

ENVIRONMENTAL ASSESSMENT



58 LOT RESIDENTIAL SUBDIVISION OF
LOT 682 DP 568678, LOT 705 DP 613881 AND
LOT 810 DP 247285, MANYANA DRIVE, MANYANA

Volume 1

Prepared by:

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ENVIRONMENTAL ASSESSMENT UNDER PART 3A—MAJOR PROJECT

58 LOT RESIDENTIAL SUBDIVISION

**LOT 682 DP 568678, LOT 705 DP 613881 AND LOT 810 DP 247285,
MANYANA DRIVE MANYANA**

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This report has been prepared for JWA Enterprises Pty Ltd, a joint venture partner with Vacenta Pty Ltd the landowner, of Lot 682 DP 568678, Lot 701 DP 613881 and Lot 810 DP 247285 Manyana Drive, Manyana, in accordance with the scope of services required by JWA Enterprises Pty Ltd to comply with the EP & A Act 1979.

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58 LOT RESIDENTIAL SUBDIVISION

LOT 682 DP 568678, LOT 705 DP 613881 AND
LOT 810 DP 247285, MANYANA DRIVE, MANYANA

ENVIRONMENTAL ASSESSMENT CERTIFICATION

Statement on Validity of the Environmental Assessment

This Environmental Assessment has been prepared in relation to Project Application No. 06_0165, which relates to a proposed 58 Lot residential subdivision of Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285, Manyana Drive, Manyana. 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.



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EXECUTIVE SUMMARY

This application proposes a fifty eight (58) lot subdivision on the subject site, which consists of Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285 Manyana Drive, Manyana. The subject land is an irregular shaped area of some 9.5 ha with maximum north-south and east-west dimensions of 384 m and 530 m respectively. The site is located along the eastern edge of the existing developed residential area of Manyana in the area bounded by Manyana Drive, Sunset Strip, The Palisade, The Barquette, The Bounty and the fore dunes of Manyana Beach. That part of the land subject to development lies approximately 300 m west of Manyana Beach. The subject site is zoned part Zone 2(a1) Residential, with a portion in the east zoned 2(e) Village, (deferred from Shoalhaven LEP 1985, Amendment No. 62).

The original subdivision layout considered a 71 lot residential subdivision of the subject site. The layout comprised a mixture of Torrens Title lots (proposed lots 101-151) and Neighbourhood Lots (proposed Lots 1-21) under the Community Land Development Act. Proposed Lot 1 was to form an Association Property lot in favour of the Neighbourhood Lots. On 9 June 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 was 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 October 2006 and listed 15 key project specific issues, which are provided in the Table below, along with the relevant sections of the Environmental Assessment where the issues have been addressed.

A range of environmental studies were undertaken and following a more detailed flora and fauna assessment of the subject site, three endangered ecological communities (EECs) were found to exist on the site. At this point it was determined that there was potential for the proposed subdivision layout to negatively impact on two of those communities (Swamp Oak Floodplain Forest, and Swamp Sclerophyll Forest). In addition, having considered concerns raised by the Department of Planning, the Department of Natural Resources and Shoalhaven City Council, urban design principles and the environmental impacts of the proposed layouts it was concluded that the option for a 71 lot subdivision was not viable due to the likely environmental impacts. Therefore fourteen (14) lots along the southern side of Sunset Strip and the eastern side of the proposed loop road were removed and the project design modified.

Subsequently three alternate layouts were considered before arriving at the final option for the proposed fifty eight (58) lot subdivision. The preferred layout was chosen for a number of reasons including the use of a perimeter loop road and

connecting road off Manyana Drive. This street design further reduces the impact on the EEC, improves bushfire protection and enhances opportunities for public access to foreshore areas while providing public road access to all lots within the subdivision and improving the permeability within the street network.

Issue No.	Key Project-Specific Issue	Relevant Sections of EA
1	<u>Design and Visual Impacts</u> – Demonstrate suitability of the proposal with the surrounding area in relation to potential character, bulk, scale and visual amenity of development resulting from the subdivision having regard to the Coastal Design Guidelines of NSW (2003) and Shoalhaven Subdivision DCP in particular the cumulative visual impact of the project from public areas including the foreshore and waterways. Identify extent of potential development footprints, building envelopes and built form controls and any significant trees to be removed.	Sections 3.3, 4.8 and 7.11
2	<u>Access to Foreshore</u> – Examine existing and future opportunities for public access to and along the foreshore and to community facilities on the Palisade. Establish appropriate mechanisms to ensure access is properly managed.	Sections 3.4, 3.8, 4.8 and 7.9
3	<u>Cumulative Impacts</u> - Address cumulative impacts, having regard to the proposed development; and existing, approved and other proposed development (where practical) within the Manyana, Bendalong and Cunjurong Point Area. Cumulative impacts to address water supply, electricity, waste disposal and social infrastructure including health services and schools. Consultation with service providers, Council, Department of Health and Department of Education is required. Provide evidence of capacity of infrastructure to service the proposed development and expected growth in the locality.	Sections 3.6, 3.9, 5 and 7.14
4	<u>Management of Common Properties</u> – Provide details of appropriate management plans for common properties under proposed community title.	No longer relevant as Community Title Lots are no longer proposed.
5	<u>Traffic and Access</u> – Provide a Traffic Impact Study in accordance with the RTA Guide to Traffic Generating Developments. 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. This should include identification of pedestrian movements and appropriate treatments.	Sections 3.4, 7.10 and 9.1

6	<u>Flood Impact Assessment</u> – Prepare flood impact assessment and flood mitigation strategies for the development including identification of any flood prone land on the site.	Section 7.1
7	<u>Stormwater Plan</u> – Prepare a stormwater plan for the subdivision layout based upon best practice Water Sensitive Urban Design Principles.	Section 7.1
8	<u>Riparian Management</u> – Demonstrate provision of an effective riparian zone with excludes development, and buffering to protect the environment function of the riparian vegetation of the watercourse on the site. Recommend measure to avoid or minimise conflict, if any, of the required riparian zone and asset protection zones (APZs).	Sections 7.6 and 9.1
9	<u>Bushfire</u> – Address the requirements of Planning for Bushfire Protection 2001 in particular the provision of adequate access for fighting bushfire, adequate APZs outside the property boundaries and water supply for bushfire suppression operations. Prepare a Plan of Management for fuel management including the provision and maintenance of APZs and any areas of hazard remaining, natural areas and buffer zones. Address AS 3959: <i>Building in Bushfire Prone Areas</i> .	Sections 7.7 and 9.1
10	<u>Management of APZs and Vegetation on Proposed Lot 1</u> – Demonstrate through a Vegetation Management Plan how the APZs and the bushland area on proposed Lot 1 is to be effectively managed and maintained without eroding their integrity, it should be noted that the Department of Natural Recourses in not supportive of the proposed Neighbourhood Associated scheme. In this regard, explore separating options, including construction of a perimeter road separating the development area and the bushland area to minimise vegetation loss and encroachment.	Proposed Lot 1 (now lot 158) is proposed to be dedicated to Shoalhaven City Council as public reserve. Sections 3.2, 3.3, 3.5, 7.6, 7.7, 7.9, 7.10, 9.1 and 9.3
11	<u>Infrastructure and Utilities</u> – Address existing capacity and requirements of the proposal for effluent disposal, water supply, electricity and telecommunications services in consultation with relevant agencies and identify staging, if any, of infrastructure works. Prepare a feasibility study for reclaimed water use is consultation with Shoalwater.	Sections 3.6, 5 and 7.13
12	<u>Flora and Fauna</u> – Outline measures to conserve flora and fauna and their habitats within the meaning of the Threatened Species Conservation Act 1995, having regards to the Draft Guidelines for Threatened Species Assessment (DEC & DPI July 2005). In particular, address potential impacts of the development on any Endangered Ecological Communities.	Sections 3.2, 3.3 7.6 and 9.3
13	<u>Cultural Heritage</u> – Address the draft Guidelines for	Sections 7.4 and

	Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005).	7.5
14	<u>Soil and Contamination</u> – Identify the presence and extent of acid sulphate soils on the site and recommend appropriate mitigation measures. The level of assessment shall be consistent with the Acid Sulphate Soil Manual by ASSMAC.	Section 7.8
15	<u>Coastal Hazards</u> – Address potential impact of coastal hazards such as shoreline recession, storm bite, wave run up and coastal inundation on the development. Address the protection and conservation of sand due system on the site.	Section 7.9

Table ES.1: Director-Generals requirements for the preparation of the EIS

The proposed subdivision will create fifty-seven (57) Torrens Title residential allotments covering 5.59 hectares of the 9.56 hectare site. The residual land (3.97 hectares), representing 41.5% of the subject site, is proposed to be dedicated to Shoalhaven City Council as public reserve (proposed Lot 158). The proposed subdivision will be constructed and released in three (3) stages. Stage 1 will involve the creation of 15 lots (lots 101 to 115) and its associated infrastructure and the dedication of proposed Lot 158 to Shoalhaven City Council as public reserve. Stage 2 will involve the creation of 23 lots (lots 135 to 157) its associated infrastructure (including the artificial wetland) and Stage 3 will see the creation of 19 lots (lots 116 to 134) and associated infrastructure. The timing for the release of the each stage will depend upon market conditions and financing.

Access to the subdivision will be via the extension of The Barbette, The Bounty, Manyana Drive, Sunset Strip, a new perimeter loop road (Road 1) off Manyana Drive, and the new connecting road (Road 2) off Manyana Drive.

All fifty-seven residential lots will have frontage to the proposed new road network with orientation either east-west or north-south. The lots have areas ranging in size from 543m² to 1466m² with lot 158 noticeably larger in area (3.97ha). Lot 158 contains environmentally sensitive land (Endangered Ecological Communities and water course and associated riparian vegetation), which is proposed for dedication to Shoalhaven City Council as Public Reserve. This collection of natural attributes is considered a valuable asset to the community and will provide an alternative public access to Manyana Beach. Some lots contain varying degrees of Asset Protection Zone in accordance with Planning for Bushfire Protection Guidelines (2006), while accommodating suitable building area on each lot for future dwellings. Furthermore, it is proposed that an artificial wetland be constructed in the north-western section of Lot 158 to treat stormwater runoff before it reaches the creek and the ocean.

There are a number of site attributes and constraints that have been taken into consideration in the design of the subdivision layout. The final design is reflective of the inherent constraints and positive attributes associated with the subject site. The subdivision layout is considerate of the site's environmental sensitivity whilst accommodating the economic reality of the current property market. The design principles incorporate bush fire mitigation measures, preservation and the ongoing management of the creek and it's associated riparian vegetation, and protection of the Endangered Ecological Community. The urban stormwater concept has been designed in a manner sympathetic to the natural constraints of the site while recognising the proposed development is located at the lower end of a relatively large catchment.

A number of 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 and to enable appropriate management to be taken into consideration during the design of the subdivision layout. Overviews of the main findings are provided below.

Stormwater Management Plan and Flood Study

The hydraulic modelling performed in the Stormwater Management Plan and Flood Study prepared by Watkinson Apperley Pty Ltd estimated the peak water levels over the remnant creek and proposed lots at the lower end of the catchment for estimation of flooding impact in major storms (100 year flood event and 100 year ARI event incorporating climate change). The modeling identified three (3) lots likely to be impacted by flood flows from the 100 year flood event (and therefore all events of lesser magnitude). However, modeling identified six (6) lots likely to be impacted by flood flows from the 100 year flood event incorporating climate change. As a consequence of the predicted flood extents a minimum finished floor height of 0.5m above the predicted 100 year ARI flood level incorporating climate change is proposed. As the extent of flooding is otherwise fairly constrained, and emergency egress from these lots is readily and safely available via the adjoining streets, construction of dwellings on these lots will be acceptable subject to the minimum habitable floor level being set.

The existing catchment has no stormwater management controls therefore the watercourse that runs through the subject site currently receives untreated runoff from the existing developed and undeveloped areas in the 70ha catchment. A Stormwater Management Concept has been prepared for the subject site. The proposed treatment system has been designed to retain and filter stormwater to remove pollutants such as litter, sediment and nutrients to protect the existing watercourse. The proposed treatment system for this project consists of gross pollutant traps, a constructed wetland, kerbside bio-retention, a vegetated swale

(comprising a rock armoured outlet treatment) and 30 to 50m of existing vegetated buffer (riparian zone) adjacent to the watercourse. Rainwater tanks have not been proposed as it is anticipated that future dwellings will use reuse water from the Conjola Regional Sewerage Scheme for non-potable purposes.

Aboriginal Heritage Assessment

Navin Officer Heritage Consultants Pty Ltd originally conducted a field survey for the Manyana subdivision development in 2005 recording five previously unidentified Aboriginal sites and extending the boundaries of the two previously recorded sites. The new sites included four artifacts scatters and a single isolated find.

In August 2007 as part of the environmental assessment for this development, Navin Officer Heritage Consultants Pty Ltd was engaged to conduct an Archaeological Subsurface Testing Program over the subject site and to report their finding. Twenty seven (27) archaeological test pits were excavated on a rough 40 m grid. Four hundred and seventy nine (479) lithic items, including 126 artefacts, were recovered from 21 of the 27 test pits excavated at Manyana. Navin Officer concluded that overall the Manyana site assemblage shows low richness, a limited range of technological activities, core manufacture is under-represented, and the assemblage is highly fragmented. This renders the assemblages of lower information potential than other sites located in similar coastal environments to the north and south. Based on the archaeological assessments undertaken, the deposits are of low archaeological significance and are not considered to pose a constraint to the proposed development of the Manyana Subdivision area.

Flora and Fauna Assessment

The Flora and Fauna Assessments undertaken by Kevin Mills & Associates (2008 and 2009), found the subject site predominately comprises six vegetation communities Swamp Oak Floodplain Forest (Endangered Ecological Community); Swamp Sclerophyll Forest (EEC), Banksia - Bangalay Forest (EEC), Upland Swamp Oak Forest, Blackbutt - Bloodwood Forest / Tall Forest and Disturbed Woodland / Forest. The condition of the vegetation varies considerably across the site with the best quality native vegetation located on the northern half of the site and at the western end. The fauna habitat on the subject land consists of forest, woodland and cleared land.

The native vegetation and fauna habitat to be removed or modified as a result of the proposal comprises approximately 5.61 hectares over the three lots and includes about 0.4 hectares or 15 percent of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains, about 0.58

hectares or 70% of the Upland Swamp Oak Forest of all of the Blackbutt - Bloodwood Forest and about half of the disturbed woodland/forest. The vegetation will be removed during the civil works associated with each stage of the development.

The proposal will not result in the removal or modification of the Bangalay Sand Forest community. The removal of 0.4 ha of the Swamp Oak Floodplain Forest to accommodate the proposed wetland (0.24 ha) and a small part of proposed lots 103, 118 and 119 and part of the perimeter road (road 1) will be offset by the dedication of 2.3 ha of EEC (including Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest and small section of Bangalay Sand Forest) and 0.8 ha of woodland vegetation to Shoalhaven City Council as public reserve. Prior to the dedication, a vegetation management plan will be prepared to manage and improve the quality of the EEC. The 2.3 ha of EEC to be dedicated is predominantly in better ecological condition than the 0.4 ha which is to be removed. Furthermore, the 0.4 ha of the Swamp Oak Floodplain Forest is located on the edge of the community and adjacent to existing residential development where as the 2.3 ha will be buffered by perimeter roads to the north and west, woodland vegetation to south and coastal dune vegetation to the south east. The proposed offset meets the "like for like or better" test and is considered to be to a value equal or greater than the loss of 0.4 ha of the Swamp Oak Floodplain Forest.

Furthermore, Kevin Mills undertook a survey to identify the distribution of the three endangered ecological communities within the Manyana locality and concluded that the three communities are common. The eight additional sites he located were better protected than the subject site as they were either in dedicated protected areas, occurred on other public land or through land use zoning. Most of these additional sites were in better natural condition than the examples on the subject land.

Kevin Mills also undertook a survey in the Manyana locality to locate and assess Glossy Black-Cockatoo habitat. Fifteen other suitable sites in the locality were sampled and only nine of these sites exhibited foraging by the Glossy Black cockatoo which may indicate under-utilization of the local food resource by the cockatoo. Of the fifteen sites surveyed, 87 % are wholly or partly in Conjola National Park or on public land protected through zoning or other mechanism.

In summary, Kevin Mills concluded that the overall impact of the development, coupled as it is with the dedication of a large part of the land to the public, will have minimal impact on the local flora and fauna, including threatened species and communities. Additionally the dedication of Lot 158 will result in a riparian zone of 40m wide plus on both sides of the unnamed creek, which traverses the site. Therefore, the loss of the vegetation in the development area will not affect

habitat connectivity and the vegetation to be retained in the southeast will provide for continued habitat interconnections along the permanent creek.

Bushfire Protection Assessment

A Bushfire Protection Assessment prepared by Bushfire Environmental Services (2008) concluded that the bushfire risk associated with the proposed subdivision ranges from low to high depending on the lot in question. The reason for the variability in bushfire risk is the proposed residential lots are surrounded by a mixture of proposed and existing residential development, land owned by the Department of Lands which is vegetated and will remain vegetated into the foreseeable future and land proposed to be dedicated to Shoalhaven City Council (Lot 158), which will remain vegetated. The recommended APZs will be fully contained within the public road reserve and those few individual lots affected.

Acid Sulphate Soils

The Shoalhaven City Council State of the Environment (SCC SOE) online Acid Sulphate Map indicate the southeastern part of the subject site is classified as having a '*Low probability of encountering acid sulphate soils within 1 m of the ground surface*'.

An Acid Sulphate Soil Assessment was undertaken by Douglas Partners Pty Ltd. for the area mapped indicating acid sulphate soils may be encountered. Douglas Partners concluded that the testing undertaken to date indicates the presence of actual and potential acid sulphate soils of possible erratic lateral distribution within the eastern portion of the proposed development area, and generally below depths of 0.5 – 2.5 m. The majority of the eastern portion of the site (existing bushland (lot 158) is proposed to be retained as public reserve and will remain essentially undisturbed. However some disturbance of the underlying acid sulphate soils is anticipated in order to facilitate subdivision construction (roads and wetland).

An acid sulphate soil management plan (ASSMP) has been prepared by Douglas Partners Pty Ltd which provides a framework for achieving environmental objectives in order to minimise the risk of harm to human health and the environment during and following the proposed development. Any construction activities that disturb the identified AASS or PASS must be undertaken in accordance with the guidelines in order to minimise the potential for adverse environmental impact.

Coastal Hazard Assessment

Gary Blumberg & Associates (GBA) undertook a Coastal Engineering Assessment (2008) of the subject site and adjoining coastline. The assessment addressed a number of potential coastal hazards which if not properly catered for can impact coastal developments and reduce public amenity. Seven coastline hazards have been addressed including Beach Erosion, Shoreline Recession, Coastal Entrance Instability, Sand Drift, Coastal Inundation, Slope Instability and Climate Change.

Overall the report concluded that no beach erosion and shoreline recession hazard applies to the subdivision layout as there is proposed to be substantial separation of the proposed allotments from the unstabilised back beach areas (>150 m). Since all residential allotments fall within the Stable Foundation Zone, no special foundation treatments are required. GBA did recommend that two fences be installed along the eastern edge of the proposed loop road (Road 1) to guide pedestrian access to and from the beach, to protect the dune and its vegetation.

Traffic Impact Assessment

Watkinson Apperley Pty Ltd undertook a Traffic Impact Assessment. The proposed subdivision involves the extension of Sunset Strip, The Barbette, The Bounty, Manyana Drive and the creation of two (2) new roads off Manyana Drive, one running north-south and the other running east-west

The estimated additional traffic generated as a result of the proposed creation of an additional 57 residential lots (proposed Lot 158 is excluded from calculations) is 513 vehicle movements per day (during peak holiday period when the occupation rate is 100%), which is well within the capacity of the existing road network. Therefore, it is unlikely that the proposed development will have a detrimental effect on the local traffic and driver safety on The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway or the surrounding streets in the Manyana area.

The extension of The Barbette, The Bounty and Manyana Drive will be designed and constructed to match the carriageway of the existing roads in accordance with the principles of Council's Subdivision Code (DCP 100). The extension of Sunset Strip, and the perimeter loop road (Road 1) are proposed to have reduced road reserve widths in parts. Road 2 will have a reduced road reserve also. These reduced widths are proposed to assist with traffic management and due to the single loaded nature of two of these streets.

It is considered that the proposed reduction in the road reserve, carriageway and verges will provide an enhanced urban design outcome, while providing adequate space for services and a safe road environment for both vehicles and pedestrians.

Visual Impact Assessment

Maurice Hayler and Associates Architects prepared a Visual Impact Assessment that concludes that the site is not visible from Manyana Beach or **Inyadda Point** and that the visual catchment and sightlines of existing residences are largely unaffected by insertion of 57 lots due to the low lying profile of sites. The proposed street layout reinforces the existing settlement character of the locality and enhances the ecological protection and visual characteristics of the area.

Cumulative Impact

While it is acknowledged that the continued expansion of Manyana may have the potential to place strain on the existing services and infrastructure, the nature of the proposed subdivision is that of small-scale residential infill development in accordance with the zoning provisions and expectations of the area. All relevant stakeholders have been contacted and have advised that there is adequate capacity within the local services/infrastructure to handle the increase in population that will result from the proposal. Furthermore the South Coast Regional Strategy (2006) prepared by the Department of Planning indicated that future urban development will be prioritized to support infill housing and that limited development could be accommodated in a corridor between the villages of Cunjurong and Manyana in the vicinity of the subject site.

We are of the opinion that overall, the proposed 58-lot subdivision (57 residential) will have minimal cumulative impact on the local environment. The subdivision layout has been designed to protect the natural edges to the coastal environment, and to reinforce the street pattern within the local area. The proposed road network caters for all road users including, pedestrians, cyclists, cars and buses. Overall the objective of the subdivision layout is to provide a safe, attractive, energy efficient and liveable neighbourhood that fosters a sense of community and that promotes better social, economic and environmental sustainability.

Conclusion

This Environmental Assessment demonstrates how the consultant team has addressed the key issues set out in the Director-General's Requirements and has designed a subdivision layout, which minimises impact on the environment. This assessment demonstrates that the proposed development is consistent with

local, state and national legislation and guidelines. Where potential environmental impacts have been identified, appropriate investigations have been undertaken and the recommended mitigation measures and environmental safeguards have been either designed into the subdivision layout or are proposed to be constructed as part of the civil infrastructure. 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 543m² to 1466m² that in turn offers the opportunity for a diverse range of housing styles and sizes to be developed. The dedication of 3.97ha (41.5% of the subject site) of coastal vegetation to Shoalhaven City Council along with a vegetation management plan will ensure the long term survival of three endangered ecological communities (Swamp Oak Floodplain Forest; Swamp Sclerophyll Forest; and Banksia - Bangalay Forest) while water sensitive urban design will improve the water quality within the local area.

Table of Contents

1	INTRODUCTION	1
1.1	Background	1
1.2	The Applicant.....	1
1.3	Location	2
1.4	Site Description	4
1.5	Environmental Assessment Process	6
1.5.1	Major Projects	6
1.5.2	Environmental Assessment Requirements	6
1.5.3	EA Exhibition.....	9
1.6	Purpose and Structure of the Report	9
2	Existing Environment	10
2.1	Topography	10
2.2	Geology	11
2.3	Soil Landscapes	11
2.4	Vegetation	12
2.5	Surface Water.....	15
2.6	Meteorology.....	15
2.7	Landuse.....	15
2.8	Site Analysis	16
3	PROJECT DESCRIPTION.....	17
3.1	Introduction.....	17
3.2	Design Concept	18
3.3	Lot Layout.....	19
3.4	Pedestrian, Cycle and Road Access and Circulation Networks	22
3.5	Staging of Development	23
3.6	Infrastructure	25
3.6.1	Electricity.....	25
3.6.2	Sewer and Water	25
3.6.3	Telecommunications	27
3.6.4	Waste.....	28
3.6.5	Health.....	28
3.6.6	Education	29
3.7	The Scale of the Proposed Development	30
3.8	Public Access to and along Coastal Foreshore	31
3.9	Provision of Public Facilities and Services.....	31
4	STATUTORY PLANNING.....	31
4.1	Commonwealth Legislation.....	31
4.1.1	Environmental Protection and Biodiversity Conservation Act, 1999.....	31
4.2	State Legislation	36
4.2.1	Threatened Species Conservation Act 1995.....	36
4.2.2	Native Vegetation Act 2003.....	43
4.2.3	Fisheries Management Act 1994.....	43
4.2.4	Water Management Act 2000.....	44
4.2.5	Rural Fire Act 1997	45
4.3	State Environmental Planning Policies	46
4.3.1	State Environmental Planning Policy 2005 (Major Projects)	46
4.3.2	State Environmental Planning Policy (Infrastructure) 2007	47

4.3.3	State Environmental Planning Policy 55 – Remediation of Land.....	48
4.3.4	State Environmental Planning Policy 71 – Coastal Protection	49
4.3.5	State Environmental Planning Policy 44 – Koala Habitat Protection	54
4.3.6	State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004	55
4.4	Regional Environmental Planning Policies	55
4.4.1	Illawarra Regional Environmental Plan No. 1	55
4.4.2	South Coast Regional Strategy	56
4.5	Local Environmental Planning Policies	57
4.5.1	Shoalhaven Local Environmental Plan 1985.....	57
4.6	Development Control Plans and Council Polices.....	59
4.6.1	Development Control Plan 100 – Subdivision Code.....	59
4.6.2	Development Control Plan No. 93 - Controls for site waste minimisation and management.	68
4.6.3	Reflective Building Materials - Use in Coastal and Rural Areas	69
4.6.4	Policy to Control Building Height and Amenity in Residential Areas Shoalhaven Council	70
4.7	Contributions – Section 94 and Section 64 Urban Residential	70
4.8	Coastal Design Guidelines	70
5	CONSULTATION.....	79
5.1	Consultation with Stakeholders and Other Relevant Authorities.....	79
5.1.1	Statutory and Other Relevant Authorities	79
5.1.2	Community Consultation	96
6	ISSUES IDENTIFICATION	97
6.1	Methodology	97
7	ENVIRONMENTAL IMPACT ASSESSMENT	98
7.1	Water Cycle Management	98
7.1.1	Existing Environment	98
7.1.2	Potential Impacts.....	100
7.1.3	Mitigation Measures	102
7.2	Noise and Vibration	105
7.2.1	Existing Environment	105
7.2.2	Potential Impacts.....	105
7.2.3	Mitigation Measures	106
7.3	Air Quality	106
7.3.1	Existing Environment	106
7.3.2	Potential Impacts.....	106
7.3.3	Mitigation Measures	107
7.4	Aboriginal Heritage	107
7.4.1	Existing Environment	107
7.4.2	Potential Impacts.....	110
7.4.3	Mitigation Measures	111
7.5	European Heritage	117
7.5.1	Existing Environment	117
7.6	Flora and Fauna	118
7.6.1	Existing Environment	118
7.6.2	Potential Impacts.....	122
7.6.3	Mitigation Measures	126
7.7	Bushfire Risk	136

7.7.1	Existing Environment	136
7.7.2	Potential Impacts.....	136
7.7.3	Mitigation Measures	137
7.8	Acid Sulphate Soil	142
7.8.1	Existing Environment	142
7.8.2	Potential Impacts.....	144
7.8.3	Mitigation Measures	144
7.9	Coastal Hazards	148
7.9.1	Existing Environment	148
7.9.2	Potential Impacts.....	149
7.9.3	Mitigation Measures	152
7.10	Traffic and Access	156
7.10.1	Existing Environment	156
7.10.2	Potential Impacts.....	160
7.10.3	Mitigation Measures	161
7.11	Visual Assessment	164
7.11.1	Existing Environment	164
7.11.2	Potential Impacts.....	165
7.11.3	Mitigation Measures	165
7.12	Landscaping	167
7.12.1	Existing Environment	167
7.12.2	Potential Impacts.....	167
7.12.3	Mitigation Measures	167
7.13	Social Environment.....	168
7.13.1	Existing Environment	168
7.13.2	Potential Impacts.....	170
7.13.3	Mitigation Measures	171
7.14	Cumulative Impact.....	171
7.14.1	Existing Environment	171
7.14.2	Potential Impacts.....	172
7.14.3	Mitigation Measures	172
8	DRAFT STATEMENT OF COMMITMENTS FOR THE PROJECT	173
8.1	Aims.....	173
8.2	Draft Statement of Commitments	173
9	PROPOSAL JUSTIFICATION	178
9.1	Alternative Layouts	178
9.2	Justification.....	183
9.3	Ecologically Sustainable Development.....	189
9.3.1	Precautionary Principle	190
9.3.2	Intergenerational Equity	190
9.3.3	Conservation of Biological Diversity and Ecological Integrity	191
9.3.4	Valuation and Pricing of Environmental Resources	191
10	CONCLUSION	192
11	REFERENCE	193

List of Figures

Figure 1.1: Regional Locality Map.....	2
Figure 1.2: Locality Map.....	3
Figure 1.3: Locality Context Plan	3
Figure 1.4: Location shown on a topographic map	4
Figure 1.5: Breakdown of the subject site	5
Figure 2.1: Vegetation Map of the Subject Land.....	13
Figure 3.1: The proposed subdivision layout overlaid over an aerial photo	20
Figure 3.2: Staging Plan for construction of the proposed subdivision.....	24
Figure 3.3: Existing Water Services	26
Figure 3.4: Proposed Sewerage Services.....	27
Figure 4.1: Zoning Plan.....	58
Figure 7.1: Shows the 5 sub catchments used for the for flow analysis.....	99
Figure 7.2: Location of Aboriginal sites [blue] and PADs [green] within the Manyana development area [orange]	110
Figure 7.3: Location of test pits [blue] excavated during subsurface program within the Manyana Subdivision study area [orange].....	114
Figure 7.4: Extent of the Swamp Sclerophyll Forest determined by GPS Survey	123
Figure 7.5: Recent air photo showing subdivision location	149
Figure 7.6: Plan arrangement for coastal stability zones	152
Figure 7.7: Inundation Summary.....	154
Figure 7.8: Fencing to protect coastal dune and vegetation	155
Figure 7.9: Intersection of Manyana Drive and Sunset Strip.....	158
Figure 7.10: Cross section showing proposed subdivision located behind sand dunes and forest and therefore would not be visible from Manyana Beach	166
Figure 9.1: Original Subdivision Layout	178
Figure 9.2: Alternative Layout 1	180
Figure 9.3: Alternative Layout 2	181
Figure 9.4: Alternative Layout 3	183

List of Tables

Table ES.1: Director-Generals requirements for the preparation of the EIS	iv
Table 1.1: Director-Generals requirements for the preparation of the EIS	8
Table 2.1: Vegetation communities present on the subject site	14
Table 4.1: DCP 100 Compliance.....	68
Table 5.1: General issues raised in discussion with community group representatives	97
Table 7.1: Existing Peak Flows (m ³ /s).....	100
Table 7.2: Existing Peak Flows (m ³ /s)	100
Table 7.3: Proposed Minimum Habitable Floor Levels.....	104
Table 7.4: Vegetation communities present on the subject site	120
Table 7.5: Terrestrial and arboreal mammal species recorded on the subject land	121
Table 7.6: Bird Species recorded on the subject sand	122
Table 7.7: Assets Protection Zones and required Construction Level (AS3959)	141
Table 7.8: Estimated Lime Application Rates	146
Table 7.9: A breakdown of the total number of vehicles using The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway during the survey period.....	158
Table 7.10: The average peak vehicle movements per hour and the Total Daily Traffic (TDT) flows along The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway.....	159
Table 7.11: The classification of the roads within the existing subdivision in accordance with the RTA Guidelines and the Shoalhaven City Council DCP100	159
Table 7.12: The LoS for surveyed roads.....	160
Table 7.13: Typical generation rates for residential dwelling houses (RTA Guide)	160
Table 7.14: Future traffic flows due to the proposed subdivision	161
Table 7.15: Shows the predicted increase in traffic flow on Sunset Strip as a result of the proposed subdivision	161
Table 7.16: Population projections for planning area 5.....	169
Table 7.17: Age structure the for Manyana – Cunjurong area	169
Table 7.18: Age structure for the Manyana – Cunjurong area	170
Table 8.1: Draft Statement of Commitments.....	178

Volume 2 - Attachments

- Attachment 1 – Original subdivision layout
- Attachment 2 – Proposed Subdivision Layout
- Attachment 3 – Photomontage
- Attachment 4 – Aerial Photo
- Attachment 5 – Subdivision Layout Showing Buildable Areas
- Attachment 6 – Sketch Plan Showing the Proposed Road Network
- Attachment 7 – Proposed Staging Plan
- Attachment 8 – Letter from Craig Willebrand Integral Energy Dated 6th August 2007
- Attachment 9 – Letter from Mr. Bill Tomkinson Shoalhaven City Council Dated 12th July 2007
- Attachment 10 – Letter from Mr. Paul O'Bryan Telstra Forecasting and Area Planning Dated 18th July 2007
- Attachment 11 – Letter from Mr. David Hojem Shoalhaven City Council – Waste Service Department Dated 10th August 2007
- Attachment 12 – Letter from Mrs. Cristina Thompson South Eastern Sydney Illawarra Health Service Dated 6th August 2007
- Attachment 13 – Letter from NSW Department of Education and Training Dated 25th July 2007
- Attachment 14 – Letter from Department of Environment and Heritage to Vacenta Pty Limited dated 1 August 2006
- Attachment 15 – Waste Management Plan
- Attachment 16 – Design Quick Tips prepared by Watkinson Apperley Pty Ltd, July 2008
- Attachment 17 – Letter from Department of Planning and the Department of Natural Resources, South Coast Regions regarding Application to Waive Draft Master Plan Dated 10 October 2005

- Attachment 18 – Letter from Shoalhaven City Council regarding Application to Waive Draft Master Plan Dated 18th January 2006
- Attachment 19 – Letter from Shoalhaven City Council regarding Part 3A Major Project Application (SF9747) Dated 27th August 2007
- Attachment 20 – Letter from Paul Mulvey former owner of PMA Consulting dated 13th November 2007
- Attachment 21 – Letter from Department of Environment and Climate Change regarding the adequacy of the Environmental Assessment dated 14 October 2008.
- Attachment 22 – Typical Cross-Section Showing Service Location for Reduced Road Widths
- Attachment 23 – Concept Landscape Plan prepared by Captivate Landscape Design

Volume 3 – Appendixes

- Appendix 1 - Director General Requirements (DGRs)
- Appendix 2 - Acid Sulphate Soil Assessment, prepared by Douglas Partners, July 2007
- Appendix 3 - Flora and Fauna Assessment, prepared by Kevin Mills and Associates, 2008 and Supplementary Vegetation Assessment prepared by Kevin Mills and Associates, 2009
- Appendix 4 - Visual Impact Assessment, prepared by Maurice Hayler and Associates, 2007
- Appendix 5 - Acid Sulphate Soil Management Plan, prepared by Douglas Partners, 2007
- Appendix 6 - Bushfire Protection Assessment, prepared by Bushfire and Environmental Assessment, 2008
- Appendix 7 - Traffic Impact Assessment, prepared by Watkinson Apperley Pty Ltd, 2007
- Appendix 8 - Aboriginal Heritage Assessment, prepared by Navin Officer Heritage Consultants Pty Ltd, 2005
- Appendix 9 - Aboriginal Subsurface Testing Report, prepared by Navin Officer Heritage Consultants Pty Ltd, 2008

Appendix 10 - Flood and Stormwater Assessment, prepared by Watkinson
Apperley Pty Ltd, July 2009

Appendix 11 - Coastal Impact Assessment, prepared by Gary Blumberg &
Associates Pty Ltd, 2008

Appendix 12 - Flora And Fauna Assessment, prepared by PMA 2005,
Amendments of July 2007

Appendix 13 - Bushfire Protection Assessment, prepared by PMA, 2005

1 INTRODUCTION

1.1 Background

Watkinson Apperley Pty Ltd have been engaged by JWA Enterprises Pty Limited to prepare a Environmental Assessment (EA) for a proposed 71 Lot residential subdivision of Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285, Manyana Drive, Manyana. Initially the proposed subdivision layout comprised a mixture of Torrens Title lots (proposed lots 101-151) and Neighbourhood Lots (proposed Lots 1-21) under the Community Land Development Act. Proposed Lot 1 was to form an Association Property lot in favour of the Neighbourhood Lots (Attachment 1).

However, after undertaking more detailed environmental assessments of the subject site it was concluded that 71 lots was not viable from an environmental viewpoint. As a result, the subdivision layout has been modified and the number of lots have been reduced to 58 Torrens Title lots consisting of 57 residential allotments (5.59 hectares) and public reserve lot (3.97 hectares – 41.5% of subject site), which is proposed to be dedicated to Shoalhaven City Council (proposed Lot 158) (Attachment 2).

