‘WOODLANDS’ PROPOSED MEDIUM DENSITY RESIDENTIAL REZONING 126 GREVILLE STREET, WEST CHATSWOOD

ENVIRONMENTAL OVERVIEW

Prepared for Barana Group Pty Limited

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22 May 2007
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1.00 SITE CONTEXT

1.01 INTRODUCTION

Barana Group is seeking a rezoning to No. 126 Greville Street in West Chatswood (the site) to permit its redevelopment as *Woodlands*, a medium density residential development. The purpose of this report is to provide a summary environmental overview of the proposal. This report should be read in conjunction with the following appended reports:

- Appendix 01 – Ecological Assessment of Land Proposed for Rezoning at 126 Greville Street, Chatswood, May 2007 by Cumberland Ecology
- Appendix 02 – Bushfire Protection Assessment for the Proposed Rezoning of Lot 1 in DP 532353, No. 126 Greville Street, Chatswood, 21 May 2007 by Australian Bushfire Protection Planners Pty Ltd
- Appendix 03 – Arboriculture Report – 126 Greville Street, Chatswood, 15 May 2007 by Australian Tree Consultants Pty Ltd

1.02 CONTEXT

The context within which the site is set is broadly defined in Figures 1 and 2.

1.02.01 Adjacent Urban Development

All areas upstream of the site to the watershed are existing residential development. The upslope end of the proposed development site is situated approximately 500m from the uppermost extent of the watershed to the east, approximately 150m from the watershed to the south of the site and 200m to the north. The approximate catchment area for the site is 19 ha.

All of the stormwater from the above described residential catchment area runs through the site, including run-off from Fullers Road and Millwood Avenue, both of which constitute a major daily thoroughfare for large volumes of traffic. It can be expected that these roads will supply substantial loads of toxicants such as hydrocarbons from petrol, oil and grease, rubber particles and high dissolved loads of zinc, copper and formerly lead from motor vehicles. Additionally, it can be expected that a significant amount of litter may be generated from the catchment.

1.02.02 Adjacent Bushland

The site is set on its north-western and north-eastern perimeters against the steeply incised, Blue Gum Creek bushland valley. The catchment within which the site is set drains into the Lane Cove National Park (refer Figure 3). The site adjoins the National Park along its north-western boundary, and dense bushland held in State Government ownership along its north-eastern boundary. The bushland to the north-east of the site is severely weed infested, although some of this area has recently been subject to primary bush regeneration works. The corridor running between the two portions of the National Park is currently owned by the RTA, and we have been advised that this land will shortly be transferred to the National Park.

1.0 SITE CONTEXT

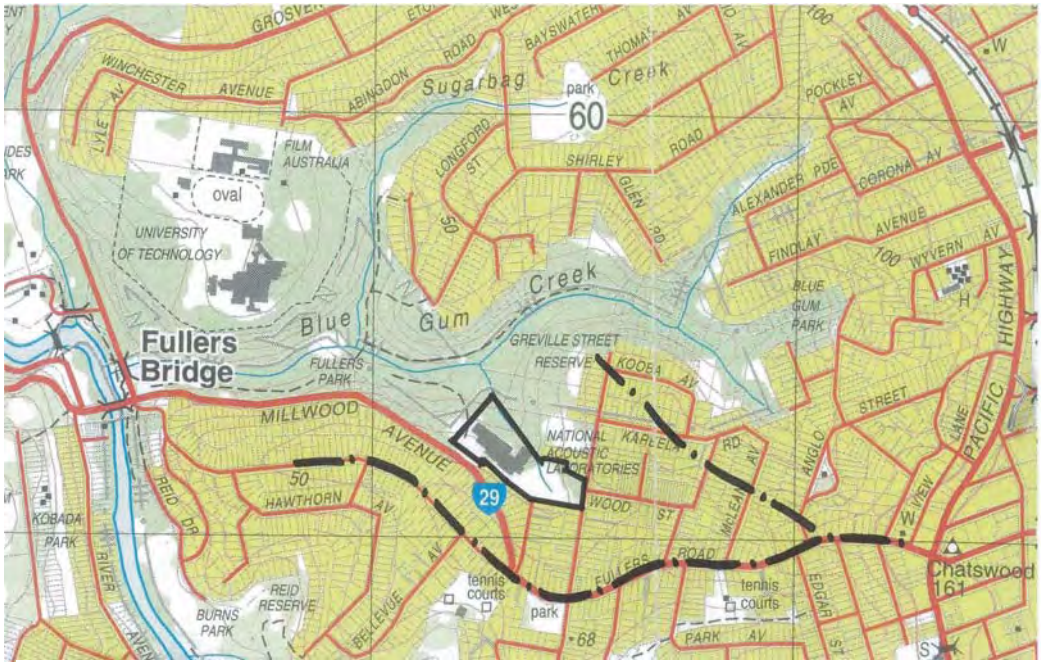

Figure 1: Site Context – Excerpt from 1:25 000 topographic map showing site and watershed boundary

Figure 2: Site Context – Excerpt from 1:25 000 aerial photo showing site and watershed boundary

Figure 3: Plan showing location of Lane Cove National Park relative to site

2.00 THE SITE

Between c.1915 and 1985, the site was used as a rifle range. Aerial photographs from 1951 show that it was substantially clear of vegetation (refer Plate 1). The existing development was undertaken in 1986 (refer Plates 2, 3 and 4), and comprises an elevated three and four level concrete office building with a large footprint, and a separate two level concrete car park.

The site has otherwise been extensively cleared with the exception of:

- A small remnant of bushland approximately 0.4ha. in area is located within the northern corner of the site. This remnant is contiguous with the adjoining valley bushland and has been identified as Sydney Sandstone Gully Forest community, which is not listed as an endangered ecological community under the *Threatened Species Conservation Act 1995*.
- Some remnant trees within the north-east corner of the site, five of which have been identified as significant specimens 'most suitable for retention' by the consulting arborist.

2.01 ENVIRONMENTAL CONSTRAINTS

Figure 4 (EDAW Dwg. No. SK08) summarises the key environmental constraints of the site as discussed below.

