

ENVIRONMENTAL ASSESSMENT REPORT



**35 LOT RESIDENTIAL SUBDIVISION (INCLUDING 1 LOT DEDICATED TO
COUNCIL AND 1 LOT FOR PROPOSED ROAD LINK), OF LOTS 118 AND
119 DP 751258, JAMIESON ROAD, NORTH NOWRA**

Volume 1

Prepared by:

Watkinson Apperley Pty Limited

January 2007

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ENVIRONMENTAL ASSESSMENT REPORT UNDER PART 3A—MAJOR PROJECT

35 LOT RESIDENTIAL SUBDIVISION INCLUDING 1 LOT DEDICATED TO
COUNCIL AND 1 LOT FOR PROPOSED ROAD LINK

LOTS 118 & 119 DP 751258
JAMIESON ROAD NORTH NOWRA

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Date: 24th January 2007

This Environmental Assessment Report has been prepared for Evelution Pty Ltd, the landowners, of Lot 118 & 119 DP 751258 Jamieson Rd North Nowra, in accordance with the scope of services required by Evelution Pty Ltd to comply with the EP & A Act.

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35 LOT RESIDENTIAL SUBDIVISION INCLUDING 1 LOT
DEDICATED TO COUNCIL AND 1 LOT FOR PROPOSED
ROAD LINK

LOTS 118 & 119 DP 751258
JAMIESON ROAD NORTH NOWRA

ENVIRONMENTAL ASSESSMENT CERTIFICATION

Statement on Validity of the Environmental Assessment

This Environmental Assessment Report has been prepared in relation to Project Application No. 06_0090, which relates to a proposed 35 Lot residential subdivision including 1 Lot dedicated to Council and 1 Lot for proposed road link, of Lots 118 and 119 DP 751258, Jamieson Road North Nowra. The information contained in the Environmental Assessment has been compiled from site inspections, file notes, correspondence and reports prepared by appropriately qualified consultants and is neither deliberately false nor misleading.



David Cannon B.Env.Sc.Adv (Hons)
Environmental Planner
Watkinson Apperley Pty Ltd

EXECUTIVE SUMMARY

On 1 April 2006, the Director-General of the Department of Planning, under delegation from the Minister for Planning (the Minister), formed the opinion that the proposed subdivision is considered a Project to which Part 3A of the EP&A Act applies. The Director-Generals environmental assessment requirements for the preparation of the Environmental Assessment Report (EAR) were received in July 2006 and list 9 key project specific issues, which are provided in the Table below, along with the relevant sections where the issues have been addressed.

Issue No.	Key Project-Specific Issue	Relevant Section of EAR
1	Riparian Zones and Dedication	Section 7.7.4
2	Water Cycle Management	Section 7.2
3	Infrastructure and Utilities Provision	Section 3.5
4	Traffic and Access	Section 7.9
5	Bushfire	Section 7.8
6	Flora and Fauna	Section 7.7
7	Cultural Heritage	Section 7.5 & 7.6
8	Visual Amenity and Design	Section 7.10
9	Soils and Contamination	Section 4.3.3

This project involves a 35 lot subdivision in the North Nowra area. The proposal will create 33 (Torrens Title) residential lots, 1 lot (riparian zone, asset protection zone and ecologically sensitive land) for dedication to Council, and 1 lot for a proposed road link, as identified in the draft Nowra Bomaderry Structure Plan.

The site is described as Lots 118 and 119 DP. 751258 and is located at the eastern extension of Warren Avenue and Sutherland Drive, North Nowra. Lot 118 has an area of 5.01ha and Lot 119 is 6.07ha, totalling 11.08ha. The area proposed to be developed as residential lots and roads amounts to **3.96ha**, being **35.7%** of the total site area. The land is zoned part Residential Living Zone 2(c), part Environment Protection (Scenic) 7(d1) and part Open Space – Recreation “C” (proposed) 6(c).

The subject land is bound to the west by residential housing off Sutherland Drive and Warren Avenue. To the south is Mahogany Creek, which connects with Bomaderry Creek further east, and is adjacent to Jamieson Road and associated residential housing. The northern boundary abuts Council managed Crown Land and the Bomaderry Creek Regional Park. The eastern boundary of the site abuts a section of Proposed Open Space – Recreation, which runs adjacent to Bomaderry Creek.

The proposed subdivision will be accessed via two points Warren Avenue and Sutherland Drive where traffic calming will be introduced by way of road design and landscape treatments. There were a number of site attributes and constraints that have been taken into consideration in the design of the subdivision layout. The main site attributes and constraints are provided below:

Attributes

- Locality – close to shops, schools, doctors, aged care facilities and community open spaces such as sporting ovals.
- Adjoining the site to the north is 82ha of land known as the Bomaderry Creek Regional Park. This area will perform a significant role in the future in terms of open space.
- Good public transport service to Nowra CBD and Bomaderry Railway Station.
- Surrounding residential subdivision pattern provides well-designed and safe access points for road connections and utilities into Portion 118.
- The site has an extensive frontage to Bomaderry Creek, adjoined by a tributary that enters along the southern boundary of the site.

Constraints

- The land is regarded as bushfire prone, therefore subdivision design must allow for Asset Protection Zones and adequate access and egress to all developed parts of the lot.
- Geotechnical investigations have reported some areas not suitable for development due to instability and the presence of a cliff line in Lot 119, which generally runs coincidental with the 2(c) zone boundary.
- A water course running west to east along the southern boundary must remain unaffected by the development.
- Two ROTAP species, *Acacia subtilinervis* and *Leptospermum sejunctum* have been detected on the subject land. Tracts of these populations are required to be retained within the Asset Protection Zones.
- Trees with hollows and trees incised by the Yellow-bellied Glider will need to be retained wherever possible.

The final design is reflective of the inherent constraints and positive attributes associated with the subject site. It is considerate of the site's environmental sensitivity whilst accommodating the economic reality of the current property market. The design principles incorporate an asset protection zone for bush fire safety, preserve the creek and riparian environment and protect vital species of flora

and fauna. The urban stormwater concept has been designed in a manner sympathetic to the topography and watercourse locations on the site and geotechnical advice with respect to structurally suitable areas for development.

All thirty-three residential lots are proposed to have frontage to the proposed internal street or the perimeter road with orientation either east-west or north-south. The lots have areas ranging in size from 560m² to 1133m² with one additional larger lot (1.4ha). Lots 11 to 22 and Lot 33 all contain Asset Protection Zone in accordance with Planning for Bushfire Protection Guidelines. Proposed Lot 34, which runs along the northern boundary of the subject site, is proposed to be dedicated to Shoalhaven City Council to form part of the North Nowra Link Road. Proposed Lot 35, which contains a mixture of riparian zone, asset protection zone and ecologically sensitive land is proposed to be dedicated to Shoalhaven City Council. The south-western section of Lot 35 adjoins two existing public reserves off Warren Ave and Philip Drive. This collection of natural area is considered a valuable asset to the community as passive open space, and potential access to Bomaderry Creek. Furthermore the eastern section of Lot 35 adjoins Bomaderry Creek Reserve.

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Appendix 8 - Traffic Impact Assessment Prepared by Watkinson Apperley Pty Ltd, November 2006

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1 INTRODUCTION

1.1 Background

Watkinson Apperley Pty Ltd has been engaged by Evelution Pty Ltd to prepare a Environmental Assessment Report (EAR) for a proposed 35 Lot residential subdivision (including 1 Lot dedicated to Council and 1 Lot for proposed road link), of Lots 118 and 119 DP 751258, Jamieson Road North Nowra.

The property is wholly contained within the coastal zone with a small portion of the eastern section positioned within the sensitive coastal locations. As the proposal involves a residential subdivision greater than 25 lots a Master Plan was previously lodged with the Department of Planning.

However, during the assessment phase there were changes made to the Environmental Planning and Assessment Act 1979 in relation to the assessment of masterplans under SEPP 71. The proposed subdivision of the abovementioned property now falls under Part 3A (Major Projects) of the EP&A Act 1979 and accordingly an Environmental Assessment Report is required to be submitted to the Department of Planning.

1.2 The Applicant

Watkinson Apperley Pty Ltd have prepared this Environmental Assessment Report on behalf of the property owners and developers, Evelution Pty Ltd.

1.3 Location

The site is described as Lots 118 (5.01ha) and 119 DP 751258 (6.07ha) Jamieson Road and is located at the eastern extension of Warren Avenue and Sutherland Drive, North Nowra (**Figure 1.1**). North Nowra is predominantly a residential suburb, approximately 2.5km from the Nowra town centre, on the northern side of the Shoalhaven River and west of the Princes Highway. The suburb has been developed over a number of years, between 1975 and 2000.

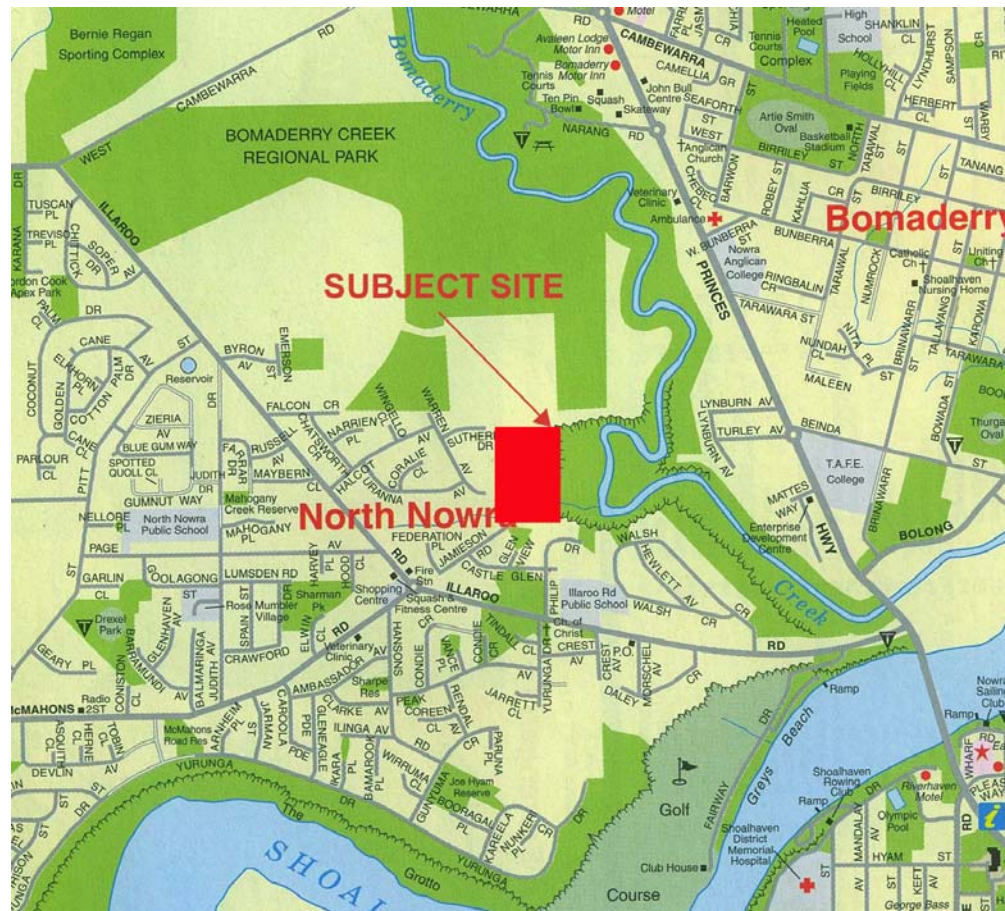


Figure 1.1: Locality Map

1.4 Site Description

The site is described as Lots 118 and 119 DP. 751258 and is located at the eastern extension of Warren Avenue and Sutherland Drive, North Nowra as defined in **Figure 1** above. Lot 118 has an area of 5.01ha and Lot 119 is 6.07ha, totalling 11.08ha. The area proposed to be developed as residential lots and roads amounts to **3.96ha** , being **35.7%** of the total site area.

The subject land is bound to the east by residential housing off Sutherland Drive and Warren Avenue. To the south is Mahogany Creek which connects with Bomaderry Creek further east, and is adjacent to Jamieson Road and associated residential housing. The northern boundary abuts Council managed Crown Land and the Bomaderry Creek Regional Park. The western boundary of the site abuts a section of Proposed Open Space – Recreation, which runs adjacent to Bomaderry Creek (**Attachment 1**).

1.5 Environmental Assessment Process

1.5.1 Major Projects

The Environmental Planning and Assessment Act (NSW) 1979 (EP&A Act) is the principal piece of legislation that governs the approval process for the Development. With effect from 1 August 2005, the EP&A Act was amended by the addition of a new Part 3A which deals with the approval of major projects. Part 3A of the EP&A Act provides an approval process that is particularly adapted for major projects. Section 75B(1) of the EP&A Act defines development to which Part 3A applies:

This Part applies to the carrying out of development that is declared under this section to be a project to which this Part applies:

- (a) by a State environmental planning policy,*
- or*
- (b) by order of the Minister published in the Gazette.*

Schedule 2 of the State Environmental Planning Policy (SEPP) (Major Projects) 2005 (Major Projects SEPP) identifies development within specified sites which are major projects. On 1 April 2006, the Director-General of the DoP, under delegation from the Minister for Planning (the Minister), formed the opinion that the proposed subdivision is considered a Project to which Part 3A of the EP&A Act applies under Schedule 2, Clause 1(1) *"Development within the coastal zone for any of the following purposes:"* (i) *"subdivision of land in a residential zone into more than 25.....wholly or partly within a sensitive coastal location"*. The Project Application has been lodged with the Department of Planning and the subsequent requirements for this Environmental Assessment are provided in Section 1.4.2.

1.5.2 Environmental Assessment Requirements

Section 75F sets out the environmental assessment requirements for approval under Part 3A of EA&A Act 1979. The main requirements in relation to the proposal are:

- "(2) When an application is made for the Minister's approval for a project, the Director-General is to prepare environmental assessment requirements having regard to any such relevant guidelines in respect of the project.*
- (3) The Director-General is to notify the proponent of the environmental assessment requirements. The Director-General may modify those requirements by further notice to the proponent.*

- (4) In preparing the environmental assessment requirements, the Director-General is to consult relevant public authorities and have regard to the need for the requirements to assess any key issues raised by those public authorities.*
- (6) The Director-General may require the proponent to include in an environmental assessment a statement of the commitments the proponent is prepared to make for environmental management and mitigation measures on the site”.*

The Director-Generals environmental assessment requirements for the preparation of the Environmental Assessment Report (EAR) were received in July 2006 and list 9 key project specific issues, which are provided in Table 1.1, along with the relevant sections where the issues have been addressed. A full copy of Director-Generals requirements is provided in Appendix A.

Issue No.	Key Project-Specific Issue	Relevant Section of EAR
1	<u>Riparian Zones and Dedication</u> – address the extent and management of riparian zones along Mahogany and Bomaderry Creeks and mitigate any conflicts between riparian zones, step lands and bushfire Asset Protection Zones. This should also address dedication and easement issues as required.	Section 7.7.4
2	<u>Water Cycle Management</u> - Address potential impacts on the water quality of surface and groundwater including, but not limited to, Mahogany and Bomaderry Creeks, having regards to the relevant State Groundwater, Rivers, Wetlands and Estuary Policies. Address the requirements of the NSW Floodplain Management Manual and provide a stormwater plan for the subdivision layout (based upon best practice Water Sensitive Urban Design principles). Demonstrate stormwater management provisions for the proposal are consistent with Shoalhaven City Council's Integrated Water Cycle Management Plan* (currently being developed). In particular, address issues associated with increased runoff and the potential environmental damage below the cliff line due to erosion of sandy soils and the steep grades and the large sections of shelf rock within the site which have the potential to cause sheet run off across properties creating ongoing problems for property owners downhill. Concentration of runoff should be conveyed all the way to the creek below, including up to the 1% ARI. The stormwater infrastructure should be designed to require minimum maintenance particularly where it located on existing or proposed public land.	Section 7.2

3	Infrastructure and Utilities Provision - Address existing capacity and requirements of the proposal for sewerage, water supply, electricity and telecommunications services in consultation with relevant agencies and identify staging, if any, of infrastructure works. Demonstrate that there is sufficient capacity to convey, treat and manage the sewerage that is generated by the development.	Section 3.5
4	<u>Traffic and Access</u> – Provide a Traffic Impact Study in accordance with the RTA Guide to Traffic Generating Development, including identification of impact of the proposal on the intersection of Illaroo Road and Halcot Avenue and the proposed link road identified in the Raft Nowra – Bomaderry Structure Plan. Identify needs (if any) to upgrade roads/junctions and improvement works to ameliorate any traffic inefficiency and safety impacts associated with the development where relevant. Demonstrate adequate connectivity to the existing cycleway system.	Section 7.9
5	<u>Bushfire</u> - Address the requirement of Planning for Bushfire Protection 2001 (RFS), in particular future management of any areas of hazard remaining, including natural areas and buffers zones. Generally, all Asset Protection Zones (APZs) should be provided within road reserves or individual lots to reduce impacts on natural areas. The Department of Lands is unlikely to support the proposed APZ over the Crown Land (Reserve 180068).	Section 7.8
6	<u>Flora and Fauna</u> - Outline measures for the conservation of flora and fauna and their habitats (including corridors) within the meaning of the Threatened Species Conservation Act 1995 and the Fisheries Management Act, having regards to the Draft Guidelines for Threatened Species Assessment (DEC & DPI July 2005). Measures may include, but not limited to, offset measures, buffers and other long-term protection methods for threatened fauna species. In particular, address impacts on the Yellow Belied Glider, Power Owl, Scooty Owl, Grey Headed Fly Fox and Bomaderry Zieria. Address impacts on adjoining DEC managed Bomaderry Creek Regional Park, in particular the erosion and sedimentation or runoff onto DEC land, management implications and impacts (trail bikes, informal walking trails, increase weed invasion from dumping of garden waste, pest control and domestic animals), boundary encroachments and visual impact.	Section 7.7
7	<u>Cultural Heritage</u> – Identify whether the site has aboriginal cultural heritage significance and identify appropriate measures to preserve and significance. Identify any other items of heritage significance and provide measures for conservation.	Section 7.5 & 7.6

8	<u>Visual Amenity and Design</u> – Demonstrate suitability of the proposal with the surrounding area in relation to bulk, scale amenity and visual amenity having regard to the Coastal Design Guidelines of NSW (2003) and the NSW Coastal Policy 1997, including cumulative visual impact of the project.	Section 7.10
9	<u>Soils and Contamination</u> – Identify any areas of contamination on the site and appropriate mitigation measures. Describe mitigation and management options to prevent, control, abate or mitigate development below the leachate dams and the possibility of contamination of habitable land from the former tip site located in the vicinity.	Section 4.3.3

Table 1.1: Director-Generals requirements for the preparation of the EIS.

1.5.3 EA Exhibition

Part 3A of the EP&A Act makes provision for the public notification and exhibition of the Environmental Assessment Report. Section 75H of the EP&A Act sets out the consultation requirements for applications under Part 3A. Section 75H(s) requires that *“After the environmental assessment has been accepted by the Director-General, the Director-General must, in accordance with any guidelines published by the Minister in the Gazette, make the environmental assessment publicly available for at least 30 days.”* Any submissions made in accordance with Section 75H are to be provided to the proponent, and any public authorities the Director-General considers appropriate.

1.6 Purpose of this Report

This report is an EA to accompany the Development Application for approval under Part 3A of the EP&A Act a proposed 35 Lot residential subdivision (including 1 Lot dedicated to Council and 1 Lot for proposed road link), of Lots 118 and 119 DP 751258, Jamieson Road North Nowra. This report describes the proposal and the environmental implications associated with the key issues for the site.

The purpose of this EAR is to provide independent and accurate information at the appropriate level to the approval agencies and the general public about the nature of a development proposal, its potential impacts and the way in which the project will be managed in order to reduce those impacts.

2 Existing Environment

The Shoalhaven region is located approximately 160 kilometres south of Sydney and stretches for a further 160 kilometres from Berry in the north to Durras in the south. The region takes in the coast, the fertile plains, the rugged mountain escarpment and the panoramic views of the eastern seaboard. The region contains rivers, coastal lakes, estuaries and over 300,000 hectares of National Parks and State Forests.

Nowra and Bomaderry are the major urban areas in the northern part of the region and are located approximately 15km from the coast situated on the southern and northern banks of the Shoalhaven River respectively.

North Nowra is located on the northern bank of the Shoalhaven River at a point where the river leaves the upstream, incised and elevated plateau landscape of the Nowra sandstone and enters the gently undulating and level alluvial plains of the coastal plain. The alluvial lowlands of the terminal Shoalhaven valley have formed from the eastward accumulation of deltaic deposits where the Shoalhaven River entered a former coastal, and subsequent estuarine embayment. The western bedrock margin of the coastal plain represents a former coastal shoreline, dating to the mid Holocene when the sea level rose to approximately its current level. The adjoining sandstone bedrock has weathered to form an elevated and gently dipping, resistant land surface or plateau. In contrast to the alluvial plains, this land surface is relatively poor in fertility and soil depth. Surface outcrops of sandstone frequently occur on crests and on gully slopes. In some areas, an overlying mantle of shales and siltstone belonging to the Berry Formation provide deeper and more fertile soils (Navin Officer Heritage Consultants, 2006).

The Shoalhaven River has downcut into the massively bedded sandstone creating a broad but relatively shallow (up to 100 m deep) steep-sided gorge. Adjacent tributary reaches, such as along Bomaderry Creek, have also formed narrow, steep sided gullies in their fall to the local river level. The Shoalhaven Gorge and its tributary gullies are typically bounded by precipitous rocky escarpments, many of which have developed overhangs and shelters from cavernous weathering. Between the scarps, narrow alluvial flats border the river banks and lower tributary reaches. These flats are fertile and comparatively sheltered and would have originally supported tall closed and open forest communities (Navin Officer Heritage Consultants, 2006).

2.1 Topography

Located at the southern end of the Sydney Basin, the urban areas of Nowra and Bomaderry have developed on the western edge of the Shoalhaven coastal flood plain. The significant topographical features of the sites locality are:

- Nowra Hill which is located southwest of the subject site.
- The Shoalhaven gorge, which has been incised by the Shoalhaven River and extends westwards from the Shoalhaven Bridge for approximately 15 Kilometres.
- Bomaderry Creek gorge which formed part of the subject site.
- The site falls from the north-western corner to the south-eastern corner at an overall grade of approximately 3- 4%. The entire site topography has been modified into a number of flat pads to accommodate parking areas, built areas and storage areas. A sedimentation basin exists in the south-eastern corner.

The study area is situated on the western margin of the lower reaches of the Bomaderry Creek corridor. At this point, the corridor consists of a narrow and steep sided gorge approximately 250 m wide with bordering vertical sandstone escarpments up to 20 m high. The dimensions of the gorge in this area are typical of the terminal sandstone reaches of the gorge where the creek is broad, estuarine, and influenced by the tidal water flows of the nearby Shoalhaven River estuary. The limit of tidal influence occurs 500 m upstream of the study area. Two hundred metres upstream of the study area, the gorge quickly narrows to a width of 125 m (Navin Officer Heritage Consultants, 2006).

The western half of the study area is dominated by an elevated sandstone plateau topography with low to moderate gradients. The relief in this area is due to the down-cutting of two minor tributaries which drain to the east and over the main Bomaderry gorge escarpment. A broad spurline crest has developed between the drainage lines. Open sandstone platforms occur frequently across the crest and upper slopes, and low discontinuous scarps characterise the lower slopes (Navin Officer Heritage Consultants, 2006).

The main escarpment, which forms the western edge of the Bomaderry Creek gorge, divides the study area approximately in half. It is relatively continuous and reaches a maximum height of about 20 m between the two tributary valleys and at the northern boundary of the study area. Some large sheltered overhangs have formed at the base of this escarpment. Typically, an accumulation of large sandstone tors, boulders and roof fall forms a debris slope at the foot of the

escarpment, which in turn grades abruptly to the adjoining alluvial flats (Navin Officer Heritage Consultants, 2006).

2.2 Geology

The site according the Wollongong 1:250 000 Geological Series Sheet is underlain by the Nowra Sandstone formation, a thick to very thickly bedded sequence of coarse grained quartzose sandstone with pebbly and conglomeratic horizons. This rock unit is part of the Shoalhaven Group of Permian age. Field assessment carried out by Douglas Partners (2004) (Appendix 2) confirmed the geological mapping with sandstone exposures observed on the site and adjacent areas.

2.3 Soil Landscapes

The Nowra Bomaderry area has a range of soil landscapes corresponding to the different geology found over the area. The soil landscape which best describes the subject site is the Nowra. According to Hazelton (1992) the crests and upper slopes have up to 40cm hardsetting dark reddish brown loam fine sandy overlies <30cm dark olive sandy clay, which overlies <30cm bright brown moderately pedal light medium clay. The midslopes have up to 10cm loose yellowish brown sand or hardsetting gravely massive yellow brown clayey sand overlies <20cm brown sandy clay loam which overlies <100cm bright brown moderately pedal light medium clay. The lower slopes and drainage lines have up to 15cm loose yellowish brown sand overlies <15cm brown sandy clay loam, which overlies <70 cm light clay with mottles.

The soil profile generally has a low to moderate fertility. Topsoils are generally hardsetting. The soils are often moderately deep but are stony, strongly to moderately acid with generally low CEC. The topsoils generally have a low erodibility, while the subsoil have a high erodibility (Hazelton, 1992).

2.4 Vegetation

The Nowra Bomaderry area covers a geographic area of the approximately 18,290ha of which 16,414ha is land and of that 8,173 ha is uncleared native vegetation. There are twenty-four different vegetation communities within the Nowra Bomaderry area ranging from rainforest, wetlands, shrubland, Paperbark, Casuarina and Eucalypt forest and woodland (Mills, 1996).

According to the Flora and Fauna Assessment undertaken by Bushfire and Environmental Services (2004) the subject site predominately comprises four main vegetation communities Grey Gum – Blue-leaved Stringbark Woodland/open Forest, Kunzea Shrubland, Riparian Forest, and Ecotonal Gully Forest.

Grey Gum – Blue-leaved Stringbark Woodland/open Forest vegetation community occurs in the north of Lot 118 and on the gently sloping land in the south. It covers approximately 3 ha and a substantial portion lies within the part of the land proposed for intensive subdivision. The community is dominated by Grey Gum *Eucalyptus punctata* and Blue-leaved Stringybark *Eucalyptus agglomerate* with occurrences of Red Bloodwood *Corymbia gummifera* and blackbutt *Eucalyptus pilularis*. The community has been impacted by weeds, clearing and the dumping of garden refuse in the west where it adjoins the existing urban development. Areas of the community further to the east appear to be in good condition.

Kunzea Shrubland vegetation community occurs in the centre of Lot 118 and covers approximately 2.42ha. The community is dominated by White Kunzea *K. ambigua*, Calytrix *Calytrix tetragona*, Nowra Tea-tree *L. sejunctum*, Paperbark Tea-tree *L. trinervium* and Prickly Moses *Acacia ulicifolia*. Nearly all of this community lies within the part of the land proposed for subdivision and Asset Protection Zones. Vehicle track and some minor clearing in the west have impacted the community. Other parts of the community are intact.

Riparian Forest vegetation community occurs in the south of the study area adjacent to the permanent watercourse. It covers approximately 0.42ha and all of the community lies beyond the part of the land proposed for subdivision. The community is dominated by Spotted Gum *C. maculata* with occasional dominants of the woodland/open forest further to the north. Species associated with damp areas occur here such as Cheese Tree *Glochidion ferdinandi*, Christmas Bush *Ceratopetalum gummiferum*, Austral Sarsaparilla *Smilax glycyphylla* and Monkey Rope *Parsonsia atramines*. The community has been impacted by weeds and the dumping of garden refuse. There is also an informal walking track and creek crossing.

Ecotonal Gully Forest community occurs in the eastern margins of the study area in the drainage line that has incised a small gully into the Bomaderry Creek Gorge and covers approximately 0.24ha of the subject site. The community has a diverse overstorey that includes Red Bloodwood *C. gummifera*, Grey Gum *E. punctata*, Blue Gum *Eucalyptus saligna* complex, and occasional White Stringybark *Eucalyptus globoidea*, a subcanopy which includes Two-veined Hickory *Acacia binervata*, NSW Christmas Bush *C. gummiferum*, Turpentine *Syncarpia glomulifera*, and occasional

Cabbage Palm *Livistona australis* and a understorey with a relatively even mix of Sweet Pittosporum *Pittosporum undulatum*, Mock Olive *Notelaea longifolia*, Cherry Ballart *Exocarpos cupressiformis*, Cheese Tree *G. ferdinandi*, Lillypilly *Acmena smithii*, and Blueberry Ash *Elaeocarpus*.

2.5 Surface Water

The site comprise of Mahogany Creek, which is a tributary of Bomaderry Creek and runs through the southern part of the subject site and discharges into Bomaderry Creek and two ephemeral drainage depressions located in the northern section of the subject site that flow to the east into Bomaderry Creek.

The northern tributaries flow mostly across a bed of boulders and slope debris, and there are only minor exposures of bedrock platforms. By way of contrast, the southern creek flows across a broad and extensive, descending bedrock platform, before falling over an escarpment cliff or 'nickpoint' and associated debris slope. Both streams then traverse the lower creek flats before entering the estuarine waters of Bomaderry Creek. The southern tributary has a larger catchment (approximately one square kilometre) than the northern tributary, and this is reflected in the flood capacity of its wider stream-bed.

2.6 Meteorology

The climate of the Shoalhaven is best described as coastal temperate and is characterised by warm summers and mild winters. Summer mean daily temperatures range between 16.3°C and 25.8°C. Winter mean daily temperatures range between 6.2°C and 15.8°C. The median rainfall for individual months ranges between 37.6mm in August and 88.4mm in January. The annual average rainfall is 1,142.1mm. During the spring and summer months the prevailing winds are easterlies in the afternoon. In the autumn and winter months this pattern changes to westerly and north westerly prevailing winds which are generally strongest in the morning.

2.7 Site Analysis

A site analysis has been prepared for the subject land (Figure 2.1) the main findings are provided below:

- North Nowra is predominantly a residential suburb, approximately 2.5km from the Nowra town centre, on the northern side of the Shoalhaven River and west of the Princes Highway
- The subject site is located within is with a 5-minute drive of the Nowra CBD and Bomaderry train station.
- North Nowra has been developed over a number of years, between 1975 and 2000.
- The proposed development will be an extension to an existing subdivision (Halcot Grove Estate), which consists of nine local roads of varying sizes. The proposed new roads will be connected to Warren Avenue and Sutherland Drive.
- Lot 118 has an area of 5.01ha and Lot 119 is 6.07ha, totalling 11.08ha.
- The property consists of unmanaged bushland and has not experienced any prior development, although Lot 118 and a section of Lot 119 are zoned 2(c) Residential.
- There is a cliff line traversing Lot 119, in a general north-easterly direction. Land east of this cliff line is zoned 7(d1) Environment Protection.
- The study area comprises four main vegetation communities Grey Gum – Blue-leaved Stringbark Woodland/open Forest, Kunzea Shrubland, Riparian Forest, and Ecotonal Gully Forest.
- The topography of the subject site is gently sloping in the north, generally flat in the centre, and more steeply sloping in the south adjacent to the Mahogany Creek and in the east where a drainage line has incised a small gully into Bomaderry Creek Gorge.
- The aspect is generally to the south east.
- To the south of the subject site is Mahogany Creek, which connects with Bomaderry Creek further east, and is adjacent to Jamieson Road and associated residential housing.
- The northern boundary abuts Council managed Crown Land and the Bomaderry Creek Regional Park.
- The eastern boundary of the site abuts a section of Proposed Open Space (Recreation), which runs adjacent to Bomaderry Creek
- The closest water body to the site is Mahogany Creek, which is a tributary of Bomaderry Creek and run through the southern part of the subject site.

- There is also two ephemeral drainage depressions located in the northern section of the subject site that flow to the east into Bomaderry Creek.
- The closest hospital (Nowra Community Hospital) is located on Weeroona Place approximately 1.5km to the south of the subject site.

A collection of photos of the site and a sketch plan showing the proposed lot layout also support the site analysis and can be found in **Attachment 1, 2 & 3** respectively.