The subject site is wholly contained within the coastal zone with a section along the eastern boundary of the site positioned within the sensitive coastal locations. As the proposal involves a residential subdivision greater than 25 lots an application for a master plan waive was lodged with the Department of Infrastructure Planning and Natural Resources under SEPP 71 in July 2005. However, during the assessment phase there were changes made to the Environmental Planning and Assessment Act 1979, requiring a project of this type to be classified as a major project under part 3A. Consequently that application was withdrawn on the 10 March 2006.

The proposed subdivision of the abovementioned property now falls under Part 3A (Major Projects) of the Environmental Planning and Assessment Act 1979 and accordingly an Environmental Assessment is required to be submitted to the Department of Planning for determination.

1.2 The Applicant

Watkinson Apperley Pty Ltd has prepared this Environmental Assessment on behalf of the property owner Vacenta Pty Limited and developer, JWA Enterprises Pty Limited, which have entered into a joint venture agreement to develop the property.

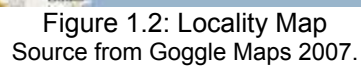
1.3 Location

Manyana is located approximately 210km south of Sydney in the Shoalhaven region. The Shoalhaven region is located approximately 160 kilometres south of Sydney and stretches 160 kilometres from Berry in the north to Durras in the south (Figure 1.1).



Figure 1.1: Regional Locality Map
Source from Goggle Maps 2007.

Manyana is a coastal residential village, including a number of holiday homes, located approximately 30kms north of Ulladulla, 11km east of the Princes Highway, north of Conjola (Figure 1.2). The subject site is located along the eastern edge of the existing developed residential area of Manyana. The site is located in the area bounded by Manyana Drive, Sunset Strip, The Palisade, The Barbette, The Bounty and the fore dunes of Manyana Beach. The subject land lies approximately 300 m west of Manyana Beach. A locality context plan indicating significant local features such as parks, community facilities, public open space, and watercourses is provided in Figure 1.3



1.4 Site Description

The overall site, which consists of Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285, comprises an irregular shaped area of some 9.5 ha with maximum north-south and east-west dimensions of 384 m and 530 m respectively (Figure 1.3). The site is located along the eastern edge of the existing developed residential area of Manyana and abuts the coastal dune fronting onto Manyana Beach, which runs between Cunjurong Point in the south and Inyadda Point in the north (Figure 1.4). The site is partly cleared and partly covered by coastal vegetation. A small watercourse traverses the site, in a west to east direction generally through proposed lot 158 & through to the beachfront behind lots 101 to 103. There is also a small drainage line, which runs from Manyana Drive through proposed lots 110 and 111 to the watercourse previously mentioned.



Figure 1.4: Location shown on a topographic map

Sourced from Centre Mapping Authority 1:25000 topographical map, reference Cunjurong Point 9027-3-N.

The overall site is bound to the north by existing residential development, to the west by a mixture of existing residential development and vacant undeveloped land, to the east by a mixture of existing residential development and sand dunes associated with Manyana beach reserve and to the south by vacant undeveloped land, crown reserve and sand dunes associated with Manyana beach reserve (Figure 1.5).

Lot 682 DP 568678 occupies the northern section of the proposed development, is irregular in shape with a total area of 2.18ha. Lot 682 is proposed to comprise of fifteen (15) Torrens Title lots ranging in size from 742m² to 1430m², the extension of Sunset Strip and part of proposed Lot 158, which will be dedicated to Shoalhaven City Council (Figure 1.5).

Lot 810 DP 247285 is located in the southwestern section of the development, is irregular in shape with a total area of 2.11ha. Lot 810 is proposed to contain twenty three (23) Torrens Title lots ranging in size from 600m² to 993.6m² and the extension of Manyana Drive, The Barquette and The Bounty (Figure 1.5).

Lot 705 DP 613881 is located in the south to southeastern section of the development land, is irregular in shape and has an area of 5.21ha. Lot 705 is proposed to comprise of nineteen (19) Torrens Title lots ranging in size from 543m² to 1466m², the creation of a new perimeter loop road (Road 1) and an adjoining road (Road 2) off Manyana Drive and part of proposed Lot 158 with a proposed artificial wetland to treat stormwater runoff, which will be dedicated to Shoalhaven City Council (Figure 1.5).

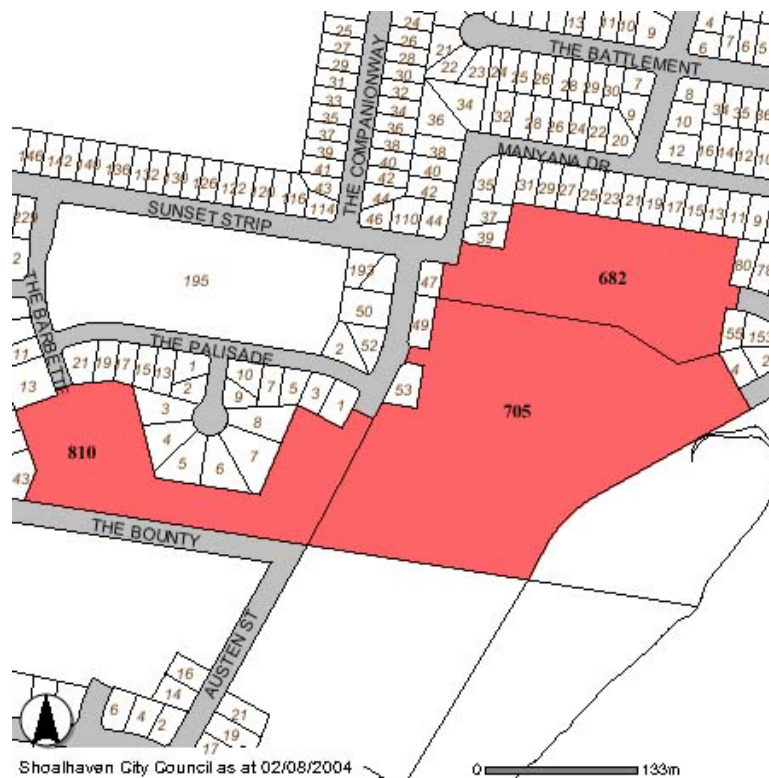


Figure 1.5: Breakdown of the subject site
Sourced from Shoalhaven City Council.

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. Taking 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. 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 26 June 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 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 1.5.2.

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 (EA) were received in October 2006 and list 15 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 1.

Issue No.	Key Project-Specific Issue	Relevant Sections of EA
1	<u>Design and Visual Impacts</u> – Demonstrate suitability of the proposal with the surrounding area in relation to potential character, bulk, scale and visual amenity of development resulting from the subdivision having regard to the Coastal Design Guidelines of NSW (2003) and Shoalhaven Subdivision DCP in particular the cumulative visual impact of the project from public areas including the foreshore and waterways. Identify extent of potential development footprints, building envelopes and built form controls and any significant trees to be removed.	Sections 3.3, 4.8 and 7.11
2	<u>Access to Foreshore</u> – Examine existing and future opportunities for public access to and along the foreshore and to community facilities on the Palisade. Establish appropriate mechanisms to ensure access is properly managed.	Sections 3.4, 3.8, 4.8 and 7.9
3	<u>Cumulative Impacts</u> - Address cumulative impacts, having regard to the proposed development; and existing, approved and other proposed development (where practical) within the Manyana, Bendalong and Cunjurong Point Area. Cumulative impacts to address water supply, electricity, waste disposal and social infrastructure including health services and schools. Consultation with service providers, Council, Department of Health and Department of Education is required. Provide evidence of capacity of infrastructure to service the proposed development and expected growth in the locality.	Sections 3.6, 3.9, 5 and 7.14
4	<u>Management of Common Properties</u> – Provide details of appropriate management plans for common properties under proposed community title.	No longer relevant as Community Title Lots are no longer proposed.
5	<u>Traffic and Access</u> – Provide a Traffic Impact Study in accordance with the RTA Guide to Traffic Generating Developments. 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. This should include identification of pedestrian movements and appropriate treatments.	Sections 3.4, 7.10 and 9.1
6	<u>Flood Impact Assessment</u> – Prepare flood impact assessment and flood mitigation strategies for the development including identification of any flood prone land on the site.	Section 7.1

7	<u>Stormwater Plan</u> – Prepare a stormwater plan for the subdivision layout based upon best practice Water Sensitive Urban Design Principles.	Section 7.1
8	<u>Riparian Management</u> – Demonstrate provision of an effective riparian zone with excludes development, and buffering to protect the environment function of the riparian vegetation of the watercourse on the site. Recommend measure to avoid or minimise conflict, if any, of the required riparian zone and asset protection zones (APZs).	Sections 7.6 and 9.1
9	<u>Bushfire</u> – Address the requirements of Planning for Bushfire Protection 2001 in particular the provision of adequate access for fighting bushfire, adequate APZs outside the property boundaries and water supply for bushfire suppression operations. Prepare a Plan of Management for fuel management including the provision and maintenance of APZs and any areas of hazard remaining, natural areas and buffer zones. Address AS 3959: <i>Building in Bushfire Prone Areas</i> .	Sections 7.7 and 9.1
10	<u>Management of APZs and Vegetation on Proposed Lot 1</u> – Demonstrate through a Vegetation Management Plan how the APZs and the bushland area on proposed Lot 1 is to be effectively managed and maintained without eroding their integrity, it should be noted that the Department of Natural Recourses in not supportive of the proposed Neighbourhood Associated scheme. In this regard, explore separating options, including construction of a perimeter road separating the development area and the bushland area to minimise vegetation loss and encroachment.	Proposed Lot 1 (now lot 158) is proposed to be dedicated to Shoalhaven City Council as public reserve. Sections 3.2, 3.3, 3.5, 7.6, 7.7, 7.9, 7.10, 9.1 and 9.3
11	<u>Infrastructure and Utilities</u> – Address existing capacity and requirements of the proposal for effluent disposal, water supply, electricity and telecommunications services in consultation with relevant agencies and identify staging, if any, of infrastructure works. Prepare a feasibility study for reclaimed water use is consultation with Shoalwater.	Sections 3.6, 5 and 7.13
12	<u>Flora and Fauna</u> – Outline measures to conserve flora and fauna and their habitats within the meaning of the Threatened Species Conservation Act 1995, having regards to the Draft Guidelines for Threatened Species Assessment (DEC & DPI July 2005). In particular, address potential impacts of the development on any Endangered Ecological Communities.	Sections 3.2, 3.3 7.6 and 9.3
13	<u>Cultural Heritage</u> – Address the draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005).	Sections 7.4 and 7.5
14	<u>Soil and Contamination</u> – Identify the presence and extent of acid sulphate soils on the site and recommend appropriate mitigation measures. The level of assessment shall be consistent with the Acid Sulphate Soil Manual by ASSMAC.	Section 7.8
15	<u>Coastal Hazards</u> – Address potential impact of coastal hazards such as shoreline recession, storm bite, wave run up and coastal inundation on the development. Address the protection and conservation of sand due system on the site.	Section 7.9

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 and Structure of the Report

This report is an Environmental Assessment (EA) to accompany the Development Application for approval under Part 3A of the EP&A Act a 58 Lot subdivision of Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285, Manyana Drive, Manyana. This report describes:

- the environmental and cultural attributes of the subject site;
- the proposed development;
- the impacts associated with the development; and
- the mitigation measures that will be employed to minimise those impacts.

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

The structure of the EA is designed for the convenience of the reader. The EA is split into three volumes including:

- Volume 1: Environmental Assessment Report;
- Volume 2: Attachments (1 - 23); and
- Volume 3: Specialist Reports (Appendices 1 – 13).

2 Existing Environment

The Shoalhaven 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. Milton and Ulladulla are the major urban areas in the southern part of the region and are located approximately 3.5km from the coast and on the coast respectively.

Shoalhaven is a species rich region with varying topography and a complex and diverse range of terrestrial native vegetation communities, covering approximately 80% of that region. The region contains over 70 threatened fauna species and approximately 30 threatened flora species and well as a number of migratory waders and waterbirds. The large amount of intact terrestrial native vegetation within the Shoalhaven region provides vegetated linkages between private land, National Parks and other protected land within the region, which contribute to the ability of terrestrial flora and fauna species to disperse, reproduce, migrate and colonise, throughout the region thereby ensuring long-term viability of native species.

The region also contains a diverse array of marine, estuarine and freshwater environments, which support important fish and marine invertebrate species, and well as mangroves, saltmarshes and other Ecological Endangered Communities.

The township of Manyana is essentially bound to the north and west by Conjola National Park, which protects extensive areas of eucalypt forest and woodland vegetation and to the south and the east by areas of coastal heath and scrub and open forest vegetation which extends along the hind dunes behind Manyana and Inyadda beaches. Beringer Lake, which is an embayment of Lake Conjola, is situated to the west of the site.

The remainder of the chapter discusses the environment attributes of the subject site as described in Section 1.4.

2.1 Topography

The main topographical features in the surrounding area are:

- The Budawang ranges which are a rugged mountain range largely located with the Budawang National Park and Morton National Park located 30 to 50km west of the subject site. The Budawang ranges comprise a number of mountains with the closest to the subject site including Pigeon House

- Mountain (720 m above sea level), Mount Nushwalk, Talaterang Mountain and Pointer Mountain.
- Inyadda Point (33m above sea level), is a prominent rocky headland with high cliffs forming the eastern portion of Manyana village. Below the cliffs on the northern side is a boulder beach before Inyadda Beach continues as sand and on the southern side are rock platforms and reefs before the continuation of Manyana Beach as sand.
 - Cunjurong Point, Green Island and the inlet for Conjola Lake are located at the southern end of Manyana Beach.

The study area lies at an altitude ranging between 10-30 m Australian Height Datum (AHD). Lots 810 and 705 range in elevation from 20 - 30m and 10 – 20m above sea level respectively and slope in a north easterly direction at grades of between 1% and 5% towards a shallow unnamed creek which runs in a west to east direction through lot 705 to Manyana Beach. Although the western section of Lot 682 does contain a small drainage line, which runs perpendicular into the creek, this drainage line has been artificially modified to collect stormwater from the developed land to the north of the subject site. Lot 682 located in the northern section of the proposed development comprises gently sloping ground in a southerly direction with grade between 1% and 3%. This area is at a lower elevation than the remainder of the site in the range of 10 - 12m above sea level and while it drains to the unnamed creek, which traverses Lot 705, it contains flatter swampy ground.

2.2 Geology

According to the *Ulladulla 1:250000 Metallogenic Map Sheet* the eastern side of the subject site is underlain by Quaternary alluvium, gravel, swamp deposits, and sand dunes. The remainder of the subject site is underlain by Tertiary undifferentiated sediments consisting of gravel, sand, clay, quartzite, sandstone and conglomerate.

2.3 Soil Landscapes

The Shoalhaven region has a range of soil landscapes corresponding to the different geology found over the area. The Manyana area comprises beach ridges, low aeolian sand dunes and fluvial and back dune lagoonal sediments. The beach ridge system controls the local creek drainage, which flows in a west to east direction through lot 705 before discharging at Manyana Beach.

According to the Shoalhaven City Council State of the Environment (SCC SOE) online Acid Sulphate Map the southeastern section of the subject site is classified as having a '*Low probability of encountering acid sulphate soils within 1 m of the ground surface*'. Further reference to the 1:25 000 Acid Sulphate Risk Map for Milton – Cunjurong Point indicates that the south eastern section of the subject

site is classified as '*Estuarine Plain of Elevation 1 – 2 m*', while the remainder of the site and its immediate surrounds are classified as having '*No known occurrences of acid sulphate soil materials*'. Accordingly an Acid Sulphate Soil (ASS) Assessment was undertaken by Douglas Partners Pty Ltd (Appendix 2) and is discussed in Section 7.8.

As part of the ASS Assessment Douglas Partners undertook soil sampling in the east to south-eastern sections of the subject site. In summary, the field investigation encountered relatively uniform subsurface conditions with the principal succession of strata observed broadly summarised as follows:

- Topsoil ranging between depths of 0.2m – 0.7m comprising brown and dark brown silty clay, sandy silty clay, clayey silt and sandy clayey silt with some roots and rootlets.
- Alluvium/Clay ranging between depths of 0.2m – 2.5 (limit of investigation) comprising firm to very stiff (typically firm to stiff) grey, light grey, dark grey, brown orange brown, red brown and grey brown clay, silty clay and clayey silt.
- Residual Soil ranging in between depths of 1.7 – 2m (limit of investigation) pits 7 and 8 comprising very stiff to hard, light grey mottled red brown slightly gravelly silty clay and gravelly silty clay.

2.4 Vegetation

The township of Manyana is essentially surrounded by Conjola National Park, which protects extensive areas of eucalypt forest and woodland extending to the north and west of the town and areas of coastal heath, scrub and open forest vegetation, which extends along the hind dunes behind the beaches.

According to the Flora and Fauna Assessments undertaken by Kevin Mills and Associates (2008 and 2009) (Appendix 3) the following six vegetation communities occur on the subject land (Figure 2.1):

- Swamp Oak Floodplain Forest;
- Swamp Sclerophyll Forest;
- Upland Swamp Oak Forest;
- Banksia - Bangalay Forest;
- Blackbutt - Bloodwood Forest / Tall Forest; and
- Disturbed Woodland / Forest.

The condition of the vegetation varies considerably across the site. The best quality native vegetation is on the northern half of the site and at the western end. The vegetation identified and mapped as "disturbed woodland / forest" and the areas mapped as "cleared land" support highly degraded vegetation or, in some places, no native vegetation at all (Mills, 2008).

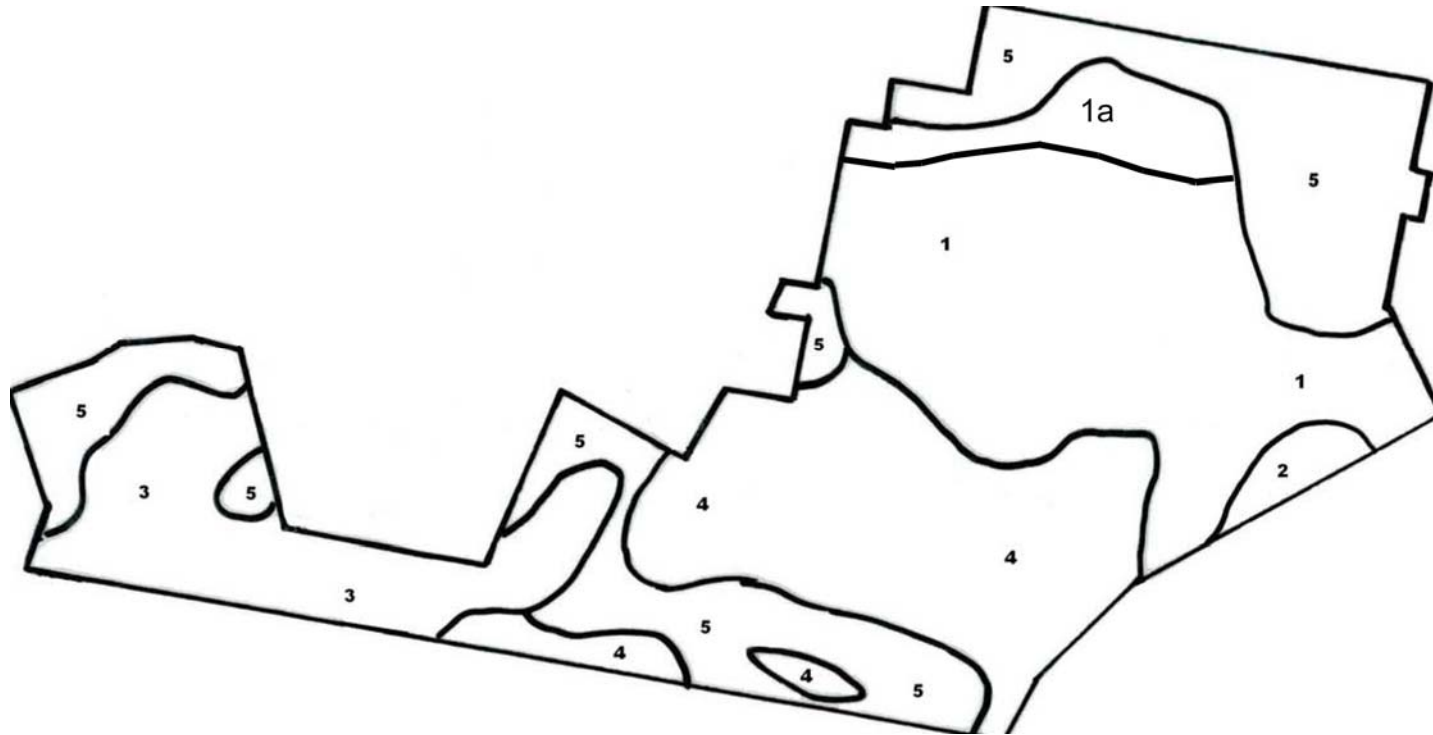


Figure 2.1: Vegetation Map of the Subject Land

(Source: Kevin Mills and Associates, modified by Watkinson Apperley to reflect the Supplementary Vegetation Assessment (April, 2009)

Vegetation Communities

1. Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest
- 1a. Upland Swamp Oak Forest
2. Banksia - Bangalay Forest (Bangalay Sand Forest)
3. Blackbutt - Bloodwood Forest
4. Disturbed Woodland/Forest
5. Cleared Land

The communities along with the key species and comments on their distribution have been provided in Table 2.1.

Community	Key species	Distribution
Swamp Oak Floodplain Forest/ Swamp Sclerophyll Forest	<i>Casuarina glauca</i> <i>Melaleuca linariifolia</i> wetland and rainforest species	This complex of two endangered ecological communities occurs on the north-eastern half of the site. The complex is associated with the moist alluvial soils along the creek and on floodplain beside the creek.
Upland Swamp Oak Forest	<i>Casuarina glauca</i> <i>Eucalyptus botryoides</i> <i>Eucalyptus longifolia</i>	The Swamp Oak forest can be divided into two types. Swamp Oak Floodplain Forest, growing on the wet lowest parts of the land, and Upland Swamp Oak Forest, growing on the higher land above. The Upland Swamp Oak Forest community is general found on the northern side of Sunset Strip.
Banksia - Bangalay Forest (Bangalay Sand Forest)	<i>Banksia integrifolia</i> <i>Eucalyptus botryoides</i> rainforest species	This endangered ecological community occurs behind the sand dunes at the eastern end of the site, south of the creek. Most of the community is in the adjoining Council reserve to the south and east; there is only a small patch on the subject land.
Blackbutt - Bloodwood Forest / Tall Forest	<i>Eucalyptus pilularis</i> <i>Corymbia gummifera</i> <i>Eucalyptus sclerophylla</i> <i>Eucalyptus imitans</i> <i>Allocasuarina littoralis</i> <i>Acacia</i> spp.	This community occurs on the sandstone at the western end of the site, where the soils are dry, shallow and gravelly. The Bounty extension is on the boundary between the Blackbutt - Bloodwood Forest at the western end of the site and the Scribbly Gum – <i>Casuarina</i> Forest to the south, on the neighbouring property.
Disturbed Woodland / Forest	<i>Eucalyptus botryoides</i> <i>Casuarina glauca</i> <i>Banksia integrifolia</i> <i>Allocasuarina littoralis</i> <i>Allocasuarina distyla</i>	This community occurs in the centre of the site, most of which was cleared at some stage for the quarrying of gravel. The regrowth woodland/ forest in this area is still in the early stages of regeneration and therefore presents as a heavily disturbed community.
Cleared Land		There is cleared land around approximately half of the property boundary, as well as across the centre and southern parts of the site, between the forest at the western end and the disturbed woodland / forest in the centre.

Table 2.1: Vegetation communities present on the subject site
(Source: Kevin Mills and Associates, modified by Watkinson Apperley to reflect the Supplementary Vegetation Assessment (April, 2009))

2.5 Surface Water

The study area is located at the downstream end of a 70ha catchment, which takes in a large part of the developed portion of Manyana. The subject site contains a small unnamed creek which traverses the site, in a west to east direction generally behind the location of proposed lots 115, 103 and 101 through to Manyana beach. At the time of the site inspections the creek contained flowing water and was supported by riparian vegetation. The site also contains one small ephemeral drainage line, which runs perpendicular into the creek in the western section of Lot 682. The drainage lines generally run through proposed lots 110 and 111. The drainage line has been artificially modified to collect stormwater from the developed land to the north of the subject site. The majority of the water entering the site on a regular basis is collected and transferred through a network of stormwater pipes. However, during time of heavy rainfall the water also enters the site through overland surface flow.

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. The average monthly wind speed varies by about 20 per cent throughout the year.

2.7 Landuse

Manyana is predominantly a coastal residential village, which includes a general store, caravan parks, holiday rentals and picnic areas with surfing and swimming beaches. The subject site is bounded to the north by existing residential development, to the west by a mixture of existing residential development and vacant undeveloped land, to the east by a mixture of existing residential development and sand dunes associated with Manyana beach reserve and to the south by vacant undeveloped land, crown reserve and sand dunes associated with Manyana beach reserve.

The subject site (Attachment 3 and 4) is vacant except for a recently constructed Sewer Pumping Station and its associated access from Sunset Strip, which forms part of the Conjola Regional Sewerage Scheme. Most of the vegetation on the land has been cleared at some stage historically and regrowth has occurred over most of the land. Some areas remain quite disturbed with many weed

species and patches of bare earth are present. The site contains a number of informal walking and vehicular tracks, with two formal beach access points located on the south-eastern boundary of the site (one located at the eastern corner and the other located at the southern corner of the south-eastern boundary). A number of the walking tracks extend towards these points from the northwest, north, east and west. The south-eastern area of the land has been highly degraded through the creation and use of "dirt bike" tracks, and this area is highly eroded.

2.8 Site Analysis

A site analysis has been undertaken for the subject land and the main findings are provided below:

- Manyana is a coastal residential village, located approximately 30kms north of Ulladulla, 11km east of the Princes Highway, north of Conjola.
- The 3 lots the subject of this application are residue lots from previous subdivisions of the area that has been progressively developed in stages over a period of 45 years.
- This proposed development effectively forms infill of the residual lots to complete development in this area. The new development will extend Sunset Strip, Manyana Drive, The Barrette, the Bounty Road, and create two additional roads connecting on the northern side of Manyana Drive.
- Lot 682 has an area of 2.1091ha, Lot 810 has an area of 2.18ha and Lot 705 has an area of 5.21ha, totalling 9.4991ha.
- The property consists of unmanaged native vegetation, which has been cleared at some stage historically and has re-grown. The sites have not experienced any prior development, although the majority of the site is zoned 2(a1) Residential.
- The study area comprises six vegetation communities which occur on the subject land: Swamp Oak Floodplain Forest; Swamp Sclerophyll Forest; Banksia - Bangalay Forest; Upland Swamp Oak Forest; Blackbutt - Bloodwood Forest / Tall Forest; and Disturbed Woodland / Forest.
- The subject site lies at an altitude ranging between 10-30 m Australian Height Datum (AHD). Lots 810 and 705 generally slope in a north easterly direction at grades of between 1% and 5% and Lot 682 generally slopes in a southerly direction at grade between 1% and 3% towards an unnamed creek which traverses the subject site.
- A mixture of residential development, vacant undeveloped land, crown reserve and sand dunes associated with Manyana beach reserve bound the subject site.
- The closest main water bodies to the site comprise the Tasman Sea, Conjola Lake and Berringer Lake.
- The subject site contains a small-unnamed creek, which traverses the site, in a west to east direction. The site also contains a small ephemeral

- drainage line, which runs perpendicular into the creek in the western section of Lot 682.
- The closest hospital is Milton-Ulladulla Hospital, located on the Princes Highway at Milton south of the subject site.
 - Nowra Coaches provide a bus service to and from Nowra to Lake Conjola, Fishermans Paradise, Manyana and Bendalong. The service operates a general service Tuesday to Thursday (1 service each day) and school service Monday to Friday (1 service each day on school days). The bus service works on a hail & ride system and currently goes down Manyana Drive and Sunset Strip.
 - Kellam Bus Lines provide a bus service to and from Ulladulla to Lake Conjola, Fishermans Paradise and Bendalong. The service operates a school service Monday to Friday (1 service each day on school days), the general public can use the school bus. The bus service works on a hail & ride system and currently goes down Manyana Drive and Sunset Strip.

A collection of photos of the site, a sketch plan showing the proposed lot layout and visual impact assessment support the site analysis and can be found in Attachment 2, 3 and Appendix 4 respectively.

3 PROJECT DESCRIPTION

3.1 Introduction

The proposal is for the 58 lot subdivision of the subject land (Attachment 2), comprising 57 residential lots and the dedication of proposed Lot 158 to Shoalhaven City Council as public reserve. These 3 lots (Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285) are residue lots from previous subdivisions of the area that has been progressively developed in stages over a period of 45 years. This proposal forms infill development of the residue lots to complete development in this area. All the proposed residential lots will be Torrens Title lots with Lot 158 proposed to be dedicated to Shoalhaven City Council as public reserve. The proposed subdivision will be constructed and released in three (3) stages.

This phase of the development finalises the residential component of the village envisaged by its founder, John Curvers and is being completed by his family to fulfill his original vision. This land was previously approved for subdivision however the consent lapsed. This is a modest and measured proposal, which takes into consideration the environmental sensitivity of the site, in contrast to other proposals within the local area.

3.2 Design Concept

This development provides the opportunity for residential properties to be located in a unique coastal setting within an established community based village. The site is fortunate to be readily accessible via a good public road network and has access to infrastructure such as sewer, water, electricity and telecommunications. The local social infrastructure also has the capacity to absorb the potential growth from this project.

The nature of the proposed subdivision is that of small-scale residential infill. The development is situated within an 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 have been a number of alternate subdivision layouts considered throughout the design process, these are discussed in section 9.1. The final subdivision layout has been designed to best suit the range of natural site conditions and environmental constraints discussed below. The subdivision layout completes the existing road network while protecting the ecologically sensitive parts of the site through the dedication to Shoalhaven City Council (proposed Lot 158) as public land.

There are 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

- The proposed site is located in an established coastal residential village, which is located within a 30 minute drive of Ulladulla and 1 hour drive of Nowra CBD.
- Adjoining the site to the southeast is Manyana Beach Reserve and Manyana Beach. The site has two access points directly to Manyana beach located on the southeastern boundary of the site (one located at the eastern corner and the other located at the southern point of the southeastern boundary). This area will perform a significant role in the future in terms of passive open space.
- The site has access to established community infrastructure including Yulunga Reserve and it's associated tennis court, basketball court, soccer field and Community Hall located on Sunset Strip.
- Public transport service to Nowra CBD and Ulladulla is available from the local area.
- The surrounding residential subdivision pattern provides a well-defined road network, which is suitable to be extended to facilitate the establishment of the proposed subdivision layout.
- The local area has utility infrastructure, which is suitable to be augmented to accommodate the proposed subdivision. Furthermore, Shoalhaven City

Council has recently built a Sewer Pumping Station adjacent to the proposed public reserve lot, of the subject land, which forms part of the Conjola Regional Sewerage Scheme.

- The site has a relatively flat topography, which will allow the construction of the proposed subdivision without the need for extensive cut and fill to occur.

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 determined that a small section of the site is underlain by various degrees of acid sulphate soil.
- A small unnamed creek, which traverses the site, in a west to east direction through to Manyana beach must remain unaffected by the development.
- Three Endangered Ecological Communities are present on the subject site Swamp Sclerophyll Forest, Swamp Oak Forest on Floodplain and Bangalay Sand Forest.
- Three of the proposed lots of the subject site are subject to potential flooding during 1 in 100 year storm events.

The final design is reflective of the inherent constraints and positive attributes associated with the subject site. The subdivision layout is considerate of the site's environmental sensitivity whilst accommodating the economic reality of the current property market. The design principles incorporate bush fire mitigation measures; preservation and the ongoing management of the creek and its associated riparian vegetation; and protection of the Endangered Ecological Community. The urban stormwater concept has been designed in a manner sympathetic to the natural constraints of the site while recognising the proposed development is located at the lower end of a relatively large catchment.

It is further acknowledged that due to the location of the subdivision within a coastal village, future dwellings will be encouraged to utilise materials and colours in tones that are complimentary to the natural setting.

3.3 Lot Layout

The subdivision layout has been designed to capitalise on the natural attributes of the area while protecting the environmentally sensitive parts of the site. The proposed subdivision will create fifty-seven (57) Torrens Title residential allotments covering 5.59 hectares of the 9.56 hectare site. The residual land (3.97 hectares), representing 41.5% of the subject site, is proposed to be dedicated to Shoalhaven City Council as a public reserve lot (proposed Lot 158

in the subdivision). The proposed residential allotments and the configuration of roads are shown in Figure 3.1 and on the subdivision layout plan (Attachment 2). The proposed subdivision will be constructed and released in three (3) stages as discussed in Section 3.5. The subdivision layout will result in the unformed parts of the existing roads; 'The Barrette', 'The Bounty', 'Sunset Strip' and 'Manyana Drive' being extended to provide access to the new residential allotments and two new roads being created to provide access to the western section of Lot 705.



Figure 3.1: The proposed subdivision layout overlaid over an aerial photo
Image sourced from Maurice Halyer (2008).

All fifty-seven residential lots will have frontage to the proposed new road network with orientation either east-west or north-south. The lots have areas ranging in size from 543m² to 1466m² with lot 158 noticeably larger in area (3.97ha). Lot 158 contains environmentally sensitive land (Endangered Ecological Communities and water course and associated riparian vegetation), which is proposed for dedication to Shoalhaven City Council as Public Reserve. This collection of natural attributes is considered a valuable asset to the community and will provide an alternative public access to Manyana Beach. Lots 102, 103 to 115, 119, 120, 126, 130 to 134, 140 to 148, 153 and 157 contain varying degrees of Asset Protection Zone in accordance with Planning for Bushfire Protection Guidelines (2006), while accommodating suitable building

area on each lot. Furthermore, it is proposed that an artificial wetland be constructed in the north-western section of Lot 158 to treat stormwater runoff before it reaches the creek and the ocean.

The subdivision layout has been designed with the intention of providing a building line set back of:

- 7.5m on the lots fronting The Barquette, The Bounty, Sunset Strip and Manyana Drive in line with the existing dwellings; and
- 5.5m on the lots fronting the proposed perimeter loop Road 1, off Manyana Drive, and Road 2, off Manyana Drive connecting to the loop Road 2.

The reduced building line setback is being sought for the lots in the south eastern section of the subdivision layout (Lots 116 to 134) as these lots are either smaller or contain small buildable areas due to their Assets Protection Zone requirements (16 - 20m APZ). The limited depth of land between the existing road network (Manyana Drive) and the residential zone boundary of the proposed lot 158 to the east restricts the design options for this section of the site. This is demonstrated through the earlier design options considered for the site discussed in Section 9.1. A plan showing that all the lots have adequate buildable areas has been provided in Attachment 5. The plan takes into consideration all environmental constraints as will the required offsets in accordance with Shoalhaven City Council requirements and the request for the reduce building setback lines.

We are of the opinion that the reduction in the building line set back is warranted in this section of the subdivision layout for the following reasons:

- There are no existing dwellings within this section of the subdivision and therefore all the future dwellings will adopt the same building line setback.
- It is proposed to have narrow road reserves in this stage, which will act as a form of traffic calming. Reducing the building line setbacks have the effect of bringing dwellings closer to the street, enhancing the opportunity to propagate neighbourly contacts and removing physical barriers to social contact. These simple design characteristics are considered to be positive attributes that assist in community building. Opportunities for spontaneous casual exchange are also increased between neighbours which is critical for the development of community.
- Fear of crime is often attributed to social isolation. While crime and perceived crime are the result of complex social interactions and therefore a single cause would be difficult to apply in a generic sense, reduced building setbacks can assist in reducing crime and fear of crime by engaging the built form with the street.

3.4 Pedestrian, Cycle and Road Access and Circulation Networks

The proposed road network (Attachment 6) completes linkages between the existing roads and forms the basis for the final lot layout. The existing road patterns dictate this final layout to a certain degree, as it is apparent they have been built with the assumption that development of the subject land would be occurring at some stage in the future. The proposal provides important connections between the existing 'dead end' streets abutting the land to be developed.

The proposed subdivision will be accessed via the extension of The Barquette, The Bounty, Manyana Drive, Sunset Strip, the construction of a new perimeter loop road (Road 1) off Manyana Drive, and the construction of a new connecting road (Road 2) off Manyana Drive (Attachment 6). A long section of Sunset Strip has been provided in Attachment 6 to illustrate the form of a typical long-section within the proposed internal network. Below is a brief description of the proposed road network. The traffic impact of the proposal and a justification for the proposed road network are discussed in Section 7.10 and 9.1.

The extension of The Barquette, The Bounty and Manyana Drive will be designed and constructed to match the carriageway of the existing roads. The Barquette is proposed to have a 15.24 metre road reserve, with approximately 3.7 metre verges and a 7.8 metre carriageway. The Bounty and Manyana Drive are proposed to have a 20.115 metre road reserve, with 6.5 metre verges and a 7 metre carriageway.

