COMPARATIVE ENVIRONMENTAL

AND

BIODIVERSITY ASSESSMENT

FOR

PROPERTY AT

14 – 16 WYATT AVENUE,

BELROSE NSW 2085

Prepared for:

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Consultants experience

The directors of 'Actinotus Consultancy Services (ACS) – Environmental P/L' (formerly Actinotus Environmental Consultants) have collectively worked in the area of biodiversity impact and bushfire hazard assessment services for a period of greater than 20 years. They also have over 30 years of experience in scientific research (ecological, genetic) and teaching in biological science.

The principals of the former 'Actinotus Environmental Consultants' have completed the NSW Consulting Planners Bushfire Training Course organised by the Planning Institute of Australia NSW Division for planning consultants and allied professionals relating to the implementation of 'Planning for Bushfire Protection', in June 2003.

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EXECUTIVE SUMMARY

'ACS (Actinotus Consultancy Services) – Environmental' were commissioned to undertake a biodiversity survey and environmental constraints analysis assessment on an area of residential land at 14 – 16 Wyatt Avenue, Belrose, the lower section of which is predominantly used as horse paddocks. The far north-east section of the land contains a small extent of natural vegetation over an area of about 360m^2 (representing about 3% of the total site area of 11,609^{2}m) that also contains some significant rock outcropping.

This current survey and assessment is in response to the draft mapping of environmental constraints and biodiversity assessment contained in the Draft Oxford Falls Valley - Belrose North Strategic Review (2013) produced by The Department of Planning and Warringah Council.

The small patch of local ecological plant community is most likely described as 'Hornsby Sandstone Exposed Bloodwood Woodland (Code: S_DSF11) grading into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) (DECCW 2009).

The primary environmental constraints addressed in the Draft Oxford Falls Valley - Belrose North Strategic Review (2013) mapping document for all land included in the Oxford Falls/North Belrose precincts include the following:

- Significant vegetation;
- Threatened species habitat;
- Wildlife corridors and/or core habitat; and
- Riparian constraints

Ground-truthing of the small area of natural vegetation at the lower north-east section of the land concurs with mapping by DECCW (2009) and mapping by the Strategic Review Committee that the plant community does not represent Significant Vegetation.

The code given in Table 2 for Significant Vegetation at the subject site is '3' and this is considered anomalous and should be changed to '0' as is the case for the similarly cleared adjoining properties in the area.

The small area of natural vegetation at the lower north-east section of the land represents <5% of the total area of the land in relation to habitat parameters for both native flora and fauna. This is compared with the 95% of the subject site that is either cleared, grazed, landscaped or areas that are weed-occupied, and does not provide consistent utilizable habitat for indigenous species.

The code given in Table 2 for Wildlife Corridors and Core Habitat at the subject site is '1' and this is considered anomalous and could be changed to '0'.

The habitat of the small patch of remnant woodland at the subject site does contain some rock crevice habitat for shelter for the threatened species, Rosenbergs Goanna, though this would be suboptimal due to the proximity of human and domestic animal habitation. As such, the likelihood of its potential occurrence at the subject site is unlikely.

The code given in Table 2 for Threatened Species Habitat at the subject site is '2', however, this ranking is considered anomalous as qualified above and should be changed to '1'.

There is no evident drainage channel with defined creekbanks evident on the subject land. Overland flow occurs in high rainfall events where water directed down driveways and through pipes is released onto infilled and pasture-sown grassland and dissipated into natural bushland at the lower boundary of the subject site.

The code given in Table 2 for Riparian Land at the subject site is '3' compared to that at No. 18 - 20 Wyatt Avenue where the indicative score index is '0' and where water is similarly directed downslope via plastic piping. This rank coding for riparian land at the subject site is considered anomalous as qualified above and should be changed to '0'.

It is concluded that the best fit for the assessment of environmental constraint parameters is derived from detailed and intensive field survey and analysis of the environmental attributes occurring at the subject land at 14 – 16 Wyatt Avenue, Belrose, in contrast to indices assessed for environmental constraint parameters at the site as listed by the Draft Strategy Committee (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013).

As such, it is considered that a cumulative score for infrastructure and environmental constraints parameters is more objectively given by a score of 7 for the 'Rating 2' category in Table 2. This aggregate score would subsequently relate more accurately to a potential future development of 'CATEGORY A' inferring **'**Low restriction to development' (scores from 2 – 10) compared to the 'CATEGORY C' ranking inferring **'**Significant restriction to development' (scores of 15 and above) as derived by the Draft Oxford Falls Valley – Belrose North Strategic Review (2013).

1 INTRODUCTION

1.1 Background

'ACS (Actinotus Consultancy Services) – Environmental' were commissioned to undertake a biodiversity survey and environmental constraints assessment on an area of residential land at 14 – 16 Wyatt Avenue, Belrose, the lower section of which is predominantly used as horse paddocks (Figure 1). The far north-east section of the land contains a small extent of natural vegetation over an area of about 360m^2 with significant rock outcropping (Figure 1).

This current survey and assessment is in response to the draft mapping of environmental constraints and biodiversity assessment contained in the Draft Oxford Falls Valley - Belrose North Strategic Review (2013) produced by The Department of Planning and Warringah Council.

Figure 1 is an aerial view of the subject land showing the extent of clearing and small section of natural vegetation occurring at the far north-east section of the property.

Figure 1 – Aerial view of subject land at 14 – 16 Wyatt Avenue, Belrose showing extent of clearing and small tract of natural vegetation occurring in lower north-east section of land

The primary environmental constraints addressed in the Draft Oxford Falls Valley - Belrose North Strategic Review (2013) mapping document for all land included in the Oxford Falls/North Belrose precincts include the following:

- Significant vegetation;
- Threatened species habitat;
- Wildlife corridors and/or core habitat;
- Riparian constraints; and
- Potential zoning of subject land

1.2 Statutory and legislative control instruments

Planning controls that have been addressed in comprehensive biodiversity studies on the subject land are listed below.

Planning controls provided by State and Commonwealth Legislation include the following:

- *Environmental Planning and Assessment Act (EP & A Act)(1979)*,
- *Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)(1999),*
- *Threatened Species Conservation Act (TSC Act)(1995).* The *Threatened Species Conservation Act (TSC Act)(1995)* includes Preliminary Determinations of the NSW Scientific Committee (to August 2013) as well as Provisional Listings of Endangered Species on an emergency basis (to August 2013)*,*
- *Noxious Weeds Act (1993).*

Local Council planning controls and documentation include:

- *Warringah Council Local Environmental Plan (2000).*
- *Warringah Council Local Environmental Plan (2011) Land Application Map.*
- *Warringah Council Development Control Plan (2011)*
- *Warringah Council Creek Management Study (2004).*
- *Warringah Council Policy – Policy No. PL 740 Waterways 'Protection of Waterways and Riparian Land Policy (2010).*
- *Vegetation History and Wildlife Corridors (Smith & Smith 2009)* update of the *Natural Area Survey - Vegetation History and Wildlife Corridors (Smith & Smith 2005)*
- *Warringah Biodiversity Conservation Study (Eco Logical 2011).*
- *Draft Oxford Falls Valley – Belrose North Strategic Review* (2013)

1.3 Objectives and scope of the study

This assessment report includes an account of:

- The description and status of the ecological community that occurs on the subject property;
- The species of threatened flora and fauna species, populations, endangered ecological communities and their habitats, as listed under the Threatened Species Conservation Act (TSC Act), 1995 that have been recorded in the locality of the subject site and an appraisal of the likelihood of their occurrence in the subject area;
- The assessment of riparian corridors and other riparian issues on the subject land; and
- The assessment of potential wildlife corridors and core habitat values that may occur on the subject land.