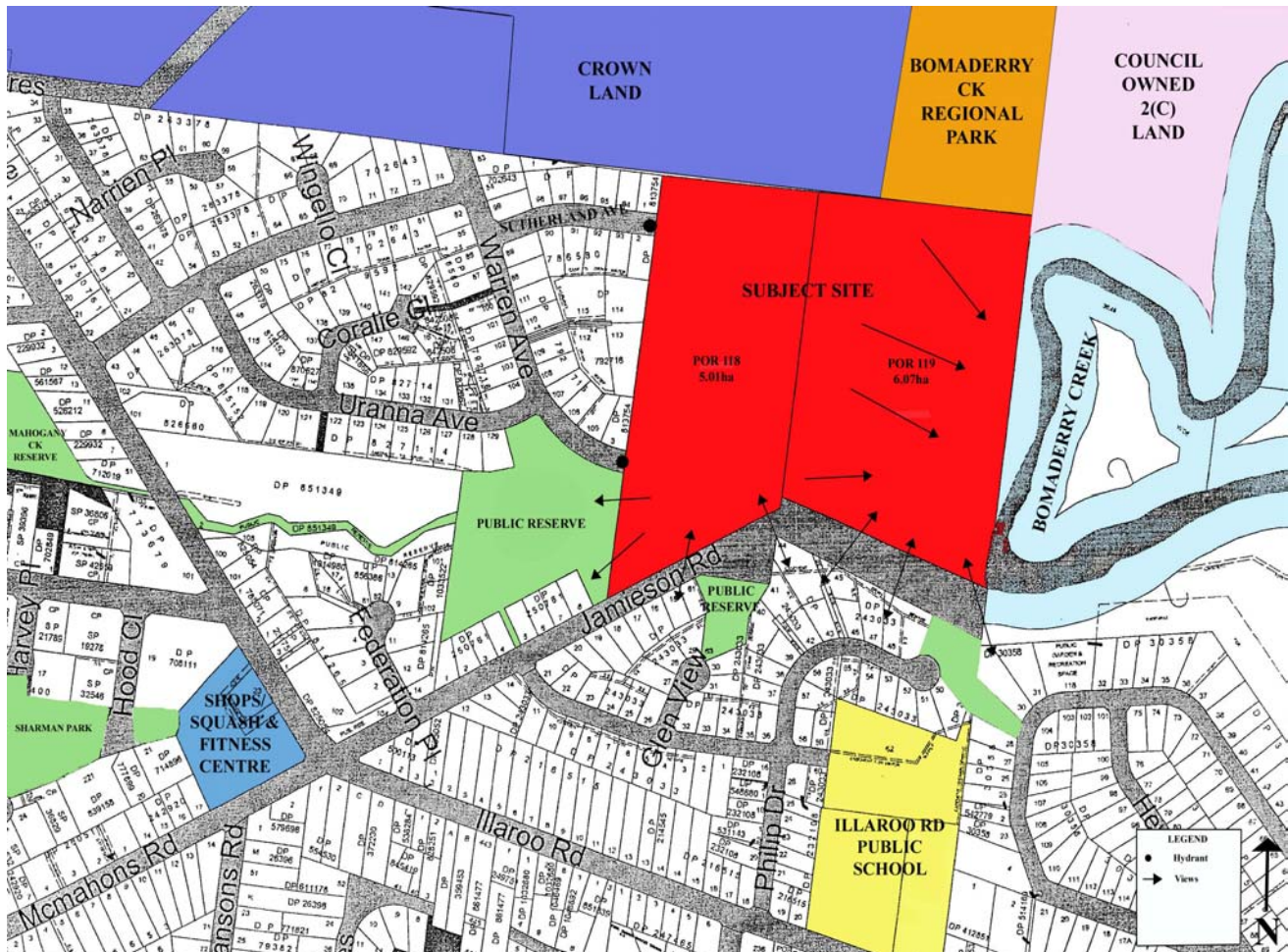


Figure 2.1: Site analysis

3 PROJECT DESCRIPTION

3.1 Introduction

This project involves a 35 lot subdivision in the North Nowra area. The proposal will create 33 (Torrens Title) residential lots, 1 lot (riparian zone, asset protection zone and ecologically sensitive land) for dedication to Council, and 1 lot for proposed road link, as identified in the draft Nowra Bomaderry Structure Plan. The site is impacted by significant changes in topography, flora and fauna issues, along with bushfire risks. In particular, the issue of Asset Protection Zones (APZ) for bushfire protection presented limitations to the extent of lots achievable within the subdivision. Subsequently, the subdivision layout has been designed to best suit the range of natural site conditions and constraints. All land proposed to be developed is contained within the coastal zone. There is to be no development within the *'sensitive coastal location'*.

The original subdivision layout proposed in the previously submitted draft Master Plan application is shown in **Attachment 4**. Since that time, the following design matters have come to our attention, resulting in a revised design that forms the current proposal as shown in **Attachment 3**:

- i. Shoalhaven City Council requested that provision be made for a potential link road across part of the northern boundary of the subject site. This has been the subject of a report to Council and a Draft Deed of Agreement between our clients and Shoalhaven City Council, which is currently being prepared. **Attachment 5**
- ii. Department of Environment & Conservation (National Parks and Wildlife Service) raised issues in relation to flora and fauna, Aboriginal Heritage and management of the land that is to be dedicated, that adjoins the Bomaderry Regional Park.
- iii. Department of Infrastructure Planning and Natural Resources required an extension of the riparian zone along Mahogany Creek.
- iv. NSW Rural Fire Service requested the ongoing management of the APZs to be clarified.

3.2 Design Concept

This development provides the opportunity for residential properties to be located in a unique setting within an existing urban area, with good access to public facilities and urban infrastructure. The nature of the proposed subdivision is that of small

scale residential infill. It is situated immediately adjacent to existing residential development. The layout has been dictated by the existing road network and utilises these roads, creating extensions and linkages to complete the street network. There are no alternate subdivision patterns that would be feasible in this situation. The subdivision has been designed so that the ecologically sensitive parts of the site are protected through their proposed dedication to Council as public lands. The proposed layout facilitates utilisation of the existing infrastructure, with no impact on current services to the local area.

The site is fortunate to be readily accessible via a good public road network and existing infrastructure such as sewer, water, electricity and telecommunications. The local social infrastructure also has the capacity to absorb the potential growth from this project.

There were a number of site attributes and constraints that have been taken into consideration in the design of the subdivision layout. The main site attributes and constraints are provided below:

Attributes

- Locality – close to shops, schools, doctors, aged care facilities and community open spaces such as sporting ovals.
- Adjoining the site to the north is 82ha of land known as the Bomaderry Creek Regional Park. The Regional Park was gazetted on 11 December, 2002 under the provisions of the National parks and Wildlife Act, 1974. This area will perform a significant role in the future in terms of open space.
- Public transport service to Nowra CBD and Bomaderry Railway Station.
- Surrounding residential subdivision pattern provides well-designed and safe access points for road connections and utilities into Portion 118.
- The site has an extensive frontage to Bomaderry Creek, adjoined by a tributary that enters along the southern boundary of the site.

Constraints

- The land is regarded as bushfire prone, therefore subdivision design must allow for Asset Protection Zones and adequate access and egress to all developed parts of the lot.
- Geotechnical investigations have reported some areas not suitable for development due to instability and the presence of a cliff line in Lot 119, which generally runs coincidental with the 2(c) zone boundary.

- A water course running west to east along the southern boundary must remain unaffected by the development
- Two ROTAP species, *Acacia subtilinervis* and *Leptospermum sejunctum* have been detected on the subject land. Tracts of these populations are required to be retained within the Asset Protection Zones.
- The majority of trees with hollows and trees incised by the Yellow-bellied Glider will need to be retained wherever possible and tree spacings from these trees to proximate areas of native vegetation are not to exceed 20m.

The final design is reflective of the inherent constraints and positive attributes associated with the subject site. It is considerate of the site's environmental sensitivity whilst accommodating the economic reality of the current property market. The design principles incorporate an asset protection zone for bush fire safety, preserve the creek and riparian environment and protect vital species of flora and fauna. The urban stormwater concept has been designed in a manner sympathetic to the topography and watercourse locations on the site and geotechnical advice with respect to structurally suitable areas for development.

It recognised that due to the location of the subdivision on the edge of an urban bushland and some visibility from a local vantage point, future dwellings will be required to utilise materials and colours in tones that are more complimentary to natural setting.

3.3 Lot Layout

The subdivision layout has been designed to capitalise on the natural attributes of the site's topography acknowledging views over the attractive bushland to the south, east and south-west (Attachment 3). All thirty-three residential lots are proposed to have frontage to the proposed internal street or the perimeter road with orientation either east-west or north-south. The lots have areas ranging in size from 560m² to 1133m² with one additional lot noticeably larger in area (1.4ha). Lots 11 to 22 and Lot 33 all contain Asset Protection Zone in accordance with Planning for Bushfire Protection Guidelines.

Proposed Lot 34 which runs along the northern boundary of the subject site is proposed to be dedicated to Shoalhaven City Council to form part of the North Nowra Link Road, as identified in the draft Nowra Bomaderry Structure Plan. The link road will provide a much-needed alternative route from North Nowra to the Princess Highway, thus taking pressure off the Princess Highway/Illaroo Road and Princes Highway/Bolong Road intersections. This will have the important additional benefit of improving traffic capacity, road safety, and environmental capacity

(importantly noise, pedestrian and access concerns) along the length of Illaroo Road south of the link road connection.

Proposed Lot 35, which contains a mixture of riparian zone, asset protection zone and ecologically sensitive land is proposed to be dedicated to Shoalhaven City Council. The south-western section of Lot 35 adjoins two existing public reserves off Warren Ave and Philip Drive. This collection of natural area is considered a valuable asset to the community as passive open space, and potential access to Bomaderry Creek. Furthermore the eastern section of the Lot 35 adjoins Bomaderry Creek Reserve.

3.4 Pedestrian, Cycle and Road Access and Circulation Networks

The proposed subdivision will be accessed via two points Warren Avenue and Sutherland Drive where traffic calming will be introduced by way of road design and landscape treatments. Turning circle heads will be provided at each entry point for those vehicles choosing not to enter the new residential area. This serves as both traffic calming but also provides for easy manoeuvring at the end of Sutherland Drive and Warren Avenue, which are currently unformed dead-end streets.

The proposed subdivision involves the creation of two roads varying in size from 16 - 20m wide with the road 1 being a loop road, which connects to the ends of two existing residential streets (Warren Avenue and Sutherland Drive). The perimeter (loop) road has been designed in accordance with the requirements outlined in the Planning for Bushfire Protection Guidelines.

There are no formal footpaths along the roads within the existing subdivision; however, there is a formal footpath on the western side of Illaroo Road. It is foreseen that due to the small amount of traffic predicted on the proposed new roads there would be no need to provide formal footpaths or cycleway.

3.5 Infrastructure

3.5.1 Electricity

The supply authority for electrical power in the Shoalhaven Local Government Area is Integral Energy. Integral Energy was contacted (Mary Todd Contestable Works Administrator) who advised that at this point in time there is sufficient capacity for the proposed subdivision to be supplied ex Bomaderry Zone Substation via 11kV distribution feeder BDA2 along Illaroo Road". Underground servicing is proposed for this development.

3.5.2 Sewer and Water

Shoalhaven Water is the service provider for sewer and water. These services currently exist to the adjoining residential as detailed in **Figure 3.1** and **3.2**.

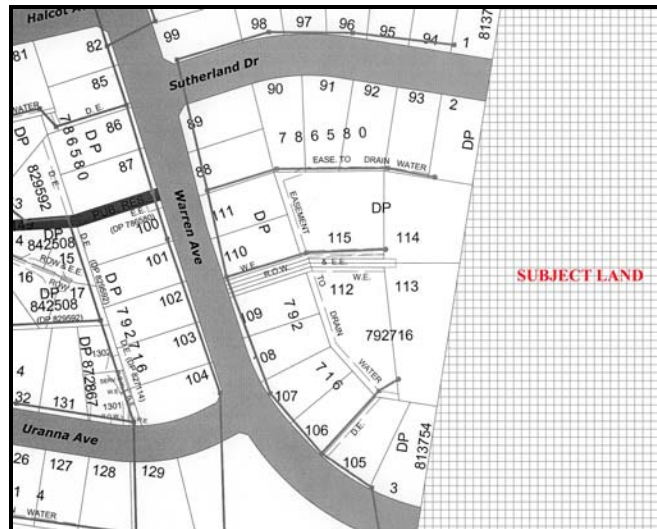


Figure 3.1: Existing Sewerage Services

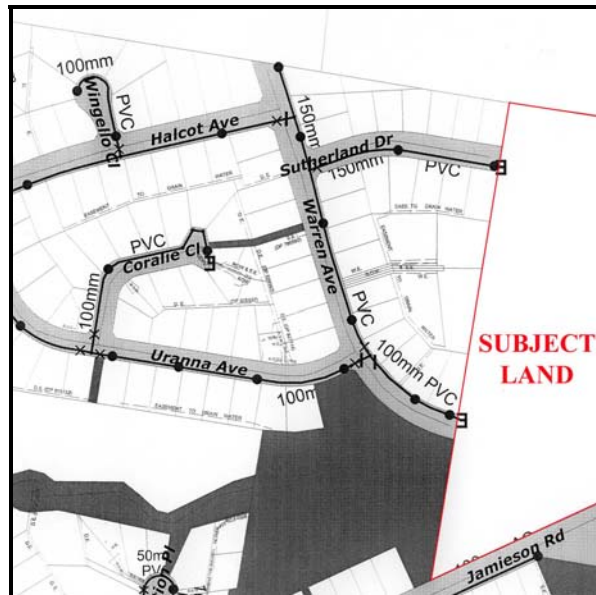


Figure 3.1: Existing Water Services

Shoalhaven Water has been contacted and a copy of Shoalhaven City Council requirements can be found in **Attachment 6**. In accordance with Council requirements a concept sewerage servicing strategy has been prepared to show that all lots can be adequately drained to Council's existing sewerage system.

Although it should be noted that this is only a concept plan and that the final position of the sewer collection pipes may change slightly to take into account any large trees or rock outcrops in the vicinity of the proposed sewer mains.

A sewerage servicing plan has been designed (Attachment 7) which shows that there is sufficient capacity to convey, treat and manage the sewerage that is generated by the development. The sewerage strategy is proposed to utilise standard gravity mains (150mm uPVC), to collect the sewerage from the 33 residential lots and discharge into the existing surcharge main which runs along the northern side of Mahogany Creek within the subject land and further on to the Nowra Treatment Works. The gravity mains will be located at the lowest point of the lots with manholes to be located approximately every 80 metres or generally every 4-5 lots. Gravity mains will commence at the up stream end at about one metre deep. The following depth will be determined by the grade of the land and the number of services. Any road crossing will require a greater depth to allow for the crossing of other services (drainage, water reticulation, electricity etc.). Easements to drain sewage will be created over all affected lots including through the drainage reserve. The easement will be located centrally over the sewer pipes. The minimum widths of the easement shall be as follows:

- Sewer depth to invert less than 2.50m – easement 2.40m wide
- Sewer depth to invert greater than 2.50m – easement 4.0 wide.

3.5.3 Telecommunications

Telstra will provide the initial infrastructure for telecommunications. Telstra has been contacted and we are waiting for their final response.

3.6 Desired Future Locality Character

The land surrounding the subject site is typically low density residential, which is indicative of the entire North Nowra suburb. To the north of the suburb, land use is predominantly rural residential and rural agricultural. Bomaderry Creek and associated riparian flora and fauna constitute the eastern boundary of the North Nowra area whilst the Shoalhaven River curls around the south and western side. Connection to the main centre of Nowra is via Illaroo Road, which intersects at the Princes Highway and provides access to the Nowra CBD.

The subject site is located on the eastern boundary of the North Nowra area, a short distance from Bomaderry Creek. The site is bordered to the west by other residential development and has bushland views to the east. The south eastern corner of Lot 118 and the southern boundary of Lot 119 are currently viewed

across a gully by two residential properties located on the eastern side of Philip Drive. Houses located on the eastern side of Jamieson Road also have filtered views of the site, through native vegetation, which is intended to be retained.

The subject site has good access to public facilities. The local shopping centre is located approximately 1km to the east and consists of a grocery store, fruit shop, butcher, bakery, chemist, take-away store and hair dresser. A service station and fitness centre are located adjacent to the shopping centre.

Two public schools are located within the locality along with a number of community recreational spaces. These include two sporting ovals, an animal park, golf course and public Wharf, a number of picnic areas and bush walking facilities are located along Bomaderry Creek and the Shoalhaven River.

The Shoalhaven LEP zoning for the North Nowra area is shown in **Figure 4.1**, and is indicative of the Shoalhaven City Council's vision for the future of the locality. The current zoning across North Nowra is predominantly a mix of residential 2(a1) and 2(c) zones. In relation to the SLEP, this allows for a variety of residential lifestyles across the locality and the proposal is not dissimilar to the existing character of the area.

3.7 Location of Development in Relation to Natural Features

Lot 118 has been identified as being underlain by the Nowra Sandstone formation, which is a thick to very thickly bedded sequence of coarse-grained quartzite sandstone with pebbly and conglomeratic horizons. A geotechnical investigation has been undertaken by Douglas Partners and their recommendations to the limitations of the development in regards to the natural restrictions have been implemented into the subdivision design. This includes but is not limited to a 10m set back to the south eastern corner of the site (Lot 118) and a development boundary line to coincide with the RL 39 to allow for further stress relief and weathering within the jointed rock mass. For the full report see **Appendix 2**.

There are no specific natural features of the site that require consideration in relation to coastal processes.

3.8 The Scale of the Proposed Development

The proposed development will result in the creation of an additional 33 lots in a residential area. The lots are similar in size to those in the locality. The creation of two points of entry to the site via Warren Avenue and Sutherland Drive where

traffic calming will be introduced by way of road design and landscape treatments will assist in managing driver behaviour in what is essentially a quiet, low density residential area. The site has good access to public facilities, such as schools, shops and recreational facilities.

The proposal involves the dedication of important natural areas of land to Council, to assist in protection of the significant ecological communities associated with Bomaderry Creek and improves the integration of the development with the existing landscape. In addition, the development requires the retention of native vegetation as detailed in the Vegetation Management Plan to be prepared for the site.

The scale of the development is such that two storey dwellings will be the maximum achievable and therefore is unlikely to result in problems associated with overshadowing. Part of the lot layout is not a regular configuration as the site constraints have mostly informed the final layout. Solar access provisions will be addressed as part of the BASIX certification for future dwellings.

The development is not proposed to be staged, with all civil works to be completed in one stage. However, the lots will be release in stages depending on market conditions.

3.9 Public Access to and along Coastal Foreshore

The subject site is not located in the vicinity of the coastal foreshore and will therefore not have an impact upon public access to such areas. The proposed dedication of the Creek and the riparian zone in the southern section of proposed Lot 35 to Shoalhaven City Council will improve public access to these waterways and associated environments.

3.10 Provision of Public Facilities and Services

The suburb of North Nowra is well serviced with public facilities:

- Two public schools are located in the North Nowra suburb.
- There are several existing areas of public open space and sporting facilities, such as Sharman Park, Mahogany Creek Reserve and the public reserve adjoining the subject site to the west.
- The subject site is approximately 2.5km from the Nowra CBD, which provides a large range of public facilities and services, including high schools, hospitals, doctors, specialist services and a police station.

4 STATUTORY PLANNING

4.1 Commonwealth Legislation

4.1.1 Environmental Protection and Biodiversity Conservation Act, 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* specifies that approval is required from the Commonwealth Minister for the Environment and Heritage for actions that have, will have or are likely to have a significant impact on a matter of "national environmental significance".

Matters of national environmental significance are:

- listed threatened species and communities,
- migratory species protected under international agreements,
- RAMSAR wetlands of international importance,
- the Commonwealth marine environment,
- World Heritage properties,
- National Heritage places, and
- nuclear actions.

The Department of Environment and Heritage (2005) has published guidelines to assist in determining whether an action will have or is likely to have a significant impact on a matter of national environmental significance and, hence, whether a referral should be submitted to the Department for a decision by the Minister on whether assessment and approval is required under the EPBC Act.

The Guidelines state that, to make a decision as to whether or not to refer an action to the Minister, you should consider the following questions:

1. Are there matters of national environmental significance located in the area of the proposed action?
2. Considering the proposed action at its broadest scope, is there potential for impacts on matters of national environmental significance?
3. Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance?
4. Are any impacts of the proposed action on matters of national environmental significance likely to be *significant* impacts?

The Guidelines provide the following important definitions:

"To be *likely*, it is not necessary for a significant impact to have a greater than 50% chance of happening, it is sufficient if a significant impact on a matter of national environmental significance is a real or not remote chance or possibility."

"*Population*, in relation to critically endangered, endangered or vulnerable, threatened species, means:

- A geographically distinct regional population, or collection of local populations; or
- A regional population, or collection of local populations occurring within a particular bioregion."

"An *important population* is a population that is necessary for a species' long-term survival and recovery. This may include populations that are:

- Key source populations either for breeding or dispersal,
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species' range.

"*Habitat critical to the survival of a species* refers to:

- Habitat identified in a recovery plan for the species as habitat critical for those species or communities; and/or
- Habitat listed on the Register of Critical Habitat maintained by the Minister under the Act; and/or
- Areas that are necessary:
 - for activities such as foraging, breeding, roosting, or dispersal,
 - for succession,
 - to maintain genetic diversity and long term evolutionary development, or
 - for the reintroduction of populations or recovery of the species."

Comments

A Flora and Fauna Report has been prepared by Bushfire and Environmental Services (BES) which found that the proposal involves the clearing and/or modification of indigenous vegetation, and construction works, which may constitute an action defined by the *EPBC Act*.

BES suggested that the study area provides suitable habitat for the following matters of National Environmental Significance listed on the schedules of the *EPBC Act*:

- The Vulnerable Species Grey-headed Flying-fox and Giant Burrowing Frog; and
- The Migratory Species Satin Flycatcher.

There are no Commonwealth Endangered Species, World Heritage Properties, Wetlands of National Importance, Commonwealth Marine Areas, or Commonwealth Land to be affected by the proposal.

Commonwealth Vulnerable Species

The study area is unlikely to contain any important populations of the Grey-headed Flying-fox or the Giant Burrowing Frog necessary for the species' long-term survival and recovery. The 6.1 ha of vegetation to be affected by the proposal would not contain key source populations of these species. Nor would it be likely to contain any potential populations likely to be necessary for maintaining genetic diversity, or near the limit of the species' range. The Greyheaded Flying-fox would be an occasional visitor to the study area for foraging. The Giant Burrowing Frog could utilise habitats in the south of the study area, which will not be directly affected by the proposal. Soil and water management strategies will be implemented during the construction phase of the proposal to protect water quality. Stormwater runoff will be treated in bio-retention swales before discharging overland to Bomaderry Creek reducing nutrient loads by up to 50% (Storm Consulting 2005). The creek is already subject to runoff from the North Nowra urban area so impacts are likely to have already reduced the habitat value of this creek for the species. Thus, with respect to Commonwealth Vulnerable Species, the proposal is very unlikely to:

- Lead to a long-term decrease in the size of an important population of a species; or,
- Reduce the area of occupancy of an important population; or,
- Fragment an existing important population into two or more populations; or,
- Adversely affect habitat critical to the survival of the species; or,
- Disrupt the breeding cycle of an important population; or,
- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or,
- Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or,
- Interfere substantially with the recovery of the species.

The proposal is unlikely to have a significant impact on Commonwealth Vulnerable Species listed by the *EPBC Act* that may occur in the study area.

Commonwealth Migratory Species

The Rufous Fantail and Satin Flycatcher may utilise parts of the study area for foraging and breeding from time to time, but they were not detected there during the survey period. The proposal is too small to substantially modify, destroy or isolate an area of important habitat, result in invasive species becoming established in such habitat, or seriously disrupt the life cycle of an ecologically significant proportion of these species' populations. In addition, there are vast areas in the locality and region that could still be utilised by these species.

Vegetated areas in the south and east of Lots 118 and 119 (Lot 35) will be dedicated to Shoalhaven City Council to secure the preservation of the habitats suitable for these migratory species. The proposal is unlikely to have a significant impact on Commonwealth Migratory Species listed by the *EPBC Act* that may occur in the study area.

4.2 State Legislation

4.2.1 Threatened Species Conservation Act 1995

The New South Wales *Environmental Planning and Assessment Act 1979*, as amended by the *Threatened Species Conservation Act 1995* and *Threatened Species Conservation Amendment Act 2002*, requires that various factors be taken into account in deciding whether a proposed action, development or activity is likely to have a significant effect on threatened species, populations or communities, or their habitats and, hence, whether the preparation of a Species Impact Statement (SIS) is warranted.

The TSC Amendment Act also specifies that any assessment guidelines issued by the Minister for the Environment be taken into account when assessing the impacts to threatened species, populations, or ecological communities, or their habitats arising from a develop proposal assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. Referred to as the *Draft Guidelines For Threatened Species Assessment*, they clarify technical terms and assist in the interpretation and application of the various factors.

The Guidelines state that,

The objective of the assessment process is to provide information to enable decision makers to ensure that developments deliver the following environmental outcomes:

1. Maintain or improve biodiversity values (ie. there is no net impact on threatened species or native vegetation).
2. Conserve biological diversity and promote ecologically sustainable development.
3. Protect areas of high conservation value (including areas of critical habitat).
4. Prevent the extinction of threatened species.
5. Protect the long-term viability of local populations of a species, population or ecological community.
6. Protect aspects of the environment that are matters of national environmental significance.

The assessment is designed to provide information and analysis to demonstrate that feasible alternatives have been considered, that the project has been designed to be consistent with the principles outlined above, and where there are impacts, that adequate mitigation measures are implemented.

Comment

A Flora and Fauna Report has been prepared by BES which address the extent, magnitude and significance of the impacts of the proposal on threatened species, populations and ecological communities listed on the *TSC Act* in relation to the conservation importance of the habitats, populations and individuals likely to be affected by the proposal. The affected threatened species, populations and ecological communities were identified as the Bauer's Midge Orchid, Greater Broad-nosed Bat, Giant Burrowing Frog, Grey-headed Flyingfox, Yellow-bellied Glider, Powerful Owl and Sooty Owl.

The proposal will remove:

- Potential habitat for the Bauer's Midge Orchid.
- A small area of foraging habitat for the Greater Broad-nosed Bat, Grey-headed Flyingfox,
- Powerful Owl and Sooty Owl.
- Trees with old grown-over incisions made by the Yellow-bellied Glider.
- Trees with hollows that could provide future roosting and denning habitats for the Greater Broad-nosed Bat and Yellow-bellied Glider respectively and prey habitat for the Powerful Owl and Sooty Owl.
- Vegetation upslope of the creek in the south which may reduce the integrity of Giant Burrowing Frog habitats adjacent to this creek.

To mitigate and offset these impacts, the proposal will provide for the preservation of suitable habitat for Bauer's Midge Orchid, suitable foraging habitats for the

Greater Broad-nosed Bat, Grey-headed Flying-fox, Powerful Owl and Sooty Owl, trees incised by the Yellow-bellied Glider, and trees with hollows by.

- a) Dedicating proposed Lot 35 in the south and east of Lots 118 and 119 to Shoalhaven City Council.
- b) Securing the appropriate management of land east of the asset protection zone on proposed Lot 33 in accordance with an approved Vegetation Management Plan via a "Restriction on the Use of Land" on the title of this property pursuant to Section 88B of the *Conveyancing Act 1919*.
- c) Securing the retention of some trees with visible hollows and some trees incised by the Yellow-bellied Glider on Lot 118 via a "Restriction on the Use of Land" pursuant to Section 88B of the *Conveyancing Act 1919* on the titles of affected lots, and appropriately protecting these trees during the construction phase of the proposal.
- d) Ensuring appropriate soil, water and stormwater management strategies are adopted for the proposal.

4.2.2 Native Vegetation Act 2003

The objects of this Act are:

- (a) To provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and
 - (b) To prevent broadscale clearing unless it improves or maintains environmental outcomes, and
 - (c) To protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation, and
 - (d) To improve the condition of existing native vegetation, particularly where it has high conservation value, and
 - (e) To encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation,
- in accordance, with the principles of ecologically sustainable development.

Comments

According to Schedule 1 (Land excluded from operation of Act) Part 3 (Urban areas) Clause 14 of the Act land within a zone designated "residential" are not covered under the Native Vegetation Act 2003. Therefore only the eastern section of Lot 119 which is zoned 7(d1) and 6(c) need to be considered under this Act.

The 7(d1) and 6(c) zoned land associated with the subject site is currently in private ownership. The entire area zoned 7(d1) and 6(c) is proposed for dedication to Council for the purposes of riparian corridor, asset protection zone and inclusion in the Bomaderry Creek Regional Park. The intent of the entire 7(d1) and 6(c) zoned land dedication was to ensure the protection of the scenic, cultural, and natural features of this area through public ownership.

4.2.3 Fisheries Management Act 1994

The objects of this Act are:

- (1) The objects of this Act are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.
- (2) In particular, the objects of this Act include:
 - (a) to conserve fish stocks and key fish habitats, and
 - (b) to conserve threatened species, populations and ecological communities of fish and marine vegetation, and
 - (c) to promote ecologically sustainable development, including the conservation of biological diversity, and, consistently with those objects:
 - (d) to promote viable commercial fishing and aquaculture industries, and
 - (e) to promote quality recreational fishing opportunities, and
 - (f) to appropriately share fisheries resources between the users of those resources, and
 - (g) to provide social and economic benefits for the wider community of New South Wales.

Comments

The proposal will not impact any threatened fish or marine vegetation listed by the *NSW Fisheries Management Act 1994*, as none were recorded in the study area and none are expected to occur there.

The site comprise of Mahogany Creek, which is a tributary of Bomaderry Creek and run through the southern part of the subject site and discharges into Bomaderry Creek and two ephemeral drainage depressions located in the northern section of the subject site that flow to the east into Bomaderry Creek. Bomaderry Creek runs adjacent to the eastern boundary of the subject site.

Mahogany Creek and the land adjacent to Bomaderry Creek comprises part of proposed Lot 35 which is intended to be dedicated to Shoalhaven City Council for the purposes of riparian corridor and inclusion in the Bomaderry Creek Regional

Park. The intent of the dedication was to ensure the protection of the scenic, cultural, and natural features of this area through public ownership.

We are of the opinion that the dedication of this land to public ownership is inline with the objectives of the Fisheries Management Act 1994.

4.3 State Environmental Planning Policies

4.3.1 State Environmental Planning Policy 2005 (Major Projects)

The aims of this Policy are as follows:

- (a) to identify development to which the development assessment and approval process under Part 3A of the Act applies,
- (b) to identify any such development that is a critical infrastructure project for the purposes of Part 3A of the Act,
- (c) to facilitate the development, redevelopment or protection of important urban, coastal and regional sites of economic, environmental or social significance to the State so as to facilitate the orderly use, development or conservation of those State significant sites for the benefit of the State,
- (d) to facilitate service delivery outcomes for a range of public services and to provide for the development of major sites for a public purpose or redevelopment of major sites no longer appropriate or suitable for public purposes,
- (e) to rationalise and clarify the provisions making the Minister the approval authority for development and sites of State significance, and to keep those provisions under review so that the approval process is devolved to councils when State planning objectives have been achieved.

Comments

The whole of the subject property falls within the '*coastal area*' (*SEPP (Major Projects) 2005 Schedule 2 Clause 1*) and the '*Coastal Zone*'; as defined in the *Coastal Protection Act 1979 (CP Act)* with the exception of a small portion of the eastern section positioned within the *Sensitive Coastal* locations, within the Shoalhaven Local Government Area.

Schedule 2, Clause 1 of SEPP (Major Projects) 2005 states that the following sites in the coastal areas are projects to which Part 3A applies:

(i) subdivision of land in a residential zone into more than 25 lots or in a rural/residential zone into more than 5 lots, but in the case of the metropolitan coastal zone only if the land is wholly or partly within a sensitive coastal location.

In summary, the proposed project falls within Schedule 2 as it involves subdivision to create greater than 25 lots in a residential zone, is located wholly within the coastal area and partially within the sensitive coastal location.

As a result this Environmental Assessment Report has been prepared to address the Director General Requirements as discussed in Section 1.5.2.

4.3.2 State Environmental Planning Policy 11 – Traffic Generating

The aims, objectives, policies and strategies of this Policy are to ensure that the Traffic Authority:

- (a) Is made aware of, and
- (b) Is given an opportunity to make representations in respect of, development referred to in Schedule 1 or 2.

Comment

The proposed development is for a subdivision of 35 Lots less which is less than the 50 lot requirement of Schedule 2 “(g) subdivision of land into 50 or more allotments”, and is therefore not affected by State Environmental Planning Policy No.11. The proposal therefore, does not need referral to the RTA and a traffic study is not a legal requirement for the development.

However, in compliance with the Director General Requirements a the Traffic Impact Study was undertaken in accordance with the RTA Guide to Traffic Generating Development Guidelines. The aim of this assessment was to:

- Investigate the existing traffic conditions including current traffic volumes, road widths, and posted speed limit in the vicinity of the proposed development.
- Assess the intersection and traffic requirements for the development.
- Investigate the potential impacts the proposed development is likely to have on the existing traffic conditions and recommend methods to minimise those impacts if required.

The results and outcomes of the study are discussed in section 7.9.

4.3.3 State Environmental Planning Policy 55 – Remediation of Land

The objectives of this Policy are as follows:

- (1) The object of this Policy is to provide for a Statewide planning approach to the remediation of contaminated land.
- (2) In particular, this Policy aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment:
 - (a) By specifying when consent is required, and when it is not required, for a remediation work, and
 - (b) By specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular, and
 - (c) By requiring that a remediation work meet certain standards and notification requirements.

Comments

To the north of the subject site, Shoalhaven City Council currently utilises a leachate pond for the purposes of collecting ground water and surface run-off from the former tip site. The water from the dam is then reapplied back onto the grass paddocks on the northern section of the former tip site. Shoalhaven City Council is of the opinion that they have sufficient mitigation measure in place to stop leachate leaving the former tip site, thus there would be no subsequent contamination of the subject site.

4.3.4 State Environmental Planning Policy 71 – Coastal Protection

This policy aims to:

- *To protect and manage the natural, cultural, recreational and economic attributes of the New South Wales coast.*

Comments

The subject site is considered within the coastal zone as it is located within the vicinity of Bomaderry Creek, a tributary of the Shoalhaven River. The proposal has been designed to ensure protection of the environment, through a riparian zone, stormwater/water quality controls, maintaining significant stands of vegetation and dedication of environmentally sensitive land to Council.