2.01.01 Ecological Assessment

An ecological assessment of the site was undertaken by Cumberland Ecology. The consultant noted that:

- Most of the site has been cleared and so affords little or no habitat value for native flora and fauna, with the exception of the small remnant of bushland located within the north-west corner of the site, as mentioned above. This remnant has habitat value because it adjoins the Lane Cove National Park, thus forming part of a large block of habitat and is worthy of conservation if possible
- The vegetation on the site does not comprise an endangered ecological community and no threatened or other significant native species have been identified on the site, though some threatened fauna species are likely to use the site from time to time.
- No bushland exists above the main waterfall on the site (Waterfall 03). The impact on remnant species in the upper section of the site would be insignificant in terms of conservation of species.

Plate 1: Aerial photograph of the site in 1951 showing land use as a rifle range. Note site is predominantly cleared with the exception of minor remnants retained within the north-west and north-east corner of the site

Plate 2: Aerial photograph of the site in 1986 looking due north. Note the extent of construction works over the watercourse.

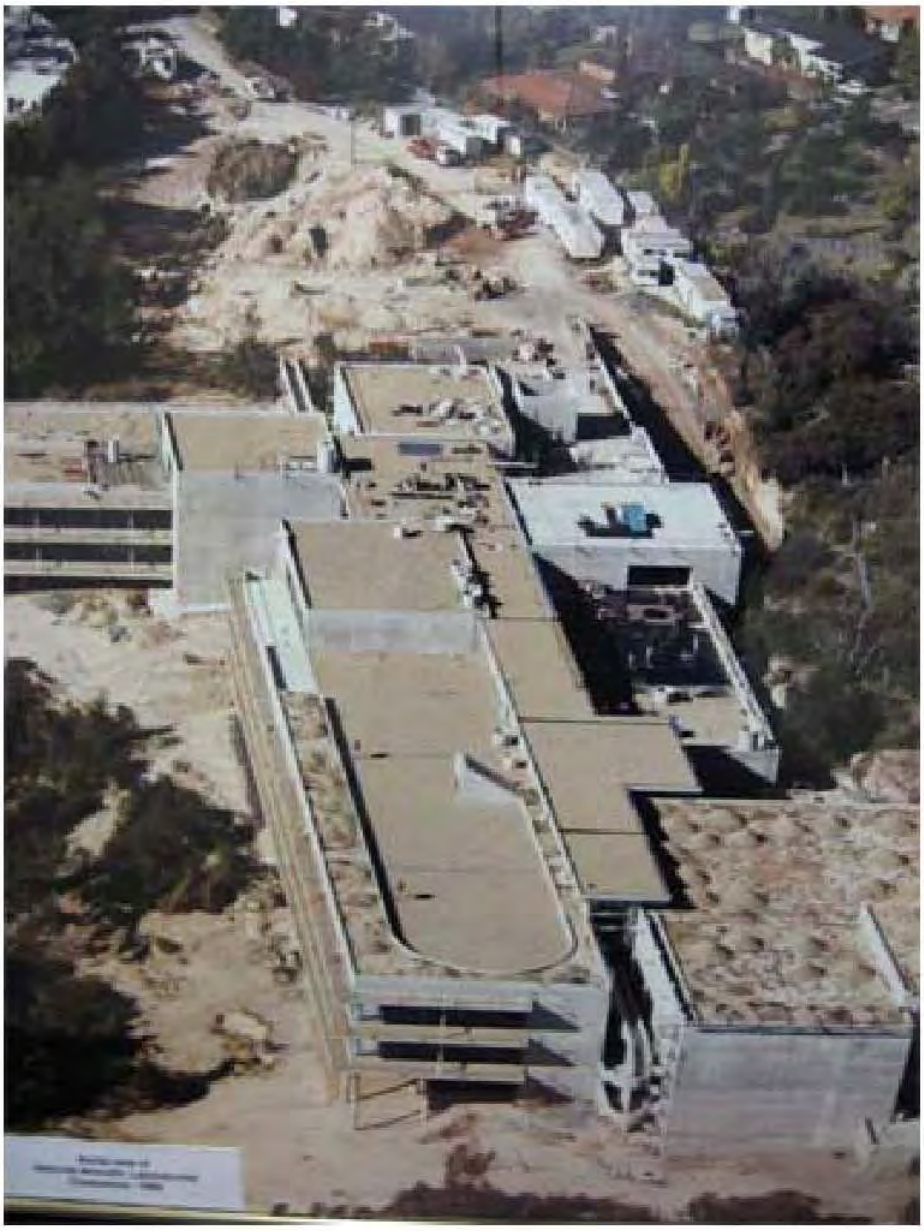

Plate 3: Aerial photograph of the site in 1986 looking south-east across the site to the Greville Street entry. Note the extent of construction works over the watercourse.

Plate 4: Aerial photograph of the site near completion

Lane Cove National Park

Category 2 watercourse

State Government owned bushland- highly weed infested

Conserved Sydney Sandstone Gully Forest

Waterfall 03

Category 3 watercourse

Line of top of bank

Waterfall 01

Significant trees to be retained as per recommrndation of Consulting Arborist (refer Arboricultural Report)

Waterfall 02

T488

T478

T509

T504

T576

BOUNDARY SETBACK

WOOD STREET

GREVILLE STREET

Sydney Sandstone Gully Forest - Outer Protection Area

Line of existing vegetation

Radius transitions from 23m to 20m

42m

33m

23m

28m

FIRE TRAIL

APZ

B1

B2

B3

B4

B5

A1

A2

C1

C2

C3

D1

D2

D3

D4

D5

35m

20m

12m

10m

6m

2m

NOTE:
Pedestrian egress via lifts to basement for units B1-B5, A1+A2, C1-C3

9.27m

7.41m

BOUNDARY SETBACK

EMERGENCY EGRESS TO RANGE STREET

Line of 20m APZ to Category 3 Watercourse Riparian Corridor

Headwall 01

Emergency vehicular / pedestrian egress from basement

Emergency pedestrian egress from basement carpark to Millwood Avenue

DNR Requirement: Fully structured riparian corridor average 10m wide (min. 5m wide).

Headwall 02

RANGE STREET

Council Bushland Reserve

NOTE:
This development edge is based upon a 33.0m APZ setback comprising of 23.0m landscape development Inner Protection Area and a 10m Outer Protection Area to existing bushland edge.