1.4 Study methodology

Currently existing information on 'Threatened Flora of the Locality', defined as a 1km radius around the site, was accessed from the OEH Atlas of NSW Wildlife (August 2013) and the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) Environmental Reporting Tool (August 2013) databases.

A survey was undertaken on foot (diversity search method of Cropper 1993, DEC 2004) to identify the existence of extant ecological communities present on the subject area.

The extent of noxious and other weed incursions on the subject area of the property was also assessed.

2 EXISTING ENVIRONMENT

2.1 Topography, geology and soils

The site has a north-western aspect. The topography of the subject site is a steady down-slope hillside, the northern-most down-slope gradient estimated at about 10 - 15^{O}.

The local substrate geology of the subject area is the Triassic Hawkesbury Sandstone (Herbert 1983). The Hawkesbury Sandstone substrate is largely comprised of medium to coarse-grained quartz sandstone with very minor shale and laminite lenses (Herbert 1983).

The soil landscapes particular to the surveyed area are the residual 'Somersby' Soil Landscape Series overlying the erosional 'Gymea' Soil Landscape Series (Chapman & Murphy 1989).

The 'Somersby' Soil Landscape Series is characterised by gently undulating to rolling rises on deeply weathered Hawkesbury Sandstone plateau with gentle relief and where occurring on broad crests and convex valleys, rock outcropping is low. The 'Gymea' soil landscape series is characterised by undulating to rolling rises and low hills on Hawkesbury Sandstone. Gradients usually range from 10 - 25%, with <25% rock outcropping. Other features of this landscape are moderately inclined side-slopes with wide benches and localized rock outcrops on low broken scarps (Chapman & Murphy 1988, Hill & Williams 1997).

Soil material derived from differential weathering of Somersby soil landscape substrates includes yellow earths and earthy sands on mid-slopes (Chapman & Murphy 1983). Soil material formed from differential erosion and weathering of Gymea soil landscape substrates include shallow to moderately deep earthy sands and yellow earths on crests and on the inside of benches (Chapman and Murphy 1989).

2.2 Existing vegetation

Figure 2 indicates the distribution of various vegetative units occurring on the subject land.

The lower and upper sections of the land are separated by a row of planted landscaped trees including Swamp Oak, Coast Banksia, Sweet Pittosporum, Sydney Golden Wattle and Tick Bush (Figures 2 & 3).

The lower grassed section of the land is cleared exotic grassland currently actively grazed by horses, the cleared grassland extending in part to the rear boundary of the land (Figures 1, 2 & 4).

Other significant exotic species distributions include a large individual of Camphor Laurel and along the western boundary, a screen of low shrubs of Cassia (*Senna pendula* var *glabrata*) (Figures 2 & 5).

A small section of vegetation occurring at the northern boundary of the subject land includes natural woodland retained among an outcrop of exposed sandstone (Figures 2 & 6). Natural bushland is contiguous with this patch of woodland beyond the northern boundary of the land (Figures 1 & 2).

Figure 2 - Aerial depiction of the subject property indicating the local distribution of natural, exotic and landscaped vegetative units occurring at the site.

Figure 3 - Landscaped planted row of trees such as Coast Banksia, Swamp Oak, Sweet Pittosporum at junction of landscaped upper yard area and horse paddocks

Figure 4 - Exotic grazed grassland section of horse paddock extending downslope to rear boundary indicating exotic shrubs of Cassia and Green Cestrum to left and right of image and individuals of indigenous tree species towards rear of subject land.

Figure 5 - Indicating exotic shrubs of Cassia extending along lower western boundary of subject land

Figure 6 - View upslope from northern lower section of subject land indicating sandstone rock outcropping and small extent of associated remnant native bushland

Appendix 1 is an account of indigenous and exotic species occurring within the distribution of natural vegetation occurring at the site.

The area of natural vegetation and rock outcropping retained at the subject site is estimated at about 360m^2. The canopy of the small area of natural vegetation retained at the subject land is about 20% CCPD (DEC 2002) with tree heights from 12 – 14m tall (Figure 6). Tree species include Red Bloodwood (*Corymbia gummifera*), Sydney Red Gum (*Angophora costata*) and Silvertop Ash (*Eucalyptus sieberi*) with Sydney Peppermint (*Eucalyptus piperita*) and Grey Gum (*Eucalyptus punctata*) occurring among the assemblage further downslope beyond the property boundary.

A total of 14 indigenous small tree, shrub and sub-shrub species were evident in the woodland assemblage. Many of the smaller sub-shrub and shrub species have been grazed to ground level by horses.

A total of 9 ground stratum species including geophytes and grasses were evident in the ground layer. Again significant grazing pressure has reduced much of this stratum to ground surface distributions.

The local ecological plant community is most likely described as 'Hornsby Sandstone Exposed Bloodwood Woodland (Code: S_DSF11) grading into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) (DECCW 2009).

2.3 Current land use

The current land use of the subject property is residential with landscaped gardens in the upper sections of the land and active grazing by horses throughout much of the lower, northern sections of the site (Figures 1, 2 & 3).

2.4 Summary of environmental attributes of area of natural vegetation at site

Table 1 - Summary of the relevant environmental features of the natural vegetated area of the subject site:

Attribute	Description of attribute at subject site
Geology	The local substrate geology of the subject area is the Triassic Hawkesbury Sandstone (Herbert 1983). The Hawkesbury Sandstone substrate is largely comprised of medium to coarse-grained quartz sandstone with very minor shale and laminite lenses (Herbert 1983)
Soil landscape (description)	The soil landscapes particular to the surveyed area are the residual 'Somersby' Soil Landscape Series overlying the erosional 'Gymea' Soil Landscape Series (Chapman & Murphy 1989). The 'Somersby' Soil Landscape Series is characterised by gently undulating to rolling rises on deeply weathered Hawkesbury Sandstone plateau with gentle relief and where occurring on broad crests and convex valleys, rock outcropping is low. The 'Gymea' soil landscape series is characterised by undulating to rolling rises and low hills on Hawkesbury Sandstone. Gradients usually range from 10 - 25%, with <25% rock outcropping. Other features of this landscape are moderately inclined side-slopes with wide benches and localized rock outcrops on low broken scarps (Chapman & Murphy 1988, Hill & Williams 1997).
Topography and aspect	The site has a north-western aspect. The topography of the subject site is a steady down-slope hillside.
Gradient	The northernmost down-slope gradient is estimated at about 10 - 15^{O}. The gradient over which rock outcropping occurs is up to 25^{O}
Extent exposed sandstone	The extent of exposed sandstone rock over the subject site is probably about 3%, though within the area of natural bushland at the lower section of the land the extent of rock exposure is about 60% of the wooded area.
Vegetation type	The local ecological plant community is most likely described as 'Hornsby Sandstone Exposed Bloodwood Woodland (Code: S_DSF11) grading into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) (DECCW 2009).
Canopy (%CCPD)	The canopy to 20% CCPD includes tree species to 12 – 14m tall such as Red Bloodwood (*Corymbia gummifera*), Sydney Red Gum (*Angophora costata*) and Silvertop Ash (*Eucalyptus sieberi*) (Figure 6) with Sydney Peppermint (*Eucalyptus piperita*) and Grey Gum (*Eucalyptus punctata*) occurring among the assemblage further downslope beyond the property boundary.
Understorey stratum (%CCPD)	The understorey stratum is sparse at <5% CCPD with many shrubs and subshrubs grazed to near ground level. Larger shrubs and small trees include Wattles, Tick Bush, Yellow Teatree, Sweet Pittosporum and Old Man Banksia (Figure 6) (Appendix 1).