- *To protect and improve existing public access to and along coastal foreshores to the extent that this is compatible with the natural attributes of the coastal foreshore.*

The site has no direct impact on the coastal foreshore, although there are public access issues regarding Bomaderry Creek. Currently, Portion 119 is in private ownership. Part of this development had proposed a dedication to Council of the 7(d1) zoned section of Portion 119, which joins the 6(a) zoned public reserve associated with Bomaderry Creek. This would improve public access to Bomaderry Creek and surrounds. Council is currently reviewing this potential dedication.

- *To ensure that new opportunities for public access to and along coastal foreshores are identified and realized to the extent that this is compatible with the natural attributes of the coastal foreshore.*

This site is not located within a coastal foreshore. The eastern face of the cliff that sits within Portion 119 is frequented by rock climbers from throughout the state. The location is written up in Rock Climbing guidebooks. Access is gained by following the extension of the unformed eastern section of Jamieson Road, crossing the creek and walking around the cliff face. In the event that dedication to Council does not eventuate, this practice will have to cease.

- *To protect and preserve Aboriginal cultural heritage, and Aboriginal places, values, customs, beliefs and traditional knowledge.*

An Aboriginal Heritage Assessment has been conducted by Navin Officer Heritage Consultants, 2006 and is discussed in Section 7.5.

- *To ensure that the visual amenity of the coast is protected.*

The development is not visible from the coast and as such will not have a negative impact on the visual amenity of the coast.

- *To protect and preserve beach environments and beach amenity*

The subject site has no direct impact on beach environments or beach amenity.

- *To protect and preserve native coastal vegetation.*

Dedication of the riparian zone and 7(d1) zoned section of Portion 119 will ensure the protection of native vegetation associated with these areas.

- *To protect and preserve the marine environment of New South Wales.*

The proposal will not have a negative impact on any marine environments. It is located a considerable distance from the coast.

- *To protect and preserve rock platforms*

There are no rock platforms in the vicinity of the subject site. A cliff face and ledge exist within this site, but as can be seen from the layout plan, they are not impacted by any part of the development proposal.

- *To manage the coastal zone in accordance with the principles of ecologically sustainable development.*

There is nothing in this proposal that will hinder the protection of the environment for the benefit of future generations. Dedication of the riparian corridor and the environmentally sensitive land adjoining Bomaderry Creek will aid in the proper management of unique ecosystems. The public ownership of these areas should ensure their proper management to benefit future generations.

- *To ensure that the type, bulk, scale and size of the development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area.*

The portion of the subject site proposed to be developed with residential lots is zoned 2(c) Residential. The site directly abuts other undeveloped 2(c) zoned land to the east and is surrounded to the south and west by residential land. The existing housing stock in the immediate vicinity is predominantly single dwellings on a single block of land. This proposal will result in the creation of lots with a range in sizes. Generally the lots proposed are not greatly dissimilar to those existing in the area. However, those lots existing along the western boundary of the site have a lot layout and sizes quite different to those proposed to adjoin that boundary on the eastern side. It is not considered likely that this would have a detrimental impact on the existing dwellings, apart from the possible perception that the subject site formed a piece of open space for the existing residents. However, the site is in private ownership and zoned for the use proposed.

The proposed dedication of the riparian zone to the south will extend the public reserve it adjoins on the western boundary. This will ensure the protection of the scenic quality along the creek area. In addition, the development will maintain as

much native vegetation as practical on the site to ensure integration with the surrounding bushland.

- *To encourage a strategic approach to coastal management.*

This site does not strictly fall into the area of coastal management. In addition, the site is a residue parcel of residential zoned land, some distance from the coast. This proposal will utilise all development potential the site. Having said that, the proposal has been designed with full regard to the environmental constraints and natural attributes of the site and relevant legislation.

Part 2 (Clause 8): Matters for Consideration

- a) The aims of this policy set out in clause 2:*

See Section 4.1 above.

- b) Existing public access to and along the coastal foreshore for pedestrians or persons with a disability should be retained and, where possible, public access to and along the coastal foreshore for pedestrians or persons with a disability should be improved:*

The site has no direct impact on the coastal foreshore, although there are public access issues regarding Bomaderry Creek. Currently, Portion 119 is in private ownership. Part of this proposal is to dedicate the 7(d1) zoned section of Portion 119, which joins the 6(a) zoned public reserve associated with Bomaderry Creek Reserve, to Council. This would improve public access to Bomaderry Creek and surrounds, but is subject to further consideration by Shoalhaven city Council

- c) Opportunities to provide new public access to and along the coastal foreshore for pedestrians or persons with a disability:*

As above.

- d) the suitability of development given its type, location and design and its relationship with the surrounding area:*

The portion of the subject site proposed for development is zoned 2(c) Residential. The site directly abuts other 2(c) zoned land to the north - east and is surrounded to the south and west by residential housing. The majority of housing type in the vicinity is single dwelling low density. While this is probably considered by today's

standards as an under-utilisation of the land, given the growth of the Shoalhaven area, the proposal will result in the creation of lots that are similar in size and orientation to those in the general area of the site.

The subject site has good access to public facilities (schools, transport, shops, etc) and infrastructure. The site is directly adjoining existing residential development and will function as an extension of the existing residential area. The proposal takes advantage of pleasant views and natural surrounds.

- e) Any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore:*

The subject site is not located in the vicinity of the coastal foreshore and will not have a detrimental impact on the foreshore in terms of loss of views or overshadowing.

- f) The scenic qualities of the New South Wales coast, and means to protect and improve these qualities:*

The development is not visible from the coast and as such will not have a negative impact on the visual amenity of the coast.

- g) Measures to conserve animals (within the meaning of the Threatened Species Conservation Act 1995) and plants (within the meaning of that Act), and their habitats:*

A Flora and Fauna Assessment has been undertaken by BES and is discussed in Section 7.7

- h) Measures to conserve fish (within the meaning of Part 7A of the Fisheries Management Act 1994) and marine vegetation (within the meaning of that Part), and their habitats:*

The proposal will not have any adverse impacts on fish or marine vegetation.

- i) Existing wildlife corridors and the impact of development on these corridors:*

There are no wildlife corridors associated with the subject site.

Part 4 (Clauses 13-16): Development Control

Clause 13: Flexible Zone Provisions

Flexible zone provisions are not applicable to the subject site. All proposed development will be constrained within the 2(c) Residential zoned portion of the subject land.

Clause 14: Public Access

The proposal will not impede or diminish the right of the public to gain physical, land based right of access to or along the coastal foreshore. Part of the proposal is to dedicate a portion of land to Council for inclusion in existing public reserves, thus improving public access to a natural area.

Clause 15: Effluent Disposal

All new lots will be serviced with reticulated sewer, which will ensure protection of the nearby Bomaderry Creek and associated tributary.

Clause 16: Stormwater

A Stormwater Management Concept has been prepared for the subject site by Storm Consulting. The concept plan includes provisions for stormwater treatment and on site detention. All new dwellings will install rainwater tanks, which will reduce the total volume of stormwater generated on the subject site.

4.3.5 State Environmental Planning Policy 44 – Koala Habitat Protection

The aims of SEPP No. 44 are:

“to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.”

It requires a judgment to be made about whether the land in a study area is potential and/or core koala habitat based on the proportion of trees present that are listed as Koala Feed Tree Species in Schedule 2 of the policy and/or the presence of koalas. These listed feed trees must constitute at least 15 % of the total

number of trees in the upper or lower strata of the tree component for the vegetation to be classified as *potential koala habitat*. *Core koala habitat* is land where there is a resident population of koalas including breeding females.

The policy requires the preparation of plans of management before development consent can be granted in relation to areas of *core koala habitat*, encourages the identification of areas of *core koala habitat*, and encourages the inclusion of areas of *core koala habitat* in environment protection zones.

Comments

The policy applies to this proposal because:

- The land is within the Shoalhaven local government area;
- The land has an area of more than 1 ha; and
- A development application has been made for the proposal.

The study area contains Grey Gum, a Koala feed tree listed on Schedule 2 of SEPP No. 44. Grey Gum makes up more than 15 % of the canopy in the Grey Gum – Blue-leaved Stringybark Open Forest/Woodland in the study area so there is *potential koala habitat* present as defined under SEPP 44.

BES Flora and Fauna Assessment concluded that the study area does not contain any *core koala habitat* as defined by SEPP 44 as there were no resident koalas detected there and no evidence to infer their presence such as scats or scratchings. The proposal will not affect areas of vegetation that provide habitat for the Koala. A Plan of Management for Koala habitat is not required for the proposal.

4.4 Regional Environmental Planning Policies

4.4.1 Illawarra Regional Environmental Plan No. 1

The IREP No. 1 sets out the regional planning context for the land. This plan aims to maximise the opportunities for the people of the region and the state to meet their individual and community, economic and social needs. Particular reference is paid to the way in which these needs are related to the allocation, availability, accessibility and management of the region's land resources having regard to the objectives specified in the REP. **Part vii, Division 1—Provisions Relating To Living Areas** applies to the subject site.

Comments

The proposed development as described, satisfies the above objectives, as it will not prejudice the future use of the land for urban purposes and delivers benefits to the community by way of dedicating ecologically sensitive land for public benefit.

4.4.2 Draft South Coast Regional Strategy

The Draft South Coast Regional Strategy has been prepared by the Department of Planning and applies to the local government areas of Shoalhaven, Eurobodalla and Bega Valley.

The South Coast is one of the high growth regions in NSW. The primary purpose of the Regional Strategy is to ensure that the significant natural and scenic assets that define the region's character and underpin its economy are not compromised by growth. The Strategy aims to ensure that land is available in appropriate locations to sustainably accommodate the projected population growth and associated housing, employment and environmental needs over the next 25 years.

Whilst the Regional Strategy does not identify specific regional infrastructure needs, it will however, inform work undertaken by the Government to determine infrastructure investment priorities for the South Coast. Infrastructure planning will take into account the broad planning framework identified in the Strategy, to ensure that future population growth is supported by essential human services and associated infrastructure.

The Final South Coast Regional Strategy will provide the framework and context to guide the preparation of all new LEPs within the region. Shoalhaven City Council will be required to prepare a new LEP within the next three years. The new LEP will guide future development and must be consistent with the outcomes and actions in the South Coast Regional Strategy.

A review of the Draft South Coast Regional Strategy with regard to this proposal provides the following main findings:

- An additional 26,300 dwellings will be required in the Shoalhaven over the next 25 years, of which 23,900 can potentially be accommodated by existing vacant urban land and existing investigation areas.
- A majority of this land is located around the major centre of Nowra–Bomaderry.
- One of the main attractions of the South Coast as a place to visit and live is the distinctive rural and coastal character of the region's towns and villages.

- Future urban development will be prioritised to support infill housing and new residential subdivisions located adjacent to existing well serviced centres and towns.

Comments

The proposed subdivision is in line with the South Coast Regional Strategy and provides for the opportunity for residential properties to be located in a unique setting within an existing urban area, with good access to public facilities and urban infrastructure. The nature of the proposed subdivision is that of small scale residential infill. It is situated immediately adjacent to existing residential development. The layout has been designed to complete the street network by extending and utilising the existing roads.

4.5 Local Environmental Planning Policies

4.5.1 Shoalhaven Local Environmental Plan 1985

The land is subject to the provisions of Shoalhaven Local Environmental Plan 1985 (with amendments). The land is zoned part Residential Living Zone 2(c), part Environment Protection (Scenic) 7(d1) and part Open Space –Recreation “C” (proposed) 6(c) (**Figure 4.1**).

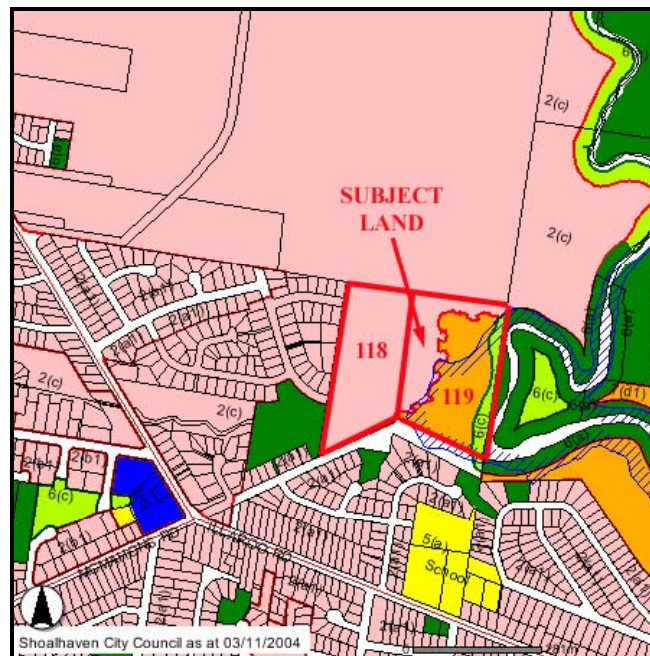


Figure 4.1: Zoning Plan

The objectives of these zones are as follows:

Zone 2(c)

- *To provide for new residential areas with a range of housing types with provision for urban facilities to serve the local community.*

The proposed development utilises a range of lot sizes, from 560m² to 1133m². One additional lot significantly larger in area is also proposed. The variety in lot sizes proposed offers the opportunity for a diverse range of housing styles and sizes to be developed. The topography and setting of the site have been utilised in the design to ensure all future dwellings have a pleasant outlook to the surrounding bushland.

The subject site is the eastern-most extent of residential development within this area of North Nowra, as it adjoins the 7(d1) zoned land to the east. As such, it will function simply as an extension of the existing residential area. The subject site has good access to public facilities (schools, transport, shops, etc) and infrastructure.

Zone 7(d1)

- *To preserve and enhance scenic quality;*
- *To protect natural and cultural features of the landscape which contribute to scenic value; and*
- *To ensure that development is integrated with the landscape values of the area.*

The 7(d1) zoned land associated with the subject site is currently in private ownership. The entire area zoned 7(d1) is proposed for dedication to Council for the purposes of riparian corridor, asset protection zone and inclusion in the Bomaderry Creek Regional Park. The intent of the entire 7(d1) and 6(c) zoned land dedication was to ensure the protection of the scenic, cultural, and natural features of this area through public ownership. This proposed dedication is the subject of a Deed of Agreement currently being negotiated between Council and Evelution Pty Ltd, relating to the dedication of proposed lot 34 for a future road link.

Public ownership of this portion of land would provide the opportunity for rehabilitation programs by community groups, which may lead to an improvement in the scenic and natural attributes associated with the area. In addition, the social

values of the land as a recreational asset may be better managed if in public ownership.

The proposed development is contained wholly within the 2(c) zoned land and will not jeopardise the objectives of the adjoining 7(d1) zoned land.

Zone 6(c)

- *To identify land that will be required to be dedicated as public open space when the land is subdivided to provide for recreation for the general use of the community. The exact boundaries will be fixed at the time of subdivision.*

See comments above, in 7(d1).

Division 5 – Environmental Management (*Clause 28: Danger of Bushfire*) The subject site has been identified on the maps at Shoalhaven City Council as Bushfire Prone. A Bushfire Protection Assessment has been undertaken by Bushfire and Environmental Services. The requirements outlined in Section 7.8.3 have been incorporated into the project design.

4.6 Development Control Plans

4.6.1 Development Control Plan 100 – Subdivision Code

Development Control Plan No. 100- Subdivision Code applies to the subject site. Overall, the proposal generally complies with DCP 100- Subdivision Code.

Development Control Plan No. 100- Subdivision Code applies to the subject site. The following table is a compliance assessment of the proposed development with respect to the performance criteria of the DCP. Overall, the proposal generally complies with DCP 100- Subdivision Code.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
RESIDENTIAL NEIGHBOURHOOD DESIGN		
Layout responds to site characteristics through street & open space networks	N/A	Streets designed with consideration for geotechnical and environmental constraints. Public open space incorporating sensitive environmental areas.
Street and lot layout enables efficient provision of physical services		Design enables efficient servicing of water, sewer, electricity and telecommunications.
Street and lot orientation/dimensions facilitate energy efficient dwellings		Streets aligned predominantly in a North-South direction.
Lot layout/design provide variety of lot sizes & enable a variety of housing types		Lot sizes ranging between 560-1300m ² with various shapes & outlooks
Layout retains significant vegetation & habitat areas, incl. threatened species		As per the Fauna & Flora Assessment, stands of <i>Leptospermum sejunctum</i> and <i>Acacia sptilineris</i> , incised trees & hollow trees to be retained where possible. Also dedicating riparian zone to Council and proposing to dedicate part Lot 119 as public reserve.
Retention of a riparian buffer around waterways	Minimum 20m from banks or centreline	Riparian zone with average of 40m from of centreline, to be dedicated to Council.
STREET NETWORKS		
Safe & Efficient connections between transport corridors and residential neighbourhoods are provided.	Emergency and/or footpath connections are provided into residential areas with only one road access and with more than 30 allotments	Two access points forming a loop road (requirements of NSW Rural Fire Service)
To protect the performance of the road corridors and quality of the street networks in the neighbourhood	To avoid traffic volume in the excess of 3000 vpd on local collector streets.	The proposal will create <3000 vpd (~ 297vpd)
Street networks provide convenient movement for residents between their homes and higher roads.	Driving distance from any dwelling to the nearest collector road is max. 700m	Furthest distance from any dwelling to a collector road (Illaroo Road) is 790m
	No more than three turning movements required in order to travel from any home to the most convenient collector street or higher order road.	Two turning movements are required to reach the nearest collector road

Access Street		
	Street reserve - 16 width (Avge)	Street reserve – 16-20m
	Kerb type - layback	Kerb type – Traditional stormwater drainage is not proposed for the development. Concrete edge strip and layback kerb proposed.
	Street longitudinal grade maximum - 16%	Street longitudinal grade maximum - 5%
	Pavement treatment - AC, paving block or stamped or patterned concrete.	Patterned concrete and AC.
	Footpath requirements - No	No Footpath
	Parking provision within street reserve - carriageway	Parking provision within street reserve - carriageway
	Entrance kerb return radius - 5m	Entrance kerb return radius - 5m
	Speed - 30km/h	Speed - 30km/h
	AADT < 500	AADT < 500
	Carriageway 5.0 to 6.0m	Carriageway 5.5m
PEDESTRIAN & CYCLIST FACILITIES		
Footpath	No footpaths are required on streets with a traffic volume of < 2000vpd as pedestrians can share with vehicles in a low speed environment	No footpath as proposal generates < 2000 vpd
Cycle Path	Cycle paths considered when traffic volumes reach 5000 vpd	No cycle path proposed as traffic volumes < 5000 vpd
PUBLIC TRANSPORT		
Increase opportunities for choice in mode of transport via public transport services that are accessible and convenient to the community	At least 85% of dwellings are within 500m safe walking distance from an existing or potential bus route.	Bus stops located on Illaroo Road, 790meters away. 8 services per weekday, linking with Nowra CBD and school services. Potential for service to move closer.
PUBLIC OPEN SPACE		
To provide public open space for outdoor recreational social activities that contributes to the identity and environmental health of the community	Public Reserve is provided in accordance with an approved open space strategy or DCP or Council's Section 94 Contribution Plan	Public Reserve is provided in accordance with Shoalhaven City Council Section 94 Contributions Plan.
STREET DESIGN		
Speed reduction techniques are used to achieve desired speeds	Control on straight sections by short lengths of road with corners at 90° for pavement 7-7.5m wide or 60° for 5-5.5m wide pavement.	Only straight length of road is ~190m long with T-intersections at both ends and no corners.

Safe sight distances based on vehicle travel speeds exist at property access points, pedestrian and cyclist crossings and at junctions and intersections.	Stopping distance (30m in 40km/h access street) is directly related to speed	30m sight distance based on 40km/h speed.
	Motorists can enter or reverse from a lot in a single movement	Motorists can enter or reverse from a lot in a single movement
The horizontal & vertical alignments satisfy safety criteria and reflect physical land characteristics and major drainage functions	Longitudinal gradients do not exceed 16% on roads other than distributor roads.	Longitudinal gradients of 4-5%
	Curve super elevation does not exceed 6%	Curve super elevation does not exceed 6%
	For downgrades of 5-10% street design should be based on an increase of the maximum speed of 5km/h. For downgrades > 10%, this max speed should be increased by 10km/h.	Downgrades < 5%
	Cross fall on street pavement is generally 3%, otherwise 2.5-5%.	3% cross fall.
Car parking is provided in accordance with projected needs	For allotments having frontages of 12m or more, one on street car park is to be provided for every two dwellings. These are to be located against the kerb or in parking bays constructed within the verge, located within 60m of each allotment.	On-street car parking is provided in carriageway, as per guidelines, at 1 space per 1-2 dwellings.
UTILITY SERVICES		
Ensure adequate servicing of residential developments in terms of sewerage, water, electricity, telecommunications, etc.	Design & provision of utility services conforms to the requirements of relevant authorities.	Two-metre services zone provided in verge. All utilities are available to serve the site and will be in accordance with requirements of authorities.
STORMWATER DRAINAGE		
Subdivision design and layout provides for adequate site drainage	When site topography prevents the discharge of storm water directly to the street gutter or a council controlled piped system, inter-allotment drainage is provided to accept run-off from all existing or future impervious areas that are likely to be directly connected.	A Stormwater Management Concept has been prepared for the subject site. Traditional stormwater controls are not utilised.
Detention Basins	Where down stream storm water drainage systems are inadequate and cost of upgrading is excessive, Council may determine that the use of a detention basin as being applicable. Design should be based on 1 in 100 Average Recurrence Interval storm.	Storm water will be conveyed in an open sandstone channel with small water quality treatment areas containing a gravel and macrophytes matrix to provide a level of sediment and nutrient removal. The pavement shall have one-way cross fall to direct all flows to the storm water.
Inter-allotment Drainage	*Inter-allotment drainage lines are to be at least 0.5m from lot boundaries and contained within a drainage easement of 1.0m width.	

	Inter-allotment drainage to be provided for every allotment which does not drain directly to the street frontage or a natural watercourse.	
	Drainage pits are to be located at all changes of direction and at a maximum spacing of 60m.	
Drainage discharge from property development	Drainage from a development can be discharged into the kerb and gutter by two 100mm dia. Pipes where the calculated flow does not exceed the pipes capacity.	
STREETSCAPE		
To provide an attractive street scope that reinforces the function of a street. Enhances the amenity of buildings and are sensitive to built forms and the environmental conditions	Landscaping of floodways, drainage lines, types of fencing	Street trees will be provided, however details will be addressed in a Landscape Plan, having due regard for details in the Asset Protection Zones and Vegetation Management Plan to be provided at Construction Certificate Stage.
	Footpath trees maximum spacing of 10m, minimum of two trees per lot. Minimum distance from intersections 10m, provide a six month maintenance plan	
	Common design that aids street identity, lighting, signs, tree guards, bus shelters.	
	Street signs to be placed at all intersections in accordance with AC 1743 Road signs.	
ALLOTMENT LAYOUT		
To provide a range and mix of lot sizes to suit a variety of dwellings and household types, with areas & dimensions to meet user requirements	Standard residential allotments: the minimum lot size is to be 500m ²	Minimum lot size 560m ²
To provide lots that enable the application of energy conservation principles	Rectangular Corner lots: Square width min 20m, depth min 30m	1 of 4 corner lots is below minimum with 17m width. However the 30m depth means the area is still > 500m ²
To provide lots of sufficient size to protect environmental features and take into account site constraints.	Rectangular Non-corner lots: Square width min 16m, Depth min 30m	Rectangular non-corner lots are all above minimum standard.
	Irregular shaped lots: Square width min 12m, width at building line 16m, Mean width 18m, Depth 30m.	Irregular shaped lot: minimum width 20m, average width 27m, Depth 30m
	Battle-axe lots: min lot size 650m ² excluding access handle	No Battle-axe lots proposed
Suitable building envelopes that can be developed	Rectangular building envelope of minimum dimensions 15m x 15m be available	Rectangular building envelope of minimum dimensions 15m x 15m are available
Provide opportunity for future dwellings to have good solar access	Allotment design to achieve 5 star rating in accordance with Council's Energy Efficiency Policy. i.e. 80% of lots in the subdivision have 5 star solar access	> 80% of the lots in the subdivision will have 5 star solar access.
Retain character of location by preserving existing mature trees or provide opportunities for future planting	Identify strands of mature trees that can be retained and/or opportunities for future landscaping	Refer to Flora & Fauna Assessment. A landscape plan will be prepared prior to issuing of a Construction Certificate.

Integrated or medium density lots shall only be located in medium density zones as defined in Council's SLEP 1985	Compliance with Council's medium density guidelines.	No medium density proposed.
BUSHFIRE MITIGATION		
Minimise threats of bushfire to developments and provide adequate services for emergency situations	Public perimeter road around residential development	Proposed perimeter road around the subdivision
	Provision of low fuel zone beyond the perimeter road with hydrants at rate of 1 per 100m	Generous APZs have been provided around site, in accordance with the Bushfire Protection Assessment
GEOTECHNICAL		
Subdivision prevented in high risk slip areas	Exclude areas with slope stability problems from development	Geotechnical report has identified areas of instability which will not be developed

Table 4.1: DCP 100 Compliance

4.6.2 Development Control Plan No. 93 - Controls for site waste minimisation and management.

The aim of **DCP 93** is to reduce the rate of waste generation, in particular the demand for waste to landfill disposal. The objectives of this plan are as follows:

- *To maximise avoidance, reuse and recycling of building/construction materials, household generated waste and industrial/commercial waste;*
- *To assist in achieving Federal and State Government waste minimisation targets in accordance with Regional Waste Plans;*
- *To minimise the overall environmental impacts of waste and foster the principles of ESD;*
- *To provide advice on the preparation of waste management plans, matters for assessment, and the reduction and handling of waste;*
- *To require source separation and other design and location standards, which complement waste collection and management services, offered by Council and private service providers;*
- *To encourage building designs and construction techniques which will minimise future waste generation;*
- To encourage the use of materials made from recycled products and materials that can be recycled; and
- Provide on-going management for waste handling and minimisation on premises.

Comments

A Waste Management Plan has been prepared for the proposed development in accordance with the requirements of DCP 93 and is provided Attachment 8.

We would consider the proposed development to be a low waste generating development. With the majority of the waste material generated by the proposed development being the result of earthwork associated with the construction of the proposed roads and the removal of the mature of trees. It is foreseen that the majority of this waste will be reused onsite, with trees to be mulched onsite for use in landscaping and the excavation material to be reused, as fill in other areas of the site were possible.

4.6.3 Development Control Plan 57 – Dual Occupancy

Dual occupancy provides opportunities to develop two dwellings on one lot. Dual occupancy development means development that may result in 2 dwellings, whether attached or detached, on a single allotment of land. This may take the form of conversion of part of an existing dwelling to a second dwelling; additions to an existing dwelling for the purpose of a second dwelling or two detached dwellings.

The objectives of this plan are as follows:

- *To ensure a high standard of dual occupancy development throughout the City.*
- *To preserve and enhance the amenity and environmental character of the area.*
- *To ensure that scale and design of dual occupancy development is compatible with existing environmental character and adjoining development.*
- *To minimise visual prominence and impact of development.*
- *To preserve and compliment any natural or heritage characteristics of the area.*

Comments

It considered that the following lot numbers 1, 11, 12, 21, 22, 26, 29, 30, 31, 32 & 33 are suitable for dual occupancy. However, it is acknowledge that a more detailed assessment would be required as part of any future development application for the individual lots.

The following table is a compliance assessment of the proposed development with respect to the performance criteria of the DCP.

PERFORMANCE CRITERIA	DCP 57 SOLUTIONS	PROPOSAL
Building Lines	Minimum front building line 7.5 metres. Minimum side building line of 900mm to walls and 675mm to eaves (outer edge of guttering). Minimum rear building line of 4.0 metres (or 7.5 metres in the case of lots abutting public reserves). For corner lots a side building line of 3.5 metres to the street or laneway applies.	All the abovementioned lots have the required space to meet these requirements. The exact position of the dwellings would be cover in a sperate DA.
Height and Bulk Controls	All new development shall conform with Council's <i>Policy to Control Building Height and Amenity in Residential Areas</i>. In the case of detached dual occupancy the dwelling furthest from the street shall be of single storey construction and have a maximum height to the underside of eaves of 3.0 metres above natural ground level at any point. Consideration will be given to a mezzanine or loft within the roof space.	The exact height and bulk of the proposed dwellings have not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent these controls, being satisfied.
Floor Space Ratio	For lots up to 1000 m2 in area the maximum floor space ratio for any dual occupancy shall be 0.4:1 (total floor area:site area) – see figure below. For lots greater than 1000 m2 in area the maximum total floor area shall not exceed 400m2.	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent these ratios, being satisfied.
Minimum Lot Sizes	In the case of detached dual occupancy, development will not be permitted on lots having an area of less than 700m2. In the case of attached dual occupancy development will not be permitted on lots having an area of less than 500m2.	All the abovementioned lots have a lot size greater than 700m ² ranging from 716 to 1.4ha
Solar Access	Greater side boundary setbacks are encouraged to Northern or Eastern Boundaries. New development shall be designed to maintain at least 4 hours of sunshine to adjoining properties between 9 a.m. and 3 p.m. at the time of the	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent these

	winter solstice ie 22nd June. Development shall be designed to maximise solar access by orientation of buildings and appropriate placement of window openings and private recreation areas. The use of deciduous trees as part of the landscaping is encouraged in situations where evergreen species may reduce winter sunlight to adjoining properties.	controls, being satisfied.
Energy Efficiency	A certificate from an accredited assessor showing a minimum natHERS or equivalent rating of 3.5 stars.	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent this ratio, being satisfied.
Privacy	Buildings shall be designed and orientated to minimise overlooking of adjoining dwellings and private recreation areas. Design elements such as obscure glass shall be incorporated where openings required for light and ventilation overlook or intrude upon adjoining residences. Driveways and parking areas shall be located and designed to minimise noise disturbance and visual intrusion upon neighbours.	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent this ratio, being satisfied.
Landscaping	A minimum of 40% of the total site shall be landscaped area). Landscaping should be designed to enhance the natural features of the site and compliment the development	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent this ratio, being satisfied.
Carparking Requirements	A minimum of one on-site car parking space shall be provided for each dwelling having a gross floor area of 125 square metres or less A minimum of two on-site car parking spaces shall be provided for each dwelling having a gross floor area exceeding 125 square metres.	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent this requirement, being satisfied.
Private Recreation Areas and Laundry Facilities	A minimum area of 50m² shall be provided as an identifiable private recreation area for each dwelling. The private recreation area should be adjacent to the dwelling and be useable and appropriately proportioned. In this regard at least part of the	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA. Although there are no physical constraints, which would prevent this ratio and controls, being satisfied.

	area shall have minimum dimensions of 6 metres x 4 metres. The private recreation area should be grassed or paved and provide privacy and solar access. Laundry facilities shall be provided for each dwelling. Shared facilities will only be permitted if separate from each dwelling and access is not required via either unit. Screening shall be provided for each dwelling where the drying area is likely to be visible from adjacent dwellings or private recreation areas.	
Building Materials and Design	Generally for new development masonry walls will be required with some timber or textured fibrous cement infill permitted.	The exact design of the proposed dwellings has not been considered as part of this DA and would be cover in a sperate DA.

Table 4.2: DCP 57 Compliance

4.7 Draft Local Policies

4.7.1 Nowra Bomaderry Structure Plan

The subject site is identified within the Draft Nowra Bomaderry Structure Plan as existing urban area and therefore presents no specific limitations to the ability to develop the land for urban purposes. However, Council have acknowledged the need for a Nowra Bomaderry link road and the land the subject of this development has been identified as one potential option for a connecting route. In an effort to accommodate the link road, our clients have agreed to enter into a Deed of Agreement with Council, to facilitate the reservation of land (proposed lot 34) along the northern boundary of the site if required.

5 CONSULTATION

5.1 Consultation with Stakeholders and Other Relevant Authorities

5.1.1 Statutory and Other Relevant Authorities

Prior to progressing the design for the previously prepared draft Master Plan, the following agency consultation occurred:

- 8 April 2004: Meeting with Shoalhaven City Council
 - Asset Protection Zones on Community Land
 - Riparian Zones and dedications
- 23 April 2004: DIPNR (David Zerafa) & Flora & Fauna Consultant (Dimitri Young) met on-site to determine and mark with flagging tape, the riparian zone
- 9 May 2004: On-site meeting with NSW Rural Fire Service (Danielle Simpson)
 - Asset Protection Zones
- 31 May 2004: Pre-lodgement meeting with DIPNR (Lisa Pemberton)
 - Masterplan Layout
 - Asset Protection Zones
 - Riparian Zones
 - Titling of Subdivision

In addition, after lodgement of the previously prepared draft Master Plan agency comments were received and are discussed below:

NSW Rural Fire Service

1. The construction of the perimeter road system and road accessing Lots 33-36 and 38-39 in accordance with section 4.3.1 of the *Planning for Bushfire Protection 2001*.

Comments

As a result of the amendments made to the lot layout (**Attachment 2 & 3**) Lots 33 – 36 and Lots 38-39 no longer exist in the same format. The amended layout plan has reduced the number of lots on the western side of the proposed road from

12 to 7, with the most western lot (Lot 34) being dedicated to Shoalhaven City Council for public road reserve. Therefore Lot 34 will provide a perimeter road system to the rear of proposed Lots 29 – 33.

2. The provision of Asset Protection Zones in accordance with Table A2.2 of *Planning for Bushfire Protection 2001*. It is suggested that a survey plan be provided with any future development application that clearly demonstrates the predominant slope (out to 100 metres) that will most affect fire behaviour.