MILLWOOD AVENUE

New site boundary shown

NOTES
1. All plant selection on project will be based on locally occuring species from the Sydney Sandstone Gully Forest community

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21.05.2007	O	Final Issue	
15.05.2007	N	Client Issue	
10.05.2007	M	Client Issue	
03.04.2007	L	Client Issue	
30.03.2007	K	Client Issue	
21.03.2007	J	Client Issue	
20.03.2007	I	Client Issue	
19.03.2007	H	Client Issue	
08.11.2006	G	Client Issue	
06.11.2006	F	Client Issue	
28.08.2006	E	Client Issue	
22.08.2006	D	Client Issue	
14.08.2006	C	Client review	
07.08.2006	B	Client review	
03.08.2006	A	Preliminary review	

Project: 126 Greville Street, West Chatswood

Client: Barana Group

Drawing: Key Environmental Constraints

LEGEND

- Category 2 Watercourse
- Category 3 Watercourse
- Watercourse
- APZ (Inner Protection Area) landscape development - set against existing bushland to be managed as an Outer Protection Area (to the Category 2 Watercourse) and new bushland to be restored to the Category 3 Watercourse
- Existing building footprints
- Line of existing vegetation
- Existing significant remnant tree to be retained
- Fully structured riparian corridor average 10m wide (minimum 5m wide)
- Zone of fully structured vegetation - Remnant Sydney Sandstone Gully Forest
- Asset Protection Zone Outer Protection Area of remnant Sydney Sandstone Gully Forest
- Landscape Area

Key Environmental Constraints

'Woodlands' Medium Density Residential Development

Barana Group

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2.01.02 The Watercourse

An assessment of the site with regard to watercourse categorisation was undertaken by EDAW.

Upper Reach

The upper reaches of the watercourse and areas around the car park were until recently heavily weed infested with coral trees and a forest of privet, as is still in place within the bushland to the north-east of the site. The client has under the supervision of an arborist removed the majority of this weed infestation. Subsequently the upper reaches of the watercourse have limited remaining plant cover (refer Plate 5).

Figure 5 shows the existing drainage patterns relevant to the site. As can be seen from this figure, the majority of the stormwater entering the site comes via Greville Street, and is fed to an open watercourse by three (3) large stormwater pipes of approximately 750mm dia., and a smaller line of approximately 450 mm dia. (Headwall 01 refer Plate 6). An additional stormwater line of approximately 600mm dia. also feeds into the upper reach of the watercourse (Headwall 02), and emanates from Millwood Avenue.

A formed watercourse is evident from downstream of Headwall 01. Some 20m downstream of this point, a small constructed waterfall approximately 1.5m high by 2-3m wide has been made using site rock (Waterfall 01 – Constructed), possibly to conceal a trunk sewer main inspection pit. The trunk sewer main appears to run through the watercourse at this point as shown on the Services Survey (refer Figure 6). Approximately 30m downstream of this point the watercourse leaves its earthen banks and fans out across exposed sandstone shelving before falling at Waterfall 02 some 3m to a further area of broad, open rock shelving (refer Plate 7).

This watercourse then quickly transitions to a channel where it appears to have been re-routed as part of the 1986 development of the site, in order to avoid the northern-most part of the existing building. The watercourse in this area is approximately 1.0 – 1.5m wide with steep to near vertical sides, some of which are constructed using rip-rap sandstone, and are approximately 1.0 to 1.5m high, as located in Figure 4, and shown in Plates 8 and 9. The bed of the watercourse in this area is sandstone bedrock which exhibits some potholing, suggesting that the watercourse may have previously been quite flat and broad at this point before spilling over the main waterfall within the site (Waterfall 03), just to the north of the existing building.

The upper reach of the watercourse falls a height of some 15m from the headwall invert to the lip of Waterfall 03, over a length of approximately 150m.

As can be seen from Plate 1, the upper reach of the watercourse was virtually completely cleared in 1951, and then in Plates 2 and 3, this area appears to have again been effectively destroyed as a result of the building construction works. The current watercourse must in the main be presumed to be constructed.

Lower Reach

The lower reach of the watercourse stretches from Waterfall 03 to the downstream end of the site. Waterfall 03 falls approximately 5m into a densely vegetated corridor of Sydney Sandstone Gully Forest, which covers an area of approximately 0.4 hectare, as shown in Figure 4. This reach of the watercourse falls a height of some 22m from the lip of Waterfall 03 to the downstream end of the site, over a length of approximately 130m.

The watercourse therefore has a total site length of approximately 280m, and falls a total height across the site of some 37m.

Watercourse Categories

In order to assist in determining appropriate reinstatement treatments applicable to the watercourse, we made an assessment of watercourse categories based upon watercourse categorisation criteria published by the Department of Natural Resources (DNR). Drawing upon this assessment, we assessed the two reaches of the watercourse as best fitting the following categories:

- Upper Reach – 'Category 3 – Bank Stability and Water Quality'. We base this assessment on the following criteria:
    - Aquatic Ecosystem – Is likely to be 'Poor' – all water comes from a fully developed upstream catchment – no significant ponding of water within this reach of the watercourse
    - Existing or Potential Connectivity – Is 'Limited' (effectively non-existent due to upslope residential development)
    - Potential for Corridor Maintenance – Restoration ('Low' given the demonstrable lack of resilience within this part of the watercourse) and Reinstatement ('High' if considerable resources of time and money are applied, but will still always be subject to substantial edge effects due to poor shape – high edge to area ratio)
    - Relative Length and Location of Piped Sections (Urban Context) – the 'Majority is Engineered'
- Lower Reach – 'Category 2 – Terrestrial and Aquatic Habitat'. We base this assessment on the following criteria:
    - Available footprint – There is potential for a 20m setback either side
    - Aquatic ecosystem – Aquatic ecosystem health in this area is likely to be trending towards a rating of 'Good', due to its good connectivity with downstream bushland and increased habitat complexity over that available within the Upper Reach
    - Existing or Potential Connectivity – Is still 'Limited', i.e. we would assess that it does not form a 'Local connection within stream length' due to its proximity to the head of the catchment and the developed nature of the upstream areas
    - Potential for Corridor Maintenance – Restoration capacity is 'High'
    - Relative Length and Location of Piped Sections (Urban Context) – Is 'Open'

The Department of Natural Resources concurred with our categorisation of the watercourse.