Attribute	Description of attribute at subject site
Ground/ understorey stratum (%CCPD)	The ground stratum assemblage commonly includes Soft Bracken Fern (*Calochlaena dubia*) and Spiny-headed Mat-rush with other species occurring less frequently. Grazing of herbs, grasses and geophytes has reduced biomass to near ground level (Figure 6) (Appendix 1).
Is vegetation contiguous with neighbouring properties?	Canopy vegetation of native bushland is contiguous with surrounding natural vegetation down-slope of the subject site and on the eastern side-slope in the locality. Existing residential development occurs on either side and across Wyatt Avenue to the south of the subject land (Figures 1 & 2).

3 ENVIRONMENTAL BIODIVERSITY SURVEY AND COMPARATIVE ASSESSMENT

3.1 Methods

3.1.1 Literature review

The following planning instruments and environmental surveys, including draft mapping of biodiversity and environmental attributes of the specific site and surrounding lands, were consulted:

- *Warringah Council Local Environmental Plan (2011) Land Application Map.*
- *Warringah Council Development Control Plan (2011)*
- *Warringah Council Creek Management Study (2004).*
- *Warringah Council Policy – Policy No. PL 740 Waterways 'Protection of Waterways and Riparian Land Policy (2010).*
- *Vegetation History and Wildlife Corridors (Smith & Smith 2009)* update of the *Natural Area Survey - Vegetation History and Wildlife Corridors (Smith & Smith 2005)*
- *Warringah Biodiversity Conservation Study (Eco Logical 2011).*
- *Draft Oxford Falls Valley – Belrose North Strategic Review* (2013)

Existing information on 'Threatened Flora of the Locality', defined as an area of 1km radius around the site, was accessed from the DECCW Atlas of NSW Wildlife (1:100,000 map sheet 9130 Sydney - August 2013) and Commonwealth SEWPaC Environmental Reporting Tool (August 2013).

3.1.2 Site survey

As part of the comparative biodiversity survey, the subject site was inspected by 'ACS Environmental P/L' on 22nd August 2013. The survey included a biodiversity assessment noting dominant tree species, shrubs and small tree species, as well as ground cover species that comprised the main ecological communities that occur on the site. Riparian drainage lines and overland flow corridors were also noted.

3.2 Tabulated secondary environmental and infrastructure constraints relevant to development potential of private land

3.2.1 Background

A range of reforms were made in September 2005 to the Environmental Planning and Assessment Act, 1979 (EP & A Act) including the gazettal of the New South Wales Government's Standard Instrument (Local Environmental Plans) Order 2006 which required that all New South Wales

councils prepare new comprehensive Local Environmental Plans (LEPs) in a standard instrument format.

Warringah LEP 2000 is a unique local planning instrument that took a 'place based' approach to land-use planning rather than relying on traditional land use zones. It embodied the concept of 'a one stop planning shop' in that all applicable State Environmental Planning Policies (SEPPs) and Development Control Plans (DCPs) were contained within the one document (Draft Oxford Falls Valley – Belrose North Strategic Review 2013).

A place-based plan presented unique challenges for Warringah Council, relative to other councils, because translating this document into the standard instrument format required rationalising 73 place based 'localities' into standard instrument zones (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013).

Localities B2 Oxford Falls Valley and C7 Belrose North were proposed to be zoned E3 Environmental Management in the draft version of Warringah's standard instrument. This was based on a detailed translation methodology that was applied to all land within Warringah LGA (*Draft Oxford Falls Valley – Belrose North Strategic Review* (2013).

3.2.2 Draft Oxford Falls Valley – Belrose North Strategic Review (2013)

The Strategic Review (Draft Oxford Falls Valley – Belrose North Strategic Review 2013) was initiated in response to stakeholder concern regarding the adequacy of consultation during the preparation of the Warringah Local Environmental Plan 2011 (LEP 2011). The purpose of the strategic review has been to translate the planning controls under Warringah Local Environmental Plan 2000 (LEP 2000) into the best-fit zones and land use controls under Warringah LEP 2011 and to engage the community in the process.

Table 2 indicates the potential environmental and infrastructure constraints in relation to development numbered as a weighted score for properties on either side, and including the subject land at 14 – 16 Wyatt Avenue, Belrose. A total of 13 infrastructure and environmental constraints were considered with ranked scores given for each criterion for each street address (Site ID) (Table 2) such that the least constrained total score possible was '2' while the most constrained score was '54' (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013).

The Project Control Group (PCG) informing the Strategic Review (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013) agreed to apply composite scores to be determined by aggregating each individual score for the potential secondary constraint which were categorized such as follows (Table 2):

- **CATEGORY A –** Low restriction to development (scores from 2 – 10)
- **CATEGORY B –** Moderate restriction to development (scores from 11 – 14)
- **CATEGORY C –** Significant restriction to development (scores of 15 and above)

The PCG has recommended that sites that fall under 'Category C' should be considered for inclusion into the E3 Environmental Management Zone as they have levels of environmental significance that can be directly correlated with the objectives of the E3 Environmental

Management Zone and consistent with the proposed future character for both the C8 Belrose North and B2 Oxford Falls Valley localities under the WLEP 2000.

Site ID	Address	Heritage	Bushfire	Centres	Transport	Infrastructure	Telecoms	Riparian
A1	26 Wyatt Avenue BELROSE 2085	0	2	3	2	0	0	3
A2	24 Wyatt Avenue BELROSE 2085	0	2	3	2	0	0	3
A3	18-20 Wyatt Avenue BELROSE 2085	0	2	2	2	0	0	0
A4	18-20 Wyatt Avenue BELROSE 2085							
A5	14-16 Wyatt Avenue BELROSE 2085	0	2	2	2	0	0	3
A6	12-10 Wyatt Avenue BELROSE 2085	0	2	2	2	0	0	3
A7	8 Wyatt Avenue BELROSE 2085	0	2	2	2	0	0	0
A8	8 Wyatt Avenue BELROSE 2085	0	2	2	2	0	0	0

Site ID	Address	Sig Veg	Corridor / Habitat	Th Spec	Flooding	Wetland Buffer	Cumulative Score	Rating 1	Rating 2
A1	26 Wyatt Avenue BELROSE 2085	0	0	3	0	0	13	B	B
A2	24 Wyatt Avenue BELROSE 2085	0	0	2	0	0	12	A	B
A3	18-20 Wyatt Avenue BELROSE 2085	0	1	2	0	0	9	A	A
A4	18-20 Wyatt Avenue BELROSE 2085								
A5	14-16 Wyatt Avenue BELROSE 2085	3	1	2	0	0	15	B	C
A6	12-10 Wyatt Avenue BELROSE 2085	3	1	0	0	0	13	B	B
A7	8 Wyatt Avenue BELROSE 2085	3	1	3	0	0	13	B	B
A8	8 Wyatt Avenue BELROSE 2085	0	1	0	0	0	7	A	A

Table 2 - indicates the potential environmental and infrastructure constraints in relation to development, each criterion numbered as a weighted score for properties on either side, and including the subject land at 14 – 16 Wyatt Avenue, Belrose (from (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013).