Sunset Strip is proposed to have a 12 metre road reserve, with a 4 metre verge on the northern side and a 2 metre verge on the southern side of the street with a 6 metre carriageway. It is also proposed to contain a bio-retention system within the verge and carriageway, reducing the road carriageway width to 5m at one point. The bio-retention system will have the dual purpose of managing stormwater flows and providing a traffic calming device similar to a chicane.

The perimeter loop road (Road 1) will be located off Manyana Drive approximately 20m north of The Palisade and approximately 40m north of The Bounty. Furthermore, it is proposed that an 80m connecting road (Road 2) from Manyana Drive to Road 1 be constructed to service seven lots (Attachment 6).

The perimeter loop road (Road 1) is proposed to have a variable road reserve ranging from 12 to 13 metre. The northern and eastern sections of the loop road are proposed to have a 12m road reserve, with a 4 metre verge on the western side and a 2 metre verge on the eastern side of the street with a 6 metre carriageway. The southern section of the Road 1 and Road 2 are proposed to have a road reserve of 13m, with 3.5 metre verges and a 6 metre carriageway.

There are no formal footpaths or cycleways along the roads within the existing road network. It is foreseen that due to the low levels of traffic predicted on the proposed new roads, footpaths or cycleways will not be required. Therefore, pedestrian connections will be provided via street access through the subdivision to areas of public open space and community facilities including Manyana Beach and Yulunga Reserve on the Palisade. Furthermore, an additional public access point is proposed to be provided to Manyana Beach through an access track located to the north of proposed Lot 131 and through the southern part of proposed lot 158.

3.5 Staging of Development

The proposed subdivision will be constructed and released in three (3) stages (Figure 3.2 and Attachment 7) as described below. The timing for the release of the each stage will depend upon market conditions and financing.

- Stage 1 – will involve:
 - The creation of 15 lots (lots 101 to 115);
 - The construction of the extension of Sunset Strip;
 - The construction of the bio-retention system and the vegetated swale;
 - The dedication of proposed Lot 158 to Shoalhaven City Council as public reserve;
 - The creation of an easement over Lot 158 for the sub-station (Padmount);
 - The creation of an easement over Lot 158 for the transfer of electricity;
 - The creation of an easement over Lot 158 for Sewer;
 - The imposition of flooding planning floor levels over Lot 115; and
 - The creation of easements over Lots 111 and 115 for drainage.
- Stage 2 – will involve:
 - The creation of 23 lots (lots 135 to 157);
 - The extension of The Barquette, The Bounty and Manyana Drive;
 - The construction of the artificial wetland and the installation of a Gross Pollution Trap to treat the stormwater entering the wetland from stage 2.
 - The creation of an easement over Lot 158 for access to the Wetland; and
 - The creation of easements over Lots 147, 149, 150, 151, 152 & 153 for interallotment drainage.

- Stage 3 – will involve:
 - The creation of 19 lots (lots 116 to 134);
 - The construction of the perimeter road 1 and 2 off Manyana Drive.
 - The installation of a Gross Pollution Trap to treat the stormwater entering the wetland from stage 3.
 - The imposition of flooding planning floor levels over Lots 116 and 119;
 - The creation of easements over Lots 116, 118, 121, 128, 129 and 130;
 - The construction of a fence adjacent to perimeter loop road (Road 1) and Lot 158;
 - The formalisation of the public access track to Manyana Beach located to the north of proposed Lot 131 and through the southern part of proposed lot 158 through the creation of an easement over Lot 158;

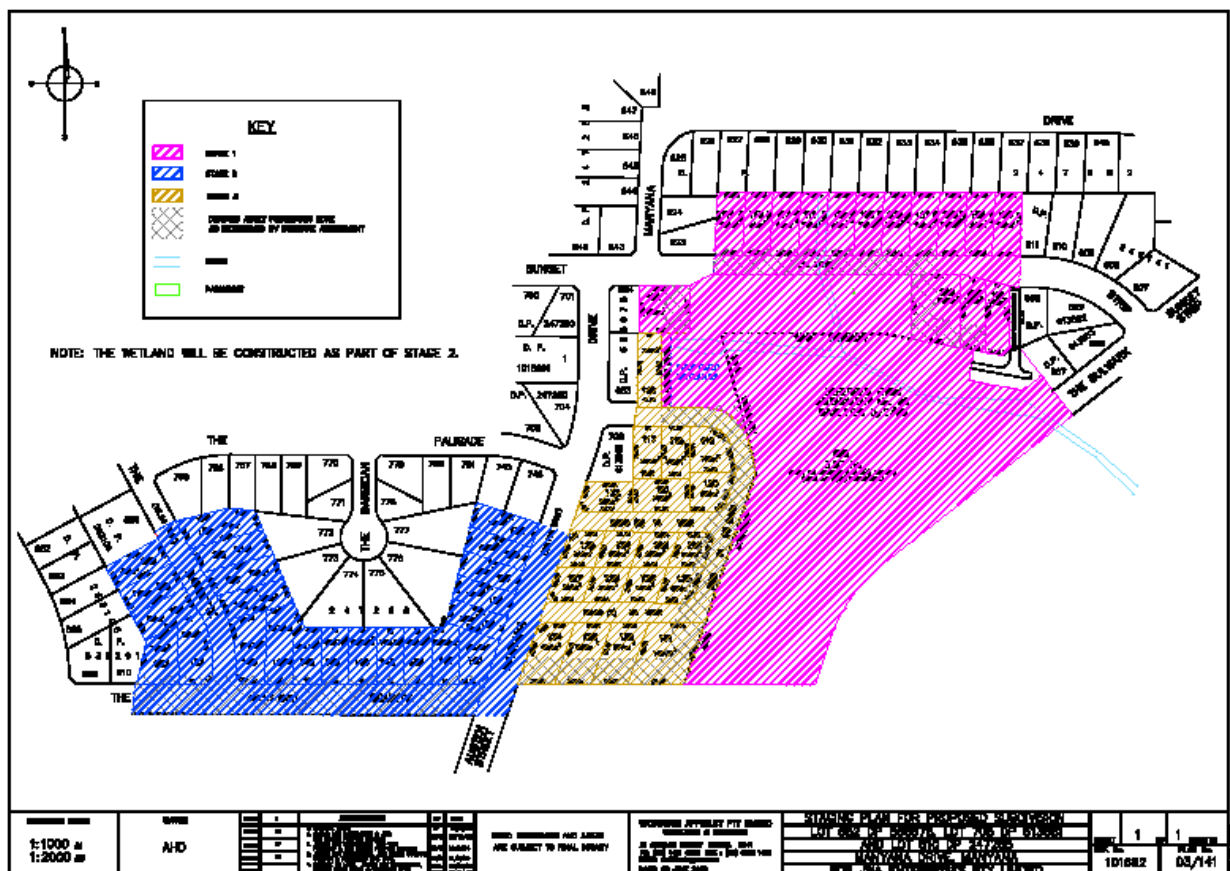


Figure 3.2: Staging Plan for construction of the proposed subdivision.
(Stage 1 shown in pink, Stage 2 shown in blue and Stage 3 shown in brown) refer to Attachment 7 for a large plan.

3.6 Infrastructure

3.6.1 Electricity

The supply authority for electrical power in the Shoalhaven Local Government Area is Integral Energy. At the time of writing this report, Integral Energy was consulted to confirm their network has capacity to support the proposed increase in dwellings as a result of the proposed subdivision. Integral Energy Engineering Officer (Major Project) provided a letter dated 6th August 2007 (Attachment 8) advising that the proposed subdivision could be supplied from the existing electrical distribution network after certain augmentations have been completed. Integral Energy provided the following comments:

- The assessed load for the subdivision is approximately 500KvA.
- The connection of this load to the existing network would cause the 'end of line' voltage levels at Bendalong, Bendalong North and Manyana to fall below the acceptable planning levels.
- To overcome this issue, a voltage regulator will be required to be established on the backbone feeder prior to the township of Manyana.

An application for the connection of the subdivision electrical network will be submitted to Integral Energy prior to any construction commencing.

It should be acknowledged that the developer has liaised with Shoalhaven City Council over the last four years on the location for the sewerage scheme in the vicinity of the subject land (discussed in section 3.6.2). As part of the sewerage scheme a Padmount Substation has been constructed on the southern side of Sunset Strip, within proposed Lot 158 (Attachment 2) to provide High Voltage power to the wastewater pumping station and the future subdivision. In accordance with the terms outlined in the Deed of Agreement between Vacenta Pty Ltd and Shoalhaven City Council dated 26 of September 2006 the landholder agreed to meet part of the costs of installing the Padmount Substation to supply electricity for the future subdivision of the land.

3.6.2 Sewer and Water

Shoalhaven Water is the service provider for sewer and water within the Manyana area. Water services currently exist to the adjoining residential area as detailed in Figure 3.3. Shoalhaven Water for a period of time, have been planning and designing the Conjola Regional Sewerage Scheme, which will service the catchment of the Manyana area. Over the last four years the developer and Council have had many discussion and exchanged correspondence concerning the development of the sewerage scheme at Manyana. The Council and the developer have worked in close consultation in designing the sewage line route in the vicinity of the subject site. The developer has agreed to allow Council to acquire a portion of land behind Lots 101 and 102 in order for the Council to construct the wastewater pumping station in

accordance with the terms outlined in the Deed of Agreement between Vacenta Pty Ltd and Shoalhaven City Council dated 26 of September 2006. The wastewater pumping station was moved to this site due to community concern over the previously considered location. Shoalhaven City Council has constructed the wastewater pumping station but has not at this stage acquired the portion of land behind Lots 101 and 102 however, the Deed of Agreement allows Council the right of occupation and exclusive use of the land prior to acquisition. Shoalhaven City Council has also constructed a sewer line, which runs through proposed Lot 158 adjacent to the rear of lots 101 to 103 and the north-eastern corner of proposed Road 1 (Figure 3.4). Shoalhaven Water has provided a number of sewer junctions to the lots adjacent to the sewer line and the sewer line has been designed to allow for augmentation to the remaining lots during the construction of the subdivision.

At the time of writing this report Shoalhaven City Council (Shoalhaven Water) has been consulted to confirm the existing water and sewer infrastructure can accommodate the increased number of dwellings resulting from the proposed subdivision. Shoalhaven Water Acting Director, provided a letter dated 12th July 2007 (Attachment 9) confirming that:

- There is sufficient capacity in the water supply system to provide potable water at an urban standard to all proposed 71 lots; and
- The sewer reticulation has been located and sized to collect residential wastewater from the 71 lots within the subdivision.

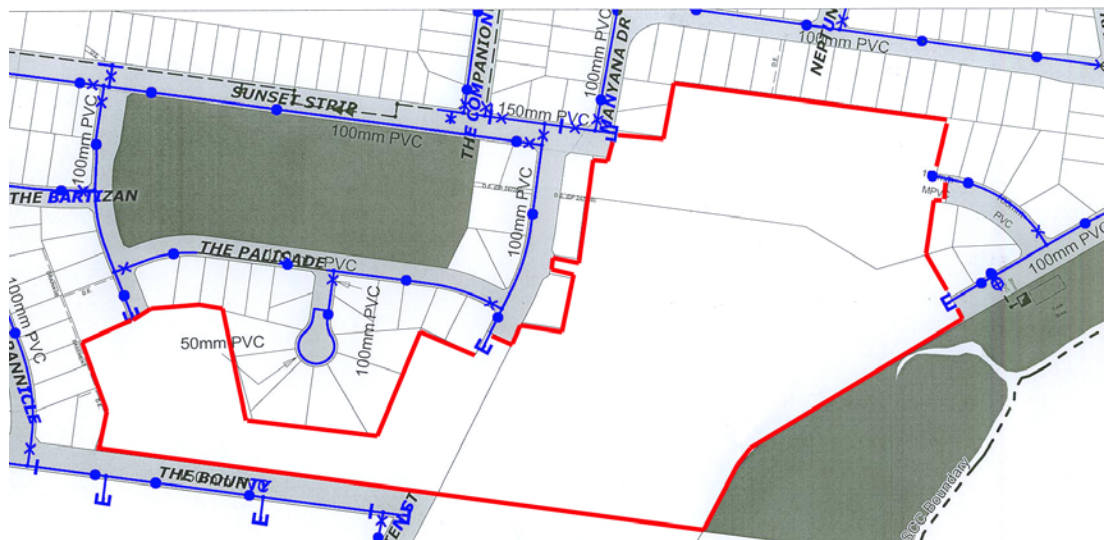


Figure 3.3: Existing Water Services
(Red line indicates the subject site and the Blue line indicates the existing water main)



Figure 3.4: Proposed Sewerage Services
(Red line indicates the subject site and the purple line indicates the recently constructed sewer line)

Shoalhaven City Council (Shoalhaven Water) are currently undertaking a feasibility study into the provision of supplying a dual piped recycled water system to all new large subdivisions within Manyana that includes the 57 lots in this proposed development. Shoalhaven Water has engaged consultants to undertake consultation with the relevant stakeholders and to undertake studies into the required infrastructure and risk assessments in compliance with the relevant federal and state health and environmental guidelines. During the consultation process Watkinson Apperley Pty Ltd on behalf of the landowners of the subject land, has been involved in a number of workshops and meetings with Council. It is our understanding that the recycled water pipe will be purple in colour and will share the same trenches as the potable water pipe. The two pipes will be offset by a distance to be nominated by Council once the risk assessments have been completed.

Shoalhaven Water has advised that it is likely that a final outcome of these investigations, risk assessments will be reported to Council sometime in the near future. The recycled water will initially be used for toilet flushing, gardening and other outdoor purposes. In the future the recycled water may also be used for the laundry facilities, once further research has been undertaken.

3.6.3 Telecommunications

At the time of writing this report, the Forecasting and Area Planning section of Telstra was consulted to confirm that Telstra telecommunications infrastructure could accommodate the proposed increased number of people resulting from the proposed subdivision. Telstra Area Planner provided a letter dated 18th July 2007 (*this letter was received by email on the 7th July 2008. It is therefore assumed the*

letter is incorrectly dated) (Attachment 10) confirming that Telstra Corporation is the Primary Universal Service Provider for telecommunications infrastructure in Australia and the key planning issues that have been considered as having an impact on Telstra's telecommunications infrastructure include the following:

- Pit, Pipe-and Cabling under Telstra's New Estate Process; and
- Shared Trench agreements.

Telstra advised that early notification of any proposed development will enable Telstra to deliver services with minimal disruption and enable coordination of trenching with other infrastructure.

3.6.4 Waste

At the time of writing this report, Shoalhaven City Council Waste Service Department was consulted to confirm that Shoalhaven's waste management infrastructure could accommodate the proposed increased population resulting from the proposed subdivision. Shoalhaven City Council Waste Service Manager provided a letter dated 10th August 2007 (Attachment 11) confirming that the following services are available to the Manyana area:

- Weekly household garbage collection;
- Fortnightly household recyclables collection;
- An annual chemical collection day for household chemicals on 24th November 2007 located at Ulladulla Admin Centre;
- An on-call fee-for-service Bulky and Green waste collection service
- The annual provision of two no-charge tipping vouchers which allows ratepayers to take a total of 2m³ of domestically sourced waste; and
- The provision of a Recycling and Waste Transfer Depot located at Bendalong Road, Bendalong. The depot is open on Saturdays from 9am – 1pm and Sundays from 1pm to 5pm. The Depot operates for extended hours in January. The depot is closed Christmas Day.

The waste from the Manyana area collected in the red lid bins are taken to Council's waste facility at West Nowra and the recyclable material collected in the yellow lid bins are taken to the material recover facility at Bomaderry for further processing. According to Shoalhaven City Council Waste Service Manager the West Nowra Landfill facility life expectancy is 15 years at the current rate of disposal.

3.6.5 Health

The villages of Manyana, Bendalong and Cunjurong Point currently do not have a medical practitioner practicing full-time within the local area. A part-time facility (Tuesday afternoons) is offered by a general practitioner from the Milton Medical Centre who operates out of the Community Hall sited within Yulunga Reserve. At the time of writing this report the general practitioner's office was consulted and advised that their books were open to people living within the Manyana area.

This service is supported by a number of general practitioners who operate from within the larger centres of Milton, Ulladulla, Mollymook, Sussex Inlet, St Georges Basin and Nowra. The recently upgraded Milton-Ulladulla Hospital, located on the Princes Highway at Milton, would provide the closest public hospital to the subject site, with a public and private hospital also provided at Nowra.

At the time of writing this report South Eastern Sydney Illawarra Health Service (SESIH) was consulted to determine if there are any intentions to establish a fulltime medical centre within the Manyana area and to confirm whether the health infrastructure within the Shoalhaven Region can accommodate the proposed increase in the number of people resulting from the proposed subdivision. The Acting Director Population Health, Planning and Performance provided a letter dated 6th August 2007 (Attachment 12) advising us that:

- The proposed increase in population will be easily absorbed by the public health infrastructure.
- SESIH has no immediate intention to increase public health service provision in the Manyana Locality;
- Currently the residents of Manyana and surrounding villages would primarily access the Shoalhaven District Hospital in Nowra for public hospital service.
- Community health services are provided from a range of other locations across the region including St Georges Basin, Sussex Inlet and Ulladulla. These services also provide a diversity of outreach service to people's homes.
- SESIH is currently working on a proposal to enhance primary and community health service in Sussex Inlet in recognition of the health issues affecting people living in small villages down the south coast. This proposal may assist Manyana residents by providing better integration between the public and private primary care providers in the region.

3.6.6 Education

Currently there are no schools located in the Manyana area. However, there are educational facilities available in Milton, Ulladulla, the Bay and Basin area and the Nowra and Bomaderry areas (including University of Wollongong Shoalhaven Campus and Nowra Tafe College).

According to population data provided in Shoalhaven City Council report "Community Profile" (<http://www.shoalhaven.nsw.gov.au/>), the Manyana area has an average of 2.33 persons per detached house. Therefore the proposed new 57 lots will result in a maximum increase in the population of 139 people (57 x 2.44). As 17.4% of people in the Manyana area are aged between 5 and 17, the proposal will result in an additional 24 school aged students.

At the time of writing this report the NSW Department of Education and Training (DET) was consulted to determine if they had any intention of establishing any educational facilities within the Manyana area and to confirm whether the education infrastructure within the Shoalhaven region can accommodate the proposed increase in the number of people resulting from the proposed subdivision. The Asset Manager Service Planning provided a letter dated 25th July 2007 (Attachment 13) advising that:

- Currently Manyana is serviced by Milton Public School.
- Milton Public School has recently had major capital works to upgrade and extend facilities on site with eight additional home bases and a newly completed communal hall.
- High school students from Manyana attend Ulladulla High School.
- Based on historical and current demographic data Manyana has maintained its profile as a vacation destination with only 27 percent of homes occupied at the 2006 Census. The number of school aged children has remained small with a ratio of 8 per 100 dwellings for 5 -14 years olds in 2006.

Therefore, it is anticipated that any new enrolments from the proposed development can be accommodated within existing local schools.

3.7 The Scale of the Proposed Development

The proposed development will result in the creation of an additional 57 residential lots in a residential area and the dedication of an important natural area to Shoalhaven City Council, to assist in protection and management of three significant ecological communities associated with the Manyana Beach dune environment.

The subdivision is a small-scale infill development with lots similar in size to those in the locality. The extension of The Barbette, The Bounty, Manyana Drive, Sunset Strip, will complete the existing road network, while the construction of an additional two minor streets will also provide an additional access point to Manyana Beach. The introduction of traffic calming devices (landscape treatment) on Sunset Strip, and Roads 1 and 2 will assist in managing driver behaviour in what is essentially a quiet, low density residential area.

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. Solar access provisions will be addressed as part of the BASIX certification for future dwellings.

3.8 Public Access to and along Coastal Foreshore

The subject site is located adjacent to the foreshore, however, there is a strip of 6(a) zoned land between the subject site and Manyana beach. The majority of the land within the subject site, which is adjacent to the foreshore, is proposed to be dedicated to Shoalhaven City Council as public reserve. Furthermore, an additional public access point is proposed to be provided to Manyana Beach through an access track located to the north of proposed Lot 131 and through the southern part of proposed lot 158.

The proposed dedication of the Creek and the riparian zone in the northern section of proposed Lot 158 will improve public access to this waterway and its associated environments.

3.9 Provision of Public Facilities and Services

The suburb of Manyana has limited public facilities; however, it is located within a 30min drive of Ulladulla, which contains sufficient public facilities including high schools, hospitals, doctors, specialist services and a police station to cater for the proposed increase in population, associated with the proposal. The Manyana area does have public open space and sporting facilities, such as Manyana Beach and Yulunga Reserve and community Hall. There is a small public toilet facility located at the intersection of Sunset Strip and The Bulwark, adjacent to on street carparking.

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."

Response:

A Flora and Fauna Assessment Report has been prepared by Kevin Mills and Associates (2008) (Appendix 3) 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*.

Kevin Mills has provided answers to the following questions in the *Significant Impact Guidelines* (DEWR May 2006), which must be addressed when deciding whether or not to refer a proposed action to the Commonwealth Minister for the Environment:

1. Are there any matters of national environmental significance located in the area of the proposed action (noting that 'the area of the proposed action' is broader than the immediate location where the action is undertaken; consider also whether there are any matters of national environmental significance adjacent to or downstream from the immediate location that may potentially be impacted)?

Response:

The Department of Environment and Heritage sent a letter to Vacenta Pty Limited dated 1 August 2006 (Attachment 14) stating "*matter of national environmental significance which are relevant within the Manyana area include nationally listed species. In particular the Giant Burrowing Frog (Heleioporus australiacus) may be present in the Manyana area*". Kevin Mills found during his fauna survey that the Giant Burrowing Frog did not occur in the local area. Therefore, according to the results of the flora and fauna undertaken by K. Mills in 2007 and 2008 no matters of national environmental significance are known to be located in the area of the proposed action. The Grey-headed Flying-fox, which is a nationally threatened species, is the only matter of national environmental significance expected to occur on the subject land; this species could occasionally occur on the site.

2. Considering the proposed action at its broadest scope (that is, considering all stages and components of the action, and all related activities and infrastructure), is there potential for impacts, including indirect impacts, on matters of national environmental significance?

Response:

Considering the proposed action at its broadest scope, the proposed development is not likely to have a direct or indirect impact on Grey-headed Flying-foxes. The clearing will involve a relatively small area of woodland/forest (four or five hectares) compared to the very large areas utilized by flying-foxes for foraging (Mills, 2008).

3. Are there any proposed measures to avoid or reduce impacts on matters of national environmental significance (and if so, is the effectiveness of these measures certain enough to reduce the level of impact below the 'significant impact' threshold)?

Response:

The proposed development is not likely to have a significant impact on Grey-headed Flying-foxes or on any other matter of national environmental significance. The proposal for dedication of a public reserve and revegetation of that area with woodland/forest vegetation offsets the loss of the foraging habitat (Mills, 2008).

4. Are any impacts of the proposed action on matters of national environmental significance likely to be significant impacts (important, notable, or of consequence, having regard to their context or intensity)?

Response:

The proposed development is not likely to have a significant impact on Grey-headed Flying-foxes or on any other matter of national environmental significance (Mills 2008).

The Grey-headed Flying-fox is the only nationally listed threatened species expected to occur in the development area. The impact of the proposed development on the Grey-headed Flying-fox has been assessed below by applying the significant impact criteria for vulnerable species. The impact on this species was also assessed under the TSC Act; please refer to the seven part test assessment below, in section 4.2.1. The impact on listed migratory species has also been assessed below, by applying the significant impact criteria for migratory species (Mills 2008).

Significant Impact Criteria for Vulnerable Species

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- *lead to a long-term decrease in the size of an important population of a species;*
- *reduce the area of occupancy of an important population;*

- *fragment an existing important population into two or more populations;*
- *adversely affect habitat critical to the survival of a species;*
- *disrupt the breeding cycle of an important population;*
- *modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;*
- *result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;*
- *introduce disease that may cause the species to decline; or*
- *interfere substantially with the recovery of the species.*

Impact of the Proposed Subdivision on the Grey-headed Flying-fox

The four or five hectares of potential foraging habitat for Grey-headed Flying-foxes to be cleared as a result of the proposed subdivision is unlikely to lead to a long-term decrease in the size of an important population of a species or any of the other impacts listed above. The habitat to be removed is not particularly important for flying-foxes. Flying-foxes have a very large home range, of which such a small site would be a negligible part. The species does not camp on this site (Mills, 2008).

Significant Impact Criteria for Listed Migratory Species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;*
- *result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or*
- *seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.*

An area of "important habitat" for a migratory species is:

- *habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or*
- *habitat that is of critical importance to the species at particular life-cycle stages; and/or*
- *habitat utilised by a migratory species which is at the limit of the species range; and/or*
- *habitat within an area where the species is declining.*

Listed migratory species cover a broad range of species with different life cycles and population sizes. An "ecologically significant proportion" of a population

therefore varies from species to species. In relation to migratory species, "population" means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

Impact of the Proposed Subdivision on Listed Migratory Species

The proposed subdivision is not likely to have a significant impact on listed migratory species. Although various listed migratory species occur on the site from time to time, there is no "important habitat" on the site for such species and the habitat is not likely to support an ecologically important proportion of a population of such species. The site is too small and does not contain the habitat needed for such species to occur there in numbers that would constitute an important population (Mills, 2008).

Conclusion, EPBC Act

In Kevin Mills' opinion, the proposed subdivision is not likely to have a significant impact on matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999*. Referral to the Commonwealth Minister for the Environment for assessment and approval is therefore not warranted. The proposed subdivision is not likely to constitute a "controlled action" because it is not "likely to have a significant impact on a matter of national environmental significance".

However, while Kevin Mills assessment concluded that the proposed subdivision is not likely to have a significant impact on matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999*, Vacenta Pty Limited did receive a letter from the Department of Environment and Heritage (Attachment 14) advising of the potential for the Giant Burrowing Frog (*Heleioporus australiacus*) being present in the Manyana area. Therefore, the Environmental Assessment report will be forwarded to the Department of Environment and Heritage for their comment.

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 development proposal assessed under Part 3A of the *Environmental Planning and Assessment Act 1979*. Referred to as the *Assessment of Significance - Threatened Species Assessment Guidelines (2008)*, they clarify technical terms and assist in the interpretation and application of the various factors.

These guidelines have been prepared to help applicants/proponents of a development or activity with interpreting and applying the factors of assessment. The aim of the guidelines is to help ensure that a consistent and systematic approach is taken when determining whether an action, development or activity is likely to significantly affect threatened species, populations or ecological communities, or their habitats either directly or indirectly.

Response:

The assessment of significance (seven part test) set out under Section 5A of the EPA Act 1979 has been applied, below, to assist in determining whether the development of the proposed subdivision is likely to have a significant effect on species, populations and communities (and their habitats) listed under the TSC Act.

A Flora and Fauna Assessment Report has been prepared by Kevin Mills and Associates (Appendix 3) which addresses 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. An additional targeted flora survey was undertaken by Kevin Mills and Associates undertook in 2009 to confirm the extent of the northern boundary of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains.

The seven part test has been applied to the Glossy Black-Cockatoo and Grey-headed Flying-fox, which are the only threatened species known to occur on the subject land. It has also been applied to the Gang-gang Cockatoo, several threatened microbat species, which, although not recorded with certainty, are reasonably likely to occur there, as well as the Swamp Oak Floodplain Forest, and Swamp Sclerophyll Forest endangered ecological communities. The small area of Bangalay Sand Forest on the dunes on the eastern edge of the subject land is well away from the proposed residential lots and is proposed to be dedicated to Shoalhaven City Council, as public reserve so is not considered further here (Mills 2008).

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

Glossy Black-Cockatoo:

The development of the proposed subdivision will result in the removal of a stand of *Allocasuarina littoralis* used occasionally for feeding by the local population of this cockatoo. A survey of this habitat was undertaken in the locality and it was found that feeding habitat for the Glossy Black-Cockatoo is abundant in the locality and that almost all of this is located on land set aside for conservation purposes. In these circumstances, the removal of the small stand of *Allocasuarina littoralis* is not likely to adversely affect the life cycle of the local population of the Glossy Black-Cockatoo to such an extent that it is placed at risk of extinction (Mills 2008).

Grey-headed Flying-fox:

The development of the proposed subdivision is not likely to adversely affect Grey-headed Flying-foxes to the extent that a local population of the species would be placed at risk of extinction. This wide ranging species would not depend on the small area of potential foraging habitat to be cleared (Mills 2008).

Gang-gang Cockatoo:

Gang-gang Cockatoos are unlikely to be affected by the proposed development to the extent that a local population of the species would be placed at risk of extinction. Gang-gangs are nomadic and have a fairly wide foraging tolerance; there is ample foraging habitat for them in the local area and throughout the district. No potential nest trees for Gang-gang Cockatoos will be removed, assuming that the large hollow-bearing trees along The Bounty extension are retained (Mills 2008). The hollow-bearing trees, except for possibly one tree, are located outside the proposed development area.

Threatened microbat species:

The development of the proposed subdivision is not likely to adversely affect the life cycle processes of microbat species such as the Eastern Bentwing Bat, Greater Broad-nosed Bat, East-coast Freetail Bat and Eastern False Pipistrelle. These wide ranging species would not depend on the small area of potential foraging habitat to be cleared. The life cycle processes of these species are threatened by the loss and degradation of their maternity sites, either caves or tree hollows. No caves occur on the subject land and the hollow-bearing trees, except for possibly one tree, are outside the proposed development area (Mills 2008).

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

Mills (2008) concluded that the proposed development is not likely to have an adverse effect on the life cycle of any endangered population. No endangered populations have been declared on, or adjacent to, the subject land.

- (c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction*
 - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its occurrence is likely to be placed at risk of extinction*

The proposal will involve clearing approximately 0.4 hectares or 15 percent of the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains complex. The remaining area of this community complex will be retained within a dedicated public reserve and managed in accordance with a Vegetation Management Plan. Particular care is needed in managing such a small area of the endangered ecological communities as it will be placed at greater risk of extinction in the medium to long term. The remaining vegetation will be more vulnerable to weed invasion, disturbance from human activities and bushfires. To counter this a vegetation management plan dealing with the short to long term protection and management of the area must be prepared and implemented. The survey of the distribution of endangered ecological communities in the locality found that the communities occurring on the subject land are common in the locality and almost totally on land set aside for conservation purposes (Mills 2008 and Mills 2009).

Mills (2008) concluded that there is no risk of extinction of the communities in the locality and an adequate management regime needs to be established to avoid extinction on the subject land ("local occurrence").

- (d) in relation to the habitat of a threatened species, population or ecological community:*
- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed*
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action*
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality*

Glossy Black-Cockatoo:

- (i) Two foraging areas for Glossy Black-Cockatoos will be cleared as a result of the proposed development (Mills 2008).
- (ii) Not applicable; these are the only foraging areas for Glossy Black-Cockatoos on the subject land (Mills 2008).

- (iii) The foraging areas consist of mature Black She-oaks bearing large quantities of cones. Such habitat is important for the long term survival of Glossy Black-Cockatoos. The loss of good quality feeding areas is one of the main threats to this species. The survey of feeding habitat in the locality found abundant feeding areas, mostly located on land set aside for conservation. In these circumstances, the importance of the stand of casuarinas on the subject land is likely to be low (Mills, 2008).

Grey-headed Flying-fox:

- (i) Four or five hectares of potential foraging habitat for Grey-headed Flying-foxes will be cleared as a result of the proposed action (Mills, 2008).
- (ii) Clearing this vegetation will not cause habitat for flying-foxes to become fragmented or isolated; flying-foxes are highly mobile and forage over very large areas, including urban environments (Mills, 2008).
- (iii) The habitat to be removed is not particularly important for flying-foxes. Flying-foxes have a very large home range, of which such a small site would be a negligible part (Mills, 2008).

Gang-gang Cockatoo:

- i) Four or five hectares of potential foraging habitat for Gang-gang Cockatoos will be cleared as a result of the proposed action (Mills 2008).
- (ii) Clearing this vegetation will not cause habitat for Gang-gang Cockatoos to become fragmented or isolated; the species is fairly wide ranging (Mills 2008).
- (iii) The habitat to be removed is not particularly important for Gang-gangs. Gang-gangs would not rely on this site; they range widely in their foraging activities. There are no tree hollows on the site where the cockatoo could potentially breed (Mills 2008).

Threatened microbat species:

- (i) Four or five hectares of potential foraging habitat for threatened microbats will be cleared as a result of the proposed action (Mills 2008).
- (ii) Clearing this vegetation will not cause habitat for threatened microbats to become fragmented or isolated; microbats are wide ranging and highly mobile (Mills 2008).
- (iii) The habitat to be removed is not particularly important for microbats; they have a very large home range, of which this small site would be a negligible part. There are virtually no tree hollows on the site where bats could potentially roost (Mills 2008).

Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest on Coastal Floodplains:

- (i) About 15 percent (0.4 hectares) of the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on the subject land will be removed or modified as a result of the proposed action (Mills 2008 and Mills 2009).
- (ii) The action will reduce the size of the stand rather than fragment or isolate it, as the vegetation is already isolated through existing urban development

(Mills 2008). Furthermore, the 0.4 ha of the Swamp Oak Floodplain Forest is located on the edge of the community and adjacent to existing residential development where as the 2.3 ha will be buffered by perimeter roads to the north and west, woodland vegetation to south and coastal dune vegetation to the south east (Mills 2009).

(iii) The Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest to be removed is a small proportion of the extent of this community complex in the locality. The removal of the 0.4 hectares on the subject land is not likely to compromise the long-term survival of the communities in the locality (Mills 2008 & Mills 2009).

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

Critical habitat refers only to those areas of land listed in the Registers of Critical Habitat. No critical habitat has been declared on the subject land (Mills 2008).

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

Not applicable; recovery plans have not been prepared for these threatened species and endangered ecological communities, and no relevant threat abatement plans have been prepared (Mills 2008).

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

Key threatening processes in New South Wales are listed under the TSC Act and *Fisheries Management Act 1994* (FMA Act). The applicability of these processes to the proposed residential development has been summarised below.

Key Threatening Process	Applicable; Yes/No
<u>TSC Act</u>	
Weeds	
Invasion and establishment of exotic vines and scramblers	no
Invasion and establishment of Scotch Broom <i>Cytisus scoparius</i>	no
Invasion of native plant communities by bitou bush <i>Chrysanthemoides monilifera</i> and boneseed	no
Invasion of native plant communities by exotic perennial grasses	no
Invasion, establishment and spread of <i>Lantana camara</i>	no
Pest Animals	
Competition and grazing by feral European Rabbit	no
Competition and habitat degradation by Feral Goats	no
Competition from Feral Honey Bees	no
Herbivory and environmental degradation caused by feral deer	no
Importation of Red Imported Fire Ants	no
Introduction of the Large Earth Bumblebee	no
Invasion and establishment of the Cane Toad <i>Bufo marinus</i>	no
Invasion of the Yellow Crazy Ant, <i>Anoplolepis gracilipes</i>	no
Predation by the Feral Cat	no
Predation by the European Red Fox	no

Predation by Plague Minnow <i>Gambusia holbrooki</i>	no
Predation from the Ship Rat on Lord Howe Island	no
Impact of Feral Pigs	no

Habitat loss/change

Alteration to the natural flow regimes of rivers, etc.	no
Bushrock removal	no
Clearing of native vegetation	yes ⁽²⁾
Alteration of habitat following subsidence due to longwall mining	no
High frequency fire resulting in the disruption of life cycle processes	no
Anthropogenic Climate Change	minor ⁽¹⁾
Loss and/or degradation of sites used for hill-topping by butterflies	yes ⁽³⁾
Loss of hollow-bearing trees	yes ⁽³⁾
Removal of dead wood and dead trees	yes ⁽⁴⁾

Diseases

Infection by Psittacine Circoviral Disease in Parrots	no
Infection of frogs by amphibian chytrid	no
Infection of native plants by <i>Phytophthora cinnamomi</i>	no

Other Threats

Death or injury to marine species following capture in shark control programs	no
Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments	no

FM Act

Current shark meshing program	no
Hook and line fishing in areas with threatened fish	no
Introduction of fish to fresh waters	no
The removal of large woody debris	no
The degradation of native riparian vegetation	no
Instream structures altering natural river flow regimes	no
Introduction of fish and vegetation to coastal waters	no

(1) Although the sites are small, clearing the native vegetation will, to some extent, contribute to anthropomorphic climate change by the release of green house gases (Mills 2008).

(2) Native vegetation on the subject land will be cleared. The total amount of clearing over the three lots is about 5.61 hectares. It is noted that the areas currently cleared on the land to be dedicated to Shoalhaven City Council as public land will be regenerated, thus compensating to some extent for the loss of the vegetation elsewhere on the site (Mills 2008).