Plate 5: View from the near the top of the watercourse looking downstream to the existing pedestrian bridge. Note the almost entire lack of groundcover, that some of the remaining trees are Coral trees yet to be removed, and the stability of the watercourse in this area.

Plate 6: Starting point of the watercourse.
The three large pipes connect directly to Greville Street.

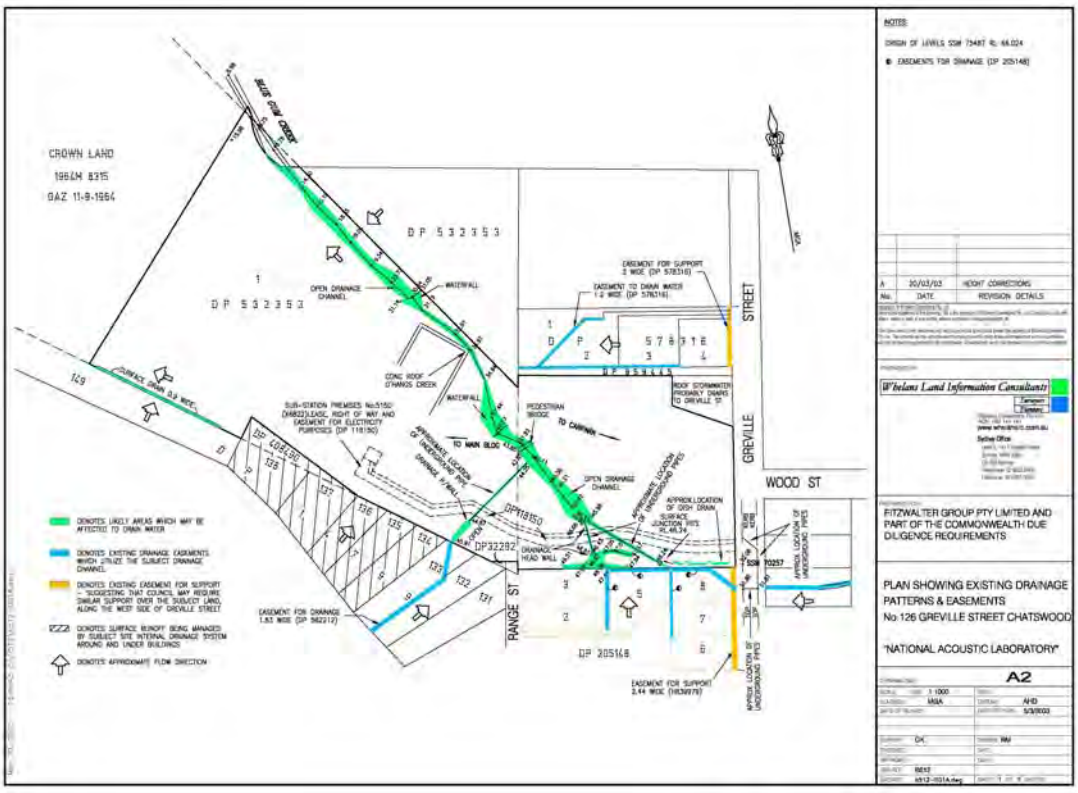

Figure 5: Plan showing existing drainage patterns and easements for the site

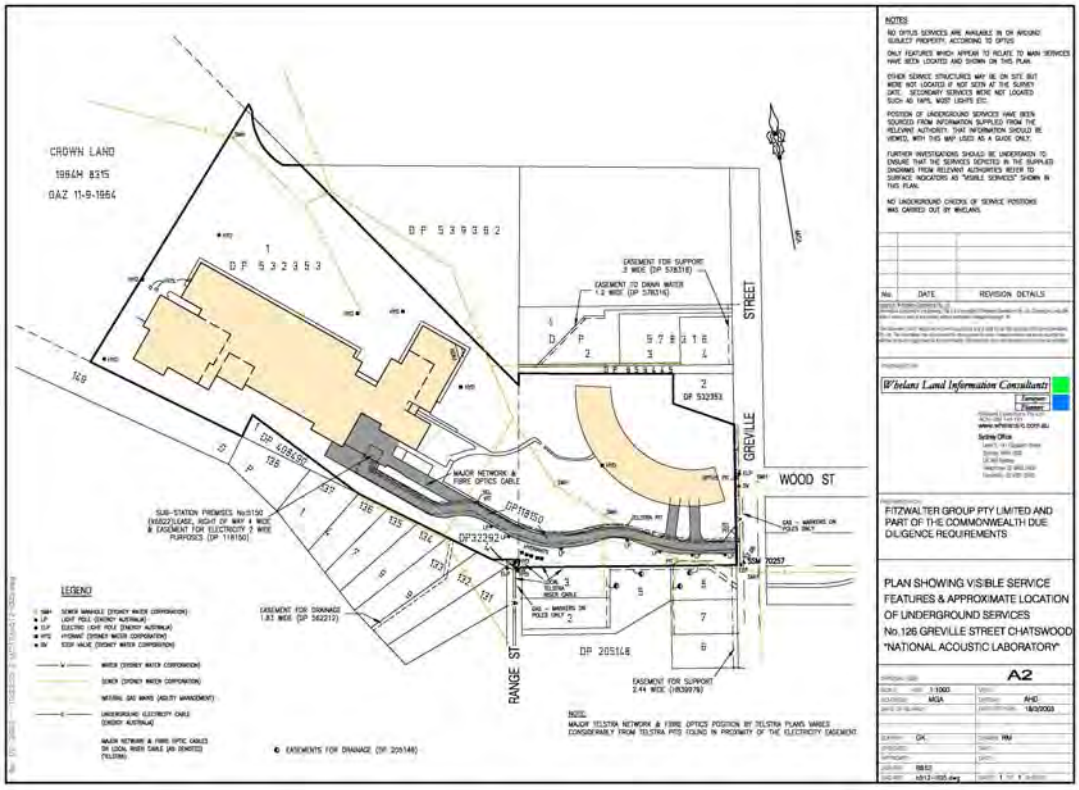

Figure 6: Plan showing visible service features and approximate location of underground services

Plate 7: View from existing pedestrian bridge to Waterfall 02

Plate 8: View looking downstream to the channel entry point with adjoining heavily weed-infested neighboring site in the background

Plate 9: View of watercourse where it is channelled near the north-east boundary of the site. Note the extent of privet infestation on the adjoining lot – the watercourse on the site was until recently in the same condition. Note the sandstone bed of the channel and active erosion to the bank in this

2.01.03 Bushfire Hazard

A bushfire protection assessment was undertaken for the site by Australian Bushfire Protection Planners Pty Limited. The report notes that with regard to unmanaged vegetation within the Lane Cove National Park and the riparian corridor within the site, the development complies with the deemed-to-satisfy specifications for the provision of Asset Protection Zones for the effective slopes and vegetation formations found within these bushfire prone areas.

