and compaction of the clay soil;
- Earthworks should not be undertaken when soils are wet; and
- The cleared weed is to be "rafted" into linear strips or piles along the contour. Weeds with seed present are to be segregated and either removed from site or placed under black plastic.

Weeds within 2 m of the trunks of the local native trees are to be removed by hand by experienced bush regenerators as specified by the Environmental Manager.

Creation of a series of ephemeral ponds
The primary purpose of the ephemeral ponds is for stormwater management (including protection of water quality) as well as having been designed to provide fauna habitat and flight paths. Design details are provided in the Stormwater Management Plan.

In areas proposed for the creation of ephemeral ponds, any introduced materials and dense weed growth are to be carefully removed from the ground and any potential sewer leaks, dumpings or obvious environmental risks investigated and controlled.

Following erection of any jute sediment fencing or other measures downslope of proposed waterbodies, as required by the Environmental Manager supervising the earthworks, the area is then to be reformed into a series of ephemeral ponds as directed by and under supervision of the Environmental Manager in consultation with the Construction Manager and the Hydro-engineer. The waterbody works are similar to those in Sheldon Forest (see photographs in Appendix 10).

4.3.3 Management Objective 3 – Weed control

The initial weed control is the clearing of the dense weeds (see Objective 4).

All noxious weeds on the Site are to be continually suppressed and destroyed.

Within the more intact vegetation, weeding is to take place in successive stages. Weed management usually occurs in three stages, namely:

- Primary weed control, involving initial weed removal works and resulting in the removal of the bulk of weed infestations;
- Secondary weed control, involving follow-up removal of weed regrowth; and

- Tertiary weed control, involving maintenance.

Primary control of woody weeds
Removal of the woody weeds will most likely involve the application of undiluted glyphosate herbicide, using drill- or frill-and-inject, cut-and-paint, or scrape-and-paint methods:

- Frilling involves cutting through the tree's bark with a hammer and chisel, and drilling involves drilling into larger trees at intervals around the trunk, followed promptly in both methods by injecting herbicide into the active transport layer. Trees are left standing to die *in-situ*;
- The cut-and-paint method involves cutting the weed plant down as close to ground level as possible, followed by the manual application of dyed herbicide to the sapwood of the stump; and
- Scrape-and-paint, applicable to smaller diameter stems, specifically those that re-shoot if cut and painted, involves scraping off a vertical strip of the bark with a sharp implement followed by the application of dyed, undiluted herbicide onto the exposed sapwood.

These methods reduce the likelihood of slope erosion, as well as the need for the physical removal of the larger weeds, which makes the work faster and less physically demanding. These methods, however, require regular follow-up work, as treated weeds can sucker. Any flowering, fruiting or seeding bodies should be removed from plants treated using these methods. The use of undiluted herbicide should be undertaken carefully and no more than absolutely necessary. It is essential to use a glyphosate formulation such as *Roundup Biactive* when working in the vicinity of water, to reduce the impact on wildlife, especially frogs.

Secondary and maintenance control of woody weeds
Following initial treatment of woody weeds, there will be regrowth from the soil weed seed bank and bird seed drop. Small seedlings are to be removed by hand where appropriate, and saplings or any suckering scraped and painted with undiluted glyphosate herbicide. These actions will require regular implementation to exhaust the weed seed bank and prevent any new seedlings maturing and seeding.

It is important following secondary weeding that any new weed infestation is readily addressed as part of the on-going management.

Local native known weedy species, *Glochidion ferdinandi and Pittosporum undulatum*, despite being listed characteristic BGHF species, will be reduced in number to decrease their competition with the less aggressive native BGHF species. These species co-occur with exotic weeds in bushland patches surrounded by suburban development (Clements 1983). *Pittosporum undulatum* is an aggressive coloniser in urban northern Sydney and is known as a troublesome invader in sclerophyll forest (NSW Flora Online - PlantNET, Clements (1983), Gleadow (1982), Gleadow and Narayan (2007).
In the Commonwealth Species Profile and Threats database for Blue Gum High Forests, accessed at http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=47 the occurrence of *Pittosporum undulatum* as a weed in remnants is discussed:

> ***Weed invasion – native species***
> *Although a natural component of Blue Gum High Forest, Sweet Pittosporum* (Pittosporum undulatum) *is considered a weed in remnants if it reaches high densities. In Blue Gum High Forest in the Ludovic Blackwood Memorial*

Sanctuary, areas with a closed canopy layer of Sweet Pittosporum (or under dense Large-leaved Privet) lacked native grasses, herbs and small shrubs in above-ground vegetation (Buchanan 1989). The dense shade and leaf litter of Sweet Pittosporum also prevented the establishment of saplings of the dominant eucalypts.

…

*The absence of fire in Blue Gum High Forest (e.g. for at least 40 years, Buchanan 1989) is known to lead to the native plant Sweet Pittosporum (*Pittosporum undulatum*) becoming dominant in the understorey and causing long-term loss of other plant species (McDonald* et al. *2002; New South Wales National Parks and Wildlife Service 2004b).*

Primary control of groundlayer weeds

Within the barer areas with little native component, careful application of herbicides to new growth of weeds, following earthworks and/or slashing, may be required as directed by the Environmental Manager. Spraying new growth reduces herbicide use and maximises the success of the herbicide use:

- Prior to earthworks, bare areas dominated by exotic grasses are to be carefully sprayed with herbicide as specified by the Environmental Manager. Repeated careful herbicide application may be required;
- Post-earthworks, re-shooting exotic grasses from root fragments or from seed in the soil is to be carefully spot sprayed with herbicide; and
- Other herbaceous weed species may be treated simultaneously with herbicide until the native vegetation establishes.

Any herbicide application following planting is to occur during windless periods (0-5 km/hr) such as early mornings, using a nozzle set to large droplets to minimise risk of spray drift.

Secondary and maintenance control of groundlayer weeds

Qualified bush regenerators will need to regularly weed the existing vegetation and revegetated areas of the Conservation Area and the managed buffer zone. This will involve hand pulling of smaller weeds and ongoing removal of flowering heads of annual and perennial weeds, until planted natives are tall enough to shade out the bulk of weed regrowth. Ongoing careful spot spraying may be required as specified by the Environmental Manager.

It is important that weeds on immediately adjoining areas such as on the edge of the rail corridor are controlled as specified by the Environmental Manager and in consultation with the adjoining landowners.

Specific weed control actions required

Weed control management actions will vary, with abundance and environmental requirement of the weed species. The weeds recorded during the 2012 survey included:

Scattered occurrences:

Ageratina adenophora	Crofton Weed

Asparagus aethiopicus	Asparagus Fern
Chlorophytum comosum	Spider Plant
Lonicera japonica	Japanese Honeysuckle
Monstera deliciosa	Fruit-salad Plant
Ochna serrulata	Mickey Mouse Plant
Oxalis pes-caprae	Soursob
Setaria palmifolia	Palm Grass
Solanum nigrum	Blackberry Nightshade

Dense clump occurrences

Cinnamomum camphora	Camphor-laurel
Delairea odorata	Cape Ivy
Erythrina x sykesii	Coral Tree
Hedychium gardnerianum	Yellow Ginger, Ginger Lily
Musa acuminata	Banana

Dense widespread weeds

Ipomoea indica	Blue Morning Glory
Lantana camara	Lantana
Ligustrum lucidum	Broad-leaved Privet, Glossy Privet
Ligustrum sinense	Small-Leaved Privet, Chinese Privet
Tradescantia fluminensis	Wandering Jew

In paragraph 12 of the Final Determination, it is stated that:

the problematic weed species in Blue Gum High Forest include the following:

Asparagus asparagoides	Bridal Creeper
Cinnamomum camphora	Camphor laurel
Lantana camara	Lantana
Ligustrum lucidum	Large-leaved Privet
Ligustrum sinense	Small-leaved Privet
Ochna serrulata	
Passiflora edulis	Passionfruit
Passiflora subpeltata	Passionfruit
Pennisetum clandestunum	Kikuyu
Rubus ulmifolius	Blackberry
Senna colutioides	
Tradescantia fluminensis	

*'Invasion and establishment of exotic vines and scramblers', 'Invasion of native plant communities by exotic perennial grasses' and 'Invasion, establishment and spread of Lantana (*Lantana camara *L.* sens. lat*)' are listed as Key Threatening Processes under the Threatened Species Conservation Act. The influx of stormwater, pollutants and nutrients, and the invasion of weeds contribute to a very large reduction in the ecological function of the community.*

The listed key threatening processes involving weeds (http://www.environment.nsw.gov.au, accessed 31 March 2015) are as follows:

Invasion and establishment of exotic vines and scramblers
Invasion and establishment of Scotch broom (*Cytisus scoparius*)
Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidata*
Invasion, establishment and spread of *Lantana camara*
Invasion of native plant communities by *Chrysanthemoides monilifera* (bitou bush

and boneseed)
Invasion of native plant communities by exotic perennial grasses
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants

Ku-ring-gai Council's Weed Management Policy
The following weeds recorded during the 2012 surveys and observed onsite in subsequent visits are listed as follows in Ku-ring-gai Council's Weed Management Policy, revised edition March 2007. These weeds included listed Noxious Weeds, Urban Environmental Weeds and Nuisance Weeds.

Noxious Weeds, declared under the Noxious Weeds Act 1993 as at January 2006, recorded were the following.

Class 4: – Locally controlled weeds
Action required: *the growth and spread of the plant must be controlled according to the measures specified in a management plan published by the local control authority.*

Species	Common names
Asparagus aethiopicus	Asparagus Fern
Cinnamomum camphora	Camphor Laurel
Lantana camara	Lantana
Ipomoea indica	Morning Glory (blue)
Ochna serrulata	Ochna
Ligustrum lucidum	Privet (large–leaf)
Ligustrum sinense	Privet (small–leaf)

Class 5: – Restricted plants
Action required: *the requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with*.

Species	Common names
Lantana spp.	Lantana

Urban Environmental Weeds

Species	Common names
Acer negundo	Box Elder
Ailanthus altissima	Tree of Heaven
Olea europaea subsp. *africana* (now known as *Olea europaea* subsp. *cuspidata*)	African Olive
Salix babylonica	Weeping Willow

Nuisance Plants

Species	Common names
Ageratina adenophora	Crofton Weed
Brachychiton acerifolius	Illawarra Flame Tree
Grevillea robusta	Silky Oak
Liquidambar styraciflua	Liquidambar
Lonicera japonica	Japanese honeysuckle
Phoenix canariensis	Date Palm

4.3.4 Management Objective 4 – Stimulate natural regeneration through managed disturbance

As stated in the Best Practise Guidelines for Blue Gum High Forest (DECC 2008B):

> *In the past, intentional disturbance to an ecosystem has been perceived negatively, as damage and destruction. However, it is now understood that disturbance is a natural process, integral to plant community and ecosystem dynamics (Buchanan 1989; Thomas 1994, McDonald* et al. *2002*).

To create necessary disturbance in degraded BGHF for triggering natural regeneration, control burns have been used successfully in two highly degraded sites, Dalrymple Hay Nature Reserve in St Ives (DECC 2008B) and Sheldon Forest in Pymble (McDonald *et al.* 2002) in Ku-ring-gai Local Government Area. The success of pile burn strategy and ongoing bush regeneration in Sheldon Forest are shown in photographs in Appendix 8 and from vegetation data from OEH survey sites (Figures 5B, 5C, Table 3).

McDonald *et al.* (2002) carried out a trial of controlled burns in a highly degraded 1.5 ha section of Sheldon Forest. The treatments applied were:

- A prescribed burn using standard fire hazard reduction techniques with fuel load near the point of ignition increased using cut *Pittosporum*;
- A small, smoky prescribed burn in a section of grassy regrowth; and
- Burn piles of debris, which in this case was mainly *Pittosporum.*

It was found that the most successful of the applied treatments was the burning of piles of debris.

Fire results chemical, physical and temperature changes in the soil. Fire is a traditional Aboriginal tool for managing vegetation, which was applied in mining restoration in the 1980-1990s (Grant *et al.* 1997A, B, C, Grant and Longeragan 1999, 2001, Smith *et al.* 2000) and more recently to bush regeneration in urban areas (McDonald *et al*. 2002, DECC 2008B). Application of “smoke water” is also a useful restoration technique with the exposure of seeds to aerosol smoke or crude smoke extract stimulating the germination of a number of fire-dependent and fire-independent plant species (Roche *et al.* 1997, Flemetti *et al.* 2004). “Smoke water” has been used since the 1990s and is available as a dry granulated smoke-infused product.

Fire frequency for BGHF is discussed in the Commonwealth Species Profile and Threats database for Blue Gum High Forests (accessed at http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=47) with:

- High frequency fire regimes being listed as a threatening process likely to result in the loss of plant species; and
- Absence of fire (e.g. for at least 40 years) leading to the native plant *Pittosporum undulatum* becoming dominant in the understorey and causing long-term loss of other plant species.

Fire intensity affects the plant germination and establishment. Low fire intensity is related to litter accumulation and low seed germination, and high fire intensity related to high seed release (Buchanan 1989).

The Best Practice Guidelines for Blue Gum High Forest (DECC 2008B) indicate that the preferred fire is to be a high intensity surface fire to reduce the area to an ash bed, in which weeds are not likely to survive.

To achieve the required fire intensity on the Site, weed piles from the primary weed control consisting of mainly cut *Ligustrum* spp. and *Lantana camara* are to be placed

in the potential future burn area to dry. For this Site, the weed piles will be rafted along the contours to minimise risk of erosion. The weed piles are not to exceed 1 m as a pile too high may result in a burn that is too intense and hence sterilise the underlying native seed bank (DECC 2008B).

Pile burns, as used at Sheldon Forest, are likely to be appropriate for the regeneration on the Site, but need to be carefully assessed in terms of factors, such as:

- Weed species present in the weed pile;
- Moisture content of soil and the weed pile;
- Habitat requirements of Brush Turkeys onsite;
- Density of the remnant trees in the area of weed piles;
- Presence and diversity of ant species;
- Erosion risks, especially on steeper slopes; and
- Fungal occurrence and associated rates of breakdown of the weed piles.

Before any environmental burn could be undertaken, approval and detailed discussions with Council's bushland and bushfire officers would be required.

If pile burns are not possible due to the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2010* (NSW), then smoke water can be used as a chemical stimulant in conjunction with primary weed control and rafted weed piles. The scratching/raking of the exposed soil by the onsite population of Brush Turkeys will further stimulate the soil seed bank.

4.3.5 Management Objective 5 – Enhance the local native vegetation through revegetation and planting

Assisted natural regeneration is the preferred means for restoring Blue Gum High Forest wherever possible, but supplementary plantings are likely to be necessary in this highly degraded site for effective restoration of the community.

Conserving and enhancing the local native vegetation form part of the aims of the VMP. The existing vegetation on the Conservation Area and the managed buffer to the Conservation Area is degraded and reduced to native canopy trees with scattered ferns under dense weed growth. Intensive ongoing weeding, planting and seed dispersal will be required.

Seed collection
Local provenance plants are required for the landscape and for the Conservation Area.

Seed for direct seeding and for growing the required tubestock is to be sourced from on the Site or nearby. Seed collection is to be undertaken in consultation with the Council's bushland officer as additional seed will need to be collected from off the Site. From conversation with David Wilks, Biodiversity Officer of Ku-ring-gai Council, on 12 November 2012, local provenance seed for propagation and planting in the onsite Conservation Area is likely to be available in consultation with Council.

Some seed and/or tubestock may be obtained from Ku-ring-gai Nursery and other nurseries with known local provenance stock. The existing ferns onsite are to be used as propagation material for re-planting as tubestock in the Conservation Area.

The collection of seed, and any cuttings of the local native plants, is to be carried out in accordance with current conservation best practice (Ralph 1994, Mortlock 1998), with at least two thirds of the seed production retained on the donor plants. Skilled restoration ecologists and bush regenerators may vary the techniques used, depending on seed availability and climatic conditions in order to achieve successful outcomes.

The plant material used to re-establish the understorey of the BGHF must be of local provenance. The proposed Conservation Area will in future form part of the locality's conservation assets, containing material available for use in rehabilitation of other local sites. Local provenance plants are to be available for the native component of the landscaping.

Reducing the weed seed bank prior to planting and seeding
Following vegetation responses from weed clearing, weed rafting and, if possible control burns, bare areas may require planting and seed dispersal as directed by the Environmental Manager. The timing of the seeding and planting will depend on the extent of weed regrowth and time of year.

If there is low rainfall following weed clearing, then the cleared areas are to be watered as directed by the Environmental Manager to encourage growth from the weed soil seed bank, followed by careful herbicide control.

If there is dense weed growth persisting after 2 or 3 herbicide treatments of weed seedlings, with no native plant germination, then scalping the soil surface and gently rotary hoeing may be required to reduce the soil weed seed bank as directed by the Environmental Manager. The scalped 1-2 cm of weedy soil seed bank is to be either carefully removed from the Site or placed in a black plastic covered stockpile.

The areas with sufficient controlled weed growth are to be direct-seeded and/or tubestock planted with local native provenance plants, depending on the extent of natural regeneration.

During secondary works, any areas that do not appear to be regenerating may require some supplementary planting and direct seeding.

From the Sheldon Forest experience (McDonald *et al.* 2002), the manual removal and control pile burns stimulated native regeneration with germinations especially *Acacia* spp., *Gonocarpus* sp., *Hibbertia* sp., *Leucopogon juniperinus*, *Ozothamnus diosmifolius*. The most common groundcovers regenerating and subsequently spreading after treatments were *Pseuderanthemum variabile*, *Dichondra repens*, *Oxalis* sp. (native), *Pratia purpurascens*, *Geranium homeanum*, *Lomandra longifolia*, *L. filiformis*, *Dianella* sp., native grasses *Microlaena stipoides*, *Entolasia* spp., *Oplismenus* spp., and twiners *Glycine* sp., *Desmodium* sp., *Eustrephus latifolius*, *Clematis glycinoides*, *Hardenbergia violacea*, *Kennedia rubicunda* and *Pandorea* spp.

From the Sheldon Forest experience, natural regeneration from soil seed-bank occurred following the reduction of weeds and the pile burns. It is expected that there will be some natural regeneration onsite with the progressive weed removal and the raking of the soils by the Brush Turkeys. From the onsite track clearing of dense *Lantana camara* in June 2014, there was sprouting from rhizomes of *Adiantum formosum* observed within a week of the clearing. It is expected on this head gully site that ferns will rapidly re-establish.

Perimeter planting of Conservation Area
To delineate the perimeter of the Conservation Area, an approximately 1-2 m wide strip is to be densely planted with local native provenance tubestock. This is to assist in limiting any accidental or deliberate incursion into the Conservation Area. The perimeter plantings are to be undertaken as early as practicable in the rehabilitation program so that the perimeter plantings are establishing prior to completion of construction works.

The dense plantings of local provenance species on the perimeter also provide an onsite seed source for the progressive rehabilitation works in the Conservation Area.

Revegetation of bare ground/exotic ground layer not under native canopy trees
The areas of native canopy trees require intensive hand weeding, planting, brush matting and seed dispersal.

The areas in the Conservation Area, not under native canopy trees, will be designated as recipient areas for cut seed-bearing branches or biomass from the native species, as directed by the Environmental Manager. In addition:

- Plant out the areas with local native primary colonising species, including ferns propagated from the onsite scattered native ferns and *Dichondra repens* (recorded in the front lawn of 1A Avon Road), as well as local provenance species such as *Acacia* spp., *Alphitonia excelsa*, *Breynia oblongifolia, Ozothamnus diosimifolia*, *Oplismenus* spp., *Poa affinis*, *Pratia purpurascens*, and
- Brush mat and disperse local native seed in the area as specified by the Environmental Manager.

Planting of water bodies
The water bodies are to be planted with native aquatic vegetation as directed by the Environmental Manager.

Recommended species for planting within the Conservation Area
There are four main areas within the Conservation Area, plus the at least 10 m wide managed bushland buffer.

A. Managed buffer zone to Conservation Area
The bushfire requirements limit the planting in these areas to native canopy trees (see under C. below) and groundlayer species. Species should be selected from the following list of local natives.

Species	Common name	Description
Adiantum aethiopicum	Common Maidenhair	Low fern with deep rhizomes spreading into extensive colonies, sheltered sites often on earth banks
Adiantum formosum	Tall Maidenhair	Fern to 0.5 m, widely spaced fronds from deep rhizomes, in heavy shade
Adiantum hispidulum	Rough Maidenhair	Fern to 0.3 m forming spreading dense clumps, semi-shade to deep shade
Asplenium flabellifolium	Necklace Fern	Prostrate or pendulous fern, restricted to rocks and earth banks
Blechnum cartilagineum	Gristle Fern	Fern with coarse fronds spreading from single crown, about 0.5 m, growing in moist spots, semi-shaded
Calochlaena dubia	Rainbow Fern	Fern to 0.8 m forming very large colonies in forest understorey on sheltered slopes, fresh green fronds
Christella dentata	Binung	Fern with fishbone-like fronds from

Species	Common name	Description
		single crown, mostly on creek banks
Clematis aristata	Headache Vine	Vigorous tendril climber mostly under 3 m but will mound to about 1 m in absence of support; massed white flowers in spring
Cyperus imbecillis	(a native sedge)	Small weak sedge with floppy grass-like leaves, freely seeding to form colonies
Cyperus mirus	(a native sedge)	Small sedge with threadlike bright green leaves, freely seeding to form extensive colonies
Dianella caerulea	Blue Flax-lily	Strap-leafed plant to 0.5 m, deep blue flowers, shade tolerant
Dichondra spp.	Kidney Weed	Small spreading mat-forming plant, sun and shade tolerant
Doodia aspera	Rasp Fern	Fern with fishbone-like fronds to 0.3 m long, new fronds deep pink, forming large, dense mats on forest floor, favours moist areas
Entolasia marginata	Bordered Panic	Lanky grass with stems to 1 m long, forming colonies, freely seeding
Eustrephus latifolius	Wombat Berry	Wiry twining vine to 3 m or forming tangle mound under 1 m if not supported; bright orange berries
Glycine clandestina	Twining Glycine	Delicate leguminous twining, forming tangled mass under 0.3 m high in absence of support; purplish flowers
Hardenbergia violacea	False Sarsaparilla	Light-loving leguminous twiner to about 2 m, or under 0.5 m if lacking support; masses of purple flowers
Kennedia rubicunda	Red Coral-pea	Light-loving leguminous twiner to about 3 m, or under 0.5 m if lacking support; red flowers; rapid space-filler, can smother other plants MINIMAL USE
Lomandra longifolia	Spiny Matrush	Strap-leafed plant about 0.5 m high, making large, dense clumps, long-lived, tolerates sun and semi-shade
Microlaena stipoides	Weeping Rice-grass	Common grass of forest floor, tolerates moderate shade, deep rhizomes, freely seeding
Microsorum pustulatum	Kangaroo Fern	Fern with creeping rhizomes clinging to rocks, bases of trees and dry earth banks, in moist forest and rainforest
Morinda jasminoides	Sweet Morinda	Twining low climber, making irregular mound when not supported; grows in moist spots often in heavy shade
Oplismenus imbecillis	Basket Grass	Prostrate creeping grass with delicate short leaves spreading rapidly in warm season, shade tolerant, freely seeding
Poa affinis	(a native grass)	Clumping grass with weak elongated stems to 0.6 m, fine foliage; grows on sheltered slopes in forest openings
Pratia purpurascens	Whiteroot	Low plant from densely massed rhizomes forming extensive colonies; tiny leaves; tolerates sun or shade
Pteris tremula	Tender Brake	Tufted fern with bracken-like fronds to 0.6 m high, often appears spontaneously on rocks and earth

Species	Common name	Description
		banks
Schelhammera undulata	(a native 'lily')	Low, soft herb with small leaves and starry pink flowers, found on sheltered earth banks in forest
Tylophora barbata	Bearded Tylophora	Delicate twiner mostly under 2 m with fine stems, fleshy leaves and starry purplish flowers
Viola hederacea/banksii	Native Violet	Mat-forming with dense stolons, round leaves, white-and-purple flowers; prefers sheltered places

B. Within the canopy of native trees

The same groundlayer species as specified above (within 10 m of the building) may be used, as well as clumps of local native subcanopy, shrub and liana species including:

Species	Common name	Description
Acacia floribunda	White Sally Wattle	Erect or spreading shrub or tree 3–8 m high, occurring mostly near creek banks in sheltered sites
Acacia longissima	Long-leaf Wattle	Slender wattle to about 5 m tall, fast-growing, occasional groups in openings in tall forest
Acmena smithii	Lilly-pilly	Medium-tall tree of moist forest and rainforest, persists in shady understorey
Alphitonia excelsa	Red Ash	Fast-growing tree of moist forest and rainforest, light-loving
Backhousia myrtifolia	Grey Ironwood	Slow-growing small-medium tree of moist forest understorey
Breynia oblongifolia	Coffee Bush	Shrub to 3 m high, forming clonal colonies in forest understorey
Cissus hypoglauca	Native Grape	Large liana climbing into subcanopy
Clerodendrum tomentosum		Shrub or small tree to 6 m of moist forest margins, light-loving
Elaeocarpus reticulatus	Blueberry Ash	Small tree 6–9 m, shade-tolerant
Ficus coronata	Sandpaper Fig	Small tree to about 8 m, often on creek banks, shade tolerant
Leucopogon juniperinus	Prickly Beard-heath	Prickly shrub under 1.5 m, common in forest understorey on more fertile soils
Leucopogon lanceolatus		Open shrub to 2 m, occurs in shaded understorey
Maytenus silvestris	Orange Bush	Erect shrub to about 2 m, mostly in understorey of taller forest types
Ozothamnus diosmifolius	White Dogwood	Much-branched, erect shrub to 5 m high, usually c. 2 m high
Pandorea pandorana	Wonga Vine	Liana, can climb high into subcanopy, attractive flowers
Platylobium formosum	Handsome Flat-pea	Pea-flowered shrub 1–2 m tall, of moist forest; easily raised from seed
Polyscias sambucifolia	Elderberry Panax	Erect shrub 2–3 m forming clonal colonies, in most types of moister forest
Trema aspera	Peach-leaved Poison Bush	Shrub or small tree to 6 m, fast growing but short-lived
Smilax glyciphylla	Sarsaparilla	Twining vine forming dense masses of foliage

C. Not within the canopy of native trees
The aim in these areas is to re-establish the native canopy with a dominance of *Eucalyptus saligna* and occasional *E. pilularis* and *E. paniculata.* Subcanopy trees include:

Species	Common name	Description
Acmena smithii	Lilly-pilly	Taller tree of rainforest affinities, mostly in sheltered gullies
Allocasuarina torulosa	Forest She-oak	Tree to 20 m or more, light-loving, mostly on drier slopes
Ceratopetalum gummiferum	Christmas Bush	Tree 8-12 m, mostly closer to sandstone
Elaeocarpus reticulatus	Blueberry Ash	Tree 6-12 m in open to shaded understorey
Glochidion ferdinandi	Cheese Tree	Tree 8-15 m with spreading crown, common in a range of habitats; No or MINIMAL USE
Persoonia linearis	Narrow-leaved Geebung	Slender small tree 5-8 m, mostly on or close to sandstone
Pittosporum undulatum	Sweet Pittosporum	Tree 8-15 m with densely shading canopy, proliferating in unburnt bushland. No or MINIMAL USE

Shrub and groundlayer species should be selected from the lists under headings A and B above.