(3) One hollow-bearing tree only would probably be removed, all other such trees are not on the development site, but on land to the south (Mills 2008).

(4) Some dead wood will be removed as this occurs in all native vegetation areas. No large old dead trees, with valuable habitat elements, are present on the site (Mills 2008).

Conclusion, TSC Act

Mills (2008) concluded that the development of the proposed subdivision at Manyana is not likely to have a significant effect on the local occurrence of the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest complex and on the

threatened species the Glossy Black-Cockatoo. The preparation of a Species Impact Statement (SIS) is, in Kevin Mills's opinion, not warranted.

4.2.2 Native Vegetation Act 2003

The objectives 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.

Response:

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. The subject land is zoned part 2(a1) Residential, and part 2(e) Village, (deferred from Shoalhaven LEP Amendment No. 62). The section of the site zoned 2(e) was exhibited as 7(d2), however, it was deferred subject to the outcome of a local environmental study. Therefore according to the current zoning the Act does not apply to the subject land. Although it should be acknowledged that the 2(e) portion of the site is proposed for dedication to Council for the purposes of a public reserve. The intent of the dedication is to ensure the protection of an important natural ecosystem 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.

Response:

The proposal will not have an impact on 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 comprises a small-unnamed creek, which traverses the site, in a west to east direction. The creek and its associated riparian zone comprises part of proposed Lot 158 which is intended to be dedicated to Shoalhaven City Council as public reserve.

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.

4.2.4 Water Management Act 2000

The River and Shore Improvement Act 1948 was repealed by Sch 7 to the Water Management Act 2000 No 92 with effect from 4.2.2008.

The Water Management Act is administered by the NSW Department of Water and Energy. The objects of the Act are to provide for the sustainable and integrated management of the water sources of the State for the benefit of both present and future generations.

In accordance with clause 91 (Activity approvals) there are two kinds of activity approvals, namely, *controlled activity approvals* and *aquifer interference approvals*. A controlled activity approval confers a right on its holder to carry out a specified controlled activity at a specified location in, on or under waterfront land. In this proposal the waterfront land is taken to mean the bed of the coastal waters of the State, and any land lying between the shoreline of the coastal waters and a line drawn parallel to, and the prescribed distance inland of, the mean high water mark of the coastal waters where the prescribed distance is 40 metres.

Response:

The proposal involves the construction of an artificial wetland to treat stormwater runoff. The wetland is proposed to be located in the north western corner of proposed lot 158 and will be positioned between the existing piped section of the

creek and the open channel section of the creek. This will require construction work to occur within 40m of the watercourse. Therefore the proposal if not for section 75U of the EP&A Act 1979 would require a controlled activity approval from NSW Department of Water and Energy.

An Erosion and Sediment Control Plan will be prepared prior to the construction of the wetland to manage sediment runoff. Furthermore, an Acid Sulphate Soil Management Plan has been prepared by Douglas Partner Pty Ltd (Appendix 5) to manage the presence of acid sulphate soils (refer to section 7.8).

4.2.5 Rural Fire Act 1997

The objects of this Act are to provide:

- (a) for the prevention, mitigation and suppression of bush and other fires in local government areas (or parts of areas) and other parts of the State constituted as rural fire districts, and
- (b) for the co-ordination of bush fire fighting and bush fire prevention throughout the State, and
- (c) for the protection of persons from injury or death, and property from damage, arising from fires, and
- (d) for the protection of the environment by requiring certain activities referred to in paragraphs (a)–(c) to be carried out having regard to the principles of ecologically sustainable development described in section 6 (2) of the Protection of the Environment Administration Act 1991.

Clause 100B Bush fire safety authorities

- (1) The Commissioner may issue a bush fire safety authority for:
 - (a) a subdivision of bush fire prone land that could lawfully be used for residential or rural residential purposes, or
 - (b) development of bush fire prone land for a special fire protection purpose.

Response:

The subject site is identified as being bush fire prone in accordance with mapping prepared by Shoalhaven Council in conjunction with the Rural Fire Service. The subdivision if not for section 75U of the EP&A Act 1979 would require a Section 100b Bushfire Safety Authority. Regardless of this, a Bushfire Protection Assessment (Appendix 6) has been prepared by Bushfire and Environmental Services (2008) in accordance with DGRs. The Bushfire Protection Assessment

addresses the threat of bushfire and to address the requirements of Planning for Bushfire Protection guidelines 2006.

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.

Response:

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 (Infrastructure) 2007

State Environmental Planning Policy 11 – Traffic Generating Development was repealed by Schedule 4 to the State Environmental Planning Policy (Infrastructure) 2007 (641) with effect from 1.1.2008.

The State Environmental Planning Policy (Infrastructure) 2007 is to facilitate the effective delivery of infrastructure across the State by:

- (a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and
- (b) providing greater flexibility in the location of infrastructure and service facilities, and
- (c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and
- (d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and
- (e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and
- (f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing

Division 17 (Roads and traffic) clause 104 (Traffic-generating development)

- (1) This clause applies to development specified in Column 1 of the Table to Schedule 3 that involves:
 - (a) new premises of the relevant size or capacity, or
 - (b) an enlargement or extension of existing premises, being an alteration or addition of the relevant size or capacity.
- (2) In this clause, **relevant size or capacity** means:
 - (a) in relation to development on a site that has direct vehicular or pedestrian access to any road—the size or capacity specified opposite that development in Column 2 of the Table to Schedule 3, or
 - (b) in relation to development on a site that has direct vehicular or pedestrian access to a classified road or to a road that connects to a classified road where the access (measured along the alignment of the connecting road) is within 90m of the connection—the size or capacity specified opposite that development in Column 3 of the Table to Schedule 3.

Response:

The proposed development is for a 58 lot subdivision, which is less than the requirements provided in Column 2 (size or capacity) Table to Schedule 3 (*200 or more allotments (where the subdivision includes the opening of a public road)*). 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's Requirements a Traffic Impact Study (Appendix 7) was undertaken in accordance with the RTA Guide to Traffic Generating Development Guidelines. The aim of this assessment is 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 impact the proposed development is likely to have on the existing traffic conditions and recommend methods to minimise that impact if required.

The results and outcomes of the study are discussed in section 7.10.

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 all remediation work meet certain standards and notification requirements.

Response:

The subject site has not been previously developed, is predominately covered in native vegetation and therefore it is unlikely that there would be contamination contained on the subject site and SEPP 55 does not apply.

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.*

The subject site is located on the back dunes of Manyana Beach approximately 120m from the beach. The area between the subject site and the beach is 6(a) zoned public reserve land. The dedication of environmentally sensitive land (proposed Lot 158) to Shoalhaven City Council will increase the public land directly adjacent to Manyana Beach. Furthermore, the proposal has been designed to ensure the protection of the unnamed creek and its associated riparian zone, which run through the site by improving stormwater treatment within the local area through dedication of environmentally sensitive land to Shoalhaven City 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 subject site is located adjacent to the foreshore; however, there is a strip of 6(a) zoned land between the subject site and Manyana beach. The majority of the land within the subject site, which is adjacent to the foreshore, is proposed to be dedicated to Shoalhaven City Council as public reserve. Furthermore, the connection of Sunset Strip will improve access to Manyana Beach and the public facilities located at the intersection of The Bulkwark and Sunset Strip.

- *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.*

It is proposed that an additional formal public access point be provided to Manyana Beach through an access track located to the north of proposed Lot 131 and through the southern part of proposed lot 158. It should be noted that the locals have already created an informal access point through this section of Lot 705 and Council has created a formal access point from the edge of Lot 705 to Manyana Beach.

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

An Aboriginal Heritage Assessment and Aboriginal Subsurface Testing Program (Appendix 8 and 9) have been conducted by Navin Officer Heritage Consultants, 2008 and are discussed in Section 7.4.

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

The proposed subdivision will not be visible from Manyana Beach (refer to Figure 7.10 in Section 7.11.3) because of its location behind the sand dunes and bushland to the west of the beach. The residential subdivision will complete the existing residential pattern of Manyana whilst linking up a number of streets.

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

The proposed development will provide an additional public access point to Manyana Beach. The proposed development will pose no direct impact on beach environments or beach amenity.

- *To protect and preserve native coastal vegetation.*

Dedication of the native coastal vegetation (Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest, Bangalay Sand Forest and coastal woodland) located on Lot 158 (3.97ha) will ensure the protection of native vegetation associated with the back dune environment of Manyana Beach.

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

The catchment currently has no specific water quality management however this proposal incorporates water sensitive urban design, which will provide treatment for the whole catchment, ensuring a net benefit to water quality for the catchment. The proposal will not have a negative impact on any marine environments.

- *To protect and preserve rock platforms*

There are no rock platforms in the vicinity of the subject site.

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

Ecologically sustainable development is development, which aims to meet the needs of today, while conserving our ecosystems for the benefit of future generations. ESD principles have been considered throughout the planning and design of this proposal. As a result the proposed subdivision was assessed against social, economic and environmental factors to ensure the proposal satisfied the ESD principles. The proposal was developed to minimise negative impacts and maximise benefits to the local community and give due consideration to the environment. The dedication of the riparian corridor and the endangered ecological communities located on Lot 158 (3.97ha) will aid in the ongoing management of the coastal zone. The public ownership of this land will

increase public access to the coastal foreshore and will conserve this important ecosystem for the benefit of 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 local area is comprised of a mixed range of housing types and styles from modest weekenders (fibre-cement or 'fibro' clad houses dating from the 1950s) through to brick veneer single and double storey homes of the 70's and 80's and a few architecturally distinctive houses.

The portion of the subject site proposed to be developed with residential lots is zoned 2(a1) Residential. The proposal is infill development and completes the street network within the local area. This proposal will result in the creation of an additional 57 residential lots ranging in size from 543m² to 1466m². Generally, the proposed lots are similar in shape and size to those existing in the local area and considered to be of a scale and density suitable for the local area.

The proposed dedication of Lot 158 will extend the public reserve it adjoins on the eastern boundary, ensuring the protection of the scenic quality from Manyana Beach. The proposed subdivision will not be visible from Manyana Beach because of its location behind the sand dunes and bushland to the west of the beach. 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.*

The site is a residue parcel of residential zoned land and the proposed subdivision completes the street network within the local area. This is a modest and measured proposal, which takes into consideration the environmental sensitivity of the site, the natural attributes of the site and all relevant legislation.

Part 2 (Clause 8): Matters for Consideration

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

As discussed 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 subject site is located adjacent to the foreshore; however, there is a strip of 6(a) zoned land between the subject site and Manyana beach. The majority of

the land within the subject site, which is adjacent to the foreshore, is proposed to be dedicated to Shoalhaven City Council as public reserve. Furthermore, the connection of Sunset Strip will improve access to Manyana Beach and the public facilities located at the intersection of The Bulkwark and Sunset Strip.

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

It is proposed that an additional formal public access point will be provided to Manyana Beach through an access track located to the north of proposed Lot 131 and through the southern part of proposed lot 158. It should be noted that the locals have already created an informal access point through this section of Lot 705 and Council has created a formal access point from the edge of Lot 705 to Manyana Beach.

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

The local area comprises mixed range of housing types and styles from modest weekenders through to brick veneer single and double storey homes and a few architecturally distinctive houses. The portion of the subject site proposed to be developed with residential lots is contained within the land zoned 2(a1) Residential. The proposal is infill development and completes the street network within the local area. This proposal will result in the creation of an additional 57 residential lots ranging in size from 543m² to 1466m². Generally, the proposed lots are similar in shape and size to those existing in the local area. The proposed subdivision completes the existing residential pattern of Manyana and is considered to be of a scale and density suitable for the local area.

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 proposed dedication of Lot 158 will extend the public reserve it adjoins on the eastern boundary. This will ensure the protection of the scenic quality from Manyana Beach. The proposed subdivision will not be visible from Manyana Beach because of its location behind the sand dunes and bushland to the west of the beach. The subject site 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 proposed subdivision will not be visible from Manyana Beach 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 (Appendix 3) has been undertaken by Kevin Mills and Associates and is discussed in Section 7.6

- 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 contained within the 2(a1) Residential zoned portion of the subject land.

Clause 14: Public Access

The proposal will improve the right of the public to gain physical, land based right of access to or along the coastal foreshore. The proposal will result in the connection of Sunset Strip, improving access to Manyana Beach and the public facilities located at the intersection of The Bulkwark and Sunset Strip. In addition, part of the proposal is to dedicate Lot 158 to Shoalhaven City Council as public reserve, and to create a formal public access track through the southern part of the public reserve to Manyana Beach.

Clause 15: Effluent Disposal

All new lots will be serviced with reticulated sewer, which will ensure protection of the nearby creek and beach.

Clause 16: Stormwater

A Stormwater Management Concept has been prepared for the subject site by Watkinson Apperley Pty Ltd (Appendix 10). The proposed treatment system has

been designed to retain and filter stormwater to remove pollutants such as litter, sediment and nutrients to protect the existing watercourse. The proposed treatment system for this proposal consists of gross pollutant traps, a constructed wetland, kerbside bio-retention, a vegetated swale (comprising a rock armoured outlet treatment) and 30 to 50m of existing vegetated buffer (riparian zone) adjacent to the watercourse. Rainwater tanks have not been proposed as it is anticipated that future dwellings will use reuse water from the Conjola Regional Sewerage Scheme for non-potable purposes.

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.

Response:

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.

Kevin Mills (2008) 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. No Schedule 2 Koala food trees were recorded on the subject land. The area is therefore not "potential Koala habitat" and no further provisions of the Policy apply.

4.3.6 State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004

Regulations under the Act have established a scheme to encourage sustainable residential development (*the BASIX scheme*) under which:

- (a) an application for a development consent, complying development certificate or construction certificate in relation to certain kinds of residential development must be accompanied by a list of commitments by the applicant as to the manner in which the development will be carried out, and
- (b) the carrying out of residential development pursuant to the resulting development consent, complying development certificate or construction certificate will be subject to a condition requiring such commitments to be fulfilled.

The aim of this Policy is to ensure consistency in the implementation of the BASIX scheme throughout the State.

This BASIX SEPP achieves its aim by overriding provisions of other environmental planning instruments and development control plans that would otherwise add to, subtract from or modify any obligations arising under the BASIX scheme.

Response:

The BASIX SEPP does not apply to the initial subdivision of land, however the development of the resultant allotments will need to comply with the water and energy efficiency targets established in the BASIX SEPP.

As discussed in Section 3.6.2 it is anticipated that future dwellings will use reuse water from the Conjola Regional Sewerage Scheme for non-potable purposes, therefore BASIX may not mandate the use of rainwater tanks to collect rainwater.

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.

Response:

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 South Coast Regional Strategy

The South Coast Regional Strategy (2007) 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 the 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 South Coast Regional Strategy provides 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 two 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 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.

- The South Coast is characterised by many separate settlements ranging from small villages with less than 200 people (e.g. Hyams Beach and Tilba Tilba) up to the major regional centres of Nowra–Bomaderry, Batemans Bay and Bega. Whilst the dispersed nature of settlements is part of the charm of the South Coast, the Regional Strategy maintains that continued expansion of smaller villages and creation of new ones has the potential to place a strain on services and Infrastructure.
- Future urban development will be prioritised to support infill housing and new residential subdivisions located adjacent to existing well serviced centres and towns. The major regional centres of Nowra–Bomaderry, Batemans Bay, Bega and the major towns of Ulladulla, Moruya, Narooma, Merimbula and Vincentia (serving the Jervis Bay and St Georges Basin area) are nominated to accommodate the majority of future growth. The Regional Strategy also allows some small expansions around existing villages and rural towns that will support the role of the town in serving surrounding communities.

Response:

The proposal will create an additional 57 residential properties in a unique coastal setting. While it is recognised that the continued expansion of Manyana has the potential to place strain on the existing services and infrastructure the nature of the proposed subdivision is that of small-scale residential infill development. As discussed in section 3 all the relevant stakeholders have been contacted and have advised that there is adequate capacity within the local services/infrastructure to handle the increase in population as the result of the proposal.

The proposed subdivision is in line with the aim and objectives of the South Coast Regional Strategy. The proposed subdivision provides a range of lot sizes allowing for a variety of dwelling types and sizes. The subdivision layout has been designed to protect the natural edge of the coastal environment, and to reinforce the street pattern within the local area. The proposed road network caters for all road users including, pedestrians, cyclists, cars and buses. Overall the objective of the subdivision layout is to provide a safe, attractive, energy efficient and liveable neighbourhood that fosters a sense of community to promote better social, economic and environmental sustainability.

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 Zone 2(a1) Residential, with a portion in the east zoned 2(e) Village, (deferred from Amendment No. 62). (Figure 4.1).

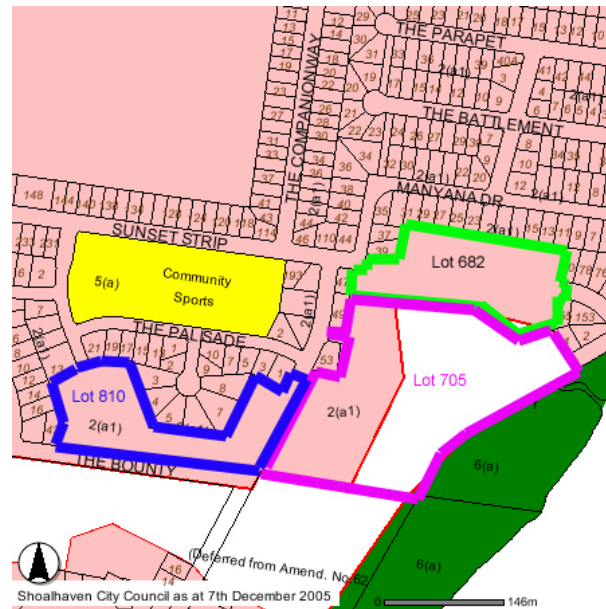


Figure 4.1: Zoning Plan

The objectives of zone 2(a1) is as follows:

Zone 2(a1)

- *The objectives are to provide an environment primarily for detached housing and to ensure that the range of other development permitted in a residential area is compatible with the residential environment.*

The proposed development utilises a range of lot sizes, from 543m² to 1466m². The variety in lot sizes provides 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 as much practical, useable space as possible. The proposal was developed to minimise negative impacts on the environment and maximise benefits to the local community. The subject site is the eastern-most extent of residential development within this area of Manyana, as it adjoins the 6(a) zoned land to the east. As such, it will complete the existing residential area.

Zone No 2 (e)

- *The objectives are to provide a village lifestyle with a range of residential accommodation and support urban facilities.*

The section of the site zoned 2(e) was previously exhibited by Council as a proposed 7(d2) zone, however, this was deferred subject to the outcome of a local environmental study. Since that meeting in December 1991, Shoalhaven City Council have not progressed the local environmental study and the 3.07 ha

parcel retains the 'deferred' zoning status. Discussions with officers at Shoalhaven City Council indicate that the local environmental study for this area is not a priority with Council. However, given the significance of the coastal protection legislation, the owners have resolved to dedicate the lot that is 'deferred' together with a 0.9ha portion of the land zone 2(a1) to Shoalhaven City Council for Public Reserve.

The intent of the land dedication is to ensure the protection of the scenic, cultural, and natural features of the area through public ownership. Public ownership of this portion of land would provide the opportunity for rehabilitation & land care programs by community groups, which would increase the scenic and natural attributes associated with the area.

Division 5 – Environmental Management (*Clause 28: Danger of Bushfire*) is also applicable to the subject site. A Bushfire Protection Assessment has been undertaken by Bushfire and Environmental Services (Appendix 6). The requirements outlined in Section 7.7.3 have been incorporated into the project design, as illustrated in **Attachment 2**.

4.6 Development Control Plans and Council Policies

4.6.1 Development Control Plan 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 environmental constraints and completing existing road network. Public open space incorporated as land proposed to be dedicated to Council.
Street and lot layout enables efficient provision of physical services		Design enables efficient servicing of water, sewer, electricity and telecommunications.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
Street and lot orientation/dimensions facilitate energy efficient dwellings		Streets aligned predominantly in a North-South direction (42 lots) and the remaining 15 lots in a East-West direction.
Lot layout/design provide variety of lot sizes & enable a variety of housing types		Lot sizes ranging between 543m ² to 1466m ² with various shapes & outlooks
Layout retains significant vegetation & habitat areas, incl. threatened species		The native vegetation and fauna habitat to be removed as a result of the proposal comprises approximately 5.61 hectares over the three lots. This vegetation will be removed during the civil works associated with each stage of the development. Incised & hollow trees will be retained where possible. Also proposed lot 158 (3.97 hectares), representing 41.5% of the subject site, is proposed to be dedicated to Shoalhaven City Council as public reserve.
Retention of a riparian buffer around waterways	Minimum 20m from banks or centreline	Riparian zone with average of 40m from centreline of the creek, to be dedicated to Council as part of Lot 158.
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	The proposal provides important connections between the existing 'dead end' streets adjoining the subject site. The proposed subdivision will extend & connect The Barrette, The Bounty, Manyana Drive, Sunset Strip, plus a new perimeter loop road off Manyana Drive, and a new connection road off Manyana Drive to the loop road. All the proposed roads satisfy the

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
		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 (~513vpd).
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 (The Companionway) is 550m.
	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 – three turning movements are required to reach the nearest collector road (The Companionway).
STREET DESIGN		
Speed reduction techniques are used to achieve desired speeds Safe sight distances based on vehicle travel speeds exist at property access points, pedestrian and cyclist crossings and at junctions and intersections. The horizontal & vertical alignments satisfy safety criteria and reflect physical land characteristics and major drainage functions Car parking is provided in accordance with projected needs	Street reserve - 16 width (Avge)	Street reserves range from 12 – 20m due to the environmental constraints of the site. The justification for the reduced street reserve width is provided in section 7.10.
	Kerb type - layback	Layback kerb is proposed to be used on all new roads.
	Pavement treatment - AC, paving block or stamped or patterned concrete.	Patterned concrete and AC.
	Parking provision within street reserve - carriageway	Parking provision within street reserve - carriageway
	Entrance kerb return radius - 5m	Entrance kerb return radius - 5m
	Carriageway 6.0m	Carriageway 6m
	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

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
	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.
	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 2 dwellings.
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 the proposal generates <2000 vpd
Cycle Path	Cycle paths considered when traffic volumes reach 5000 vpd	No cycle path proposed as traffic volumes are <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.	Nowra Coaches and Kellam Bus Lines provide bus services within the local area. The bus service runs on a hail and ride system and currently travels down Manyana Drive and Sunset Strip. Although Kellam Bus Lines

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
		currently only provide a bus service on school days.
<i>PUBLIC OPEN SPACE</i>		
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	Lot 158 is proposed to be dedicated to Shoalhaven City Council as Public Reserve.
<i>UTILITY SERVICES</i>		
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.	All utilities are available to serve the site and will be in accordance with requirements of authorities. A typical cross-section of a 12m and 13m wide road reserve has been provided in Traffic Impact Assessment (Appendix 7) to show the general location of services.
<i>STORMWATER DRAINAGE</i>		
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 by Watkinson Apperley Pty Ltd (Appendix 10).

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
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.	The proposed treatment system has been designed to retain and filter stormwater to remove pollutants such as litter, sediment and nutrients to protect the existing watercourse. The proposed treatment system for this proposal consists of gross pollutant traps, a constructed wetland, kerbside bioretention, a vegetated swale (comprising a rock armoured outlet treatment) and 30 to 50m of existing vegetated buffer (riparian zone) adjacent to the watercourse.
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 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.	A concept landscape plan has been prepared in accordance with Council requirements and is discussed in Section 7.12.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
	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	The lot sizes range from 543m ² to 1466m ² . The average lot size is 744 m ² (excluding Lot 158).
To provide lots that enable the application of energy conservation principles.		One corner lot (Lot 134) is below minimum frontage width, with a 19.62m width. However, the 38.25m depth means the area is greater than 500m ² (950m ²).
To provide lots of sufficient size to protect environmental features and take into account site constraints.	Rectangular Corner lots: Square width min 20m, depth min 30m	4 corner lots (lots 123, 126, 127 & 130) are below minimum frontage width, with a 19.62m width and below the minimum depth with depths of 24.38. These lots are the smallest in the subdivision however, they still produce a lot size >500m ² (543m ²). The lots are small due to the environmental constraints of the site as discussed through this report. It is also proposed to have a building line setback of 5.5m on these lots (as discussed in Section 3.3).

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
	Rectangular Non-corner lots: Square width min 16m, Depth min 30m	All rectangular non-corner lots are above minimum standard, except lots 124, 125, 128 & 129, which have widths greater than 16m (23.84m) but depths less than 30m (24.38). However, the area is greater than 500m ² (551m ²). It is also proposed to utilise a building line setback of 5.5m on these lots (as discussed in Section 3.3).
	Irregular shaped lots: Square width min 12m, width at building line 16m, Mean width 18m, Depth 30m.	All the irregular shaped lots are above minimum standard.
	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	The majority of the lots can accommodate a 15m x 15m rectangular building envelope. The lots with a 16m frontage will not be able to accommodate 15m x 15m rectangular building envelope due to site setback requirements. However, all of these lots have a depth in excess of 30m and would accommodate a building with a similar floor space. A number of the irregular shape corner lots (lots, 122, 140, 148 & 153) will not be able to accommodate 15m x 15m rectangular building envelope and would require more site specific designed dwellings. However, these lots range in size

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
		from 641m ² to 914.1m ² . A plan showing that all lots have suitable buildable areas is provided in Attachment 5.
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	The native vegetation and fauna habitat to be removed as a result of the proposal comprises approximately 5.61 hectares over the three lots. This vegetation will be removed during the civil works associated with each stage of the development. Although all the vegetation on proposed lot 158 (3.97 hectares), representing 41.5% of the subject site, is proposed to be retained and dedicated to Shoalhaven City Council as public reserve. A concept landscape plan has been prepared that provide for street trees to be planted within the road reserve.
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.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
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 south eastern section of the subdivision layout, Road 1. The extension of Sunset Strip and The Bounty will also form perimeter roads as they will effectively be single loaded roads.
	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	The subject site does not have slope stability issues.

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.

Response:

The DCP requires that a Waste Minimisation and Management Plan (WMMP) be prepared. The WMMP is required to outline the amount of waste expected to be generated, its storage, and future re-use or disposal method. A Waste Minimisation and Management Plan has been prepared which provides the future re-use or disposal methods (Attachment 15). However, the amount of waste, which will be generated by the proposal, is not known at this time. It is normal that such information be provided at the engineering design stage and before the actual construction work commences. It is considered reasonable that a condition of consent can be imposed requiring such information is provided.

We would consider the proposed development to be a low waste generating proposal. With the majority of the waste material generated by the proposed development being the result of earthworks associated with the construction of the proposed roads and wetland and the removal of mature 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 where possible. Where the excavation takes place in areas identified as containing Acid Sulphate Soils, the soil material will be treated in accordance with the Acid Sulphate Management Plan prepared by Douglas Partners (Appendix 5) before being reused.

4.6.3 Reflective Building Materials - Use in Coastal and Rural Areas

Shoalhaven Council has adopted a policy to control the use of reflective materials in locations where the natural landscape is of such quality it should be pre-eminent. Structures should not strongly contrast with the background and highly reflective materials are not permitted in such locations.

Response:

This proposal is only for the subdivision of the subject land therefore this policy does not directly apply to this proposal. However, the recommendations of the Visual Impact Assessment (Appendix 4) discourage the use of highly reflective materials such as galvanised iron on any future dwelling and as such, compliance with this policy should be achieved through application at the future residential housing stage.

4.6.4 Policy to Control Building Height and Amenity in Residential Areas Shoalhaven Council

This policy controls the height and floor space of residential dwellings in order to preserve residential amenity. This policy includes, amongst other things, requirements relating to overall height (8.5 metres) and a maximum of two storeys, building height plane (projected at 45° from a height of 5 metres) and a floor space ratio (0.6:1).

Response:

This proposal only involves subdivision of the subject land. However, this policy has direct application to the future residential housing development and will be effective at that stage. The lots in this proposal have been designed to facilitate future dwellings that will be able to comply with the policy objectives.

4.7 Contributions – Section 94 and Section 64 Urban Residential

Any development consent issued for the subdivision of land for residential purposes will generally attract the payment of a cash contribution at the time of release of the plan of survey:

- i. Water supply and/or sewerage headworks and/or special charge.
- ii. Community facilities, open space – either dedication of land where appropriate or cash contribution for active and passive recreation, bushfire, road upgrading.

Response:

This proposal will be subject to section 94 and 64 contributions in accordance with Shoalhaven City Council contribution plan. Our client has already provided Shoalhaven City Council with a portion of land behind proposed lots 101 and 102 for a wastewater pumping station. It is also proposed to dedicate proposed Lot 158 to Shoalhaven City Council as public reserve. Having due consideration to these aspects, several meetings have been held with Shoalhaven City Council to negotiate an equitable contribution rate for additional section 94 contributions for this project. The contribution rate will comprise part of a voluntary planning agreement between the proponent and Shoalhaven City Council. The voluntary planning agreement will go on public exhibition in accordance with the *Environmental Planning and Assessment Act 1979* once it is finalised.

4.8 Coastal Design Guidelines

The Coastal Design Guidelines for NSW were published in 2003 establishing criteria for the various categories of coastal settlement. While Manyana only has a population just over 500, the currently zoned residential land has the potential

to provide a population growth that will see Manyana clearly fit the category of a Coastal Village. The Guideline document identifies present and future opportunities associated with each settlement category along with desired future character and design principles for coastal settlements.

The following addresses each of these areas of consideration and how the proposal responds to these matters. In addition a Visual Impact Study by Maurice Hayler & Associates Architects (Appendix 4) has been provided to demonstrate the relationship between the subject development area and key public locations of Manyana and the likely impact of development.

Present and Future Opportunities

<u>Present and Future Opportunities</u>	<u>Proposals Response</u>
Ensure settlements maintain their identity and physical distance from each other	•Project is contained within the existing subdivision framework/pattern. •Does not encroach on other settlements
Ensure development builds on the settlement's existing structure	•Project design utilises existing street pattern & completes streets as per the original intended layout.
Strengthen the original structure of the settlement and its relationship to the surrounding natural features	•Design completes the Sunset Strip connection to the beach, and Manyana Dr. to The Bounty. •Preserves a significant stand of coastal vegetation adjacent to the coastal dune through public reserve.
Enhance and focus retail and commercial development within the village centre	•Development does not detract retail & commercial opportunities. •Future residents will enhance viability of retail in the village.
Gain mutual benefits and develop economic and cultural synergies with neighbouring villages, towns and cities	•The project design layout integrates with existing street pattern that will assist the new population to establish local community contacts, to adopt village values & contribute to the local character & culture. •
Retain close visual and physical boundaries between natural and built environments	•The majority of the public reserve lot is fronted by public road and coastal dune. •New dwellings in Sunset Strip & the Road 1 will have a visual outlook to the public reserve. •An additional public access will be provided to the beach front.

Encourage tourist accommodation that fits within the small-scale, built form context	• This project is for residential housing & can only contribute to tourist accommodation through holiday rentals of future dwellings.
Protect the areas surrounding ecological integrity, improve and protect water quality in lakes and waterways	• A public reserve is proposed to protect coastal vegetation and retain EEC. • Water quality ponds to manage water prior to entering the watercourse.
Maintain vegetation whilst providing asset protection zones around urban areas	• Vegetation protected within the public reserve & coastal dune. • Asset Protection Zones contained within the public roads.
Reduce the encroachment of urban development on defined buffer zones and setbacks to conservation areas	• Design process eliminated layout options that failed to address these opportunities.
Protect and reinstate indigenous ecological systems and control non-indigenous landscaping	• Public reserve & Crown land to the south protect indigenous ecological system. • A Vegetation Management Plan for the public reserve will recommend how to address planting in the reserve. • Community awareness & education material should be provided to encourage appropriate planting in future landscaping.
Provide logical, clear visual and physical access for the public to and along the coastal edge.	• Extension of Sunset Strip. • Connection of Manyana Dr & The Bounty • An additional public walkway access to beach via the public reserve.

Desired Future Character

The Coastal Design Guidelines describe six key desired future characteristics for coastal villages, to reinforce scenic and tourist values by maintaining and improving the distinctive way in which the settlement sits within the landscape.

<u>Relationship to the Environment</u>	<u>Proposals Response</u>
The relationship between the village and the coast reinforces:	
The way in which the settlement sits within the landscape	• The project layout effectively provides infill to unfinished areas of the existing street pattern.
The visual and environmental dominance of the landscape and surrounding ecological systems	• The public reserve adjacent to the fore-dune will achieve this.

The ecological corridors that surround the settlement	•The linkage with the Crown land to the south and the public reserve & foreshore dunes.
Separation between settlements is maintained by excluding urban development from surrounding rural and natural lands	•Residential layout that forms an infill to the existing residential pattern of the village.
Clear boundaries around the settlement are established	•New residential streets complete the existing pattern with one new street that forms a public road frontage to the public reserve.
New buildings and other urban development are located within the boundaries of the village	•Future dwellings confined to the residential zoned land that will be developed within the existing residential housing footprint.
Land with high ecological agricultural and visual integrity surrounding the village is protected	•EEC retained within the proposed public reserve.
Aboriginal and European places and relics are protected	•Addressed in accordance with the Navin Officer report Section 7.4.
Total water cycle management and water sensitive urban design initiatives are implemented	•Dual water system in accordance with Shoalhaven water requirements, the proposed treatment system for this proposal consists of gross pollutant traps, a constructed wetland, kerbside bio-retention, a vegetated swale and 30 to 50m of existing vegetated buffer (riparian zone) adjacent to the watercourse.
The settlement's micro-climatic conditions are improved through landscaping and mature trees	•Retention of majority of native vegetation •Vegetation Management Plan for reserve •Street planting •Landscaping associated with dwellings.
Development is set well back from areas affected by coastal processes, flooding, erosion and sea level rise	•Coastal dune & public reserve form the setback.
Waste and water services match seasonal tourism influxes	•Residential development serviced accordingly by Shoalhaven Council.
Invasive plant species are removed from ecological areas	As per the Vegetation management Plan.
Bush fire protection and vegetation clearance are balanced to maintain ecological integrity and visual quality	•All APZs are contained within the public roads and small parts of private lots. •Minimal loss of EEC maintains ecological integrity. •Public reserve preserves visual quality.

<u>Visual Sensitivity</u>	<u>Proposals Response</u>
Visual character is critical in coastal villages. New development responds sensitively in form and character to the village and to the existing proportions and materials of existing buildings	• Lot sizes are similar to the existing lot sizes which will deliver a mix of similar housing product. • The visual impact is addressed in Section 7.11.

<u>Edges to the Water and Natural Areas</u>	<u>Proposals Response</u>
Foreshore access in proximity to primary streets and public places within the village are reinforced	• foreshore access off Sunset Strip • new access proposed through the public reserve off Road 1.
Connection between the village park, other public open spaces, the main street and the foreshore edge is strengthened	• foreshore edge strengthened through public reserve dedication.
Pathways to the foreshore are aligned with existing streets	• see above
Along the foreshore are aligned with existing streets	• see above
Along the foreshore reserve and other public open spaces the boundary between public and private land is defined with public streets or pedestrian pathways	• reserve and public open space areas are defined by Sunset Strip & Road 1.
Walking tracks and vehicular access points (where appropriate) to the beach and through the dunes are defined	• no vehicular access is proposed. • as defined in the design layout.

<u>Streets</u>	<u>Proposals Response</u>
Coastal villages have a range of street types including: - An access road leading from the freeway or highway and passing through the village - A mixed-use main street which is the key economic and social street linking important places in the settlement - Streets revealing important views and vistas of and through the settlement to natural features - Streets separating natural areas from urban development - Streets following the original subdivision pattern	• Extension of Sunset Strip to the east. • Sunset Strip & Road 1. • Completing the existing subdivision pattern.

- Residential streets and laneway Pedestrian and cycle pathways and routes	
The original street pattern of village is reinforced	• This proposal finalises the missing links in the original street pattern of the village.
The layout of new streets responds to geographic features	• Layout protects the public reserve & provides APZs.
The settlement has an interconnected and permeable system of streets; the central main street is linked to residential blocks and connects places of importance within the settlement	• Increased accessibility and permeability.
All streets within the settlement are walkable and safe	• All streets are walkable, providing for safe design speed.
Pedestrian and cycle access ways follow the street	• On street cycleways. • Designed for low traffic speed & safe pedestrian environment.

<u>Buildings</u>	<u>Proposals Response</u>
Areas surrounding the village centre may have coastal cottages and outhouses, detached houses and project homes. These buildings: - address the street and respond to the streetscape in terms of building setbacks, landscaping and parking - have materials, forms and colours that produce cohesion throughout the village as a whole have adequate and amenable private open space.	• Single detached dwellings with attached & detached garages. • Conventional layout that accommodates dwellings that address the street with conventional building setbacks. • Medium density is prohibited within the 2(a1) zone, therefore the “character” of the area will be retained as low density residential. • In the absence of a Council supported & approved site specific DCP this aspect is not feasible to impose on new dwellings.