Emergency access provisions have also been addressed in the provision of an alternate vehicular egress from the underground carpark to the medium density development within the western portion of the site, to Range Street and emergency pedestrian egress is available from the underground carpark to Millwood Avenue, via an existing residential property [25 Millwood Avenue] to the south of the site.

The following table from the report summarises the extent to which the schematic development proposal conforms to the requirements of Section 46(1) (g) of the *Rural Fires Regulation 2002* and the deemed-to-satisfy specifications of *Planning for Bushfire Protection 2006*

Table 6. Compliance with Section 46(1) (g) of the Rural Fires Act

	Requirements of Section 46(g) of Rural Fires Regulation	**Compliance with deemed-to-satisfy provisions of *Planning for Bushfire Protection 2006.***
(I)	Asset Protection Zone setbacks	YES
(II)	The siting and adequacy of water supplies for fire fighting	YES
(III)	Capacity of public roads to handle increased volumes of traffic in the event of a bushfire emergency	YES
(IV)	Public roads that link with the fire trail network have two - way access	YES
(V)	Adequacy of emergency response access and egress	YES
(VI)	Adequacy of bushfire maintenance plans and fire emergency procedures	YES
(VII)	Building construction standards	YES
(VIII)	Adequacy of sprinkler systems and other fire protection measures to be incorporated into the development	Not applicable

2.01.04 Arboric ultural Assessment

An arboricultural assessment of the site was und ertaken by Australian Tree Consultants Pty Ltd. Remnant bushland trees no. 478, 488, 504, 509 and 576 (Angophoras and Blackbutts) within the eastern corner of the site, were identified as being significant trees worthy of being retained. Two of these trees were identified as being 'large old remnants'. It is proposed to retain these five (5) trees as part of any re-development of the site.

3.00 AUTHORITY LIAISON

Authority liaison has been undertaken with both the Rural Fire Service (RFS) and the Department of Environment and Conservation (DEC) with regard to bushfire issues, and the Department of Natural Resources (DNR) with regard to 3A Permit issues.

3.01 RURAL FIRE SERVICE

Liaison has been undertaken with the Rural Fire Service (RFS) as described within the Bushfire Protection Assessment. The liaison process included two (2) meetings on site with the Service and two (2) other meetings with RFS officers. The proposed bushfire setbacks shown in Figure 4 (EDAW Dwg. No.SK08) have been agreed in principle with the RFS.

3.02 DEPARTMENT OF ENVIRONMENT AND CONSERVATION

The Department was approached (National Parks and Wildlife Service – Lane Cove National Park) to ascertain its position with regard to undertaking fire protection measures on its land. It was agreed that any bushfire protection measures for the proposed development will be incorporated within the site boundary of *Woodlands*.

3.03 DEPARTMENT OF NATURAL RESOURCES

Liaison has been undertaken with regard to the requirements of the *Rivers and Foreshores Improvement Act 1948* and the need to obtain (at the development application stage) a 3A Permit from the Department of Natural Resources (DNR) for all works undertaken within 40m of the top of the bank of a watercourse. DNR agreed in principle to the below assessment. Liaison with the Department included a site meeting with the relevant Natural Resource Officer; the provision of detailed briefing material; a presentation at DNR's Parramatta office and telephone/email correspondence.

3.03.01 Lower Reach

The reach of the watercourse downstream of Waterfall 03 is a Category 2 watercourse and requires a minimum average 20m fully structure riparian corridor to be in place. It was agreed with the Department that any development would retain all of the existing SSGF below Waterfall 03 intact, with the exception of a maximum 10m wide strip fronting onto *Woodlands* that would have its understorey thinned to act as an Outer Protection Area (OPA), as a component of an overall 33m wide Asset Protection Zone (APZ) along this frontage.

This will require substantial thinning to the understorey sufficient to meet OPA fuel load requirements. This impact was assessed by the project ecologist as not being significant within the context of the development.

3.03.02 Uppe r Reach

The watercourse upstream of Waterfall 03 is classified as Category 3. DNR will accept an average 10m wide (5m minimum) fro m the top of t he bank f ully st ructured riparian corr idor be crea ted, extending from Waterfall 03 up until the point where the existing formed watercourse commences, i.e. at Headwall 01 (refer Figure 4 [EDAW Dwg. No. SK08]).

In addition to ensuring bed and bank stability issues, a key objective of the Department with regard to th e la ndscape re storation w ithin th e C ategory 3 s ection of the watercourse is to extend the ecological reach of the watercourse up int o the catchment, particularly with regard to connectivity of vegetation.

The DNR riparian restoration recommendation for the Category 3 reach of the watercourse would result in the creation of a pproximately 2 ,750sq.m o f f ully structured riparian v egetation b eing incorporated into this area. An out come resulting from this requirement is that any new proposed dwellings adjacent to the watercourse will require a minimum 20m APZ setback from the outside edge o f th e fu lly s tructured c orridor to th e face o f the d welling (r efer Figu re 4 [EDAW D wg. N o. SK08]).

4.00 RESTORATION RESPONSE

Figure 7 (EDAW Dwg. No. SK01) shows the layout of the proposed development, and the associated proposed Landscape / Restoration approach. Figure 8 (EDAW Dwg. No. SK07) comprises:

- Diagram 01 showing the approximate extent of existing native vegetation on the site, and
- Diagram 02 showing the extent of proposed vegetation on the site.

The landscape / restoration response to the site is described below.

4.01 STRUCTURING OF RESTORATION

Site restoration has been undertaken in accordance with the recommendations of DNR (refer s.3.03 of this report) with the exception of the incorporation of a minor landscape amenity zone along the south-western bank of the Category 3 reach of the watercourse in the form of sheltered pocket grassed area to catch morning sun, and a small platform that provides a single access point to the water's edge.