3.3 Comparison of environmental criteria cited in Draft Strategic Biodiversity Review with current surveys and assessment

3.3.1 Significance of plant community (Significant Vegetation)

3.3.1.1 Description and status of local ecological community

Description

The local ecological plant community at the subject site is most likely described as 'Hornsby Sandstone Exposed Bloodwood Woodland' (Code: S_DSF11) grading further downslope into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) (DECCW 2009).

The canopy of the small extent of natural vegetation at the subject land is comprised of trees including Red Bloodwood (*Corymbia gummifera*), Scribbly Gum (*Eucalyptus haemastoma*), Sydney Red Gum (*Angophora costata*) and Silvertop Ash (*Eucalyptus sieberi*), with Sydney Peppermint (*Eucalyptus piperita*) and Grey Gum (*Eucalyptus punctata*) occurring among the assemblage further downslope beyond the property boundary.

'Hornsby Sandstone Exposed Bloodwood Woodland' (Code: S_DSF11) occurs on free-draining sandstone-derived soils on crests and exposed gully slopes where soil development is generally poor (DECCW 2009). This vegetation community grades into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) further downslope occurring on sandstone outcropped gully slopes away from exposed ridges and slopes (DECCW 2009).

Conservation status in local area

The Hornsby Sandstone Exposed Bloodwood Woodland vegetation in the locality is conserved extensively in a number of reserves of northern Sydney and the Central Coast hinterland including Garigal and Kur-ing-gai National Parks (DECCW 2009).

Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest vegetation in the locality has been mapped by DECCW (2009) (Figure 7) and is conserved extensively in Garigal, Royal, Heathcote and Dharawal reserves (DECCW 2009).

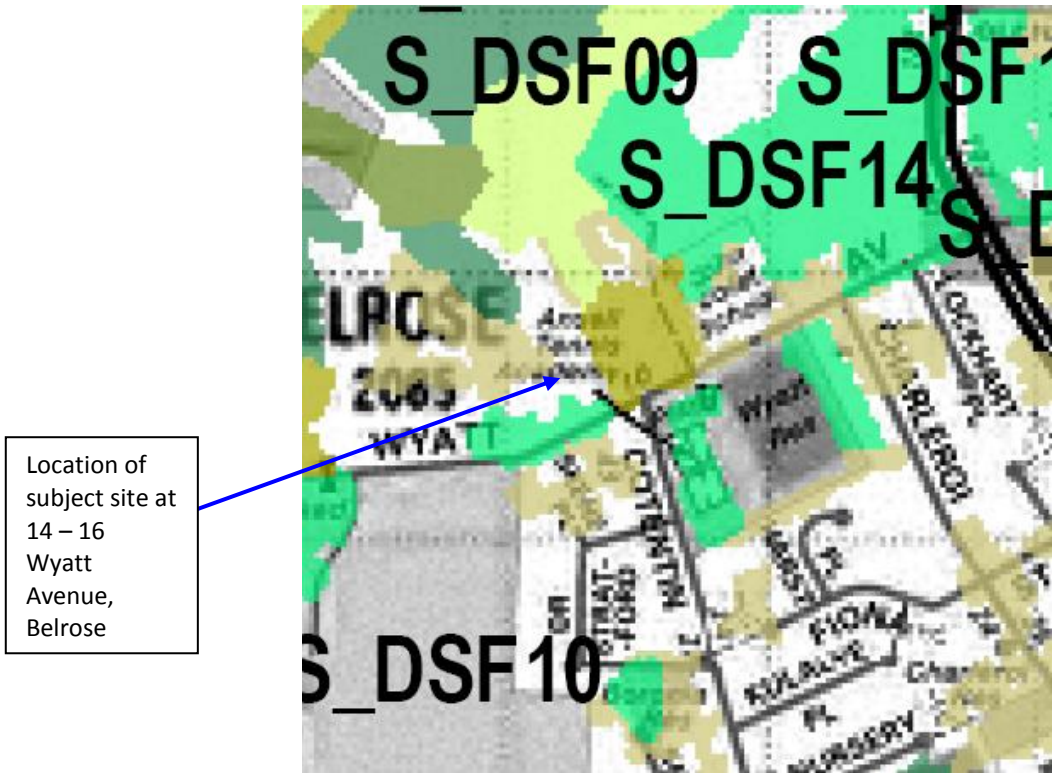

Figure 7 – Vegetation community mapping of local area, including subject site, by DECCW (2009). The dark green shading represents Sandstone Woodland communities, the light green shading (S_DSF09) represents Sheltered Peppermint-Apple Forest. Olive green shading represents weeds and exotics. The bright green shading (S_DSF14) has been erroneously mapped along Wyatt Avenue at the location of No. 14 – 16 Wyatt Avenue.

TSC Act* and *EPBC Act

The ecological communities occurring on and in the vicinity of the subject land are common in the locality and are not listed as threatened under registers of the *TSC Act* or the *EPBC Act.*

3.3.1.2 Comparison of environmental indicators for Significant Vegetation

Mapping by Strategic Biodiversity Survey

The mapping of Significant Vegetation by the Strategic Review Committee at the subject site at 14 – 16 Wyatt Avenue indicates no significant vegetation community occurring at the site (Figure 8) (Draft Oxford Falls Valley – Belrose North Strategic Review 2013).

This mapping concurs with both the mapping by DECCW (2009) for the locality and the ground-truthing survey and confirmation of description of the community as defined in DECCW (2009).

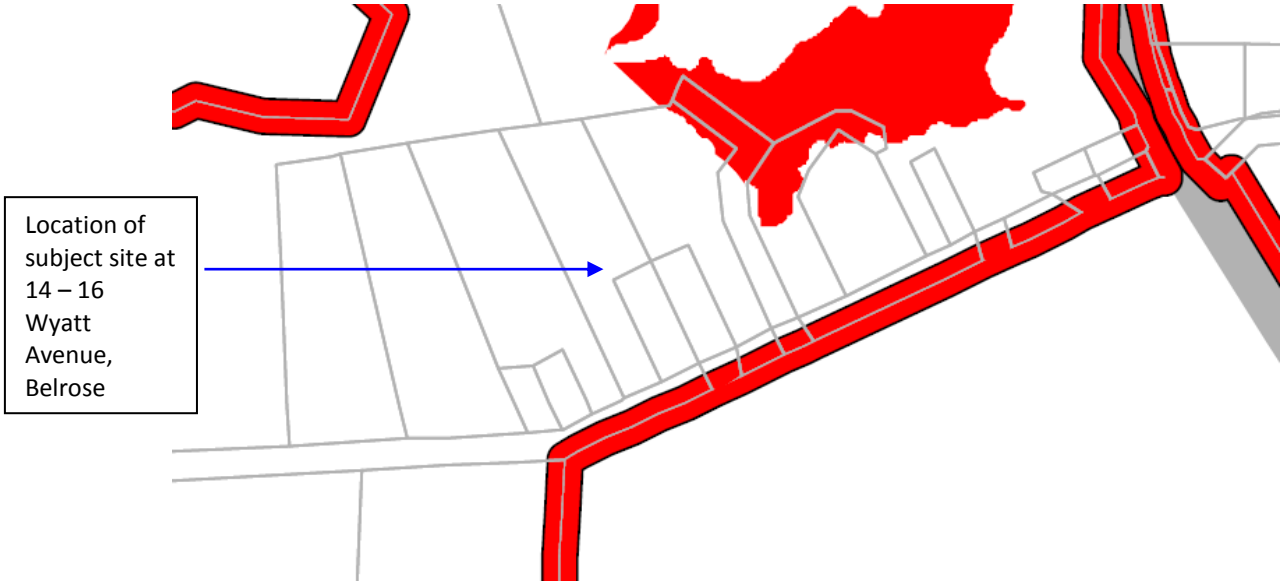

Figure 8 - Mapping by Strategic Review Committee of subject site and surrounds. The red shading represents significant vegetation.