<u>Height</u>	<u>Proposals Response</u>
The village centre and the main street have a maximum of up to three storeys	• N/A
Some elements of important public buildings within the centre may be marginally higher than surrounding buildings	• N/A
Residential buildings surrounding the centre have a maximum of two storeys.	• Maximum 2 storey height for all dwellings.

Heights are subject to place-specific urban design studies. New development is appropriate to the predominate form and scale of surrounding development (either present or future), surrounding landforms and the visual setting of the settlement. Buildings avoid overshadowing of public open spaces, the foreshore and beaches in centres before 3pm midwinter and 6.30pm Summer Daylight Saving Time. Elsewhere avoid overshadowing of public open spaces, the foreshore and beaches before 4pm midwinter and 7pm Summer Daylight Saving Time.	• There is no potential for overshadowing the public open space or beach area due to the public reserve being fringed by public road and no dwellings immediately adjacent to the beach & foreshore areas.
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Design Principles

The Coastal Design Guidelines establish 5 design principles as best practice for designing the present and future form of coastal settlements. These principles are listed below, addressing how the proposal responds to these principles in its contribution to the growth of Manyana.

1. Defining the footprint and boundary of the settlement

Response:

For the main part this project overlays three existing lots of land that were residue parcels from the earlier residential development in the area. The footprint & boundary for this development are essentially locked-in the existing street pattern. The three stages of the proposal are;

Stage 1 (Sunset Strip) — this street is partly constructed with dwellings at either end and this stage simply finalises the connection through, thus providing easier & safer pedestrian access to the beachfront. The public reserve will be created at this stage, ensuring long term protection of the EEC and the coastal dunes.

Stage 2 (The Bounty) — this stage completes The Barbette, through to The Bounty, which will form the connection through to the extension of Manyana Drive. All three sections of road will be contributing to the missing links in the current street network.

Stage 3 (Road 1&2) — this stage utilises a small pocket of land created by the provision of a perimeter road around the public reserve lot. The perimeter road also acts as the APZ for the residential lots on the opposite side of the street from the reserve. The stage 3 subdivision footprint fronts lots to the existing Manyana Drive and introduces two short streets that provide increased

pedestrian access to the public reserve and permeability within the subdivision. Lots within this stage have an orientation similar to lots in the locality.

This project design respects the existing character in this part of Manyana, and does not encroach into areas that are considered valuable character & environmental sites to the community.

2. Connecting open spaces

Response:

The completion of Sunset Strip provides a formal, legal & safe access for the broader community through to the beachfront. A formal public pathway is proposed for the southern section of the public reserve. This will connect pedestrian access to the existing dune crossing already constructed by Council, forming another beachfront access point.

The street pattern, in principle has been designed to increase pedestrian opportunities and connectivity to other existing open space areas, in particular Yulunga Reserve.

3. Protecting the natural edges

Response:

Road 1 forms a perimeter edge to the public reserve along with the extension of Sunset Strip, thus eliminating issues relating to the edge effect of residential abutting sensitive natural areas. The public road frontage also enables ease of access for fire fighting purposes. The establishment of the public reserve ensures retention of the EEC and creates a greater buffer to the rear of the coastal dunes.

4. Reinforcing the street pattern

Response:

The typical street pattern for Manyana is predominantly aligned east-west with interconnecting roads running-north south. The project design completes the pieces of the existing street pattern that were not linked. The new streets created will access off Manyana Drive and will reinforce the orientation of lots and streets that exist.

5. Appropriate buildings in a coastal context

Response:

Present housing in Manyana is a mix of original 1950's style seaside cottages, modern brick & suburban style houses & some architecturally designed modern coastal residences. There is no one architectural characteristic that defines Manyana.

While we acknowledge the opportunity exists to establish a contemporary housing design code for this subdivision, suited to this quaint coastal location, it would be difficult to articulate a code that adopts local character and coastal design requirements without creating a sameness to many other New South Wales coastal settlements. In the absence of Council's ability to introduce a new DCP or willingness to enforce a private developer imposed design code restriction, the exercise of preparing a design code adds no meaningful input to the merit of the project.

The buyer profile for Manyana could be from a number of lifestyle choices i.e. young families, retirees or sea changers. It is difficult to anticipate what the housing market trend is likely to do in the future or what impact broader economic policy is likely to have on peoples' choice of locations & housing. However it is not unreasonable to expect the majority of homes to be single storey, given there is little opportunity to achieve ocean views by building two storey homes. While a predominance of single storey homes could be said to be a contributor to the local Manyana character, it is not feasible to impose this form of design restriction.

A more positive approach to influencing the built form outcome is the development of a marketing brochure that forms part of the information package to all potential purchasers, designers & builders for the Manyana subdivision. The aim of the brochure would be to point out the special & unique characteristics of Manyana, that make it the place people have chosen to build & live in. Thus encouraging people to give some consideration to what they can contribute as new residents in adding to and preserving those features. The brochure should also include some "Design Quick Tips" on how to preserve Manyana's characteristics (Attachment 16).

5 CONSULTATION

5.1 Consultation with Stakeholders and Other Relevant Authorities

5.1.1 Statutory and Other Relevant Authorities

Meetings

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

During the preparation of the Environmental Assessment Report, the following agency consultation occurred:

Onsite meeting (11/01/07) with the Department of Planning. Attendees: Bronwyn Seiden (Watkinson Apperley), David Cannon (Watkinson Apperley), Helen Warton (Department of Planning, Sydney Office), Eng-Joo Ong (Department of Planning, Sydney Office), Paulina Hon (Department of Planning, Sydney Office), and Mark Parker (Department of Planning, Wollongong office). The main points/issues raised at the meeting were as follows:

- Watkinson Apperley to investigate the possibility of public access off Manyana Drive and proposed road 1, near Austen St intersection, through to the foreshore.
- Watkinson Apperley to include more detail in the EAR on the proposed community title arrangement. I.e. neighbourhood association

- Watkinson Apperley to hold discussions with the community regarding their issues including lot sizes and density.
- Watkinson Apperley to include more information in EAR on the proposed beach access through the community title neighbourhood lot.
- Watkinson Apperley to include more information in EAR on the capability of Shoalhaven Water new sewer system to accommodate the proposed increase in dwellings associated with the subdivision.
- Watkinson Apperley are to submit an electronic copy of the report to the department for review before submitting the final application.
- DOP (Helen) agreed that the proposed subdivision was an extension (in fill) of the existing subdivision pattern.
- DOP (Helen) brought up the issue of the dedication of the deferred lot to Council or the Crown.
- DOP (Helen) brought up the issue of SEPP71 and public access to the beach.
- DOP (Eng-Joo) brought up DEC comment that “the perimeter road should border the deferred lot”.

Phone calls and emails with the Department of Planning with regards to issues raised at the onsite meeting.

Phone calls and emails with Department of Natural Resources (MR. David Zerafa) regarding the potential conflict between the riparian zone and the proposed development.

Written Communication

Department of the Environment and Heritage

The Department of Environment and Heritage sent a letter to Vacenta Pty Limited dated 1 August 2006 (Attachment 14) stating “*matter of national environmental significance which are relevant within the Manyana area include nationally listed species. In particular the Giant Burrowing Frog (Heleioporus australiacus) may be present in the Manyana area*”. Any proposal for development of the site may be required to be referred to the department for assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

Response:

Kevin Mills and Associates undertook a flora and fauna assessment (Appendix 3), which concluded that the Giant Burrowing Frog did not occur in the local area. However, while Kevin Mills assessment concluded that the proposed subdivision is not likely to have a significant impact on matters of national environmental significance listed under the *Environment Protection and Biodiversity Conservation Act 1999*, as our clients Vacenta Pty Limited did receive a letter

from the Department of Environment and Heritage, the Environmental Assessment report will be forwarded to the Department of Environment and Heritage for comment.

Department of Planning and Department of Natural Resources, South Coast

In response to an application to waive a Master Plan the Department of Planning as well as the Department of Natural Resources, South Coast regions provided a letter dated 10 October 2005 (ERM 2005/4037) with responses in relation to the original subdivision layout comprising 71 Lots part Torrens title and part Community title (Attachment 17).

The following comments were provided.

Comments from Planning

- Potential subdivision layouts are very restricted by the street layout in the existing village, which will connect to the proposed subdivision.
- The proposal is essentially infill development, which integrates with the existing village despite the large number of lots proposed.
- The site is not visible from the coast and houses in the subdivision are not expected to be visually prominent such that site specific design guidelines and controls would be necessary;
- The development of the area adjacent to the deferred land raises a host of natural resources and bushfire management issues as outlined in the comments from the Department of Natural Resources.
- The subdivision design appears to restrict rather than enhance opportunities for public access to foreshore areas.
- An edge road as suggested for fire and natural resource management would also assist in improving public access.

Response:

As discussed throughout this report we agree with the Department of Planning that the subdivision layout is restricted by the street layout of the existing village, is essentially infill development which integrates with the existing village and that future dwellings within the subdivision will not be visually prominent. The Department raised the issue of the large number of lots being proposed. However, since that time the lot yield has reduced from 71 lots to 58 lots, a reduction of 14 lots. We believe that this is a modest and measured proposal, which takes into consideration the environmental sensitivity of the site.

The Department raised concerns with the development of the area adjacent to the deferred lot and that the overall subdivision design appears to restrict rather than enhance opportunities for public access to foreshore areas. The

Department suggested an edge road would assist in improving public access. The revised subdivision layout addresses these issues by reducing the number of lots proposed along the southern side of the extension of Sunset Strip from 9 in the original subdivision layout to 4 lots in the final proposed layout. This results in the majority of the extension of Sunset Strip being a single loaded (edge road), with the area of native vegetation on the southern side of Sunset Strip proposed to be dedicated to Shoalhaven City Council within a public reserve. Furthermore, the south-eastern section of the subdivision layout now incorporates a perimeter loop road off Manyana Drive which results in only one lot (Lot 131) adjoining the previously deferred lot which is a reduction of 9 lots from that section of the original layout. The proposal will improve public access to foreshore through the connection of Sunset Strip, which will improve access to Manyana Beach and the public facilities located at the intersection of The Bulkwark and Sunset Strip. The creation of a formal public access track through the southern part of the public reserve to Manyana Beach also contributes to the public access options.

Comments from Natural Resources

Riparian Objectives for watercourses.

- The site contains a watercourse as indicated on the Cunjurong Point (9027-3-N) 1:25000 mapsheet. Given the proximity of the EEC and Manyana Beach, it is suggested that the watercourse would classify as a Category 2 stream as outlined in the Landcom, Soils and Construction, Managing Urban Stormwater 2004, commonly referred to as the "Blue Book". The objectives of this category are to maintain as much as possible the natural functions of the stream to:
 - i) maintain the viability of native riparian vegetation;
 - ii) provide suitable habitat for terrestrial and aquatic fauna; and
 - iii) provide bank stability; and
 - iv) protect water quality.
- A protected core riparian zone of 20 metres with an additional 10 metre buffer (i.e. 30 metres on both sides of the watercourse) is recommended to achieve these objectives. As a result of the above categorisation, the lots proposed in the vicinity of the watercourse should be reviewed to ensure that riparian management outcomes are achieved. It appears that the Community Title Lots (2-15 particularly), and their associated APZ's may conflict with these recommended riparian management objectives.
- The Department would further apply these criteria to any activities, which were proposed within 40 metres of the subject watercourse that would require authorisation by way of a Part 3A Permit under the Rivers and Foreshores improvement Act 1948.

Response:

The proposal involves the construction of an artificial wetland to treat stormwater runoff. The wetland is proposed to be located in the north-western corner of proposed lot 158 and will be positioned between the existing piped section of the creek and the open channel section of the creek. This will require construction work to occur within 40m of the watercourse, therefore the proposal if not for section 75U of the EP&A Act 1979 would require a controlled activity approval from NSW Department of Water and Energy.

An Erosion and Sediment Control Plan will be prepared prior to the construction of the wetland to manage sediment runoff. Furthermore, an Acid Sulphate Soil Management Plan has been prepared by Douglas Partner Pty Ltd (Appendix 5) to manage the presence of acid sulphate soils (refer to section 7.8).

Acid Sulfate Soils

- The former Department of Land and Water Conservation PLWC) Acid Sulphate Soils (ASS) Risk Maps indicate that a part of the site is classed as an estuarine plain landscape and probably underlain by ASS materials within 1 metre of the landform surface. The exposure of ASS can result in substantial environmental harm and longterm degradation. It appears that clearing for APZs and the proposed stormwater detention basin may be within or in proximity of potential ASS areas. Any future land use should give appropriate consideration to the identification and management of ASS.

Response:

According to the Shoalhaven City Council State of the Environment (SCC SOE) online Acid Sulphate Map the southeastern section of the subject site is classified as having a '*Low probability of encountering acid sulphate soils within 1 m of the ground surface*'. Further reference to the 1:25 000 Acid Sulphate Risk Map for Milton – Cunjurong Point indicates that the south eastern section of the subject site is classified as '*Estuarine Plain of Elevation 1 – 2 m*', while the remainder of the site and its immediate surrounds are classified as having '*No known occurrences of acid sulphate soil materials*'. Accordingly an Acid Sulphate Soil (ASS) Assessment was undertaken by Douglas Partners Pty Ltd (Appendix 2) and is discussed in Section 7.8.

Douglas Partners concluded that the testing undertaken to date indicates the presence of actual and potential acid sulphate soils of possible erratic lateral distribution within the eastern portion of the proposed development area, and generally below depths of 0.5 – 2.5 m.

The majority of the eastern portion of the site (existing bushland (lot 158)) is proposed to be retained as public reserve and will remain essentially undisturbed. However some disturbance of the underlying acid sulphate soils is anticipated in order to facilitate subdivision construction (roads and wetland).

Douglas Partners recommended that an acid sulphate soil management plan (ASSMP) be prepared and as a precautionary measure with further investigation being undertaken as construction of the subdivision proceeds over the remainder of the site. Accordingly an acid sulphate soil management plan (ASSMP) has been prepared by Douglas Partners Pty Ltd (Appendix 5) which provides a framework for achieving environmental objectives in order to minimise the risk of harm to human health and the environment during and following the proposed development.

EEC and Vegetation Management

- The site is zoned Residential 2(a1) with the exception of a section of the land which was exhibited as 7 (d2) but deferred subject to the outcomes of a local environmental study. This deferred area therefore presumably maintains it's original zoning as village. Residential and Village zones are excluded from the operations of the Native Vegetation Conservation Act 1997 so consent is not required from the Department for the clearing of native vegetation.
- The applicant has identified the presence of "Swamp Sclerophyll Forest on Coastal Floodplains" Endangered Ecological Community. The applicant proposes that the proposed community title lots will be responsible for implementing and maintaining necessary APZ requirements as well as implementing a vegetation management plan for the EEC.
- The Department questions the ability of this approach to achieve desired vegetation management outcomes required to maintain the integrity of the EEC and is not supported.

Response:

After undertaking more detailed environmental assessments of the subject site the subdivision layout has been modified and the number of lots reduced to 58 Torrens Title lots consisting of 57 residential allotments and 1 public reserve lot, which is proposed to be dedicated to Shoalhaven City Council (proposed Lot 158) (Attachment 2). As result of the modifications to the subdivision layout there is no longer a community title component to the proposal. The land previously identified as Lot 1 (Community lot) is now proposed to be dedicated to Shoalhaven City Council as public reserve. Furthermore there will be no APZs located within the public reserve lot with all the APZ requirements contained within the public road system or on private land. The native vegetation to be retained within the public reserve lot consists of about 85 percent (2.3ha) of the

endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains, the small area of Bangalay Sand Forest, and about half of the disturbed woodland/forest. Furthermore a vegetation management plan dealing with the short to long-term protection and management of the area will be prepared prior to dedication of the land to Shoalhaven City Council. The dedication of 3.97ha of land and the preparation of a vegetation management will ensure that the endangered communities are preserved in the long term.

Zone Issues

- The zonings for the subject land are Residential 2(a1) with the exception of a section of the land, which was exhibited as 7 (d2) but deferred subject to the outcomes of a local environmental study. The objective of this 7(d2) zone is to preserve and enhance scenic quality. Several activities are proposed within this deferred area including bushfire asset protection, a bushfire access/perimeter fire trail and stormwater detention basin.
- In the absence of a determination on the appropriate zone for the deferred area, such activities should be excluded from the area unless bushfire asset protection activities and the incorporation of drainage structures/water quality control ponds are considered to be permissible activities (with development consent) within this zone.
- It is suggested that the appropriate zoning for the deferred area under the Shoalhaven LEP 1985 would be Zone No. 7(a) Environment Protection "A" (Ecology) zone. The objectives of this zone are:
 - a) to protect and conserve important elements of the natural environment including wetland and rainforest environments;
 - b) to maintain the intrinsic scientific, scenic habitat and educational values of natural environments;
 - c) to protect threatened species and habitats of endangered species;
 - d) to protect areas of high biodiversity value and
 - e) to protect and enhance water quality in the catchment.

Response:

All of the land zoned as 2(e) Village will be encompassed in Lot 158, which is proposed for dedication to Shoalhaven City Council. There is no clearing proposed within the 2(e) zoned land. Furthermore, while the proposed wetland will be constructed within proposed Lot 158 it will be constructed outside the 2(e) zoned land. The only work, which may occur inside the 2(e) zoned land, is some rock armouring of the creek where the drainage swale from the bio-retention system enters the creek. The proposed dedication of the 2(e) zoned land (Lot 158) for use as public reserve along with the preparation of a vegetation management plan prior to dedication is in accordance with the objectives of the 7(a) Environment Protection Zone.

Lot Layout

- DIPNR has specific concern with proposed lots 2 -22 (Community Title Neighbourhood Lots) and their associated APZ. The issues outlined above also have consequences for Lots 101, 113-116 and 117-119. With the exception of clearing some vegetation, all other lots appear to have minimal constraints.
- Ideally the area proposed to be developed into residential lots should be flanked by perimeter roads separating lots to be developed from bushland areas and which can contribute to the bushfire asset protection requirements for the site. It is suggested that the preferred location of the perimeter road should correspond to the edge of all of the proposed Torrens title lots indicated. In this way the extent of vegetation loss and encroachments into the identified EEC for asset protection purposes can also be significantly reduced.
- It is recommended that the lot layout and subdivision design be amended to reflect the significant ecology of the EEC and the natural values of this area.

Response:

The proposed subdivision layout has been amended to incorporate the recommendation of the Department of Natural Resources. The proposed subdivision now incorporates two perimeter roads, which provides an edge between the majority of the torrens title lots and the bushland. Three lots (102, 103 and 131) still back onto the bushland, however, the APZ's for these lots are fully contained within the lots. The amended subdivision design reflects the significant ecology of the EEC and the natural values of this area, through the use of perimeter roads and the dedication of 3.97ha of native vegetation including the creek line and associated riparian zone.

Coasts & Estuaries comments

- The proposal involves 71 lot subdivisions near the shoreline of a prime coastal location. But the application provides minimum information on the coastal processes and features of the area. The fact that no building will be located on the shoreline is not enough in relation to coastal hazard consideration. Hazards like shoreline recession, storm bite, wave run-up, coastal inundation, creek instability etc are needed to be assessed for the management of the overall area. Some area of the site is quite low and coastal inundation can be a serious problem. Demarcation and conservation of the dune system are important and deserve specific attention. Other matters like public access, aesthetics, cultural heritage, native vegetation, storm water management, water quality etc, are required to be considered under the requirements of SEPP 71.

Response:

A Coastal Hazard Assessment has been prepared by Gary Blumberg & Associates Pty Ltd (2008) (Attachment 11), which addressed shoreline recession, storm bite, wave run-up, coastal inundation, creek instability etc and the results are discussed in Section 7.9. However, overall the report concluded that no beach erosion and shoreline recession hazard applies to the subdivision layout and there was substantial separation of the proposed allotments from the unstabilised back beach areas ($>150\text{ m}$). GBA did recommend that two fences be installed along the eastern edge of the proposed loop road (Road 1) to guide pedestrian access to and from the beach, to protect the dune and its vegetation.

The other matters like public access, aesthetics, cultural heritage, native vegetation, storm water management, water quality etc that are required to be considered under the requirements of SEPP 71 have been addressed in a number of sections throughout this report. SEPP 71 objectives and matter for consideration have specifically been addressed in Section 4.3.4 and Table 1.1.

Floodplain Risk Management Comments

- The site appears to be in a locality adjacent to rather than within the catchment of Conjola Lake and to therefore neither drain to nor be subject to inundation from the Lake.
- It is noted that the proposed titling scheme and lot layout contains a reference to a possible location for a detention basin but does not contain any provision for drainage easements or other legal mechanisms to provide unhindered flow paths to convey flows to or from the basin.
- It is also noted from the 1:25,000 Topographic map (Cunjurong Point 9027-3-N) that the site appears to be bisected by a watercourse draining to Manyana Beach. The catchment area of the watercourse appears to drain those parts of Manyana roughly bounded by Berringer Road and Cunjurong Point Road (& be of the order of 1 km^2).
- The documentation supplied in support of the application to waive the draft master plan makes four references to the proponent's intention to prepare a Stormwater Management Plan at the DA stage but does not provide an obvious reference to the existence of the watercourse nor any hydrologic or hydraulic analyses of flow to or in the watercourse.
- While the catchment is small, it is nonetheless unclear how any informed decision on the appropriate management of potential flood impacts & risks associated with flow to, in or from the watercourse can be reached in the absence of any analysis.
- Preparation of a flood impact assessment as part of a master plan for the subdivision would be essential so as to form a sound basis for informed decision making in relation to appropriate flood mitigation

strategies and / or future uses and zoning of any flood prone land identified on the site.

Response:

Watkinson Apperley Pty Ltd has prepared a Stormwater Management Plan and Flood Study (Appendix 10), which undertake both hydrologic and water quality analysis. The results and the recommendations of the study have been incorporated in the subdivision design and are discussed in Section 7.1.

Shoalhaven City Council

Master Plan Waiver

In response to an application to waive a Master Plan Shoalhaven City Council provided a letter dated 18th January 2006 (SF9747) with responses in relation to the original subdivision layout comprising 71 Lots part Torrens title and part Community title (Attachment 17).

The main issues raised by Shoalhaven City Council are provided below:

- PMA have detected 6 threatened fauna species (with another since added to the threatened species lists) and one endangered ecological community (*NSW TSC Act 1995*) on the 9.56ha of land subject to the proposal. The EEC appears to cover half to two-thirds of the site. It appears the application is to develop all of the land except the low-lying land, the EEC and vegetation with hollow-bearing trees is proposed to be developed.
- PMA detected Glossy black-cockatoos via chewed cones beneath *Allocasuarina littoralis* but the locations of the feed trees are not located on the site plan nor is the tree species listed in the flora table (table 4).
- PMA have stated how many hectares of EEC will be directly affected and in the 8 part test. However, reasons have not been given as to why the area to be removed is not significant.
- The hollow-bearing trees have not been "stag-watched" to determine if they were being utilised by threatened fauna.
- It is recommended the applicant submit a detailed site plan to show the locations of the hollow-bearing trees, glossy black-cockatoo feed trees, and the locations where other threatened species were detected, overlayed on the vegetation mapping and the proposed subdivision layout. It is also recommended the area of EEC to be cleared is quantified.
- Drainage easements and overflow paths through proposed Lots 108/109 (now Lot 111) and 7 (now deleted), and through 12/13 (now deleted) need to be identified and addressed.
- Provide some assessment (preliminary only) of the existing drainage system to cater for flows from new development off The Barrette.
- Interallotment Drainage to be provided for Lots 141 –146 and connected through an existing property to The Palisade.

- Assessment to be provided of development impact on peak flow quantities for stormwater, noting that the provision of detention basins will have limited if any benefit due to the development being at the downstream end of the catchment.
- Pedestrian paths should be provided along Sunset Strip and Manyana Drive to cater for pedestrian movements through the subdivision to the beach and playing field north of The Palisade.

Response:

Kevin Mills & Associates have prepared a Flora and Fauna Assessment (Appendix 3) to replace the document prepared by PMA in December 2004 and January 2005 and amended in 2007 (Appendix 12). The outcome of the new Flora and Fauna Assessment is discussed in Section 7.6. The subdivision layout has been modified to reduce the impact on the EECs, about 85 percent (2.3ha) of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplain and the small area of Bangalay Sand Forest proposed to be retained within a public reserve. Furthermore, a vegetation management plan dealing with the short to long-term protection and management of the area will be prepared prior to dedication of the land to Shoalhaven City Council.

Watkinson Apperley Pty Ltd has prepared a Stormwater Management Plan and Flood Study (Appendix 10), which address the issues raised by Shoalhaven City Council, with regards to interallotment drainage, drainage easements, and an assessment of peak flow quantities for stormwater taking into consideration the proposed wetland. The results and the recommendations of the study have been incorporated into the subdivision design and are discussed in Section 7.1. There are no formal footpaths or cycle ways along the roads within the existing road network. It is foreseen that due to the small amount of traffic predicted on the proposed new roads there would be no requirement to provide formal footpaths or cycleway. Therefore, pedestrian connections will be provided via street access through the subdivision to areas of public open space and community facilities including Manyana Beach and Yulunga Reserve.

Major Project Application

In response Part 3A Major Project Application (SF9747) Shoalhaven City Council provided a letter dated 27th August 2007 (Attachment 19) raising the following issues:

- There is no intention by Council to require dedication or any proposed acquisition of the proposed Lot 1, which abuts and forms part of the coastal dune.
- A review of proposed Lot 1 indicates that it would have little usable recreational space and any passive or active recreation so Section 94 contributions associated with this development should be directed to embellish existing and/or proposed recreational facilities in Planning Area

5. Therefore, Lot 1 should be dedicated as part of the adjoining Crown Reserve system prior to becoming a Community Title/ Neighbourhood lot.

Council recommended the following amendments to the subdivision layout:

- Reconfigure proposed lots 2-10 and 12-22 to include land comprising the Asset Protection Zone (APZ) setback area. The APZ within each allotment is to have restrictions as to user applied as per Appendix 2, Planning for Bush Fire Protection 2006.
- Allotments that share a common boundary with the remainder of proposed Lot 1 are to be fenced in accordance with Council's *Boundary Fence and Courtyard Wall Code for Single Dwellings*.
- A footpath/cycleway is to be provided adjacent to the fence line within the remainder of proposed Lot 1 to formalise access to the existing beach accessway and existing facilities at the southern end of Sunset Strip and to link with the trail through the Crown Reserve to the south. The Right of Carriageway on the southern boundary adjacent to lot 22 should be incorporated in the footpath/cycleway and have unauthorised vehicle access restricted by a slip rail.
- The footpath/cycleway should be excluded from the remaining vegetation by use of barrier fencing (e.g. Post and Wire, Post and Rail) with at least one vehicle access point provided.
- A Vegetation Management Plan (VMP) is to be submitted for review by the Policy Planning Section of Council.

Response:

The issues raised in the above comments by Shoalhaven City Council have been addressed in other sections of this report or surpassed by further subdivision design resolution. The matter relating to dedication of Public Reserve is a matter that will require clarification. Council appeared at the time of these comments, to not understand the Community Land Management Act 1989 process had no relationship to *Community Land* in terms of dedication to Council. Nonetheless, dedication of lot 158 as public reserve is now proposed, which meets with the intent of most agency's design requirements and the early indications from the Community Consultation process.

Assistance is sought from the Department of Planning with a resolution to this matter as Council has previously indicated it is not willing to accept dedication.

Department of Planning and Department of Environment and Climate Change

Department of Planning

Watkinson Apperley Pty Ltd submitted the draft Environmental Assessment to the Department of Planning for a reviewed in relation to its adequacy in

addressing the DGRs. Department of Planning raised few issues that needed further input. Below is their main issues and how they have been addressed:

- Provided a locality plan indicating significant local features such as parks, community facilities and open space, water courses and heritage items.

The additional locality plan has been provided in Figure 1.3

- Please provide engineering drawings of at least one typical long-section of an internal roadway.

A long section of Sunset Strip has been provided in Attachment 6 to illustrate the form of a typical long-section within the proposed internal network.

- Provide a concept Landscape Plan.

A concept landscape plan has been prepared in accordance with Council requirements and is discussed in Section 7.12.

- Further assessment of the visual impact of the proposal when viewed from Inyadda Point is required.

The visual impact assessment has been updated with a Photo (photo 10) looking southwest from the rock platform near Inyadda Point to Manyana Beach. The photo shows that the proposed residential subdivision will not be seen from the rock platform because of the sand dunes, dunal vegetation and established bushland behind. The visual impact assessment concluded that the proposed subdivision will not be visible from Manyana Beach or from the rock platform near Inyadda Point because of its location behind the sand dunes and because of bushland to the west of the beach

- Provide a detailed Tree Removal/Retention Plan.

The Department of Planning agree that a Tree Removal/Retention Plan was not required as the intention is to removal all the vegetation from road reserve and from Lot 101 to 157 during the civil works associated with each stage of the development. Although it should be noted that all the vegetation on proposed lot 158 (3.97 hectares), representing 41.5% of the subject site, is proposed to be retained and dedicated to Shoalhaven City Council as public reserve. Furthermore, a concept landscape plan has been prepared that provides for street trees to be planted within the road reserve.

- Provide a plan showing indicative building envelopes.

A plan showing that all the lots have adequate buildable areas has been provided in Attachment 5. The plan takes into consideration all environmental constraints

as will the required offsets in accordance with Shoalhaven City Council requirements and the request for the reduce building setback lines.

- Update the Flood Impact Assessment to include reference to the DECC Floodplain Risk Management Guideline '*Practical Consideration of Climate Change*' and the latest IPCC report.
 - Ensure that all relevant scenarios and combinations of ocean and catchment storm conditions are assessed to determine the potential for flooding of the site.
 - Hydrologic and hydraulic models must be used to investigate and quantify flood behaviour.
- It appears that the trapping effort carried out for this proposal is insufficient in its intensity and coverage for this site. Tabulate all survey technique and effort against the recommended techniques and effort outlined in the draft *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004).

PMA the company who undertook the trapping as part of their initial Flora and Fauna Assessment is no longer in operation. We made contact with the former owner of the company Mr. Paul Mulvey regarding accessing PMA field notes for site to tabulate the survey techniques and efforts undertaken against the recommended techniques and efforts outlined in the draft *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004). Mr Mulvey advised that unfortunately he no longer has access to the original environmental files. Mr Mulvey provided a letter (Attachment 20) stating that all work completed under PMA environmental consultancy was completed in accordance with the recommended techniques and efforts outlined in the draft *Threatened Biodiversity Survey and Assessment Guidelines* (DEC 2004). Mr Mulvey indicated that to the best of his knowledge the trap stations (large and medium sized Elliot traps), which were set up at three non-random locations within the different vegetation communities were baited and results recorded over three consecutive nights on the 17th, 18th and 19th of January during the nocturnal fauna surveys.

- The EA needs to clearly state whether it meets each of the key thresholds set out in Step 5 of the draft *Guidelines for Threatened Species Assessment*.

The key thresholds set out in Step 5 of the draft *Guidelines for Threatened Species Assessment* are addressed in section 9.2 of the EA.

- Provide a plan of the subdivision layout overlain with the position of all ecological constraints (hollow-bearing trees, EECs, threatened species habitat/sightings). Add a line showing a 50m buffer to the EECs.

Figure 9.5 provides a subdivision layout plan overlain with the position of all ecological constraints (hollow-bearing trees, EECs, threatened species habitat/sightings). Furthermore, a line showing a 50m buffer to the EEC has been provided in accordance with the Department of Environment and Climate Change request.

- The draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC 2005) and the *Interim Community Consultation Requirements for Applicants* (DEC 2004) need to be followed and referenced within the relevant reports.

The *Interim Guidelines for Aboriginal Community Consultation – Requirements for Applicants* prescribe DECC consultation requirements for the preparation of applications for approvals under Part 6 of the National Parks and Wildlife Act 1974 (NP&W Act). Although the Interim Guidelines do not have direct application to the preparation of this report, as approvals under Part 6 of the NP&W Act are not required because the project has been approved under Part 3A of the Environmental Planning & Assessment Act 1979 (EPA Act), the consultation requirements have been complied with in its preparation, having regard to Section 8.1 of the Amended Statement of Commitments in the Minister's Approval.

In accordance with the Interim Guidelines, letters were mailed on 27 August 2007 to the Jerrinja Local Aboriginal Land Council (JLALC); NSW DECC; NSW Department of Aboriginal Affairs, the NSW Native Title Office and Shoalhaven City Council.

Notices (see below) were placed in the *South Coast Register* (29/8/2007); and the *Milton Ulladulla Times* (29/8/2007) inviting Aboriginal parties to formally register their interest in taking part in the proposed archaeological works at Manyana by 14 September 2007.

ABORIGINAL HERITAGE ASSESSMENT

Navin Officer Heritage Consultants Pty Ltd has been commissioned by Watkinson Apperley Pty Ltd to undertake subsurface archaeological investigation of various Aboriginal sites and areas of predicted archaeological potential at the Manyana Subdivision Area).

The investigation is required to assess the potential impact of the proposed development of these lands on Aboriginal cultural heritage values. The investigation is being assessed under Part 3A of the *Environmental Planning & Assessment Act*.

The area subject to investigation consists of approximately 10 hectares situated to the south of Manyana Drive.

As required by the Department of Environment and Conservation's *Interim Guidelines for Aboriginal Community Consultation*, we are inviting registration from interested Aboriginal groups and individuals in relation to this assessment.

Please forward expressions of interest to:

The Secretary
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street
Kingston ACT 2604

The closing date for this registration of interest is 14th September, 2007.

The Jerrinja LALC responded to the notice and was formally endorsed as a Registered Stakeholder. Shoalhaven City Council also registered its interest.

The Manyana Subdivision Study Area falls within the boundaries of the Jerrinja LALC. The Land Council was in administration at the time the archaeological subsurface testing program was conducted.

A copy of the subsurface testing methodology was provided to the Jerrinja LALC (20 September 2007) for their review and comment. No comments were received and the methodology was subsequently endorsed on the 23 October 2007.

- Provide further information on section 94 contributions.

Several meetings have been held with Shoalhaven City Council to negotiate an equitable contribution rate for additional section 94 contributions for this project. The contribution rate will comprise part of a voluntary planning agreement between the proponent and Shoalhaven City Council. The voluntary planning agreement will go on public exhibition in accordance with the *Environmental Planning and Assessment Act 1979* once it is finalised.

- Provide a maintenance period for the land that is to be dedicated to Council.

The proponent will provide a 3-year maintenance period for the land, which is proposed to be, dedicated Shoalhaven City Council.

Department of Environment and Climate Change

Watkinson Apperley Pty Ltd submitted the draft Environmental Assessment to the Department of Planning for a reviewed in relation to its adequacy in addressing the DGRs. The Department of Planning request DECC comments on the draft EA. DECC provided the attached letter (Attachment 21), which questioned the accuracy of the northern boundary of the Endangered Ecological Community and requested that the EA address the proposed offset against the thirteen principles provided in the DECC *"Principles for the use of biodiversity offsets in NSW"*.

Kevin Mills and Associates therefore carry out additional field survey of the area where the vegetation boundary was in dispute and identify, describe, map the vegetation types in that area and prepared a supplementary Vegetation Assessment (Appendix 3). The supplementary Vegetation Assessment reassess the boundaries of the vegetation types in light of the above investigations and assess the proposed biodiversity offset against DECC *"Principles for the use of biodiversity offsets in NSW"*.

Mills and Associates (2009) Supplementary Vegetation Assessment concluded that the Swamp Oak forest within the study area, can be divided into two types. Swamp Oak Floodplain Forest (EEC), growing on the wet lowest parts of the land where there is some influence from floods and to some extent estuarine conditions, and Upland Swamp Oak Forest, growing on the higher land above.

The forest on the higher land, essentially above the 1:100 year flood event, is not an endangered ecological community. That regrowth forest is either Upland Swamp Oak Forest or Bangalay - Banksia Forest. A new vegetation map has been prepared showing the distribution of the identified plant communities (Figure). The communities and their distribution have been assessed and identified in the field and supported by vegetation survey plots and photographs.

The re-assessment has resulted in a reduction of the EEC by 0.65ha with the northern boundary being repositioned to the southern side of Sunset Strip. Mills and Associate's (2009) updated mapping clearly disagrees with the mapping provided by the DECC and we are of the opinion Mills and Associates (2009) mapping is more accurate and should be the mapping referred to for the assessment of the project.