D. Adjoining ephemeral constructed waterbodies and in the gully
These areas should be planted with a wider spacing between groups of trees and shrubs to allow visual enjoyment of the water as well as to provide adequate light for aquatic and stream-bank herbaceous plants – although some degree of shading is perhaps desirable as a check on excessive growth of aquatics and algae. The following table lists appropriate species for planting, namely:

Species	Common name	Description
Acacia floribunda	White Sally Wattle	See under B.
Adiantum aethiopicum	Maidenhair	See under A.
Backhousia myrtifolia	Grey Myrtle	Subcanopy tree 5-8 m
Blechnum cartilagineum	Gristle Fern	See under A.
Blechnum nudum	Fishbone Water Fern	Frequent fern of creek banks, sometimes in edge of water; light-loving
Callicoma serratifolia	Blackwattle	Shrub or small subcanopy tree 3-6 m, branching from ground, forms stream-bank thickets
Calochlaena dubia	Rainbow Fern	See under A.
Carex appressa	Tall Sedge	Common sedge to .8 m of boggy areas and shallow margins; light-loving
Carex longebrachiata	(a native sedge)	Sedge to about .4 m high with tufts of gracefully recurving leaves
Centella asiatica	Indian Pennywort	Creeping low herb with slender stolons, round leaves
Christella dentata	Binung	See under A.
Cyperus exaltatus	(a native sedge)	Large sedge, to 1.5 m, with long basal leaves, forming sparse tufts
Cyperus imbecillis	(a native sedge)	See under A.

Species	Common name	Description
Cyperus mirus	(a native sedge)	See under A.
Dianella caerulea	Blue Flax-lily	See under A.
Doodia aspera	Rasp Fern	See under A.
Ficus coronata	Sandpaper Fig	Subcanopy tree 5-8 m, occurring mostly on creek banks
Gahnia clarkei	Tall Saw-sedge	Large sedge, to 2 m or more tall, forming dense stands in boggy areas and on stream banks
Glycine clandestina	Twining Glycine	See under A.
Juncus continuus	(a native rush)	Tufted rush to 1.6 m. Grows in boggy areas and stream banks
Leptospermum polygalifolium	Tantoon Tea-tree	The common tea-tree of stream banks and drainage lines, 2-6 m tall
Lomandra longifolia	Spiny Matrush	See under A.
Lomatia myricoides	River Lomatia	Shrub of creek banks, 2-3 m tall
Microlaena stipoides	Weeping Rice-grass	See under A.
Oplismenus imbecillis	Basket Grass	See under A.
Schoenus melanostachys	Black Bog-rush	Densely tufted sedge to 1 m tall with fine, sprawling stems, leafless
Stenocarpus salignus	Scrub Beefwood	Small subcanopy tree 4-6 m
Trema tomentosa var. *aspera*	Peach-leaf Poison Bush	Short-lived small tree to 6 m
Viola hederacea	Native Violet	Low mat-forming plant

Planting densities
Canopy tree planting under existing canopy trees is to be limited to areas with existing low tree densities.

Midstorey and Shrub plantings, direct seeding and/or natural regeneration in the prepared soil are to be undertaken under existing remnant trees at a density of 1 per 2 m^2 under existing canopy trees, and 1 per 1 m^2 without existing canopy trees. The midstorey and shrub plantings are to be made in clumps with separation between clumps as directed by the Environmental Manager.

Groundcover plants are to be extensively planted, depending on the natural regeneration and responses to direct seeding in the entire Conservation Area and in the managed buffer to the Conservation Area.

Planting time, hardening off and watering
In common with nearly all parts of the Sydney region, the Site does not receive regular, reliable rainfall. Plantings should be undertaken following rain during late February to June and early Spring, when temperatures are milder and transpiration rates are lower. Plants are to be hardened off in the nursery prior to delivery. Hardening off is essential for tubestock to cope with field conditions.

Plantings will require an initial thorough watering in. It is not recommended to water extensively after the initial stages of plant establishment as it discourages deep root growth. In times of low rainfall, water may be required as specified by the Environmental Manager. Excessive watering will render the plants reliant on a constant source of water, possibly resulting in plant death once the constant water source is inevitably removed at the end of the maintenance period. Watering also encourages weed growth and increases weed competition with the germinating and establishing local native species.

Additional brush matting and seed dispersal
Any local native trees to be removed for the proposed development, or branches to be removed are rehabilitation assets. Some of the seed is to be collected for propagation and direct seeding. The seed bearing branches are to be collected and dispersed within the Conservation Area, as specified by the Environmental Manager. If any trees are to be removed, they are to be checked by a qualified fauna expert, prior to removal, to ensure that no native fauna are harmed. If native fauna are encountered, these are to be managed as specified by a fauna expert.

Brush matting with seed-bearing branches of local native species will assist regeneration and help to provide cover on bare surfaces in the immediate aftermath of earthworks and planting. Seed-bearing branches are to be cut from local native species and laid in open areas between the plantings. Later, during secondary work, further brush matting should be applied to any areas that do not appear to be regenerating.

Collected local native seed of primary colonising species may also be dispersed between plantings in the larger open areas, as directed by the Environmental Manager. The use of cut seed-bearing branches or seed dispersal is dependent on the time of seeding of the various species and also on the availability of seed and/or plants and advisability of removal of the seed bearing branches.

During the maintenance period, it would be advisable to collect native material for dispersal within the Conservation Area, such as bark, branches and seed, from within 10 m of buildings, particularly if/when any material is to be pruned or removed for purposes of bushfire protection. Before any material is distributed in the Conservation Area, it must checked by the Environmental Manager or qualified bush regenerators to ensure it does not introduce any weed material or pathogens to the Conservation Area.

4.3.6 Management Objective 6 – Increasing awareness of the conservation value of the vegetation

The Conservation Area is in a residential development surrounded by residential properties and in close proximity to public transport and a school. The aim is to increase awareness by the people using the Site of the existence and value of BGHF and its associated fauna habitat values, so as to minimise the possibility of accidental or deliberate harm to these values.

Therefore the most appropriate actions required for increasing awareness are:

During construction phase(s)
- The Environmental Manager is to meet with the Construction Manager about fencing as required, vehicle cleanliness and site induction;
- The Conservation Area is to be clearly identified on plans, clearly identified on the Site and marked with signs as specified by the Environmental Manager;
- All site workers are to be inducted and made fully aware of the significance of the Conservation Area. This area is to be clearly identified on plans and marked on the Site as a “no-go” area to construction workers;
- For the onsite construction workers, the importance of the Conservation Area is to be discussed at the weekly toolbox talks;

- Existing native trees or tree groups to be retained are to be clearly identified and protected as required by the Environmental Manager supervising the earthworks. All earthworks are to be carried out under strict supervision of the Environmental Manager in consultation with the Construction Manager to avoid damage to the remnant trees;
- All machinery is to be cleaned prior to entry into the Conservation Area. The machinery and loading equipment are to be inspected and photographed as required by the Environmental Manager;
- Sediment fencing is to be erected as required by the Environmental Manager supervising the earthworks and the Construction Manager and Environmental Manager are to ensure that sediment fencing stays in place and is maintained without damage to native tree roots or trees;
- Any breaches of the Conservation Area boundary during construction are to be immediately reported to the Environmental Manager and to the Construction Manager, and any requests for corrective actions are to be carried out promptly by the Site owner;
- A poster and/or signage are to be designed and displayed in lunch rooms or work offices or beside the areas being conserved, as specified by the Environmental Manager. These materials can be utilised as part of site induction and during weekly tool box talks; and
- Copies of the VMP are to be kept readily available and accessible to the Construction Manager and workers.

During occupancy phase(s)
- The conservation significance of the local flora and fauna of the BGHF are to be described on signs located along the formalised paths and in the building foyer;
- Resident and public access in the Conservation Area is to be restricted to the formalised paths to minimise risk of weed and pathogen introductions;
- Seating in the Conservation Area is to be located adjoining the formalised paths;
- Environmental Awareness Kits are to be provided to all new residents.

4.3.7 Management Objective 7 – Monitoring and maintenance

The aims of the VMP are to conserve and enhance the local native vegetation by establishing a long-term, ecologically viable BGHF Conservation Area and to protect the water quality in the downslope offsite watercourse, an upper tributary of Lane Cove River.

These aims are to be achieved by implementation of the actions contained under the objectives listed in Table 4.

Specific targets for measuring how well the aims are being achieved throughout the monitoring period, and for determining when or if further actions are required, and timeframes for carrying out the tasks to be completed are also contained in Table 4.

Specific short-term targets, including during construction phase(s), relate to:
- Sediment and erosion control, weed control, replacement of plant losses and any other requirements for achieving successful vegetation establishment;
- In the early phase of the proposed development, weekly inspection of sediment and erosion controls or as required by the Environmental Manager; and
- Requests for corrective actions where required, with prompt response by the Construction Manager.

The long-term targets for the life of the proposed development include weed control, native plant species diversity and ongoing native recruitment of BGHF canopy species.

- **Weed control**
  The long-term target is <5% total projected foliage weed cover in the BGHF Conservation Area and managed bushland buffer.

  If any 10 m x 10 m patch of the BGHF Conservation Area has ≥ 5% projected foliage cover by exotic species in the form of a weed plume, that the source of the possible nutrient enrichment be investigated as part of Corrective Action Requests, with water quality testing undertaken, including for *E. coli* (indicative of sewer leaks). The implementation of actions to address the contaminants must be undertaken and documented. The weed cover is to be re-assessed and documented in the next Monitoring Report.

  Weeds such as *Lantana camara*, *Ligustrum* spp. and *Cinnamomum camphora* are bird spread and isolated individuals are expected. In Sheldon Forest, the persistent bird-spread weeds also included *Asparagus* spp., *Ochna serrulata, Pyracantha angustifolia* and *Rhaphiolepis indica.* In areas of enriched soils surrounded by urban development, scattered individuals of these weeds have the potential to rapidly spread and out-compete the regenerating native vegetation and limit re-establishment of natural nutrient cycling.

- **Native plant species diversity**
  The long-term target for the BGHF restoration onsite should reflect the plant species diversity of the successfully restored BGHF reference site in nearby Sheldon Forest. The reference site is managed by Ku-ring-gai Council. The numbers of local native species recorded by OEH in 2013/2014 (sampled in Quadrats SHEL_04, 05, 06, 07) were as follows.

Strata	Number of species recorded in BGHF in Sheldon Forest	Number of species recorded in 20 m x 20 m quadrats
Canopy trees	5	2 to 3
Sub-canopy	14	4 to 8
Shrubs	16	7 to 10
Creepers and climbers	15	7 to 10
Ferns	2	0 to 2
Groundlayer (not grasses)	17	4 to 13
Grasses	8	4 to 7
TOTAL	77	30 to 44

  These numbers are similar to the ecologist Dr Peter Smith's suggested long-term diversity target of at least 65 native plant species, including at least 5 canopy tree species, 15 understorey tree and large shrub species, 40 ground layer species (include small shrub species) and 5 climber species, all of which are to be local indigenous species, of local provenance, and consistent with native species composition of BGHF.

- **Natural recruitment of BGHF canopy species**
  Recruitment of canopy species is required for the long-term soil stability in this head gully and to achieve the weed control target (<5%) and species

diversity targets. The long-term natural recruitment is expected to occur from the soil seed bank and/or from canopy seed showers.

The recruitment density of new individuals of the existing canopy species is to be at least one new recruit on average per 20 m x 20 m. If the resilience of the ecosystem is too low for natural canopy regeneration then tubestock of canopy species grown from seed collected onsite would be required to achieve this density.

Monitoring vegetation - Baseline vegetation records have been established, and vegetation photographed in June 2012 from two long transects consisting of 10 m x 10 m contiguous quadrats (Transect 1, and Transect 2 and Spot location A). The records from the quadrats showed weed distributions across the gully.

Additional monitoring plots may be required, especially in areas without native canopy trees and along the drainage line, and for experiment trials.

For the monitoring data, the percent projected foliage cover of each species is to be recorded in quadrats, resulting in the following being readily recorded.

The data from 400 m^2 plots are to be compared with the biodiversity benchmark data recorded in the OEH 400 m^2 sample plots in the reference site.

In addition to the monitoring plots, fixed photographic monitoring points are to be established in readily accessible locations (close to boundaries and formalised paths) to monitor progress of the restoration of the BGHF.

Scheduling - Monitoring, maintenance and reporting relate to the time periods of Month 1, Month 3, Month 6, Month 12, then yearly for the life of the proposed development. For each of the monitoring periods, the specific performance targets are related to the successes in previous monitoring periods. The targets are set by the Environmental Manager to guide site management for the next monitoring period(s).

Monitoring Reports are to include:

- Details of rainfall;
- Changes in the extent of weed versus native cover & diversity;
- Works done;
- Progress to date and works required;
- A photographic record from the fixed photographic monitoring points;
- Vegetation structure, species composition and percent projected foliage cover recorded in the fixed monitoring plots;
- Any native fauna observed, including photographs if possible; and
- Any issues that arise through the monitoring process are to be addressed and corrective actions implemented, and outcomes of implementation documented in the next monitoring report.

These reports are to be used to evaluate success of the project over each monitoring period and to assess the long-term potential resilience of the ecosystems.

Results of the monitoring are to be discussed with the Construction Manager and/or Body Corporate. The monitoring reports are to be submitted to the client for distribution to the relevant authorities.

Research - The implementation of the VMP provides an opportunity for rigorous statistical testing of the differences in rates of establishment of native species (percent projected foliage cover), soil nutrient changes (pH, nitrogen and phosphorus), and species diversity for both the establishment period and during long-term monitoring, due to treatments such as:

- Manual rafting weeds;
- Manual weed rafting with control burns;
- Clearing followed by addition of smoke water / other chemicals; and
- Clearing followed by no addition of smoke water / other chemicals.

Discussions with the experienced Council's bushland team may assist in guiding the treatments to be statistically tested. The results should be provided to the Council bushland team and may be published in a peer-reviewed journal.

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Figures

Site boundary

Conservation Area

Managed Conservation Buffer Zone /APZ

0 50 100
metres

Figure 1A.
Conservation Area to which the VMP applies overlaid on the SIXmaps aerial photograph (accessed 22 June 2012)

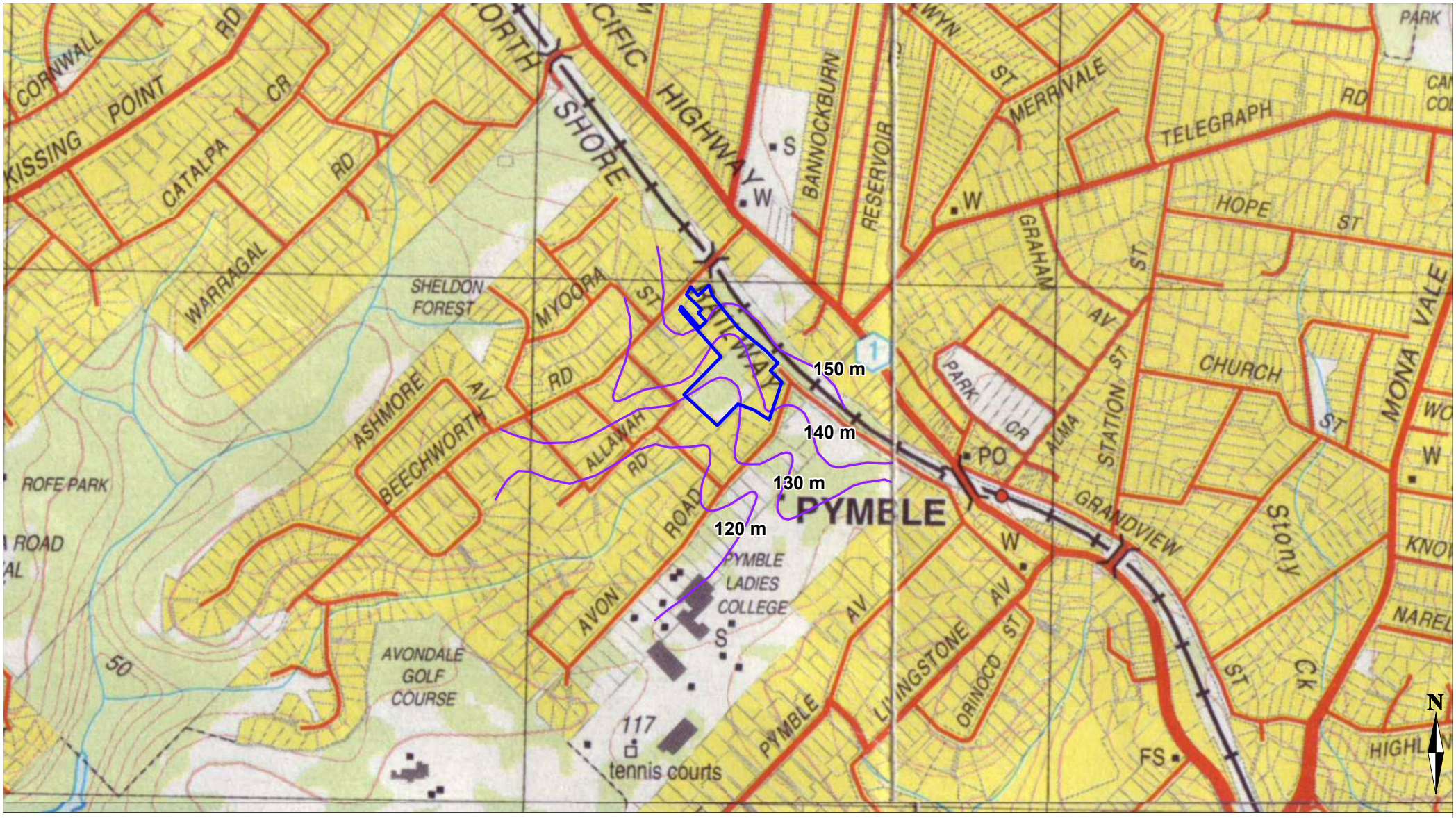
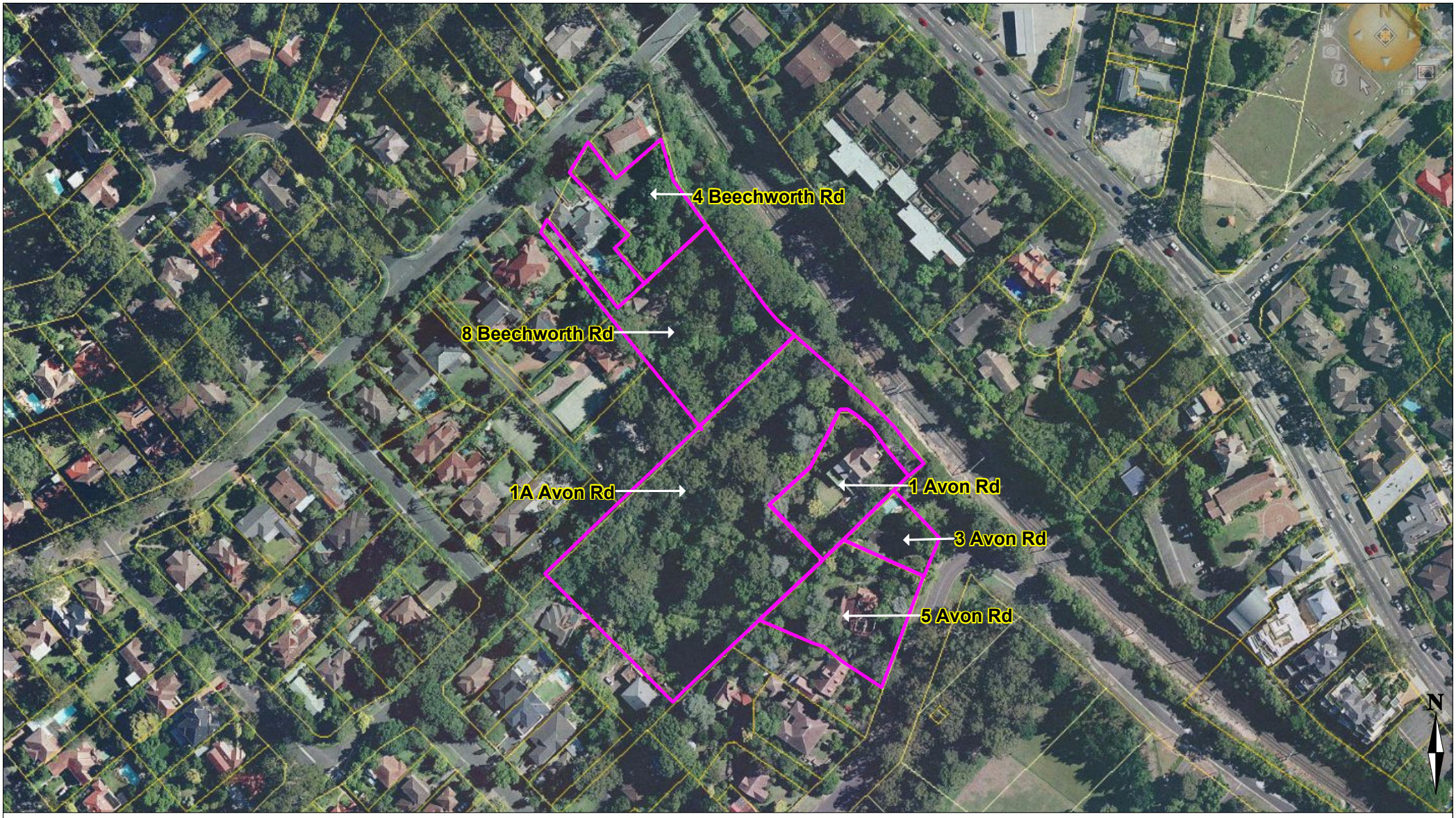


Figure 1B.
Site boundary overlaid on the Hornsby 1:25 000 topographic map

Figure 1C.
Site boundary overlaid on the Nearmap aerial photograph (dated 26 June 2014)

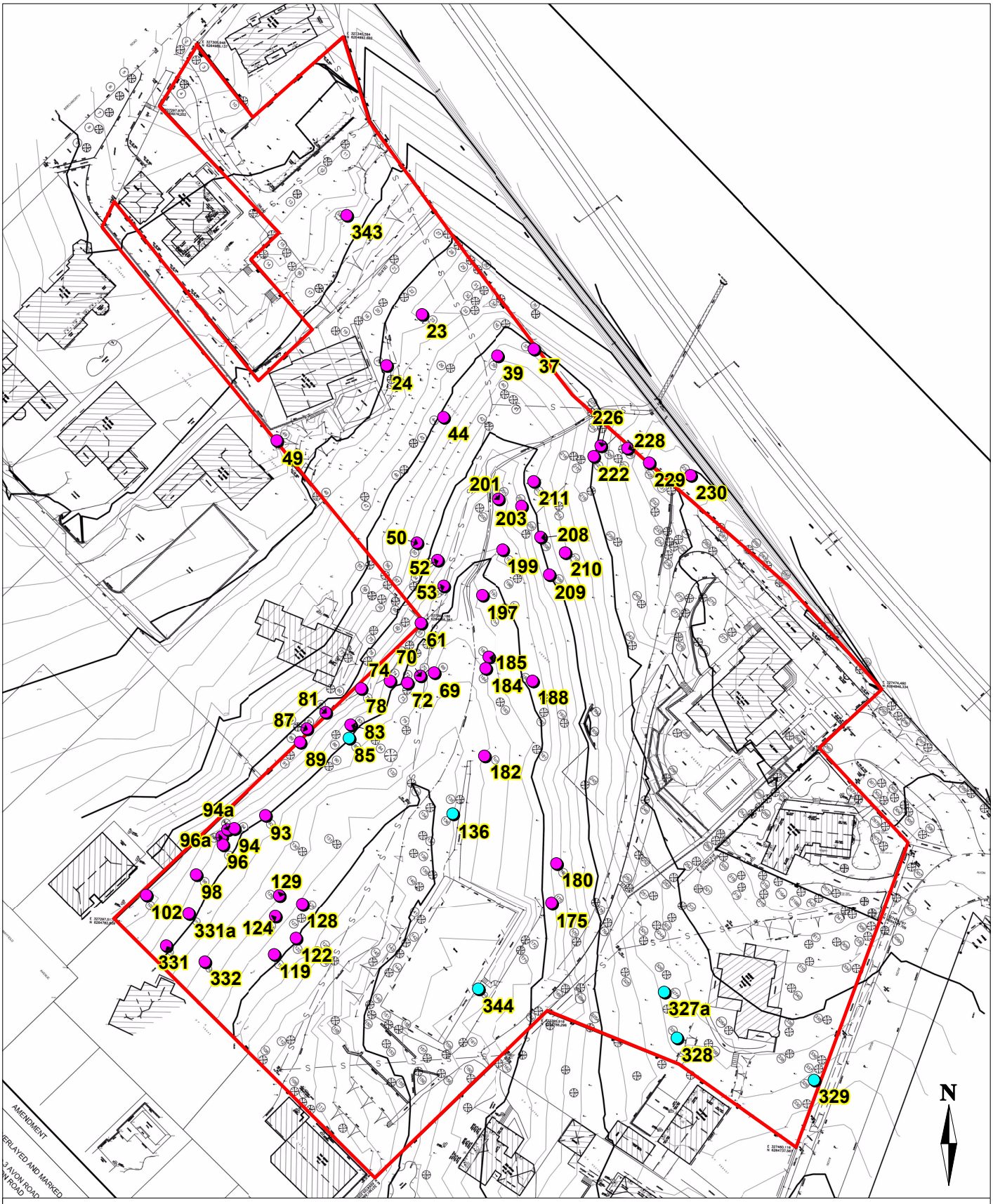


Site boundary

0 50 100
metres

Figure 1D.
Close up of the site on the SIXMaps aerial photograph (accessed 22 June 2012)

Figure 2A.
Survey plan showing location of trees.
(Higgins Surveyors, Reference: 21446 amendment N, dated 3 Sept 2014)



Site Boundary

Local native BGHF canopy trees (eucalypts)

Possibly local native BGHF sub-canopy trees
(Port Jackson Fig, Lilly Pilly, Pittosporum)

0 25 50
metres

Figure 2B.
Location of native trees overlaid on the survey plan
(Higgins Surveyors Ref: 21446 amendment N, dated 3 Sept 2104)