The above action has resulted in a slight reduction in the area of fully structured riparian vegetation that will be attained for the Category 3 area of the watercourse, from the approximately 2,900sq.m that would have been derived as per the DNR recommendations, to approximately 2,750 sq.m. However, as can be seen from Figure 8 (EDAW Dwg. No. SK07), the total area of restoration planting proposed for the site far exceeds any minor shortfall in the DNR required Category 3 area of the watercourse

4.02 CONNECTIVITY

Connectivity between the Category 2 and 3 reaches of the watercourse will be attained by:

- the reinstatement of a fully structured riparian community to the banks of the Category 3 watercourse, and
- via the State government-owned bushland property along the north-eastern boundary of the site.

4.03 CONSERVATION OF EXISTING ENVIRONMENTAL ASSETS

The following environmental site assets will be conserved:

- The SSGF in the north-western corner of the site will be retained intact with the exception of the 10m OPA treatment buffer area. On-going fuel management of this buffer area will be undertaken by a bushland restoration contractor as described below. The remainder of the patch will be subject to on-going bushland regeneration;
- The five (5) important remnant bushland trees to the north-eastern corner of the site as identified by the consulting arborist;
- Many of the other existing trees on the site (in the order of 200no.) as shown in Figure 9 (EDAW Dwg. No. SK09);
- Much of the remnant vegetation at the top of the cut face along the south-western boundary of the site, and
- Waterfalls 02 and 03 and any other outcropping sandstone associated with the watercourse.

LEGEND

- Site boundary
- Asset Protection Zone (APZ)
- Existing contours (shown white)
- Boundary setback
- Existing significant tree to be retained and protected
- Paving 1 - Pedestrian footpath
- Paving 2 - Private open space
- Paving 3 - Gravel fire access trail 4m wide
- Paving 4 - Gravel fire access trail 1m wide clear zone either side
- Paving 5 - Road
- Timber decking
- Existing Sydney Sandstone Gully Forest fully structured riparian corridor
- Existing Sydney Sandstone Gully Forest Asset Protection Zone (Outer Protection Area)
- Planting 1 - Sydney Sandstone Gully Forest fully structured riparian corridor planting.
- Planting 2 - Sydney Sandstone Gully Forest APZ managed fuel reduced planting zone.
- Planting 3 - Taller landscape planting using species from Sydney Sandstone Gully Forest community
- Planting 4 - Open & generally low APZ / landscape planting using species from Sydney Sandstone Gully Forest community.
- Planting 5 - Rooftop landscape using native grasses and groundcovers
- Planting 6 - Macrophyte planting in creekline
- Creekline with pool and riffle
- Bioswale treatment
- Waterfeature
- Turf
- Sandstone wall

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21.05.2007	H	Final Issue	
18.05.2007	G	Client review	
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10.05.2007	E	Client review	
24.08.2006	D	Client Issue 100%	
14.08.2006	C	Client review	
07.08.2006	B	Client review	
03.08.2006	A	Preliminary review	

Project: 126 Greville Street, West Chatswood

Client: Barana Group

Drawing: Landscape Plan

Landscape Plan

'*Woodlands*' Medium Density Residential Development

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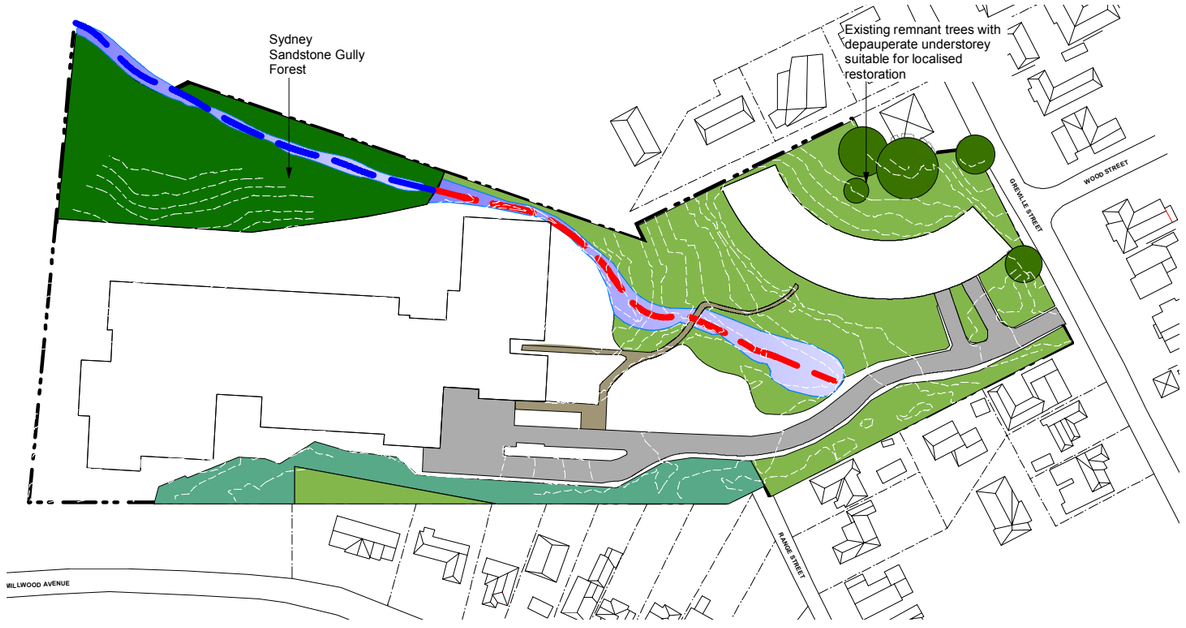
Diagram 01 - Existing vegetation



LEGEND

- Category 2 Watercourse
- Category 3 Watercourse
- Watercourse
- Existing significant remnant tree to be retained
- Fully structured riparian bushland - Sydney Sandstone Gully Forest
- Remnant native high scrub/ low open woodland suitable for bushland regeneration
- Mixed native / exotic community

Diagram 02 - Proposed vegetation

LEGEND

- Category 2 Watercourse
- Category 3 Watercourse
- APZ
- Watercourse
- Private Open Space
- Landscape Area

Conservation of existing remnant bushland and trees

- Existing significant remnant native tree to be retained
- Remnant fully structured riparian bushland to be retained/bush managed - Sydney Sandstone Gully Forest
- Asset Protection Zone- Existing Sydney Sandstone Gully Forest to be managed as an Outer Protection Area
- Existing remnant native vegetation to be bush managed

Restoration of high value native habitat

- Fully structured riparian corridor planting as required by DNR - Sydney Sandstone Gully Forest
  Area 2825m2

Restoration of supplementary native habitat

- Proposed landscape planting using species from the Sydney Sandstone Gully Forest community
- Asset Protection Zone - Inner Protection Area using species from the Sydney Sandstone Gully Forest community.