Comments

In the original plan of subdivision the majority of the APZ's were contained within Lot 41, with only a small strip of APZ's running along the eastern and southern boundary of proposed lots 11-12, 22-28 and 37-39.

As a result of the amendments made to the lot layout (**Attachment 1**), the APZ zone shown as Lot 41 in the original plan has been amalgamated with Lots 40 and 43 to encompass Lot 35, which will be dedicated to Council as riparian corridor and ecologically sensitive land. Consequently as part of the deed of agreement Council will be responsible for the management of the APZ's on that lot.

The remaining APZ's along the southern boundaries of proposed lots 11-12 and 22-28 remains the same, with the APZ's on proposed lots 37-38 now being contained within the new Lot 33, which was created by the amalgamation of lots 35 – 38.

3. Processes for the management of any APZ located outside of individual property boundaries – a detailed Plan indicating who will be responsible for the management of the proposed Association Property under the proposed Community Title Scheme.

Comments

On the account of the amendments to the lot layout, the dedication of land to the Council, and the change from Community Title to Torrens Title blocks there are no APZ's located on land outside individual property boundaries.

Department of Environment and Conservation

- **Flora & Fauna**

1. DEC has reviewed the Draft masterplan and accompanying Fauna and Flora report by Bushfire & Environmental Services. The report has identified the presence of Yellow-bellied Glider (YBG - Petaurus Australia), Powerful Owl (PO - Ninox strenua), Grey-headed Flying fox (GFF - Pteropus poliocephalus) and Sooty Owl (SO - Tyto tenebricosa) on site, and the likely occurrence of Masked Owl (MO - Tyto novaehollandiae) Glossy Black-cockatoo (GBC - Calyptorhynchus lathami) and Giant Burrowing Frog (GBF - Heleioporus australiacus) in the 1.25ha proposal area. In addition, the proposal advocates the clearance of vegetation and habitat for both construction and bushfire protection purposes.

Comments

Whilst BES acknowledges that their report identified the presence of Yellow-bellied Glider (YBG - Petaurus Australia), Powerful Owl (PO - Ninox strenua), Grey-headed Flying fox (GFF - Pteropus poliocephalus) and Sooty Owl (SO - Tyto tenebricosa) in the study area, it should be noted that only the Grey-headed Flying-fox was recorded within the areas to be directly affected by the proposal. The species was recorded within the north of the study area. Whilst there was evidence that the yellow-bellied Glider has previously foraged in the areas to be directly affected by the proposal, the incisions on these trees had completely grown over, indicating that the species had ceased foraging for sap from trees some time ago. No Yellow-bellied Gliders were recorded in the part of the study area despite six targeted nocturnal survey over two months.

2. The proposal will cause the loss of 10% of available high quality Yellow-bellied Glider habitat in the Bomaderry Creek bushland. In Part (a) of the 8-part test (pg 31) the report argues that the local population of YBG may not be viable already, yet the conclusions advocate the removal of more habitat, including a significant area of known habitat containing key resources (feed trees and hollow-bearing trees), as insignificant. This is highly inconsistent. In addition, the loss of known feed trees in the western section of portion 118 is justified partly by the conclusion that they did not have fresh feeding scars. It must be noted that these trees are very close to existing development, which is likely to have compromised their suitability. Following on from this, it is naïve to suggest that retention of other identified feed trees and hollow-bearing trees in the proposed development area, particularly those in the north east of portion 118 and in portion 119, will mitigate

the impact of the development on the population of this species in the area. The expansion of development in the north-east of the study area will also place additional pressure on the area to the north-east of the two lots, suggested as being the "core" area for YBG in the Bomaderry bushland area.

Comments

BES rejects the comments of the DEC regarding inconsistencies in their analysis of the viability of the local Yellow-bellied Gilder population. BES report suggested that the local population inhabiting the Bomaderry Creek Bushland may not be viable in the long-term as the population appears to only have very tenuous habitat linkages to larger areas of Bushland nearby that support Yellow-bellied Gilder populations. BES view that the proposed loss of sap trees no longer used for sap by the species and hallows unoccupied by the species during the two month survey period would not be significant is not consistent with their suggestions regarding the viability of the local population, as the vegetation to be affected would have negligible impacts on the habitat connectivity since it adjoins the North Nowra urban area.

DEC asserts that the suitability of previously used feed trees is likely to have been compromised by their proximity to existing development. BES rejects this assertion, as the Yellow-bellied Glider is known to persist in urbanized areas. BES staff members have undertaken extensive surveys for Yellow-bellied Glider in the Shoalhaven and there are numerous locations where the species continues to use sap trees and nectar resources in very close proximity to existing development including the backyards of dwellings. Furthermore, BES has also recorded numerous sap trees with incisions that have grown over in isolated locations many kilometers from existing development. BES suggest that the abandonment of sap trees may be in response to a range of factors including changes to Yellow-bellied Glider population dynamics and possibly changes to the physiology of individual trees that affect sap quality and/or quantity. In this context, it hardly naïve to consider that the retention of key areas of Yellow-bellied Glider habitat to the east and north, as identified by field work, would enable the species to continue to persist despite the establishment of the proposal.

3. There appears to be no discussion of minimising disturbance to the area where the PO was observed at roost. This area is likely to also provide roosting habitat for the SO that was heard calling. This is of concern due to the fact that the bushfire APZ for lots 38 & 39 appears to extend into the identified roosting patch and comes within 30 m of the actual PO roost location. While the requirements of the APZ allow for the retention of canopy trees, the removal of the mid and under

storey from this area is likely to have an impact on the suitability of the area for the PO & SO. The proposal also results in the loss of a small amount of foraging habitat for both species. Additionally, surveys for the owls were conducted outside of the breeding season.

Recommendation

- 1. In order to reduce this level of impact, modification of the development is required. At a minimum this would include the removal of lots 38 and 39 and the re-configuration of 34-37 (amalgamation into 1-2 larger lots with definite building envelopes) such that maximum tree retention is achieved and the required APZ does not extend into the ecotonal gully forest community.*

Comments

DEC raises concerns regarding the proximity of the asset protection zone (APZ) to the identified Powerful Owl roost and roosting patch. The proposal has been amended as per recommendation 1 of DEC to exclude the APZ from the majority of the ecotonal gully forest vegetation in the study area. The APZ is entirely located above the escarpment. BES acknowledges that field work was not programmed during the breeding season of the Powerful Owl, but this was a conscious decision, as none of the trees with hollows in the study area were suitable for large owl breeding activities. The hollows were too small.

4. Notwithstanding the conclusions of the consultants in the Flora and Fauna Report, the proposal as it stands may indeed have a significant impact on the local population of the YBG, and the likely impact on the roosting habitat of the PO could also be assessed more thoroughly in a SIS.

The above discussion identifies the proposed lots in the north east of the proposed layout in particular lots 38 & 39 as those that are likely to have the greatest impact, either directly through loss of habitat, or by degradation of habitat through development and management of APZ.

Comments

DEC states that ‘ *The proposal may indeed have a significant impact on the yellow-bellied Gilder and that the likely impact on Powerful Owl roosting habitat could also be assessed more thoroughly in a Species Impact Statement*’, but 5A of the Environmental Planning and Assessment Act 1979 only requires a Species Impact Statement if the a proposal is likely to have a significant effect on threatened species

or their habitats. The modified proposal (Drawing 05/125 of Watkinson Apperley) has further reduced the impacts originally assessed by BES, and further confirms the previous conclusions stated in our flora and fauna assessment report that the proposal is unlikely to have significant effect on threatened species or their habitats and that a Species Impact Statement is not required.

Recommendation

- 2. The removal of lots 22-28 from the subdivision layout would achieve the retention of all YBG feed trees with hollows, as well as the majority of the identified ROTAP flora species.*

BES does not believe that there is a need to amalgamate Lots 22 – 28 to reduce the impacts of the modified proposal on the Yellow-bellied Gilder and ROTAP flora species. The retention of all Yellow-bellied Gilder feed trees and other trees with hollows in the study area is not necessary for a conclusion of non-significance to be reached for the modified proposal pursuant to Section 5A of the Environmental Planning and Assessment Act 1979. The Key resources used by the local population occur to the east and north of the areas to be affected by the proposal. The impact mitigation measures included in the modified proposal, as recommended in our flora species within the asset protection zones and on the remainder of the property beyond the development footprint.

- **Aboriginal Heritage**

The draft masterplan does not adequately consider potential impacts to Aboriginal cultural heritage values of the site. Page 23 of the plan states that there are “no issues associated with cultural heritage”, however, this statement is not substantiated with any information based on a DEC Aboriginal heritage Information System (AHIMS) database research, an archaeological assessment or contact with local Aboriginal community members.

DEC AHIMS records 19 known sites within a 2km radius of the proposal. In the Nth Nowra/Bomaderry area, there is a high probability for Aboriginal artefact scatters to occur on the flat country, above the gorges. There is no reason to suggest the Aboriginal objects would not be present at the site.

Recommendation

An Aboriginal cultural heritage survey be undertaken by a qualified archaeologist according to the DEC's Aboriginal Cultural Heritage Standards and Guidelines kit (1997). Within these guidelines is the requirement for archaeologists to work with

appropriate Aboriginal groups and for three copies of reports they prepare to be forwarded direct to the DEC's Aboriginal Heritage Unit (Southern) PO Box 733, Queanbeyan NSW 2620.

Comments

Navin Officer heritage consultants Pty Ltd was engaged to conduct an Aboriginal Heritage Assessment of the subject site. The assessment of the site was conducted during December 2005. In accordance with DEC's Aboriginal Cultural Heritage Standards and Guidelines kit (1997) the Nowra Aboriginal Land Council was represented during the field survey by their senior sites officer Mr. Sonny Simms.

Five Aboriginal sites were recorded in the Jamieson Road study area during the course of the Aboriginal Heritage Assessment. These comprise: a rock shelter with remnant Aboriginal art and potential archaeological deposit; a rock shelter with an artefact shelter scatter, Aboriginal art, and potential archaeological deposit; a previously recorded group of grinding grooves; and two isolated artifacts.

However, when comparing the location of the Aboriginal sites found during the survey with the proposed subdivision layout it was determined that only one of the Aboriginal sites (isolated artefact – 27 x 21 x 6 mm dark brown chalcedony broken flake) is located within the boundaries of the subdivision. Navin Officer recommended that an application be made to the Director-general of DEC for a combined section 87 and section 90 permit to destroy either destroy the artifact or re-position the surface artefact away from the development area, if requested by the Aboriginal Community.

- ***Conservation Reserve***

The proposal directly neighbours Bomaderry Creek Regional Park, managed by DEC. Bomaderry Creek Regional Park was gazetted to protect a number of threatened plant species (including the endangered Bomaderry Zieria (Zieria baeuerlenii) and to provide recreational opportunities in an urban setting.

Recommendation

To reduce impacts on the Regional Park, DEC recommends the following issues be incorporated in any management, landscape, construction and/or operational plans for the proposal:

- 1. Adequate storm water management***

- 2. Adequate weed control*
- 3. Prohibition of illegal dumping of rubbish into, and the collection of bush rock and firewood from the Regional Park*
- 4. Prohibition of additional access points, trails or tracks into the adjoining Regional Park.*

Comments

1. The issue of stormwater management has already been addressed in the stormwater management plan undertaken by Storm consulting to accompany the application. The stormwater management plan recommended the use of a water sensitive road design in conjunction with rainwaters on all dwellings to reduce the runoff volumes. The water sensitive road design is proposed to comprise a one-way crossfall road, draining to a bioretention system running alongside the road. The system will both treat and convey stormwater flows removing sediment, phosphorus and nitrogen from runoff.
2. Due to Lot 35 (block directly adjoining the Regional Park) being dedicated to council as a riparian corridor and undeveloped ecologically sensitive land. Council will be responsible for maintaining adequate weed control within this area. As the remainder of the subject site will be developed during the construction of the subdivision, weed control should not be an issue in this area.
3. The protection of the regional park from illegal dumping of rubbish and the collection of bush rock and firewood is the responsibility of the Department of Environment and Conservation and their rangers. However, as the amended subdivision layout is to dedicate Lot 35 (block directly adjoining the Regional Park) to Shoalhaven City Council this should act as buffer zone.
4. The maintenance and security of the regional park is the responsibility of the Department of Environment and Conservation and their rangers. However, as the amended subdivision layout is to dedicate Lot 35 (block directly adjoining the Regional Park) to Shoalhaven City Council this should act as buffer zone.

Other issues

The recreational opportunities afforded by the cliffs on portion 119 are significant and they have been recognised at a national and international level for their

outstanding rock climbing values. The draft master plan states pg23 that should dedication of some land to council as part of this proposal not eventuate, access to the cliff face would have to cease. This action has the potential to impact negatively on eco-tourism in the Shoalhaven Region.

Comments

The cliffs on portion 119 will be dedicated to Shoalhaven City Council as part of proposed Lot 35. Therefore, the accessibility of the cliffs for rock-climbing purpose will be determine and managed by Council.

Department of Planning and Natural Resources

- **Riparian Zone (Proposed lot 40)**

The Draft Masterplan indicates that a riparian zone has been identified along the southern portion of lot 118 (along Mahogany Creek) in consultation with David Zerafa, DIPNR Nowra. This zone is identified as proposed lot 40 and will be dedicated to Shoalhaven Council for inclusion with adjacent public reserves.

At the time of the onsite consultation with DIPNR, the riparian zone was only identified to the cliff line (approximate boundary of portion 118), as it was understood that little, if any development would occur on portion 119. In order to achieve holistic riparian zone objectives however, the riparian zone should continue for the full length of Mahogany Creek to the eastern boundary of portion 119 and it's confluence with Bomaderry Creek. Thus the lot layout should be amended to incorporate the full length of the riparian zone along the full length of Mahogany Creek.

Bomaderry Creek Reserve and Riparian Zone

The Draft Masterplan indicates that proposed lot 43 will remain as a residue lot to be retained by the current landowners pending further investigations regarding potential public dedication and use. It is noted that the land to the east of lot 43 and which separates lot 43 from Bomaderry Creek is a Shoalhaven City Council Public Reserve. The land to the north of lots 38 and 43 is the Bomaderry Creek Regional Park owned and managed by the Department of Environment and Conservation (DEC).

DIPNR supports the recommendations in the Draft Masterplan, that proposed lot 43 be best dedicated as public land, to be administered by Shoalhaven City Council

or alternatively by DEC. This approach would serve to consolidate the adjoining reserves into a more contiguous parcel of land allowing for holistic management of sensitive lands and landuse activities.

Irrespective of the land title/ownership of proposed lot 43, a riparian zone should also be identified and established along/adjacent to Bomaderry Creek and the eastern boundary of portion 119.

In accordance with DIPNR's "Classification of waterbodies based on objectives for Riparian Land" as outlined in Section 5.2 Managing Urban Stormwater – Soils and Construction Landcom 2004 commonly referred to as the "Blue Book", DIPNR considers that category 1 riparian objectives apply to Bomaderry Creek.

A riparian objective provides for the protection and/or restoration of individual watercourses and their vegetated buffer zones, according to their relative importance and future function within a catchment.

Recommendations

In summary, a riparian zone in accordance with the above criteria, should be identified and established along/adjacent to Bomaderry Creek and the eastern boundary of portion 119. This area should be added to proposed lot 40.

Comments

As a result of the amendments made to the lot layout (**Attachment 1**), the riparian zone (Lot 40) in the original plan has been amalgamated with lots 41 and 43 to encompass Lot 35, which will be dedicated to Council as riparian corridor and ecologically sensitive land. Consequently as part of the deed of agreement Council will be responsible for managing the riparian zone in accordance with the requirements of a Category 1 – *Environmental corridor* including: (i) the core riparian zone; (ii) the vegetated buffer; and (iii) the asset protection zone.

- **Asset Protection Zone (proposed lot 41)**

The majority of the proposed APZ/lot 41 is above the cliff line and/or corresponding elevation. A section of the proposed APZ near proposed lots 36 and 39 however, encroaches beyond the cliff face to the lower slopes adjoining Bomaderry Creek. The APZ requirements will require vegetation removal within the Ecotonal Gully Forest Vegetation Community described in the Flora and Fauna Report submitted with the draft Masterplan. DIPNR considers that this is inappropriate given the landscape and diversity of this vegetation community.

DIPNR has also identified that the majority of portion 119 is classified as Category (A) State Protected Lands (land that is generally in excess of 18 degrees slope) under the Native Vegetation Conservation Act 1997 (NVC Act) which places restrictions on the clearing of native vegetation. As State Protected Land, minimal clearing (two hectares or less if < 25% total area of State Protected Land) for a purpose other than the construction of a vehicular track or road may be carried out under exemption. The equivalent minimal clearing exemption for non State Protected Lands i.e. the clearing of up to 2 hectares per annum for any contiguous landholding in the same ownership, was repealed by Regulation from the Coastal Zone on 26th March 2004 and no longer applies. Depending on the nature of works required for the APZ on State Protected lands, formal consent from DIPNR under the NVC Act may/may not be required. As State Protected Lands, DIPNR would prefer that this area be excluded from the APZ.

Please note the Native Vegetation Conservation Act 1997 will be repealed and replaced by the Native Vegetation Act 2003 in the near future. At this stage it is unknown what, if any difference this would make to assessment of applications, or what the transitional provisions from one Act to the next will be.

Also, in accordance with the previous riparian zone criteria, the proposed APZ/Lot 41 should not conflict with the riparian zone objectives for Bomaderry Creek.

Recommendation

The subdivision layout should be amended to ensure the APZ's are restricted to the property above the cliff line or corresponding elevation and not extend over the steeper State Protected Lands down to the lower Bomaderry Creek flats and Ecotonal Gully Vegetation Community as outlined near proposed lots 36 and 39.

Comments

As a result of the amendments made to the lot layout (**Attachment 1**), the APZ zone shown as Lot 41 in the original plan has been amalgamated with Lots 40 and 43 to encompass Lot 35, which will be dedicated to Council as riparian corridor and ecologically sensitive land. Consequently as part of the deed of agreement Council will be responsible for the management of the APZ's on that lot.

Furthermore, proposed lots 36 and 39 in the original plan no longer exist and have been amalgamated with lots 35 – 39 to form Lot 33. The APZ for Lot 33 is contained fully within the property boundaries, which is above the cliff line.

Therefore, as a result of the amendments made to the lot layout, there will be no vegetation removal required within the Ecotonal Gully Forest Vegetation Community for the construction of APZ's.

5.1.2 Community Consultation

After lodgement of the previously prepared draft Master Plan 23 public comments were received (Attachment 9). The public comments have been grouped into 11 categories and are provided in Table 5.1 along with sections of the report, which discuss the relevant issues.

Community Issue	Relevant Section of EAR
Amenity will be reduced	Section 3.6, 3.7, 3.8 & 7.11
Traffic and Access Impact	Section 7.9
Flora and Fauna Impacts	Section 7.7
Extensive Earthwork during Construction Phase	Section
Potential Leachate from Former North Nowra Waste Disposal Center	Section 4.3.3 & 7.10
Loss of Habitat	Section 7.7
Aboriginal Heritage	Section 7.5
Stormwater Issues	Section 7.2
Conflict with SEPP 71	Section 4.3.4
Capacity of existing Infrastructure	Section 3.5
Scale and density of the proposed development	Section 3.8

Table 5.1: Public Comment in relation previously draft Master Plan application.

6 ISSUES IDENTIFICATION

6.1 Methodology

The following site investigations and reports have been prepared as part of the risk assessment analysis conducted in the preparation of this Environmental Assessment. The aim of this analysis was to identify all key environmental risk factors relevant to the project, so they could be appropriately managed and taken into consideration during the design of the subdivision layout. The results and recommendations of the analysis are discussed in Section 7.

- Geotechnical Investigation prepared by Douglas Partners, February 2004 (with amendments as of 12/01/05 (Appendix 2).
- Bushfire Protection Assessment prepared by Bushfire and Environmental Services, November 2004, amendments of November 2006 (Appendix 3).
- Flora and Fauna Assessment prepared by Bushfire and Environmental Services, November 2004, amendments of November 2006 (Appendix 4).
- Stormwater Management Concept prepared by Storm Consulting, January 2005, amendments of October 2006 (Appendix 5).
- Aboriginal Heritage Assessment prepared by Navin Officer Heritage Consultants Pty Ltd, March 2006 (Appendix 6).
- European Historic Inventory prepared by Navin Officer Heritage Consultants Pty Ltd, March 2006 (Appendix 7).
- Traffic Impact Assessment Prepared by Watkinson Apperley Pty Ltd, November 2006 (Appendix 8).
- Visual Impact Assessment prepared by Dr Iain Pratt Architect and Planner (Appendix 9)

7 ENVIRONMENTAL IMPACT ASSESSMENT

7.1 Cumulative Impact

7.1.1 Existing Environment

At the time of writing this report there were only four 2-lot subdivisions being assessed by Shoalhaven City Council for the North Nowra area. We are not aware of any other proposals for substantial development that are likely to impact on the infrastructure and services including water supply, electricity, waste disposal, gas, and social infrastructure such as health care and public schools.

According to the Nowra Bomaderry Structure Plan (2006) the currently zoned areas within Nowra Bomaderry contains 11,559 dwellings with realistic potential for the development of a further 1,863 dwellings. In respect of the North Nowra area there are currently 2,452 dwellings (2,170 detached dwellings, 282 medium density) with the potential for a further 222 dwellings (205 detached dwellings, 17 medium density).

7.1.2 Potential Impacts

Below are the potential cumulative impacts of the proposed subdivision and associated infrastructure and dwellings:

- Increased pressure on the infrastructure and services of the local area including water supply, electricity, waste disposal and gas.
- Increased pressure on the social infrastructure such health care and public schools.
- Increased pressure on coastal ecosystems.
- A reduction in the biodiversity of the local area.
- An increase in greenhouse gas emissions, largely from burning fossil fuels.
- An increase bushfire risk to the local community.

7.1.3 Mitigation Measures

We are of the opinion that overall the proposed 35-lot subdivision will only have a minimal cumulative impact on the local environment. The existing environment, potential impacts and mitigation measures that will be implemented are discussed throughout the Section 7 and a Draft Statement of Commitments for the Proposal are provided in Section 8.

7.2 Water Cycle Management

7.2.1 Existing Environment

As the site is located on a sandstone escarpment, the relief from the development site to receiving waters is steep. Currently, runoff is dispersed over the development site, apart from one formed drainage depression in the north eastern portion of the development.

The site comprises of Mahogany Creek, which is a tributary of Bomaderry Creek and runs through the southern part of the subject site to discharges into Bomaderry Creek. The site also comprises of two ephemeral drainage depressions located in the northern section of the subject site that flow to the east into Bomaderry Creek. These drainage depression are discussed in section 2.5.

The proposed site of the residential component of the development is located on an escarpment above the floodplain (Attachment 3). The lowest relative level (AHD) of the residential component of the proposed subdivision is on lot 33 and is approximately 35.5m AHD, well above the 1% AEP flood level in the area. Therefore the residential component of the proposed development will not be affected by flooding from the Shoalhaven River or Bomaderry Creek and as such requirements in the NSW Floodplain Management Manual do not apply to this proposal.

7.2.2 Potential Impacts

The construction of the proposed subdivision with the removal of vegetation and the addition of impervious areas will alter the natural vegetation and infiltration characteristics of the catchment. This in turn will cause the catchment to have a much higher surface flow component (runoff), which will increase the erosion potential of the surface water and also increase the amount of water entering the natural creeks. The activities associated with the urbanisation of the site such as the use of motor vehicles and the use of fertilizers could also create water quality problems due to pollutants entering the surface runoff. During a storm event, land surfaces, including impervious surfaces, are washed clean by the rainfall and the resulting runoff creates an increased loading of pollutants to receiving streams. The principal types of pollutants found in urban runoff from these various sources include:

- Sediment
- Oxygen-demanding substances (organic matter)
- Nutrients (Phosphorus, Nitrogen)

- Heavy metals (Copper, Lead, Zinc, Others)
- Pesticides
- Hydrocarbons (PAHs, Others)
- Temperature
- Trash/debris

7.2.3 Mitigation Measures

A Stormwater Management Concept has been prepared for the subject site by Storm Consulting (**Appendix 5**).

The addition of roads and other impervious areas necessitates a more formal drainage system to safely convey flows. In order to minimise the modification in hydraulic regime on the site, the development is split into 3 catchments requiring 2 drainage outlets (Attachment 10).

Catchment 1 drains to the existing channel in the northeast. This drainage path currently conveys flows without causing erosion. The catchment will be slightly reduced in area after development so it will continue to be able to safely convey flows to Bomaderry Creek. However, it is recommended that as much vegetation as possible is retained in and around the channel.

Catchments 2 and 3 will be directed to a low point (Figure 3.1) in the escarpment. The culvert outlet will discharge to existing stable, or stabilised areas. Rock armouring (preferably by hand, or small earthmoving machinery) should be installed where necessary to ensure erosion is prevented.

The overall concept is to manage stormwater flows as close to the source as possible, and to emulate existing runoff conditions, both in location and hydrological regime as much as possible. The increase in the number of small runoff events associated with the increase in impervious areas has a significant impact on urban waterways. Reducing the number of runoff events is seen as a key step in mitigating the impacts of urban developments on downstream aquatic ecosystems. The site geology is a mixture of shallow sandy soils underlain by sandstone bedrock and exposed bedrock. This geology is not conducive to infiltration of stormwater. Given this constraint, emulation of existing conditions will be attempted by retaining or detaining stormwater through the use of rainwater tanks and stormwater landscape features within the road.

The concept includes the following features:

- Road pavements shall have a one-way cross-fall (falling to the west) to direct all flows to a bioretention system running alongside the road. The system will both treat and convey stormwater flows, removing sediment, phosphorus and nitrogen from runoff.
- Lots on the western side of the Road 1 and the eastern side of Road 2 drain to an interallotment drain at their rear boundary and then to stormwater collection pits located at points along the perimeter road (Road 1).
- It is a that all lots will utilise rainwater tanks (5-10kL capacity), which will provide on site retention and detention, reducing the volume of water running off the site and the area/volume required for centralised subdivision detention. Recycling will also reduce demand on Council's potable water supply. It is acknowledged dwellings constructed on the proposed estate, will be required to satisfy BASIX requirements.
- Utilisation of permeable (grass) buffer strips have been recommended for areas on lots below any impervious areas.
- The use of 'soft engineering' techniques (rock boulders) to construct or protect drainage channels will mean that stormwater flows can be conveyed from the development area at the top of the escarpment to Bomaderry Creek and its tributaries without causing erosion.

In addition to the above features recommended by Storm Consulting, it is also proposed to introduce the following features:

- Only a single car driveway crossing (3.0 metre maximum width) is permitted beyond the property boundary. Driveways may be widened within the property to access larger garages.
- Consideration for grassed median strips should be given to all driveways to increase permeability and facilitate replenishment of ground water, reduce stormwater runoff and reduce the visual impact of hard paved surfaces.

7.3 Noise and Vibration

7.3.1 Existing Environment

Currently the subject site experiences a small amount noise from the adjoining residential dwellings to the west and south and from the former North Nowra tip to the north. Council is currently using the former North Nowra tip as a depot storage area.

7.3.2 Potential Impacts

The proposed development has the potential to impact on the noise and vibration amenity of the local community in the following ways:

- Noise and vibration associated with the earthmoving equipment during the construction phase;
- Increase in the amount of traffic movement (large vehicles) during the construction phase;
- Noise and vibration associated with the construction of dwellings;
- Increase in the noise level associated with the increase in the number of people living in the local area; and
- Increase in the amount of traffic movement as a result of the increase in the number of people living in the local area.

7.3.3 Mitigation Measures

The proposed development will generally have a minimal impact on the noise level of the local environment. The majority of the noise associated with the development will be generated during the construction phase. This noise will be a temporary inconvenience and is expected to be given time constraints by way of relevant hours of operation in the development consent. It's foreseen that the future noise level generated by the proposed development will be similar to the existing estate, and will be regulated by relevant state legislation and policies for residential living.

7.4 Air Quality

7.4.1 Existing Environment

The Nowra Bomaderry Structure Plan states that the Shoalhaven region has an excellent level of air quality, well above both current and proposed standards.

The subject site is currently un-developed and predominately comprises four main vegetation communities Grey Gum Woodland/open Forest, Kunzea shrubland, Riparian Forest, and Ecotonal Gully Forest. The air quality within the subject would be considered to be excellent, with only the occasional odour problem associated with the ethanol plant located in Bomaderry.

7.4.2 Potential Impacts

Potential air pollution in an urban area can arise from a wide variety of sources although they are mainly a result of combustion processes. The combustion of fossil fuels for transport, heat and electricity generation can result in the emission of significant amounts of pollutants including suspended particulate, which are made up of a combination of airborne smoke, soot, dust, and liquid droplets. However, the largest source of pollution in most urban areas is motor vehicles.

The proposed development has the potential to impact on the air quality of the local community in the following ways:

- The removal of native vegetation;
- Fugitive air emissions (dust) associated with the earthmoving equipment during the construction phase;
- Increase in the amount of traffic movement (large vehicles) during the construction phase;
- Increase in the amount of air pollution associated with the increase in the number of people living in the local area; and
- Increase in the amount of traffic movement as a result of the increase in the number of people living in the local area.

7.4.3 Mitigation Measures

The proposed development will generally have a minimal impact on the air quality of the local environment. The following points are made with regards to mitigation of air pollution:

- The proposed development has been designed to minimise the amount of tree removal. Furthermore, the entire area zoned 7(d1) and 6(c) is proposed for dedication to Council for the purposes of riparian corridor and inclusion in the Bomaderry Creek Regional Park. The intent of the land dedication is to ensure the protection of the scenic, cultural, and natural features of this area through public ownership.
- The majority of the fugitive air emissions will occur during the construction phase. An erosion control and dust suppression plan will be prepared and provided as part of the documentation for a construction certificate for the proposed development.
- All future dwelling constructed on the proposed estate, will be required to satisfy BASIX requirements.

- The proposed development will result in an increase in traffic movement of 297 vehicle movements per day. This is considered to be a relatively small increase in the overall traffic movements of the local area.

7.5 Aboriginal Heritage

7.5.1 Existing Environment

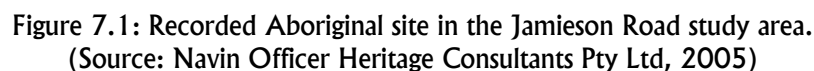
Navin Officer Heritage Consultants Pty Ltd were engaged to conduct an Aboriginal Heritage Assessment of the subject site (Appendix 6). The assessment of the site was conducted during December 2005. In accordance with DEC's Aboriginal Cultural Heritage Standards and Guidelines kit (1997) the Nowra Aboriginal Land Council was represented during the field survey by their senior site officer Mr. Sonny Simms.

Five Aboriginal sites were recorded in the Jamieson Road study area during the course of the Aboriginal Heritage Assessment (Figure 7.1).

These comprise:

- A rock shelter with remnant Aboriginal art and potential archaeological deposit (JR1), (a European gunflint was also found in this shelter);
- A rock shelter with an artefact scatter, Aboriginal art, and potential archaeological deposit (JR2);
- A previously recorded group of grinding grooves (JR3, DEC site no. 52-5-84); and
- Two isolated artefacts (JR4 and JR5).

Four rock shelters with potential Aboriginal archaeological deposit (JRPAD 1-4) were also identified in the study area.



Aboriginal significance can be defined as the cultural values of a place held by and manifest within the local and wider contemporary Aboriginal community. Places of significance may be landscape features as well as archaeologically definable traces of past human activity. The significance of a place can be the result of several factors including: continuity of tradition, occupation or action; historical association; custodianship or concern for the protection and maintenance of places; and

the value of sites as tangible and meaningful links with the lifestyle and values of community ancestors. Aboriginal cultural significance may or may not parallel the archaeological significance of a site.

The most serious impact would be the destruction of the entire aboriginal heritage associated with the site. However, when comparing the location of the Aboriginal sites found during the survey with the proposed subdivision layout it was determined that only one of the Aboriginal sites JR5 will be directly impacted by subdivision development. The remaining Aboriginal site recordings are situated in peripheral areas, which are proposed to be dedicated to Shoalhaven City Council and thus are not subject to direct impacts from the proposed subdivision. Therefore the main impact of the proposal will be the removal of a dark brown chalcedony broken flake(Figure 7.2).

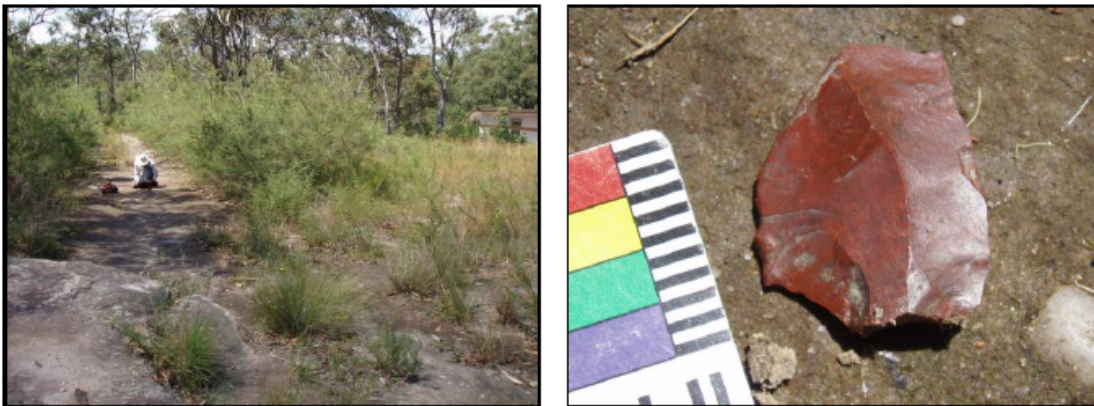


Figure 7.2: Isolated find JR5.
(Source: Navin Officer Heritage Consultants Pty Ltd, 2005)

The indirect impact to Aboriginal sites from recreational use of the Bomaderry Creek corridor is not an issue unique to this development proposal, and should not be considered in isolation from the larger development context. A majority of the corridor is now fringed by urban residential development and recreational facilities including walking trails, accessible crown lands and sporting grounds. Indirect impacts to Aboriginal sites are occurring as a consequence of current conditions, and the absence of the proposed Jamieson Road development would not influence this current situation.