Note: Tree 230 is within the rail corridor

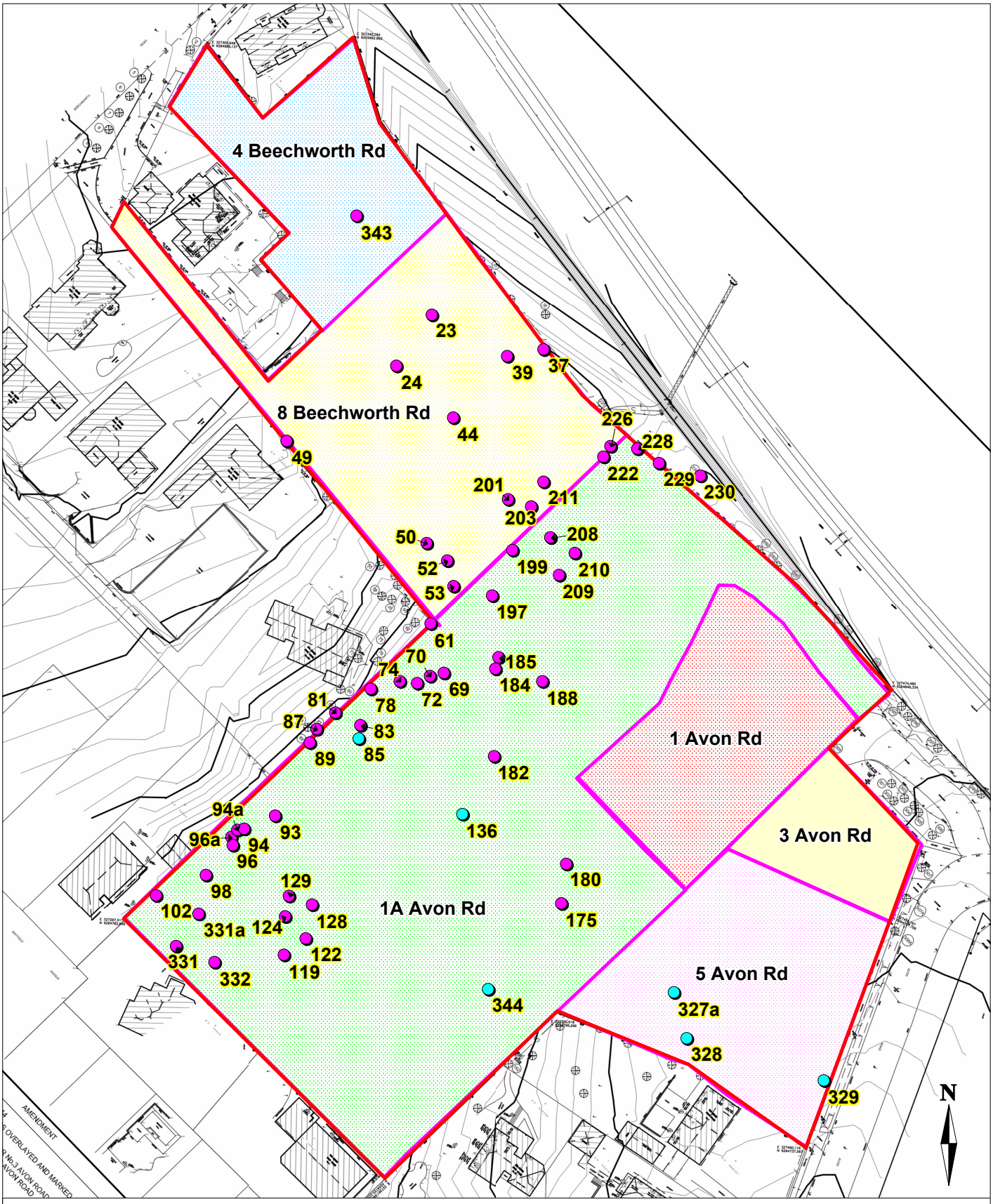


Figure 2C.
Location of native trees within lot boundaries overlaid on the survey plan (Higgins Surveyors Ref: 21446 amendment N, dated 3 Sept 2014)

Note: Tree 230 is within the rail corridor

Note: Tree 230 is within the rail corridor

Figure 2D.
Location of native trees overlaid on the
Nearmap aerial photograph dated 16 May 2014

Site Boundary

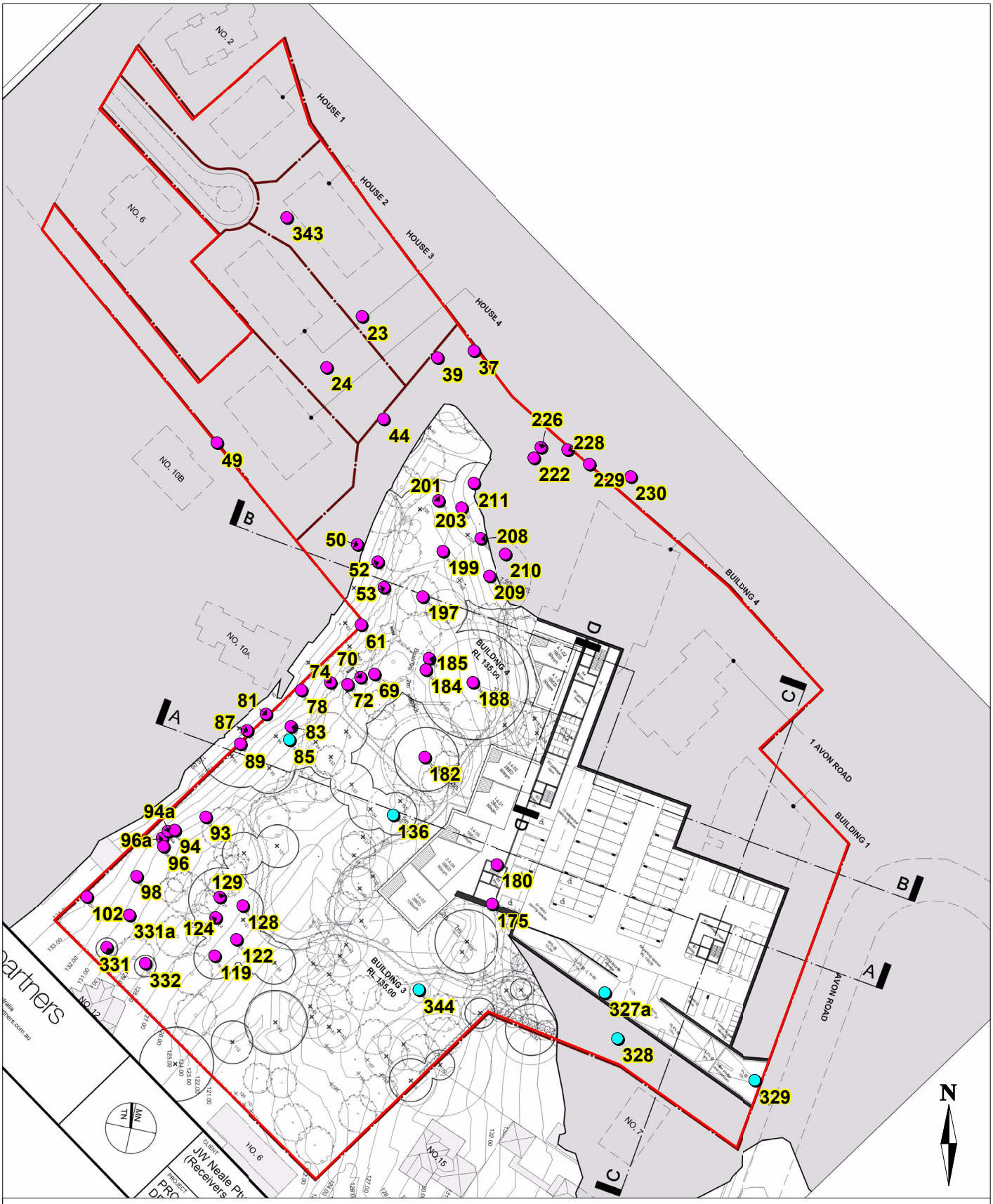
Local native BGHF canopy trees (eucalypts)

Possibly local native BGHF sub-canopy trees
(Port Jackson Fig, Lilly Pilly, Pittosporum)

0 25 50
metres

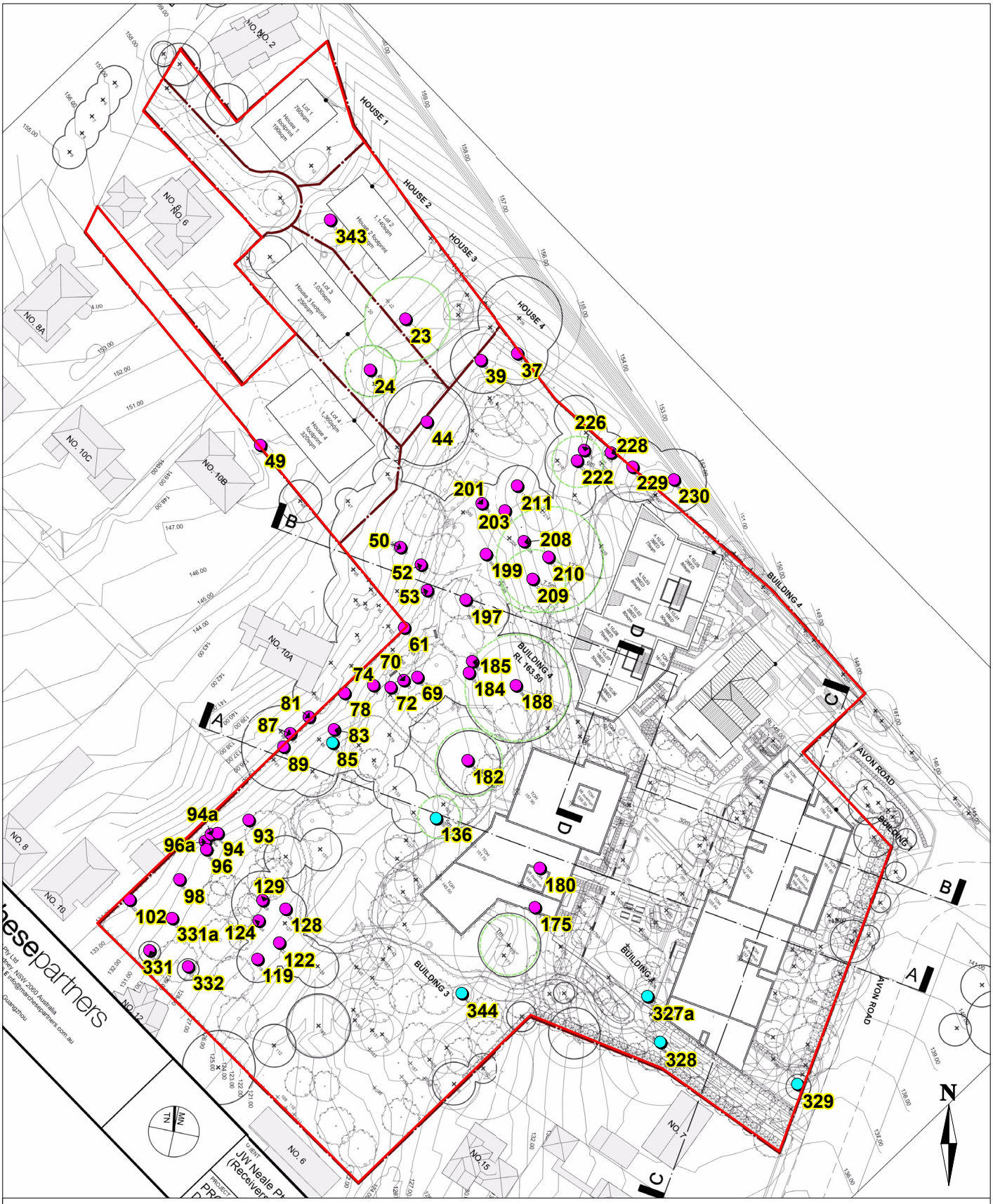
Note: Tree 230 is within the rail corridor

Figure 2E.
Location of native trees overlaid on the
1943 historic aerial photograph (SIXMaps)



Note: Tree 230 is within the rail corridor

Figure 2F-1.
Location of native trees overlaid on the proposed floorplan RL + 135
(Marchese Partners, Drawing MP 22.06 Rev. M dated 12 Sept 2014)

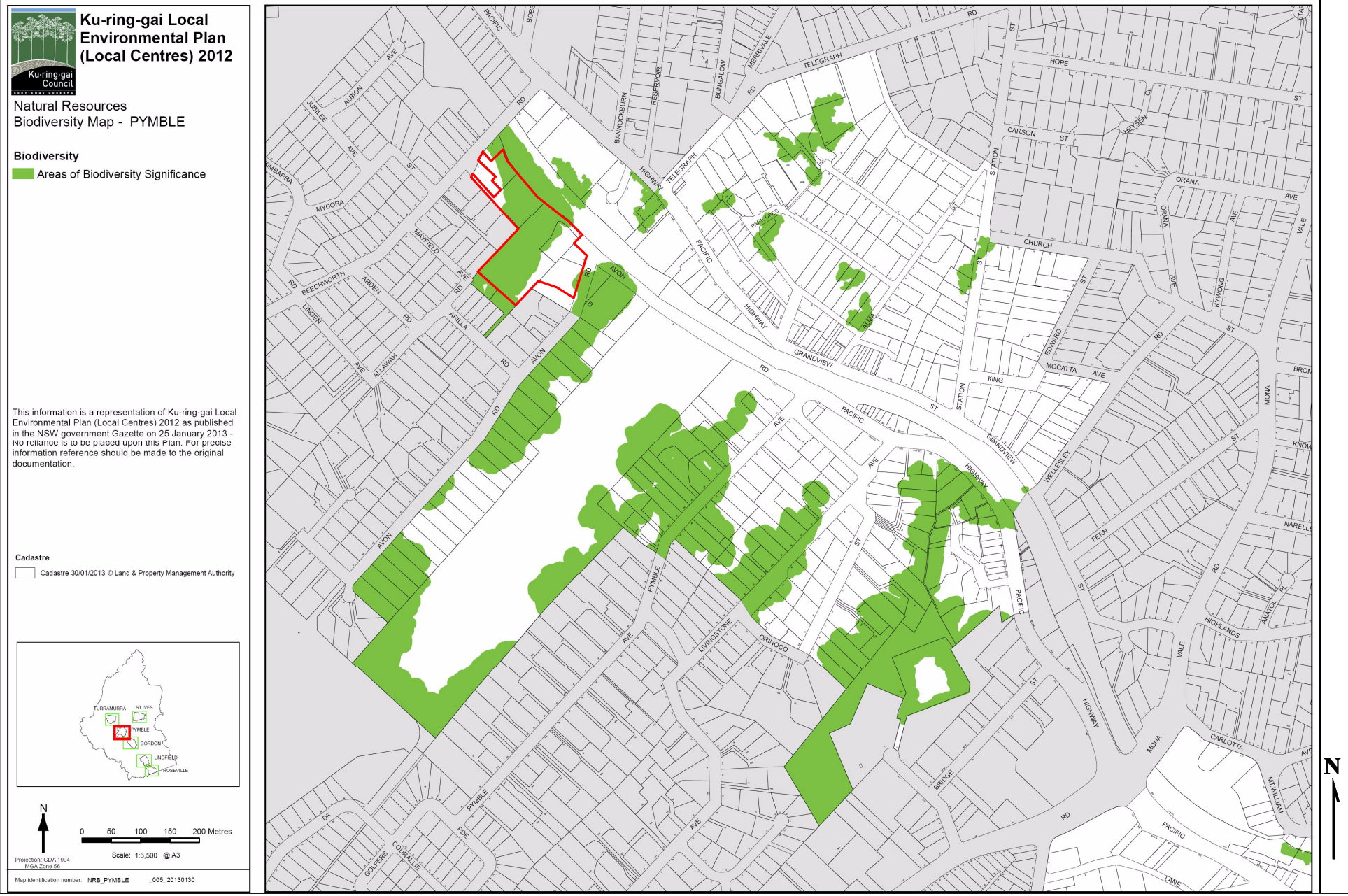


Note: Tree 230 is within the rail corridor

Figure 2F-2.
Location of native trees overlaid on the proposed floorplan RL + 162
(Marchese Partners, Drawing MP 22.15 Rev. M, dated 12 Sep 2014)

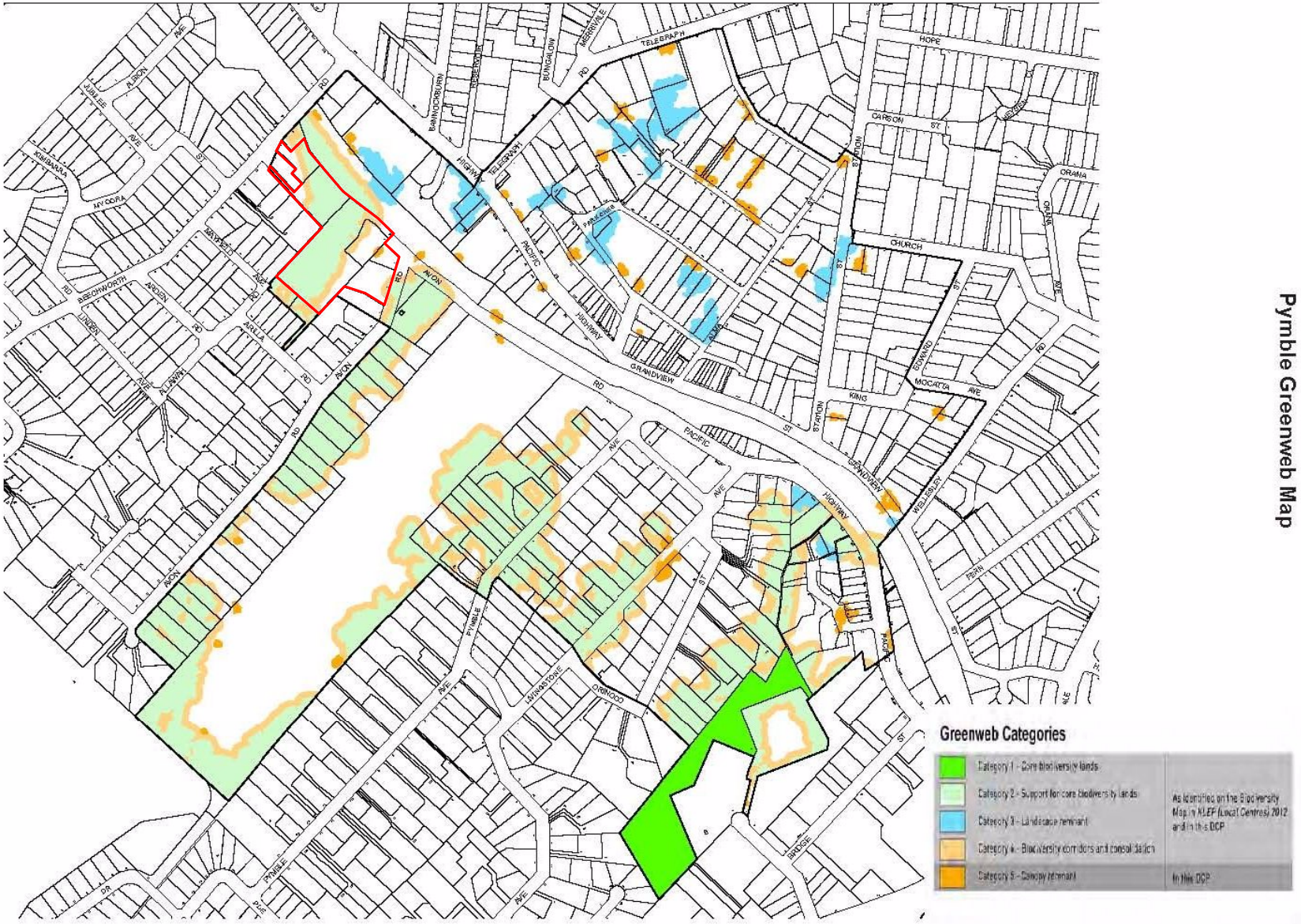
Note: Tree 230 is within the rail corridor

Figure 2G.
Planting Protection Zones
(Site Image Dwg: MP 003 Issue S, dated 15 Sept 2014)



Site boundary

Figure 3A-1.
Natural Resources biodiversity Map - Pymble
(Ku-ring-gai Local Environmental Plan (Local Centres) 2012)



Site boundary

Figure 3A-2.
Pymble Greenweb Map
(Ku-ring-gai Local Centres Development Control Plan 2013)

Site Boundary

Category 1 Core Biodiversity lands

Category 2 Support for Core Biodiversity Lands

Category 3 Landscape Remnant

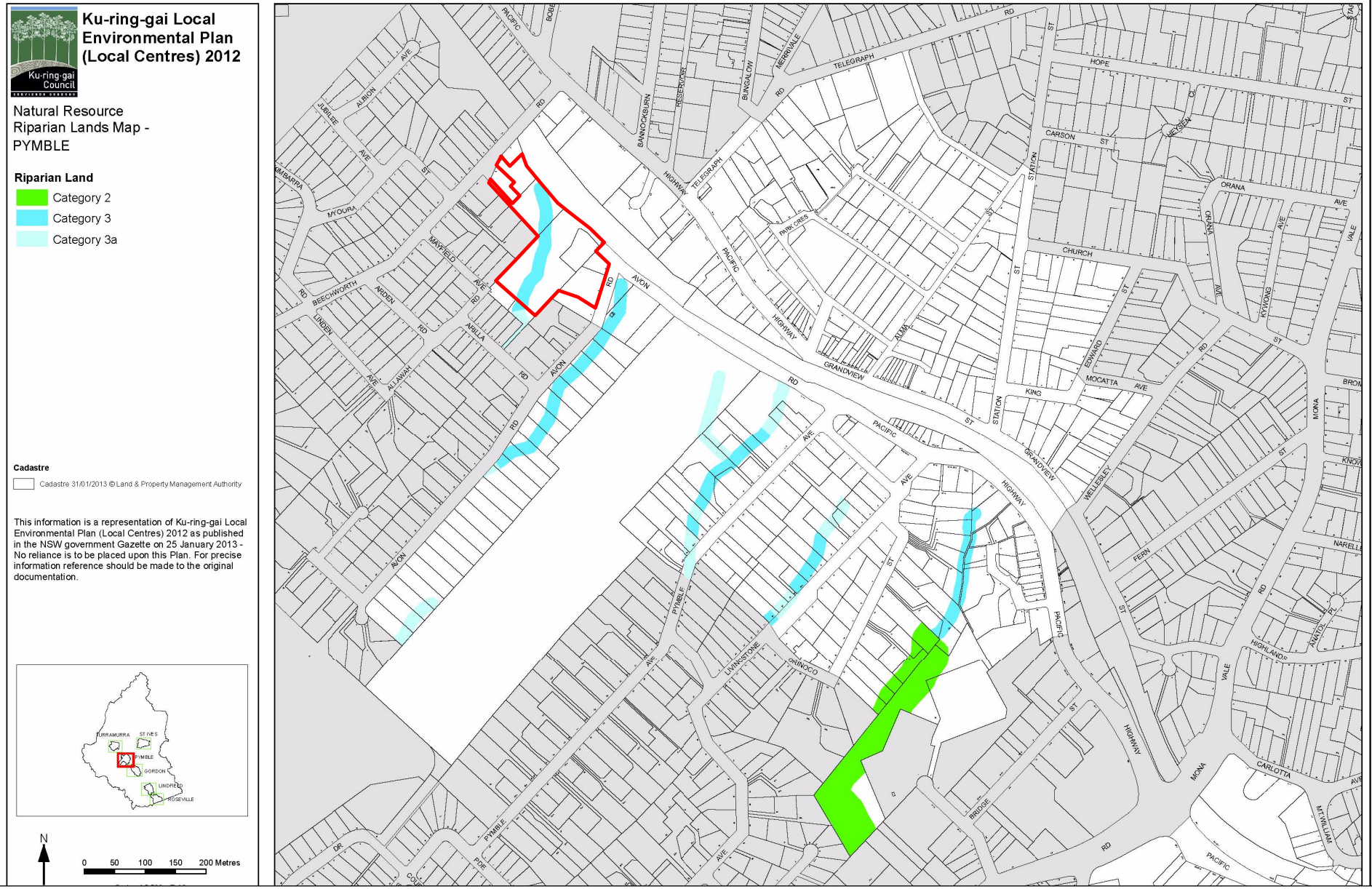
Category 4 Biodiversity Corridors and Consolidation

Category 5 Canopy Remnant

0 40 80

metres

Figure 3A-3.
Pymble Greenweb Map close up
(Ku-ring-gai Local Centres Development Control Plan 2013)



Site boundary

Figure 3B.
Natural Resources Riparian Lands Map - PYMBLE
(Ku-ring-gai Local Environmental Plan (Local Centres) 2012)

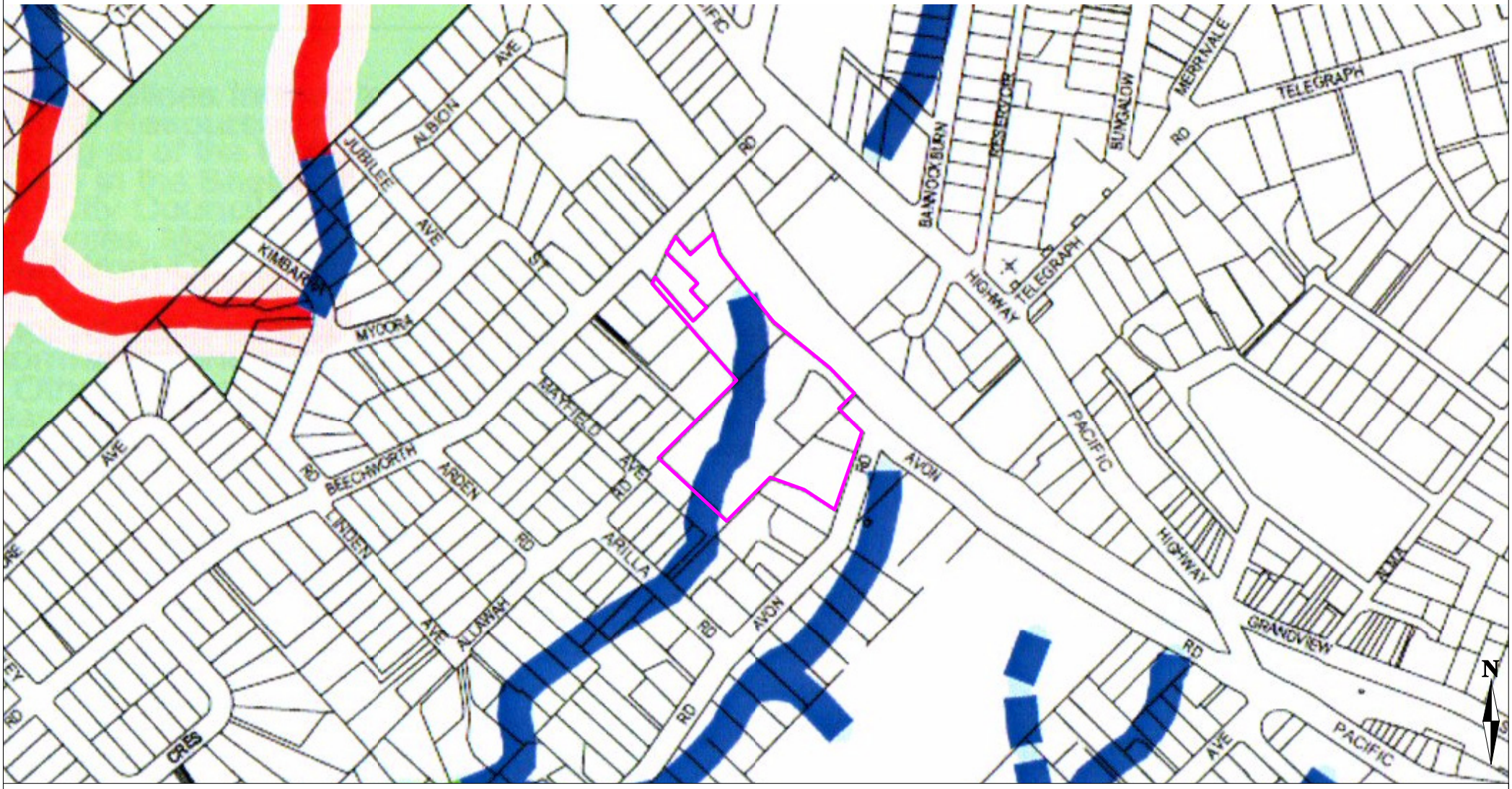


Figure 3C.
Map of Riparian Systems in the Ku-ring-gai Local Government Area
from Appendix 16 of the Ku-ring-gai DCP 47 (available on Council website 4 July 2014)