Comment & recommendation in relation to comparative assessment of 'Significant Vegetation'

Ground-truthing of the small area of natural vegetation at the lower north-east section of the land concurs with mapping by DECCW (2009) (Figure 7) and mapping by the Strategic Review Committee (Figure 8) that the plant community does not represent Significant Vegetation.

The code given in Table 2 for Significant Vegetation at the subject site is '3' and this is considered anomalous and should be changed to '0' as is the case for the similarly cleared properties in the locality.

3.3.2 Wildlife Corridor or Core Habitat constraint

3.3.2.1 Description and status of wildlife corridor or core habitat

The area of natural vegetation including rock outcropping at the subject site is about 360m^2, this representing less than 5% of the total area of the property. The remaining 95% of the area is either grazed or landscaped with exotic grasses and planted trees, most of which are not extant in the locality, or otherwise the cover is represented by woody weeds such as Cassia, Privet, Lantana, Camphor Laurel etc (Figures 1, 2, 4 & 5). Wyatt Avenue is a residential urban street with dwelling houses occupying both sides of the street (Figures 1 & 2).

The mostly cleared area of the subject site does not represent a significant wildlife corridor or core habitat for any species of threatened flora or fauna. The distribution of natural vegetation at the lower section of the site is locally very small in relation to contiguous bushland occurring to the north and is discontinuous with other natural vegetation to the south, west or east (Figure 1 & 2).

3.3.2.2 Comparison of environmental indicators for Wildlife Corridors and Core Habitat

Mapping by Strategic Biodiversity Survey

The mapping of Wildlife Corridors or Core Habitat by the Strategic Review Committee at the subject site at 14 – 16 Wyatt Avenue indicates that the subject site is part of a 'Regional Habitat Corridor' (Figure 9) (Draft Oxford Falls Valley – Belrose North Strategic Review 2013).

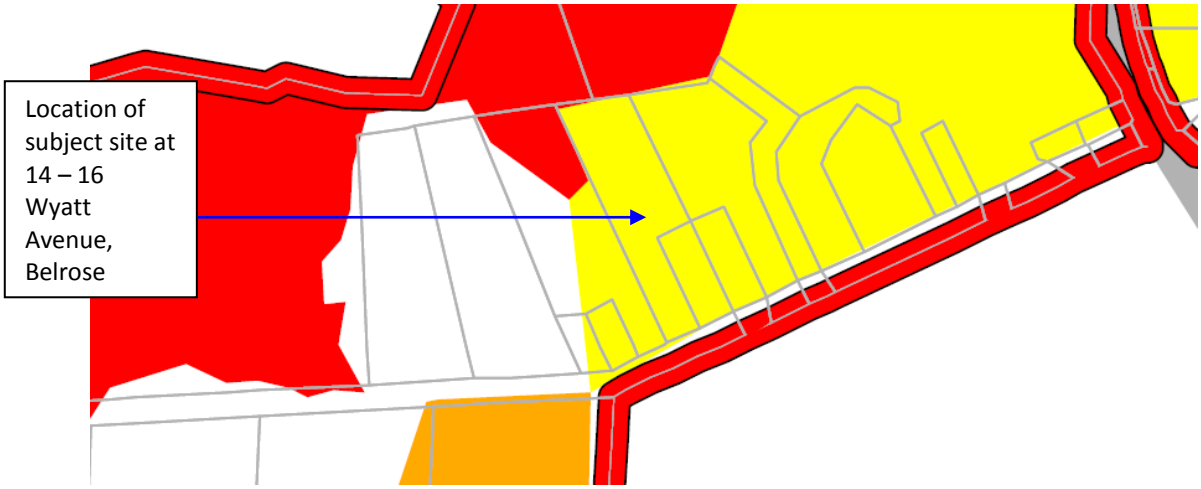

Figure 9 - Mapping by Strategic Review Committee of subject site and surrounds. The yellow shading represents 'Regional Habitat Corridor'

Further revised mapping of wildlife corridors and draft core habitats also indicates the subject site as part of a 'Wildlife Corridor' (Figure 10).

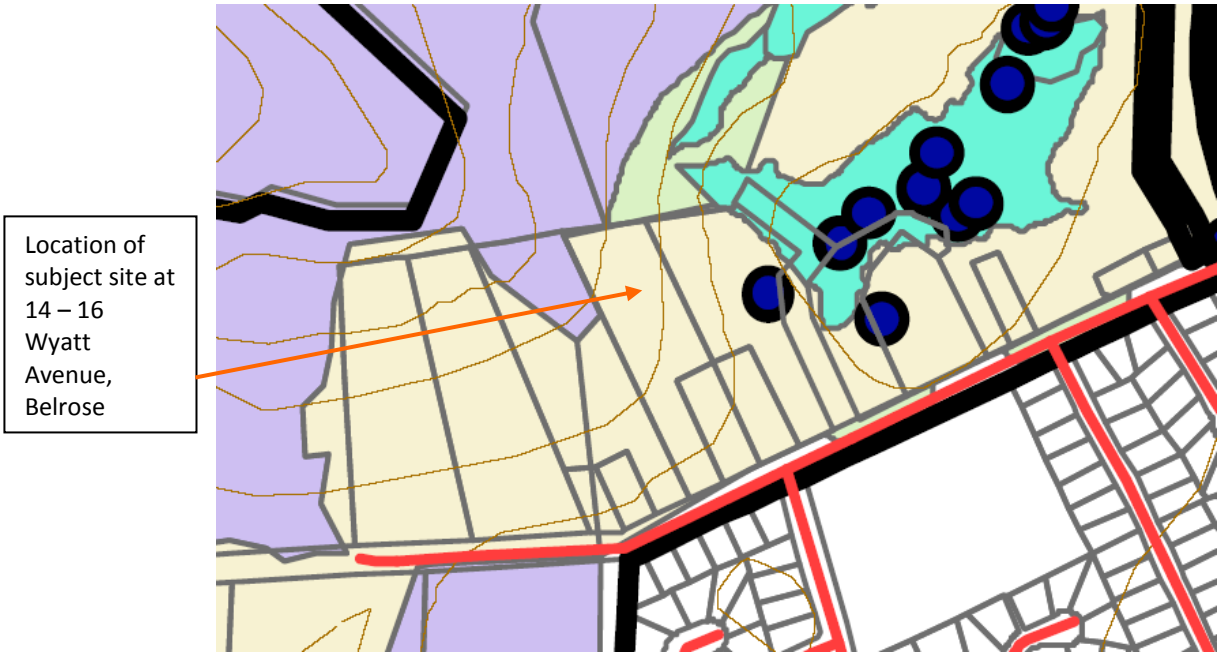

Figure 10 – Revised mapping by Strategic Review Committee of subject site and surrounds. The beige shading represents 'Draft Revised Wildlife Corridor'

Comment & recommendation in relation to comparative assessment of 'Wildlife Corridor or Core Habitat'

The small area of natural vegetation at the lower north-east section of the land represents <5% of the total area of the land in relation to habitat parameters for both native flora and fauna. This is compared with the 95% of the subject site that is either cleared, grazed, landscaped or areas that are weed-occupied and does not provide consistent utilizable habitat for indigenous species.