7.5.3 Mitigation Measures

The following mitigation measures will be undertaken during the construction of the proposed subdivision:

1. An application will be made to the Director-General of the DEC for a combined section 87 and section 90 permit to destroy the site **JR5**, and to

- collect, and (if requested by the Aboriginal community), re-position the surface artefact away from the development area.
2. Consultation with the Nowra Local Aboriginal Land Council will continue with regards to the Aboriginal cultural heritage resource within the current study area.

The remaining Aboriginal sites are located in the area proposed to be dedicated to Shoalhaven City Council. It is recommended that Shoalhaven City Council considered the implementation of an integrated management plan to conserve and actively manage all of the remaining Aboriginal sites with regards to the recreational use and visitation to these areas.

The following strategies should be considered when formulating the management of recreational use and visitation to those parts of the study area, which will not be subject to direct development impact:

- a) Walking trails and pedestrian access routes should be positioned and aligned so that users are directed away or around sensitive Aboriginal sites and landforms;
- b) The grinding groove site JR3 should not be actively promoted and the growth of native vegetation encouraged around the site in order to discourage this portion of the creekline as pedestrian route;
- c) The use of motorised bikes should be actively discouraged in the area of the southern tributary creek rock platforms;
- d) Members of local recreational rock climbing organisations should be educated regarding awareness of Aboriginal sites, their values, and how to use shelters already developed for climbing, without further reducing their heritage values;
- e) Sections of the valley floor and creek banks should be rehabilitated so that they act as a focus for recreation and pedestrian access along the creek corridor. This could include the selective control of Lantana and the establishment of carefully placed walking trails and picnic tables. This should direct walkers away from the escarpment, which presently provides the only foot route along the southern side of the creek.
- f) Visitation levels and user impacts should be periodically monitored at Aboriginal sites and the efficacy of management strategies reviewed in the light of monitoring results.

7.6 European Heritage

7.6.1 Existing Environment

Navin Officer Heritage Consultants Pty Ltd was engaged to conduct an Aboriginal Heritage Assessment of the subject site. The assessment of the site was conducted during December 2005. During the undertaking of the Aboriginal Heritage Assessment the following European historic sites were detected.

Seven historic sites were encountered during survey of the study area (Figure 7.2).

These comprised:

- Four stone quarry features (JRH1 - JRH4),
- A water tank (JRH5),
- A surface scatter of building rubble (JRH6) and
- A small and low stone cairn (JRH7).

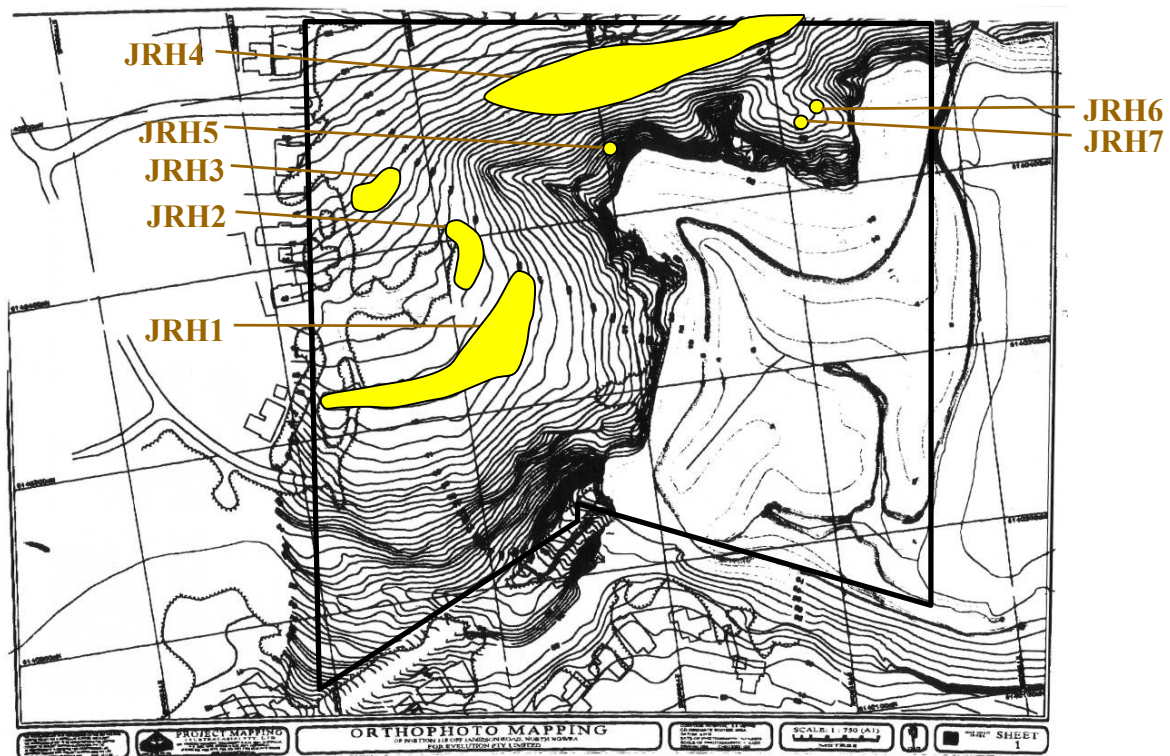


Figure 7.2: Recorded European site in the Jamieson Road study area.
(Source: Navin Officer Heritage Consultants Pty Ltd, 2005)

7.6.2 Potential Impacts

The potential impact of the proposed subdivision will be the removal of three sites JRH1, JRH2, JRH3 and the eastern section of JRH4 connected with the construction of the dwelling and the associated civil infrastructure.

Jamieson Road Historic 1 (JRH1)

This site consists of a series of shallow excavated quarry pits and surface rock platforms where naturally occurring semi-detached, horizontal tabular sandstone strata have been quarried. Naturally exposed surface rock platforms have been exploited, as well as strata down to approximately 1.5 m in depth which have been exposed through the excavation and removal of overburden. Splitting of the rock appears to have been achieved through the use of aligned wedges approximately 7-8 cm wide, placed in shallow slots, approximately 10-12 cm apart. Drill holes or jumper marks are not in evidence, suggesting a nineteenth century or early twentieth century age for the quarrying. Navin Officer suggests the possibility that this and similar quarry sites within the study area were used for the extraction of road kerbing and cobbles. Alternatively the quarried rock may have been utilised for other civic works, such as culverts and embankments, or for building construction.



Figure 7.3: Shows site JRH1 (a) A quarry pit exposing tabular sandstone for quarrying, (b) A series of surface rock platforms with quarried downslope faces in the northern portion of JRH1.
(Source: Navin Officer Heritage Consultants Pty Ltd, 2005)

Jamieson Road Historic 2 (JRH2)

This site consists of a quarried edge and shallow extraction area within a downslope section of an extensive surface rock platform. The quarried area has been later partially filled with rubble and cleared vegetation. Quarrying techniques are the

same as the surface platform quarrying methods in the northern portion of JRH1, which is located nearby.

Jamieson Road Historic 3 (JRH3)

This site consists of a number of scattered quarried edges within surface rock platforms. Quarrying techniques are the same as for the northern portion of JRH1.

Jamieson Road Historic 4 (JRH4)

This site consists of a series of broad and irregular stepped sandstone quarry platforms located on south facing, upper and mid spurline slopes (Plates 14 to 17). Many of the quarry platforms are extensive and semi-continuous and suggest a larger scale of works than for sites JRH1-3. Remnant sections of former vehicle tracks are evident in places. Unlike the quarry sites JRH1-3, where the rock being quarried occurred in relatively narrow semi-detached strata, the sandstone at JRH4 appears to be more massive, requiring splitting along a horizontal, as well as vertical axes (Plate 17). The splitting method across most of this quarry area appears to have been the same as for the other quarry sites, involving the use of aligned shallow wedges.

7.6.3 Mitigation Measures

The following mitigation measures will be undertaken during the construction and on going management of the proposed subdivision:

- A photographic inventory will be undertaken of all European historic sites to be affected by the proposed subdivision prior to the commencement of any construction work.
- A "Restriction on the Use of Land" will be imposed on land east of the Lot 118 boundary on proposed Lot 33 pursuant to Section 88B of the *Conveyancing Act 1919*, requiring conservation and ongoing management of the European sites as identified by Navin Officer Heritage Consultants Pty Ltd, 2005.

7.7 Flora and Fauna

7.7.1 Existing Environment

A Flora and Fauna Assessment was undertaken by Bushfire Environmental Service and the results and recommendations of the report (Appendix 4) are provided in the following section.

The study area supports four vegetation communities Grey Gum – Blue-leaved Stringybark Woodland/Open Forest, Kunzea Shrubland, Riparian Forest, and Ecotonal Gully Forest. In addition a population of the Nowra Tea-tree *Leptospermum sejunctum*, a *Rare or Threatened Australian Plants* ROTAP species, was detected in the central, eastern and southern parts of the study area. Approximately 749 individuals were detected on Lots 118 and 119 however this is likely to be an underestimation of the actual number of plants. The Nowra Tea-tree is characteristic of dry rock surfaces near gullies and cliff lines and is confined to the Nowra area. A total of 144 flora species were identified during the flora surveys comprising 133 native species 11 introduced species. In addition, a total of 18 mammals, 45 birds, two reptiles and six amphibians were also identified during the fauna surveys. The threatened species, populations, and ecological communities given detailed consideration in this report were identified as the Bauer's Midge Orchid, Greater Broad-nosed Bat, Giant Burrowing Frog, Grey-headed Flying-fox, Yellow-bellied Glider, Powerful Owl and Sooty Owl.

The fauna habitats present in the study area are those generally associated with woodland/open forest, shrubland and riparian forest along a permanent creek. The study area contains foraging resources in the form of abundant Grey Gum, Red Bloodwood and to a lesser extent Spotted Gum sap trees, a few winter-flowering Spotted Gum trees, some Black She-oaks with cones, some plants with blossoms, some fleshy fruit-bearing plants, and some flowering tree and shrub acacias and banksias. Some of the Grey Gum trees have incisions consistent with those made by the Yellow-bellied Glider. None of the incised trees within the development footprint showed evidence of recent sap feeding by the Yellow-bellied Glider. There are thirteen trees with trunk hollows and branch hollows within the study area so there are denning, roosting, or nesting sites for hollow-dependent arboreal animals, birds and microchiropteran bats. Shelter for terrestrial fauna species occurs mainly in those parts of study area that have not been under-scrubbed, where the understorey and groundcover strata are intact. The dominant growth forms comprise heathy shrubs in the understorey and grasses, rushes and forbs in the groundcover. These areas contain fallen logs, some with hollows that provide limited shelter for terrestrial fauna. Rock habitats occur as outcrops, sandstone

benches, overhangs and crevices. These provide resources for reptiles and some amphibians. These habitats generally occur in the southern and eastern parts of the study area. Water habitats occur in the permanent creek adjacent to the southern boundary of the study area. Water was flowing freely during the survey period and the creek exhibits sandstone along its bed. Habitat interconnections occur to the east where contiguous areas of vegetation adjoin the crown land along Bomaderry Creek. The patches of dense sub-canopy below the escarpment in the gorge of Bomaderry Creek provide roosting habitat for Large Forest Owls and a Powerful Owl was detected roosting there during the survey period. A Sooty Owl was also heard calling on one occasion during the survey period.

7.7.2 Potential Impacts

The fauna habitat to be removed or modified for the proposal comprises shelter or blossom associated with the understorey and groundcover within the open forest, sap trees in the canopy, and trees with hollows. The extent of foraging resources to be affected, approximately 6.1 ha, represents 9.5% of the approximately 64.15 ha of high quality habitat (Grey Gum – Blue-leaved Stringybark Woodland / Forest) available to the Yellow-bellied Glider in the Bomaderry Creek Bushland (as mapped by KMA 1999). Another 71.82 ha of Scribbly Gum – Red Bloodwood forest, 23.1 ha of Scribbly Gum – Casuarina Forest, and 29.16 ha of Spotted Gum – Blackbutt Forest occurs in the Bomaderry Creek Bushland. These communities are also likely to provide habitat, if somewhat lower quality, for the Yellow-bellied Glider. Home ranges for the species are thought to be between 20 and 85 ha (Lindenmayer 2002).

In this context, the loss of a small area of potential habitat resources for the Yellow-bellied Glider in the study area is unlikely to reduce the long-term viability of the local population or accelerate the extinction of the species. The impacts of the proposal on this species are not considered significant. Of the thirteen trees with hollows within the study area, seven are likely to be able to be retained as they occur within the proposed asset protection zone, on the edges of the proposed road reserves, or outside of likely building envelopes. Connectivity will be retained to all hollow bearing trees to be retained. The other trees with hollows to be removed appear to be either unoccupied, or occupied by common hollow-dependent fauna species.

The loss of potential habitat for the Greater Broad-nosed Bat

There are foraging resources, particularly within the vegetated corridor along the drainage line, and roosting resources in the trees with hollows. However, a targeted

survey found no bats. The proposal involves the modification of a small amount of already partially disturbed foraging habitat, which is a tiny proportion of the expected home range of this species.

The loss of potential foraging resources for the Grey-headed Flying-fox. There are two permanent camps in the vicinity of the study area at Comerong Island and Bugong. The study area provides a very small area of foraging habitat for the species. The loss of this habitat would not affect the ability of the species to forage in the locality given the vast areas of vegetated lands available to this highly-mobile animal.

The loss of potential prey habitat for the Powerful Owl and Sooty Owl,

There are no trees with hollows that could be used for breeding by these species as the hollows are too small. However, the proposal involves the modification of about 6.1 ha of already partially disturbed prey habitat, which is a tiny proportion of the home ranges of these species. Trees with hollows of sufficient size for breeding for these owls will not be affected by the proposal nor will potential roosting habitat in the Bomaderry Creek Gorge. The removal of vegetation from the study area will not sever habitat connections for these species as they are capable of flying. In this context, the loss of a small area of prey resources for the Powerful Owl and Sooty Owl in the study area is unlikely to reduce the long-term viability of their local populations or accelerate the extinction of these species. The impacts of the proposal on these species are not considered significant.

The loss of potential habitat for the Giant Burrowing Frog.

The study area contains a limited amount of marginal habitat suitable for the Giant Burrowing Frog. There is an ephemeral drainage line in the north-east of the study area, but it does not appear to have habitat characteristics suitable for this species. The permanent creek in the south of the study area appears to provide suitable habitat for the Giant Burrowing Frog, but the quality of the water appears low as the creek drains the urban area of North Nowra. The species is known to prefer creeks with very high water quality. Surveys for the species were undertaken but no frogs were detected. The proposal will not directly affect the part of the study area most suitable for the species. This area, adjacent to the permanent creek, will be dedicated to Shoalhaven City Council, and consequently the vegetation in this area will be retained intact.

The study area does not support any endangered ecological communities so the proposal will not have any impacts on such communities.

The proposal will not impact any endangered populations as none are listed in the Shoalhaven local government area.

The proposal will not impact any threatened fish or marine vegetation listed by the *NSW Fisheries Management Act 1994*, as none were recorded in the study area and none are expected to occur there.

7.7.3 Mitigation Measures

The proposal will incorporate the following measures to mitigate the impacts on threatened species, populations, ecological communities, migratory species or their habitats, and minimize the impacts of the proposal on the flora and fauna values of the study area in general.

Vegetation and Habitat Management

1. Proposed Lot 35 will be dedicated to Shoalhaven City Council.
2. A “Restriction on the Use of Land” will be imposed on land east of the asset protection zone on proposed Lot 33 pursuant to Section 88B of the *Conveyancing Act 1919* requiring vegetation and habitat management on this part of proposed Lot 33 in accordance with a Vegetation Management Plan approved by the Shoalhaven City Council.
3. A “Restriction on the Use of Land” will be imposed on proposed lots containing trees with visible hollows and trees incised by the Yellow-bellied Glider identified for retention requiring that these trees not be removed without approval from Shoalhaven City Council. Other trees will also be required for retention within 30m of trees with hollows and incised trees to sustain canopy connectivity.
4. Clumps of *Leptospermum sejunctum* and *Acacia subtilinervis* will be retained within the proposed asset protection zone on Lot 35 and on other affected lots, strategically located in accordance with the proposed asset protection zone specifications. Clumps will be identified by a suitably experienced and qualified ecologist in consultation with a suitable qualified bushfire consultant and protected during construction works and asset protection zone works.
5. The asset protection zone on Lot 35 will be established and maintained with hand tools to limit disturbances to retained *Leptospermum sejunctum* and *Acacia subtilinervis* plants.
6. All trees and clumps of vegetation to be retained on proposed residential lots and in the asset protection zone of proposed Lot 35 will be identified by a suitably qualified ecologist, marked on site and located by a registered

- surveyor. The plan of survey for these ecological features will be legally tied to the titles of affected lots and submitted to the Shoalhaven City Council.
7. All trees and vegetation to be retained will be appropriately protected from compaction of root systems, damage to trunks, and the build-up of soil around tree bases, by appropriate work practices during the construction phase of the proposal.
 8. All vegetation to be retained will be protected from unauthorised access during the construction phase of the proposal. An induction program for workers will be developed and implemented to inform them of the limitations of the construction site. Temporary fencing will be installed along the edges of vegetation to be retained and workers will be instructed to avoid encroaching into such vegetation.
 9. A Vegetation Management Plan will be prepared by a suitably qualified person for the part of Lot 35 affected by asset protection zone works and for the part of Lot 33 east of the asset protection zone. The Vegetation Management Plan will address a number of matters including, but not limited to, protection and maintenance of the flora species of conservation significance, trees with hollows and incised trees, weed control, vegetation enhancement, control of access, monitoring and fire management.
 10. Perimeter roads will be located such that they adjoin retained vegetation on proposed Lot 35 wherever possible in order to provide a line of demarcation between disturbed areas and protected areas and limit unauthorised access and dumping.
 11. Trees with hollows to be felled during the construction phase, will be felled in accordance with the following procedures:
 - (a) Felling will be supervised by a fauna specialist appropriately licensed under the *NSW National Parks and Wildlife Act 1974*, for the purpose of rescuing displaced fauna.
 - (b) The fauna specialist will be suitably attired with protective clothing and have suitable equipment to undertake the work. A “green card” from an Occupational Health and Safety Induction Training Course for Construction Work will also be held by the fauna specialist, who may also need to be suitably vaccinated (especially if there is potential for handling bats).
 - (c) An appropriately skilled local wildlife carer must be notified at least 24 hours prior to the tree felling, that animals may be captured and that these animals may need care.
 - (d) Any non-hollow-bearing trees around those with tree hollows to be felled will be removed first. At least one day will be left between clearing of the non-hollow-bearing trees and the hollow-bearing trees to allow fauna time to vacate the trees.

- (e) Prior to felling of the identified and marked hollow-bearing trees, the trees will be shaken or nudged by tree-felling equipment to encourage any fauna to vacate the trees.
- (f) If no animals emerge from the hollows after shaking or nudging, then the tree will be felled and lowered to the ground if possible.
- (g) If an animal emerges from a hollow following shaking or nudging of the tree, then at least 30 minutes will be allowed for the animal to leave the tree. If the animal comes to the ground, or when it is on the lower trunk, attempts will be made to capture the animal using a net. Captured animals will be immediately transferred to a suitably sized cotton bag and checked for obvious injury during the transfer process.
- (h) Captured animals will be placed in individual bags unless they are a family group to which separation would risk the survival of the young (i.e. a lactating female with young).
- (i) Once the tree has been felled, a search will be made of the branches around the tree for any fleeing fauna and hollows should be inspected with a torch for the presence of any animals. Attempts will be made to capture any fleeing fauna with a net, and animals inside hollows should be extracted by hand. Captured animals will be immediately transferred to a suitably sized cotton bag and checked for obvious injury during the transfer process.
- (j) Injured, shocked or immature captured animals will be placed in a cotton bag secured at the top. Bags will be wrapped in appropriate insulating material such as blankets and placed in a quiet, warm and preferably dark place until the wildlife carer can collect them. Details on the location of the capture and proposed release areas will be provided to the wildlife carer.
- (k) Uninjured animals will be released in appropriate habitat as soon as practicable (at night for nocturnal species).

Drainage Management

- 12. Drainage management will be designed to minimise alterations to the hydrologic regime of the creeks in the study area and protect water quality.
- 13. Stormwater flows will be returned to the watercourse in the south via a stormwater drainage system designed to improve the water quality for flows leaving the site via the pollutant removal devices, which will reduce the pollutant.
- 14. The principles of Water Sensitive Urban Design will be incorporated into the proposal.

15. Any proposed armouring of watercourses will only be undertaken with the approval of Shoalhaven City Council following advice from a suitably qualified ecologist.

Sediment Controls

16. Appropriate sediment control measures will be established before the commencement of work on the proposal and retained in place until all bare areas have been revegetated.
17. A Soil and Water Management Plan will be prepared in accordance with the Blue Book.

Landscaping

18. Exotic perennial grasses will not be sown in any areas that abut native vegetation to be retained or re-established within the proposal or native vegetation on adjoining lands. If grasses are to be used in these areas, for landscaping or soil stabilisation purposes, then indigenous native species or non-invasive exotic species will be used.
19. Native plants from the species list in Table 4 of this report will be included in any landscaping for the proposal.
20. Individuals of *Leptospermum sejunctum* and *Acacia subtilinervis* will be propagated by a suitably qualified person and utilised in landscaping for the proposal.
21. No known environmental weeds, noxious weeds or known invasive plant species will be planted within the study area in association with the proposal.

Domestic Pet Management

22. Any domestic pets to be kept within the subdivision will be restrained wholly within the dwelling curtilage at all times, unless secured on a leash.

Conclusion

The study area lies on the interface between the urban area and adjacent areas of bushland. The loss of the vegetation in the development area will not affect habitat connectivity. The vegetation to be retained in the south will provide for continued habitat interconnections along the permanent creek. Stormwater runoff will be treated in bio-retention swales before discharging overland to Bomaderry Creek reducing nutrient loads by up to 50% (Storm Consulting 2005). The creek is already subject to runoff from the North Nowra urban area so impacts are likely to

have already occurred and the contribution of the proposal to the creek system would be minor in this context. In summary, the proposal will not impose significant impacts on fauna habitats, given the context of the study area, the conservation value of the habitats found there and the presence of similar habitats of superior quality on adjacent and nearby lands with high conservation value. The proposal will retain a large proportion of the trees incised by the Yellow-bellied Glider and trees with hollows located on the subject site. Tree spacings from the trees that are retained to adjacent areas of native vegetation will not exceed 20 metres, which will facilitate access for the Yellow-bellied Glider. Trees will be retained within the Asset Protection Zones, in particular the species Grey Gum, Red Bloodwood and Spotted Gum, which are the preferred feed trees of the Yellow-bellied Glider. Individuals of the ROTAP species *Acacia subtilinervis* and *Leptospermum sejunctum* will be retained in clumps within the Asset Protection Zones, while still observing the requirements or specifications for these areas to be effective APZs.

7.7.4 Riparian Zones and Dedication

A tributary of the Bomaderry Creek traverses the southern portion of the subject site from the west, travelling in an easterly direction through to Bomaderry Creek. A riparian zone 40m wide and varying has been observed on the northern side of the creek within which development is prohibited. This riparian zone was identified on site, in full consultation with Mr. David Zerafa from the Nowra office of DIPNR. It is proposed that the riparian zone will be dedicated to Shoalhaven City Council.

We recommended that Shoalhaven City Council should include the riparian zone of the subject land in to the current Plan of Management (1999) for Mahogany Creek Reserve, Judith Drive, North Nowra (Community Land Plan No. 3). The Mahogany Creek Reserve is part of a system of public reserves in the North Nowra area. To the east, the reserve is continuous (apart from interruption by roads) with other public reserves that continue along the same drainage line toward Bomaderry Creek. To the west of Judith Drive there is a proposal by Shoalhaven City Council that a new reserve be created by utilising a 25m wide strip of Department of School Education land and a 40m wide strip of Shoalhaven City Council land. This strip of council land would run directly into the subject land and would connect Mahogany Creek to Bomaderry Creek.

The role of the Plan of Management is as follows:

- Control urban drainage areas.
- Create an environmental facility which provides some ability to act as a vegetated link leading from the Bomaderry Creek Bushland to the vegetated

lands to the west of Pitt Street, Bangalee Reserve and the Gypsy Point area (Goldingay, 1994).

- Create an environmental facility, which contains some vegetation, which is listed as being regionally significant (Leonard, 1994).
- Create an environmental facility with a capacity to treat urban pollutants.
- Create a recreational facility for passive recreation in close proximity to existing and planned urban development.
- Create a local scenic attraction for visitors and residents alike.
- Create an educational facility for nearby residents and school children from the proposed North Nowra Primary School.
- Create a pedestrian linkage.

7.8 Bushfire Risk

7.8.1 Existing Environment

Bushfire Environmental Services has undertaken a Bushfire Protection Assessment and the results and recommendations of the report (Appendix 3) are provided in the following section.

The subject site predominately comprises four main vegetation communities Grey Gum Woodland/open Forest, Kunzea Shrubland, Riparian Forest, and Ecotonal Gully Forest. The western half of the study area is dominated by an elevated sandstone plateau topography with low to moderate gradients. The relief in this area is due to the down-cutting of two minor tributaries which drain to the east and over the main Bomaderry gorge escarpment. A broad spurline crest has developed between the drainage lines. Open sandstone platforms occur frequently across the crest and upper slopes, and low discontinuous scarps characterise the lower slopes.

7.8.2 Potential Impacts

Bushfire risk is defined by the PBP guidelines as *“the chance of a bushfire igniting, spreading, and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset”*.

The bushfire risk to the proposed subdivision is considered to be major for the following reasons:

- The vegetation to the east and northeast of the subject land is likely to remain as forest vegetation;

- Slope classes to the east, north and south are greater than 5 degrees and generally downslope; and
- Forest vegetation exist to the north and northwest of the subject land, however this is separated from the proposed development by an area of grassland greater than required by the *Planning for Bushfire Protection 2001*.

7.8.3 Mitigation Measures

The proposal will incorporate the following measures to mitigate the potential bushfire impacts. The APZ will be provided partially on private residential land, the perimeter road reserve and on land to be dedicated to Shoalhaven City Council (Lots 35 and Lot 34).

1. Table 7.1 provides the APZ, which will be incorporated into the 33 residential lots.

Proposed allotment	Direction	Predominant vegetation community	Slope class	Recommended APZ (minimum)* ¹
11, 12, 26 - 28	South	Forest	> 5 – 10° downslope	> 50 m
29 – 33	North	Grassland	5 – 0° upslope	20 m
33, 22 - 28	East	Forest	10 – 15° downslope	> 60 m
1 - 11	West	Residential development	0 – 5°	N/A

Table 7.1: Assets Protection Zone

2. A Bushfire Management Plan will be prepared for the management of the APZ and the management of bushfire hazard within any residual bushland remaining within the subject land (*i.e.* proposed Lot 34 and 35). Although, the bushfire hazard associated with the area (Crown Land Reserve 180068) between proposed Lot 34 (the link road) and Lots 29 and 30 is considered insignificant and the threat will be more than adequately reduced by the APZ management with Lot 34 for the following reasons:

- The current vegetation management along the Sutherland Drive northern interface significantly reduces the amount of bushfire fuel that may contribute to a bushfire and restricts the passage of a bushfire's approach towards the proposed development.

- The vegetation to the north of Sutherland Drive and proposed Lots 29 to 30 comprises predominantly kikuyu grassland with only a thin strip ($\approx 2 - 3$ m wide) of bushland located within a cut-off drain.

3. Access and egress from the proposed subdivision has been designed to satisfy the *Planning for Bushfire Protection Guidelines 2001*. The proposed perimeter road has been designed in the form of public roads with 20m wide reserve to the south and east and 16 in all other directions.

4. Habitable dwellings adjoining the eastern or southern boundary will be constructed to comply with a level 3 standard (AS3959/2000), with remaining allotments to comply with a level 1 standard.

5. Water hydrants will be provided throughout the development, observing an unobstructed 90m path between the hydrant and the furthest point of any building.

7.9 Traffic and Access

7.9.1 Existing Environment

A Traffic Impact Assessment was undertaken by Watkinson Apperley and the results and recommendations of the report (Appendix 7) are provided in the following section.

The main road in the vicinity of the subject site is the Princes Highway. The Princes Highway is the only continuous north-south route through Nowra area. It links Nowra to Wollongong and Sydney in the north and Ulladulla and Batemans Bay and in the South. North of the Shoalhaven River, the other roads connecting Nowra to the greater road network are Moss Vale Road to the north west and Gerroa Road to the north east. The site is located in a predominantly residential area within the Shoalhaven City Council road network. The proposed development will be an extension to an existing subdivision (Halcot Grove Estate), which consists of nine local roads of varying sizes (Attachment 2). The proposed new roads will be connected to Warren Avenue and Sutherland Drive (Figure 7.4), which currently terminate as dead end public roads, without the provision for vehicular turning circles. Sutherland Drive has a 20.03m road reserve, with a 9–10m carriageway. Warren Avenue has a variable road reserve ranging from 20.03 to 17.8m, with a 6.8m carriageway. The speed limit along both these roads is 50km/hr.



Figure 7.4: Shows Warren Avenue (A) and Sutherland Drive (B), which currently terminate as dead end public roads.

Land use in the vicinity of the site is predominately residential, however, there is a retirement village, local shops/Gym and primary school located on Illaroo Road approximately 100m, 400m and 1km south of the intersection of Illaroo Road and Halcot Avenue. In addition there is a street crossing associated with the retirement village located approximately 100m south of the intersection.

Shoalhaven City Council has provided traffic counts (Average Daily Totals) for a number of locations in the vicinity of proposed development. The counts were taken over a number of different years. Applying the 3% compound growth usually adopted by Council, the following traffic volumes have been estimated to represent existing conditions in the vicinity of the subject site (Table 7.2).

Location	TDT
Illaroo Road South of West Cambewarra Road	3787
Illaroo Road North of Page Avenue	6495
Illaroo Road East of Philip Drive	16566
Halcot Avenue East of Illaroo Road	1257

Table 7.2: Average Daily Totals Provided by Shoalhaven City Council.

In order to verify the existing traffic volumes in the vicinity of the site, traffic counts were undertaken at the intersection of Illaroo Road and Halcot Avenue during weekday morning (7:45 - 9:15am) and afternoon (4:00 - 5:30pm) peak periods on 28 September, 2006. These periods were selected because they represent times of peak traffic activity in the area. Table 7.3 shows a breakdown of the total number of vehicles using Illaroo Road and Halcot Avenue during the study period. As the data was collected over a 1.5 hour period the data has also been converted into peak vehicle movements per hour.

	AM (Total)	Average P/V/H (AM)	PM (Total)	Average (PM) P/V/H
Illaroo Road (Total)	666	444	773	515
North Bound (25/60%)	167	111	60	40
South Bound (75/40%)	500	333	40	27
Halcot Ave (Total)	111	74	163	108
East Bound (26/68%)	29	19	111	74
West Bound (74/32%)	82	55	52	35

Table 7.3: A breakdown of the total number of vehicles using Illaroo Road and Halcot Avenue during the study period.

Typically, peak hour flows represent between 8% and 12% of daily traffic flows. Using this assumption, daily traffic flows along Illaroo Road and Halcot Avenue was calculated using 10% of peak hour flows (Table 7.4).

	Average P/V/H	TDT
Illaroo Road (Total)	480	4797
North Bound (44%)	211	2111
South Bound (66%)	317	3166
Halcot Ave (Total)	91	912
East Bound (51%)	46	465
West Bound (49%)	45	447

Table 7.4: The average peak vehicle movements per hour and the Total Daily Traffic (TDT) flows along Illaroo Road and Halcot Avenue.

Table 7.5 provides a breakdown of the classification of the roads within the existing subdivision in accordance with the RTA Guidelines and the Shoalhaven City Council DCP100.

Road Name	Carriage Width (m)	Speed limit	Road Hierarchy (RTA)	Road Hierarchy (DCP 100)
Illaroo Road	12	60	Collector	Local Distributor
Halcot Ave	13	50	Local	Collector
Chatsworth Cres	8	50	Local	Local Street
Narrien Pl	7	50	Local	Access Place
Falcon Cres	6.5	50	Local	Local Street
Uranna Ave	8 to 4	40	Local	Access Street
Coralie Cl	4	50	Local	Access Place
Warren Ave	6.8	50	Local	Local Street
Sutherland Drive	9 to 10	50	Local	Local Street
Wingello Cl	7	50	Local	Access Place

Table 7.5: The classification of the roads within the existing subdivision in accordance with the RTA Guidelines and the Shoalhaven City Council DCP100.