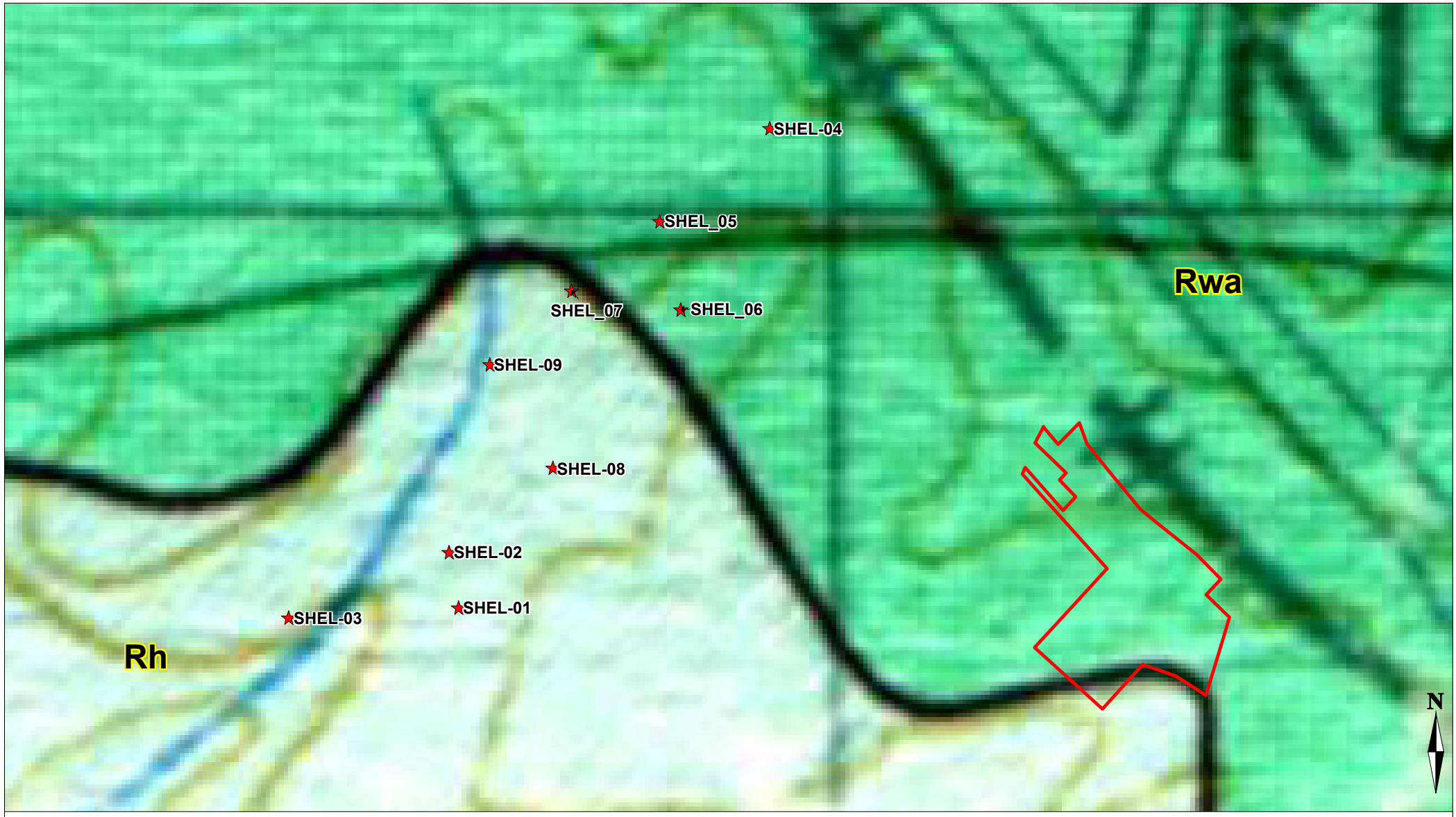


Figure 4A.
Site boundary and Sheldon forest survey sites
overlaid on the Geology mapping (Herbert and West 1983)

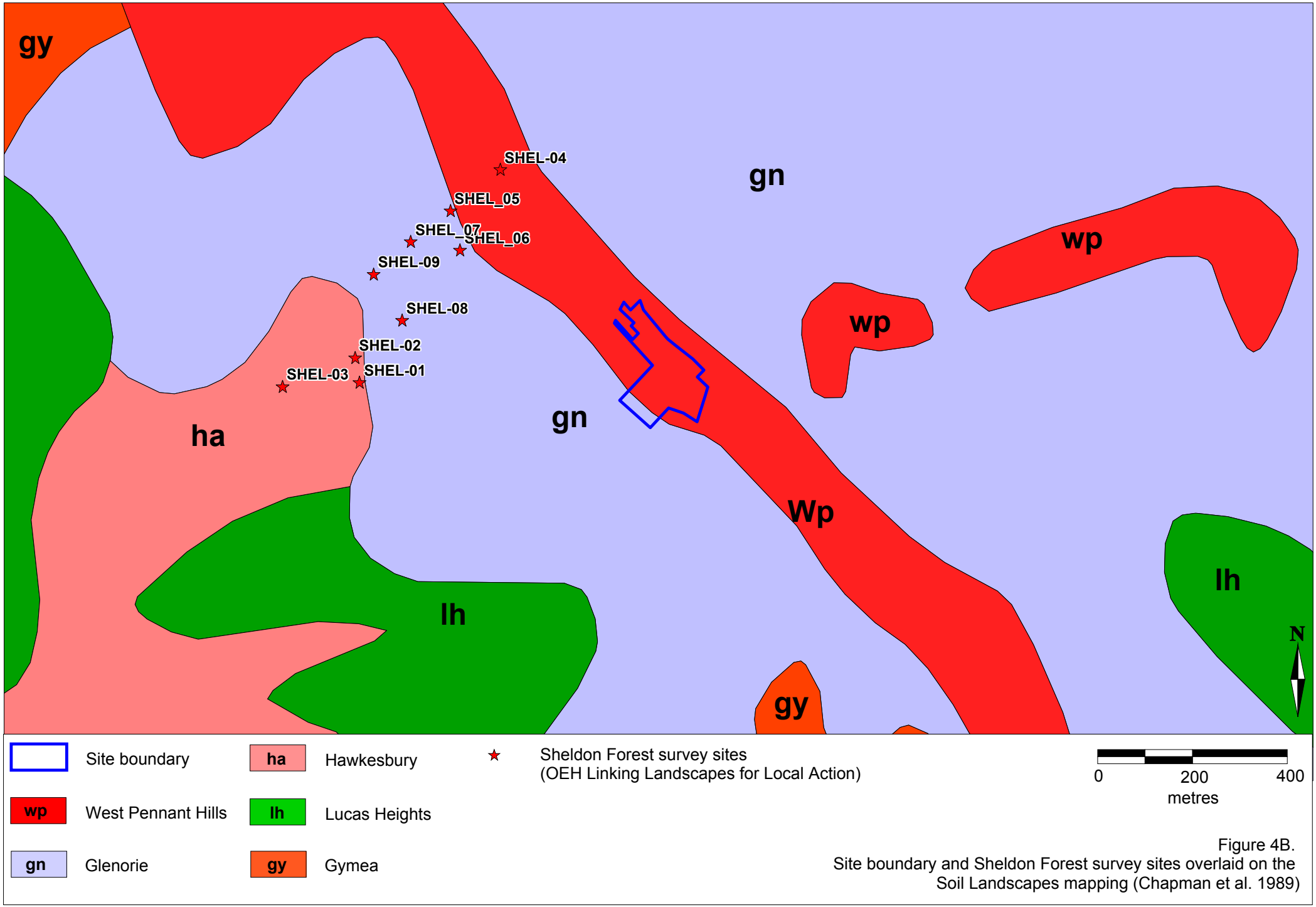


Figure 4B.
Site boundary and Sheldon Forest survey sites overlaid on the Soil Landscapes mapping (Chapman et al. 1989)

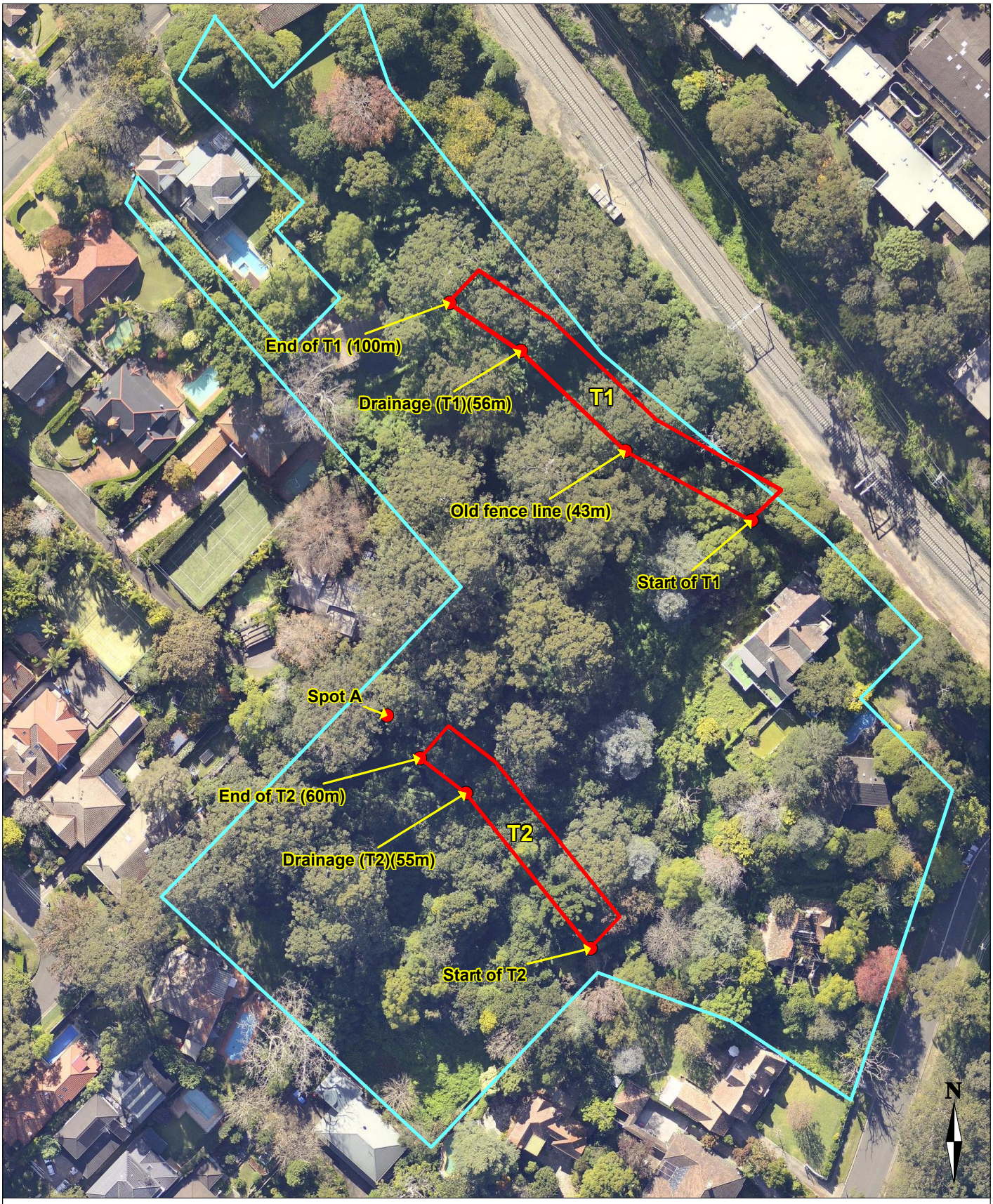


Figure 5A.
Transects sampled in October 2012 overlaid on the Nearmap aerial photograph dated 16 May 2014

Site boundary

Sheldon Forest survey sites
(OEH Linking Landscapes for Local Action)

0 100 200
metres

Figure 5B.
Sampling locations in Sheldon Forest
(from Atlas of NSW Wildlife, VIS Bionet accessed 4 July 2014)

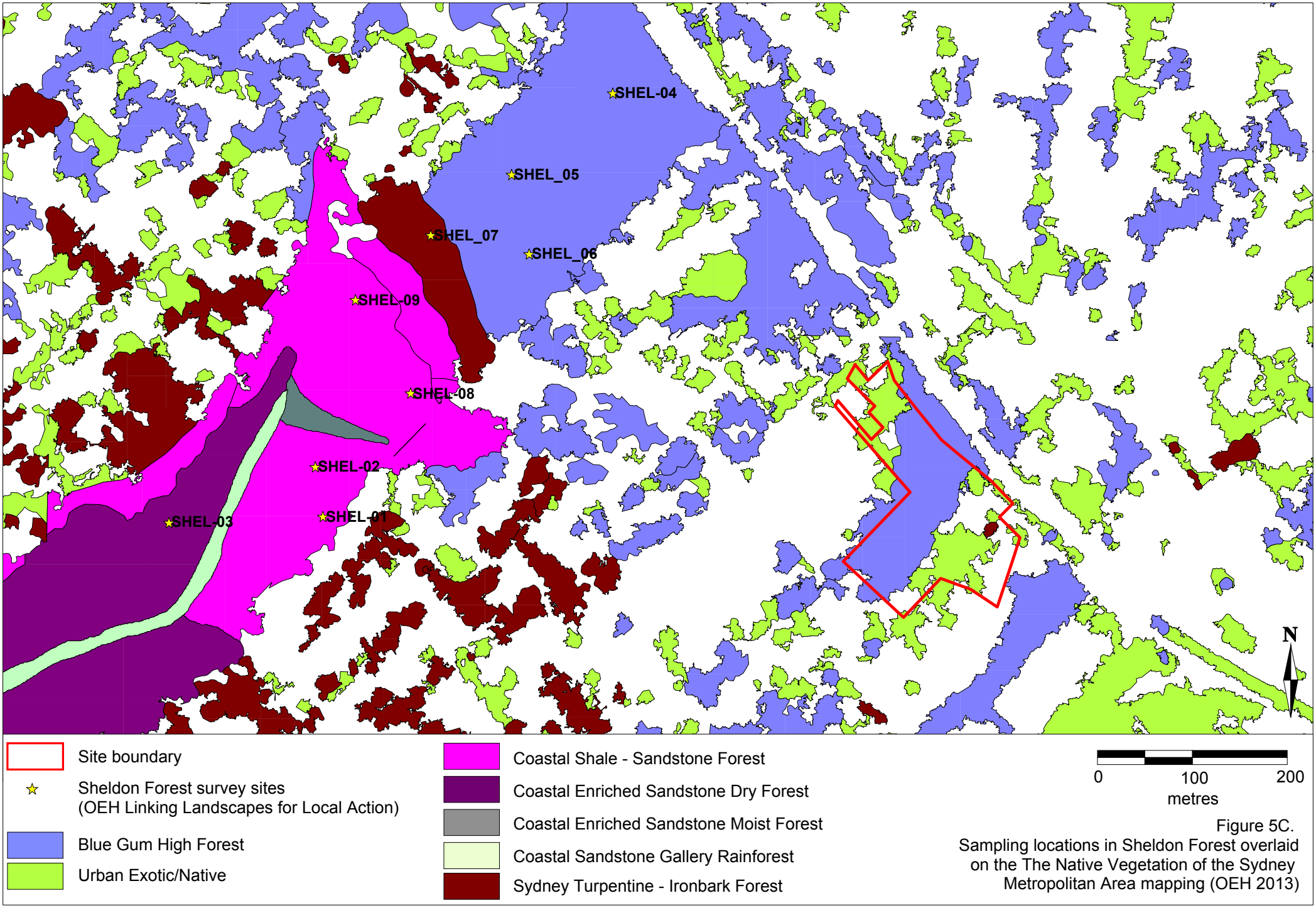


Figure 5C.
Sampling locations in Sheldon Forest overlaid on the The Native Vegetation of the Sydney Metropolitan Area mapping (OEH 2013)

Tables

Table 1. Local native trees recorded

Note: tree height data are estimates and may be subject to error

row	Tree no. from Survey Plan (Higgins 2014)	Species	Description	Diameter, Spread, Height (m) (Higgins 2014)
1	**23**	*Eucalyptus saligna*	BGHF canopy tree species	1.3Ø,20SP,30H *
2	**24**	*Eucalyptus saligna*	BGHF canopy tree species	0.5Ø,12SP,25H *
3	**37**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,14SP,30H *
4	**39**	*Eucalyptus saligna*	BGHF canopy tree species	0.90,14SP,33H *
5	**44**	*Eucalyptus saligna*	BGHF canopy tree species	0.9Ø,20SP,40H *
6	**49**	*Eucalyptus saligna*	BGHF canopy tree species	0.90(x3),30SP,30H
7	**50**	*Eucalyptus saligna*	BGHF canopy tree species	0.80,30SP,30H
8	**52**	*Eucalyptus saligna*	BGHF canopy tree species	0.7Ø,15SP,25H
9	**53**	*Eucalyptus saligna*	BGHF canopy tree species	0.7Ø,15SP,25H
10	**61**	*Eucalyptus paniculata*	BGHF canopy tree species	0.50, 20SP,25H
11	**69**	*Eucalyptus saligna*	BGHF canopy tree species	0.40,15SP,25H
12	**70**	*Eucalyptus pilularis*	BGHF canopy tree species	0.7Ø,15SP,25H
13	**72**	*Eucalyptus saligna*	BGHF canopy tree species	0.50,20SP,25H
14	**74**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,10SP,25H
15	**78**	*Eucalyptus paniculata*	BGHF canopy tree species	0.5Ø,8SP,20H
16	**81**	*Eucalyptus saligna*	BGHF canopy tree species	1.00, ,30H
17	**83**	*Eucalyptus saligna*	BGHF canopy tree species	0.80,20SP,30H
18	**85**	*Ficus rubiginosa*	local native tree	0.50, ,15H
19	**87**	*Eucalyptus saligna*	BGHF canopy tree species	0.90, ,30H
20	**89**	*Eucalyptus saligna*	BGHF canopy tree species	0.60,20SP,25H
21	**93**	*Eucalyptus saligna*	BGHF canopy tree species	0.45, , 30H
22	**94**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,8SP,30H
23	**94a**	*Eucalyptus saligna*	BGHF canopy tree species	0.30, ,15H
24	**96**	*Eucalyptus saligna*	BGHF canopy tree species	1.0Ø,20SP,25H
25	**96a**	*Eucalyptus saligna*	BGHF canopy tree species	0.55,10SP,25H
26	**98**	*Eucalyptus saligna*	BGHF canopy tree species	1.0Ø,20SP,25H
27	**102**	*Eucalyptus saligna*	BGHF canopy tree species	1.3Ø,20SP,30H
28	**119**	*Eucalyptus saligna*	BGHF canopy tree species	0.5Ø,10SP,25H
29	**122**	*Eucalyptus saligna*	BGHF canopy tree species	0.55,10SP,30H
30	**124**	*Eucalyptus saligna*	BGHF canopy tree species	0.40,10SP,25H
31	**128**	*Eucalyptus saligna*	BGHF canopy tree species	0.50,10SP,30H
32	**129**	*Eucalyptus saligna*	BGHF canopy tree species	0.55,15SP,30H
33	**136**	*Acmena smithii*	BGHF subcanopy	0.5Ø,10SP,15H *
34	**175**	*Eucalyptus saligna*	BGHF canopy tree species	0.5Ø,6SP,26H *
35	**180**	*Eucalyptus saligna*	BGHF canopy tree species	0.3Ø,10SP,20H *
36	**182**	*Eucalyptus saligna*	BGHF canopy tree species	0.9, 20SP,35H *
37	**184**	*Eucalyptus pilularis*	BGHF canopy tree species	1.0Ø,15SP,30H
38	**185**	*Eucalyptus pilularis*	BGHF canopy tree species	0.8,10SP,40H
39	**188**	*Eucalyptus saligna*	BGHF canopy tree species	0.90,24SP,35H *
40	**197**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,10SP,20H
41	**199**	*Eucalyptus pilularis*	BGHF canopy tree species	0.6Ø,10SP,25H
42	**201**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,10SP,20H
43	**203**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,10SP,15H
44	**208**	*Eucalyptus pilularis*	BGHF canopy tree species	0.6Ø,25SP,30H
45	**209**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,15SP,30H
46	**210**	*Eucalyptus pilularis*	BGHF canopy tree species	1.30,24SP,30H *
47	**211**	*Eucalyptus saligna*	BGHF canopy tree species	0.8Ø,10SP,25H
48	**222**	*Eucalyptus saligna*	BGHF canopy tree species	1.00,15SP,30H
49	**226**	*Eucalyptus saligna*	BGHF canopy tree species	1.00,10SP,30H
50	**228**	*Eucalyptus saligna*	BGHF canopy tree species	0.5Ø,10SP,30H
51	**229**	*Eucalyptus saligna*	BGHF canopy tree species	0.9Ø,15SP,30H
52	**230**	*Eucalyptus saligna*	BGHF canopy tree species - offsite rail corridor	0.8Ø,15SP,30H
53	**327a**	*Acmena smithii*	possible BGHF in landscape area	0.3 & 0.2,8SP,6H *
54	**328**	*Ficus rubiginosa*	local native tree	1.2Ø,20SP,15H *
55	**329**	*Acmena smithii*	possible BGHF in street frontage landscape area	0.4Ø,6SP,8H *
56	**331**	*Angophora floribunda*	BGHF canopy tree species	0.3Ø,5SP,12H
57	**331a**	*Eucalyptus saligna*	BGHF canopy tree species	0.5Ø,10SP,20H
58	**332**	*Eucalyptus saligna*	BGHF canopy tree species	0.3Ø,5SP,15H
59	**343**	*Eucalyptus saligna*	BGHF canopy tree species	0.50,16SP,18H *
60	**344**	*Pittosporum undulatum*	BGHF midstorey	0.2 & 0.4,8SP,15H *

*** = Trees with asterisk have had dimensions confirmed by Peter Castor of Tree Wise Men Pty Ltd**

Table 2A. Percent projected foliage covers of species in the contiguous 10 m x 10 m quadrats in Transects 1 and Transect 2 (plus Spot location A)

Notes: 1. Asterisk (*) before botanical name signifies exotic species. Hash symbol (#) signifies a non-local native, planted or naturalised

2. Families are grouped under headings 1. Pteridophytes, 2. Gymnosperms, 3. Dicotyledons, 4. Monocotyledons.
One or more of these plant groups may be absent from this site

3. The numbers in the columns are a measure of percent projected foliage cover of the species over the 10 x 10 m quadrat.