The code given in Table 2 for Wildlife Corridors and Core Habitat at the subject site is '1' and this is considered anomalous and could be changed to '0'.

3.3.3 Threatened Species Habitat Constraint

3.3.3.1 Potential for occurrence of threatened species and threatened species habitat at subject site

The area of natural vegetation including rock outcropping at the subject site is about 360m^2 which represents less than 5% of the total area of the property. The remaining 95% of the area is either grazed or landscaped with exotic grasses and planted trees, most of which are not extant in the locality, or the cover is represented by woody weeds such as Cassia, Privet, Lantana, Camphor Laurel etc (Figures 1, 2, 4 & 5).

The mostly cleared area of the subject site does not represent habitat for any species of threatened flora or fauna as the distribution of natural vegetation at the lower section of the site is locally very small in relation to contiguous bushland to the north (Figure 1 & 2).

From Atlas of NSW Wildlife records (August 2013) for threatened flora and fauna occurring within 1km of the subject site, the following threatened species have been recorded in the vicinity:

- Caleyi's Grevillea (*Grevillea caleyi*);
- Red-crowned Toadlet (*Pseudophryne australis*); and
- Rosenberg's Goanna (*Varanus rosenbergi*)

1. Caleyi's Grevillea

Restricted to an 8 km square area around Terrey Hills, approximately 20 km north of Sydney. Occurs in three major areas of suitable habitat, namely Belrose, Ingleside and Terrey Hills/Duffys Forest within the Ku-ring-gai, Pittwater and Warringah Local Government Areas.

All natural remnant sites occur within a habitat that is both characteristic and consistent between sites.

All sites occur on ridgetops between elevations of 170 to 240m asl, in association with laterite soils and a vegetation community of open forest, generally dominated by Eucalyptus sieberi and *E. gummifera*.

Commonly found in the endangered Duffys Forest ecological community (OEH 2013).

Comment: The habitat of the small patch of remnant woodland at the subject site does not occur on the ridgetop and the shallow skeletal and yellow earth soils are not associated with lateritic sedimentation. The nearest occurrences of Caleyi's Grevillea occurs some 300m to the north-east in the vicinity of the John Colet School. The likelihood of its potential occurrence at the subject site is highly unlikely.

2. Red-crowned Toadlet

The Red-crowned Toadlet's range coincides with the Hawkesbury Sandstone geology of the Sydney Basin Bioregion including densely populated urban areas of Sydney. Known records are distributed in a belt around, but not on the Cumberland Plain. The range limits of the species have not been extended significantly despite intensive surveys in recent years.

The Red-crowned Toadlet shows considerable ecological specialisation. Suitable habitat follows the interface of Hawkesbury Sandstone and shale e.g. the Wianamatta and Narrabeen Shales, with individuals found below sandstone ridges, generally where shale lenses are weathering at the base of cliff lines. The species deposits eggs in terrestrial nests beneath rocks and logs or in leaf litter. The Toadlet relies on rainfall to wash the partially developed tadpoles into ephemeral creeks for completion of the reproductive cycle (OEH 2013).

Comment: The habitat of the small patch of remnant woodland at the subject site does not occur at the interface of Hawkesbury Sandstone and shale e.g. the Wianamatta and Narrabeen Shales, where individuals may occur below sandstone ridges, generally where shale lenses are weathering at the base of cliff lines. The nearest occurrences of Red-crowned Toadlet occur some 500m to the north-west in the vicinity of the Fireclay Gully. The likelihood of its potential occurrence at the subject site is highly unlikely.

3. Rosenbergs Goanna

Rosenbergs Goanna is found in heath, open forest and woodland.

Its food resources are associated with termites, the mounds of which this species nests in; termite mounds are a critical habitat component.

Individuals require large areas of habitat.

The species also feeds on carrion, birds, eggs, reptiles and small mammals.

The species shelters in hollow logs, rock crevices and in burrows, which they may dig for themselves, or they may use other species' burrows, such as rabbit warrens (OEH 2013)

Comment: The habitat of the small patch of remnant woodland at the subject site does contain some rock crevice habitat for shelter, though this would be suboptimal due to the proximity of human and domestic animal habitation. The nearest recorded occurrences of Rosenbergs Goanna occur some 800m to the north-west in the vicinity of the Fireclay Gully. The likelihood of its potential occurrence at the subject site is unlikely.

3.3.3.2 Comparison of environmental indicators for potential occurrence of threatened species

Mapping by Strategic Biodiversity Survey

The mapping of Threatened Species Habitat by the Strategic Review Committee at the subject site at 14 – 16 Wyatt Avenue indicates that the subject site includes mainly 'Low Habitat' where the land has been cleared and grazed or landscaped (Figure 11). The patch of retained natural bushland and rock outcropping however, indicate "Potential Habitat' (Draft Oxford Falls Valley – Belrose North Strategic Review 2013).

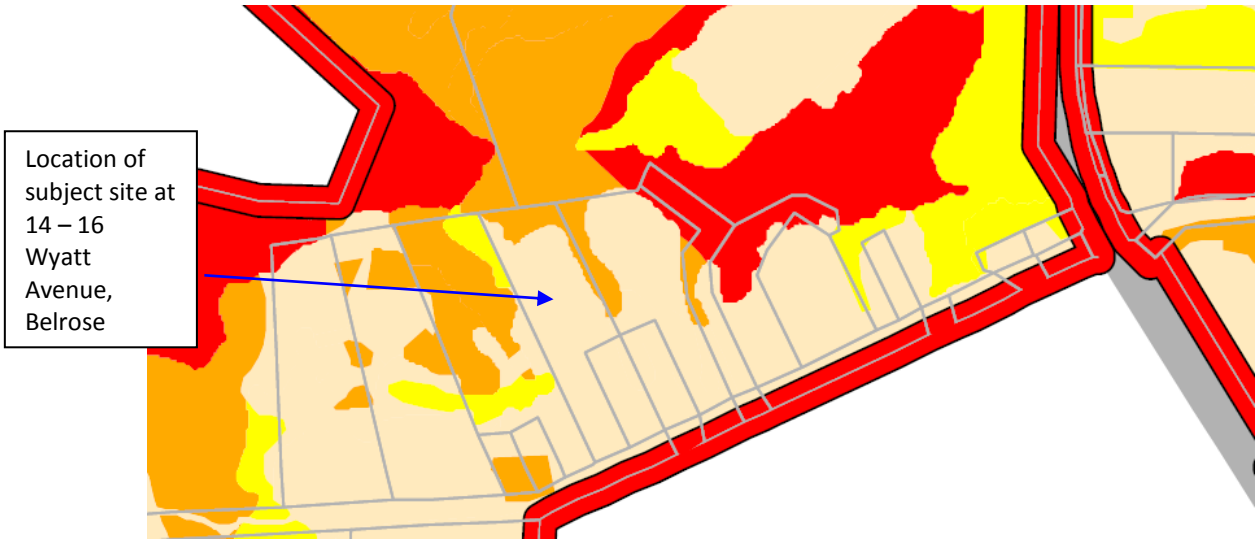

Figure 11 - Mapping by Strategic Review Committee of subject site and surrounds. The pale orange shading represents 'Low ranked Habitat for Threatened Species' whereas the dark orange shading represents 'Potential ranked Habitat for Threatened Species'