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Project: 126 Greville Street, West Chatswood

Client: Barana Group

Drawing: Existing and Proposed Vegetation

Existing and Proposed Vegetation

'*Woodlands*' Medium Density Residential Development

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LEGEND

- Existing fully structured vegetation
- Proposed fully structured vegetation
- Existing vegetation to be managed
- Proposed landscape treatment
- Existing building footprints
- Asset Protection Zone

'A' Class Trees

- Existing tree to be retained with class AA. Total number to be retained = 5
- Existing tree to be retained with class A1, A2, A3 and A4. Approximate number to be retained = 200
- Existing tree to be removed with any A classification that falls within 2 metres of building and construction works. Approximate number to be removed = 100

'Z' Class Trees

- Existing tree to possibly retain with Z1, Z6, Z8, Z10 and Z11 category. Approximate number potentially to be retained = 80
- Existing tree to be removed with class Z2, Z3, Z4, Z5, Z7, Z9, Z12 and those with any Z class that falls within 2 metres of building and construction works. Approximate number to be removed = 220

NOTES:

1. Refer to Arborist Report, May 2007 for further detail. Report prepared by Australian Tree Consultants.

2. This drawing provides an indication of trees likely to be retained and removed based upon their proximity to construction works. Final numbers will be determined as part of the detail design process.

3. Some tree symbols represent more than a single tree.

DATE	REV	AMENDMENTS	APP
30.05.2007	D	Final Issue	
21.05.2007	C	Final Issue	
10.05.2007	B	Client review	
03.04.2007	A	Preliminary review	

Project: 126 Greville Street, West Chatswood

Client: Barana Group

Drawing: Trees to be retained/removed

Vegetated Areas - Indication of existing trees likely to be retained/removed

'*Woodlands*' Medium Density Residential Development

Barana Group

0 10 20 30 40 50 M

SYDNEY
BRISBANE
MELBOURNE
SUNSHINE COAST

ASIA
EUROPE
MIDDLE EAST
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Scale: 1:1000@A3

Project No.: 06055B

Drawn: KG / DG

SK09 D

4.04 HABITAT CREATION

In addition to the above mentioned habitat conservation areas, all of the remaining landscape / restoration works to the site will be designed such that they perform a hierarchy of habitat functions, as detailed below.

4.04.01 High Value Habitat

The following areas will comprise high value habitat:

Most of the Category 3 watercourse will be planted to fully structured forms of Sydney Sandstone Gully Forest, and

The creation of a naturalistic pool and riffle system up stream of Waterfall 02 suitable for macro-invertebrates, e.g. yabbies.

4.04.02 Supplementary Habitat

The following areas will comprise supplementary habitat:

- The APZ buffering the Category 3 watercourse will be planted to a modified form of Sydney Sandstone Gully Forest contiguous with the fully structured restoration corridor;
- The remnant trees and other vegetation within the north-eastern corner of the site and along the Greville Street frontage will be augmented with appropriate bushland species to form a modified SSGF setting commensurate with bushfire fuel load requirements, and
- The streetscape and all other landscaped areas will utilise a high percentage of locally endemic species.

All locally endemic species used on the site will be of local provenance. The design development of the landscape / restoration works will be undertaken in conjunction with the project ecologist to help define the most appropriate habitat types, e.g. the creation of habitat suitable for small insectivorous birds which require dense understorey vegetation for protection, and some of which prefer open native grassland areas for foraging.

Additionally, habitat complexity will be increased by providing logs and / or rock within restoration areas to provide refuge and shelter for small ground fauna.

4.05 WATER MANAGEMENT

Stormwater will be managed in the following ways:

- A treatment train of water sensitive urban design (WSUD) measures will be integrated into the landscape development of the site to ensure that stormwater run-off does not increase pollutant loads to the catchment over and above existing conditions, and with the aim of improving site run-off water quality to a level greater than that currently in place. Treatment train measures will include:
    - Perimeter and road verge bio-swales, and
    - Water harvesting 'rain-gardens' that detain run-off and maximise infiltration and nutrient uptake prior to release
- Litter traps will be placed upstream of Headwalls 01 and 02 to capture litter from the catchment. This measure will make a significant contribution beyond the boundaries of the

site to the reduction of catchment-based litter entering the watercourse and Lane Cove National Park. Investigations will be undertaken to assess whether it is possible to provide a higher level of pollutant capture at these points with the installation of gross pollutant traps (GPT's), which are additionally capable of capturing significant levels of fine materials including potentially toxic fines from road run-off (e.g. there may insufficient fall between the GPT inlet point and outlet point / bed of the watercourse to facilitate these).

4.06 COMMUNITY AWARENESS

At DA stage opportunities for public access to the site will be explored. Unlike much of the nearby housing, *Woodlands* addresses the riparian corridor / bushland edge rather than the street. Site pedestrian circulation has been designed to lead people through a series of pleasant urban and bushland environments, including:

- a main formalised pedestrian entry located on Greville Street, providing an inviting, enframed view into the restored riparian corridor (refer EDAW Dwg. No. SK 04 - Section C);
- an attractive and quiet internal streetscape, accessible to pedestrians from both Greville Street and Range Road;
- bush walking trails that travel through and alongside the regenerated riparian corridor within the site, and its associated landscape pocket parks and amenity zones, and
- a fire trail that runs through a pleasantly landscaped frontage to the main bushland edge.

The above pedestrian systems provides for a series of pleasant recreational circuits through the site.