Botanical name	Common name	Sampling locations																
		T1Q1	T1Q2	T1Q3	T1Q4	T1Q5	T1Q6	T1Q7	T1Q8	T1Q9	T1Q10	T2Q1	T2Q2	T2Q3	T2Q4	T2Q5	T2Q6	SPOT A
1. Pteridophytes																		
Adiantaceae																		
Adiantum formosum	Giant Maidenhair Fern				1	1												
Adiantum hispidulum	Rough Maidenhair Fern													1				
Blechnaceae																		
Doodia aspera	Prickly Rasp Fern					1												
Polypodiaceae																		
Microsorum pustulatum	Kangaroo Fern	<1																
Pteridaceae																		
Pteris tremula	Tender Brake		<1															
Thelypteridaceae																		
Christella dentata	Binung														<1			
2. Gymnosperms																		
Araucariaceae																		
#Agathis robusta	Queensland Kauri												60	<1		1		
Ginkgoaceae																		
* Ginkgo biloba	Ginkgo, Maidenhair Tree	40																
3. Dicotyledons																		
Araliaceae																		
* Hedera helix	Ivy, English Ivy											1		1	2	1	2	

Botanical name	Common name	Sampling locations																
		T1Q1	T1Q2	T1Q3	T1Q4	T1Q5	T1Q6	T1Q7	T1Q8	T1Q9	T1Q10	T2Q1	T2Q2	T2Q3	T2Q4	T2Q5	T2Q6	SPOT A
Asteraceae																		
* Ageratina adenophora	Crofton Weed						2	1										
* Delairea odorata	Cape Ivy								2	10	10							
Bignoniaceae																		
* Jacaranda mimosifolia	Jacaranda		40															
Caprifoliaceae																		
* Lonicera japonica	Japanese Honeysuckle		1															
Convolvulaceae																		
Dichondra repens	Kidney-weed, Mercury Bay Weed	<1																
* Ipomoea indica	Blue Morning Glory	20	20	50	40	45	60	50	80	80	80			5	1	3		5
Elaeocarpaceae																		
Elaeocarpus reticulatus	Blueberry Ash													<1				
Fabaceae Faboideae																		
* Erythrina x sykesii	Coral Tree							25	10	10								
Hamamelidaceae																		
* Liquidambar styraciflua	Liquidambar, Sweet Gum											50		<1				
Lauraceae																		
* Cinnamomum camphora	Camphor-laurel					10												X
Malvaceae																		
* Abutilon pictum	Chinese Lantern								10									
Moraceae																		
Ficus rubiginosa	Port Jackson Fig, Rusty Fig																	X
Myrtaceae																		
Acmena smithii	Lilly-pilly															3		
# Corymbia citriodora	Lemon-scented Gum				15													
Eucalyptus saligna	Sydney Blue Gum					30			15		10							X
Ochnaceae																		
* Ochna serrulata	Mickey Mouse Plant		<1										<1	1	<1			
Oleaceae																		
* Ligustrum lucidum	Broad-leaved Privet, Glossy Pribet	5	5	15	25	25		10		2	3	60	50	80	70	70	60	X
* Ligustrum sinense	Small-Leaved Privet, Chinese Privet	2				1						2	2	3	1	5	10	X

Botanical name	Common name	Sampling locations																
		T1Q1	T1Q2	T1Q3	T1Q4	T1Q5	T1Q6	T1Q7	T1Q8	T1Q9	T1Q10	T2Q1	T2Q2	T2Q3	T2Q4	T2Q5	T2Q6	SPOT A
Oxalidaceae																		
* Oxalis pes-caprae	Soursob										5							
Pittosporaceae																		
Pittosporum undulatum	Pittosporum	30																
Solanaceae																		
* Solanum nigrum	Blackberry Nightshade	<1																
Theaceae																		
* Camellia sasanqua			10															
Verbenaceae																		
* Duranta erecta	Sky-flower, Golden Bead Tree	<1	5															
* Lantana camara	Lantana		20	50	50	45	10	10	20	30				5	2			
Violaceae																		
* Viola odorata	Sweet Violet	<1																
4. Monocotyledons																		
Alliaceae																		
* Agapanthus praecox	Agapanthus	1																
Amaryllidaceae																		
* Clivia miniata	Kaffir Lily	<1	1															
Anthericaceae																		
* Chlorophytum comosum	Spider Plant	<1	<1									1						
Araceae																		
* Monstera deliciosa	Fruit-salad Plant, Ceriman, Imbe									<1								
Arecaceae																		
* Syagrus romanzoffiana	Cocos Palm, Queen Palm																	X
Asparagaceae																		
* Asparagus aethiopicus	Asparagus Fern	1	1									1	<1	1				
Commelinaceae																		
* Tradescantia fluminensis	Wandering Jew	40	10			5	30	80		40	20					30	80	95
Cyperaceae																		
Cyperus imbecillis			<1															

Botanical name	Common name	Sampling locations																
		T1Q1	T1Q2	T1Q3	T1Q4	T1Q5	T1Q6	T1Q7	T1Q8	T1Q9	T1Q10	T2Q1	T2Q2	T2Q3	T2Q4	T2Q5	T2Q6	SPOT A
Iridaceae																		
* Dietes sp.	Butterfly Iris													1				
Musaceae																		
* Musa acuminata	Banana									5	15							
Poaceae																		
Microlaena stipoides	Weeping Grass, Meadow Rice-grass	<1																
Oplismenus aemulus	Broad-leaved Basket Grass	1																
* Setaria palmifolia	Palm Grass						1	2		<1								
Zingiberaceae																		
* Hedychium gardnerianum	Yellow Ginger, Ginger Lily		<1													1		

Table 2b. Number of individuals and heights of all species of trees and shrubs attaining 2 m or more in height in Transect 1 and 2

Botanical name	quadrat 1		quadrat 2		quadrat 3		quadrat 4	
	number	height	number	height	number	height	number	height
Transect 1								
Camelia sasanqua			1	4 m				
Cinnamomum camphora								
Corymbia citriodora							1	25 m
Duranta erecta	1	3 m	3	3 m				
Erythrina x sykesii								
Eucalyptus saligna								
Ginkgo biloba	2	13 m						
Jacaranda mimosifolia			3	14 m				
Ligustrum lucidum	20+	8 m	2	6 m	1	10 m	7	6 m
Ligustrum sinense	20+	5 m						
Pittosporum undulatum	2	8 m						

Botanical name	quadrat 5		quadrat 6		quadrat 7		quadrat 8	
	number	height	number	height	number	height	number	height
Transect 1								
Camelia sasanqua								
Cinnamomum camphora	1	9 m						
Corymbia citriodora								
Duranta erecta								
Erythrina x sykesii					6	12 m	1	2 m
Eucalyptus saligna	1	30 m					1	30 m
Ginkgo biloba								
Jacaranda mimosifolia								
Ligustrum lucidum	6	6 m			1	9 m		
Ligustrum sinense								
Pittosporum undulatum								

Botanical name	quadrat 9		quadrat 10	
	number	height	number	height
Transect 1				
Camelia sasanqua				
Cinnamomum camphora				
Corymbia citriodora				
Duranta erecta				
Erythrina x sykesii	3	3 m		
Eucalyptus saligna			1	30 m
Ginkgo biloba				
Jacaranda mimosifolia				
Ligustrum lucidum	1	4 m	2	4 m
Ligustrum sinense				
Pittosporum undulatum				

Botanical name	quadrat 1		quadrat 2		quadrat 3		quadrat 4	
	number	height	number	height	number	height	number	height
Transect 2								
Acmena smithii								
Agathis robusta			1	30+				
Ligustrum lucidum	20+	6 m	20+	8 m	20+	15 m	20+	13 m
Ligustrum sinense								
Liquidambar styraciflua	1	17 m						

Botanical name	quadrat 5		quadrat 6	
	number	height	number	height
Transect 2				
Acmena smithii	1	17 m		
Agathis robusta				
Ligustrum lucidum	20+	15 m	4	14 m
Ligustrum sinense			20+	2 m
Liquidambar styraciflua				

Table 3. Abundance scores recorded for species in the nine 20 m x 20 m quadrats in Sheldon Forest (Altas of NSW Wildlife, VIS Bionet Accessed 4 July 2014)

Exotic	Species	SHEL-01	SHEL-02	SHEL-03	SHEL-04	SHEL_05	SHEL_06	SHEL_07	SHEL-08	SHEL-09
	Acacia elata			2		1			1	
	Acacia floribunda					1	1			
	Acacia implexa						1			
	Acacia longifolia				1		2			
	Acacia longissima		1							3
	Acacia parramattensis				1		2			
	Acacia stricta					1	1			
	Acacia ulicifolia		3							
x	Acer negundo	2								
	Acmena smithii					1			1	
x	Agapanthus spp.	2								
x	Ageratum houstonianum	3								
	Allocasuarina littoralis									3
	Allocasuarina torulosa		3	1						
	Amperea xiphoclada		2	3						
	Angophora costata	1	1	5			2	1	1	
	Angophora floribunda					2				
	Anisopogon avenaceus		3							
x	Aristea ecklonii					2				
x	Asparagus aethiopicus	3	2		3	3	3			
x	Asparagus asparagoides							1		1
x	Asparagus scandens					1	3	1		
	Austrostipa pubescens									5
	Austromyrtus tenuifolia			1						
	Banksia serrata		1	1						
	Banksia spinulosa		2							
x	Bidens pilosa	1								
	Billardiera scandens		2				4		1	3
	Blechnum cartilagineum				4		1			
	Bossiaea heterophylla		2							
	Bossiaea obcordata		2							3
	Brachychiton acerifolius					1				
	Breynia oblongifolia				3	3	4	2	1	3
	Bursaria spinosa				1					
	Callicoma serratifolia			5						
	Calochlaena dubia			5					1	
x	Cardiospermum grandiflorum					1				
	Cassytha pubescens							2		
	Ceratopetalum gummiferum			3						
x	Cinnamomum camphora	3			3	2	1	1	2	1
	Cissus hypoglauca						4			
	Clematis aristata				3	5	5	3		
	Clerodendrum tomentosum				3	1				
	Commelina cyanea	2								
	Cordyline stricta					2		1		
	Corymbia gummifera		2							
	Cryptostylis erecta								2	3
	Cryptostylis spp.		2							
	Cyperus mirus	1								
	Desmodium varians				1	4	3	3		
	Dianella caerulea var. producta							3	3	2
	Dianella caerulea	1	2	2	1	3	3			
	Dichelachne micrantha									3
	Dichondra repens					4		5		
	Dillwynia retorta		1							
	Dodonaea triquetra									3
	Echinopogon ovatus					1				
x	Ehrharta erecta	3								
	Elaeocarpus reticulatus	1	2	3	1	3	1	3	2	3
	Entolasia marginata		2	3	3	3	4			
	Entolasia stricta		3	2		3	4	5	3	5
	Eucalyptus pilularis	5	5	1	5	6	6	5	5	5
	Eucalyptus piperita			5						
	Eucalyptus saligna				6					
	Eustrephus latifolius	2			3	5	5	4	3	4
	Exocarpos cupressiformis						1			
	Gahnia clarkei			3						
	Geranium homeanum							2		
	Glochidion ferdinandi					2		1		
	Glycine clandestina				2			3		3

Exotic	Species	SHEL-01	SHEL-02	SHEL-03	SHEL-04	SHEL_05	SHEL_06	SHEL_07	SHEL-08	SHEL-09
	Glycine spp.					3	3			
	Gonocarpus teucrioides							1		
	Goodenia hederacea							1		
	Goodenia heterophylla		1							
	Grevillea robusta	1								
	Hardenbergia violacea					1		2		
x	Hedera helix	2				1				
x	Hedychium gardnerianum	2							1	
	Hibbertia aspera						4	3	1	3
	Hibbertia dentata			1	2	2	3	3	1	5
	Homalanthus populifolius					2		3		
	Hovea linearis									1
	Imperata cylindrica				2	1	1	4		3
x	Ipomoea indica	1								
	Juncus usitatus	1								
x	Lantana camara	2			6	1				1
	Lepidosperma laterale			2			3		3	5
	Leptomeria acida		1							
	Leptospermum polygalifolium			1						
	Leptospermum trinervium		2							
	Leucopogon juniperinus		3		2	1	3	2	1	3
	Leucopogon lanceolatus			2			1	2	2	2
x	Ligustrum lucidum	5			5	2		1		
x	Ligustrum sinense	5			6		4	3	1	2
x	Lilium formosanum					1		1		
	Lindsaea linearis			1						3
	Lindsaea microphylla			1						
	Lomandra cylindrica									2
	Lomandra filiformis subsp. filiformis		3	2						3
	Lomandra filiformis							1		
	Lomandra gracilis								4	
	Lomandra longifolia	1	3	3	2		5	1	3	3
	Lomandra obliqua		3	1						3
	Lomatia silaifolia								2	3
x	Lonicera japonica	1			3					
x	Magnolia spp.									1
	Marsdenia rostrata					3			3	
	Marsdenia suaveolens			3					2	
	Maytenus silvestris						1			
	Microlaena stipoides					4	3		3	5
	Microlaena stipoides var. stipoides		3	1	3			5		
	Morinda jasminoides					5			2	
	Myrsine variabilis								3	
	Notelaea longifolia			3			1	3	5	5
x	Ochna serrulata	3	2		4	3	4	3	5	3
x	Olea europaea subsp. cuspidata								2	1
x	Olea europaea					1				
	Oplismenus aemulus	2								
	Oplismenus imbecillis	2			4	5	5	4	2	3
	Oxalis spp.						1			
	Oxalis perennans							3		2
	Ozothamnus diosmifolius				1		3	1		
	Pandorea pandorana				3	4	4	4	2	3
	Panicum simile		1							
	Parsonsia straminea							5	2	
x	Passiflora edulis					1				
x	Passiflora subpeltata								1	
	Patersonia glabrata		3						2	2
	Persoonia laurina									1
	Persoonia levis		1							2
	Persoonia linearis					1			2	3
	Persoonia pinifolia		1							1
	Petrophile pulchella		2							
x	Phoenix canariensis	2								
	Phyllota grandiflora		2							
	Phyllanthus hirtellus		3							3
x	Phyllanthus tenellus	1								
x	Physalis peruviana	1								
x	Pistacia chinensis					1				
	Pittosporum revolutum				3					
	Pittosporum undulatum	2	5	2	2	5		3	5	3

Exotic	Species	SHEL-01	SHEL-02	SHEL-03	SHEL-04	SHEL_05	SHEL_06	SHEL_07	SHEL-08	SHEL-09
x	Plantago lanceolata					1				
	Platylobium formosum		1	2		3	4	3	1	3
	Platysace lanceolata		3							
	Poa affinis					1	1	5		4
	Poaceae indeterminate						1			
	Polyscias elegans				1	5	1			
	Polyscias sambucifolia				2	2	4	2	1	3
	Pomax umbellata		1					3		2
	Pratia purpurascens						1	3		3
x	Prunus spp.	1			1					
	Pseuderanthemum variabile				4	3	4	4	3	2
	Pteridium esculentum		2	3		1	2			3
x	Pyracantha angustifolia						3			
x	Rhaphiolepis indica					2	3	1	5	3
	Rubus parvifolius					1				
	Schelhammera undulata			1						
	Schizaea dichotoma			2						
x	Senna pendula var. glabrata	2								
	Smilax glyciphylla		3	3	1	1		3	3	4
x	Solanum mauritianum					1				
x	Solanum nigrum	2								
x	Solanum pseudocapsicum					1				
	Stylidium productum			3						
	Syncarpia glomulifera		5	1				6	6	6
	Syzygium spp.						1			
	Tetraria capillaris		4	4						
x	Thunbergia alata	1								
x	Tradescantia fluminensis					3				
	Tristaniopsis collina			2						
	Trochocarpa laurina			3		1			3	1
	Tylophora barbata				3	4	3			
	Vernonia cinerea					1				
	Xanthorrhoea arborea		2	6						
	Xanthorrhoea spp.								1	
	Xanthosia pilosa		1	1						
	Zieria pilosa		2							
	Zieria smithii		3	3					1	

Table 4.
Targets and actions required for the implementation of the Vegetation Management Plan

The following management objectives have been set:

1. Protection of the Conservation Area.
2. Earthworks to remove introduced materials and create ephemeral ponds
3. Weed control.
4. Stimulate natural regeneration through managed disturbance.
5. Enhance the local native vegetation through revegetation and planting.
6. Increase awareness of the conservation value of the vegetation.
7. Monitoring and maintenance.

Management Objectives	Targets	Actions	Time frame	Responsibility
1 to 7	Appoint Environmental Manager.	Appoint an Environmental Manager (EM) with experience restoring degraded sites using large earthmoving equipment. The Environmental Manager is to be a responsible person with at least 5 years experience of supervising the restoration of degraded native ecosystems and with at least a university degree in natural sciences to supervise, co-ordinate and document conservation works.	Prior to commencement of works.	The client.
1, 6, 7	Prepare required induction document and environmental signs.	Prepare induction document to be signed by all persons entering the site.	Prior to commencement.	Construction Manager and Environmental Manager.
1, 6, 7	All personnel entering the	Induct all persons entering the site, explain the	Prior to and during the	Construction Manager in

Management Objectives	Targets	Actions	Time frame	Responsibility
	site inducted.	issues and sign the induction form.	construction phase	consultation with the Environmental Manager.
1, 6, 7	Personnel remain aware of Environmental significance issues on the site.	Conduct regular tool box talks at which: - Personnel are reminded of the conservation importance of the site to maintaining health of the catchment. - Induction material listed above is reviewed. - Current new issues are discussed.	Weekly or as specified by the Construction Manager and/or Environmental Manager during the construction phase.	Construction Manager in consultation with Environmental Manager.
1, 6, 7	All new residents made aware of environmental significance of the Site.	Produce and provide all new residents with an Environmental Awareness kit in which the location and significance of the *Blue Gum High Forest* are presented. Signpost the *Blue Gum High Forest* along the paths.	Post the construction phase.	Body Corporate/Client in consultation with Environmental Manager.
2, 7	Protect fauna habitat.	For all hollow-bearing trees being removed, the fauna expert needs to advise on the careful removal of fauna. The fauna expert may require that clearing be delayed to allow for completion of nesting and breeding requirements of the fauna species. Any required fauna reports are to be included in the monitoring reports.	Prior to the construction phase.	Environmental Manager, fauna expert in consultation with Environmental Manager, as required.
2, 7	Test results on water entering the site and flowing in the gully at time of rain events.	Test stormwater runoff in accordance with ANZECC 2000 guidelines, as specified by the Environmental Manager.	During rain events prior to commencement of works for the first stage of the development.	Environmental Manager.
2, 7	Source of contamination identified and corrected.	If nutrient, phosphorus or human faecal bacteria are identified in the stormwater runoff, then the source of contamination is to be identified and corrective strategies implemented.	Prior to commencement of works for the first stage of the development, and if plumes of weeds are detected in the Conservation Area.	Construction Manager in consultation with Environmental Manager.
2, 7	Water quality testing onsite	Record water quality at sampling points to test stormwater surface runoff in accordance with ANZECC 2000 guidelines and compare against	Post rain events, during the construction phase and post construction, and if plumes of	Environmental Manager

Management Objectives	Targets	Actions	Time frame	Responsibility
		baseline data at entry and exit points.	weeds are detected in the Conservation Area.	
1, 3, 4, 5, 7	Tagged and photographed the upper perimeter of the existing *Blue Gum High Forest*	Tag and photograph the upper perimeter of the local native canopy trees on site. Monitoring photographs during works.	Prior to the construction phase, during works and as part of the regular monitoring	Environmental Manager.
1, 7	Fencing and protection measures implemented.	Fence the construction area to reduce accidental incursions into the Conservation Area.	Following soil testing, prior to construction work commencing upslope of the Conservation Area.	Construction Manager in consultation with Environmental Manager.
1, 7	Sediment control measures in place. Security fencing installed as required.	Install sediment control measures constructed from biodegradable low nutrient materials such as timber-staked jute fencing and/or windrows of removed weeds from the site (hay bales not to be used), as specified by the Environmental Manager.	Prior to the construction work commencing upslope of the Conservation Area.	Construction Manager in consultation with Environmental Manager.
3, 4, 5, 7	Remove at least 95% of primary weed cover	- Photograph weed cover prior to removal and regularly - Physically remove the surface layer of weeds, using excavation machinery or as specified by the Environmental Manager. - Remove the seed-bearing weed material to a licensed disposal site or to weed piles onsite - Carefully cut and paint weeds growing upslope in fill, with herbicide or hand weeded as specified by the Environmental Manager. - Photograph/ monitor the areas post weed removal.	At commencement of works and gradually over time to minimise erosion risk	Construction Manager in consultation with Environmental Manager.
1, 7	All vehicles and machinery cleaned and inspected before entering the site.	- Clean and inspect all machinery and vehicles prior to entry and/or re-entry of the site. -Document the cleanliness of vehicles entering the site (records and photographs) and include within the	During construction phase	Environmental Manager in consultation with Construction Manager.

Management Objectives	Targets	Actions	Time frame	Responsibility
		early monitoring report.		
3, 4, 5, 7	Remove at least 95% of secondary weed cover	- Carefully remove secondary weeds downslope, as specified by the Environmental Manager. - Remove weed materials to a licensed disposal site, as appropriate.	During construction phase and gradually over time to minimise erosion risk	Environmental Manager.
2, 7	Create ephemeral ponds	- Carefully excavate, using an excavator, working progressively from upper section of gully to the lower section, as specified by the Environmental Manager. - Place rock as required to minimise erosion risk.	During the construction phase.	Construction Manager, in consultation with Environmental Manager.
1, 3, 4, 5, 7	Sediment control measures in the Conservation Area	Given the extensive weed cover in both the Conservation Area and in the buffer zone, the weeds need to removed and raked/placed in “rafts” (linear piles) along the contours to reduce the risk of downslope erosion. The rafting results in exposing soil surfaces to be scratched over by the Brush Turkey, which may increase potential germination from the native soil seed bank.	During construction, following each completed stage in the Conservation Area.	Environmental Manager in consultation with Construction Manager.
5, 7	Propagate 100 tubestock of local native trees (at least 32 required)	- Collect seed from trees growing onsite. - Propagate a mix of the local native tree species from seed collected from *insitu* trees collected onsite by specialist seed collectors.	Prior to and during the construction phase.	Specialist nursery propagator(s) in consultation with the Environmental Manager.
5, 7	Collect propagation material, including the ferns onsite.	- Propagation of local provenance plants for Landscape Areas and for Conservation Area in consultation with the Coucil bushland officers. - Propagate and collect the ferns if at risk from the drainage works as specified by the Environmental Manager. As many ferns as possible are to be grown from onsite material. 1000s of ferns are required for the Conservation Area and managed buffer zone to the Conservation Area.	Prior to and during the construction phase.	Specialist nursery propagator(s) in consultation with the Environmental Manager.
1, 7	Compliance with Rural Fires Requirements	Managed buffer zone to Conservation Area is to be managed as an Inner Protection Zone with	Post construction, prior to occupation of the buildings	Environmental Manager prior to Occupancy.

Management Objectives	Targets	Actions	Time frame	Responsibility
		continuous ground layer cover and canopy trees with non-touching canopies.	inspection by bushfire expert.	Corporation Body post Occupancy
7	Monitoring, corrective actions requests issued and implementation corrective actions.	Checking, monitoring, reporting. Updating targets.	During the construction phase and the monitoring phase.	Environmental Manager in consultation with the Construction Manager.
7	Monitoring from fixed transects and photographs from fixed points.	- Set up monitoring plots and fix photographic points. - Record the percent projected foliage cover of species from monitoring plots.	Prior to commencement of the works and during the monitoring period.	Environmental Manager.
Long term for the life of the proposed development				
3, 7	<5% total projected foliage weed cover in the Conservation Area and Buffer Zone	If any 10 m x 10 m patch of the BGHF Conservation Area had $\geq$ 5% projected foliage cover by exotic species in the form of a weed plume, that the source of the possible nutrient enrichment be investigated as part of Corrective Action Requests, with water quality testing undertaken, including for *E. coli* (indicative of sewer leaks). The implementation of actions to address the contaminants must be undertaken and the weed cover re-assessed in the next annual monitoring and documented in the next Monitoring Report.	Yearly for the life of the proposed development.	Environmental Manager
5, 7	The long-term diversity target for the BGHF restoration onsite to reflect that of the BGHF in Sheldon Forest.	Permanent plots are to be established and regularly monitored. The percent projected foliage cover of each species is to be recorded. The data from 400 m^2 plots in the Conservation Area are to be compared with the data recorded in the OEH 400 m^2 plots in the Sheldon Forest BGHF reference site. The species diversity from 400 m^2 reference plots are used as the biodiversity benchmarks.	Plots established prior to earthworks. Comparisons with reference site after Year 5.	Environmental Manager
5, 7	Recruitment of at least 1 canopy tree per 20 m x 20 m area	Supplementary seeding and planting of local provenance may be further required to encourage regeneration onsite.	As required.	Environmental Manager

Management Objectives	Targets	Actions	Time frame	Responsibility
Monitoring and reporting				
7	All rehabilitation works are monitored and reported regularly.	Monitoring, maintenance, reporting and corrective action requests. - Monitor all rehabilitation works and prepare reports detailing the progress and success of revegetation and rehabilitation works. - Include in reports: • details of rainfall and stormwater; • fauna sightings and associated works; • works done and further works required; • a photographic record of works and photographs from the fixed monitoring points; • data on vegetation structure and species composition recorded from fixed transects. - Use the monitoring reports to assess the success of the conservation works against the targets. - Discuss results of the monitoring with the Construction Manager. - Forward reports to the client for distribution to the appropriate government departments and/or Certifier.	Month 1, Month 3, Month 6, Month 12, then yearly for the life of the proposed development.	Environmental Manager, Construction Manager and/or Body Corporate.
7	Maintenance and corrective actions are carried out as required. Maintenance and corrective actions are documented.	- Address any issues that arise through the monitoring process and implement corrective actions. - Document outcomes of implementation in the next monitoring report.	Month 1, Month 3, Month 6, Month 12, then yearly for the life of the proposed development.	Environmental Manager, Construction Manager and/or Body Corporate.

Appendices

Appendix 1. Court Order issued by Land and Environment Court of New South Wales (Case number 10648 of 2013) on 5 December 2014

Concept Approval

Section 75O of the *Environmental Planning & Assessment Act 1979*

As delegate of the Minister for Planning under delegation executed on 14 September 2011, and in accordance with the decision of the Land and Environment Court on 5 December 2014 to uphold appeal proceedings No. 10648 of 2013, the Planning Assessment Commission of NSW (Commission) determines:

(a) pursuant to Section 75O and s75Q(3) of the *Environmental Planning and Assessment Act 1979*, to approve the Concept Plan referred to in Schedule 1, subject to the terms of approval and modifications in Schedule 2 and the Statement of Commitments in Schedule 4, as determined by the Court;

(b) pursuant to Section 75P(1)(a) and 75P(2)(c) of the *Environmental Planning and Assessment Act 1979*, that the further environmental assessment requirements for approval to carry out the development are as set out in Schedule 3; and

(c) pursuant to section 75P(1)(b) of the *Environmental Planning & Assessment Act 1979*, that all future stages (apart from project application no MP10_0219 which is (at any time) the subject matter of Land and Environment Court proceedings No. 10834 of 2013) of the Concept Plan approval are subject to Part 4 of that Act.

David Furlong
Member of the Commission

Jan Murrell
Member of the Commission

Sydney 19 December 2014

SCHEDULE 1

PART A: PARTICULARS

Application No.:	MP 08_0207
Proponent:	Brett Stephen Lord and Marcus William Ayres as Joint and Several Receivers and Managers of the Site
Approval Authority:	Minister for Planning
Land:	1, 1A, 3 and 5 Avon Road and 4 and 8 Beechworth Road, Pymble (Lot 1 DP 583803, Lot 2 DP 583803, Lots 1 and Lot 2 DP 205504, Lot 1 DP 403072 and Lot 3 DP 403072)
Project:	Residential development comprising: • three (3) building envelopes incorporating basement level parking; • 15,136m^2 GFA for residential flat building use (excluding 1 Avon Rd) and 187 dwellings and up to 257 parking spaces; • subdivision into four (4) residential lots with building footprints for single dwellings on the western (Beechworth Ave) side of the site with maximum GFA of 1,151m^2 and subdivision of associated vehicular access lot; • retention and restoration of 1 Avon Rd for common use of future residents; • vegetation management plan for conservation and rehabilitation of Blue Gum High Forest; • landscape concept; • stormwater concept.

PART B: NOTES RELATING TO THE DETERMINATION OF MP 08_0207

Responsibility for other approvals/ agreements

The Proponent is responsible for ensuring that all additional approvals and agreements are obtained from other authorities, as relevant.

Legal notices

Any advice or notice to the approval authority shall be served on the Secretary.

PART C: DEFINITIONS

Act means the *Environmental Planning and Assessment Act* 1979 (as amended).

Advisory Notes means advisory information relating to the approved development but do not form a part of this approval.

Council means Ku-ring-gai Council.

Department means the Department of Planning & Environment or its successors.