DECC also raised the issue of the using proposed Lot 158 as a biodiversity offset for the removal of the small section of EEC which is located on the edge of the community and adjacent to existing residential development. The Supplementary Vegetation Assessment addresses the thirteen principles provided in the DECC *"Principles for the use of biodiversity offsets in NSW"*. The report concludes that the proposed offset land in conjunction with the proposed vegetation management plan are consistent with the DECC *"Principles for the*

use of biodiversity offsets in NSW” and will enhance the biodiversity of the dedicated area in the long term to a value equal to or greater than the loss of the 0.4 ha of the Swamp Oak Floodplain Forest.

5.1.2 Community Consultation

A meeting was held with the executives of the Red Head Community Association (Mr. Peter Hudson, Mr. Ian Barrett, Mr. Geoff Bloomfield and Mr. John Bryant) on 11th June 2008. The Red Head Community Association comprises an amalgamation of the former community groups and associations for the Manyana area (Bendalong & Districts Environmental Association, Manyana District Citizens Association, Save Manyana Alliance) and therefore is the principal community association representing the Manyana Area.

At the meeting Watkinson Apperley provided a short presentation on the proposed subdivision and the design process. We discussed the environmental constraints associated with the subject site and what mitigation measures will be employed to minimise the impact on the environment. Overall, attendees at the meeting were supportive of the proposal and recognised that the proponents had undertaken the required environmental investigations and had incorporated the recommendations of those investigations into the design of the subdivision. The community group representatives were pleased with the final design option which realised a reduction in lot yield from 71 to 57 and that proposed Lot 158 become public land through dedication to Shoalhaven City Council.

During the meeting with the community group representatives a number of general issues about Manyana were discussed. Explanations were provided on the design process and how this proposal addresses these issues. The representatives were generally supportive of the project and design outcome, which they believe is suited to the existing character of Manyana. We also informed the community group representatives that they would have the ability to make further comment once the application was lodged with the Department of Planning. The topics of discussion have been grouped into 8 categories as shown in Table 5.1 along with sections of the report, which discuss the relevant issues.

Community Issue	Relevant Section of EAR
Access to the Beach	Section 3.8
Traffic and Access Impact	Section 7.10
Flora and Fauna Impacts	Sections 7.6, 4.1.1 & 4.2.1
Management of Lot 158	Lot 158 is proposed to be dedicated to Shoalhaven City Council as public reserve, with a Vegetation Management Plan at the registration of Stage 1. Shoalhaven City Council will be responsible for the ongoing management of the Lot 158.
Aboriginal Heritage	Section 7.4
Stormwater Issues	Section 7.1
Capacity of existing Infrastructure	Sections 3.6 and 7.13
Scale and density of the proposed development	Sections 3.7 and 9.2

Table 5.1: General issues raised in discussion with community group representatives

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.

- Acid Sulphate Soil Assessment, prepared by Douglas Partners, July 2007 (Appendix 2);
- Flora and Fauna Assessments, prepared by Kevin Mills and Associates, 2008 and 2009 (Appendix 3);
- Visual Impact Assessment, prepared by Maurice Hayler and Associates, 2007 (Appendix 4);
- Acid Sulphate Soil Management Plan, prepared by Douglas Partners, 2007 (Appendix 5);
- Bushfire Protection Assessment, prepared by Bushfire and Environmental Assessment, 2008 (Appendix 6);
- Traffic Impact Assessment, prepared by Watkinson Apperley Pty Ltd, 2007 (Appendix 7);
- Aboriginal Heritage Assessment, prepared by Navin Officer Heritage Consultants Pty Ltd, 2005 (Appendix 8);
- Aboriginal Subsurface Testing Report, prepared by Navin Officer Heritage Consultants Pty Ltd, 2008 (Appendix 9);

- Flood and Stormwater Assessment, prepared by Watkinson Apperley Pty Ltd, August 2008 (Appendix 10);
- Coastal Impact Assessment, prepared by Gary Blumberg & Associates Pty Ltd, 2008 (Appendix 11);
- Flora And Fauna Assessment, prepared by PMA 2005, amendments of July 2007 (Appendix 12); and
- Bushfire Protection Assessment, prepared by PMA, 2005 (Appendix 13).

7 ENVIRONMENTAL IMPACT ASSESSMENT

While a large proportion of Manyana and the surrounding area is currently vegetated in native vegetation, population growth and the need for infrastructure are putting increasing pressure on developable land, which will result in the clearing of some native vegetation communities. It is acknowledged that measures need to be taken to avoid ecologically unsustainable impacts on biodiversity and negative environmental impacts. This chapter discusses the potential environmental impacts of the proposed subdivision and the mitigation measures, which have been recommended and incorporated into the subdivision layout design to minimise those environmental impacts.

7.1 Water Cycle Management

7.1.1 Existing Environment

Watkinson Apperley Pty Ltd were engaged to prepare a Stormwater Management Plan and Flood Study (Appendix 10). The results and recommendations of the Stormwater Management Plan and Flood Study are used in the following section.

The site is partly cleared and partly covered by the natural coastal vegetation. It is located at the downstream end of a 70ha catchment, which takes in a large portion of the developed portion of Manyana. A remnant watercourse traverses the site, in a west to east direction generally behind the location of proposed lots 115, & lots 103 to 101, through to Manyana Beach. There is also a smaller drainage path running from a piped drainage outlet at the rear of Lot 630 DP247282 (No. 25) Manyana Drive to the remnant watercourse. The subject site slopes generally and gradually towards the watercourse and the ocean at grades of between 1% and 5%.

The Catchment was divided into 5 sub catchments for flow analysis, Catchments 1a, 1b, 1c, 2 and 3. These catchments are shown in Figure 7.1. It should be noted that the subcatchment delineation adopted in Figure 7.1 is different to that

adopted for the water quality model due to the differences between the function of the hydraulic and the water quality models.

Catchments 1a, b, and c drain through the existing street pipe drainage network and via overland flows to the soccer field and subsequently to the head of the creek at the downstream end of the proposed development. Catchment 2 is collected by the existing street drainage which discharges into an open drain through proposed Lot 111 to the watercourse at the downstream end of the proposed development. Catchment 3 currently drains as overland flow directly to the creek.



Figure 7.1: Shows the 5 sub catchments used for the for flow analysis

The stormwater runoff and water levels for the various cross sections within the remnant creek were determined by modelling them in the urban drainage design and analysis modelling software “DRAINS”. “DRAINS” calculates catchment response by unit hydrograph and kinematic wave analysis. Flow depths for overland flow upstream of the creek were determined using open channel flow analysis with the peak overflows determined from the DRAINS model.

The DRAINS subcatchments were adjusted to account for the existing impervious area to model the flows from the existing system. A summary of estimated DRAINS peak flows is provided in Table 7.1 for the existing conditions.

Sub-Catchment	Area	DRAINS Existing Development	
		Q ₅	Q ₁₀₀
1a	34.4	4.6	11.5
1b	7.5	2.4	4.7
1c	9	1.5	3.7
2	15.5	3.4	7.2
3	3.4	0.5	1.3
Total	69.8	11.9	26.3

Table 7.1: Existing Peak Flows (m³/s)

The existing catchment has no stormwater management controls therefore the watercourse that runs through the subject site currently receives untreated runoff from the existing developed and undeveloped areas in the 70ha catchment.

7.1.2 Potential Impacts

The construction of the proposed subdivision with the removal of vegetation and the increase of impervious areas will alter the natural vegetation and infiltration characteristics of the catchment. This in turn could cause the catchment to have a 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 creek.

The impervious areas for sub-catchments 1c, 2, and 3 were adjusted in the DRAINS model to account for the estimated impervious area of the subject development assuming an increase to 40% impervious over the affected areas. A summary of estimated DRAINS peak flows is provided in Table 7.2 for the post development conditions. A comparison of the post development peak flow with the existing development flow for the total catchment shows that there is no increase in total peak flows as a result of the proposed development for the 100 year ARI storm. However as indicated in appendix D of appendix 10 there is a slight increase of 1.7% for the 1 year and 5 year storms. The difference between the existing and post development peaks for the 1 year and 5 year storms is considered within the limits of accuracy of the modelling. Therefore it is considered that there would be no increase in the total peak flow from the development within the limits of accuracy of the hydraulic modeling.

Sub-Catchment	DRAINS POST Development	
	Q ₅	Q ₁₀₀
1a	4.6	11.5
1b	2.4	4.7
1c	2.2	4.6
2	3.4	7.2
3	0.8	1.6
Total	12.1	26

Table 7.2: Existing Peak Flows (m³/s)

A consideration of this development is whether the site is flood prone. Urban development has the potential to increase the effects of floodwaters. Floodwaters can have a number of impacts on urban area including:

- **Economic impacts** - this includes the cost of damage done to a property by a flood, the costs of clean-up (e.g. paying for the house to be dried out), the costs of living in temporary accommodation, and possibly the costs of having a house that is harder to re-sell because it has been flooded or is in a defined floodplain.
- **Non-economic losses** - this refers to the loss of items of sentimental value (e.g. photographs).
- **Impacts on physical and psychological health** - the potential health effects can be considered at three time periods:
 - immediate: death by drowning, injuries due to being knocked over by flood waters or struck by falling trees, over-exertion during the event, hypothermia,
 - electrocution, exposure to contaminants, the stress of the event itself;
 - medium term: gastrointestinal illnesses, cardiovascular disease from over-exertion during recovery/clean-up processes, lacerations, sprains/strains, dermatitis, respiratory illnesses, carbon monoxide poisoning;
 - longer term: mostly psychological effects.
- **Impacts associated with evacuation and temporary accommodation** - these impacts include both the effects of having to leave home and those of having to live away from home. In urban areas, if there are large numbers of people to be relocated then this will put pressure on services, and may mean that people have to live in cramped and overcrowded conditions, or have to move a distance from their homes.
- **Household disruption** - this refers to the business of cleaning up the house, dealing with builders, and dealing with living in a damp environment.
- **Community and neighbourhood changes** - This refers to impacts at the community and neighbourhood level. For example impacts businesses could substantially change the nature of that community.

The hydraulic modelling performed in the Stormwater Management Plan and Flood Study estimated the peak water levels over the remnant creek and proposed lots at the lower end of the catchment for estimation of flooding impact in major storms (100 year flood event and 100 year flood event incorporating climate change). The impact on climate change was modeled by incorporating an increase in rainfall intensities of 30% above the existing 1% AEP event and sea level rise of 90cm (sea level of RL 3.7 mAHD at the creek outlet), based on the current NSW Department of Environment and Climate Change (DECC)

guidelines for assessing the effects of climate change on flooding and the draft Sea Level Rise Policy Statement respectively.

The modeling showed that proposed Lots 115, 116 and 119 are the only lots impacted by flood flows from the 100 year flood event (and therefore all events of lesser magnitude). However, when incorporating future climate change the number of affected lots increase from three to six lots (Lots 103, 115, 116, 117, 118 and 119).

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

7.1.3 Mitigation Measures

A concept Stormwater Management Plan has been prepared for the proposed subdivision. The concept Stormwater Management Plan has been designed to meet the following objectives:

- peak runoff flow rates from the development during storm events should not exceed existing values;
- average annual runoff volume after development should be minimised;
- average annual pollutant load in runoff following development should not exceed existing values; and
- industry best practice runoff water quality control measures should be implemented to achieve a maximum reduction in the annual pollutant load from the development

The concept Stormwater Management Plan is based on the following philosophies:

- The general drainage philosophy for the site will be to provide piped drainage for the 1 in 5 year Average Recurrence Interval (ARI) storm event within areas draining to existing drainage infrastructure and to provide an overland flow path for the 1 in 100 year ARI storm event.

Detailed survey and calculations of the existing piped drainage within The Barrette, The Palisade, and Manyana Drive will form part of the detailed design for the development to confirm the existing pipe system capacity. Where the system capacity is determined to be marginal On Site Detention may be specified for the proposed lots draining to those areas.

- Low flows within the new section of Sunset Strip will be directed to bioretention filters within the road reserve and outflows from the existing piped drainage off Manyana Drive will pass through a proposed constructed wetland. Where possible, treatment of flows for water quality will follow a treatment train approach providing primary, secondary, and tertiary treatment for water quality, via gross pollutant trap, bioretention, and wetland water quality measures.
- Easements for drainage are to be created over proposed Lots 116 and 111 to cater for the existing drainage lines through those lots with the existing pipe terminating in Lot 111 to be extended through to drain on the downstream side of Sunset Strip.
- Where lots do not drain directly to the street interallotment drainage and 1.0m wide easements shall be provided along the rear boundaries to connect to the street drainage system. An easement will be negotiated with the owners of either Lot 765, 766, or 767 DP 247285, The Palisade for connection of the proposed interallotment drainage with the existing system in The Palisade.
- Due to the development being at the downstream end of a large catchment, drainage easements will be required over piped flows transported from roadways within the development to the watercourses below the development. Such easements are over proposed lots 115 and 111 and shall be a minimum 3 meters wide benefiting Shoalhaven City Council.
- Stormwater detention is not required for the proposed development as a result of its being predominantly at the downstream end of the catchment. It is generally accepted (and borne out by stormwater flow modelling) that detention facilities installed at the downstream or outlet end of a catchment provide either no reduction, or in some cases an increase in peak flows at the catchment outlet due to the lag time for the bulk of flows over the remainder of the catchment. The proposed wetland therefore is to be designed without specific attention to stormwater detention for peak flow reduction.

As discussed in section 7.1.2 the hydraulic modelling showed that proposed Lots 103, 115, 116, 117, 118 and 119 are impacted by flood flows from the 100 year flood event incorporating climate change. As a consequence of the predicted flood extents a minimum finished floor height of 0.5m above the predicted 100 year ARI flood level incorporating climate change is proposed. The minimum habitable finished floor levels of the affected lots are provided in Table 7.3.

Lot Number	ARI 100 Peak Water Level Incorporating Climate Change (m AHD)	Minimum Habitable Floor Level (m AHD)
103	4.43	4.62
115	5.43	5.93
116	5.43	5.93
117	5.43	5.93
118	5.19	5.69
119	4.96	5.46

Table 7.3: Proposed Minimum Habitable Floor Levels

As the extent of flooding is otherwise fairly constrained, and emergency egress from proposed Lots 103, 115, 116, 117, 118 and 119 is readily and safely available via the adjoining streets, construction of dwellings on these lots will be acceptable subject to the minimum habitable floor level being set at 500mm above the 100 year peak water level incorporating climate change. The boundaries of Lots 101, 102, and 120 were found to be close to the predicted flood levels and were checked for possible impact on building floor levels. It was found that the buildable envelope within these lots was at least 500mm above the 100 year peak water level incorporating climate change and therefore no minimum floor level was required.

The stormwater management strategy to be implemented on the site is proposed to incorporate best practice water sensitive urban design (*WSUD*) measures. The proposed treatment system has been designed to retain and filter stormwater to remove pollutants such as litter, sediment and nutrients to protect the existing watercourse. The proposed treatment system for this proposal consists of the following:

- A gross pollutant trap to treat the stormwater from sub-catchments 1 and 2.
- A constructed wetland to provide a secondary level of treatment for the outflow from the gross pollutant trap.
- Kerbside bioretention areas will be constructed within the proposed extension to Sunset Strip to treat runoff from the new road and proposed lots within subcatchments 3 and 4.
- A vegetated swale (comprising a rock armoured outlet treatment) will be constructed to convey the stormwater from the existing development within catchment 3 and 4 to the existing Creek. The swale will be vegetated with a range of native grasses, shrubs and sedge species, depending on hydraulic requirements.
- A 30 to 50m existing vegetated buffer (riparian zone) has been provided between sub-catchment 3 and 4 and the watercourse.

The efficiency of treatment system was modeled on MUSIC Version 3.01. The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is a water

quality model.

The results show that pollutant loads will be reduced to below existing levels for suspended solids and phosphorus while nitrogen loads are predicted to increase by 1.8%. However it should be acknowledged that phosphorus is the limiting growth factor for most freshwater environments (ARQ, 2006) and therefore the impact of a 1.8% increase in nitrogen with the reduction of all other loads could be considered as minimal.

The existing development in the catchment has no stormwater management controls and thus the recommended treatment systems will also provide treatment to existing development. Therefore if the stormwater management for the proposed subdivision is designed and installed in accordance the recommendations in the Stormwater Management Plan, stormwater runoff will be collected and treated prior to discharge from the site improving the water quality of the water reaching the watercourse at the base of the site.

The proposed maintenance program for the sites water quality control measures would consist of the following:

- Periodic (*6 monthly*) inspection and removal of any gross pollutants & coarse sediment that is deposited in the water quality control pond and replacement of vegetation as necessary;
- Periodic (*3 monthly*) and episodic (*post storm greater than 1 yr ARI*) inspection and removal of trapped pollutants from all GPTs and bio-retention systems

7.2 Noise and Vibration

7.2.1 Existing Environment

Currently the subject site experiences a small amount of noise from the adjoining residential dwellings and from trail bikes unofficially using the sections of the site.

7.2.2 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 ambient background noise levels associated with an 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.

7.2.3 Mitigation Measures

The proposed development will generally have 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 subject to time constraints by way of relevant hours of operation in the development consent. It is foreseen that the future noise level generated by the proposed development will be similar to the existing residential area, and will be regulated by relevant state legislation and policies for residential living. Furthermore, the dedication of Lot 158 to Shoalhaven City Council as public reserve will give Council more power to control the unofficial use of the site by trail bikes. The increase in houses with surveillance to the public reserve will also assist with self-policing of behaviour and unlawful use of the reserve area.

7.3 Air Quality

7.3.1 Existing Environment

The Shoalhaven region in general has an excellent level of air quality, well above both current and proposed standards. The subject site is currently un-developed and predominately comprises native coastal vegetation. The air quality within the subject site would be considered excellent, with only the occasional odour problem associated with decaying seaweed located along Manyana Beach and Hydrogen Sulfide or 'rotten egg' gas released from Berringer Lake and Lake Conjola depending on prevailing wind conditions.

7.3.2 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.

7.3.3 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, with 3.97ha (41.5% of the total site area) of vegetated land proposed to be dedicated to Shoalhaven City Council for the purposes of public reserve. The intent of the land dedication is to ensure the protection of coastal back dune environment (which comprises three endangered ecological communities) and the riparian corridor located in 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 dwellings constructed within the proposed subdivision, will be required to satisfy the BASIX SEPP requirements.
- The proposed development will result in an increase in traffic movement of 513 vehicle movements per day. This is considered to be a relatively small increase in the overall traffic movements of the local area.

7.4 Aboriginal Heritage

7.4.1 Existing Environment

Navin Officer Heritage Consultants Pty Ltd were engaged to conduct an Aboriginal Heritage Assessment of the subject site in 2005 (Appendix 8). Navin Officer has undertaken the following four Aboriginal archaeological investigations which have included all or part of the Manyana Subdivision study area:

- Navin Officer Heritage Consultants 2001b Conjola Regional Sewerage Scheme EIS. Cultural Heritage Component. Report to CH2MHill Pty Ltd.
- Navin Officer Heritage Consultants 2005 Proposed Subdivision of Lots 682, 705 and 810, Manyana, NSW. Aboriginal Cultural Heritage Assessment. Report to Watkinson Apperley Pty Ltd

- Navin Officer Heritage Consultants 2005b Conjola Regional Sewerage Scheme Archaeological Subsurface Testing Program. Report to NSW Department of Commerce.
- Navin Officer Heritage Consultants 2006 Conjola Regional Sewerage Scheme Archaeological Salvage Program. Report to NSW Department of Commerce.

Archaeological assessments carried out for the Conjola Regional Sewerage Scheme have included several areas that are located within the present investigation area at Manyana. Two artefact scatters (CS14 and CS25) and two PADs (PAD 1 and PAD 4) were recorded within or close to the present study area during field survey of these areas (Figure 7.2).

- Site CS14 (AHIMS# 58-2-0375) was recorded as a large low to high density surface artefact scatter (c.500 artefacts) located on low gradient, north to northeast facing mid-slopes on the spurline which forms Cunjurong Point. Exposures of artefacts occurred within the northern and southern road reserve extensions of Austen Street and Manyana Drive (maximum area dimensions: 175 x 60+m). Artefacts were visible in eroded road easements, gullies and extensive areas of sheet erosion. Artefacts included flakes, cores, flake fragments, backed blades and retouched flakes. The site was associated with potential archaeological deposit.
- Site CS25 (AHIMS# 58-2-0397) was a low density scatter of two visible artefacts located 5 m apart in an exposure (60 x 80+m) approximately 10 m west of the proposed sewer main alignment from the northern end of Alaska Street to Sunset Strip. The exposure was part of complex of exposures that adjoined site CS14. The area was very eroded, with lag gavels laying on top of a trampled clay horizon. It was considered that site CS25 may be an extension of site CS14, which was located about 140 m to the west of the proposed new sewer main. Both sites were located on the same topographic feature, ie a low gradient, north to northeast facing mid-slopes on the spurline, which forms Cunjurong Point.
- PAD 1(AHIMS# 58-2-0398) was located on the alluvial flats adjacent to a tributary creekline and small estuary lagoon behind Manyana Beach. The PAD was located on the proposed pipeline route along alluvial flats at Manyana.
- PAD 4 was identified along the pipeline easement associated with the site CS25. The assessment mapped the PAD dimensions as confined to the pipeline easement (50 m) but is highly likely to expand beyond this corridor.

Field survey for the Manyana subdivision development was conducted in 2005 recording five previously unidentified Aboriginal sites (MS1-MS5) and extending the boundaries of the two previously recorded sites CS14 and CS25 (Figure 7.2).

The new sites included four artefacts scatters (MS1, MS3, MS4 and MS5) and a single isolated find (MS2).

- MS1 is an artefact scatter comprising two artefacts (grey quartzite (flake) and grey silcrete (flaked piece) situated on a foot track that ran along the southern boundary of the study area. The track followed the alignment of a water pipeline and provided good visibility in otherwise heavily vegetated ground. The site was on the gentle north facing slope of the main spurline that forms Cunjurong Point. The deposits of the site were characterised by a grey sandy deposit overlying more compact sandy clay. Off the track, the deposits appeared to be relatively intact and therefore there is high potential for subsurface deposits to occur.
- MS2 is an isolated artefact (pink silcrete (flaked piece) located at the junction of walking tracks at the western boundary of the study area, where the walking track meets an existing roadway. The site was on a gentle north facing slope of the main spurline and the deposits were typically a sandy upper level over a more clayey deposit. There is very good potential for the site to extend off the track into the relatively undisturbed ground within the study area. The deposits present would also suggest that there is high potential for subsurface cultural deposits.
- MS3 is an artefact scatter comprising five artefacts (grey silcrete (flaked piece), grey silcrete (broken flake), grey silcrete (core), red & grey banded quartzite (flake) & grey quartzite (flake)) located on gently sloping north facing lower slopes of the main spurline of Manyana – Cunjurong Point. The site was found in an area of sheet erosion and disturbed ground at the end of a street named The Barquette. The soils at the site appeared to be a sandy clayey deposit, most likely with a sandy upper horizon that has now eroded away. However, where relatively undisturbed deposits remain there would be high potential for subsurface cultural material.
- MS4 is a small scatter of two artefacts (grey silcrete (broken flake) & white quartz (broken flake)) was located on a narrow walking track behind existing houses on the boundary of the study area. The site was on the same north facing lower slope as site MS3 and the deposits were grey sandy loam. There is high potential for this site to be larger and extend across the undisturbed, vegetated lower to upper slopes of the study area.
- MS5 is an artefact scatter comprising six artefacts (milky quartz (broken flake), grey (very fine) silcrete (core), creamy grey silcrete (flake), grey quartzite (core), pink/grey silcrete (flaked piece) & grey silcrete (flaked piece)) located in a large erosion exposure that was used as a bike track. The site area was almost level but slightly elevated above the drainage line located about 50 m to the north. It was situated at essentially the basal slope of the main spurline that forms Cunjurong Point. The exposed deposits were mainly yellow brown sandy clay with some ironstone gravels also evident. There is moderate to high

potential for subsurface deposits to occur within the site area and also outside the exposure.

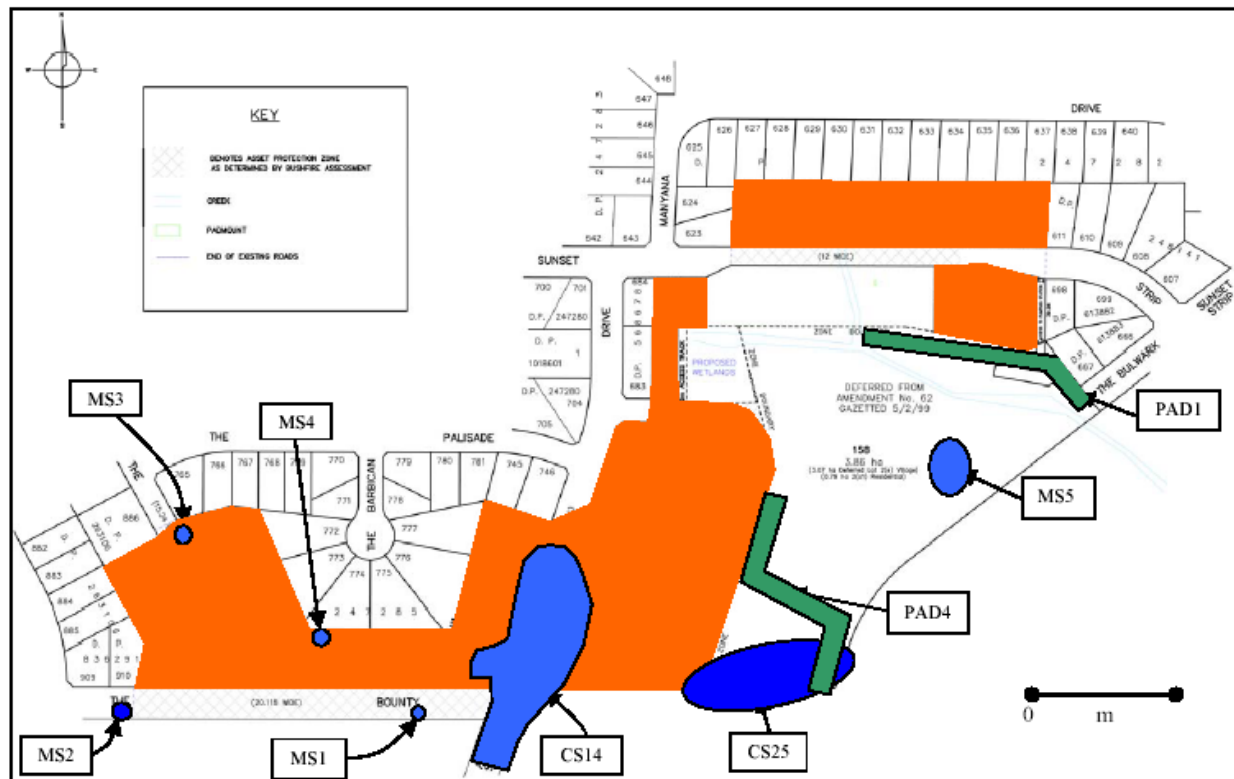


Figure 7.2: Location of Aboriginal sites [blue] and PADs [green] within the Manyana development area [orange]

(Source: Navin Officer Heritage Consultants Pty Ltd, 2008)

Isolated finds are not normally considered significant therefore, site MS2 is not considered to have any archaeological significance. The remaining sites within the study area, MS1, MS3, MS4, MS5, CS145 and CS25 all have typical characteristics of sites in the region. They are small to large artefact scatters, revealed in exposed ground on foot and vehicle tracks and erosion. At each location there is high potential for the site to be larger and to extend beyond the exposures. In particular, sites MS1, MS2, MS3, MS4 and CS14 are likely to extend across the northern slopes of the spurline to form one large site. Indeed there is also good potential that sites CS25 and MS5 could extend across the intervening vegetated areas to form a large site.

7.4.2 Potential Impacts

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.

The survey found that while sites (MS5 and CS25) and two areas of potential archaeological deposit (PAD 1 & 4) occurred within the area proposed to be dedicated to Shoalhaven City Council and are not likely to be impacted by housing development or other infrastructure the remaining five sites would be impacted by the current proposal. Furthermore, the survey found that there was potential for artefacts to be located across most of the study area, however the significance of the sites could not be determined based on the surface manifestations. Navin Officer therefore recommended that further archaeological assessment in the form of subsurface testing would be required to more accurately identify the nature and extent of the sites. The testing program would aim to identify the extent, nature and significance of the archaeological deposits and sites across the study area.

7.4.3 Mitigation Measures

An extensive subsurface testing program for the Conjola Regional Sewerage Scheme was undertaken during 2005 and included parts of the current study area (Navin Officer Heritage Consultants 2005b). Four auger holes were excavated at PAD 1. The deposit was wet sieved but no cultural material was located. It was concluded that this was most likely due to the low lying nature of the topography. The vegetation was also thick and infested with ticks and leeches, probably contributing to a poor occupation locale. Fourteen auger holes were excavated along a proposed pipeline route at PAD 4. Artefacts were retrieved from two of the auger holes, which were situated on the crest and upper northern spur slope of the spurline.

PAD1 and PAD4 were found to contain low artefact areal incidence and were both situated within a generally disturbed context. It is considered unlikely that additional archaeological assessment of these areas would reveal increased artefact numbers or provide data to answer research questions. No further archaeological investigation was therefore considered necessary at PAD1 and PAD4.

Surface collection at Site CS26 was conducted under a program of archaeological salvage for the Conjola Regional Sewerage Scheme during 2006 in accordance with subsurface testing recommendations provided in 2005 (Navin Officer Heritage Consultants 2006). Five silcrete flakes were collected at the southern end of the 'Bulwark' road next to a small creekline at Manyana. Little could be extrapolated from such a small sample however analysis of the

complete Conjola Regional Sewerage Scheme assemblage indicated that on-site manufacture of stone artefacts was probably represented at all sites and furthermore, sites with a small sample size that were characterised by an absence of cores and hammerstones reflected on-site reduction of material.

In August 2007 as part of the environmental assessment for this development Navin Officer Heritage Consultants Pty Ltd was engaged to conduct an Archaeological Subsurface Testing Program over the subject site and to report their finding (Appendix 9). In accordance with the *Interim Guidelines for Aboriginal Community Consultation – Requirements for Applicants*, letters were mailed on 27 August 2007 to the Jerrinja Local Aboriginal Land Council (JLALC); NSW DECC; NSW Department of Aboriginal Affairs, the NSW Native Title Office and Shoalhaven City Council. Furthermore, notices (see below) were placed in the *South Coast Register* (29/8/2007); and the *Milton Ulladulla Times* (29/8/2007) inviting Aboriginal parties to formally register their interest in taking part in the proposed archaeological works at Manyana by 14 September 2007.

ABORIGINAL HERITAGE ASSESSMENT

Navin Officer Heritage Consultants Pty Ltd has been commissioned by Watkinson Apperley Pty Ltd to undertake subsurface archaeological investigation of various Aboriginal sites and areas of predicted archaeological potential at the Manyana Subdivision Area).

The investigation is required to assess the potential impact of the proposed development of these lands on Aboriginal cultural heritage values. The investigation is being assessed under Part 3A of the *Environmental Planning & Assessment Act*.

The area subject to investigation consists of approximately 10 hectares situated to the south of Manyana Drive.

As required by the Department of Environment and Conservation's *Interim Guidelines for Aboriginal Community Consultation*, we are inviting registration from interested Aboriginal groups and individuals in relation to this assessment.

Please forward expressions of interest to:

The Secretary
Navin Officer Heritage Consultants Pty Ltd
4/71 Leichhardt Street
Kingston ACT 2604

The closing date for this registration of interest is
14th September, 2007.

The Jerrinja LALC responded to the notice and was formally endorsed as a Registered Stakeholder. Shoalhaven City Council also registered its interest. Representatives of Jerrinja LALC were present during the subsurface testing program.

The Manyana Subdivision Study Area falls within the boundaries of the Jerrinja LALC. The Land Council was in administration at the time the archaeological subsurface testing program was conducted.

A copy of the subsurface testing methodology was provided to the Jerrinja LALC (20 September 2007) for their review and comment. No comments were received and the methodology was subsequently endorsed on the 23 October 2007

The aims of the Manyana Subdivision archaeological subsurface testing program were to determine if Aboriginal sites or Aboriginal Objects (as defined by the NPW Act) were located subsurface within the identified test areas.

Specific aims were to:

1. Characterise the nature of any archaeological deposits encountered (within the limitations of the sampling and processing methodology).
2. Identify the need for any further archaeological work, such as salvage excavation.
3. Provide informed mitigative measures and management recommendations for any sites located within the proposed development zone.

The excavation program was conducted over the course of five days during November 2007 and January 2008. Twenty seven (27) archaeological test pits were excavated on a rough 40 m grid by backhoe and mechanical excavator using a straight-edged 850 mm wide toothless bucket. The depth interval for each spit was 5-20 cm and each pit was approximately 3 m long. The locations of test pits are shown on Figure 7.3.

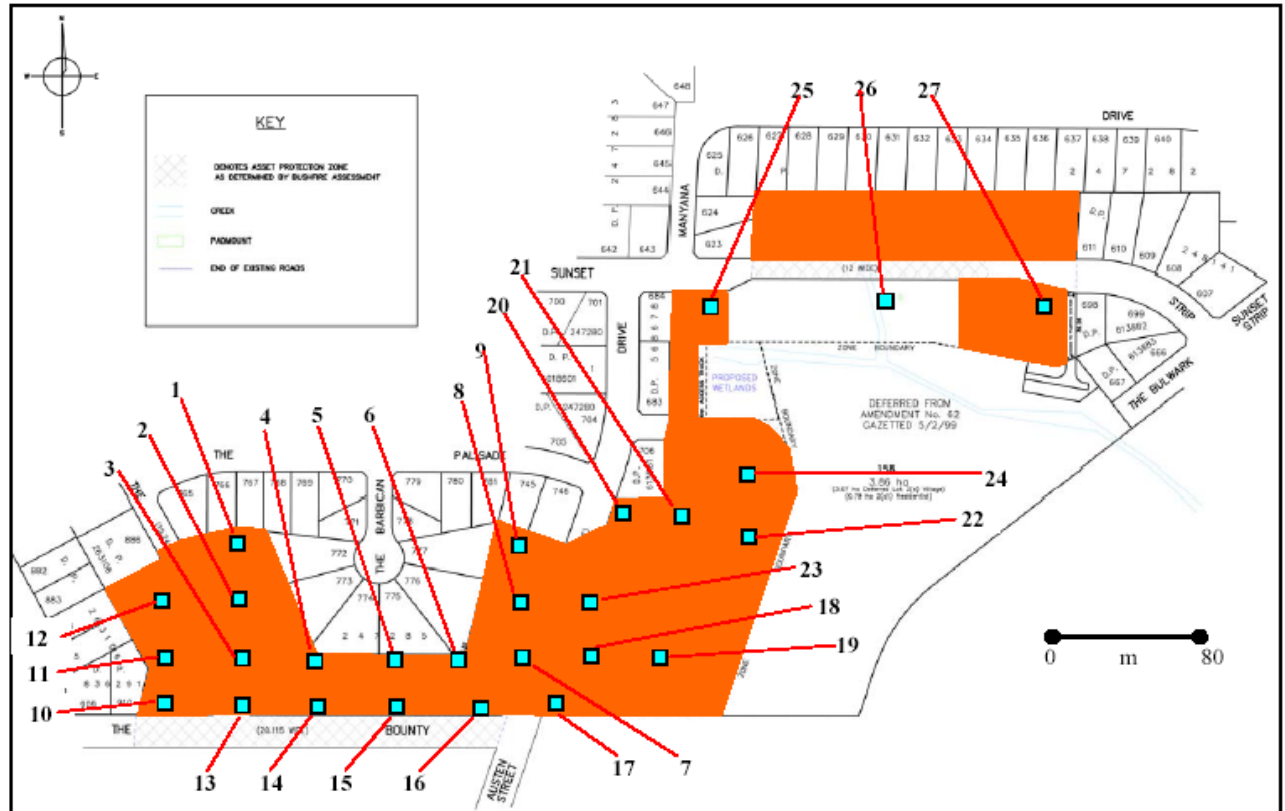


Figure 7.3: Location of test pits [blue] excavated during subsurface program within the Manyana Subdivision study area [orange]
(Source: Navin Officer Heritage Consultants Pty Ltd, 2008)

Analysis of the Manyana Subdivision salvaged stone artefact assemblage involved the macroscopic inspection and classification of stone artefacts into 44 technological classes, or “assemblage elements”. These categories help capture the variability in chipped and ground stone assemblages found on the NSW coast. The approach to classification adopted here first orders artefacts resulting from conchoidal fracture into cores, flakes and retouched flakes. This scheme views these three categories as mutually exclusive, chronologically distinct stages in the reduction of stone materials. Cores are defined as artefacts possessing only negative conchoidal scars. Six types of cores are recognized in the analysis: single platform, multiplatform, bidirectional, discoidal and uni- and multi-directional bipolar cores. Large flakes that have been extensively spalled along their margins are recorded as burinate cores as well as retouched flakes.