The desirable maximum capacity of a road section is determined from AUSTRROAD's "*Guide to Traffic Engineering Practice: Part 2 – Roadway Capacity*", by the Level of Service (LoS). A basic Level of Service (LoS) may be equated to a particular Volume/Capacity by considering a range of LoS from A through F with, A representing a very good LoS, through F, which represents an unacceptable LoS. For Illaroo Road and Halcot Avenue, using the assumed desirable maximum hourly flow of 1000 and 250 respectively and the data from Table 7.3, the volume to capacity ratio and the level of service are shown in Table 7.6. As indicated in Table 7.7 the roads are operating at a Level of Services "A". This confirms the observations during the traffic survey, when only minor congestion or delays were noted for existing road users.

	V/C	LoS	V/C	LoS
	AM		PM	
Illaroo Road	0.44	A	0.52	A
Halcot Ave	0.30	A	0.43	A

Table 7.6: The LoS for Illaroo Road and Halcot Avenue.

When considering the practical absorption capacity for the intersection in accordance with the RTA Guide and the Austroads "Guide to Traffic Engineering Practices" Part 2 Roadway Capacity. The Illaroo Road and Halcot Avenue intersection would be a right hand turn from a major road across one lane which would result in a t_a value of 4 sec and a t_r value of 2 sec. Given the existing traffic conditions (Table 7.3) the intersection would have a major stream flow (vph) of 480 vph, which would, correspond to a practical absorption capacity of approximately 1000. This would indicate that the intersection is running a 48% of its capacity. This confirms the observations during the traffic survey, when only minor congestion or delays were noted for existing road users. The overall level of service for road users in the vicinity of the site is considered to be good, with minimal delays, safe operation due to good visibility and no observed road safety issues.

7.9.2 Potential Impacts

The impact of the traffic associated with the proposed development has been assessed with regard to the RTA Guide to Traffic Generating Developments. This is the standard document used to assess the impact of traffic associated with developments. The typical generation rates for residential dwelling houses are provided in Table 7.7. Note that a trip is defined as one-way vehicle movement from one point to another. Therefore, a return trip to and from a land use is counted as two trips.

Daily vehicle trips	9.0 per dwelling
Weekday peak hour vehicle trips	0.85 per dwelling

Table 7.7: Typical generation rates for residential dwelling houses (RTA Guide).

Using the above rates, the future increase in traffic volumes associated with the proposed subdivision and the creation of an additional 33 residential lots are summarised in Table 7.8. As can be seen from Table 7.8, the future increase in traffic flows associated with the proposed subdivision are relatively low.

Number of proposed dwellings	Daily vehicle trips	Weekday peak hour vehicle trips
33	297	28

Table 7.8: Future traffic flows due to the proposed subdivision.

Table 7.9 shows that Illaroo Road currently carries approximately 444 vehicles per hour during the morning peak period. With the additional flows from the proposed subdivision of 28 vehicles per hour traveling along Illaroo Road this flow would increase to approximately 472 vehicles. This will remain well within the acceptable limit of 1,000 vehicles maximum per hour. As a result the volume to capacity ratio would be 0.47 resulting in a Level of Service "A".

Table 7.9 shows that Illaroo Road currently carries approximately 515 vehicles per hour during the afternoon peak period. With the additional flows from the proposed subdivision of 28 vehicles per hour traveling along Illaroo Road this flow would increase to approximately 543 vehicles. This remains well within the acceptable limit of 1,000 vehicles maximum per hour. As a result the volume to capacity ratio would be 0.54 resulting in a Level of Service "A".

	Existing traffic flow from survey	Future traffic flow due to proposed subdivision	Total future traffic flow	Volume to capacity ratio	LoS
AM Peak Traffic Flow (veh/hr)	444	28	472	0.47	A
PM Peak Traffic Flow (veh/hr)	515	28	543	0.54	A
Total Traffic	4797	297	5094		

Table 7.9: Shows the predicted increase in traffic flow on Illaroo Road as a result of the proposed subdivision.

Table 7.10 shows that Halcot Avenue currently carries approximately 74 vehicles per hour during the morning peak period. With the additional flows from the proposed subdivision of 28 vehicles per hour traveling along Illaroo Road this flow would increase to approximately 102 vehicles. This remains well within the

acceptable limit of 250 vehicles maximum per hour. As a result the volume to capacity ratio would be 0.41 resulting in a Level of Service "A".

Table 7.10 shows that Halcot Avenue currently carries approximately 108 vehicles per hour during the afternoon peak period. With the additional flows from the proposed subdivision of 28 vehicles per hour traveling along Illaroo Road this flow would increase to approximately 136 vehicles. This is well within the acceptable limit of 250 vehicles maximum per hour. As a result the volume to capacity ratio would be 0.55 resulting in a Level of Service "A"

	Existing traffic flow from survey	Future traffic flow due to proposed subdivision	Total future traffic flow	Volume to capacity ratio	LoS
AM Peak Traffic Flow (veh/hr)	74	28	102	0.41	A
PM Peak Traffic Flow (veh/hr)	108	28	136	0.55	A
Total Traffic	912	297	1209		

Table 7.10: Shows the predicted increase in traffic flow on Halcot Avenue as a result of the proposed subdivision.

When considering the increase in traffic flow along Illaroo Road (Table 7.10) on the practical absorption capacity of the Illaroo road Halcot Avenue intersection in accordance with the RTA Guide and the Austroads " Guide to Traffic Engineering Practices" Part 2 Roadway Capacity. The Illaroo Road and Halcot Avenue intersection would be a right hand turn from a major road across one lane which would result in a t_a value of 4 sec and a t_r value of 2 sec. Given the predicted traffic conditions (Table 7.10) the intersection would have an average major stream flow (vph) of 508 vph, which would, corresponded to a practical absorption capacity of approximately 990. This would indicate that the intersection is running a 51% of it capacity. This would suggest that the proposed subdivision would have a negligible impact on the intersection.

7.9.3 Mitigation Measures

The proposed subdivision will be accessed via two points Warren Avenue and Sutherland Drive where traffic calming will be introduced by way of road design and landscape treatments. Turning circle heads will be provided at each entry point for those vehicles choosing not to enter the new residential area. This serves as both traffic calming but also provides for easy manoeuvring at the end of Sutherland Drive and Warren Avenue.

The proposed subdivision involves the creation of two roads varying in size from 16 - 20m wide with the main road being a loop road, which connects to the ends of two existing residential streets (Warren Avenue and Sutherland Drive) that currently terminate as dead end public roads, without the provision for vehicular turning circles. It is understood that the absence of turning circles in these locations was on the basis that eventually the roads would be extended when this last remaining vacant parcel of land is developed.

From the location of the site within the road network and within North Nowra, it is considered that there would be no additional traffic flow along the proposed new roads. However, it is considered that there would be an increase in traffic flows along Illaroo Road with the majority of the future increase in traffic flows coming from future subdivision to the north of the subject site. Although it should be noted that the increase in traffic flows resulting from any possible future subdivision to the north of the subject site will partly be offset by the proposed North Nowra Link Road. The link road will provide a much-needed alternative route from North Nowra to the Princess Highway, thus taking pressure off the Princess Highway/Illaroo Road and Princes Highway/Bolong Road intersections. This will have the important additional benefit of improving traffic capacity, road safety, and environmental capacity (importantly noise, pedestrian and access concerns) along the length of Illaroo Road south of the link road connection. Council currently has three options for the North Nowra Link Road:

- The extension of West Cambewarra Road;
- Pitt Street to Narang Road; and
- Illaroo Road between Byron Avenue and Falcon Crescent.

It should be noted that all three options are located to the north of the intersection of Illaroo Road and Halcot Avenue.

We have been advised by Shoalhaven City Council officers that an independent consultant has been engaged to investigate the three options and that no discussion has been made with regards to which option would be pursued.

7.10 Visual Assessment

7.10.1 *Existing Environment*

A Visual Impact Assessment was prepared by Dr Iain Pratt (Architect and Planner) and the results and recommendations of the report (Appendix 9) are provided in the following section.

The Site

The residential component of the site comprises of some 3.96 HA while the remaining area of the site of 7.12 HA is to be dedicated for public open space. This area is generally along and below the cliff-line (See Attachment 3) abutting to the residential site immediately to the west is an existing low density housing subdivision c. 1960-70s with single storey brick veneer houses on allotments of 600 -700+ m².

To the north and east of the proposed residential subdivision is public open space. The Southern boundary adjoins a narrow strip of 6(a) zoned land, owned by Shoalhaven council, which abuts Bomaderry Creek. Views to the proposed subdivision will be from Jamieson Road to the south and from Warren Ave and Sutherland Drive (Attachment 1). The proposed dwellings will not be visible from Bomaderry Creek environs because of the height of the cliff-line and existing vegetation.

Street Pattern

The proposed street layout reinforces the existing settlement character of the locality and enhances the ecological urban form and visual characteristics. The existing street pattern to the west has been extended into the site in sympathy with the topography (see Coastal Design Guidelines: 2.4 (2003)).

A single fronted “edge road” has been utilised to protect the natural edge of the site and retain the cliff-line for public use as well as bushfire management. This public edge facilitates pedestrian access (see Coastal Design Guidelines: 2.3)

The edge road links into the ends of Sutherland Drive and Warren Ave, whilst an internal north-south road allows allotments of 560-650 m² to be created with an east-west orientation. The allotments fronting the edge road range from 650 -850+ m². Thus there is an intentional increase in allotment size from the west to the east of the site towards the cliff-line and public open space.

This street pattern provides views to the important natural features of the site and Bomaderry Creek environs. It also limits fast moving traffic (with calming devices) and facilitates way-finding and legibility (see Coastal Design Guidelines: 2.4). Water sensitive urban design principles have been adopted for the management of stormwater runoff.

Amenity

All the allotments will facilitate dwelling orientation that enables energy efficient design. The smaller lots to the west of the site of 560 m² have 16 metre frontage with solar access to the east and north. Shared driveways and varied setbacks will allow increased solar access. All the other allotments have access to sunlight before 4p.m. in mid-winter. To this end, the street setback for lots 12 to 20 could be varied to 4 metres.

Cooling summer breezes from the east and north-east are available to all the proposed allotments, while the colder winter winds from the west and south-west are relatively protected.

The majority of allotments have potential views to the cliff-line with its existing remnant vegetation to the east and/ or the riparian corridor to the south. Dwellings constructed on the larger allotments with wider frontages to the edge road will allow filtered views from the houses erected to the west via larger side boundary setbacks and driveways. There will be no overshadowing on any of the developed lots.

7.10.2 Potential Impacts

Below are the potential visual amenity impacts of a poorly designed subdivision and associated infrastructure and dwellings:

- Overshadowing;
- Loss of privacy; and
- Loss of solar access.

7.10.3 Mitigation Measures

The following measures are proposed to assist with minimizing the potential impacts:

- Retention of selected vegetation in accordance with the flora and fauna assessment.

- Introduction of street tree planting in species compatible with the native vegetation of the area.
- Use of sympathetic building materials. Limit the colour of roofs to non-reflective colour blending with the natural environment.
- Building heights in keeping with existing housing in the area.

CONTROLS

Building heights, depths and separation, setbacks to the street and side and rear setbacks are controlled by Shoalhaven Council Policy to control “Building Height and Amenity in Residential Areas”. The maximum F.S.R. for a dwelling is 0.6 to 1 permissible under the Code. Thus less than 50% of the residential area can be built over with the inclusion of roadways and grass verges. Given the area of the allotments and average dwelling floor areas for Nowra this ratio would more realistically be 30-40%.

Articulated elevations to the dwellings are to be encouraged. The bulk, scale and amenity of the proposed housing development will be an extension of the existing housing to the west but with the protection of the natural edge for public use, the management of bushfire risk and an improved micro-climate (see Coastal Design Guidelines: 2.5 “Appropriate Buildings in a Coastal Context” (2003)). The existing trees, which are to be retained, are discussed in Section 7.7.3.

CUMULATIVE VISUAL IMPACT

The issue of vegetation clearing and the compatibility of future dwellings are the critical issues for cumulative visual impact of the development proposal. The level of visibility is dependant on the distance from the proposed development and the proportion of the viewscape occupied by the development.

In this proposal, the land use, bulk, scale and amenity are all compatible with that of all nearby properties. Visibility is greatest for those adjoining houses that abut the western boundary and those adjoining at the ends of Sutherland Drive and Warren Ave.

The proposal involves low density residential housing with site areas sufficient to ensure setback compliances. Vegetation clearing will be the most noticeable impact. However, the ratio of clearing to the amount of vegetation to be retained over the total site is relatively small, as is the gross residential

density. The issue of vegetation clearing may also be a contributing factor for those sites with more distant views i.e. sites in Jamieson Road, Phillip Drive and Glen View Close. The visual impact for these properties is from a greater distance. There will be reduced clarity of the disturbance area when viewed from a distance. It should also be noted that the proposed development will not be visible from below the cliff-line. Thus the final outcome in terms of cumulative impact will be negligible.

Coastal Design Guidelines

The Coastal Policy (1997) developed by the Coastal Council of NSW and the Coastal Design Guidelines for NSW (2003) have been considered in this assessment of visual impact. Issues and policy objectives such as protecting buildings from storm events, sea level rise and erosion, damage to mangroves and salt marsh, beach amenity and building on frontal dunes are obviously not relevant to this report. Nor are issues related to main streets, retail/commercial, shop-top housing, car parking or infill development. The issue of footprint and boundary is not relevant but the design objective of connecting open spaces is relevant and is satisfied through the dedication of proposed Lot 35 which will connect two existing public reserves off Warren Ave and Philip Drive and Bomaderry Creek Reserve in the east. This collection of natural area is considered a valuable asset to the community as passive open space, and potential access to Bomaderry Creek Reserve.

7.11 Landscaping

7.11.1 Existing Environment

The study area supports four vegetation communities Grey Gum Woodland/Open Forest, Kunzea Shrubland, Riparian Forest, and Ecotonal Gully Forest. The main landscaping will be undertaken at the entry point of the proposed subdivision and along the proposed new roads.

7.11.2 Potential Impacts

Below are the potential environmental impacts of poorly designed landscaping:

- Poor visual appearance;
- Spread of weeds; and
- Increase soil erosion.

7.11.3 Mitigation Measures

A landscaping plan has been prepared by W.H & G Smit Landscape Architect (Attachment 11), which incorporates the landscape recommendations outlines in Section 7.7.3.

7.12 Social Environment

7.12.1 Existing Environment

In order to consider the likely impacts on social infrastructure, it is necessary to establish the likely population increase resulting from the proposed development.

The proposed subdivision proposes the creation of 33 residential allotments. Shoalhaven City Council has produced a "Population Profile 2001", based on information contained in the Australian Bureau of Statistics 2001 census. This document places North Nowra in Area 1 Planning District, which covers the northern section of the Shoalhaven area including the Nowra and Bomaderry areas. In some circumstances, the profile provides specific information for North Nowra, whilst other information relates solely to Planning District 1. The following statistics are relevant to consider potential population expansion resulting from this subdivision:

- North Nowra has an unoccupied dwelling rate of 6.5%, therefore permanent occupation is limited to 97.5%.
- Occupancy rates for Planning Area 1 are an average of 2.69 persons per detached house.
- The population of Planning Area 1 in 2001 was 39,274 with Compound Growth Rate (CGR) of 0.9%, with the North Nowra area having a population of 5,962 with GGR of -0.2%. Although, it should be noted that North Nowra had a CGR Of 3.5% from 1996-2001.

The North Nowra area's high levels of occupied dwellings are what would be expected given its proximity to Nowra CBD and it's associated infrastructure. The Nowra CBD is the major commercial, retail and administrative centre of the Shoalhaven region.

The reduction in the Compound Growth Rate from 3.5% to - 0.2% indicates that the North Nowra is now losing population. This is most likely the result of a lack of new residential land and a change in the population dynamics with 7.5% of the population in North Nowra aged between 18 –24 and 17.4% between 25-29.

The population breakdown in age percentage of overall population for planning Area 1 is shown in Table 7.11.

Age Group	Percentage of overall population
0-4	6.7%
5-12	13.0%
13-17	7.9%
18-24	7.5%
25-39	17.4%
40-54	21.1%
55-64	10.4%
65-74	9%
75+	6.9%

Table 7.11: Population Breakdown for Area 1 Planning District

The social infrastructure of the North Nowra is relatively well established and includes local shops, primary schools, doctors, a dentist, aged care facilities and community open spaces such as sporting ovals and Bomaderry Creek Regional Park. Furthermore, North Nowra is well serviced by public transport and is located 5 minutes from Nowra's CBD and it's associated social infrastructure including two hospitals and Bomaderry railway station.

7.12.2 Potential Impacts

This section outlines the population projections for the proposed subdivision based on the above profile. As outlined above, this proposal provides for a total of 33 residential allotments and, assuming an occupied dwelling rate of 97.5% as is currently the case for this locality, it is expected that approximately 32 dwellings (33x 97.5%) will be occupied. Given that the majority of the development will be in the form of detached dwellings, it is appropriate to use the occupancy rate of 2.69 persons per dwelling rather than the lower average figure of 2.54 and as such, the 32 occupied dwellings are likely to generate an additional population of 86 persons (32 x 2.69) when completed. The subdivision is proposed to be released in three stages; the timeframe for the release will depend on the market conditions. However, it is anticipated that the release will occur over a 3 to 5 year period. This would result in approximately 23 additional persons per year, which equates to a growth rate of approximately 0.07% p.a. to the existing population. This is not considered significant, given that the Nowra area experienced a 2.9% p.a growth rate from 1996 –2001.

In addition to an anticipated overall population growth of 86 persons Table 7.13 below shows the projected additional population, divided into the various age categories assuming current age distribution rates for Area1 as contained in Table 7.12 above.

Age Group	Number of additional persons
0-4	7.8
5-12	11.2
13-17	6.8
18-24	6.4
25-39	15
40-54	18
55-64	8.9
65-74	7.7
75+	5.9

Table 7.12: Population Breakdown for Area 1 Planning District

The impacts of other potential sites has not been undertaken as the likely yield from these lands is unknown at this time. To conclude this section, the total additional permanent population for this application, is 86 persons. Below are the potential social and environmental impacts of an increase in population associated with a proposed subdivision:

- Increased pressure on the local public health system
- Increased pressure on the food supply to the Nowra area.
- Increased pressure on freshwater supply.
- Increased pressure on the management and treatment of liquid and solid waste.
- Increased pressure on coastal ecosystems.
- A reduction in the biodiversity of the local area.
- An increase in greenhouse gas emissions, largely from burning fossil fuels.

7.12.3 Mitigation Measures

It is considered that the proposed subdivision will only result in a minimal increase to the local population of the North Nowra area and as a result will have only a negligible impact on the existing social infrastructure of the North Nowra and Nowra areas. The proposed subdivision will also result in the dedication of approximately 6ha of native bushland to Shoalhaven City Council, which will increase public accessibility to Bomaderry Creek Reserve.

8 DRAFT STATEMENT OF COMMITMENTS FOR THE PROJECT

8.1 Aims

The proponent is committed to minimising the potential for environmental impacts from the proposed residential subdivision. The measures that the proponent will implement to minimise any potential environmental, social and economic impacts are outlined in Table 8.1.

8.2 Draft Statement of Commitments

Item	Commitments	Timing
General	The developer will carry out the development in accordance with this Environmental Assessment Report (EAR), prepared by Watkinson Apperley Pty Ltd dated December 2006, plans prepared by Watkinson Apperley Pty Ltd and supporting reports.	For the duration of the subdivision.
Legislative Controls/ Requirements	The developer will obtain and maintain the following licences, permits and approvals for the residential subdivision: • Shoalhaven City Council - Construction Certificates for engineering works for each stage of the subdivision. The application for Construction Certificates will contain Design Drawings submitted containing, where relevant, detailed designs relating to earthworks, drainage, Soil erosion and Sediment Control and site rehabilitation, tree clearing and site stability, roadworks, footpaths/cycleways, water supply (both potable and use of reclaimed water) and sewerage works, and landscaping. • Shoalhaven City Council - Road Opening Permit from Shoalhaven City Council as required; • Shoalhaven City Council - Section 138 Consent for roadworks (Roads Act 1993); • Integral Energy - Design Certification; • Integral Energy - Notification of Arrangement; • Telstra - Compliance Certificate; • Shoalhaven Water - Compliance Certificate; • Shoalhaven City Council – Subdivision Certificates for each stage.	For the duration of the subdivision.

Final Plan of Subdivision	- The developer will prepare a final plan of subdivision and Section 88B instrument for each stage of the development in accordance with the recommendations of the Environmental Assessment and requirements of Shoalhaven City Council. - Department of Land and Property Information - registration of the subdivision	Prior to the issue of Subdivision Certificates.
Water Cycle Management	The developer will design, install and maintain water quality control measures in accordance with the following: - Road pavements shall have a one-way cross-fall (falling to the west) to direct all flows to a bioretention system running alongside the road. The system will both treat and convey stormwater flows, removing sediment, phosphorus and nitrogen from runoff. - Lots on the western side of the Road 1 and the eastern side of Road 2 drain to an interallotment drain at their rear boundary and then to stormwater collection pits located at points along the perimeter road (Road 1). - It is anticipated that all lots will utilise rainwater tanks (5-10KL capacity), which will provide on site retention and detention, reducing the volume of water running off the site and the area/volume required for centralised subdivision detention. Reuse will also reduce demand on Council's potable water supply. It is acknowledged dwellings constructed on the proposed estate, will be required to satisfy BASIX requirements. - Utilisation of permeable (grass) buffer strips have been recommended for areas on lots below any impervious areas. - The use of 'soft engineering' techniques (rock boulders) to construct or protect drainage channels will mean that stormwater flows can be conveyed from the development area at the top of the escarpment to Bomaderry Creek and its tributaries without causing erosion. The developer will prepare a soil and water management plan to control run off during construction in accordance with the principles of the	Prior to the release of the final plan of subdivision. Prior to the issue of the Construction Certificate.

	Landcom publication Managing Urban Stormwater (MUS): Soils and Construction Volume 1, 4th Edition and Construction Certificate Plans approved by Shoalhaven City Council and DCP 100.	
Aboriginal Heritage	The developer will manage Aboriginal historic sites in accordance with the following: - An application will be made to the Director-General of the DEC for a combined section 87 and section 90 permit to destroy the site JR5, and to collect, and (if requested by the Aboriginal community), re-position the surface artefact away from the development area. - Consultation with the Nowra Local Aboriginal Land Council will continue with regards to the Aboriginal cultural heritage resource within the current study area.	Prior to the issue of the Subdivision Certificate.
European Heritage	The developer will manage European historic sites in accordance with the following: - A photographic inventory will be undertaken at all European historic sites to be affected by the proposed subdivision prior to the commencement of any construction work. - A "Restriction on the Use of Land" will be imposed on land east of the Lot 118 boundary on proposed Lot 33 pursuant to Section 88B of the <i>Conveyancing Act 1919</i>, requiring conservation and ongoing management of the European sites as identified by Navin Officer heritage consultants Pty Ltd, 2005.	Prior to the issue of the Subdivision Certificate.
Flora and Fauna	The developer will manage vegetation and habitat in accordance with the following: - Dedicate proposed Lot 35 to Shoalhaven City Council. - A "Restriction on the Use of Land" will be imposed on land east of the asset protection zone on proposed Lot 33 pursuant to Section 88B of the <i>Conveyancing Act 1919</i> requiring vegetation and habitat management on this part of proposed Lot 33 in accordance with a Vegetation Management Plan approved by the Shoalhaven City Council. - A "Restriction on the Use of Land" will be imposed on proposed lots containing trees with visible hollows and trees incised by the	On registration of the plan of subdivision.

	Yellow-bellied Glider identified for retention requiring that these trees not be removed without approval from Shoalhaven City Council. Other trees will also be required for retention within 30m of trees with hollows and incised trees to sustain canopy connectivity. • Clumps of <i>Leptospermum sejunctum</i> and <i>Acacia subtilinervis</i> will be retained within the proposed asset protection zone on Lot 35 and on other affected lots, strategically located in accordance with the proposed asset protection zone specifications. • The asset protection zone on Lot 35 will be established and maintained with hand tools to limit disturbances to retained <i>Leptospermum sejunctum</i> and <i>Acacia subtilinervis</i> plants. • All trees and clumps of vegetation to be retained on proposed residential lots and in the asset protection zone of proposed Lot 35 will be identified by a suitably qualified ecologist, marked on site and located by a registered surveyor. The plan of survey for these ecological features will be legally tied to the titles of affected lots and submitted to the Shoalhaven City Council. • All trees and vegetation to be retained will be appropriately protected from compaction of root systems, damage to trunks, and the build-up of soil around tree bases, by appropriate work practices. • All vegetation to be retained will be protected from unauthorised access during the construction phase of the proposal. • A Vegetation Management Plan will be prepared by a suitably qualified person for the part of Lot 35 affected by asset protection zone works and for the part of Lot 33 east of the asset protection zone. • Perimeter roads will be located such that they adjoin retained vegetation on proposed Lot 35 wherever possible in order to provide a line of demarcation between disturbed areas and protected areas and limit unauthorised access and dumping.	For the duration of the subdivision. Prior to the issue of the Subdivision Certificate and for the duration of the development. During the construction phase. Prior to the issue of the Subdivision Certificate. Prior to the issue of the Subdivision Certificate and during the construction phase
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Bushfire Risk	Provision of Asset Protection Zones The developer will establish and maintain Asset Protection Zones (APZs) as outlined in Section 7.8.3 Mitigation measure 1 (Table 7.1). The developer will install relevant infrastructure as required, including fire hydrants. <u>Bushfire Management plan</u> A Bushfire Management Plan will be prepared for the management of the APZ and the management of bushfire hazard within land to be dedicated to Council (<i>i.e.</i> proposed Lot 34 and 35) as outlined in Section 7.8.3 Migration measure 2. <u>Restriction as to User</u> The developer will impose a Section 88B Restriction as to User on the title of relevant allotments specifying a Level of Construction in accordance with Mitigation measure outlined in Section 7.8.3 as Migration measure 4.	Prior to the issue of the Subdivision Certificate and for the duration of the development. On registration of the plan of subdivision.
Traffic and Access	The developer will manage traffic and access measures in accordance with the following: • Traffic calming will be introduced by way of road design and landscape treatments at the two proposed access points. • Turning circle heads will be provided at each entry point for those vehicles choosing not to enter the new residential area. • Two roads varying in size from 16 - 20m wide will be created with the main road being a loop road, which connects to the ends of two existing residential streets (Warren Avenue and Sutherland Drive)	Prior to the release of the final plan of subdivision.
Landscaping	The developer will use native species, endemic to the locality in the preparation of landscaping plans, and subsequent works undertaken in conjunction with this subdivision.	For the duration of the subdivision
Public Open Space	The entire area zoned 7(d1) and 6(c) is proposed for dedication to Council for the purposes of riparian corridor and inclusion in the Bomaderry Creek Regional Park.	On registration of the plan of subdivision

Construction	The developer will prepare a Construction Management Plan for approval by Shoalhaven Council including education of workers in the approvals and conditions requiring compliance (including soil erosion and sediment controls, flora and fauna and aboriginal archaeological issues), details of the environmental management procedures during the development and measures relating to waste minimisation and management.	Prior to the commencement of construction and for the duration of the development.
Infrastructure	<u>Roads</u> The developer will construct all roads and intersections in accordance with DCP 100 and approved Construction Certificates. The developer will provide street signs in accordance with the requirements of Shoalhaven City Council. <u>Electricity and Telecommunications</u> The developer will provide underground power to each residential lot in the subdivision in accordance with the requirements of Integral Energy The developer will provide underground telecommunications infrastructure to each lot in the subdivision in accordance with requirements of Telstra. <u>Water and Sewer Services – Residential Allotments</u> The developer will provide reticulated water and sewerage services to each lot in the subdivision in accordance with the requirements of Shoalhaven Water	Prior to release of the release of the final plan of subdivision.

Table 8.1: Draft Statement of Commitments

9 PROPOSAL JUSTIFICATION

9.1 Justification

- The proposed development will result in the creation of an additional 33 lots in a residential area. The lots are similar in size to those in the locality.
- The development proposed makes the highest and best use of existing residential zoned, that will utilise easy access to infrastructure and services, without negatively impacting the existing urban amenity.
- This development provides the opportunity for residential properties to be located in a unique setting within an existing urban area, with good access to public facilities and urban infrastructure.
- The nature of the proposed subdivision is that of small scale residential infill which is situated immediately adjacent to existing residential development.
- The layout has been dictated by the existing road network and utilises these roads, creating extensions and linkages to complete the street network.
- The subdivision has been designed so that the ecologically sensitive parts of the site are protected through their proposed dedication to Council as public lands.
- There are no alternate subdivision patterns that would be feasible in this situation.

9.2 Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) represents one of the greatest challenges facing industry, in the coming years. While there is no universally accepted definition of ESD, in 1990 the Commonwealth Government through the Ecologically Sustainable Development: Commonwealth Discussion Paper suggested the following definition for ESD in Australia:

...using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life, now and in to the future, can be increased.

Put more simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.

ESD principles must be considered in the planning and design of development within Australia. This is reflected in giving consideration to environmental resources on which it is often difficult to place monetary values such as air, flora, fauna, hydrology, soil and public health.

The EP&A Regulation 2000, Schedule 2 defines the principles of ESD as:

- (a) *precautionary principle*
- (b) *inter-generational equity,*
- (c) *conservation of biological diversity and ecological integrity,*
- (d) *improved valuation, pricing and incentive mechanisms,*

The ESD principles have been recognised as part of the environmental assessment process and are discussed below.

9.2.1 Precautionary Principle

The EPA's precautionary principle states that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Comment

The design of the proposed subdivision has taken into consideration the results and recommendations of a number of environmental studies undertaken as part of the preparation of the EAR and are discussed in section 7 & 8. It is unlikely that an increase of 33 residential lots containing approximately 86 people would lead to serious or irreversible threats to the environment. However, design mechanisms have been incorporated into the subdivision layout to preserve sections of the natural vegetation, while sensitive urban water design have been incorporated into the design to reduce the impact on the aquatic ecosystem and to maintain high levels of water quality.

9.2.2 Intergenerational Equity

Inter-generational equity is aimed at the future, not the present. The aim of this principle is that the present generation should ensure that the health, diversity and

the productivity of the environment is maintained or enhanced for the benefit of future generations.

Comment

The essential premise is that we have a moral obligation to preserve the life supporting and resource-providing environmental systems of the earth for future generations, so that they too have an opportunity for a high quality of life.

It is recognised that the proposed subdivision will result in 3.96ha of vegetation being removed or modified. We are of the opinion that through incorporating the mitigation measures discussed in section 7 and 8 and through the dedication of 7.12ha of land to Shoalhaven City Council that the impact on the local environmental can be reduced.

9.2.3 Conservation of Biological Diversity and Ecological Integrity

Sustainability recognises that all life has intrinsic value, is interconnected and that biodiversity and ecological integrity are part of the irreplaceable life support systems upon which the earth depends.

Comment

The proposed development has been designed to achieve minimal impact on the surrounding natural environment. Measures have been implemented to avoid adverse impacts on the air, noise and water quality of the local environment. The mitigation measures are discussed in detail in Section 7 & 8.

A soil and water quality management plan is to be prepared to ensure that sedimentation of the drainage channel which runs through the property does not occur during the construction and operational phase.

9.2.4 Valuation and Pricing of Environmental Resources

Environmental factors should be included in the valuation of assets and services, such as:

- (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement;*

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste; and

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Comment

While the proponent agrees that environmental factors should be included in the valuation of assets and services. We are of the opinion that this objective is more aimed at local, state and national government agencies that have the power to create development policies and establish incentive structures, including market mechanisms.

10 CONCLUSION

This EAR demonstrates how the subdivision layout and consultant team has addressed the key issues as set out in the Director-General's Requirements. Where potential impacts have been identified appropriate mitigation measures and environmental safeguards have been either designed into the subdivision layout, or are proposed to be managed by the use of management plans.

These measures have been demonstrated to enable the potential impacts to be reduced or contained to within acceptable standards or levels. This assessment demonstrates that the proposed development is consistent with local, state and national legislation and guidelines. The final design is reflective of the inherent constraints and positive attributes associated with the subject site. The proposed development utilises a range of lot sizes, from 560m² to 1133m². The variety in lot sizes proposed offers the opportunity for a diverse range of housing styles and sizes to be developed. The topography and setting of the site have been utilised in the design to ensure all future dwellings have a pleasant outlook to the surrounding bushland.

Having regard to the conclusions and findings contained in this EAR, we recommend to the Minister for Planning that the subdivision layout as detailed in this EAR be approved under Part 3A of the Environmental Planning and Assessment Act.

11 REFERENCE

NSW Acts and Regulations

Environmental Planning and Assessment Act 1979.

Environmental Planning and Assessment Regulation 2000.

Environmental Protection and Biodiversity Conservation Act, 1999.

Fisheries Management Act 1994.

Heritage Act 1977 (As Amended 1998).

National Parks and Wildlife Act 1974.

Native Vegetation Act 2003.

Threatened Species Conservation Act 1995.

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ATTACHMENTS



ATTACHMENT 1

PHOTOMONTAGE

Attachment 1 – Photomontage



Photo 1: Looking in a north easterly direction down Jamieson Road with a nature Reserve on the left hand side of the road.



Photo 2: Nature Reserve on the left hand side of Jamieson Rd.

Attachment 1 – Photomontage



Photo 3: Looking South across proposed Natural Reserve on Portion 118. House located on Jamieson Rd can be seen through the tree tops.



Photo 4: Looking South across proposed Natural Reserve on Portion 118. House located on Jamieson Rd can be seen through the tree tops.

Attachment 1 – Photomontage



Photo 5: Example of bush setting.



Photo 6: Western boundary showing neighbouring residents.

Attachment 1 – Photomontage



Photo 7: showing example of rock outcrop.