Secretary means the Secretary of the Department or his/her nominee or delegate.

FFL means finished floor level as defined by the Standard Instrument.

FSR means floor space ratio as defined by the Standard Instrument

GFA means gross floor area as defined by the Standard Instrument.

Minister means the Minister for Planning.

MP No. 08_0207 means the Major Project described in the plans and documentation listed in condition A2 below.

Second Further Preferred Project Report (PPR) means the Second Further Preferred Project Report prepared by JBA Urban Planning Consultants Pty Ltd and dated September 2014.

Project Application/s means transitional Part 3A Project No. MP10_0219 the subject of Land and Environment Court proceedings 10834 of 2013.

Proponent means Brett Stephen Lord and Marcus William Ayres as Joint and Several Receivers and Managers of the Site or any party lawfully acting upon this approval.

Certifying Authority has the same meaning as Part 4A of the Act.

Regulation means the Environmental Planning and Assessment Regulation 2000 (as amended).

Subject Site has the same meaning as the land identified in this Schedule.

End of Schedule 1

SCHEDULE 2

PART A – TERMS OF APPROVAL

Development Description

A1 Concept approval is granted to the development as described below:

Use of the subject site for a residential development including:

- three (3) building envelopes incorporating basement level parking;
- 15,136m2 GFA for residential flat building use (excluding 1 Avon Rd) and 187 dwellings and up to 257 parking spaces;
- subdivision into four (4) residential lots with building footprints for single dwellings on the western (Beechworth Ave) side of the site with maximum GFA of 1,151m2 and subdivision of associated vehicular access lot;
- retention and restoration of 1 Avon Rd for common use of future residents;
- vegetation management plan for conservation and rehabilitation of Blue Gum High Forest;
- landscape concept; and
- stormwater concept.

Development in Accordance with the Plans and Documentation

A2 The development shall be undertaken generally in accordance with:

i) Second Further Revised Preferred Project Report prepared by JBA Urban Planning Consultants Pty Ltd dated 19 September 2014; and

ii) Landscape Architect Design Report – Revised Concept Plan Proposal prepared by Site Image (NSW) Pty Limited, Issue F, dated 13 November 2014,

including all associated documents and reports;

- the Statement of Commitments prepared by JBA Urban Planning Consultants Pty Ltd included in the Second Further Revised Preferred Project Report dated 19 September 2014 at Appendix 4; and
- specifically, the following reports and drawings:

Drawings Prepared by Marchese Partners International Pty Ltd		
Drawing No	***Name of Plan***	***Date***
MP 20.00 Revision P	Cover Page	27/11/14
MP 21.01 Revision P	Comparison Plan Current & Previous	27/11/14
MP 21.02 Revision P	Separation Plan	27/11/14
MP 21.03 Revision P	Tree Plan	27/11/14
MP 21.04 Revision P	Planting Protection Zone Plan	27/11/14
MP 21.05 Revision P	Heritage Lot Plan	27/11/14
MP 21.06 Revision P	Building Position Plan	27/11/14
MP 21.07 Revision P	Site Area Plan	27/11/14
MP 22.03 Revision P	Indicative Design Floor Plan Level RL + 126	27/11/14
MP 22.04 Revision P	Indicative Design Floor Plan Level RL + 129	27/11/14
MP 22.05 Revision P	Indicative Design Floor Plan Level RL + 132	27/11/14

MP 22.06 Revision P	Indicative Design Floor Plan Level RL + 135	27/11/14
MP 22.07 Revision P	Indicative Design Floor Plan Level RL + 138	27/11/14
MP 22.08 Revision P	Indicative Design Floor Plan Level RL + 141	27/11/14
MP 22.09 Revision P	Indicative Design Floor Plan Level RL + 144	27/11/14
MP 22.10 Revision P	Indicative Design Floor Plan Level RL + 147	27/11/14
MP 22.11 Revision P	Indicative Design Floor Plan Level RL + 150	27/11/14
MP 22.12 Revision P	Indicative Design Floor Plan Level RL + 153	27/11/14
MP 22.13 Revision P	Indicative Design Floor Plan Level RL + 156	27/11/14
MP 22.14 Revision P	Indicative Design Floor Plan Level RL + 159	27/11/14
MP 22.15 Revision P	Indicative Design Floor Plan Level RL + 162	27/11/14
MP 22.16 Revision P	Indicative Design Floor Plan Level Roof	27/11/14
MP 23.01 Revision P	Indicative Design Section AA	27/11/14
MP 23.02 Revision P	Indicative Design Section BB	27/11/14
MP 23.03 Revision P	Indicative Design Section CC	27/11/14
MP 23.04 Revision P	Indicative Design Section Driveway	27/11/14
MP 23.05 Revision P	Indicative Design Section DD	27/11/14
MP 24.01 Revision P	Soil Section 01-01' Building 04	27/11/14
MP 24.02 Revision P	Soil Section 02-02' Building 04 & Building 01	27/11/14
MP 24.03 Revision P	Soil Section 03-03' Building 04 & Building 01	27/11/14
MP 24.04 Revision P	Soil Section 04-04' Building 01	27/11/14
MP 24.05 Revision P	Soil Section 05-05' Building 04 & Building 01	27/11/14
MP 24.06 Revision P	Soil Section 06-06' Building 3 & Building 1	27/11/14
MP 24.07 Revision P	Soil Section 07-07' Building 03	27/11/14
MP 24.08 Revision P	Soil Section 08-08'	27/11/14
MP 24.09 Revision P	Soil Section 09-09'	27/11/14
MP 24.10 Revision P	Soil Section 10-10'	27/11/14
MP 25.00 Revision P	Avon Road Elevation Impression	27/11/14
MP 26.01 Revision P	Concept Plan Shadow Diagram Jun 21 9AM	27/11/14
MP 26.02 Revision P	Concept Plan Shadow Diagram Jun 21 10AM	27/11/14
MP 26.03 Revision P	Concept Plan Shadow Diagram Jun 21 11AM	27/11/14

MP 26.04 Revision P	Concept Plan Shadow Diagram Jun 21 12PM	27/11/14
MP 26.05 Revision P	Concept Plan Shadow Diagram Jun 21 1PM	27/11/14
MP 26.06 Revision P	Concept Plan Shadow Diagram Jun 21 2PM	27/11/14
MP 26.07 Revision P	Concept Plan Shadow Diagram Jun 21 3PM	27/11/14
MP 27.01 Revision P	View from the Sun 9.00AM 21 Jun	27/11/14
MP 27.02 Revision P	View from the Sun 9.30AM 21 Jun	27/11/14
MP 27.03 Revision P	View from the Sun 10.00AM 21 Jun	27/11/14
MP 27.04 Revision P	View from the Sun 10.30AM 21 Jun	27/11/14
MP 27.05 Revision P	View from the Sun 11.00AM 21 Jun	27/11/14
MP 27.06 Revision P	View from the Sun 11.30AM 21 Jun	27/11/14
MP 27.07 Revision P	View from the Sun 12.00PM 21 Jun	27/11/14
MP 27.08 Revision P	View from the Sun 12.30PM 21 Jun	27/11/14
MP 27.09 Revision P	View from the Sun 1.00PM 21 Jun	27/11/14
MP 27.10 Revision P	View from the Sun 1.30PM 21 Jun	27/11/14
MP 27.11 Revision P	View from the Sun 2.00PM 21 Jun	27/11/14
MP 27.12 Revision P	View from the Sun 2.30PM 21 Jun	27/11/14
MP 27.13 Revision P	View from the Sun 3.00PM 21 Jun	27/11/14
MP 28.01 Revision P	Photomontage Overview	27/11/14
MP 28.02 Revision P	Photomontage Avon Road M1	27/11/14
MP 28.03 Revision P	Photomontage Avon Road M2	27/11/14
MP 28.04 Revision P	Photomontage Neighbouring Sites View 6	27/11/14
MP 28.05 Revision P	Photomontage Neighbouring Sites View 7	27/11/14
MP 28.06 Revision P	Photomontage Neighbouring Sites View 11	27/11/14
MP 28.07 Revision P	Photomontage Neighbouring Sites View 12	27/11/14
MP 28.08 Revision P	Photomontage Neighbouring Sites View 14	27/11/14
MP 29.01 Revision P	GFA Plan Building 1	27/11/14
MP 29.02 Revision P	GFA Plan Building 3	27/11/14
MP 29.03 Revision P	GFA Plan Building 4	27/11/14
MP 29.04 Revision P	GFA Plan Heritage Building	27/11/14
MP30.01 Revision P	Material Board	27/11/14
Issue 141127 Refer Plans Issue P	GFA Development Data Sheet	27/11/14
Issue 141127 Refer Plans Issue P	Apartment Size & Mix Development Data Sheet	27/11/14

Landscape Plans Prepared by Site Image (NSW) Pty Ltd		
MP-000 Issue V (Job Number SS12-2482)	Coversheet	13/11/14
MP-001 Issue V (Job Number SS12-2482)	Landscape Masterplan	13/11/14
MP-002 Issue T (Job Number SS12-2482)	Tree Removal & Retention Plan	13/11/14
MP-003 Issue V (Job Number SS12-2482)	Landscape Zones	13/11/14
MP-006 Issue H (Job Number SS12-2482)	Tree Protection Plan	13/11/14
MP-C100 Issue T (Job Number SS12-2482)	Landscape Masterplan Colour	13/11/14
NPC Management Consultants and Project Managers		
Drawing No. 1 of 1, Issue D, DA Issue V4	Proposed Stormwater Drainage Concept Plan (SDCP)	21/10/14
Traffix Traffic and Transport Planners		
TX.00 (Project 14.243)	Proposed Footpath	17/07/14
TX.01 Revision B (Project 14.243)	Proposed Footpath	17/07/14
TX.02 (Project 14.243)	Proposed Footpath	17/07/14
TX.03 (Project 14.243)	Proposed Footpath	17/07/14
TX.04 (Project 14.243)	Proposed Footpath	17/07/14
TX.05 (Project 14.243)	Proposed Footpath	17/07/14

except as modified by the following conditions in Part B Modifications pursuant to Section 75O(4) of the Act and the conditions below.

Inconsistencies Between Documentation

A3 In the event of any inconsistency between modifications of the Concept Plan approval identified in this approval and the drawings / documents including the Statement of Commitments referred to above, the modifications of the Concept Plan shall prevail. To the extent of inconsistency between documents, the later document shall prevail.

Building Envelopes

A4 Building footprints and setbacks are to be generally consistent with the Building Position Plan Drawing MP21.06, Revision P, dated 27 November 2014.

Building height

A5 Building heights are to be consistent with the RLs shown on MP 22.16 Indicative Design Floor Plan Level Roof, Revision P, dated 27 November 2014 subject to condition B12.

Maximum FSR

A6 The maximum FSR for development on the site shall not exceed 0.66:1 (excluding the GFA of 1 Avon Rd). The FSR is to be calculated on a site area of 24,643m^2.

Maximum GFA (residential flat building use)

A7 The maximum GFA for the development shall not exceed 15,136m2 GFA for residential flat building use (excluding the GFA of the heritage building at 1 Avon Rd).

Maximum Number of Residential Units and Car Spaces (residential flat building use)

A8 This approval is for 187 dwellings in the residential flat buildings and up to 257 car spaces. However, the dwelling numbers may vary by up to 10% subject to there being:

a. No increase in the GFA for the residential flat buildings of 15,136m^2 (excluding the GFA of the heritage building at 1 Avon Road); and
b. No increase in the number of parking spaces (257 spaces); and
c. No increase in the approved basement footprint.

Maximum GFA and FSR (single dwelling building footprints)

A9 The maximum GFA for the development shall not exceed 1,151m2 GFA for the single dwelling building footprints for the residential subdivision or the following FSR for each individual dwelling:

a. Lot 1 – 0.3:1
b. Lot 2 – 0.3:1
c. Lot 3 – 0.3:1; and
d. Lot 4 – 0.2:1

Any unrealised GFA for any or all of these lots may not be transferred to the Residential Flat Building Use.

Lapsing of Approval

A10 Approval of the Concept Plan shall lapse 5 years after the determination date shown on this Instrument of Approval, unless an application is submitted to carry out a project or development for which concept approval has been given.

Unit Mix

A11 A range of apartment sizes and types (studio, one, two and three bedrooms) must be included within the residential flat buildings as required by Ku-ring-gai Local Centres Development Control Plan 2013 Volume A Part 7 clause 7C.6.

(a) a minimum of 60% of apartments within each building are capable of being naturally cross ventilated including through consideration of methods such as ventilation chimneys, through apartments and corner apartments; and

(b) a minimum of 70% of apartments within each building receive a minimum of 3 hours solar access to living areas and balconies mid winter.

ESD

7. Future Development Applications or Project Applications shall demonstrate the incorporation of ESD principles in the design, construction and ongoing operation phases of the development.

Section 94 Contributions

8. Future Development Applications or Project Applications shall be required to pay development contributions to the Council towards the provision or improvement of public amenities and services. The amount of the contribution shall be determined by Council in accordance with the requirements of the Contributions Plan current at the time of approval of the Future Development Applications or Project Applications, including any applicable credits.

Adaptable Housing

9. Future Development Applications or Project Applications shall provide a minimum of 10% of apartments as adaptable housing in accordance with Australian Standard 4299-1995.

Roads and Maritime Services Requirements

10. Future Development Applications or Project Applications shall be accompanied by a detailed Construction Traffic Management Plan (CTMP) detailing the various construction stagings and, for each stage, identifying the truck access routes, expected number of trucks per day by truck size, hours of operation, site access arrangements, parking arrangements for construction workers and proposed traffic and pedestrian control measures. The CPTMP shall prevent all truck activity by vehicles larger than a 6.4m MRV between 8am and 9.30am and 2.30pm and 4pm on weekdays (the school peaks) during school terms and such other times required by the Council. The CPTMP shall be forwarded to Council for approval and the RMS for review and any Road Occupancy License applications required shall be obtained from RMS.

Bushfire Safety Requirements

11. Future Development Applications or Project Applications shall demonstrate compliance with the recommendations set out in the Amended Bushfire Protection Assessment prepared by Australian Bushfire Protection Planners Pty Ltd dated 18 September 2014.

12. Future Development Applications or Project Applications shall address the bushfire risk associated with the proximity of the conservation area to the dwelling at No. 1 Arilla Road.

13. Future Development Applications or Project Applications shall demonstrate compliance with the requirements of the Rural Fire Service as detailed in its correspondence dated 14 February 2013.

RailCorp Requirements

14. Future Development Applications or Project Applications shall demonstrate compliance with the requirements set out in Attachment A of RailCorp's correspondence dated 15 March 2013.

Sydney Water Requirements

15. Future Development Applications or Project Applications shall address Sydney Water's requirements in relation to:

    (a) required amplification works to existing drinking water mains (if required);
    (b) any required amplification works to the wastewater system; and
    (c) application for Section 73 certificates as necessary.

Contamination

16. Future Development Applications or Project Applications shall provide evidence that the site is suitable for the intended residential use and include the following:

    (a) further site investigations that includes sampling and analysis after the vegetation (weeds and noxious plants) has been cleared undertaken in accordance with the recommendations of the Stage 1 Environmental Assessment prepared by Environmental Investigation Services dated December 2012;
    (b) a waste classification is assigned to any fill material that is excavated for off-site disposal; and
    (c) a Hazardous Building Materials Survey of the existing buildings and structures on the site is undertaken prior to demolition.

17. In the event that any significant contamination is encountered, a Remedial Action Plan (RAP) will be required

Design of Future Dwellings on Housing Lots

18. Future dwelling houses on the housing lots are to be designed to comply with Ku-ring-gai Local Centres Development Control Plan 2013 Part 4.

Exterior finishes and material

19. The design of the residential flat buildings is to incorporate a mix of materials. The exterior or buildings must be high quality and comprised of durable materials and finishes. Large, unbroken expanses of any single material and finish should be avoided. The use of high reflective materials should also be avoided. The exterior finish material must be integral to the overall building façade and must not appear as cosmetic. Lightweight materials and finishes should be used on the upper levels to assist in minimising bulk and scale.

20. The selection of a colour scheme for the residential flat buildings must comply with the following:

    (a) Base colours for major areas of the façade are to be light in tone and hue;
    (b) Highlight colours to details of the building are to contrast with the base colour;
    (c) Trim colours for window frames and awning fascias are to be darker contrast to base and highlight colours;
    (d) Natural earth tones are to be used on building facades in close proximity to bushland.

Heritage Management Document

21. A Heritage Management Document is to be prepared and submitted to Council/Minister for approval in accordance with Clause 5.1(10) of the Ku-ring-gai Local Centres LEP 2012 when the first Project Application or Development Application is lodged. The document is to address conservation issues relevant to the adaptation of 1 Avon Rd to community uses and must include detail of the proposed use of the community building.

Water Sensitive Urban Design

22. Future Development Applications or Project Applications shall be generally in accordance with:

    (a) the approved Stormwater Concept Plan prepared by NPC Management Consultants and Project Managers and dated 21 October 2014; and

    (b) the Water Sensitive Urban Design principles as outlined in Ku-ring-gai Local Centres Development Control Plan 2013, Volume C, Part 4.

Arborist impact assessment and Tree Protection Plan

23. As part of any future Development Applications or Project Applications an arborist impact assessment shall be undertaken and tree protection plan developed by an arborist with a minimum qualification AQF 5.

    Trees assessed are those trees to be retained within the subject site and those trees on adjacent sites whose tree protection zones are impacted by the proposed works. The plan shall include an inventory of all trees on and adjacent the site and whether proposed to be retained or removed, and a plan to scale of 1:100 clearly indicating all of these trees. The assessment shall be undertaken to establish likely impacts on these trees from the proposed works including construction access impacts and to ensure that the proposed works and site management plans are amended to ensure the viability of trees retained.

    A tree protection plan shall be developed to ensure the ongoing protection of retained trees during construction works.

    The tree protection plan shall document the trees to be retained and include specifications for and specific locations of fencing, ground protection and the like. The plan shall indicate the specific stages of inspections of works, by the project arborist. Both the assessment and protection plan shall be undertaken consistent with AS4970-2009 Protection of Trees on Development Sites. The plan shall also include the protection of trees during the various stages of construction within the conservation area.

Landscape Plans

24. As part of any future Development Applications or Project Applications for this site, a suitably qualified landscape architect is to prepare and submit to Council/Minister, detailed landscape plans to comply with Council's Development Application Guide, relevant development control plans, approved VMP and the approved Landscape Architect Design Report and plans (referred to in condition A2) and these conditions of approval.

    In addition the following issue is to be addressed by the detailed landscape plans:

    a. A marker tree or trees of advanced, 100 litre size Hoop Pine (*Araucaria cunninghamii*) be planted to replace the Bunya Pines removed at the corner of Avon Rd.

Staging of VMP and Landscaping Works

25. As part of any future Development Applications or Project Applications, a further plan is to be provided to the Council/Minister to confirm commencement of the VMP works and landscape works as part of early works in the areas adjacent to No. 7 and 15 Avon Road and No 1 Arilla Avenue, and specifically to demonstrate:

    a. Early planting of screen tree species to No. 7 boundary as shown on the detailed landscape plans; and

    b. Staged removal of Privet plants within the first 18 months to assist temporary visual screening of the development from these three adjoining residences, while new plantings are establishing.

Relocation of driveway to Building 1

26. At the time of the preparation of a Development Application or Project Application for Building 1, consideration is to be given to whether the access driveway could be relocated to the north and/or made perpendicular to Avon Road with a view to reducing amenity impacts on No 7 Avon Road and whether the mechanical garage door can be setback from the facade of Building 1.

End of Schedule 3

PART B - MODIFICATIONS

Rehabilitation and maintenance of the Blue Gum High Forest

B1. The building footprint for House 4 is not to extend into the 10 m wide Asset Protection Zone/Buffer Zone to the Conservation Area.

B2. The impact of the stormwater management works on Blue Gum High Forest Trees 39 and 201 is to be assessed by a suitably qualified arborist. The works are to be modified if necessary to ensure that these trees are not significantly affected.

B3. The Blue Gum High Forest Conservation Area and Buffer Zone/Asset Protection Zone in the multi-unit residential development area are to be protected on title in perpetuity. The unit owners will be required to manage the Conservation Area and Buffer Zone in accordance with the approved vegetation, stormwater and fire management plans. An annual levy will be imposed on each unit to fund these management obligations. The Owners Corporation will set, collect and spend the levies, both for regular maintenance and monitoring, and for any additional works that may be required from time to time. There is to be no alienation of Conservation Area land for purposes inconsistent with conservation of Blue Gum High Forest. There is to be no clearing of Blue Gum High Forest trees or vegetation for bushfire protection except as required under the approved fire management plan (i.e. no additional clearing under the 10/50 Vegetation Clearing Code).

B4. Blue Gum High Forest Trees 23 and 24 are to be retained in House Blocks 2 and 3, respectively, and are to be protected on title. There are to be no soil level changes within the Tree Protection Zones (TPZs) of the two trees. Construction work within the TPZs is to be restricted to less than 10% of each TPZ, except for decking or other suspended structures. The trees are not to be removed under the 10/50 Vegetation Clearing Code.

B5. A 10 m wide strip along the eastern boundaries of House Blocks 2, 3 and 4 is be managed as both an Asset Protection Zone (Inner Protection Area) for bushfire protection, and a Buffer Zone to the adjoining Blue Gum High Forest Conservation Area (i.e. plants growing within the Buffer Zone are to be Blue Gum High Forest species derived from material of known local provenance). No houses are to be constructed within the Asset Protection Zone. There is to be a restriction on the titles of House Blocks 2, 3 and 4 to ensure appropriate management of the Asset Protection Zone/Buffer Zone in perpetuity.

B6. The Vegetation Management Plan dated 19 September 2014 is to be modified as follows:

p.6 - Add a paragraph stating that although the vegetation in the gully does not currently meet the criteria for recognition as Blue Gum High Forest under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, it may meet those criteria if successfully rehabilitated, i.e. the Conservation Area has potential high conservation significance at national level as well as state level.

p.11 - 2nd dot point – Reword as 'No communities listed under the EPBC Act were recorded because of extensive weed occurrence. Single isolated trees or stands of trees, characteristic of the canopy of Blue Gum High Forest of the Sydney Basin Bioregion, without a native understorey are not included in the

Commonwealth listing. However, successful weed control and restoration of a native understorey may mean that the vegetation may in future correspond to BGHF as listed under the EPBC Act.'

p.19 - Section 4.2 – Expand to include the size of the Conservation Area (0.899 ha) and the Buffer Zone (0.2918 ha, not including the western Buffer Zone in House Blocks 2, 3 and 4). Outline the management arrangements for the western Buffer Zone and how these will be coordinated with management of the Conservation Area and the eastern Buffer Zone.

p.19 - Management objectives – Rewrite Objective 2 so that it is clear that the primary purpose of the ephemeral ponds is for stormwater management (including protection of water quality) and that they have incidental value as fauna/gully habitat. Reorder the objectives so that Objective 3 is weed control, Objective 4 is stimulation of natural regeneration, and Objective 5 is enhancement through revegetation and planting. Adjust the remainder of the Vegetation Management Plan accordingly.

p.20 - 8th dot point in first set of dot points – Clarify by rewording as 'Trees or tree groups to be retained in the Buffer Zone are to be ….'

p.20 - 1st dot point in second set of dot points – Clarify by rewording as 'All earthworks in the Conservation Area and Buffer Zone are to be ….'

p.23 - Section 4.3.2 heading – Delete '(fauna habitat and flight paths)'.

p.24 - Ephemeral ponds section – Refer to the Stormwater Management Plan that provides the design for the works.

p.25 - Section 4.3.4 – Add an introductory paragraph stating that assisted natural regeneration is the preferred means for restoring Blue Gum High Forest wherever possible, but that supplementary plantings are likely to be necessary in this highly degraded site for effective restoration of the community.

p.27 - 1st dot point under revegetation of bare ground – A wider range of species is to be planted, not just ferns and *Dichondra*. Use the list of species in the 1st paragraph at the top of p.27 as a guide for these plantings.

p.35 - After paragraph 12 of the Final Determination, list other relevant key threatening processes involving weeds, namely invasion by African Olive, invasion by *Chrysanthemoides monilifera*, and invasion by escaped garden plants.

p.37 - 3rd dot point – Clarify by rewording as 'Trees or tree groups to be retained are to be ….'

Table 1 - Add a statement at the top of the table that the tree height data are estimates and may be subject to error.

Table 4, p.1 - Delete '(fauna habitat and flight paths)' after Objective 2.

Table 4, p.2, 3rd target - Change target to 'All new residents made aware of environmental significance of site'.

Table 4, p.3, 5th target - Change target to 'Remove at least 95% of primary weed cover'.

Table 4, p.4, 1st target - Change target to 'All vehicles and machinery cleaned and inspected before entering site'. Don't restrict it to the first two weeks of construction.

Table 4, p.4, 2nd target - Change target to 'Remove at least 95% of secondary weed cover'.

Table 4, p.5, 5th target - Change target to '<5% total projected foliage weed cover in the Conservation Area and Buffer Zone'.

Table 4, p.6, 2nd target - Change target to 'Recruitment of at least 1 canopy tree per 20 m x 20 m area'.

Appendix 3, Assessment of Significance – Correct all descriptions of the impact of the proposal. There are 59 local native trees or possible local native trees (some may be plantings) on the subject site. These include 53 eucalypts (44 *Eucalyptus saligna*, 6 *E. pilularis*, 2 *E. paniculata* and 1 *Angophora floribunda*) and 6 other trees (3 *Acmena smithii*, 2 *Ficus rubiginosa* and 1 *Pittosporum undulatum*). Seven of the 59 trees will be removed, including 4 *Eucalyptus saligna* trees (Trees 49, 175, 180 and 343), 1 *Ficus rubiginosa* tree (Tree 328) and 2 *Acmena smithii* trees (Trees 327a and 329). The *Ficus rubiginosa* tree is in poor condition and growing on an old dead tree; the two *Acmena smithii* trees are possible plantings of unknown provenance; and *Eucalyptus saligna* Tree 49 has apparently been poisoned and is suffering severe dieback. Include this information in the assessment.

Appendix 3, Assessment of Significance, p.3, Section 3.2, last paragraph – Rewrite to say that 7 of the 59 local native trees or possible local native trees on the subject site will be removed, which is a loss of 11.9% of those trees. Four of the 53 canopy trees (eucalypts) will be removed, which is a loss of 7.5%. These losses are greater than the acceptable maximum limit loss of 5% of a Blue Gum High Forest stand discussed in Court evidence by Dr Smith. However, they are not considered a significant impact in this case because of the poor condition or doubtful provenance of 4 of the 7 trees to be removed, and the proposed restoration and long-term management of this highly degraded stand. Include a commitment here and in the main part of the Vegetation Management Plan to compensate for the loss of the *Ficus rubiginosa* and *Acmena smithii* trees by replacement plantings of these two species in the Conservation Area using material of known local provenance.