Comment & recommendation in relation to comparative assessment of 'Threatened Species Habitat'

The small area of natural vegetation at the lower north-east section of the land represents <5% of the total area of the land in relation to habitat parameters for both native flora and fauna. This is compared with the 95% of the subject site that is either cleared, grazed, landscaped or weed-occupied areas that do not provide suitable habitat for threatened species.

The habitat of the small patch of remnant woodland at the subject site does contain some rock crevice habitat for shelter for Rosenbergs Goanna, though this would be suboptimal due to the proximity of human and domestic animal habitation. As such, the likelihood of its potential occurrence at the subject site is unlikely.

The code given in Table 2 for Threatened Species Habitat at the subject site is '2' and this is considered anomalous as qualified above and should be changed to '1'.

3.3.4 Riparian Constraint

3.3.4.1 Potential for occurrence of riparian land at the subject site

The subject land has been modified such that there has been extensive clearing of native vegetation and some cut and fill construction at the lower sections of the land. The headwaters of any natural drainage channels that may have historically occurred on the land have been sown to pasture for grazing by horses. Stormwater overflowing from un-kerbed and un-guttered road edges flows down the unformed driveway is channelled through a pipe onto grassed areas into the horse paddocks (Figure 3) and flows overland across an exotic grassy grazed lawn surface into natural bushland below the subject land (Figure 4). Figure 4 indicates the grassed surface over which excess water flows to the north-west off the property and finally into a constructed and channelled drainage channel in bushland below the property boundary, the channel flowing from east to west into the natural tributary of Fireclay Gully Creek.

Consequently, it is considered that no natural riparian drainage line or buffer to natural drainage occurs at the subject land.

Figure 12 indicates the position of the creekline at Fireclay Gully from the 1: 25 000 topographic map. This mapping indicates the distance from the demarcated creekline is some 167m to the north-west of the lower boundary of the subject site at 14 – 16 Wyatt Avenue, Belrose.

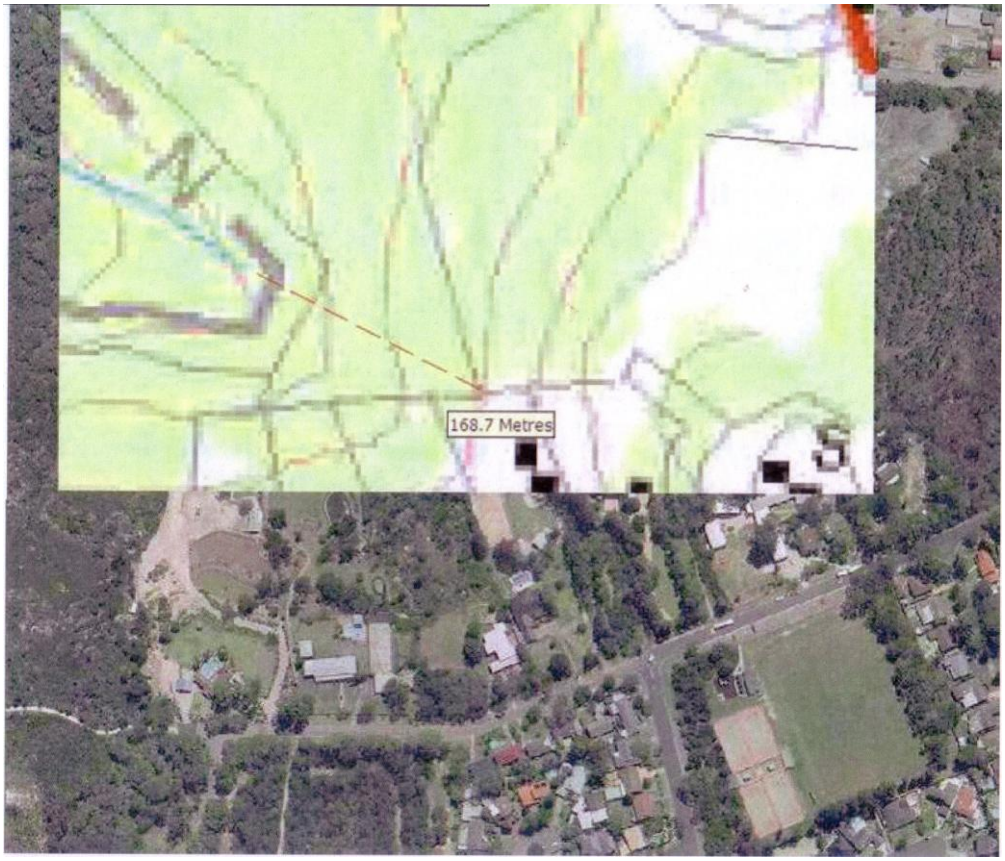

Figure 12 - indicates the location of contour lines and the demarcated position of the creekline at Fireclay Gully from the 1: 25 000 topographic map.

3.3.4.2 Comparison of environmental indicators for riparian constraints

Mapping by Strategic Biodiversity Survey

The mapping of Riparian land including riparian buffer component by the Strategic Review Committee at the subject site at 14 – 16 Wyatt Avenue indicates that the subject site includes 'Land within Riparian Zone – Category B Catchment' where the land has been cleared, infilled and grazed (Figure 13). Furthermore, an area extending upslope from the mapped riparian zone over a distance of about 30m is mapped as 'Land within Riparian Buffer – Category B Catchment' (Draft Oxford Falls Valley – Belrose North Strategic Review 2013).