Photo 8: Looking east across back of residential lots from the north eastern corner.

Attachment 1 – Photomontage



Photo 9: Looking north into crown land from Portion 118 northern boundary. Water course and steep grass slope on far side.



Photo 10: Water course running along side the northern boundary on crown land.

Attachment 1 – Photomontage



Photo11: Leachate Dam for the former North Nowra Waste Disposal Centre. Looking in a northerly direction on to crown land.



Photo 12: Crown land situated to the North of Portion 118. Mulch and wood stock piles.

Attachment 1 – Photomontage



Photo 13: Looking in an easterly direction across Crown land situated to the North of Portion 118.



Photo 14: Fenced field located on crown land to the north of portion 118.



ATTACHMENT 2

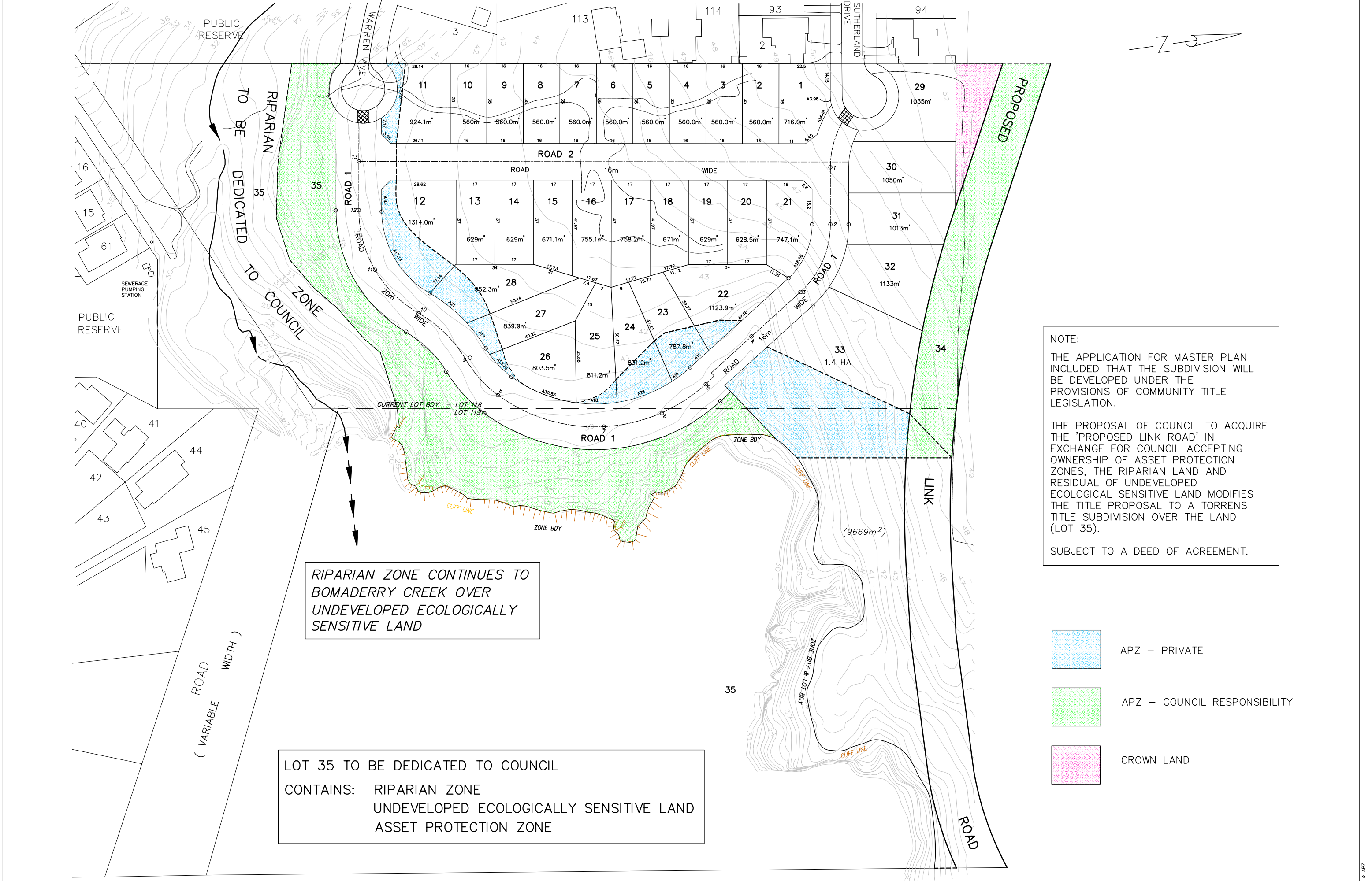
AERIAL PHOTO





ATTACHMENT 3

PROPOSED LAYOUT



NOTE:

THE APPLICATION FOR MASTER PLAN INCLUDED THAT THE SUBDIVISION WILL BE DEVELOPED UNDER THE PROVISIONS OF COMMUNITY TITLE LEGISLATION.

THE PROPOSAL OF COUNCIL TO ACQUIRE THE 'PROPOSED LINK ROAD' IN EXCHANGE FOR COUNCIL ACCEPTING OWNERSHIP OF ASSET PROTECTION ZONES, THE RIPARIAN LAND AND RESIDUAL OF UNDEVELOPED ECOLOGICAL SENSITIVE LAND MODIFIES THE TITLE PROPOSAL TO A TORRENS TITLE SUBDIVISION OVER THE LAND (LOT 35).

SUBJECT TO A DEED OF AGREEMENT.

- APZ – PRIVATE
- APZ – COUNCIL RESPONSIBILITY
- CROWN LAND



ATTACHMENT 4

ORIGINAL DRAFT MASTER PLAN LAYOUT



REDUCTION RATIO 1 : 500	DATUM O	SURVEY	TW	AMENDMENTS	BY	DATE	ATTACHMENT 3a	WATKINSON APPERLEY PTY LIMITED SURVEYORS, ENGINEERS & TOWN PLANNERS	SKETCH PLAN OF PROPOSED SUBDIVISION			SHEET REF. No. 101591	2 OF 2 SHEETS PLAN No. 04/120
		DESIGN	TW					OF LOTS 118 AND 119, DP 751258					
		DRAWN	MJ					OFF JAMIESON ROAD, NORTH NOWRA					
		CHECKED	TW					FOR EVELUTION PTY LTD					
		APPROVED											
								51 GRAHAM STREET NOWRA 2541 PH: (02) 4421 4500 FAX : (02) 4423 1496 EMAIL: email@watapp.com.au DATE: 24 AUGUST 2004					



ATTACHMENT 5

**DRAFT DEAD OF AGREEMENT BETWEEN
SHOALHAVEN CITY COUNCIL AND
EVELUTION PTY LTD**



ATTACHMENT 6

SHOALHAVEN CITY COUNCIL WATER AND SEWERAGE REQUIREMENTS

SHOALHAVEN WATER

(A Division of Shoalhaven City Council)

DEVELOPMENT APPLICATION NOTICE

(This Notice is given under Division 5 of Part 2 of Chapter 6 of the Water Management Act 2000)

Applicant's Name	Department of Infrastructure, Planning and Natural Resources
Applicant's Address	23-33 Bridge Street, Sydney NSW 2001
Development Type	33 residential lots plus residual lots
Stage	
House No.	
LOT No.	118 and 119
DP	751258
Section	
Parish	
Street	Off Sutherland Drive
Location/Town	North Nowra
DIPNR DA Number	MP 06_0090
SCC File Nos.	SF9690
Date Completed	25/07/2006 (((DRAFT))) application not yet submitted by DIPNR awaiting further information.

- The notes, conditions/requirements (including fees/charges) listed on reverse side are based on the Development Application referral submitted to Shoalhaven Water by Department of Infrastructure, Planning and Natural Resources (DIPNR) on 07/07/2006

Please note:- Contributions/fees/charges payable will be those applicable at the time of payment and in accordance with Council's then current Management Plan (List of Fees of Charges and Rentals).

- Any alterations whatsoever to the development application lodged will require review of the conditions/requirements listed over.
- If staging of the development is to occur application for amended conditions/requirements will be required in writing to Shoalhaven Water.
- The applicant must certify the completion of all the following conditions/requirements prior to application for the issue of Certificate of Compliance under Section 307 of Division 5 of Part 2 of Chapter 6 of the Water Management Act 2000.

Documentation/receipts/etc supporting each claim against the requirements listed on this Notice are to be submitted with the application for a Certificate of Compliance.

- For further information please contact Shoalhaven Water.

Issue	Date	Revision	Date	Checked	Page	1
B	1-03-2002	5	02-07-2004		of	4

No	Conditions/Requirements	Certification (Please Initial)	
		Applicant	S/Water
1			

PRIOR TO ISSUE OF OPERATIONAL CONSENT

SEWERAGE SERVICES

1	It appears that some of the proposed lots cannot adequately drain to Council's existing sewerage system. The applicant shall prepare a sewerage servicing strategy to support the proposed subdivision and show how it will integrate with the existing sewerage system. The sewerage servicing strategy shall be submit to and approved by Shoalhaven Water. Consultation with Shoalhaven Water in the preparation of the sewerage servicing strategy is recommended.		
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PRIOR TO RELEASE OF PLAN OF SURVEY (SUBDIVISION RELEASE)

WATER SUPPLY

2	A Section 64 (Water Headworks – 44WATR0001) contribution of \$135,960.00 (1/07/06 to 30/06/07), based on thirty-three (33) Equivalent Tenement's (ET's), is payable for this application. <i>Please refer "ADVICE TO APPLICANT", below.</i>		
3	Water reticulation shall be made available to each lot of the subdivision with the following minimum conditions: (a) All design plans and specifications for proposed water reticulation works are to be submitted to, and approved by, Shoalhaven Water. (b) Works are to be installed in accordance with Shoalhaven Water's specifications and approved designs and., (c) Approval is to be obtained from the Infrastructure Asset Management Section of Council's City Services Group for water main construction work to take place within all of the road/road reserve/s.		
4	The developer shall pay for a 20mm metered service (at \$536.00 (2006/07)) for the thirty-three (33) lots created. The total cost for thirty-three (33) x 20mm services is \$17,688.00 (2006/07). <i>Please note: The connection fee for a 20mm metered service is \$94.00 (2006/07) and is paid by the person making application for the future connection.</i>		

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SEWERAGE SERVICES

	A Section 64 (Sewerage Headworks - 80SEWR0002) contribution of \$135,960.00 (1/07/06 to 30/06/07), based on thirty-three (33) Equivalent Tenement's (ET's), is payable for this application. <i>Please refer "ADVICE TO APPLICANT", below.</i>		
6	Further to condition 1, above, Sewerage reticulation is to be constructed as per the approved sewerage servicing strategy. Sewer junctions are to be provided to satisfactorily and fully serve each of proposed lots within the subdivision, with the following conditions: (a) Sewerage designs are to take into account all stages of this development. (b) Sewerage designs are to be approved and works are to be constructed in accordance with Shoalhaven Water's requirements. (c) The design of the required subdivision sewerage reticulation is to take into account any large trees in the vicinity of the proposed sewer mains. Matters such as arborist reports and the need for tree removal are to be taken into account in the sewer design. Relevant details are to be submitted with sewer designs. (d) All plans and specifications for proposed sewerage works (together with details of matters raised at (c), above) are to be submitted to, and approved by Shoalhaven Water.		
7	Easement to drain sewage shall be created over all lots, which have the gravity sewer running through it, including through the drainage reserve. The easement shall be located centrally over the sewer pipes. The minimum widths of the easement shall be as follows: • Sewer depth to invert less than 2.50m - easement 2.40m wide • Sewer depth to invert greater than 2.50m - easement 4.0m wide		

GENERAL

8	Water and sewerage infrastructure shall be constructed, including land matters and easements throughout the subdivision/development to ensure that the orderly development of the adjoining lands can be undertaken as development of the area progress.		
9	Prior to issue of plan of subdivision release, satisfy all conditions, complete this Notice and make application (including lodgement of all documentation/receipts etc) for a Certificate of Compliance.		
10	All works are to be at the developer's expense.		

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ADVICE TO APPLICANT

Shoalhaven Water further advises that after 30th June 2007 Developer Contribution rates will **substantially increase** (greater than CPI) which will affect payments made after this date. For further information regarding the likely increases please contact Shoalhaven Water's Development Unit on 4429 3255.

- **GST is not applicable to Developer Contributions and the provision of meters water services.**
- All non strata and non residential properties will be levied water and wastewater availability charges (where applicable) based on the size of the water meter service connection. For further information regarding water and wastewater availability charges please contact Shoalhaven Water on 4429 3244.

Application is made for the issue of a certificate of compliance under Section 307 of Division 5 of Part 2 of Chapter 6 of the Water Management Act 2000. **All documentation/receipts/etc supporting my claim against the above requirements is attached.**

Applicant's
Name

Applicant's
Signature

Date

 / /

Council Officer

Date

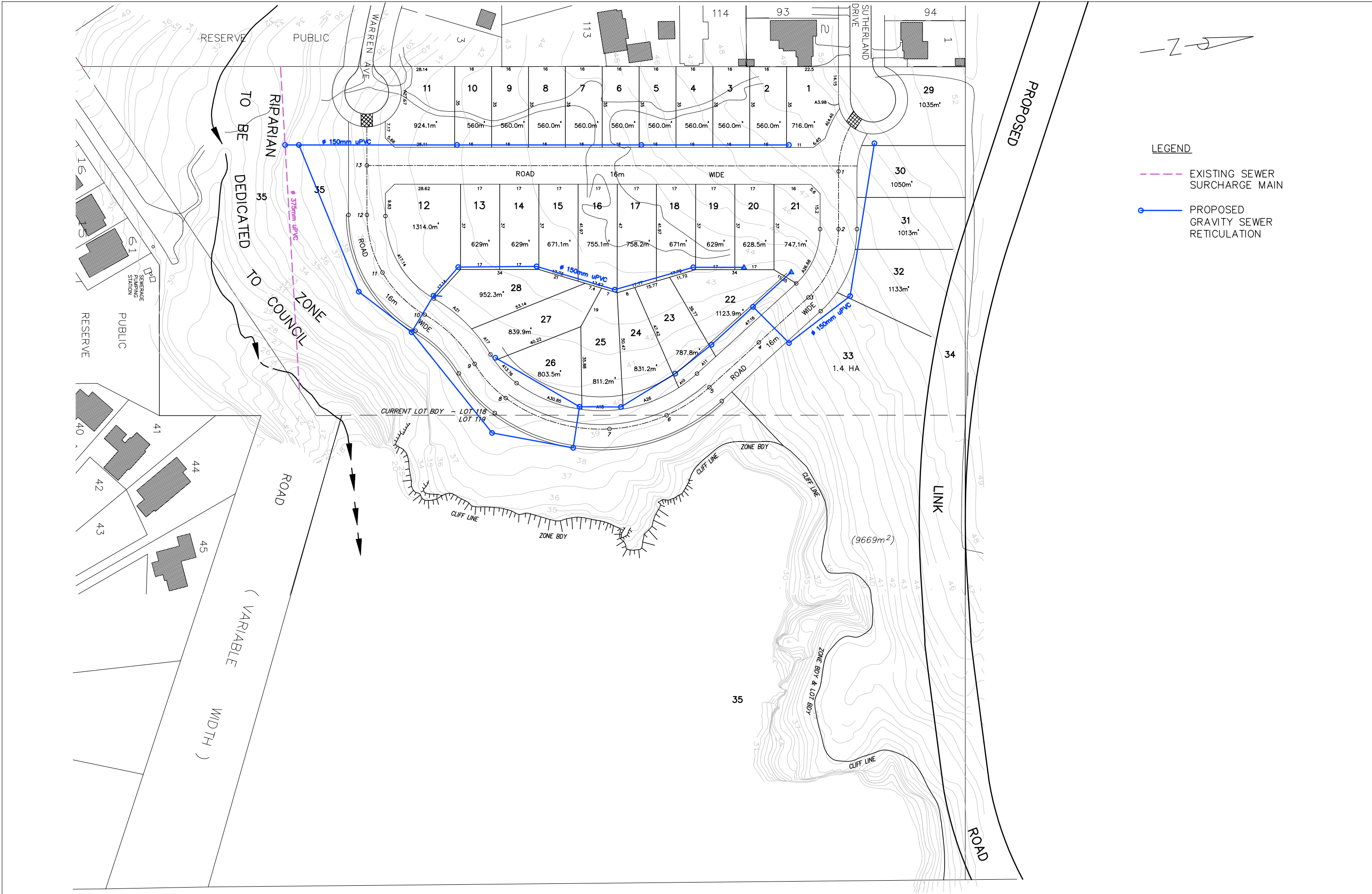
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ATTACHMENT 7

SEWERAGE SERVICING PLAN



REDUCTION RATIO	DATUM	SURVEY	AMENDMENTS	BY	DATE	WATKINSON APPERLEY PTY LIMITED SURVEYORS, ENGINEERS AND TOWN PLANNERS 51 GRAHAM STREET NOWRA 2541 PH: (02) 4421 4500 FAX : (02) 4423 1496 EMAIL: watkinsonapperley@watapp.com.au DATE: 6th OCTOBER 2006	SEWER CONCEPT PLAN FOR PROPOSED SUBDIVISION OF PORTIONS 118 & 119 PARISH OF BUNBERRA JAMIESONS ROAD, NORTH NOWRA FOR EVELUTION PTY LIMITED		SHEET REF. No.	1 OF	1 SHEETS PLAN No.
1: 750	ASSUMED CONTOUR INTERVAL 1m	DESIGN DRAWN CHECKED APPROVED							101591		06/107

101591 PLAN / SEWER CONCEPT



ATTACHMENT 8

WASTE MANAGEMENT PLAN

Attachment 8 - Waste Management Plan

Watkinson Apperley Pty Limited
51 Graham Street, Nowra NSW 2541



MATERIALS ON-SITE	DESTINATION		
	RE-USE AND RECYCLING		DISPOSAL
TYPE OF MATERIAL	ON-SITE	OFF-SITE	
<i>Excavation Material</i> (Soil, gravel, rock, buried materials)	Where possible to be kept & re-used for fill or landscaping.	To be delivered to West Nowra Waste Depot and Recycling Centre for reuse.	Any non-recoverable material to be delivered to West Nowra Waste Depot and Recycling Centre to be disposed off at an EPA approved landfill.
<i>Construction</i> (Concrete, metal, brick, soil, gravel, mortar, paper, plastic)		To be delivered to West Nowra Waste Depot to be sorted and re-used or recycled.	Any non-recoverable material to be delivered to West Nowra Waste Depot and Recycling Centre to be disposed off at an EPA approved landfill.
<i>Green Waste</i> (Trees, shrubs, grass)	Where possible to be mulched and retained for landscaping.	To be delivered to West Nowra Waste Depot and Recycling Centre for onsite composting.	Stumps and other large pieces disposed of to a West Nowra Waste Depot and Recycling Centre.
<i>Domestic (Municipal)</i> (Putrescible & Recyclable)		The recyclables to be collected by Shoalhaven City Council and taken to the MRF at Bomaderry	Putrescible waste to be collected by Shoalhaven City Council to be delivered to West Nowra Waste Depot and Recycling Centre to be disposed of at an EPA approved landfill.



ATTACHMENT 9

SUBMISSION FROM THE PUBLIC AND STATE AGENCIES

SUMMARY OF OBJECTIONS - AGENCIES

No.	Date	Agencies	Issue(s) Raised
1	22/06/05	NSW RFS	The following will need to be considered in the planning stages of any development application for subdivision to ensure the successful issue of a Bush Fire Safety Authority: • The construction of the perimeter road system and road accessing Lots 33-36 and 38-39 in accordance with section 4.3.1 of <i>Planning for Bushfire Protection 2001</i> • The provision of Asset Protection Zones in accordance with Table A2.2 of <i>Planning for Bushfire Protection 2001</i>. It is suggested that a survey plan be provided with any future development application that clearly demonstrates the predominant slope (out to 100 metres) that will most affect fire behaviour • Processes for the management of any APZ located outside of individual property boundaries – a detailed Plan indicating who will be responsible for the management of the proposed Association Property under the proposed Community Title Scheme
2	22/06/05	DEC	Flora & Fauna DEC has reviewed the Draft masterplan and accompanying Fauna and Flora report by Bushfire & Environmental Services. The report has identified the presence of Yellow-bellied Glider (YBG - <i>Petaurus Australia</i>), Powerful Owl (PO - <i>Ninox strenua</i>), Grey-headed Flying fox (GFF - <i>Pteropus poliocephalus</i>) and Sooty Owl (SO - <i>Tyto tenebricosa</i>) on site, and the likely occurrence of Masked Owl (MO - <i>Tyto novaehollandiae</i>) Glossy Black-cockatoo (GBC - <i>Calyptorhynchus lathami</i>) and Giant Burrowing Frog (GBF - <i>Heleioporus australiacus</i>) in the 1.25ha proposal area. In addition, the proposal advocates the clearance of vegetation and habitat for both construction and bushfire protection purposes. The proposal will cause the loss of 10% of available high quality Yellow-bellied Glider habitat in the Bomaderry Creek bushland. In Part (a) of the 8-part test (pg 31) the report argues that the local population of YBG may not be viable already, yet the conclusions advocate the removal of more habitat, including a significant area of known habitat containing key resources (feed trees and hollow-bearing trees), as insignificant. This is highly inconsistent. In addition, the loss of known feed trees in the western section of portion 118 is justified partly by the conclusion that they did not have fresh feeding scars. It must be noted that these trees are very close to existing development, which is likely to have compromised their suitability. Following on from this, it is naïve to suggest that retention of other identified feed trees and hollow-bearing trees in the proposed development area, particularly those in the north east of portion 118 and in portion 119, will mitigate the impact of the development on the population of this species in the area. The expansion of development in the north-east of the study area will also place additional pressure on the area to the north-east of the two lots, suggested as being the “core” area for YBG in the Bomaderry bushland area. There appears to be no discussion of minimising disturbance to the area where the PO was observed at roost. This area is likely to also provide roosting habitat for the SO that was heard calling. This is of concern due to the fact that the bushfire APZ for lots 38 & 39 appears to extend into the identified roosting patch and comes within 30 m of the actual PO roost location. While the requirements of the APZ allow for the retention of canopy trees, the removal of the mid and under storey from this area is likely to have an

		impact on the suitability of the area for the PO & SO. The proposal also results in the loss of a small amount of foraging habitat for both species. Additionally, surveys for the owls were conducted outside of the breeding season. Notwithstanding the conclusions of the consultants in the Flora and Fauna Report, the proposal as it stands may indeed have a significant impact on the local population of the YBG, and the likely impact on the roosting habitat of the PO could also be assessed more thoroughly in a SIS. The above discussion identifies the proposed lots in the north east of the proposed layout in particular lots 38 & 39 as those that are likely to have the greatest impact, either directly through loss of habitat, or by degradation of habitat through development and management of APZ. Recommendation 1. In order to reduce this level of impact, modification of the development is required. At a minimum this would include the removal of lots 38 and 39 and the re-configuration of 34-37 (amalgamation into 1-2 larger lots with definite building envelopes) such that maximum tree retention is achieved and the required APZ does not extend into the ecotonal gully forest community. 2. The removal of lots 22-28 from the subdivision layout would achieve the retention of all YBG feed trees with hollows, as well as the majority of the identified ROTAP flora species. These two scenarios would reduce the amount of clearing of grey gum – stringbark vegetation community and reduce the likely disturbance of development to the feed trees and other areas of high quality habitat of the YBG and reduce disturbance of the roosting habitat for the PO Aboriginal Heritage The draft masterplan does not adequately consider potential impacts to Aboriginal cultural heritage values of the site. Page 23 of the plan states that there are “no issues associated with cultural heritage”, however, this statement is not substantiated with any information based on a DEC Aboriginal heritage Information System (AHIMS) database research, an archaeological assessment or contact with local Aboriginal community members. DEC AHIMS records 19 known sites within a 2km radius of the proposal. In the Nth Nowra/Bomaderry area, there is a high probability for Aboriginal artefact scatters to occur on the flat country, above the gorges. There is no reason to suggest the Aboriginal objects would not be present at the site. Recommendation An Aboriginal cultural heritage survey be undertaken by a qualified archaeologist according to the DEC’s <i>Aboriginal Cultural Heritage Standards and Guidelines</i> kit (1997). Within these guidelines is the requirement for archaeologists to work with appropriate Aboriginal groups and for three copies of reports they prepare to be forwarded direct to the DEC’s Aboriginal Heritage Unit (Southern) PO Box 733, Queanbeyan NSW 2620.
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			If any Aboriginal objects are found, the DEC's archaeologist in the Queanbeyan office, Dr Phil Boot (tel: 6298 9707) should be contacted immediately. Options for managing the Aboriginal objects will need to be addressed and may require a Section 90 consent under the <i>National Parks and Wildlife Act 1974</i> as all Aboriginal objects are protected under this Act. Conservation Reserve The proposal directly neighbours Bomaderry Creek Regional Park, managed by DEC. Bomaderry Creek Regional Park was gazetted to protect a number of threatened plant species (including the endangered Bomaderry Zieria (<i>Zieria baeuerlenii</i>) and to provide recreational opportunities in an urban setting. Recommendation To reduce impacts on the Regional Park, DEC recommends the following issues be incorporated in any management, landscape, construction and/or operational plans for the proposal: 1. adequate storm water management 2. adequate weed control 3. prohibition of illegal dumping of rubbish into, and the collection of bush rock and firewood from the Regional Park 4. Prohibition of additional access points, trails or tracks into the adjoining Regional Park. Other issues The recreational opportunities afforded by the cliffs on portion 119 are significant and they have been recognised at a national and international level for their outstanding rock climbing values. The draft master plan states pg23 that should dedication of some land to council as part of this proposal not eventuate, access to the cliff face would have to cease. This action has the potential to impact negatively on eco-tourism in the Shoalhaven Region.
3	19/07/05	DIPNR	Riparian Zone (Proposed lot 40) The Draft Masterplan indicates that a riparian zone has been identified along the southern portion of lot 118 (along Mahogany Creek) in consultation with David Zerafa, DIPNR Nowra. This zone is identified as proposed lot 40 and will be dedicated to Shoalhaven Council for inclusion with adjacent public reserves. At the time of the onsite consultation with DIPNR, the riparian zone was only identified to the cliff line (approximate boundary of portion 118), as it was understood that little, if any development would occur on portion 119. In order to achieve holistic riparian zone objectives however, the riparian zone should continue for the full length of Mahogany Creek to the eastern boundary of portion 119 and it's confluence with Bomaderry Creek.

			Thus the lot layout should be amended to incorporate the full length of the riparian zone along the full length of Mahogany Creek. Bomaderry Creek Reserve and Riparian Zone The Draft Masterplan indicates that proposed lot 43 will remain as a residue lot to be retained by the current landowners pending further investigations regarding potential public dedication and use. It is noted that the land to the east of lot 43 and which separates lot 43 from Bomaderry Creek is a Shoalhaven City Council Public Reserve. The land to the north of lots 38 and 43 is the Bomaderry Creek Regional Park owned and managed by the Department of Environment and Conservation (DEC). DIPNR supports the recommendations in the Draft Masterplan, that proposed lot 43 be best dedicated as public land, to be administered by Shoalhaven City Council or alternatively by DEC. This approach would serve to consolidate the adjoining reserves into a more contiguous parcel of land allowing for holistic management of sensitive lands and landuse activities. Irrespective of the land title/ownership of proposed lot 43, a riparian zone should also be identified and established along/adjacent to Bomaderry Creek and the eastern boundary of portion 119. In accordance with DIPNR's "Classification of waterbodies based on objectives for Riparian Land" as outlined in Section 5.2 Managing Urban Stormwater – Soils and Construction Landcom 2004 commonly referred to as the "Blue Book", DIPNR considers that category 1 riparian objectives apply to Bomaderry Creek. A riparian objective provides for the protection and/or restoration of individual watercourses and their vegetated buffer zones, according to their relative importance and future function within a catchment.¹ 1. Category 1 – <i>Environmental corridor</i>. The overarching objective is to provide biodiversity linkages by maintaining connectivity for the movement of aquatic and terrestrial species along the riparian corridor and between key destinations (eg between bottom and top of catchment, between wetlands and large nodes of vegetation, etc.). This category is coloured red when mapped, and builds upon category 2 and 3. 2. Category 2 – <i>Terrestrial and aquatic habitat</i>. The overarching objective is to provide basic habitat and preserve or emulate as much as possible a naturally functioning stream (not necessarily linking key destinations). While accepting the width of the riparian corridor will not fully
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¹ Riparian Objectives have been developed for streams in the Wollongong LGA (refer DIPNR 2004), and the method has been applied successfully in strategic landscapes (eg North-West and South-West Structure Planning exercises for Sydney's urban growth and more recently the Nowra/Bomaderry Structure Plan).

			satisfy the requirements of a category 1 – Environmental Corridor, the width must still be sufficient to provide long term robust habitat and refuge for native fauna. This category is coloured green when mapped and builds upon category 3. 3. Category 3 – Bank stability and water quality. As implied, the overarching objectives are to prevent accelerated rates of soil erosion and to enhance water quality. This category may have limited habitat value but contributes to the overall basic health of a catchment. While an open watercourse emulating some natural stream function is the preferred option, it is recognised, for example, that the practicality and economics of developing urban land may make this difficult. It is this category of watercourse where it may be possible to negotiate trade-offs. This category is coloured blue when mapped. These categories reflect their relative environmental significance, and potential function within the landscape and are hierarchical, with category 1 being of the highest value, and being achieved by a larger group of management requirements, and category 3 being of the lesser value and being achieved by a reduced suite of management requirements (summarised in Table 1 below). Spatial requirements also differ in order to achieve the objective or function assigned to each category. These spatial implications are important to plan and zone in a strategic sense in order to achieve the long-term outcome. <table> <tr> <th>Management Requirements and Minimum Environmental Objectives for Riparian Land</th><th>Category 1 Environmental Corridor (red)</th><th>Category 2 Terrestrial & Aquatic Habitat (green)</th><th>Category 3 Bank Stability & Water Quality (blue)</th></tr> <tr> <td>Delineate riparian zone on a map and zone appropriately for environmental protection</td><td>yes</td><td>yes</td><td>if resources are available</td></tr> <tr> <td>Provide a minimum Core Riparian Zone (CRZ) width</td><td>40 m from top of bank</td><td>20 m from top of bank</td><td>usually 10 m from the bank</td></tr> <tr> <td>Provide additional width to counter edge effects on the urban interface (ie Vegetated Buffer)</td><td>10 m</td><td>10 m</td><td>generally not required</td></tr> </table>	Management Requirements and Minimum Environmental Objectives for Riparian Land	Category 1 Environmental Corridor (red)	Category 2 Terrestrial & Aquatic Habitat (green)	Category 3 Bank Stability & Water Quality (blue)	Delineate riparian zone on a map and zone appropriately for environmental protection	yes	yes	if resources are available	Provide a minimum Core Riparian Zone (CRZ) width	40 m from top of bank	20 m from top of bank	usually 10 m from the bank	Provide additional width to counter edge effects on the urban interface (ie Vegetated Buffer)	10 m	10 m	generally not required
Management Requirements and Minimum Environmental Objectives for Riparian Land	Category 1 Environmental Corridor (red)	Category 2 Terrestrial & Aquatic Habitat (green)	Category 3 Bank Stability & Water Quality (blue)																
Delineate riparian zone on a map and zone appropriately for environmental protection	yes	yes	if resources are available																
Provide a minimum Core Riparian Zone (CRZ) width	40 m from top of bank	20 m from top of bank	usually 10 m from the bank																
Provide additional width to counter edge effects on the urban interface (ie Vegetated Buffer)	10 m	10 m	generally not required																

			Provide continuity for movement of terrestrial and aquatic habitat	yes/ (including pierced crossings)	yes (with appropriate crossing design)	where appropriate
			Rehabilitate/re-establish local provenance native vegetation	yes	yes	where appropriate
			Locate services outside the Core Riparian Zone wherever possible	yes	yes	merit consideration
			Locate playing fields and recreational activities outside Core Riparian Zone	yes	yes	merit consideration
			Treat stormwater runoff before discharge into the riparian zone or the watercourse	yes (outside CRZ and buffer)	yes (outside CRZ and buffer)	yes
Table 1: Summary of riparian management requirements in relation to the three relative riparian categories. Particularly in regard to category 1 and 2, management requirements relate to the three key features of riparian zones: (i) the core riparian zone; (ii) the vegetated buffer; and (iii) the asset protection zone. (i) The <i>core riparian zone</i> (CRZ) is that area of land contained within and adjacent to the channel. The CRZ is to remain or become fully vegetated with local provenance native vegetation (including aquatic groundcovers, shrubs and other species) to a minimum width from the banks of the river. The minimum width from the banks is determined by the stream category which draws upon contemporary scientific literature to determine minimum spatial requirements for riparian functionality. Merit issues can also determine the width (eg extra widths of vegetation exists). (ii) A <i>vegetated buffer</i> (VB) is required to protect the environmental integrity of the CRZ from edge effects from adjacent lands, such as weed invasion, micro-climate changes, litter, trampling and pollution. The minimum width from the CRZ is 10 m but is also dependent upon merit issues. (iii) The <i>asset protection zone</i> (APZ) is required (by NSW Rural Fire Service) to protect assets from potential bushfire damage, and should be measured from the outer edge of the vegetated buffer to the asset. It should never be considered to be part of, or contained within, the VB or the CRZ						