Access and parking

B7. Bicycle Parking
Bicycle storage is to be provided in accordance with Marchese Partners Drawing MP22.06 Revision P, with two bicycle spaces to be provided within each of the boxes shown on this plan. The design of the bicycle storage is to conform to AS2890.3. The minimum number of bicycle storage spaces is to comply with Ku-ring-gai Local Centres Development Control Plan 2013.

B8. Car Parking
A maximum of 257 car parking spaces is to be provided for the residential flat buildings and contained within the approved basement footprint. In all other respects,

SCHEDULE 3

FUTURE ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Built Form: Utility Infrastructure

1. Future Development Applications or Project Applications shall provide for utility infrastructure, including substations, within the building footprint, wherever possible. If this is not possible, infrastructure shall be located outside of the public domain and appropriately screened.

Vegetation Management

2. Future Development Applications or Project Applications shall be accompanied by assessment by an environmental auditor as to the costing for the delivery of the Vegetation Management Plan dated 19 September 2014 (VMP) to practical completion of revegetation / rehabilitation works and ongoing monitoring, maintenance and reporting, including the calculation of the annual cost of the VMP delivery.

3. Future Development Applications or Project Applications shall demonstrate that appropriate measures are in place for the delivery of the VMP to practical completion of revegetation / rehabilitation works and ongoing monitoring, maintenance and reporting, including:

   (a) an establishment fund calculated at whatever percentage of the anticipated costs of the delivery of the VMP is required to ensure that sufficient funds are available to meet those costs as and when they arise; and

   (b) an annual charge to be levied only if necessary so that sufficient funds are available to fund the delivery of the VMP to practical completion.

4. Future Development Applications or Project Applications for subdivision of the site shall ensure that adequate arrangements are in place for the ongoing monitoring and management of the Conservation Area as identified by the Landscape Masterplan and specified in the VMP, including:

   (a) The appointment of an environment manager to implement the VMP;

   (b) The arrangements for scheduled monitoring, maintenance and reporting to the Council relating to the time periods of Month 1, Month 3, Month 6 and Month 12 and then annually for the life of the proposed development.

Public Positive Covenant for the BGHF Conservation Area

5. Prior to the determination of any future Development Applications or Project Applications, the proponent shall cause to be registered against the titles of the BGHF Conservation Area as shown in Figures 1A and 2G of the VMP a public positive covenant and/or restriction on the use of the land, in favour of the Council, requiring the Proponent to implement and observe the conditions of this approval and the VMP in relation to that land.

   The public positive covenant shall remain in force in perpetuity.

Residential Amenity

6. Future Development Applications or Project Applications shall demonstrate compliance with the provisions of the *State Environmental Planning Policy 65 – Design Quality of Residential Flat Development* (SEPP 65) and the accompanying *Residential Flat Design Code 2002* (RFDC) (except where modified by this Concept Plan approval), including demonstrating that:

SCHEDULE 4

PROPONENT'S STATEMENT OF COMMITMENTS

REFERENCE	COMMITMENT
Contributions	▪ Section 94 Contributions will be paid in accordance with Council's Contributions Plan. Contributions will be calculated at Development Application or Project Application stage and paid prior to the issue of construction certificates. These contributions will be paid in addition to commitments to off-site improvement works to the Avon Road footpaths and the Pacific Highway pedestrian underpass.
Erosion of Sediment Control	▪ An Earthworks Management Plan, including Erosion and Sedimentation Plans will accompany each Development Application.
Waste	▪ A Waste Management Plan relating to demolition, construction and operation will be prepared for each of the proposed buildings in the Concept Plan and lodged at Development Application stage. A proposed operational Waste Management Plan for the Buildings is at Appendix Q of the Second Further Revised Preferred Project Report.
Water and Utilities	▪ Water, electricity and gas will comply with Section 4.1.3 of Planning for Bush Fire Protection 2006. <u>Electricity</u> ▪ Where practical and reasonable, electrical transmission lines are to be underground. ▪ Where overhead electrical transmission lines are proposed: ▪ Lines are installed with short pole spacing (30m) unless crossing gullies and gorges and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002) <u>Gas</u> ▪ Reticulated or bottled gas is installed and maintained in accordance with AS1596 and the requirements of relevant authorities. Metal piping is to be used. ▪ All fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. ▪ If gas cylinders need to be kept close to building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. ▪ Connections to and from gas cylinders are metal. ▪ Polymer sheathed flexible gas supply lines to gas metres adjacent to buildings are not used.
Bushfire	▪ Future Development Applications or Project Applications will implement the relevant recommendations of the Bushfire Report prepared by Australian Bushfire Protection Planners (Appendix J of the Second Further Revised Preferred Project Report) as follows: ▪ The design and maintenance of the landscaped gardens to the

	complex, including the 10.00 metre wide buffer zone to Buildings 3, 4 & 5, will comply with the prescriptions of an Inner Protection Area [IPA] pursuant to the specifications of Appendix 5 of Planning for Bushfire Protection 2006 and the NSW Rural Fire Services document 'Specifications for Asset Protection Zones'. ▪ Buildings will be constructed to comply with BAL 29 specifications pursuant to A.S. 3959 - 2009 - 'Construction of Buildings in Bushfire Prone Areas'. ▪ A hydrant booster assembly will be provided inside the boundary and adjacent to the entry driveway off Beechworth Road prior to occupation of Building 5. ▪ The minimum pavement width of the internal driveways will be 6.5 metres. Corners will be designed to permit a Fire & Rescue Urban Pumper [Heavy Rigid Vehicle] and a B9 vehicle to pass and turning facilities will be provided to enable fire appliance egress from the site in a forward direction.
Heritage	The following heritage requirements will be incorporated into Future Development Applications or Project Applications: ▪ Nos. 3 and 5 Avon Road will be recorded prior to demolition, following the guidelines of the NSW Office of Environment and Heritage (Heritage Office) for archival recording. A copy of the archival recording being deposited into Ku-ring-gai's Local Library. ▪ 1 Avon Road: The following items will be preserved and integrated as far as possible into the new development: ▪ The eastern inter war dry laid sandstone boundary wall together with the small fountain (at the southern end of the site near the entry gates) ▪ The front sandstone fence (repaired as necessary),vehicle and pedestrian and gate posts. ▪ Salvage all sandstone building blocks and paving and reuse within the new development. ▪ The two mature palm trees in the front yard of 5 Avon Road, adjacent to Avon Road, will be preserved and integrated into the new development. ▪ An Interpretation Strategy will be prepared for the development that incorporates the history and images of Nos. 3 and 5 Avon Road. The interpretation will be able to be viewed in public areas of the development.

End of Schedule 4

Appendix 2. Company Profile, Brief CVs of Key Personnel

ANNE CLEMENTS & ASSOCIATES PTY. LIMITED
(ABN 41 077 242 365, ACN 077-160-939)
Environmental and Botanical Consultants
PO Box 1623, North Sydney 2059
Phone: (02) 9955 9733, Facsimile: (02) 9957 4343
Email: mail@acabotanic.com

April 2014

Anne Clements & Associates is a group of botanists, ecologists and restoration ecologists who specialise in botanical conservation assessment, as well as developing and implementing optimal conservation strategies. The company has more than 25 years of experience in:

- flora surveys of a wide range of ecosystems;
- flora assessments;
- assessments of impacts;
- vegetation plans of management;
- the implementation of rehabilitation/conservation programs as part of sustainable development of sites; and
- environmental management of development sites.

The company works closely with community groups, fauna consultants, town planners, geologists, engineers, lawyers, land developers and mining companies in planning and implementing optimal conservation strategies as part of sustainable development of sites.

Four of the company's environmental managed sites have won excellence awards for their quality and innovations, including "Excellence of Excellence" in 2000, Gold and Silver in NSW Rivercare 2000, Silver and Excellence in NSW Mineral Resources Excellence Awards and Excellence in the Earthmovers Awards, 2006 Environment Award for Australian Property Industry and 2007 International Green Apple Award.

Brief CVs

The group provides a broad variety of skills and a high level of experience:

Dr AnneMarie Clements
Senior restoration ecologist with M.Sc. (Macquarie Univ.) Thesis - *The vegetation of bushland in the northern Sydney area* and a Ph.D. (Univ. of Sydney) Thesis - *The vegetation of the sand masses of the mid-north coast of New South Wales*. She has more than 25 years experience.

Her major research interests include the re-establishment of native ecosystems, impacts of urban development on vegetation and soil, pattern analysis, effects of inundation and salinity on the plant communities, metal concentrations on plant growth and bioaccumulation. She has utilised her research in designing and implementing rehabilitation / conservation programs as part of sustainable developments.

Anne is a specialist Certified Environmental Practitioner under the Environmental Institute of Australia and New Zealand CEnvP Program and has been a member of the CEnvP NSW certification panel. She is a certified BioBank Assessor.

Dan Clarke
Botanist with a B. Sc (Hons 1) in Plant Science and Biology (University of Sydney). Daniel has more than 15 years experience in plant identification and bushland regeneration. He has remained actively involved in bushland conservation in the Sydney basin, both in a supervisory and volunteer capacity, as well as in TAFE NSW teaching. In 2009, he completed the Plant Science Internship Programme run by the National Herbarium of New South Wales.

Since joining Anne Clements & Associates in 2011, Daniel has managed vegetation projects involving vegetation mapping, assessments of significance of development proposals, species impacts statements and restoration ecology. Dan has an excellent working knowledge of native plant taxonomy and vegetation communities.

Dr Anne Baumann
Ecologist with a PhD in Agricultural Science (University of Sydney) Thesis - "Recruitment of *Melaleuca quinquenervia* in the Myall Lakes district". She is also a graduate of the 2009 National Herbarium of NSW Plant Science Internship. Anne has an honours degree in Agricultural Science, holds certificates in Aboriculture and Conservation and Land Management. Previous positions include the Australian Quarantine Inspection Service, NSW Office of Environment and Heritage and Woollahra Council. Anne also has experience in the bushland regeneration industry having worked in both the field and administration.

Since joining Anne Clements & Associates in 2012, Anne has worked on projects involving vegetation surveys and flora assessments, assessments of significance of development proposals, species impacts statements and GIS mapping.

Rosemary Snowdon
Rosemary holds a M.Sc. (University of Sydney) Thesis: "The Geochemistry of Soils in the IronCove Catchment"; a Graduate Diploma of Environmental Science (Sydney University) and a B.Sc. majoring in Environmental Geography and Plant Ecology (Sydney University). Previous positions include five years as an Environmental Scientist for Sydney Water, four years as an Environmental Scientist (water quality) at Hornsby Shire Council, one year as an Environmental Officer with the NSW Roads and Traffic Authority, four years as an Environmental Scientist with Anne Clements & Associates and one year as a data analyst at MapInfo Australia.

Tony Rodd
Taxonomic botanist with B.Sc. (University of Sydney) with extensive experience in plant identification. Tony was the Horticultural Botanist at the Royal Botanic Gardens, Sydney for 13 years (1970-82). After leaving the Gardens, he continued as an occasional consultant, including preparation of interpretative material and collection of plants from the wild for the living collections at the Mount Annan and Mount Tomah Botanic Gardens. He has also worked extensively with book publishers, most recently in the role of Chief Consultant for *Botanica* (Random House 1997) and *Flora* (Timber Press / ABC Gardening Australia 2003), and co-author of *Trees: a visual guide* (Weldon Owen 2008). He has a long-standing interest in the taxonomy of Australian palms and has had a major revision of the palm genus *Livistona* published in the journal *Telopea*. For more than 15 years, he has worked with Anne Clements & Associates on many flora surveys and rehabilitation projects.

Dane Brennan
Dane holds a B.Env.Sc. (University of Western Sydney). He has previously worked for an international resort company, as manager of the circus program, as well as performing. Dane has worked as a research assistant with the School of Science and Health, University of Western Sydney on native grass regeneration experiments. Since joining Anne Clements & Associates, Dane has been involved in vegetation surveys, relational database management and GIS mapping.

Major projects undertaken by Anne Clements and Associates Pty Limited

Saltmarsh restoration adjoining Parramatta River, Ermington
Client: Thiess Constructions (2006)
Key personnel: Dr AnneMarie Clements, Tony Rodd.

This project focused on the rehabilitation and conservation of the expanded saltmarsh, including the population of threatened species *Wilsonia backhousei* adjoining the Parramatta River, Ermington, to sustain the long-term viability of saltmarsh within NSW.

The work undertaken for this project included:

- Flora assessment of the saltmarsh.
- Determining the extent and frequency of natural inundation by saline tidal waters.
- Identification of potential rehabilitation resources.
- Coordinated design with engineers of the dual seawall enclosing the enlarged area of saltmarsh that allows for tidal inundation (which is enhanced by RiverCat wake), as well as, protecting the development area from erosive river action.
- Supervision of earthworks.
- Translocation of saltmarsh using excavator bucket and bobcat mounted tree spade, as well as, hand transplants of saltmarsh species, including the threatened *Wilsonia backhousei*.
- Supervision of bush regeneration.
- Monitoring success.
- Presentation of results to local community and at professional conferences.

Highly eroded river bank, June 2005


Regenerating saltmarsh, May 2006

Environmental Management for Magenta Shores Tourist Facility, NSW Central Coast (2005-2009
Client: Mirvac
Key personnel: Dr AnneMarie Clements, Dr Pamela Hazelton, Tony Rodd, Catherine Inwood, Christy Woolcock, Polly Simmonds and Dr Anne-Laure Markovina

Environmental Management of the coastal sand ecosystems, especially of the coastal dunes and the Littoral Rainforest containing the endangered species *Syzygium paniculatum*, as part of the ecological sustainable development of this former sand mined site. The project included:

- Increasing the natural resilience of dune ecosystems by substituting natural processes on a 2.3 km length of reconstructed/rehabilitated beach dune ecosystem, covering about 50 ha, as well as, restoration of Littoral Rainforest.
- Researching, designing and implementing the Habitat Restoration Plan, in addition to, vegetation and fungi surveys.
- Dune restoration works in the Coastal Protection Zone directed to increase protection of the development resources from major coastal storms and winds. Stabilised sand volume was increased by developing a mesh of soil fungal hyphae, providing natural carbon sources. Re-colonisation by sand trapping native flora, fungi and a decrease in the presence of exotic species was achieved.
- Re-use of the noxious weed Bitou Bush from the coastal dunes as an organic additive to golf course soils.
- Increasing sustainability by using the leachate from the former landfill and the groundwater to irrigate the nutrient demanding golf course, thereby reducing the risk to the adjoining lake system.
- Minimising impacts on the population of *Syzygium paniculatum* (Magenta Lilly Pilly) on and adjacent to the development, and the associated infrastructure, by implementation of a buffer zone and bush regeneration to reduce existing weed threats.
- Careful documentation and monitoring of directed staged works with results publicly available in peer reviewed publications.

Dune reshaping works at Magenta Shores

Wind eroded landform of foredune with Bitou Bush

Reconstructing dune and sediment erosion measures

Replanted foredune

Environmental Management of Settlement Shores, Port Macquarie (2002-2007)
Client: Port Shores Pty Ltd
Key personnel: Dr AnneMarie Clements, Dr Pamela Hazelton, Tony Rodd, Jane Rodd, Rosemary Snowdon

Ensuring environmental compliance for a large residential subdivision developed by Port Shores Pty. Ltd. in Port Macquarie.

The works undertaken for this project includes:

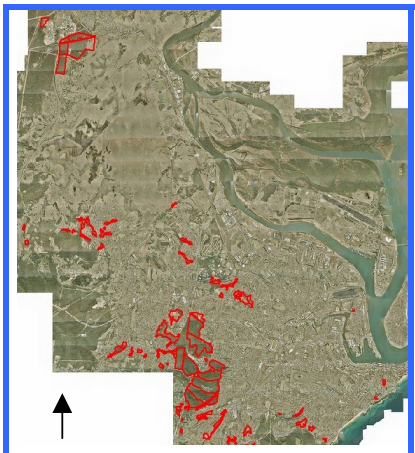
- Environmental Management during the construction phase of the earthworks associated with the development of residential land, embayments and conservation areas to ensure that the off site sensitive estuarine environment was not adversely impacted by discharge of treated acid sulphate waters and sediment movement.
- Designing, supervision and monitoring of constructed estuarine wetland and adjoining *Casuarina* forest and rainforest on former dairy land.
- Designing and supervision of the re-establishment of the natural landform and coastal dune vegetation on a former dredge disposal site with extensive monitoring.
- Long-term monitoring of any changes in sediment movement and vegetation on the nearby wetlands.
- Establishment of seagrass beds within the constructed canals and embayment.
- Ongoing monitoring assessment of water quality within the main canals, the newly constructed embayments and the adjoining river.
- Ensuring compliance with consent conditions, including establishment of conservation offsets areas.

Constructed estuarine wetlands at Settlement Shores, Port Macquarie.
Saltmarsh and mangrove ecosystems were established on excavated former grazing paddocks.

Newcastle Public Bushland Asset Management Plan (2009)
Client: Newcastle City Council
Key personnel: Rebecca Burley, Tony Rodd, Dr AnneMarie Clements

Flora and conservation significance of Newcastle bushland assets were assessed to assist Council in developing a strategy to improve bushland quality in the LGA. Management recommendations were provided to enable Council to target resources. The works for 89 Council selected bushland reserves and parks included:

- Review of previous surveys, published literature and aerial photographs.
- Categorising of areas based on geology, soil landscape mapping, park size, bushland patch size and connectivity to other bushland patches.
- Development of standardised survey methods with data-collection forms for the study and future monitoring.
- Flora assessment using data collected from 209 plots (0.04 ha in size with at least one plot per reserve or park). Data were consistent with the Lower Hunter and Central Coast regional study.
- Providing Council with an updated Newcastle focused database with information added as Geographic Information System layers to the existing Council database.
- Determining the extent of weed invasion through survey and aerial photograph interpretation.
- Development of a strategy to identify and rank bushland in need of assisted regeneration.
- Preparation of a Bushland Asset Management Plan with recommendations for each bushland parcel surveyed.
- Workshop participation, presentations, discussion and collaboration with Council staff.



Bushland reserves and parks surveyed in Newcastle LGA

Survey location in Blackbutt Reserve

Bushland in George McGregor Park on Killingworth Soil Landscape

Appendix 3. Arborist's assessment of Tree 49

The Arborist Network

58 South Creek Road
Shanes Park NSW 2747
Phone: (02) 9835 1234 Fax: (02) 9835 0066
Email: reports@arboristnetwork.com.au

Field Notes For: Anne Clements
Anne Clements and Associates
PO Box 1623
North Sydney

Document Date: 26th May 2014

Site Address: 8 Beechworth Rd
Pymble

File Number: CD1384

Tree Inspected: Eucalyptus saligna (Sydney Blue gum)

A site inspection took place on 11th April 2014. The inspection of the tree was performed from the ground. No invasive or diagnostic testing was undertaken as a part of the inspection.

Observations and discussion

There is a large 3-stemmed Sydney Blue Gum located just to the east of the existing house and towards the southern boundary. The tree was showing signs of significant stress. The majority of the foliage was absent (see Plate 1), with two of the stems appearing almost dead.

Examination of the base of the tree revealed a number of drill holes (see image 2). These were approximately 10mm in diameter and more than 100mm deep. Based on the condition of the tree it would appear almost certain that these drill holes have been used to apply an herbicide, most likely glyphosate.

Plate 1: The tree has lost the majority of its foliage

Plate 2 the screwdriver is in one hole whilst the finger shows another hole

Image 3: Location of the drain pipe, originating from the neighbouring property

In addition, it was noted that a 50 mm diameter drain pipe, originating from the property to the south, was oriented so as to discharge water within a metre or so of the trunk of the tree. Whilst the discharge of the additional water may not have had a significant impact on the tree, it is none the less a cause for concern. In particular, the discharge of water increases the exposure to pollutants and pathogens (such as, *Phytophthora sp*.). Ideally, this pipe should be blocked off and water more appropriately diverted.

Recommendations

1. Liaise with the council and the neighbour to address the issue of water discharge onto the root plate.
2. Monitor the tree over the next 1-2 years and retain any live portions of the tree. Stems are sufficiently healthy can be pruned to keep risk from the tree at an acceptable level.

Arborist: **Mark Hartley**

Senior Consulting Arborist- AQF Level 8
Grad Cert Arboriculture (1st Class Honours)
Dip Hort (Arboriculture) with Distinction
Dip Arboriculture, Dip Horticulture
LMAA; LMISA; LMIPS
ISA Certified Arborist, WC-0624 (since 1990)
Registered Consulting Arborist™ #0001
ISA Tree Risk Assessment Qualified

Appendix 4. Assessment of Significance

3.0 Introduction

The Assessment of Significance was prepared to assess the impact of the proposed development on the critically endangered ecological community *Blue Gum High Forest in the Sydney Basin Bioregion* in Part 2 of Schedule 1 of the *Threatened Species Conservation Act 1995* (NSW).

In paragraph 11 of the Final Determination for *Blue Gum High Forest in the Sydney Basin Bioregion*, it is stated that:

> *11. …. A number of stands of Blue Gum Forests have highly modified understories, in which the native woody component has been largely replaced by woody exotic species or by increased abundance of native and exotic grasses. ….*

In the *Threatened Species Assessment Guidelines: The Assessment of Significance* (DECC 2007), the terms are defined, namely:

Defined terms (page 3 of DECC 2007)	For the assessment of significance
Subject site *is the area directly affected by the proposal.*	The Subject site is approximately 2.5 ha consisting of 1, 1A, 3 and 5 Avon Road, and 4 and 8 Beechworth Road, Pymble
Study area *is 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 potential impacts into account.*	The Study area includes: ▪ Subject site; ▪ adjoining rail corridor ▪ adjoining properties
Direct impacts *are those that directly affect the habitat and individuals. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.*	Removal of 3 out of 52 remnant canopy trees on the Subject site. These remnant canopy trees are characteristic of Blue Gum High Forest.
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*	Include: • effects of stormwater runoff and erosion resulting from the development; • effects of altered hydrology on the Subject site and on adjoining properties and downslope; and • proximity of buildings may result in future removal of larger trees on safety grounds

to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.	
Interpretation of key terms (page 7 of DECC 2007)	
***Local occurrence**: the ecological community that occurs within the study area. However the local occurrence may include adjacent areas if the ecological community on the study area forms part of a larger contiguous area of that ecological community and the movement of individuals and exchange of genetic material across the boundary of the study area can be clearly demonstrated.*	The ecological community that occurs within the Study area is: Blue Gum High Forest, existing as a highly modified relic of the community persisting as small clumps of trees without a native understorey.

3.1 Vegetation of the Subject Site

The local native vegetation component of the Subject site consists of 52 canopy trees, namely 43 *Eucalyptus saligna*, 6 *Eucalyptus pilularis*, 2 *Eucalyptus paniculata* and 1 *Angophora floribunda*.

There are also two understorey trees (1 *Acmena smithii* (17 m tall) and 1 *Pittosporum undulatum* (15 m tall), and some native ferns persisting amongst a dense growth of weeds.

There are three other possible Blue Gum High Forest understorey trees in the landscape area surrounding the existing house on 5 Avon Road, one *Ficus rubiginosa* and two *Acmena smithii.* There is some doubt about whether *Acmena smithii* are remnants of the original vegetation or introduced plantings of unknown provenance (email from Dr Peter Smith to Dr AnneMarie Clements on 4 August 2014). The loss or retention of these understorey trees with unknown provenance has not been considered in this assessment of significance.

The canopy species of the listed community is given in paragraph 5 of the Final Determination, namely:

> *4. … Blue Gum High Forest is dominated by either* Eucalyptus pilularis *(Blackbutt) or* E. saligna *(Sydney Blue Gum).* Angophora costata *(Smooth-barked Apple) is frequently observed in remnants close to the shale/sandstone boundary, but also occurs infrequently on deep shale soils, as does* A. floribunda *(Rough-barked Apple).* Eucalyptus paniculata *(Grey Ironbark) is typically found on upper slopes.*

The dominant weeds are *Ipomoea indica* (Morning Glory), *Lantana camara* (Lantana), *Ligustrum lucidum* (Large-leaf Privet) and *Tradescantia fluminensis* (Wandering Jew).

The native canopy trees are characteristic of the critically endangered ecological community *Blue Gum High Forest in the Sydney Basin Bioregion,* with many exceeding a height of 30 metres. There are no native shrub species growing within the native vegetation component of the Site.

The native canopy trees extend beyond the Site boundary into the rail corridor to the north east of the site and also into some adjacent properties.

3.2 The proposal

The proposal is to:

- construct three apartment blocks (Buildings 1, 3, 4) in the east;
- retain the heritage house in the east; and
- provide four residential lots in the north-west.

Overlaying the surveyed locations of the native canopy trees onto the proposal (Figures 2F-1, 2F-2) indicates that the proposal will result in the loss of 3 of the 52 native canopy trees characteristic of the critically endangered ecological community *Blue Gum High Forest in the Sydney Basin Bioregion*. The three trees affected are *Eucalyptus saligna* (Sydney Blue Gum), with two located in the proposed building footprint of Building No. 3 (Tree numbers 175, 180) and one within the proposed lot 2 (Tree number 343).

All of the BGHF canopy trees being retained are at least 10 m from the proposed excavation for buildings. The impacts of the proposal on the trees closest to the buildings have been assessed by the arborist Peter Castor (Tree Wise Men 2014). The impacts on these trees were found to be acceptable.

The proposed loss of 3 of the 52 native canopy trees characteristic of *Blue Gum High Forest in the Sydney Basin Bioregion* is a loss of 5.8%. The acceptable maximum limit loss of the Blue Gum High Forest community discussed in Court evidence by Dr Smith is considered to be 5%. In paragraph 82 of the Judgement for Murlan Consulting Pty Limited v Ku-ring-gai Council and John Williams Neighbourhood Group Inc [2007] NSWLEC 374, it is stated that:

> *82 The impact of the proposal on the remnant BGHF on the land was determined to be a loss of 17% to a stand of trees …but in oral evidence Dr Smith stated that the loss of BGHF would actually be … . Dr Smith also took the position in oral evidence that acceptable development impacts should not exceed 5% loss of the BGHF community.*

3.3 Assessment of Significance

In the Threatened Species Assessment Guidelines (DECC 2007), it is stated that:

> *Under the Threatened Species Conservation Amendment Act 2002, factors to be considered when determining whether an action, development or activity is likely to significantly affect threatened articles s5A of the Environmental Planning and Assessment Act 1979 (EP&A Act), s94 Threatened Species Conservation Act 1995 and s220zz Fisheries Management Act 1994 (FM Act) have been revised.*

The Assessment of Significance under the TSC Act, known previously as the Eight Part Test, is now known as the Assessment of Significance.

The objective of an Assessment of Significance is to:

> *improve the standard of consideration afforded to threatened species, populations and ecological communities, and their habitats through the planning and assessment process, and to ensure this consideration is*

transparent (Threatened Species Assessment Guidelines, dated August 2007).