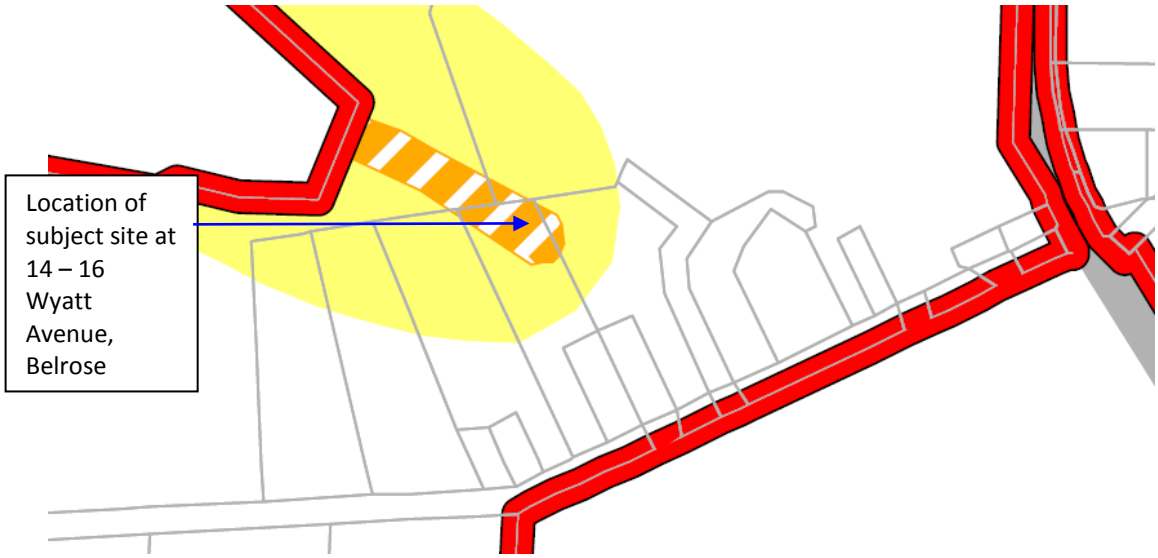

Figure 13 - Mapping by Strategic Review Committee of subject site and surrounds. The striped orange/white shading represents 'Land within Riparian Zone – Category B Catchment' whereas the yellow shading represents 'Land within Riparian Buffer – Category B Catchment'

Comment & recommendation in relation to comparative assessment of 'Threatened Species Habitat'

There is no evident drainage channel with defined creekbanks evident on the subject land. Overland flow occurs in high rainfall events where water directed down driveways and through pipes is released onto infilled and pasture-sown grassland (Figure 3), and dissipated into natural bushland at the boundary of the subject site (Figure 4).

Furthermore, the extent and location of the creek that is contained within Fireclay Gully as shown on the 1: 25 000 topographic mapping indicates the terminal end of the creek to occur at about 167m from the lower boundary of the subject land (Figure 12).

The code given in Table 2 for Riparian Land at the subject site is '3' compared to that at No. 18 - 20 Wyatt Avenue where the indicative score index is '0' and where water is similarly directed downslope via plastic piping (Table 2). This coding for riparian land at the subject site is considered anomalous as qualified above and should be changed to '0'.

3.4 Conclusions of field survey and assessment in relation to environmental constraint parameters

Table 3 compares the potential environmental constraints in relation to development at the subject land at 14 – 16 Wyatt Avenue, Belrose, for both the indices estimated by the Draft Strategy Committee and those assessed by field survey and analysis.

Potential Environmental Constraint	**Significant Vegetation**	**Potential Wildlife Corridors and Core Habitat**	**Potential Habitat for Threatened Species**	**Potential riparian land and riparian buffer zones**	**Cumulative Score (aggregate of infrastructure & environmental constraint parameters)**	**Rating 2 (Category index relating to potential for future development)**
Indices as estimated by Draft Strategy Committee	3	1	2	3	15	**C**
Indices as assessed by field survey and analysis	0	0	1	0	7	**A**

It is concluded that the best fit for the assessment of environmental constraint parameters is derived from detailed and intensive field survey and analysis of the environmental attributes occurring at the subject land at 14 – 16 Wyatt Avenue, Belrose, these being compared to indices for environmental constraint parameters listed by the Draft Strategy Committee (*Draft Oxford Falls Valley – Belrose North Strategic Review* 2013).

As such, it is considered that a cumulative score for infrastructure and environmental constraints parameters is more objectively given by a score of 7 corresponding to a 'Rating 2' category relating to potential future development of A (Table 3).

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Appendix 1: Floristic species assemblage recorded in natural vegetation at No. 16 Wyatt Avenue, Belrose

KEY

Status
* Exotic species
C3, C4 - Noxious weeds as listed on the *NSW Noxious Weeds Act (1993)*

Vegetation
'Hornsby Sandstone Exposed Bloodwood Woodland (Code: S_DSF11) grading into 'Coastal Sandstone Sheltered Peppermint – Smooth-barked Apple Forest' (Code: S_DSF09) (DECCW 2009)

Relative ranked frequency of occurrence
c very common – common
o moderately common – occasional
u relatively uncommon – uncommon

STATUS	SCIENTIFIC NAME	COMMON NAME	WOODLAND
	FILICOPSIDA		
	Dicksoniaceae		
	Calochlaena dubia	Soft Bracken	c
	MAGNOLIOPSIDA: MAGNOLIDAE		
	Apiaceae		
	Xanthosia pilosa	Woolly Xanthosia	o
	Asteraceae		
*	*Ageratina adenophora*	Crofton Weed	o
	Caesalpinaceae		
*	*Senna pendula* var *glabrata*	Common Cassia	c
	Convolvulaceae		
	Dichondra repens	Kidney Weed	o
	Fabaceae: Faboideae		
	Pultenaea stipularis		u
	Geraniaceae		
	Geranium homeanum		o

STATUS	SCIENTIFIC NAME	COMMON NAME	WOODLAND
	Haloragaceae		
	Gonocarpus teucrioides	Germander Raspwort	o
	Mimosaceae		
	Acacia longifolia ssp *longifolia*	Sydney Golden Wattle	c
	Acacia suaveolens	Sweet Wattle	u
	Acacia ulicifolia	Prickly Moses	o
	Myrtaceae		
	Angophora costata	Sydney Red Gum	c
	Corymbia gummifera	Red Bloodwood	c
	Eucalyptus haemastoma	Broad-leaved Scribbly Gum	o
	Eucalyptus sieberi	Silvertop Ash	o
	Kunzea ambigua	Tick Bush	c
	Leptospermum polygalifolium	Yellow Teatree	u
	Oleaceae		
C4	*Ligustrum sinense*	Small-leaved Privet	o
	Pittosporaceae		
	Pittosporum undulatum	Sweet Pittosporum	c
	Proteaceae		
	Banksia serrata	Old Man Banksia	o
	Grevillea buxifolia ssp *buxifolia*	Grey Spider Flower	o
	Persoonia pinifolia	Pine-leaved Geebung	o
	Rutaceae		
	Boronia ledifolia	Sydney Boronia	o
	Zieria pilosa	Hairy Zieria	o
	Santalaceae		
	Leptomeria acida	Currant-bush	u
	Solanaceae		
C3	*Cestrum parqui*	Green Poisonberry	o
	Verbenaceae		
C4	*Lantana camara*	Lantana	o

STATUS	SCIENTIFIC NAME	COMMON NAME	WOODLAND
	MAGNOLOPSIDA: LILIDAE		
	Araceae		
*	*Zantedeschia aethiopioca*	Pig Lily	o
	Cyperaceae		
	Cyathochaeta diandra	Sheath Rush	o
	Lomandraceae		
	Lomandra longifolia	Spiky-headed Mat-rush	c
	Poaceae		
*	*Cynodon dactylon*	Couch	c
*	*Ehrhata erecta*	African Veldt Grass	c
	Oplismenus aemulus	Basket Grass	o
	Xanthorrhoeaceae		
	Xanthorrhoea media	Forest Grass-tree	o

LEGEND TO APPENDIX 1 - NOXIOUS WEEDS IN WARRINGAH LGA

C3 - A noxious weed the presence of which must be fully and continuously suppressed and destroyed

C4 - A noxious weed the growth and spread of which must be controlled according to the measures specified in a management plan published by the local control authority