			(ie APZ not to result in clearing of the CRZ or VB). APZ requires cleared land that means that it cannot be considered as part of the CRZ or VB. Recommendations In summary, a riparian zone in accordance with the above criteria, should be identified and established along/adjacent to Bomaderry Creek and the eastern boundary of portion 119. This area should be added to proposed lot 40. Asset Protection Zone (proposed lot 41) The majority of the proposed APZ/lot 41 is above the cliff line and/or corresponding elevation. A section of the proposed APZ near proposed lots 36 and 39 however, encroaches beyond the cliff face to the lower slopes adjoining Bomaderry Creek. The APZ requirements will require vegetation removal within the Ecotonal Gully Forest Vegetation Community described in the Flora and Fauna Report submitted with the draft Masterplan. DIPNR considers that this is inappropriate given the landscape and diversity of this vegetation community. DIPNR has also identified that the majority of portion 119 is classified as Category (A) State Protected Lands (land that is generally in excess of 18 degrees slope) under the Native Vegetation Conservation Act 1997 (NVC Act) which places restrictions on the clearing of native vegetation. As State Protected Land, minimal clearing (two hectares or less if < 25% total area of State Protected Land) for a purpose other than the construction of a vehicular track or road may be carried out under exemption. The equivalent minimal clearing exemption for non State Protected Lands i.e. <i>the clearing of up to 2 hectares per annum for any contiguous landholding in the same ownership</i>, was repealed by Regulation from the Coastal Zone on 26th March 2004 and no longer applies. Depending on the nature of works required for the APZ on State Protected lands, formal consent from DIPNR under the NVC Act may/may not required. As State Protected Lands, DIPNR would prefer that this area be excluded from the APZ. Please note the <i>Native Vegetation Conservation Act 1997</i> will be repealed and replaced by the <i>Native Vegetation Act 2003</i> in the near future. At this stage it is unknown what, if any difference this would make to assessment of applications, or what the transitional provisions from one Act to the next will be. Also, in accordance with the previous riparian zone criteria, the proposed APZ/Lot 41 should not conflict with the riparian zone objectives for Bomaderry Creek. Recommendation The subdivision layout should be amended to ensure the APZ's are restricted to the property above the cliff line or corresponding elevation and not extend over the steeper State Protected Lands down to the lower Bomaderry Creek flats and Ecotonal Gully Vegetation Community as outlined near proposed lots 36 and 39.
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SUMMARY OF OBJECTIONS - PUBLIC

No.	Date	Issue(s) Raised
1	30.05.05	- Current level of amenity will be reduced. - Additional traffic generation and congestion in the area as a result of the development. - Environmental impact of the development on the site, in particular its effect on existing wildlife, flora and fauna. - Halcot Estate is only served by a single vehicular access, which is insufficient to serve the development.
2	31.05.05	- The site is heavily wooded and embedded with rock raising issues with regards extensive earthworks, rock and tree removal required for the installation of water, drainage, sewer and power services. - Halcot Avenue is currently overused and in a poor state of disrepair; the development raises issues over its capacity to accommodate construction vehicles and additional traffic levels. - Falcon Drive should be used as an alternative access point as Halcot Avenue and Jamieson Road are inadequate. - Further departmental investigation should be carried out to gauge the effects of the development in relation to traffic, rock hammering, construction and native bushland. - Approval of the master plan should be put on hold until all issues have been fully investigated and dealt with accordingly.
3	06.05.05	- The site is located adjacent an old tip site and leachate dam. Torrential rain may result in overflow of toxic materials into stormwater systems leading to the pollution of surrounding waterways, such as Bomaderry Creek and Shoalhaven River. - Much of the proposed site consists of large deposits of sandstone some areas of which have little or no soil coverage. Use of heavy machinery and / or sandblasting may damage surrounding properties. Whose responsibility should properties get damaged? - Increased traffic and congestion (estimated at 350 extra vehicular movements per day) on both local streets and the already heavily congested Illaroo Road; especially relevant as the proposed link road connecting North Nowra and Bombaderry appears to have been abandoned. - During the construction phase heavy equipment on existing local roads and site works will be noisy and have a detrimental impact on amenity of the area. - The site is environmentally sensitive with several endangered species present, such as the yellow bellied glider and glossy black cockatoo. The development will result in the reduction of the habitat of this wildlife. - Provision has been made by the developer to maintain grey gum, red blood wood and spotted gum trees which show wildlife activity, especially for glider. Will new landowners be happy for such trees to be retained?
4	06.06.05	Capability of the existing road system to accommodate the additional traffic generated as a result of this and other proposed developments in the area. Illaroo Road is the only access into North Nowra is already at capacity and fails during peak periods. The Roads and Traffic Authority (RTA) / Shoalhaven City Council need to resolve the issues associated with Illaroo Road and vehicular access to North

			Nowra before further development in the area is approved.
5	07.06.05		• Moss beds / pools which provide habitat and a food source for a range of wildlife, including reptiles, birds and amphibians would be destroyed. • Extensive rock breaking will be required to install services and stormwater systems giving rise to noise and dust pollution. This raises issues with regards potential structural damage to resident's local properties. If damage is sustained is there planned compensation in place? • It is proposed to route the primary access through a stand of rare trees (<i>Leptospermum Sejunctum</i>). There are indigenous in this area due to unique soil and growing conditions. Re-cultivation will prove difficult as it tends to grow in small rock crevices. • The northern boundary adjoins North Nowra tip where considerable activity still takes place. Running east west is the tip face below which there is a ditch collecting run off and seepage. This is piped across the edge of the dam to discharge in the north eastern corner of the development. Should the pipe become blocked following heavy rainfall the ditch would flood. The stormwater system may act as a conduit for leachate into nearby water systems. • The proposed development is out of keeping with the natural bush land of the area. A park like design is proposed similar to other developments on reclaimed land such as Homebush Bay. It will detract from the Bombaderry Reserve concept. • The proposed blocks will not reflect those in the existing area. The bushfire buffer zone is included in the southern and eastern perimeter blocks with an aggregation of smaller blocks on the western boundary of the site. The proposed density will have a major impact on existing dwellings adjoining the western boundary. These proposed dwellings will be multi storey resulting in loss of light, views and overlooking adversely affecting existing residential amenity. • Creation of gardens will require importation of soils as little soil exists in the area. There will be no natural seepage due to rock jointing and the impervious nature of the site so soils will leach nutrients and pesticides into the stormwater system, which combined with run off and seepage from the tip, will combine to create severe pollution to existing water systems. • The proposed development is the last remaining fresh water catchments for Mahogany Creek. If the proposed stormwater management is successful the water flow in Mahogany Creek will practically cease. Any flow that does occur will ultimately be carried over the already stressed Shoalhaven River system.
6	07.07.05		• The site is located adjacent to the former North Nowra tip and leachate dam site. Runoff will enter the stormwater system and will be discharged into Bombaderry Creek and ultimately Shoalhaven River. • Proposed water storage tanks to collect rainfall and reduce runoff will not be effective. • Heavy rainfall will cause rainwater tanks to overflow. Pits and channels etc are proposed to retain sediment but this will not leach from the tip site. • The proposal conflicts with SEPP71.
7	07.07.05		• Threat to endangered species on the site. This issue scuppered previous plans for the development of a nearby link road. • Bird habitats may be adversely affected by the development.

			• North Nowra tip is leaching potentially contaminated materials into the surrounding creek and Shoalhaven River. Are there plans in place to prevent contamination of the area? • The development will result in significantly increased traffic flows and cause hazardous conditions.
8	07.07.05		• The site is heavily wooded and embedded with rock raising issues with regards the extensive earthworks, rock and tree removal required for the installation of water, drainage, sewer and power services. • Halcot Avenue is currently overused and in a poor state of disrepair; the development raises issues over its capacity to accommodate construction vehicles and additional traffic levels. • Falcon Drive should be used as an alternative access point as Halcot Avenue and Jamieson Road are inadequate. • Further departmental investigation should be carried out to gauge the effects of the development on traffic problems, rock hammering, construction and native bushland.
9	08.07.05 (letter dated 23.05.05)		• Oil is present in the main drain below the southern tip face behind Sutherland Drive. During heavy rainfall this and any other fluids could leach and enter into the stormwater system of the proposed subdivision. • The present design of the subdivision does not allow sufficient distance from the drain or leachate dam for any overflow to be dispersed into the bush area and this not be at risk of entering the stormwater system. • Given that little control was used during tip operation and fluids, substances etc are unknown, approval of this subdivision should be put on hold until issues regarding leachate are put on hold.
10	08.07.05 (letter dated 02.08.05)		• Leachate from the main drain behind Sutherland Drive directly below the old tip face does not flow into the leachate dam but runs through a pipe through the southern dam wall and is discharged directly into the overflow outlet hence a large proportion of the leachate is not cycled into the dam system. • The leachate dam is leaking in two areas. Both areas are damp but during heavy rainfall will cause significant leakage. • Lining is required to stop the leaking of leachate into the adjacent areas. • An inspection by EPA is required before approval is forthcoming for the proposed subdivision.
11	08.07.05 (letter dated 13.08.05)		• Although the site is zoned residential this area is unsuitable for residential development. • The old tip site contains many unknown substances and fluids as little control was used during its operation. Adjacent the leachate dam is a natural watercourse which could carry unknown fluids into the stormwater system of any adjacent subdivision and into Bombaderry Creek and Shoalhaven River. • The leaching dam is constructed of clay and gravel bank, no guarantee can be given that this structure can and will contain fluids during heavy rainfall. Current overflow or leaching would be dispersed throughout the undisturbed area and not reach the creek area. • The site contains huge amounts of solid sandstone. Rock breakers would be required in the area causing noise problems for adjacent landowners during the construction phase. • Warren Avenue was never designed to carry any large volume of traffic other than street residents.
12	08.07.05		• Potential pollution of Shoalhaven River from leakage of leachate from the old tip at North Nowra

			Leakage is occurring from the main drain behind Sutherland Drive and directly below the old tip face and is being discharged into bush land. During heavy rainfall there is potential for leachate will run into Shoalhaven River.
13	09.07.05		- Existing infrastructure cannot support the scale of the proposed development. - Increased traffic generation to Warren Avenue would result in hazardous conditions. - Many of the proposed development lots are identical in shape and size. - Building heights and sizes are excessive, out of keeping and will give rise to privacy issues and loss of light. - It is proposed to build on sandstone formations. No parameters are in place to assess the possible damage to nearby properties. Resultant ground movement, vibration, dust accumulation and extreme noise effects on adjoining properties and residents needs to be addressed.
14	09.06.05		- The proposal is an overdevelopment of an environmentally sensitive site. - The site is heavily wooded and embedded with rock raising issues with regards the extensive earthworks, rock and tree removal required for the installation of water, drainage, sewer and power services. - Halcot Avenue is currently overused and in a poor state of disrepair; the development raises issues over its capacity to accommodate construction vehicles and additional traffic levels. - There is an unlined leachate dam located in the north western boundary of the site which has certain unresolved environmental problems.
15	09.06.05		- Environmental risks associated with the disused tip adjacent the proposed site. The subdivision is directly below the old North Nowra tip and leachate dam. In periods of heavy rain, unknown substances seep from the tip site into the rock. - There is a possibility that substances could enter the stormwater system then Bombaderry Creek and ultimately Shoalhaven River. - The developer states that stormwater controls are to be implemented through regulation or policing; this is insufficient to deter polluting existing waterways. - The Bushfire Protection Authority states that risk of bushfire is high. - Existing native trees are to be retained where possible although some further removal may be required to accord with the Bushfire Authority, which would be detrimental to several endangered species, such as yellow bellied gliders. - The use of pneumatic equipment (i.e. rock hammers) would have a detrimental effect on existing residents and their homes immediately adjacent the proposed subdivision site.
16	09.06.05		- Implications of additional traffic in the area and increase in hazardous conditions. - Increased congestion particularly on Illaroo Road given that this is the only access into North Nowra and already heavily congested. - Existing wildlife on the site will be endangered should the site be redeveloped. - Potential pollution problem to the Shoalhaven River from leakage of the leachate from the old tip at North Nowra. There is no guarantee that the leachate would not enter the stormwater system of the

			proposed subdivision and then Shoalhaven River. Noise issues associated with the removal of rock from the bushland.
17	09.06.05		- Destruction of flora and fauna on the site. The report refers to several native animals but omitted several endangered species who roam the area, including kangaroos and wallabies. - Destruction of fauna. Certain vegetation communities will be destroyed. E.g. Kunzea scrubland. - Native vegetation will not remain intact. Other developments in the area have proved this. - The leachate dam from the now disused rubbish tip will impact upon the site. - Removal of existing native vegetation will remove a necessary filter system resulting in contamination of Bombaderry Creek.
18	09.06.05		- A large amount of rock will need to be broken and removed to install necessary services and facilities causing enormous ecological damage to sandstone plateau. - The sites northern boundary adjoins the old North Nowra tip site. Although not used for disposal of domestic waste, it is still used to dump green waste. During heavy rainfall, runoff of a nasty black substance can be seen. If development is approved this would enter the stormwater system resulting in contamination of creeks and watercourses. - Existing native animals, birds and reptiles will be adversely affected. - Additional traffic caused by the development would have a huge impact on the traffic flows on Illaro Road/Princess Highway particularly during peak hours. Similarly, local traffic flows will also increase significantly, especially off Illaroo Road onto Halcott Avenue into Uranna Drive into Warren Avenue.
19	10.06.05		- The site is a beautiful natural asset with an abundance of vegetation and wildlife which will be destroyed if the development takes place. - The master plan disregards the natural living environment. - The site is located within a sandstone cliff line adjacent a small tributary which acts as a natural watercourse and floods during heavy rainfall. - There are several threatened species on the site. - Existing trees are to be removed which may contain wildlife. - The unique flora and fauna community would be greatly compromised. There are several endangered species present on the site. - Destabilisation of rock shelves and difficulty in excavation may cause major damage and impact on neighbouring houses in the locality. - Areas of native bushland should be integrated into the site rather than a solely replanting approach. - Floorspace ratios, site floor coverage and adequate distances from boundaries should be enforced. - Rock climbers would be adversely affected. - Maintenance issues with regards the riparian area to be transferred to Council ownership. - Confusion over the proposed number of lots. - Overdevelopment of the site. - The proposed development will influence the Nowra Bombaderry Structure Plan with regards the proposed link road.

20	15.06.05		• Inaccurate description of development. Exhibition documentation refers to 42 lots not 39 lots as previously proposed. • Validity of traffic data in particular estimated daily vehicular movements. • Destruction of threatened species of flora and fauna as a result of over concentration of development. • Future of existing trees and shrubbery. • Number of lots should be reduced and wildlife corridors maintained.
21	06.07.05		• The development will cause irreversible environmental damage given its location adjacent to the previously unrestricted North Nowra Tip. • Contaminated water will seep into Bombaderry Creek and into Shoalhaven River.
22	12/06/05		• Does not adequately address the conservation of threatened flora & fauna species • Does not consider the potential coastal hazards arising out of the location of the subdivision as is required under clause 20(2) of SEPP71 in particular risk to the Bomaderry Creek and Shoalhaven River marine • Hazards relating to leakage from a leachate dam on an until recently disused garbage tip site which adjoins the proposed development site. The proposal neither address the location of the leachate dam nor the high risk potential of leachate overflow entering the proposed subdivision stormwater management system and eventually contaminating sensitive marine environments. • Aboriginal Site Assessment under the proposal has not been completed • The Geotechnical investigation indicates that most excavation will be in rock of at least medium strength with excavation difficulties anticipates. The proposal is silent as to how the proponent intends to proceed with regards to these anticipated constraints. • Not adequately addressed the impacts arising out of the road access and circulation networks as is required under cl 20(2) of SEPP71. It does not take into account the chronic south bound traffic congestion problems currently being experienced by Nth Nowra residents at the intersection of Illaroo Rd & Princess Highway. • The impacts to the residents of Halcot Avenue is not addressed which is the only access from Illaroo Road to Sutherland Drive and Warren Avenue, the proposed 2 points of entry to the site. • With the lack of information it is not possible to assess whether the proposal is consistent with DCP100 • It is claimed that the proposal will create <3000 vpd but it is unclear whether this claim is in relation to Illaroo Rd that being the nearest collector road to the site.
23	09/06/05		• The subdivision has the potential to cause enormous ecological damage to the sandstone plateau on which it is to be placed. The amount of rock to be broken and removed to allow essential underground services to be laid is excessive • The adjoining tip is still used by council to dump green waste and in times of heavy rain, runoff of a black substance can be see which could fine its way into the stormwater and creeks and eventually into the Shoalhaven River. • Concern for native fauna in the area • Increase in traffic which would be generated by this proposal would have a huge impact on the traffic chaos in Illaroo Rd/Princes Highway

FORM LETTER SUBMISSIONS

Number	Date Received	Objector	Issue(s) Raised
1	08.06.05	Petition – 216 people	• Unacceptable risk of contamination and pollution through the stormwater system to the already stressed Shoalhaven River. • The site is unsuitable for development as it is located directly bordering the old North Nowra tip and leachate dam site at the northern end approximately 100 metres from Bombaderry Creek, which feeds into Shoalhaven River. • During periods of heavy rainfall the drain below the southern face of the tip site contains leachate which feeds through a pipe running through the leachate dam wall and overflow and is dispersed into the undisturbed bush area. In addition, the leachate dam is leaking in two areas. • Shoalhaven City Council has reopened the old tip site and large amounts of rock and gravel together with chipped green waste are being dumped onto the site. This breaches the licence agreement between Council and the EPA. This will exacerbate leachate run off. • A large proportion of the subdivision is solid rock. Jointing of the rock will be required which will further add to leachate leakage entering the stormwater system.

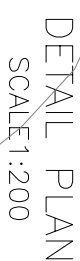
SUPPORTERS

Number	Date Received	Supporter	Justification
1	10.06.05		• No issues with regards the subdivision. • Pleased that all creeks and cliffs are being offered back as public ownership as this will complete the Mahogany Creek Reserve system.



ATTACHMENT 10

STORM WATER MANAGEMENT PLAN



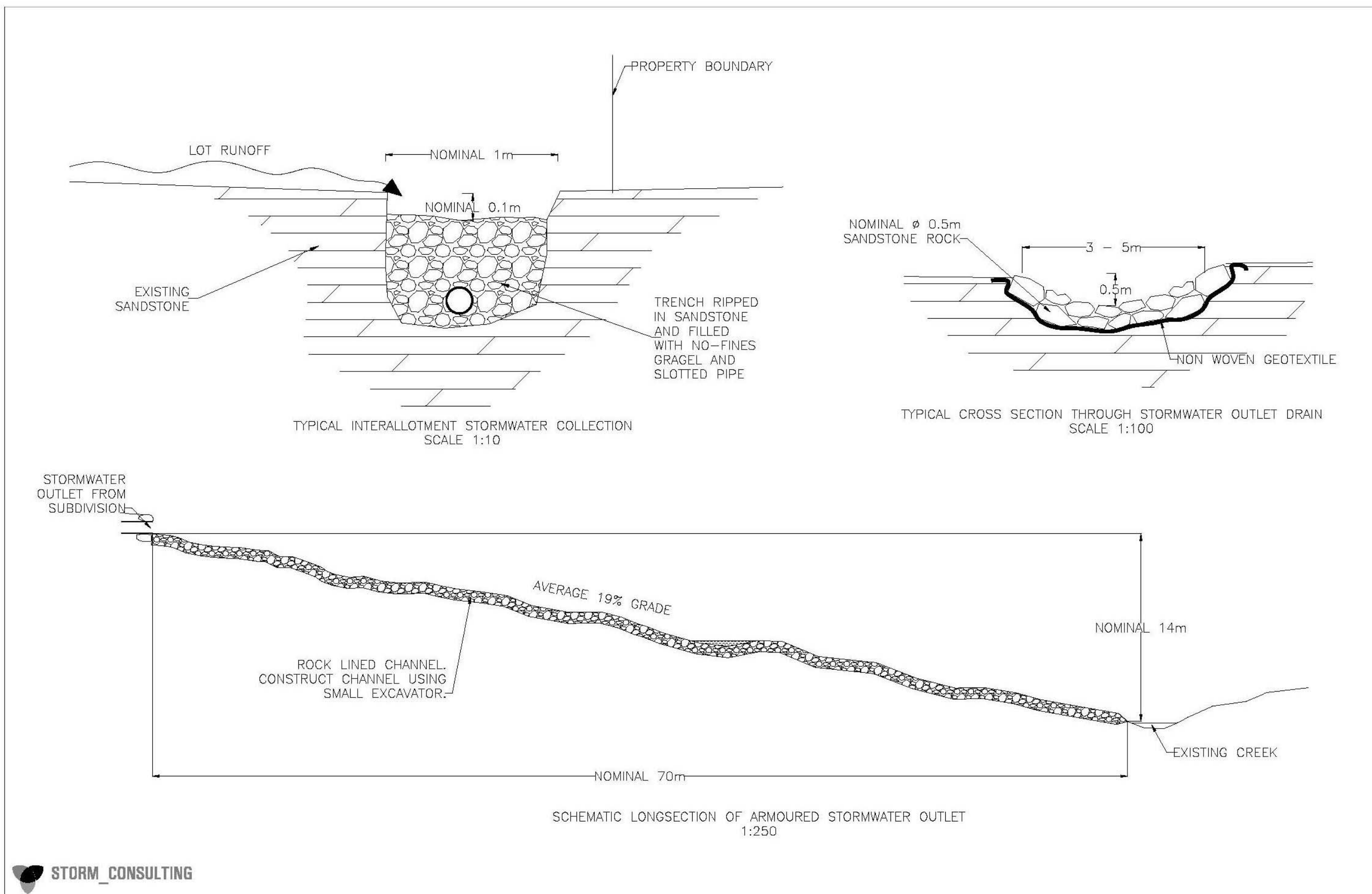


Figure 3.3 Stormwater Masterplan detail ii



ATTACHMENT 11

LANDSCAPE PLAN

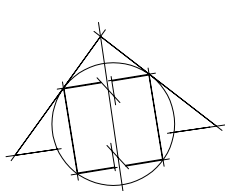
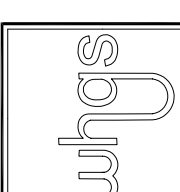
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LEGEND

STREET TREE PLANTING Proposed street tree planting of: <i>Corymbia gummifera</i> Common name: Red Bloodwood and <i>Elaeocarpus reticulatus</i> Common name: Blueberry Ash. Final species to be approved by Project Manager and Landscape Architect.	
PLANTING AT ENTRIES Proposed groundcover planting of Lomandra longifolia & Dianella caerulea var. Final species to be approved by Project Manager and Landscape Architect.	
TURFED AREAS Contractor to submit proposed turf species for consideration by project manager and landscape architect. Turf road reserves only. Topdress turf from site topsoil.	
VEGETATION MANAGEMENT PLAN Refer to Vegetation Management Plan for all landscape works over Lot 35. Ensure conservation management policies & related specifications are implemented .	
PROPOSED SUBDIVISION ENTRY STATEMENTS Reused or reclaimed sandstone to form the entry statement sign. Crushed sandstone for pathway surfaces. Sandstone edging for garden statements	
EXISTING TREES TO BE REMOVED Existing trees to be removed with on site confirmation of registered surveyor, landscape architect and inaccordance with Vegetation Management Plan.	
BIOFILTRATION SYSTEM Allow for biofiltration system as prepared by Storm_Consulting L328(P01)	
SUPPLEMENTARY PLANTING Indemic seed to be sourced for supplementary planting of Lepospermum sejunctum & Acacia subulnervis along eastern side of proposed road fronting Lot 35	
STORMWATER PITS Stormwater collection pits	
APZ –PRIVATE	
APZ - COUNCIL RESPONSIBILITY	
CROWN LAND	

SPECIFICATION
Reclaim excavated topsoil. Crush all sandstone for reuse on site as a component of reclaimed topsoil.
Herbicide: Eradicate emergent weed on site using a non-residual glyphosate herbicide in any of its registered formulæ, at the recommended maximum rate. Continue eradication throughout the course of the works and during the plant establishment period. Provide ongoing eradication minimum 3 years apply herbicide at first signs of regrowth.

All spoil and weed material to be removed to approved Rubbish Disposal Depot. Proof of delivery to be provided to superintendent.

B AMENDED LEGEND & TREE SPECIES A SUBMISSION FOR DA DATE 07.12.06 29.11.06	
PROJECT: PORTIONS 118 & 119 PARISH OF BUNBERRA JAMIESONS RD, NORTH NOWRA	
CLIENT: EVELUTION PTY LTD	 NORTH
TITLE: LANDSCAPE MASTER PLAN PROPOSED SUBDIVISION	
 WH. & G. SMIT LANDSCAPE ARCHITECTS 87 HILLCREST AVE, NOWRA NSW 2541 Ph: 07 465 206 531 Fax: 07 465 206 531 E-mail: whgs@whgslandscap.net.au	

SCALE:	DRAWN:	DESIGN:	JOB No.	SHEET No.
AS SHOWN	GS	WHS	2226	LD.1



SUBDIVISION - PLANTING PLAN

SCALE 1:750

PLANTING SCHEDULE - STREET TREES					
KEY/GENUS TREES	SPECIES	COMMON NAME	LOCATION	QTY	Pot Size
Cg	Corymbia gummifera	Red Bloodwood	WESTERN RD	40	75litre
Er	Elaeocarpus reticulatus	Blueberry Ash	EASTERN RD & ENT	29	25litre

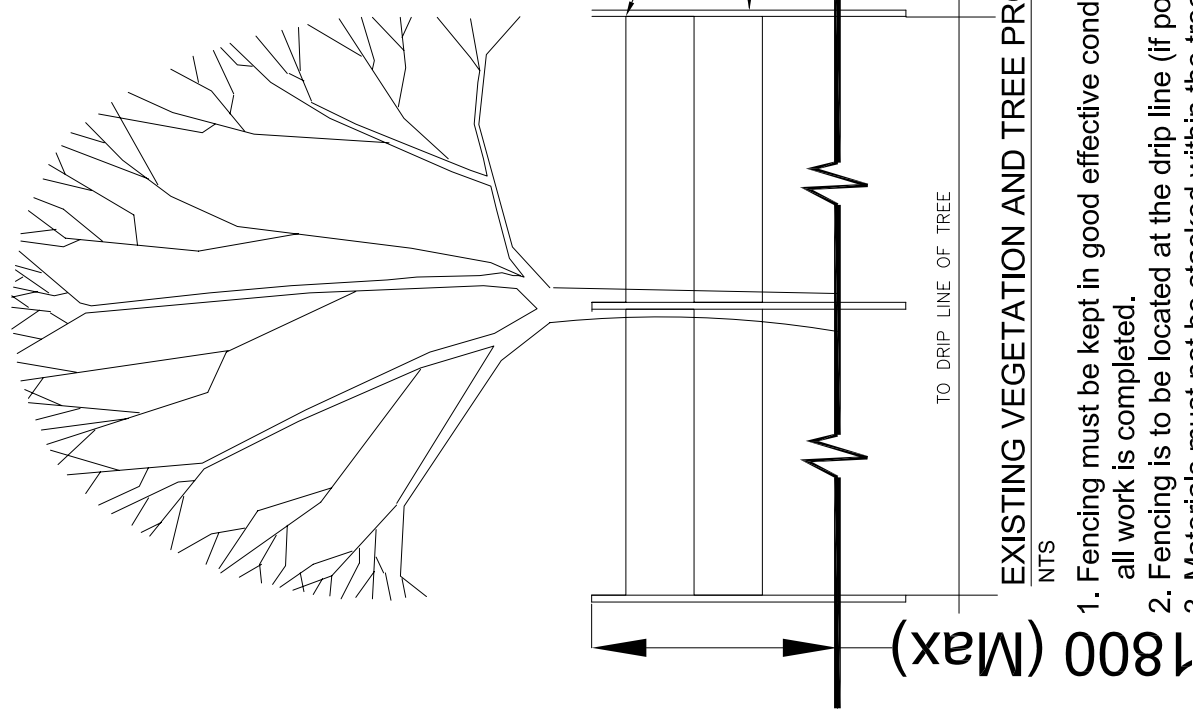
D = Deductions
E = Eradication
SP = Semi Deductions

STAKE	H/W	No REQ	STAKE	H/W	No REQ
2	10m	E	2	10m	E
2	6m	E	2	6m	E

PLANTING SPECIFICATION:
Provide plants with the following characteristics:
Large healthy root systems, with no evidence of root curl, restriction or damage.
Vigorous, well established, free from disease and pests, of good form consistent with the species or variety.
Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site.
Ensure all street trees have a single, solitary, straight trunk to 1200mm (min) before branching occurs.

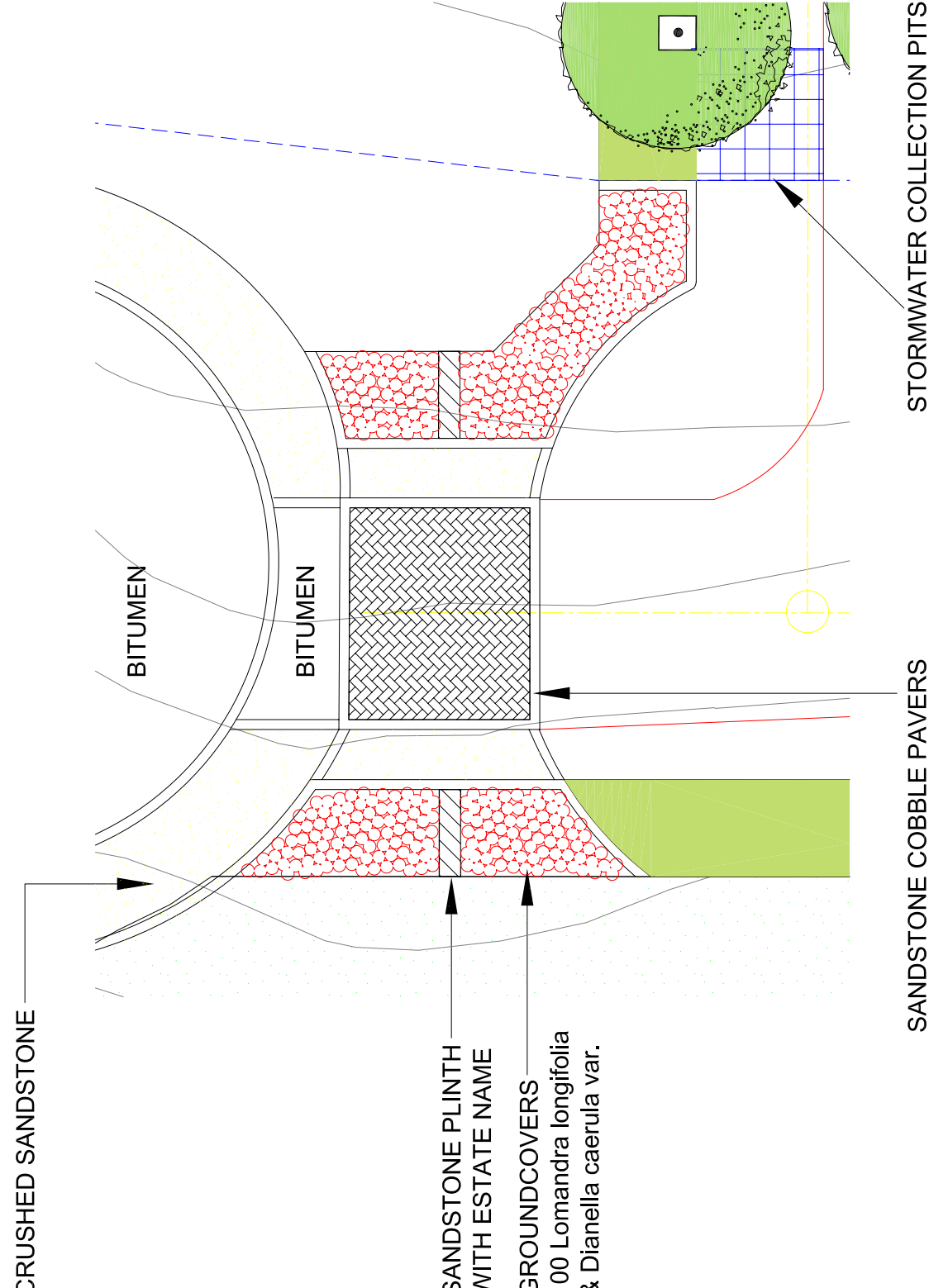
- GENERAL NOTES:**
- All works to be constructed in accordance with SCC Landscape Guidelines.
 - All plant material to be supplied by the contractor.
 - The contractor shall confirm all plant numbers prior to ordering. Species substitutions to be confirmed with the landscape architect.
 - All services shall be located on site prior to works commencing.
 - All areas disturbed during the works must be made good.
 - Final tree locations to be confirmed on site.
 - Plant new street trees in 600mm (minimum) depth topsoil. Contractor to allow for excavation into sandstone for trees.
 - Stake all trees as per plant schedule.

NOTE:
FINAL PLANT NUMBERS
DEPENDENT ON AVAILABILITY



EXISTING VEGETATION AND TREE PROTECTION - DETAIL

- NTS
- Fencing must be kept in good effective condition until all work is completed.
 - Fencing is to be located at the drip line (if possible).
 - Materials must not be stacked within the tree protection zone (TPZ).
 - No oil, tar, bitumen, cement or other material is to contaminate the ground within the TPZ.
 - Do not mix cement in the TPZ.
 - Do not use the tree as anchorages for equipment used in the removal of stumps, roots or other trees.
 - Do not place or nail notice boards, telephone cables or other services to the tree.



TYPICAL ESTATE ENTRANCE

NTS