The analysis of the incidence of artefacts across the test pits and test sites is best conducted using an areal measure of incidence rather than a volumetric measure, such as density. This approach is required for two reasons: the variable volumes of the excavation units, and the inability to relate artefact depth with chronology.

The Manyana Subdivision subsurface testing program has collected detailed information on 479 stone artefacts with the potential to inform on local and regional landuse and lithic technology. The Manyana assemblage has lower than average assemblage richness in a comparative study of twenty one East Coast sites, and also has the lowest raw material richness of any in the sample. The assemblage represents an almost exclusive use of locally available silcrete, comparable to sites situated adjacent to the current study area.

Below is a brief overview of the finding of the subsurface testing:

- Four hundred and seventy nine (479) lithic items, including 126 artefacts, were recovered from 21 of the 27 test pits excavated at Manyana, excluding pits 9, 19, 22, 24, 25 and 26.
- The largest number of stone artefacts was recovered from Pits 17, 5 and 2. Other pits nearby to these also have some of the largest assemblages, suggesting a zone of high artefact discard was concentrated on the gently sloping north facing lower slopes on the main spurline of the Manyana - Cunjurong Point. The majority of excavation pits returned only small numbers of artefacts.
- Three stone material types were recovered from the subsurface investigation within the Manyana Subdivision Area. The majority of the assemblage is overwhelmingly dominated by silcrete (97.9%) with a small quantity of quartz (1.9%) and a single basalt flake (0.2%). The majority of silcrete within the Manyana assemblage varied in shades from deep red to pink in colour. Texture varied from coarse to fine, but a general observation was that the coarse red silcrete was the predominant raw material. Discoloration may also be an indicator of heat treatment but the typical lustre associated with this process was not obvious within the assemblage.
- Twenty two (22) lithic item types were identified in the Manyana assemblage including: lithic fragment, manuport, flake, flaked piece, flake fragment, flake portion, broken flake, broken flaked piece, microblade, broken microblade, chip, core, core fragment, backed artefact, broken backed artefact, utilised flake and utilised artefact.
- The Manyana assemblage is dominated by broken flakes and flaked pieces (85%) but fire cracked rocks, microblade fragments (2%), redirecting flakes (2%), broken backed artefacts (1.3%) and retouched and unretouched artefact forms are also present in small numbers.
- In general the lithic items recovered from the Manyana area are very small in size, and lightweight, as is typical for flaking debitage and heat fractured lithic items in recent prehistoric lithic assemblages, and typical of the NSW South Coast.
- Generally the artefacts were recovered from the top three spits of the excavations, and the largest peak in artefacts occurred around 30 cm below the surface in most pits. There is no evidence of size sorting of

artefacts over the depth of the site and it is suggestive that the cultural stratigraphy of the site may well be intact. The more elevated slopes typically displayed varying degrees of truncation and erosion.

- The assemblage is highly fragmented however edge damage is rare and is mostly concentrated around areas with large assemblages where trampling damage is likely. Heat fracture is also common at the site and was probably one of the causes of the high rates of artefact fracture. The assemblage shows very little cortex, careful preparation of platforms and mostly small squat flakes. Cores are very rare. This is quite unlike typical assemblages found close to large raw material sources, where many large cores and high rates of cortex are typically found. Coupled with low technological diversity, this site is somewhat unusual in these respects.
- A range of manufacturing activities are present at Manyana, and there is evidence for spatial variability in the representation of flaking, retouching and heating of artefacts.
- No evidence of cultural features such as hearths, pits, and lenses of shell or other cultural organic material was detected as a result of the testing program.
- No potentially datable material, relative to the cultural occupation of the area, was encountered in the test excavations.
- Most of the test pits would be rated as having relatively low areal incidence but three test locations have at least some areas of medium incidence.
- The site characteristics across the study area revealed by these test excavations are an open-air, variously low to moderate density subsurface cultural deposit of lithic artefacts. The human activities carried out in the Manyana Subdivision test excavation area, identifiable by direct evidence, are stone knapping, flaking, retouching and heating of artefacts.
- Open sites displaying evidence of microlith manufacturing are the most common site type within southeastern Australia. Many such sites in coastal environments are also associated with the exploitation of coastal resources, as is the case at Currarong. This site type is common on the NSW southern coast.
- The site overall is assessed as low local scientific significance.

Navin Officer concluded that:

- Overall the Manyana site assemblage shows low richness, a limited range of technological activities, core manufacture is under-represented, and the assemblage is highly fragmented. This renders the assemblages of lower information potential than other sites located in similar coastal environments to the north and south. This may reflect local environmental factors that made the site undesirable as a major camping place. The range of activities represented, and the dominance

of silcrete, might suggest ephemeral occupation with limited onsite reduction and implement manufacture.

- Based on the archaeological assessments undertaken, the deposits are of low archaeological significance and are not considered to pose a constraint to the proposed development of the Manyana Subdivision area.
- Further salvage of artefacts using controlled archaeological methodologies is not considered to be warranted or cost-effective, based on scientific objectives. It is considered unlikely that a further program of archaeological investigation in these areas would significantly increase the understanding of the activities and distribution of artefacts across the development footprint area.

7.5 European Heritage

7.5.1 Existing Environment

Navin Officer Heritage Consultants Pty Ltd was engaged to conduct an Aboriginal Heritage Assessment (Appendix 8) of the subject site. During the undertaking of the Aboriginal Heritage Assessment Navin Officer undertook an assessment of cultural heritage significance for items and places, where these do not include Aboriginal heritage from the pre-contact period in accordance with the NSW Heritage Office criteria (NSW Heritage Office & DUAP 1996, NSW Heritage Office 2000). The following heritage assessment criteria are those set out for Listing on the State Heritage Register. In many cases items will be significant under only one or two criteria. The State Heritage Register was established under Part 3A of the Heritage Act (as amended in 1999) for listing of items of environmental heritage that are of state heritage significance. Environmental heritage means those places, buildings, works, relics, moveable objects, and precincts, of state or local heritage significance (section 4, Heritage Act 1977). An item will be considered to be of State (or local) heritage significance if, in the opinion of the Heritage Council of NSW, it meets one or more of the following criteria:

Criterion (a) an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);

Criterion (d) an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;

Criterion (e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);

Criterion (g) an item is important in demonstrating the principal characteristics of a class of NSW's

- cultural or natural places; or
- cultural or natural environments.
(or a class of the local area's cultural or natural places; or cultural or natural environments.)

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register. Only particularly complex items or places will be significant under all criteria. In using these criteria it is important to assess the values first, then the local or State context in which they may be significant. Different components of a place may make a different relative contribution to its heritage value. For example, loss of integrity or condition may diminish significance. In some cases it is constructive to note the relative contribution of an item or its components.

Navin Officer concluded that the age of the European scarred tree identified during this assessment is not known but if over 50 years in age would not meet any of the criteria listed above. The site does not therefore reach the threshold for listing at the local or State level.

7.6 Flora and Fauna

7.6.1 Existing Environment

Kevin Mills & Associates were engaged to prepare a Flora and Fauna Assessment to replace the document prepared by PMA in December 2004 and January 2005 and amended in 2007 (Appendix 12). Furthermore, Kevin Mills and Associates prepared a Supplementary Vegetation Assessment (2009) to reassess the northern boundary of the Endangered Ecological Community and assess the proposed biodiversity offset against DECC "*Principles for the use of biodiversity offsets in NSW*". The results and recommendations of the Kevin Mills & Associates Report dated July 2008 and April 2009 (Appendix 3) are used in the following section.

Using the structural classification system devised by Walker and Hopkins (1990), the vegetation communities occurring on the subject land were then classified on the basis of their structure and the name(s) of the dominant species in the tallest

stratum. The subject site contains the following six vegetation communities, Figure 2.1 shows the distribution of the vegetation types:

- Swamp Oak Floodplain Forest;
- Swamp Sclerophyll Forest;
- Upland Swamp Oak Forest;
- Banksia - Bangalay Forest;
- Blackbutt - Bloodwood Forest / Tall Forest; and
- Disturbed Woodland / Forest.

The condition of the vegetation varies considerably across the site. The best quality native vegetation is on the northern half of the site and at the western end. The vegetation identified and mapped as "disturbed woodland / forest" and the areas mapped as "cleared land" support highly degraded vegetation or, in some places, no native vegetation at all.

The communities along with the key species and comments on their distribution have been provided in Table 7.4. The subject land is floristically diverse, with at least 171 native plant species having been recorded. These consist of 156 native species recorded during the current survey and several additional species recorded by PMA.

Community	Key species	Distribution
Swamp Oak Floodplain Forest/ Swamp Sclerophyll Forest	<i>Casuarina glauca</i> <i>Melaleuca linariifolia</i> <i>Eucalyptus botryoides</i> <i>Eucalyptus longifolia</i> wetland and rainforest species	This complex of two endangered ecological communities occurs on the north-eastern half of the site. The complex is associated with the moist alluvial soils along the creek and on floodplain beside the creek.
Upland Swamp Oak Forest	<i>Casuarina glauca</i> <i>Eucalyptus botryoides</i> <i>Eucalyptus longifolia</i>	The Swamp Oak forest can be divided into two types. Swamp Oak Floodplain Forest, growing on the wet lowest parts of the land, and Upland Swamp Oak Forest, growing on the higher land above. The Upland Swamp Oak Forest community is general found on the northern side of Sunset Strip.
Banksia - Bangalay Forest (Bangalay Sand Forest)	<i>Banksia integrifolia</i> <i>Eucalyptus botryoides</i> rainforest species	This endangered ecological community occurs behind the sand dunes at the eastern end of the site, south of the creek. Most of the community is in the adjoining Council reserve to the south and east; there is only a small patch on the subject land.

Blackbutt - Bloodwood Forest / Tall Forest	<i>Eucalyptus pilularis</i> <i>Corymbia gummifera</i> <i>Eucalyptus sclerophylla</i> <i>Eucalyptus imitans</i> <i>Allocasuarina littoralis</i> <i>Acacia</i> spp.	This community occurs on the sandstone at the western end of the site, where the soils are dry, shallow and gravelly. The Bounty extension is on the boundary between the Blackbutt - Bloodwood Forest at the western end of the site and the Scribbly Gum – Casuarina Forest to the south, on the neighbouring property.
Disturbed Woodland / Forest	<i>Eucalyptus botryoides</i> <i>Casuarina glauca</i> <i>Banksia integrifolia</i> <i>Allocasuarina littoralis</i> <i>Allocasuarina distyla</i>	This community occurs in the centre of the site, most of which was cleared at some stage for the quarrying of gravel. The regrowth woodland/ forest in this area is still in the early stages of regeneration and therefore presents as a heavily disturbed community.
Cleared Land		There is cleared land around approximately half of the property boundary, as well as across the centre and southern parts of the site, between the forest at the western end and the disturbed woodland / forest in the centre.

Table 7.4: Vegetation communities present on the subject site
(Source: Kevin Mills and Associates, modified by Watkinson Apperley to reflect the Supplementary Vegetation Assessment (April, 2009))

The fauna habitat on the subject land consists of forest, woodland and cleared land. Cleared land attracts few native animals, but the forest and woodland on the site obviously attract a wide range of species, as can be ascertained from the diversity of species recorded during both the previous and current fauna surveys. The fauna habitat value of the subject land is enhanced by its links or connectivity with habitat to the east, south and west.

The forest and woodland, and the sheltered habitat within the forest along the watercourse, provide good quality foraging areas, cover and shelter for a variety of species. The ground cover and shrub layer provide protective cover, and the fallen logs, branches and other organic debris provide habitat niches for small animals. The mature stands of Black She-oak *Allocasuarina littoralis* in the central and western parts of the site provide good quality foraging habitat for the Glossy Black Cockatoo, which is a threatened species. Furthermore, there are nine large hollow-bearing eucalyptus trees (*Eucalyptus sclerophylla* - Scribbly Gum) located near the southern edge of the site (north and south of The Bounty extension). The nocturnal survey targeting the large hollow-bearing trees found that several Brush-tailed Possums were occupying some of the hollows prior to emerging for nocturnal foraging in the surrounding forest. Many birds were seen

in the trees throughout the day and a few lingered on dusk, but no nesting activity was observed and none were observed utilising the hollows. No bats were observed leaving the tree hollows or flying around the trees during the evenings of the stag-watching.

Seven terrestrial and arboreal mammal species have been recorded on the subject land; these species, which have been listed in Table 7.5, consist of six native species and one introduced species.

Common name	Taxonomic name
Common Brushtail Possum	<i>Trichosurus vulpecula</i>
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>
Common Wombat	<i>Vombatus ursinus</i>
Eastern Grey Kangaroo	<i>Macropus giganteus</i>
Long-nosed Bandicoot	<i>Perameles nasuta</i>
Rabbit*	<i>Oryctolagus cuniculus</i>
Sugar Glider	<i>Petaurus breviceps</i>

Table 7.5: Terrestrial and arboreal mammal species recorded on the subject land
(Source: Kevin Mills and Associates)

One threatened bat species, the Grey-headed Flying-fox (*Pteropus poliocephalus*), was recorded on the subject land and was seen flying overhead. PMA detected three microbat species (Gould's Wattled Bat (*Chalinolobus gouldii*), Little Forest Bat (*Vespadelus vulturnus*) and Little Freetail Bat (*Mormopterus*)) and one megabat (Grey-headed Flying-fox (*Pteropus poliocephalus*)) on the subject land in January 2005 (PMA 2007).

Thirty-eight (38) bird species were recorded on the subject land, 37 native bird species and one introduced bird species; these have been listed in Table 7.6. KMA recorded one threatened bird species on the subject land, the Glossy Black-Cockatoo. This species was recorded by the presence of chewed cones recently discarded below several Black She-oak *Allocasuarina littoralis* trees within a large stand of mature Black She-oaks in the centre of the site. PMA recorded the same species by the same method in the same location in 2004/05, which suggests regular utilisation of this stand of she-oaks.

Common name	Taxonomic name
Australian Magpie	<i>Gymnorhina tibicen</i>
Australian Raven	<i>Corvus coronoides</i>
Brown Thornbill	<i>Acanthiza pusilla</i>
Crested Pigeon	<i>Ocyphaps lophotes</i>
Crimson Rosella	<i>Platycercus elegans</i>
Eastern Spinebill	<i>Acanthorhynchus tenuirostris</i>
Eastern Whipbird	<i>Psophodes olivaceus</i>
Eastern Yellow Robin	<i>Eopsaltria australis</i>

Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>
Galah	<i>Cacatua roseicapilla</i>
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>
Grey Fantail	<i>Rhipidura fuliginosa</i>
Laughing Kookaburra	<i>Dacelo novaeguineae</i>
Lewin's Honeyeater	<i>Meliphaga lewinii</i>
Little Wattlebird	<i>Anthochaera chrysoptera</i>
Masked Lapwing	<i>Vanellus miles</i>
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>
Noisy Friarbird	<i>Philemon corniculatus</i>
Pied Currawong	<i>Strepera graculina</i>
Rainbow Lorikeet	<i>Trichoglossus haematodus</i>
Red Wattlebird	<i>Anthochaera carunculata</i>
Red-browed Finch	<i>Neochmia temporalis</i>
Rufous Whistler	<i>Pachycephala rufiventris</i>
Satin Bowerbird	<i>Ptilonorhynchus violaceus</i>
Southern Boobook	<i>Ninox novaeseelandiae</i>
Spotted Pardalote	<i>Pardalotus punctatus</i>
Spotted Turtle-Dove*	<i>Streptopelia chinensis</i>
Superb Fairy-wren	<i>Malurus cyaneus</i>
Tawny Frogmouth	<i>Podargus strigoides</i>
Welcome Swallow	<i>Hirundo neoxena</i>
Whistling Kite	<i>Haliastur sphenurus</i>
White-cheeked Honeyeater	<i>Phylidonyris nigra</i>
White-throated Treecreeper	<i>Cormobates leucophaeus</i>
Willie Wagtail	<i>Rhipidura leucophrys</i>
Wonga Pigeon	<i>Leucosarcia melanoleuca</i>
Yellow-faced Honeyeater	<i>Lichenostomus chrysops</i>
Yellow-tailed Black-Cockatoo	<i>Calyptorhynchus funereus</i>

Table 7.6: Bird Species recorded on the subject sand
(Source: Kevin Mills and Associates)

Two frog species (Common Eastern Froglet (*Crinia signifera*)& Verreaux's Tree Frog (*Litoria verreauxii*)) and one reptile specie (Grass Skink (*Lampropholis guichenoti*)) was recorded on the subject land.

7.6.2 Potential Impacts

Native vegetation will be cleared to develop the subdivision and to establish hazard reduction areas to protect the subdivision from bushfire. The Bushfire Protection Assessment for the proposed development undertaken by Bushfire and Environmental Services (2008) indicates that APZs ranging from 16m to 25m, consisting predominately of Inner Protection Area (IPA) are required.

The map displays a grid of residential lots with various street names including MARYANA DRIVE, SUNSET DRIVE, THE BARBICAN, THE PALISADE, THE BURETTE, THE BOUNDARY, and THE BULKWARK. Lot numbers and areas are provided for many lots. Environmental overlays include a 'DEFERRED FROM AMENDMENT NO. 62 GAZETTED 5/2/99' area, a 'SOLIDARITY ZONE', and 'SWAMP SOLIDARITY FOREST' areas. A 'KEY' in the bottom right corner defines the symbols used for asset protection zones, creeks, padmounts, and forest extent.

KEY

- DIAGONAL HATCHES: DENOTES ASSET PROTECTION ZONE AS DETERMINED BY BUSHSIRE ASSESSMENT
- BLUE LINE: CREEK
- GREEN OUTLINE: PADMOUNT
- PURPLE LINE: END OF EXISTING ROADS
- RED X: EXTENT OF SWAMP SOLIDARITY FOREST
- PINK SHADE: EXTENT OF SWAMP SOLIDARITY FOREST
- GREEN SHADE: EXTENT OF RESIDENTIAL DEVELOPMENT WITHIN SWAMP SOLIDARITY FOREST

The loss of Endangered Ecological Communities in the Locality

As discussed above about 0.4 hectares or 15 percent of the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on the subject land will be removed or modified as a result of the proposed action. The proposed subdivision will reduce the size of the stand rather than fragment or isolate it, as the vegetation is already isolated through existing urban development. The Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest to be removed is a small proportion of the

extent of this community complex in the locality. The proposal will not result in the removal or modification of the Bangalay Sand Forest community.

Kevin Mills and Associates undertook a survey in March 2008 in the Manyana locality (between North Bendalong, in the north and Narrawallee Nature Reserve, in the south) to identify the distribution in the area of the three (Swamp Oak Floodplain Forest, Bangalay Sand Forest and Swamp Sclerophyll Forest) relevant endangered ecological communities. The following conclusions can be drawn from the information gathered in the locality:

- Nearly all of the eight (8) occurrences found are protected from clearing through inclusion in dedicated protected areas, occurrence on other public land or through land use zoning.
- All three relevant endangered ecological communities, Swamp Oak Floodplain Forest, Bangalay Sand Forest and Swamp Sclerophyll Forest, are common in the locality.
- In most cases, the occurrences of the above communities in the locality are in a better natural condition than the examples on the subject land.
- Removal of the small area of endangered ecological community on the subject land could not result in the local extinction of any endangered ecological community.
- The removal of **the 0.4 hectares** on the subject land is not likely to compromise the long-term survival of the communities in the locality.

The loss of potential habitat for the Glossy Black-Cockatoo

The development of the proposed subdivision will result in the removal of a stand of *Allocasuarina littoralis* used occasionally for feeding by the local population of this cockatoo. Such habitat is important for the long term survival of Glossy Black-Cockatoos. The loss of good quality feeding areas is one of the main threats to this species.

Kevin Mills and Associates undertook a survey in March 2008 in the Manyana locality to locate and assess Glossy Black-Cockatoo habitat. The following conclusions can be drawn from the information gathered in the locality:

- Fifteen sites in the locality were sampled, all had a dense stand of mature cone-bearing Black She-oak trees or a reasonable number of these trees. Nine (60%) of these sites exhibited foraging by the Glossy Black-Cockatoo.
- Stands of Black She-oak are common in the locality and use by Glossy Black-Cockatoo is widespread. Within the locality, there could be at least two populations of the cockatoo. Past observations in the area have noted a maximum of three birds, probably a pair with one young.
- The absence of foraging evidence at a high proportion of the site surveyed (40%) may indicate under-utilisation of the local food resource by the Cockatoo.

- The small stand of Black She-oak on the subject land is not likely to be critical to the survival of the local population of the Glossy Black-Cockatoo. It is noted that of the 15 sites surveyed, 87% are wholly or partly in Conjola National Park or on public land protected through zoning or other mechanism.
- In these circumstances, the removal of the small stand of *Allocasuarina littoralis* is not likely to adversely affect the life cycle of the local population of the Glossy Black-Cockatoo to such an extent that it is placed at risk of extinction.

The loss of potential foraging resources for the Grey-headed Flying-fox

Four or five hectares of potential foraging habitat for Grey-headed Flying-foxes will be cleared as a result of the proposed subdivision. Clearing this vegetation will not cause habitat for flying-foxes to become fragmented or isolated. Flying-foxes are highly mobile and forage over very large areas including urban environments, of which such a small site would be a negligible part. The habitat to be removed is not particularly important for flying-foxes.

The development of the proposed subdivision is not likely to adversely affect Grey-headed Flying-foxes to the extent that a local population of the species would be placed at risk of extinction.

The loss of potential foraging resources for the Gang-gang Cockatoo.

Four or five hectares of potential foraging habitat for Gang-gang Cockatoos will be cleared as a result of the proposed subdivision. Clearing this vegetation will not cause habitat for Gang-gang Cockatoos to become fragmented or isolated. The habitat to be removed is not particularly important for Gang-gangs. Gang-gangs are highly mobile and forage over very large areas and would not rely on this site for their foraging activities. There are no tree hollows on the site where the cockatoo could potentially breed.

Gang-gang Cockatoos are unlikely to be affected by the proposed development to the extent that a local population of the species would be placed at risk of extinction. Gang-gangs are nomadic and have a fairly wide foraging tolerance. There is ample foraging habitat for them in the local area and throughout the district. No potential nest trees for Gang-gang Cockatoos will be removed, assuming that the large hollow-bearing trees along The Bounty extension are retained. It should be acknowledged that all the hollow-bearing trees, except for possibly one tree, are located outside the proposed development area.

The loss of potential foraging resources for threatened microbat species

Four or five hectares of potential foraging habitat for threatened microbats will be cleared as a result of the proposed subdivision. Clearing this vegetation will not

cause habitat for threatened microbats to become fragmented or isolated. Microbats are highly mobile and forage over very large areas. The habitat to be removed is not particularly important for microbats as they have a very large home range, of which this small site would be a negligible part. There are virtually no tree hollows on the site where bats could potentially roost.

The development of the proposed subdivision is not likely to adversely affect the life cycle processes of microbat species such as the Eastern Bentwing Bat, Greater Broad-nosed Bat, East-coast Freetail Bat and Eastern False Pipistrelle. These wide ranging species would not depend on the small area of potential foraging habitat to be cleared. The life cycle processes of these species are threatened by the loss and degradation of their maternity sites, either caves or tree hollows. No caves occur on the subject land and the hollow-bearing trees, except for possibly one is outside the proposed development area.

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 a creek, which traverses the site in west to east direction through to Manyana Beach, which could provide suitable habitat for the Giant Burrowing Frog, but the quality of the water appears low as the creek drains the urban area of Manyana. 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 affect the area most suitable for the species as the creek is proposed to be dedicated to Shoalhaven Council as public reserve (Lot 158) and consequently the vegetation in this area will be retained intact.

7.6.3 Mitigation Measures

The proposal will not result in the removal or modification of the Bangalay Sand Forest community. The removal of 0.4 ha of the Swamp Oak Floodplain Forest to accommodate the proposed wetland (0.24 ha) and a small part of proposed lots 103, 118 and 119 and part of the perimeter road (road 1) will be offset by the dedication of 2.3 ha of EEC (including Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest and small section of Bangalay Sand Forest) and 0.8 ha of woodland vegetation to Shoalhaven City Council as public reserve. The 2.3 ha of EEC to be dedicated is predominantly in better ecological condition than the 0.4 ha which is to be removed. Furthermore, the 0.4 ha of the Swamp Oak Floodplain Forest is located on the edge of the community and adjacent to existing residential development where as the 2.3 ha will be buffered by perimeter roads to the north and west, woodland vegetation to south and coastal dune vegetation to the south east.

Prior to the dedication, a vegetation management plan will be prepared to manage the short to long term protection and improvement of the EEC. The VMP

should cover all relevant matters pertaining to managing the site, including regenerating/replanting of the cleared areas. The dedication associated with good management will ensure that the endangered communities are preserved in the long term.

The following principles are a guide for DECC when it is negotiating and developing biodiversity offsets to achieve conservation outcomes in situations where a loss of biodiversity is expected. These principles are relevant to areas without an existing biodiversity offsets program. The principles are based on ideas/information from a number of publications (NSW Government 2002; NSW Government 2005) and expert knowledge. The appropriateness of biodiversity offsets will need to be determined in relation to the circumstances and the standard required by legislation for which the offset is proposed.

The following is an assessment of the thirteen principles provided in the DECC *"Principles for the use of biodiversity offsets in NSW"*

1. Impacts must be avoided first by using prevention and mitigation measures.

The original subdivision layout considered a 71 lot residential subdivision of the subject site. On 9 June 2006, the Director-General of the Department of Planning, formed the opinion that the proposed subdivision was considered a Project to which Part 3A of the EP&A Act applies.

As part of the preparation of the Environmental Assessment a range of environmental studies were undertaken and following a more detailed flora and fauna assessment of the subject site, three endangered ecological communities (EECs) were found to exist on the site. At this point it was determined that there was potential for the proposed subdivision layout to negatively impact on two of those communities (Swamp Oak Floodplain Forest, and Swamp Sclerophyll Forest). Therefore fourteen (14) lots along the southern side of Sunset Strip and the eastern side of the proposed loop road were removed and the project design modified accordingly. While the subdivision layout has been modified and the lot yield reduced, the proposal is primarily an infill development and the surrounding formed road network restricts the opportunity for changes in the subdivision layout.

Subsequently three alternate layouts were considered before arriving at the final option for the proposed fifty eight (58) lot subdivision. The preferred layout was chosen for a number of reasons, including the use of a perimeter loop road and connecting road off Manyana Drive. This road design further reduces the impact on the EEC, improves bushfire protection and enhances opportunities for public access to foreshore areas while providing public road access to all lots within the subdivision and improving the permeability within the road network. We believe that the extension of Sunset Strip would provide an appropriate buffer edge on

the northern side of the EEC, noting that the EEC as defined in this report is to the south of this proposed road.

The proposed subdivision in its current form will result in the removal of 0.4 ha of the Swamp Oak Floodplain Forest to accommodate the proposed wetland (0.24 ha) and a small part of proposed lots 103, 118 and 119 and part of the perimeter road (road 1). In reality the mapped forest is a mosaic of Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest that for convenience is mapped together on our map as Swamp Oak Floodplain Forest. This proposal will result in the remaining 2.3 ha of EEC being dedicated to Shoalhaven City Council as public reserve. Prior to the dedication, a vegetation management plan (VMP) will be prepared to manage and improve the quality of the EEC. The majority of the EEC is in good condition, however, part of the southern section (0.18 ha) is heavily degraded and will require revegetation. Additionally, a further 0.8 ha of woodland vegetation will be dedicated to Council as part of the public reserve and will be managed via the vegetation management plan. The woodland vegetation provides a buffer to the EEC and as well as a link between the EEC and the forest vegetation on the Crown land to the south.

2. All regulatory requirements must be met.

The proposal satisfies all regulatory requirements under other legislation; see Chapter 4 of the Environmental Assessment.

3. Offsets must never reward ongoing poor performance.

The area proposed as the offset has been in the ownership of the proponent's family for over 40 years. The majority of the area (2.1 ha of EEC) to be dedicated is generally in a good ecological condition, however, the southern section of the offset area (0.18 ha EEC and 0.8 ha of woodland vegetation) supports highly degraded vegetation or, in some places, no native vegetation at all. The degradation of the land has resulted from use of the site by the public, some of which has been detrimental to the vegetation cover. The site contains several informal walking and vehicle tracks, with two formal beach access points located on the south-eastern boundary of the site; one located at the eastern corner and the other located at the southern corner of the south-eastern boundary. Several of the walking tracks extend towards these points from the northwest, north, east and west. The south-eastern area of the land has been highly degraded and eroded through the creation and use of "dirt bike" tracks.

The offset area is proposed to be dedicated to Shoalhaven City Council as public reserve. The proposed dedication of the land will be accompanied by a vegetation management plan to manage the high quality areas and restore the degraded parts of the land. This will allow the beach access in the southern corner of the property to be formalised and managed more sympathetically with conservation goals in mind.

4. Offsets will complement other government programs.

More than 50% of the South Coast region's vegetation is protected in national parks and reserves managed by NPWS, and several other reserve types, including coastal reserves under the control of Shoalhaven City Council. The Shoalhaven region contains over 300,000 hectares of national parks nature reserves and state forests. The large amount of intact terrestrial native vegetation within the Shoalhaven region provides vegetated links between forested private land, national parks and other protected land within the region. This contributes to the ability of terrestrial flora and fauna species to disperse, reproduce, migrate and colonise natural areas throughout the region, thereby ensuring long-term viability of native species.

The township of Manyana is essentially bound to the north and west by Conjola National Park, protecting extensive areas of eucalypt forest and woodland vegetation. To the south and east there are areas of coastal heath and scrub and open forest vegetation that extends along the hind dunes behind Manyana and Inyadda Beaches. Beringer Lake, an embayment of Lake Conjola, is situated to the west of the site.

The proposed area to be dedicated will be directly connected with Manyana Beach Reserve to the southeast and the vegetated Crown land to the south. The Manyana Beach Reserve is linked with the national park and nature reserve, that run adjacent to the entrance to Conjola Lake and near Berringer Lake. The woodland vegetation provides a link between the EEC and the forest vegetation on the Crown land to the south.

5. Offsets must be underpinned by sound ecological principles.

The proposed offset is based on a number of ecological assessments undertaken over the past two years; these considered the structure, function and compositional elements of biodiversity, including threatened species. The area to be dedicated has high ecological value and is located adjacent to land that is already in public ownership. Furthermore, the land is generally a swampy environment, and receives the stormwater runoff from a large catchment prior to being discharged through Manyana Beach, thus the area acts as a natural filtration system.

The proposed vegetation management plan will provide strategies for the long term management of the dedicated area. The plan will include strategies to maintain and enhance the biodiversity values of the existing good quality vegetation/habitat while providing strategies on how to rehabilitate the degraded areas. The proposed dedication of the area to Shoalhaven City Council as public reserve will secure the biodiversity value of the land.

6. Offsets should aim to result in a net improvement in biodiversity over time.

The proposed subdivision in its current form will result in the removal of 0.4 ha of the Swamp Oak Floodplain Forest to accommodate the proposed wetland (0.24 ha) and a small part of proposed lots 103, 118 and 119 and part of the perimeter road (road 1). The proposal will result in the remaining 2.3 ha of EEC being an offset area and it being dedicated to Shoalhaven City Council as public reserve. Prior to the dedication, a vegetation management plan will be prepared to manage and improve the quality of the EEC. Furthermore, a further 0.8 ha of woodland vegetation will be dedicated to Council as part of the public reserve and will be managed via the vegetation management plan. The woodland vegetation provides a buffer to the EEC and also provides a link between the EEC and the forest vegetation on the Crown land to the south.

The majority of the area (2.1 ha of EEC) to be dedicated is generally in good ecological condition; however, the southern section of the area (0.18 ha EEC and 0.8 ha of woodland vegetation) supports highly degraded vegetation or, in some places, no native vegetation at all. The degradation of the vegetation has resulted from generally uncontrolled public use of the land. The proposed vegetation management plan will provide strategies for rehabilitation of the degraded areas.

The proposed area to be dedicated will be directly connected with Manyana Beach Reserve to the southeast and the vegetated Crown land to the south. The Manyana Beach Reserve is linked with the national park and nature reserve, which runs adjacent to the entrance to Conjola Lake and near Berringer Lake.

We are of the opinion that the proposed offset, composed of dedication of the land to public ownership accompanied by a vegetation management plan, will enhance the biodiversity of the offset area in the long term. This would be to a value equal or greater than the loss of 0.4 ha of the Swamp Oak Floodplain Forest, which is located on the edge of the community and adjacent to existing residential development. It should also be acknowledged that half the area of EEC to be removed will be converted into a wetland system to treat stormwater runoff from the proposed development, as well as a large area of the existing residential area that currently has no stormwater treatment. Furthermore, the wetland area will be landscaped with vegetation species found within the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest communities (to be covered in the VMP) and will provide a buffer to the proposed and existing residential development.

7. Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.

The proposed dedication of the land will be accompanied by a vegetation management plan to manage the high quality areas and restore the degraded areas. The offset area is proposed to be dedicated to Shoalhaven City Council as public reserve. The offset area will be managed by the proponent for a maintenance period to be negotiated with Shoalhaven City Council.

8. Offsets should be agreed prior to the impact occurring.

The offset proposal is proposed as part of the project application and is included in the Draft Statement of Commitments provided in the Environmental Assessment prepared by Watkinson Apperley Pty Ltd 2009. The offset areas will be adequately marked and protected prior to any construction work commencing.

9. Offsets must be quantifiable - the impacts and benefits must be reliably estimated.

The offset is based on a number of ecological assessments undertaken over the past two years that considered the structure, function and compositional elements of vegetation on the site, including threatened species. The methodology used to determine the vegetation community on the site and to calculate both the loss from the development and the gain from the offset is based on best available science and over 20 years of experience as an ecologist working in the south coast region.

The methodology include:

- Assessing the area of impact;
- Determining the types of ecological communities and habitat/species affected (The soil was dug up at several places to determine its origin, vegetation survey involved multiple traverses of the subject land, plant species notes were taken of several locations within the area inspected. Survey plots (20m x 20m) were temporarily established and sampled to identify the plant species present and their percentage cover within the plot, etc);
- Determining the connectivity with other areas of habitat/corridors;
- Determining the condition of habitat;
- Determining the conservation status and/or scarcity/rarity of ecological communities;
- Recommending management actions through the preparation of the vegetation management plan; and
- Recommending the area is dedicated to public ownership, resulting in the maximum level of security for the land.

Kevin Mills and Associates undertook a survey in March 2008 in the Manyana locality, between North Bendalong in the north and Narrawallee Nature Reserve in the south, to identify the distribution of the three EECs (Swamp Oak Floodplain Forest, Bangalay Sand Forest and Swamp Sclerophyll Forest) in the area. The following conclusions can be drawn from the information gathered on this vegetation in the locality:

- Nearly all of the eight (8) occurrences found are protected from clearing through inclusion in dedicated protected areas, occurrence on other public land or through land use zoning.
- All three relevant endangered ecological communities, Swamp Oak Floodplain Forest, Bangalay Sand Forest and Swamp Sclerophyll Forest, are common in the locality.
- In most cases, the occurrences of the above communities in the locality are in a better natural condition than the examples on the subject land.
- Removal of the small area of endangered ecological community on the subject land could not result in the local extinction of any endangered ecological community.
- The removal of the 0.4 hectares of EEC on the subject land is not likely to compromise the long-term survival of the communities in the locality.

10. Offsets must be targeted.

The removal of 0.4 ha of the Swamp Oak Floodplain Forest will be offset by the dedication of 2.3 ha of EEC (including Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest and small section of Bangalay Sand Forest) and 0.8 ha of woodland vegetation. The 2.3 ha of EEC to be dedicated is predominantly in better ecological condition than the 0.4 ha which is to be removed. Furthermore, the 0.4 ha of the Swamp Oak Floodplain Forest is located on the edge of the community and adjacent to existing residential development where as the 2.3 ha will be buffered by perimeter roads to the north and west, woodland vegetation to south and coastal dune vegetation to the south east. The proposed offset meets the “like for like or better” test.

11. Offsets must be located appropriately.

The offset is located adjacent to the area that is to be removed; it therefore shares the same ecological characteristics as the area affected by the development. The land is also contiguous with other public land, resulting in a larger area of reserved land in the locality.

12. Offsets must be supplementary.

The subject site is not funded under any Government scheme. The area to be offset is currently zoned 2(e) village (deferred depending further environmental studies)

It is acknowledged that existing protected areas cannot be used for offsets unless additional security or management actions are implemented. Therefore, while the area to be offset is currently zoned 2(e) village (deferred) we accept that the zoning on this section of the land would most likely be converted to an environmental zone given the presence of the EECs.

However, as previously stated the dedication of the land and the implementation of a vegetation management plan prior to handing it to Council will enhance the biodiversity of the dedicated area in the long term to a value equal or greater than the loss of 0.4 ha of the Swamp Oak Floodplain Forest. Furthermore, the dedication of the land to public ownership will provide additional security to the long term management and survival of the area.