The revised factors for the Assessment of Significance maintain the same intent as the Eight Part Test but focus on:

consideration of likely impacts in the context of the local rather than the regional environment as the long-term loss of biodiversity at all levels arises primarily from the accumulation of losses and depletions of populations at a local level.

The Threatened Species Assessment Guidelines (DECC 2007) are to facilitate:
a consistent and systematic approach when determining whether an action, development or activity is likely to significantly affect threatened species, populations or ecological communities, or their habitats in a direct or indirect manner ... Where there is any doubt regarding the likely impacts, or where detailed information is not available, a Species Impact Statement should be prepared.

3.3.1 Assessment of Significance for the critically endangered ecological community Blue Gum High Forest in the Sydney Basin Bioregion

a) In the case of a threatened species, whether the action 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,

Not applicable. *Blue Gum High Forest in the Sydney Basin Bioregion* is a critically endangered ecological community, not a threatened species.

b) In the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Not applicable. *Blue Gum High Forest in the Sydney Basin Bioregion* is a critically endangered ecological community, not an endangered population.

c) 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,

The vegetation component of *Blue Gum High Forest in the Sydney Basin Bioregion* on the Subject site comprises 52 canopy trees with two subcanopy trees and some native ferns persisting under a dense exotic weed growth.

The loss of 3 of the 52 characteristic trees of Blue Gum High Forest is not considered likely to place the community at risk of extinction.

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

The community persisting on the Subject site is reduced to 52 native canopy trees with two subcanopy trees and some ferns persisting under dense exotic weed growth. The loss of 3 of these 52 characteristic trees of Blue Gum High Forest is not considered 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.

d) In relation to the habitat of threatened species, populations or ecological community:

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

The loss of habitat likely to be removed or modified as a result of the action proposed is 6% of the number of characteristic trees of Blue Gum High Forest.

Habitat of Blue Gum High Forest was lost at the time of residential purposes since the 1930s and for the small orchard in the central section of the Subject site prior to 1930.

(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

The existing habitat of the Blue Gum High Forest on the Subject Site is largely restricted to the upper section of the gully in the north and in the west. There are additional characteristic trees of Blue Gum High Forest offsite to the north along the railway line and offsite to the west in adjoining gardens.

The proposal is not likely to result in the fragmentation or isolation of the area of Blue Gum High Forest 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

The canopy trees characteristic of Blue Gum High Forest on the Subject site are part of a larger stand of canopy trees characteristic of this community that extends offsite to the north.

The proposal to remove 3 of the 52 canopy trees is not likely to remove, modify, fragment or isolate the existing Blue Gum High Forest habitat on the Subject site or reduce the long-term survival of the community.

The importance of the small part of the Blue Gum High Forest habitat to be removed in this locality to the long term survival of the ecological community, is not likely to be changed by the proposed action.

e) Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for the Blue Gum High Forest on the Subject site.

From the Register of Critical Habitat in NSW (Office of Environment and Heritage website: http://www.environment.nsw.gov.au/criticalhabitat, accessed 13 October 2012), Critical habitat recommendations (pending finalisation) exist for:

- Bomaderry Zieria within the Bomaderry bushland;
- *Eastern Suburbs Banksia Scrub* Endangered Ecological Community on public exhibition to 18 April 2006;
- *Wollemia nobilis* (the Wollemi Pine) on public exhibition to 9 December 2005.

Critical habitat declarations (final) exist for:

- Gould's Petrel;
- Little penguin population in Sydney's North Harbour;
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve;
- Wollemi Pine.

Therefore, the proposal will not have an adverse effect on critical habitat (either directly or indirectly).

f) Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

There is no recovery plan for *Blue Gum High Forest in the Sydney Basin Bioregion*. It is not specifically targeted in the Cumberland Plain Recovery Plan (DECCW 2010) as only a small proportion of it occurs on the Cumberland Plain.

There are *Best Practise Guidelines for Blue Gum High Forest* (DECC 2008A). No objectives or actions of a recovery plan or threat abatement plan appear to be included.

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.

Key Threatening Process	Comments
Clearing of native vegetation	Hardly applicable to this Proposal, as virtually all vegetation to be cleared, apart from 3 individual trees, is exotic (or non-local natives), including weeds and former garden plantings.
High frequency fire resulting in the disruption of life cycle processes in plants and…loss of vegetation structure and composition	There is no evidence of a high fire frequency in or close to the Subject site. To the contrary, the dominance of exotic species in the understorey appears to have prevented all fire for several decades at least.
Infection of native plants by *Phytophthora cinnamomi*	No evidence of *Phytophthora cinnamomi* infection was observed during the surveys. Risk of introduction during any conservation works needs to be controlled during construction/ landscaping phase.
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic of the family Myrtaceae	No evidence of Myrtle Rust was observed during the surveys. Risk of introduction from nursery stock may need to be addressed, though spread of the pathogen by wind-borne spores is likely to render futile local prevention

Key Threatening Process	Comments
	measures.
Invasion and establishment of exotic vines and scramblers	Exotic vines were recorded during the surveys. The site is currently infested with dense growth of exotic vines, including *Ipomoea indica,* that are proposed for removal.
Invasion, establishment and spread of Lantana (*Lantana camara* L. sens. lat)	*Lantana camara* was recorded during the surveys and is prolific amongst and between native canopy areas. The proposal involves its removal.
Removal of dead wood and dead trees	Standing or fallen trees on the Subject site will be retained in situ unless they pose a safety concern.
Loss of hollow-bearing trees	There is the potential for hollows to exist in the two trees proposed for removal.

The only key threatening process likely to be of relevance to the proposed development is the possible *Loss of hollow-bearing trees,* arising from the proposed removal of three trees of *Eucalyptus saligna* that contain, or are likely to contain, hollows.

In conclusion, the existing *Blue Gum High Forest* onsite was assessed as consisting of 52 native canopy trees characteristic canopy trees with some native ferns persisting amongst dense weed growth.

The proposal will result in removal of 3 characteristic canopy trees (Tree numbers 175, 180, 343, Figures 7A, 7B, 7C 8A). The removal of 3 of the 52 characteristic canopy trees is considered to not likely significantly impact the occurrence of the community on the Subject site. Hence, a Species Impact Statement is not required.

3.4 Ameliorative and compensatory measures

Ameliorative and compensatory measures proposed for the Subject site are to:

- Conserve and enhance the critically endangered ecological community *Blue Gum High Forest in the Sydney Basin Bioregion* on the Subject site as part of the ecological sustainable development (example in Hazelton and Clements 2009, Clements et al. 2010); and
- Implement a vegetation management plan for the onsite conservation areas in consultation with the Council.

The vegetation plan of management is to include:

- clear aims to enhance, conserve and protect the local indigenous plants on the Site, as well as minimising risk to onsite and adjoining bushland during and post construction;
- objectives;
- realistic targets;
- regular monitoring (1, 6, 12 monthly, then yearly) which includes monitoring of any corrective action requests in reports;
- regular reporting (including corrective action requests and re-assessment of targets as required) within one month post monitoring; and
- the bush regeneration works are to be carried out by qualified bush regenerators under the supervision of a bush regenerator/restoration ecologist with at least 5 years experience.

Appendix 5.
The VMP and listed objectives for Clauses 6.3 and 6.4 of the LEP 2012

Clause 6.3 of the LEP 2012
(1) The objective of this clause is to protect, maintain and improve the diversity and condition of native vegetation and habitat, including:

Objectives 1 (a) to (d)		Considered in the VMP
(a)	*protecting biological diversity of native fauna and flora, and*	YES. In VMP
(b)	*protecting the ecological process necessary for their continued existence, and*	YES. In VMP
(c)	*encouraging the recovery of threatened species, communities, population and their habitats, and*	YES. In VMP
(d)	*protecting, restoring and enhancing biodiversity corridors.*	YES. In VMP

(2) This clause applies to land identified as "Areas of Biodiversity Significance" on the Natural Resource-Biodiversity Map .

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

	Consent authority consideration	Considered in the VMP
a.	*the impact of the proposed development on the following:*	
	(i) any native vegetation community,	YES.
	(ii) the habitat of any threatened species, population or ecological community,	YES.
	(iii) any regionally significant species of plant, animal or habitat,	NO. None recorded, State listed community recorded as remnant trees..
	(iv) any biodiversity corridor,	YES.
	(v) any wetland,	No wetland recorded onsite
	(vi) the biodiversity values within any reserve,	Site not connected to a reserve.
	(vii) the stability of the land, and	Topography, climate, geology and soil landscape considered
b.	*any proposed measure to be undertaken to ameliorate any potential adverse environmental impact, and*	YES.
c.	*any opportunity to restore or enhance remnant vegetation, habitat and biodiversity corridors.*	YES. In VMP

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

	Consent authority	Proposal consistent
a.	*is consistent with the objectives of this clause, and*	YES
b.	*is designed, and will be sited and managed, to avoid any potentially adverse environmental impact or, if a potentially adverse environmental impact cannot be avoided:*	

	(i) the development minimises disturbance and adverse impacts on remnant vegetation communities, habitat and threatened species and populations, and	YES.
	(ii) measures have been considered to maintain native vegetation and habitat in parcels of a size, condition and configuration that will facilitate biodiversity protection and native flora and fauna movement through biodiversity corridors, and	YES
	(iii) the development avoids clearing steep slopes and facilitates the stability of the land, and	YES
	(iv) measures have been considered to achieve no net loss of significant vegetation or habitat.	In VMP

(5) In this clause:
biodiversity corridor means an area that facilitates the connection and maintenance of native fauna and flora habitats and, within the urban landscape, includes areas that may be broken by roads and other urban elements and may include remnant trees and associated native and exotic vegetation.

Clause 6.4 of the LEP 2012 relates to riparian land and waterways

(1) The objectives of this clause are as follows:

	Objectives	**Considered in the VMP**
a.	*to protect or improve:* *(i) water quality within waterways, and* *(ii) the stability of the bed and banks of waterways, and* *(iii) aquatic and riparian habitats, and* *(iv) ecological processes within waterways and riparian lands, and* *(v) threatened species, communities, populations and their habitats, and* *(vi) scenic and cultural heritage values of waterways and riparian lands,*	YES. In VMP
b.	*where practicable, to provide for the rehabilitation of existing piped or channelised waterways to a near natural state.*	YES. Part of engineering design by Mark Tooker.

(2) This clause applies to land identified on the Natural Resource - Riparian Lands Map as:

		Relevance to the Site
(a)	*"Category 2", or*	-
(b)	*"Category 3", or*	mapped onsite in the gully
(c)	*"Category 3a".*	Mapped downslope on 1 Arilla Road

Note. *Some development types within 40 metres of this land will still require referral to the NSW Office of Water as* **integrated development***.*

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

(a) water quality in the waterway,

(b) the natural flow regime, including groundwater flows to a waterway,

(c) aquatic and riparian habitats and ecosystems,

(d) the stability of the bed, shore and banks of the waterway,

(e) the free passage of native aquatic and terrestrial organisms within or along the waterway and riparian land,

(f) the habitat of any threatened species, population or ecological community,

(g) public access to, and use of, any public waterway and its foreshores,

(h) any opportunities for maintenance, rehabilitation or re-creation of watercourses, aquatic and riparian vegetation and habitat in accordance with the category of land identified on the Natural Resource—Riparian Lands Map.

The above are addressed by the engineer, Mark Tooker, and in the VMP

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

(a) *integrates riparian, stormwater and flooding measures, and*

(b) *is sited, designed and managed to avoid potential adverse environmental impacts, and*

(c) *if a potential adverse environmental impact cannot be avoided by adopting feasible alternatives, the development mitigates any adverse environmental impact, to a satisfactory extent, through the rehabilitation or remediation of any existing disturbed or artificially modified riparian land on the site.*

The above are addressed by the engineer, Mark Tooker, and in the VMP.

Appendix 6. Responses to objectives for Category 2 Land

Ku-ring-gai Council's Local Centres Development Control Plan

It is stated on Council's website (http://www.kmc.nsw.gov.au/Plans_and_regulations/Building_and_development/Town_planning/Local_Centres_Development_Control_Plan, accessed 12 June 2014) that:

> *The Local Centres Development Control Plan (DCP) provides detailed guidelines for future development on land in and around Turramurra, Pymble, Gordon, St Ives, Lindfield and Roseville which is covered by Ku-ring-gai Local Environmental Plan (Local Centres) 2012. It adopts a place-based planning approach aimed at achieving a high quality built environment, landscape setting and community spaces. The DCP is effective from 7 June 2013.*

Part 6 of the DCP refers to Biodiversity Controls. This part applies to development that will have an impact on areas identified as the Greenweb in the DCP, namely:

> *The Greenweb identifies lands containing significant strategic biodiversity values, considered important in the support of native flora, fauna and ecological processes and has a particular focus on key vegetation communities, threatened populations, species and their habitats.*

In Part 6 of the DCP, land identified as being of Biodiversity significance in Clause 6.3 of the Ku-ring-gai LEP Local Centres (2012) (Figures 3A-2, 3A-3) is broken into four categories:
Category 1 – Core Biodiversity Lands,
Category 2 – Support for Core Biodiversity Lands,
Category 3 – Landscape Remnant, and
Category 4 – Biodiversity Corridors and Consolidation
that is, 4 of the 5 categories identified on the Greenweb maps. An additional category, Category 5 – Canopy Remnant, is added in the DCP (coloured orange on the Greenweb map) which does not relate to Clause 6.3 of the LEP.

The Site is mapped on the Pymble Greenweb map (Figures 3A-2, 3A-3) as a light green patch in colour (Category 2 – Support for Core Biodiversity Lands) with a light orange outline (Category 4 – Biodiversity Corridors and Consolidation). This patch is the same shape as that mapped as land of Biodiversity Significance on the LEP 2012 Natural Resources – Biodiversity Map (Figure 3A-1).

Under section 6.3, Category 2 – Support for Core Biodiversity Lands is described as:

> *<u>Controls</u>*
> *Land identified as Category 2 – Support for Core Biodiversity Lands comprises areas that provide a range of support values, such as increasing remnant size, maintaining or improving connectivity between core biodiversity lands (see Table 2 in DCP). They also include patches of local fauna habitat and/or of key vegetation communities and support the health of waterways. Category 2 lands are generally fragmented areas where protection, restoration, rehabilitation or regeneration works are required to enhance overall biodiversity values.*

Category 2 lands are described with applicability to the site as follows:

Description of Category 2 land	Applicability to the Site
Key vegetation communities,	YES. The State listed critically endangered ecological community Blue Gum High Forest is identified on the Site as remnant trees without a native understorey.
adjoining Category 1	NO. Not adjoining Biodiversity Category 1.
Local fauna habitat	A narrow range of fauna recorded due to degraded habitat onsite.
Vegetation within Core Riparian Zones:	
Riparian categories 1, 2 and 3 – all vegetation	YES, vegetation mapped within Riparian category 3 is onsite
Riparian category 3a - limited to key vegetation communities	NO, Category 3a is not mapped onsite. It is mapped on the adjacent property at 1 Arilla Road
and key vegetation communities adjoining vegetation within core riparian zones	YES, the key vegetation community is adjoining the core riparian zone, riparian category 3.
All vegetation within biodiversity corridors	YES. Native corridor is proposed to be protected, restored and enhanced. See pages 52-66, section 4.3

In the Dictionary (Part 14 of the DCP), a key vegetation community is defined as:

> *vegetation communities within the Ku-ring-gai Local Government Area, which are currently protected or listed, or considered likely to be listed, under the NSW Threatened Species Conservation (TSC) Act 1995, NSW Fisheries Management (FM) Act 1994 and / or the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999.*
>
> *Vegetation condition is a key factor determining the inclusion of remnant vegetation as a threatened ecological community, under the TSC Act, FM Act and EPBC Act. In order to recognise that future variations in federal and state scientific committee determinations and their interpretation may occur, Key Vegetation Communities have been based upon vegetation community not condition. As such Key Vegetation Communities may include areas outside the scope of conditions required to meet the determination.*

Under controls for Category 2 land, it is stated that:

Listed control	Applicability to the Site
1 Avoid locating development on land identified as Category 2 on the Greenweb map. (Refer to maps in 6R.1 of this Part).	Parts of mapped Category 2 do not support native vegetation
2 Land within Greenweb Category 2, which is already cleared or disturbed and does not form part of any existing or proposed development, is to be stabilised and progressively rehabilitated with indigenous vegetation, to an extent commensurate with the scale of the proposal.	YES. in VMP
3 Vegetation retention and rehabilitation must be designed to enhance and link existing vegetation and habitat within the site and within adjacent sites, biodiversity corridors and riparian lands.	YES. in VMP

4 Where land within an allotment is identified as Category 2, works must be consistent with a plan of management (eg. vegetation management plan). Where no plan of management exists, a plan of management, or equivalent plan, may be required. The plan must be prepared by a suitably qualified person and must identify ongoing initiatives to preserve, protect and promote the environmental values of the land. ***Note:** Guidelines for Vegetation Management Plans are available on Council's website: www.kmc.nsw.gov.au*	YES. in VMP
5 Planting within land identified as Category 2 is to consist of not less than 70% locally native tree species and 30% locally native understorey species. Species are to reflect the relevant vegetation communities within the area. A mix of groundcover, shrubs and trees is desirable.	YES. See Landscape Plan
6 The design of any permanent fencing is to minimise obstruction to the movement of small fauna species.	Fencing is used during construction period in VMP

The objectives of Category 2 are stated as:

Objective	**Applicability to the Site**
1 *To support core areas of vegetation and fauna habitat.*	YES, part of the proposal.
2 *To contribute to the protection and recovery of key vegetation communities, threatened species, populations and their habitats.*	YES, details in VMP
3 *To contribute to the protection, restoration and management of biodiversity corridors.*	
4 *To contribute to the protection, restoration and management of vegetation and habitat in riparian lands*	
5 *To contribute to the net improvement of ecological function.*	

In summary

The State listed critically endangered ecological community Blue Gum High Forest is identified on the Site as remnant trees without a native understorey. In the final determination Blue Gum High Forest includes:

> *9. ….. Highly modified relics of the community also persist as small clumps of trees without a native understorey. ….*

For the mapped area onsite identified on the LEP 2012 Natural Resources – Biodiversity Map (Figure 3A-1) and DCP Biodiversity Map (Figures 3A-2, 3A-3), the objectives include:

> *Vegetation retention and rehabilitation must be designed to enhance and link existing vegetation and habitat within the site and within adjacent sites, biodiversity corridors and riparian lands.*

The proposal meets the listed objectives for Category 2 Biodiversity Land.

5.3 CATEGORY 3 BANK STABILITY AND WATER QUALITY

Objectives

1 *To protect and/or provide bank and bed stability.*

2 *To contribute to improved water quality within the catchment.*

Controls

Location

1 All parts of the development are to be located outside the core riparian zone (CRZ) of Category 3 Riparian Land being 10m from the top of each bank.

2 An Asset Protection Zone (APZ) proposed for bushfire management is permitted within the CRZ only where no practical alternative exists.

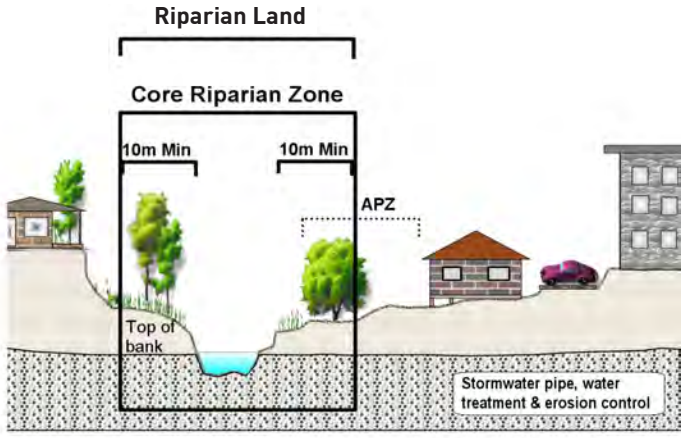


Figure 5.3-1:
Category 3 Riparian Zone

Access

3 Any access to the waterway must be located at strategic points where the ecological integrity of the existing riparian vegetation, stream bed and bank stability are not compromised.

4 Crossings (ie. bridges) over natural waterbodies must maintain riparian connectivity; retain natural stream bed and bank profile; prevent scour and erosion of the stream bed or banks during storm events; not restrict bankfull or floodplain flows and not inhibit natural sediment transport. This is to be achieved by:

i) minimising the number of crossings;

ii) minimising the width of the crossing;

iii) establishing the crossings at right angles to the flow rather than at an oblique angle; and

iv) minimising disturbance to existing native riparian vegetation.

Note: Refer to the NSW Office of Water Guidelines for Watercourse Crossings on Waterfront Land.

See Volume C Part 4C.3 for development over or adjacent to a natural waterbody, open channel or depression

5.3 CATEGORY 3 BANK STABILITY AND WATER QUALITY (continued)

Controls

Design

5 Where the CRZ has been disturbed or degraded, appropriate riparian vegetation is to be regenerated or rehabilitated. Locally native vegetation assemblages, capable of supporting the long term ecological function of the riparian land, must be used.

6 Protection, regeneration and rehabilitation of vegetation in the CRZ to is achieve a density that would occur naturally, except where the zone is within bushfire prone land.

7 Particular emphasis is to be given to the retention, regeneration or revegetation of the CRZ in key locations . Key locations include:

i) where 2 or more watercourses join;

ii) sites with significant erosion;

iii) stormwater outlets.

8 Planting within the channel and within 2 metres of the top of the bank is to consist of locally native species. Species are to reflect the relevant vegetation communities within the area. A mix of groundcover, shrubs and trees is desirable.

9 Planting within Category 3 lands more than 2 metres from the top of the bank is to consist of not less than 70% locally native tree species and 30% locally native understorey species. Species are to reflect the relevant vegetation communities within the area. A mix of groundcover, shrubs and trees is desirable.

Note: Council may support a variation to 8) or 9) above if suitable justification is provided. Planting of potential environmental weeds will not be permitted.

Watercourse and flood processes

10 Channel and bank stability within the CRZ is to be protected by avoiding the removal of natural stream structures, vegetation and woody debris, except where debris creates a flood hazard.

11 Development is to be designed to maintain or emulate a naturally functioning watercourse wherever possible.

12 Piped services through the CRZ must be avoided. Where necessary use nondestructive techniques such as direct drilling, where no part of the pipe is above ground or above the bed of the waterway. In exceptional circumstances piered crossings may be considered.

Appendix 8. Photographic record at time of survey, June 27 2012

Looking along north-east boundary from Beechworth Road railway overbridge

Frontage of 5 Avon Road

Frontage of 5 Avon Road

North-east corner of 5 Avon Road garden

1 Avon Road, front of house

West side of house at 1 Avon Road

Looking south-west across gully from near east end of Transect 1. Tall eucalypts are *E. saligna*, groundlayer and mid-storey smothered by *Ipomoea indica*.

Looking west across gully from a little south of east end of Transect 1. Large tree with dark green foliage is *Ficus microcarpa*.

Looking north-east toward head of gully from near Transect 1 - Quadrat 4

Looking west across gully from near Transect 1 Quadrat 4.

Transect 1

Quadrat 1 (0–10 m): edge of recently maintained garden area, with leafless *Ginkgo biloba* (fallen yellow leaves).

Quadrat 2 (10–20 m): Smothering by *Ipomoea indica*

Quadrat 3 (20–30 m): *Lantana camara* and smothering by *Ipomoea indica*

Quadrat 4 (30–40 m): *Ligustrum lucidum*, *Lantana camara* and *Ipomoea indica*

Quadrat 5 (40–50 m): *Lantana camara* and smothering by *Ipomoea indica*

Quadrat 6 (50–60 m): Erosion in gully, with *Tradescantia fluminensis, Ageratina adenophora, Setaria palmifolia*

Quadrat 6 (50–60 m): Centre of gully with rock rubble revealed by erosion, with *Tradescantia fluminensis, Setaria palmifolia.*

Quadrat 6 (50–60 m): Sewer manhole. Dense *Tradescantia fluminensis* and *Erythrina* x *sykesii.*

Quadrat 7 (60–70 m): Tangle of branches of *Abutilon striatum* 6–8 m across

Quadrat 8 (70–80 m): *Eucalyptus saligna* with smothering by *Ipomoea indica*

Quadrat 9 (80–90 m): *Musa acuminata*, *Eucalyptus saligna* with smothering by *Ipomoea indica*

Quadrat 10 (90–100 m): *Eucalyptus saligna* and *Musa acuminata,* with smothering by *Ipomoea indica*

House on 8 Beechworth Road, upslope and west of Quadrat 10.

Looking north-east across swimming pool on 8 Beechworth Road, showing groundlayer and mid-storey smothered by *Ipomoea indica.*

View downslope from house and pool on 8 Beechworth Road, with *Eucalyptus saligna, Jacaranda mimosifolia, Schefflera actinophylla*

Transect 2

Quadrat 1 (0–10 m): *Ligustrum lucidum*

Quadrat 2 (10–20 m): *Ligustrum lucidum* with trunk of *Agathis robusta*

Quadrat 3 (20–30 m): *Ligustrum lucidum* and smaller *Ligustrum sinense*

Quadrat 4 (30–40 m): *Ligustrum lucidum*

Quadrat 5 (40–50 m): *Acmena smithii* (brown trunk at left), *Ligustrum lucidum* and groundlayer of *Tradescantia fluminensis*

Quadrat 6 (50–60 m): *Ligustrum lucidum* and groundlayer of *Tradescantia fluminensis*

Centre of gully, downslope from Transect 2

Centre of gully looking upslope from near west end of Transect 2

Spot location A: *Eucalyptus saligna, Ligustrum lucidum, Tradescantia fluminensis.* Large leaf at left is *Strelitzia nicolai*, intruding from adjacent property.

Spot location A: looking downslope toward Transect 2. Mostly *Ligustrum lucidum, Tradescantia fluminensis,* with young *Syagrus romanzoffiana* at centre-right

Appendix 9. Pathways through conservationally significant vegetation in the Sydney region

	
Sydney Coastal Estuary Swamp Forest Complex at the Warriewood wetlands	**Sydney Coastal Estuary Swamp Forest Complex at the Warriewood wetlands**
	
Sydney Coastal Estuary Swamp Forest Complex at the Warriewood wetlands	**Sydney Coastal Estuary Swamp Forest Complex at the Warriewood wetlands**
	
Eastern Suburbs Banksia Scrub at Jennifer Street, Botany Bay National Park	**Mangrove swamp at Towra Point Nature Reserve**

	
Mangrove swamp at Towra Point Nature Reserve	**Mangrove swamp at Towra Point Nature Reserve**

Appendix 10. Photographic record from Site visit to Sheldon Forest, Turramurra, 23 June 2014

Recent Council creek works (Sophia Finlay)