5.00 SITE MANAGEMENT

An integrated Bushfire / Landscape Management Plan would be prepared for the site at the D.A. stage, as follows:

- Management of the bushland on site would be undertaken by a Bushland Regeneration Contractor (BRC).
- A bushland regeneration management approach would be prepared and annexed to the Community Management Statement. The goal of this approach would be (as far as practicable and within the limits of the specified fuel load management and landscaped design requirements), to achieve:
    - a self-perpetuating natural community characteristic of that that would have existed upon the site prior to European colonisation, to the conserved and high value habitat creation areas, i.e. Sydney Sandstone Gully Forest (mesic and sclerophyll forms), and
    - a modified landscape setting that meets aesthetic, functional and specified habitat creation goals.
- The BRC would be trained by a Bushfire Management Consultant (BMC) in how to maintain fuel loads at the required ground fuel levels. Fuel loads would be reduced by environmentally sensitive methods, e.g. manual removal.
- The BMC would be engaged to audit the work of the BRC in August or September of each year. The BMC would report to the Body Corporate on the findings of each audit and note any non-compliance. It would be the responsibility of the Body Corporate to enforce compliance by the BRC to the requirements of the BMC's report. The works would need to be completed to the satisfaction of the BMC prior to October 1 (official commencement date for the bushfire season). The BMC would report in writing to the Body Corporate by mid-October confirming that the works had been undertaken to the required standard. The Body Corporate would forward this report to the Rural Fire Service (RFS), such that it is received by the Authority no later than the end of October.

  In addition to the above, a Domestic Animal Management Plan would be prepared for the site to ensure appropriate safeguards are put in place with regard to resident ownership and management of pets.

5.01 ADAPTIVE MANAGEMENT

The above management approach would be an adaptive one (see Figure 10), that can be reviewed upon request on an annual basis by the Bushfire Management Consultant, in consultation with other specialists / stakeholders as appropriate, e.g. the Bushland Regeneration Contractor, Landscape Architect, Council, etc. The aim of the management process is to facilitate the establishment and on-going creative development of a high quality 'urban/bushland community precinct' that maximises both environmental and urban design outcomes. However, where any proposed change to the management plan has the potential to impact adversely upon bushfire safety outcomes, the final decision on what changes (if any) can be made would rest with the Bushfire Management Consultant.

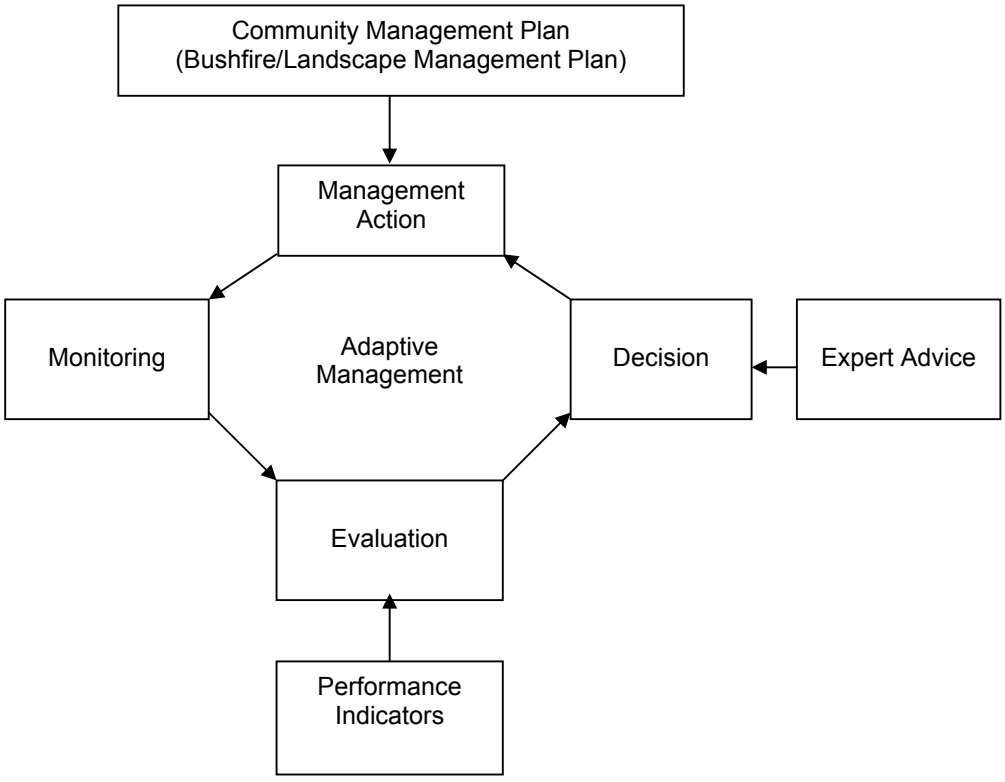

Figure 10: Adaptive Management Flow Diagram

6.00 CONCLUSI ON

Woodlands provides environmentally sound outcomes for the site, and a significant improvement over the current conditions, as follows:

- Conservation of:
  - the majority of the SSGF remnant within the northern corner of the site and bush management of the bushfire buffer (OPA) edge
  - the remnant trees to the eastern corner of the site that were considered by the consultant arborist to be significant
  - much of the remnant bushland along the south-west boundary of the site
- Creation of new habitat in the form of:
  - fully structured riparian and riparian buffer communities to the upper part of the site
  - a pool and riffle sequence to the upper part of the watercourse designed for specific aquatic organisms, e.g. yabbies
  - landscape development to the remainder of the site focussing on specific habitat for ecologically desirable species
- High percentage use of locally endemic species within the development, including:
  - 100% locally endemic species of local provenance within the high value habitat creation areas
  - High percentage use of locally endemic species of local provenance within the supplementary habitat creation areas
- Integrated management of the above with periodic bushfire fuel hazard reduction measures, facilitated by means of a Bushfire / Landscape Management Plan
- Maintenance of existing stormwater run-off quality utilising a range of sensitively implemented WSUD techniques, with an objective to improve upon this outcome
- Collection of litter conveyed via the stormwater system from the entire catchment of the site, thereby preventing its entry into the Lane Cove National Park, and if technically feasible, the upgrading of this system to full GPT's that will collect fines in addition to litter, and thereby reduce pollutant loads into downstream waters
- Preparation of a Domestic Animal Management Plan to ensure appropriate safeguards are put in place with regard to resident ownership and management of pets.
- Creation of a development that:
  - effectively integrates medium density residential development within an environmentally sensitive perimeter and downstream catchment
  - provides a level of environmental values within the development site not seen since its initial development as a rifle range over half a century ago