We are of the opinion that the proposed offset is supplementary to any current requirement to manage the land.

13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

The requirements to prepare and implement a vegetation management plan, to negotiation with Council a maintenance period and to dedicate the land to public ownership are all contained within the Draft Statement of Commitments provided in the Environmental Assessment prepared by Watkinson Apperley Pty Ltd 2009.

We acknowledge that these requirements will form part of the conditions of consent under Part 3A of the *Environmental Planning and Assessment Act 1979* (as amended).

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 158 will be dedicated to Shoalhaven City Council.
2. A Vegetation Management Plan will be prepared by a suitably qualified person for Lot 158. 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, weed control, vegetation enhancement, control of access, monitoring and fire management.
3. Compaction of root systems, damage to trunks, and the build-up of soil around tree bases will be minimised, by appropriate work practices during the construction phase of the proposal.

4. 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.
5. Perimeter roads will be located such that they adjoin retained vegetation on proposed Lot 158 in order to provide a line of demarcation between disturbed areas and protected areas and limit unauthorised access and dumping.
6. 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

- 7. Drainage management will be designed to minimise alterations to the hydrologic regime of the creeks in the study area and protect water quality.
- 8. Stormwater flows will be returned to the watercourse 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.
- 9. The principles of Water Sensitive Urban Design will be incorporated into the proposal.
- 10. Any proposed armouring of watercourses will only be undertaken with the approval of Shoalhaven City Council following advice from a suitably qualified engineer.

Sediment Controls

- 11. 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.
- 12. A Soil and Water Management Plan will be prepared in accordance with the Blue Book.

Landscaping

- 13. 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.
- 14. 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

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 site lies on the interface between the existing urban area and native coastal vegetation. The loss of the vegetation in the development area will not affect habitat connectivity and the vegetation to be retained in the southeast will provide for continued habitat interconnections along the permanent creek. In conclusion, the proposal will not impose significant impacts on fauna habitats, given the context of the site, the conservation value of the habitats found there and the presence of similar habitats of superior quality within the Manyana locality.

Furthermore the dedication of Lot 158 will result in a riparian zone of greater than 40m wide on both sides of the unnamed creek, which traverses the site. Therefore, the vegetation to be retained in the southeast of the site will provide for continued habitat interconnections along the permanent creek.

7.7 Bushfire Risk

7.7.1 Existing Environment

Bushfire Environmental Services has undertaken a Bushfire Protection Assessment and the results and recommendations of the report (Appendix 6) are provided in the following section.

The subject site predominately comprises five vegetation communities (Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest, Banksia - Bangalay Forest, Blackbutt - Bloodwood Forest / Tall Forest; and Disturbed Woodland / Forest). The condition of the vegetation varies considerably across the site. The site is relatively flat however, given that the lots are spread over an area of 9.5 hectare, there is variation in the slopes from 1° down to 3° up.

7.7.2 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 associated with the proposed subdivision ranges from low to high depending on the lot in question. The reason for the variability in bushfire risk is that the proposed residential lots are surrounded by a mixture of:

- Proposed and existing residential development,
- Department of Lands land, which is vegetated and will remain vegetated into the foreseeable future; and
- Land, which is proposed to be dedicated to Shoalhaven City Council (Lot 158), which will remain, vegetated.

7.7.3 Mitigation Measures

The proposal will incorporate the following measures to mitigate the potential bushfire impacts. The Asset Protection Zones (APZs) will be provided wholly on private residential land and public road reserves. Perimeter roads have been utilised in the subdivision design to reduce the APZ requirements on individual lots and improve access for fire fighting purposes. Water hydrants will be provided throughout the development, observing an unobstructed 70m path between the hydrant and the furthest point of any building. In accordance with *PBP 2006*, electricity should be underground wherever practicable. Where overhead electrical transmission lines are installed they are to be installed in accordance with the *PBP 2006*. Any gas services are to be installed and maintained in accordance with AS 1596.

Table 7.7 provides the APZs, and the level of construction, which will be incorporated into residential lots that require bushfire mitigation measures. The subdivision layout provided in Attachment 2 also shows the required APZs.

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
Southern lots adjacent to The Bounty (Lots 140-148, 153 and 157)					
North, east and west	n/a	Proposed and/or existing development	n/a	Level 1	
South	3° upslope	Forest	25m	Level 2	About 20m of APZ is accommodated in The Bounty and the remainder in the building line setback from the road.
Southern lots east of Austin Street (Lots 132-134)					
North, east and west	n/a	Proposed and/or existing	n/a	Level 2	

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
		development			
South	3° upslope	Forest	17m	Level 3	
SE lot (Lot 131)					
North and west	n/a	Proposed and/or existing development	n/a	Level 2	
East	1° upslope	Forest	19m	Level 3	Slope rises to higher areas on dunes
South	3° upslope	Forest	17m	Level 3	
Eastern lot, southern end (lots 130)					
North, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
East	1° upslope	Forest	19m	Level 3	About 12m of APZ is accommodated in perimeter road and the remainder on lot
Eastern lot (lot 126)					
North, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
East	Level	Forest	19m	Level 3	About 12m of APZ is accommodated in perimeter road and the remainder on lot
Eastern lot (lot 120)					
North, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
East	1° down slope	Forested wetlands	16m	Level 3	About 12m of APZ is accommodated in perimeter road and

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
					the remainder on lot, Forest (to south) transitions to Forested Wetland (to north) near this allotment
Eastern lot (Lot 119)					
North	1° down slope	Forested wetlands	16m	Level 3	About 12m of APZ is accommodated in perimeter road and the remainder on lot
East	1° down slope	Forested wetlands	16m	Level 3	About 12m of APZ is accommodated in perimeter road and the remainder on lot
South and west	n/a	Proposed and/or existing development	n/a	Level 2	About 12m of APZ is accommodated in perimeter road and the remainder on lot
Eastern lot (Lot 118)					
North, east, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
NE	1° down slope	Forested wetlands	16m	Level 3 eastern and northern elevations)	About 12m of APZ is accommodated in perimeter road and the remainder on NE corner of lot Freshwater wetland occurs immediately to the north
Eastern lot (Lot 116)					
North, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
east	1° down slope	Freshwater wetland (created by the development)	6m	Level 3	Wetlands access track provides 6 m APZ. A 1.8 m high colourbond fence provides a radiant heat barrier and security from wetland. An alternate solution is proposed to justify

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
					this approach (see text following this table).
Eastern lot (Lot 115)					
North, south and west	n/a	Proposed and/or existing development	n/a	Level 2	
East	1° down slope	Forested wetlands	16m	Level 3	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence) on southern boundary is recommended and may justify a lower construction standard at 79BA stage.
Eastern lots (Lots 108-114)					
North, east and west	n/a	Proposed and/or existing development	n/a	Level 2	
South	1° down slope	Forested wetlands	16m	Level 3	About 12m of APZ is in perimeter road and the remainder on lots
Eastern lot (Lot 107)					
North, east west and south	n/a	Proposed and/or existing development	n/a	Level 2	
SW	1° down slope	Forested wetlands	16m	Level 3	About 12m of APZ is in perimeter road and the remainder on lot.
Eastern lot (Lot 103)					
North and east	n/a	Proposed and/or existing development	n/a	Level 2	
South and west	1° down slope	Forested wetlands	16m	Level 3	Entire APZ is on lot.
Eastern lot (Lot 102)					

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
North, east and west	n/a	Proposed and/or existing development	n/a	Level 2	
South	1° down slope	Forested wetlands	16m	Level 3	Part of APZ is accommodated in sewer pump station and remainder on lots

Table 7.7: Assets Protection Zones and required Construction Level (AS3959)

An alternate solution has been proposed for the reduced APZ on Lot 116. Lot 116 adjoins a proposed freshwater wetland. The wetland planting strategy will be based on the wetland design depths/zones to meet stormwater quality objectives. The vegetation will incorporate appropriate plant species that suit the depth range of the wetland zones and have the structural characteristics to perform particular treatment processes (e.g. well distributed flows, enhance sedimentation, maximise surface area for the adhesion of particles and provide a substratum for algal epiphytes and biofilms). The macrophyte zone typically comprises four marsh zones (defined by water depth) and an open water zone. The relative proportion of each marsh zone will be dependent on the specific pollutant(s) being targeted by the wetland.

The RFS APZ calculator predicts a 9 m wide APZ for the 1° downslopes found on site. However wide areas of open water will occur in the man made freshwater wetland and the fire threat from the residual hazard to Lot 116 which is located to the west of the wetland will be minimal. Furthermore, a 6 m wide maintenance access track will separate the wetland from Lot 116 and a 1.8 m high colourbond fence will be constructed along the eastern boundary of Lot 116 to provide a radiant heat barrier and security from wetland. The track plus a 1.8 m high steel fence will eliminate the potential radiant heat and flame contact potential for a future dwelling on Lot 116 and the Level 3 building construction standard will provide best practice protection against burning debris attack.

Therefore as there is no potential for crown fire from a westerly spreading fire out of the freshwater wetland into the fringe vegetation the use of a 6 m wide APZ and a 1.8 m high radiant heat barrier will remove the proposed buildings beyond the point where a 29kW/m² radiant heat flux will occur.

Access and egress from the proposed subdivision has been designed to satisfy the *Planning for Bushfire Protection Guidelines 2006*. The proposed roads have been designed in the form of public roads with 12 - 20m wide road reserves and 6m carriageways. Perimeter roads have been incorporated into the road network

design however, a perimeter road is not provided for lots 102, 103, 115, 131 – 134 and 116. BES concluded that:

- As lots 102, 103, 115 and 116 adjoin an Endangered Ecological Community and the bushfire risk is relatively low in this remnant vegetation adjoining the Manyana beach, an adequate performance outcome consistent with that in PBP 2006 is available for firefighters operating from the existing or proposed road network.
- In the case of Lot 115 fire fighters can operate off Sunset Strip and run hoses through the APZ to the southern boundary of the lot, a distance of 30 m. If a fire trail was provided in this location it is extremely unlikely to be used, however due to the location of the proposed wetland and the EEC such a trail is not feasible.
- In the case of Lot 116 a 6 m wide maintenance access track is provided and provides adequate firefighter access over the 50 m length of Lot 116 with fire appliances remaining on the public road.
- In the case of Lot 103 and 102, fire fighters may operate from the roadway at the sewerage pumping station (below lot 101 and 102) or off Sunset Strip down the western side of Lot 103. The total distance of hose lay required would be 45 m on the western side of Lot 103 and about 40 m on the southern side of Lots 103 and 102. These small distances do not warrant a fire trail and fires can be well managed from the road system through the APZ of Lots 103 and 102.
- Lots 131 – 134 are 38 m to 42 m in depth and a bushfire tanker can be positioned on either Manyana Drive (adjoining the southern boundary of Lot 134) or the north-eastern corner of Lot 131 such that the furthest part of any building is less than 70 m from these positions. A fire hydrant can be placed in these positions if required. As there are only four lots in this portion of the subdivision and fire tanker access is available to 50% of the perimeter of Lots 131 – 134 it is considered unnecessary to have a perimeter trail.

7.8 Acid Sulphate Soil

7.8.1 Existing Environment

Coastal, low-lying alluvial soils generally below RL 5 (and occasionally at higher elevations) can contain pyrite or other sulphides. In situations where the sulphides remain out of contact with air they are relatively stable and generally in 'equilibrium' with the surrounding environment. Soils that have appreciable pyrite or other sulphides that have not yet reacted significantly with air are referred to as Potential Acid Sulphate Soils (PASS). Pyritic soils that have already started generating acid are referred to as Actual Acid Sulphate Soils (AASS).

According to the Shoalhaven City Council State of the Environment (SCC SOE) online Acid Sulphate Map the southeastern part of the subject site is classified as having a *'Low probability of encountering acid sulphate soils within 1 m of the*

ground surface'. Further reference to the 1:25 000 Acid Sulphate Risk Map for Milton – Cunjurong Point indicates that the south eastern section of the subject site is classified as '*Estuarine Plain of Elevation 1 – 2 m*', while the remainder of the site and its immediate surrounds are classified as having '*No known occurrences of acid sulphate soil materials*'.

An Acid Sulphate Soil (ASS) Assessment was undertaken by Douglas Partners Pty Ltd (Appendix 2). The results and recommendations of the Douglas Partners Pty Ltd report are used in the following section.

The assessment comprised the excavation of eight test pits (Pits 1 – 8) within the eastern portion of the overall site where previous mapping indicated acid sulphate soils may be encountered. The pits were excavated to determine subsurface stratigraphy and to enable sample collection for laboratory testing.

In summary, the test pits encountered relatively uniform subsurface conditions underlying the investigation area with silty topsoils encountered to depths of 0.2 – 0.7 m overlying typically firm to stiff alluvium/clay to depths of 1.7 – 2.5 m, thence very stiff to hard residual clays to the limit of investigation (in Bores 7 and 8) at depths of 2.0 m. Groundwater seepage was observed in Pits 1, 3, 5 and 6 at depths of 0.3 – 2.4 m.

Laboratory testing for acid sulphate soils was undertaken in two stages. Selected samples from the test pits (a total of 52 samples) were initially tested in the DP laboratory for measurement of pH in H₂O (pHF) and pH after oxidation with H₂O₂ (pHFOX) using a calibrated pH meter. Positive indicators of actual and potential acid sulphate soils (eg: pHF < 4.0, lowering of pH by at least one unit following peroxide oxidation, or pHFOX < 3.5) were found in 10 samples and as such, confirmation of acid sulphate potential was required and assessed via the undertaking of Full Chromium Suite tests.

Six soil samples were selected for Full Chromium Suite testing, which was carried out by ALS Environmental. The method includes measurement of pH in potassium chloride (KCl), sulfidic – Titratable Actual Acidity (s-TAA) and Chromium Reducible Sulphur (SCR) in order to determine Net Acidity (%S). The results indicate pH in potassium chloride values in the range of 3.9 – 4.4 with Net Acidity values in the range of 0.08 – 0.16%S for the soil samples tested from Pits 1, 3 – 6, 8. The results further indicate that whilst all Net Acidity values exceed the action criteria for greater than 1000 tonnes of soil disturbed (0.03%S), the soil samples tested from Pits 5 and 6 (0.08%S and 0.09%S respectively) do not exceed the action criteria for 1 – 1000 tonnes of soil disturbed.

Douglas Partners concluded that the testing undertaken to date indicates the presence of actual and potential acid sulphate soils of possible erratic lateral distribution within the eastern portion of the proposed development area, and generally below depths of 0.5 – 2.5 m. The majority of the eastern portion of the

site (existing bushland (lot 158)) is proposed to be retained as public reserve and will remain essentially undisturbed. However some disturbance of the underlying acid sulphate soils is anticipated in order to facilitate subdivision construction (roads and wetland).

7.8.2 Potential Impacts

If Acid Sulphate Soils are disturbed by excavation, thereby allowing ready access of oxygen to the sulphides, a natural oxidation reaction takes place and results in the generation of sulphuric acid or acid sulphates. The acid is then transported by water and, if allowed to build up in sufficient concentration, poses a direct environmental threat to organisms that come in contact with such waters. In addition, increasingly acidic waters can dissolve many metal ions that would otherwise remain insoluble and not available for uptake by organisms. Such ions include aluminium, iron and a suite of heavy metals such as zinc, lead and cadmium, which at elevated levels can be toxic to plants, animals and humans.

The principal activity likely to expose the underlying AASS and PASS to oxidising conditions is the excavation of soil generally below depths of 0.5 – 2.5 m in the alluvial clay profile (i.e. below RL 1.3 – 4.2). Douglas Partners recommended that an acid sulphate soil management plan (ASSMP) be prepared and as a precautionary measure further investigation be undertaken as construction of the subdivision proceeds over the remainder of the site.

7.8.3 Mitigation Measures

An acid sulphate soil management plan (ASSMP) has been prepared by Douglas Partners Pty Ltd (Appendix 5) which provides a framework for achieving environmental objectives in order to minimise the risk of harm to human health and the environment during and following the proposed development

The recommended management option for disturbance of the underlying acid sulphate soils is neutralisation by lime treatment and oxidation. Any construction activities that disturb the identified AASS or PASS must be undertaken in accordance with the following guidelines in order to minimise the potential for adverse environmental impact.

Neutralising Materials

For the management and neutralisation of AASS and PASS, medium-fine agricultural lime (aglime) with a grind of at least 85% by weight passing 1 mm and 100% passing 2.5 mm should be used. Dolomitic aglime or magnesium-blend aglime should not be used.

Ideally, the aglime purity should be 97% or better (that is, NV>97) unless there are significant savings to be made by the use of less pure aglime. In the latter

case however, the lime dosing rates specified in the Section below would need to be increased by a factor of 97/NV. The requirement for greater amounts of lower purity aglime should also be considered when assessing supplies of the material as the cost of lower purity aglime may be offset by the need for an increased quantity and correspondingly higher total transport costs.

It is recommended that the contractor set up an aglime store central to all excavations or stockpile areas. Aglime is non-corrosive and requires no special handling techniques however, it may be necessary to cover the aglime (with a tarpaulin for example) to prevent dust generation in strong winds and to prevent wetting, since it is then more difficult to spread.

Ponded leachate from excavated PASS should not be appreciably acidic, as the management protocols have been formulated to prevent the build up of acidity. Unforeseen events such as heavy or sustained rainfall during excavation however, especially over weekends, may produce leachates from excavated stockpiles with unacceptable acidity ($\text{pH} < 5$), as the soil may not have sufficient time to contact and react with the aglime. In such instances and in cases where ponded leachates or collected groundwater require 'finishing' prior to discharge, a calcium hydroxide solution (made from slaked lime or quicklime) can be used for rapid neutralisation.

It is recommended that the contractor have several bags of quicklime or slaked lime on site at all times together with the necessary equipment to make, transport and apply the hydroxide solution as required. Quicklime is very reactive and quite corrosive (caustic) and as such, special handling and safety procedures are required. As the reaction generates much heat when mixed with water, the lime should be added slowly.

Neutralisation Protocol (Soil)

It is recommended that aglime, as detailed above, be used for the neutralisation of AASS and PASS exposed during the construction phase. Soil treatment should comprise:

- Excavation/stripping of overlying non-AASS and non-PASS (ie: upper 0.5 m of the soil profile) which does not require treatment;
- Excavation of underlying AASS and PASS and treatment in a prepared bunded area as detailed below; and
- Treatment of AASS and PASS using Grade 1 aglime within eight hours of excavation at the estimated application rates provided in Table 7.8.

Material	Net Acidity (%S)	Estimated Lime Application Rates ¹	
		kg CaCO ₃ /tonne soil	kg CaCO ₃ /m ³ soil
Clay	0.06 – 0.09	4	7.5
	0.09 – 0.12	6	11.0
	0.12 – 0.16	8	14.5

Table 7.8: Estimated Lime Application Rates

¹ Lime rates have been estimated on the basis of the laboratory test results, an assumed bulk density of 1.8 t/m³, a safety factor of 1.5 and a neutralisation efficiency of 97%.

Soil treatment should be undertaken as follows:

- Prepare a liming pad/stockpile site appropriate for the volume to be excavated. The pad should be on gently sloping ground if the stockpile is to be left for any (extended) period of time with a natural fall to a local drainage point. Do not excavate the liming pad;
- Either bund off the pad or dig a shallow circumferential drain with a sufficiently large and easily accessible ponding point at the lowest elevation. Any upstream surface water flows should be diverted around the liming pad;
- Spread a layer of lime over the surface of the treatment area at a rate of 1 kg/m² per metre height of stockpiled material prior to the placement of PASS for treatment;
- Spread AASS and PASS in layers not exceeding 200 – 300 mm in thickness and spread lime at the appropriate rate in Table 1 over the top of the layer;
- Place subsequent layers up to a maximum of five layers and apply lime to the top of each layer as described above. Following liming of the final layer, thoroughly mix the stockpile with an excavator taking care not to disturb the base of the treatment area;
- Undertake soil screening tests (pH_f and pH_{fox}) to confirm the appropriateness of the adopted liming rate and hence that appropriate neutralisation has been achieved. Such tests should be undertaken at a rate of at least 1 test per 50 m³ of soil.

If soil pH (pH_f) drops by at least one unit following peroxide oxidation (pH_{fox}) and/or pH_f is less than 5, additional lime application will be required followed by additional soil screening tests until appropriate neutralisation has been achieved. On-site re-use, off-site disposal (to a landfill licensed to receive treated acid sulphate soils) or removal of the stockpile from the treatment area should not be undertaken unless soil monitoring confirms that appropriate neutralisation has been achieved.

As discussed above, the soil treatment area should be bunded to contain soils and runoff/leachate from the stockpile and be located in an area that will ensure minimal risk of adverse environmental impact as a result of leachate migration. An initial inspection of the soil treatment area is recommended to confirm the area has been established in accordance with the ASSMP. If PASS cannot be effectively treated within eight hours of excavation, a more comprehensive containment system, possibly including an impermeable leachate collection pond will be required.

Neutralisation Protocol (Leachate/Groundwater)

Stockpiles from which leachates are seeping should be monitored daily until a time trend is established demonstrating targeted performance of lime treatment (at which time monitoring frequency can be progressively decreased) or until leachate flow has ceased. Extracted groundwater should be temporarily stored in a multi-stage sedimentation tank and neutralised as necessary. Neutralisation should be undertaken if discharge water pH falls below natural groundwater levels (for overland discharge) or regulatory requirements (stormwater or sewer discharge). The pH of the groundwater should be monitored before and during construction.

Discharge of leachate / groundwater should be controlled. Discharges during substantial flows are preferred, since there is a beneficial effect in dilution of leachates, which will generally have higher TDS values than the receiving waters (total dissolved solids, principally calcium and sulphate). The treated groundwater could be discharged overland (ie: evaporation / infiltration), or to the stormwater / sewer (subject to regulatory requirements, approvals and licences). Water quality indicators should be checked well in advance of proposed discharge, to allow for any additional remediation if required. The pH should also be re-checked immediately prior to discharge. Notwithstanding regulatory requirements, the ponded leachates must meet the following criteria prior to discharge:

- pH between 6.5 and 8.5;
- Turbidity < 50 NTU;
- Total suspended solids < 50 mg/L.

Contingency Plan

Remedial action will be required if the agreed standards or acceptance criteria are not being achieved. Remedial action shall comprise mixing of additional lime through the stockpiled material and leachate (if generated). The revised mixing rate required to adequately treat the soil or water should be confirmed by monitoring. Sufficient lime should be stored on site during construction for the neutralisation of AASS and PASS and contingency measures.

Monitoring

Records of monitoring and neutralisation activities (soil and leachate) should be maintained by a suitably qualified consultant. A final report should be issued upon completion of the works discussing the monitoring regime, the results obtained and hence confirm that adequate lime treatment has been undertaken

7.9 Coastal Hazards

7.9.1 Existing Environment

A Coastal Engineering Assessment (2008) was undertaken by Gary Blumberg & Associates (GBA) (Appendix 11). The results and recommendations of the assessment are used in the following section.

The study area includes the shoreline and adjoining foreshore between Green Island and Inyadda Point, immediately north of the entrance to Lake Conjola, NSW South Coast (Figure 7.5). The GBA inspection found:

- The beach fronting the site in a relatively accreted condition.
- There was no sign of recent erosion of any significance.
- That a Dune Stabilisation Area (DSA) protects the back beach and foreshore immediately seaward of the site.
- Incipient vegetation (*including spinifex, pennywort, sea rocket, marram*) extended some 20 to 30 m seaward of the existing seaward boundary of the DSA (*indicated by existing / remnant fence line*), suggesting that the observed accretion is an established trend.
- Landward of the DSA but still seaward of the subject property, more mature secondary dunal plants are found (*including swordgrass, teatree, wattle and banksia*).
- A minor unnamed creek discharges across the beach at the northern end of the site, creek flow was minimal at the time of the inspection. A channel depression across the berm suggested that the creek had broken out recently, probably within the previous few days.
- While longshore sediment movements at South Coast pocket beaches such as Manyana would be low, the northerly deflection in the creek outlet across the berm points to a propensity for north-to-south transport in this section of Manyana Beach. This would be expected given the predominant SE swell along the NSW South Coast.
- The sand comprising the beach and dune at Manyana is clearly medium to fine grained marine sand with organics present in the sediments close to the creek entrance.
- The beach berm (width approximately 50 m) fronting the site was found to be relatively low, estimated at between RL 1.5 and 2.0

- In relation to wave protection, it is noted that the rock headland of Inyadda Point appears to extend offshore, protrude to RL 5 some 2 km from the coastline.
- The dunal system at Manyana forms part of the barrier separating Lake Conjola and Berringer Lake from the ocean. In line with the evolutionary description of the NSW coast developed mainly by Roy and Thom (1981), it would appear that the dune forms part of a so-called Holocene bay head barrier.

GBA suggests that with coastal storms in NSW relatively sparse over the past decade or so, the good beach condition encountered at Manyana reflects generally the recent condition of NSW beaches.



Figure 7.5: Recent air photo showing subdivision location
(Sourced from GBA, 2008)

7.9.2 Potential Impacts

There are a number of potential coastal hazards which if not properly catered for can imperil coastal developments and reduce public amenity. Seven coastline hazards have been identified:

Beach Erosion

- Beach erosion, which refers to the loss of beach and dune sand in a storm or closely-linked series of storms. During a storm, beach erosion nominally consumes beach sand down to approximately Mean Sea Level (*MSL*). Fluidisation of the sand to a further 1 m below MSL can also occur along an eroding beach. Localised scour at a hard shore structure may even extend to lower levels. Also, the back beach erosion escarpment will be quite steep during the height of the storm, but will slump to a more gentle slope as the storm subsides and embankment dries out. To account for the effects of toe scour and post-storm slumping, it is common practice to apply slope stability techniques to define the Beach Stability Zones.
- Beach erosion is commonly measured in volumetric terms above AHD. For the adopted 100 year planning period, design beach erosion on the NSW open coast typically ranges from 140 to 225 m³/m, depending on degree of coastal exposure (*Gordon, 1987*). For this assessment Blumberg has conservatively applied a maximum beach erosion value of 225 m³/m.

Shoreline Recession

- Shoreline recession refers to the long-term retreat of the shoreline, often tributed to incomplete beach recovery following erosion events. Sea Level Rise (*SLR*) due to the Greenhouse Effect also contributes to shoreline recession.
- Shoreline recession may be quantified in volumetric terms (*as above for beach erosion but in m³/m per yr*) or in terms of horizontal retreat (*simply m/yr*). The latter approach is more commonly applied and understood, considered here for the subject property.

Coastal Entrance Instability

- Coastal entrance instability refers to the tendency of entrances to estuaries and coastal lakes to migrate along the shore, close up, reopen, form new entrances, etc. in response to wave and current action and freshwater flows.

Sand Drift

- Sand drift may contribute to a permanent loss of sand from the beach. It is at best a nuisance, although it too can overwhelm nearby developments.

Coastal Inundation

- Coastal inundation is the flooding of coastal lands by ocean waters. Elevated coastal water levels during storms, and wave run up and

overtopping, both contribute to coastal inundation. Low-lying areas of the coast may be threatened by coastal inundation caused by storm surges and the action of large waves.

- **Elevated Coastal Water Levels** - sustained coastal water levels in storms can be elevated considerably above normal tide levels. Having regard to numerous investigations carried out up and down the NSW coast, and making prudent allowance for astronomical tide (*RL 1.0*), storm surge (*0.6 m*) and wave setup (*1.0 – 1.2 m*), GBA gauged the design 100 year ARI elevated coastal water level at Manyana Beach at approximately RL 2.6 to 2.8.
- **Wave Runup and Overtopping** - wave run up is the rush of water up the beach due to wave breaking. Wave run up is measured as the vertical height above Still Water Level (SWL) to which the rush of water reaches. Wave overtopping is the potential passing of water over the top of a back beach feature, eg back beach erosion escarpment or dune.

Slope Instability

- Slope and cliff stability problems are a threat to the structural integrity of buildings constructed on coastal bluffs and steep sand dunes.
- DECC currently adopts the model developed in Nielsen et al (1992) as the methodology for describing the Coastal Stability Zones. The soil mass located within the Stable Foundation Zone is assessed to develop a Factor Safety (*FOS*) against slumping which is generally in excess of 1.5. The soil mass located within the Zone of Reduced Foundation Capacity is assessed to develop an *FOS* against slumping which is generally between 1.0 and 1.5. The soil mass located within the Zone of Slope Adjustment is assessed to develop an *FOS* against slumping which is generally less than 1.0. An *FOS* of 1.5 would generally be regarded as a minimum acceptable *FOS* for embankment zones occupied by residential development.

Climate Change

- Climate change attributed to the Greenhouse Effect can exacerbate all of the above hazards, but in particular shoreline recession and coastal inundation.
- Sea level rise (*SLR*) is a potential hazard of the Greenhouse Effect. It is predicted to occur in response to the thermal expansion of the upper layers of the world's oceans and melting of the polar ice sheet.
- The Intergovernmental Panel on Climate Change has recently reported its *SLR* scenarios to the years 2090/2099 (*IPCC, 2007*). *IPCC's* current predictions are considered by DECC to be the best information available to assess the likely impact of climate change on sea levels. For coastline

hazard assessments in NSW, it has been common practice to consider the average of the SLR scenarios which, for the current IPCC revision, translates to a conservative postulated rise of 0.49 m over the 100 years to 2090/2099.

7.9.3 Mitigation Measures

Blumberg adopted a 100-year planning period for the identified hazards.

Combined Beach Erosion and Shoreline Recession

GBA assessment found that no beach erosion and shoreline recession hazard applies to the subdivision layout as proposed. Since all residential allotments fall within the Stable Foundation Zone (Figure 7.6), no special foundation treatments are required.



Figure 7.6: Plan arrangement for coastal stability zones
(Sourced from GBA, 2008)

Coastal Entrance Instability

Entrances can be structurally trained to manage longshore migration, however this is not common practice for a small creek and frequently causes more problems than it solves. Since the allotments and infrastructure comprising the proposed subdivision are well set back from the beach at Manyana, neither entrance migration nor breakout poses a risk to the project. Training of the creek entrance at Manyana is not proposed or required. GBA suggested that the morphology of the dune at the existing creek entrance would be expected to

constrain the entrance location at the back of Manyana Beach, to more or less its existing location.

Sand Drift

GBA concluded that no evidence of problematic blow-outs or sand drift were noted during the site inspection. The foredune in the vicinity of the site is reasonably stabilised with vegetation. Most importantly, the dune and hind dune areas along the coastal margins of the site and immediately seaward are well covered with shrubs and trees, limiting potential for ingress of wind blown sand. The substantial separation of the proposed allotments from the unstabilised back beach areas ($>150\text{ m}$), and the abundance of intervening vegetation, ensure that sand drift is not an issue for the proposed subdivision.

Coastal Inundation

GBA assessment recognises that Manyana Beach is reasonably exposed, but does enjoy some degree of protection from the high energy S to SE wave sector due to the presence of Green Island. There is also a submerged reef at approximately RL -5, located some 2 km offshore from Inyadda Point.

The design elevated coastal water level at Manyana Beach is assessed at approximately RL 2.6 to 2.8 m AHD. The design 2% wave run up at the primary coastal dune is predicted not to exceed RL 5.8 m AHD. For the case of severe creek breakout (*which may occur at the same time as the design coastal storm*), incident waves could penetrate the scoured entrance. GBA estimate design wave run up at the edge of the flooded creek, inside the entrance, as 35 to 40% less than that at the primary coastal dune. Allowing for Greenhouse SLR of 0.5 m over 100 years, a design wave run up level of RL 6.3 applies at the primary coastal dune, reducing to RL 5.3 at the flooded creek margin inside the entrance (Figure 7.7).

GBA recommended that the residential allotments proposed at Lots 101, 102 and 103 have regard to the design RL 5.3 coastal inundation level (Figure 7.7). The residential allotments proposed on the western side of Lot 158 are sufficiently removed from the creek entrance and protected from direct wave action by the primary dune such as not to be impacted by wave run up inside the creek entrance.



Figure 7.7: Inundation Summary
(Sourced from GBA, 2008)

Slope Instability

The Coastal Stability Zones for the Manyana site are depicted in Figure 7.7, representative of the northern and southern areas of the site respectively. The Line of Wave Impact is assessed to be located 50 m seaward of the SE corner of the site, but 6 m landward or inside the NE corner. The Zone of Reduced Foundation Capacity is well seaward of the property at its southern end, crossing the seaward property boundary (Lot 158) in the vicinity of the creek close to the NE corner (Figure 7.7).

Climate Change

GBA concluded that climate change SLR at the site would lead to shoreline recession, a coastal hazard which presently does not exist. Based on a consideration of dune and seabed levels, and storm wave penetration and breaking, GBA estimates shoreline recession due to SLR of approximately 30 m. The effect of SLR has been incorporated into GBA assessment of overall shoreline recession and is included in developing the Coastal Stability Zones.

GBA concluded that it would be reasonable to raise the wave run up level by 0.5 m to account for the effects of SLR. While increased wave action at the shoreline

may also result due to climate change, the consequences for wave run up are considered to be small relative to SLR increment, and can be neglected. Thus design wave run up at the end of the 100 year planning period could be expected to attain a 2% level up to RL 6.3 at the primary coastal dune, and RL 5.3 at the flooded creek margin inside the entrance (Figure 7.8)

Recommendation

GBA recommended that fencing be introduced to guide pedestrian access to and from the beach, protecting the dune and its vegetation. GBA recommended that two fences be installed (Figure 7.8):

- (1) a fence along the eastern edge of the 12 m wide road reserve joining the proposed wetland area at the NW corner of Lot 158, with the NE corner of Lot 131; and
- (2) a fence from the NE corner of Lot 131, running eastward along the northern boundary of the existing footpath and terminating at the eastern boundary of vacant Lot 158.

Both fences could be of the conventional Bayco-type, with 100Ø treated pine poles at 5 m maximum spacing and three 4 mm wire strands (*galvanised and PVC coated*) equally separated and extending 1.2 m above the ground. Intermediate posts should penetrate 0.6 m into the ground, and end strainer posts 1.0 m into the ground. It is proposed that these fences would be located fully within Lot 158.



Figure 7.8: Fencing to protect coastal dune and vegetation
(Sourced from GBA, 2008)

7.10 Traffic and Access

7.10.1 *Existing Environment*

Watkinson Apperley undertook a Traffic Impact Assessment and the results and recommendations of the report (Appendix 7) are provided in the following section.

The road network in the vicinity of the site includes Princes Highway, Bendalong Road, Inyadda Drive, Berringer Road, Curvers Drive, The Companionway, The Bulwark, Sunset Strip, Manyana Drive, The Rampart, Neptune Place, The Palisade, The Barquette, The Bartizan, The Barbican and Cunjurong Point Road.

- The Princess Highway is the main road in the vicinity of the subject site. The Princes Highway is the only continuous north-south route through the Shoalhaven Region. It links Shoalhaven to Sydney to the north and Batemans Bay and Canberra to the South. The Princes Highway in the vicinity of the turnoff to Manyana (Bendalong Road) comprises one southbound lane and two northbound traffic lanes with a 100 kilometre per hour speed limit. The northbound overtaking lane merges north of Bendalong Road. Access from the Princes Highway onto Bendalong Road is uncontrolled. Although turning lanes are provided on the highway for right and left turns into Bendalong Road. A give way sign controls access to the Princes Highway from Bendalong Road. Furthermore, a short acceleration lane is also provided for left turns from Bendalong Road.
- Bendalong Road runs east from the Princes Highway and provides access to Bendalong, Manyana, Berringer Lake and Cunjurong Point. Bendalong Road comprises two lanes of traffic, one lane in each direction with sealed and unsealed shoulders and a speed limit of 100 kilometres per hour.
- Inyadda Drive runs south from Bendalong Road into the Manyana township, Berringer Lake and Cunjurong Point. The intersection of Inyadda Drive with Bendalong Road is a t-intersection controlled by give way signs, with Bendalong Road having priority. Inyadda comprises two lanes of traffic, one lane in each direction with sealed and unsealed shoulders and a speed limit of 80 kilometres per hour.
- Berringer Road and Curvers Drive form a t-intersection at the southern end of Inyadda Drive. Berringer Road provides access to Berringer Lake residential areas in the west of Manyana. Curvers Drive provides access to residential areas east of Manyana.
- The Companionway, The Bulwark, Sunset Strip, Manyana Drive, The Rampart, Neptune Place, The Palisade, The Barquette, The Bartizan, The Barbican and Cunjurong Point Road are all comprised of two lanes of traffic, one lane in each direction and a speed limit of 50 kilometres per hour. All of the above roads provide access to residential properties. Sunset Strip also provides access to open space and community facilities. The intersections of the majority of these roads are priority controlled

except for the intersections of Berringer Road with Cunjurong Point Road and the Companionway, which are controlled by stop signs.

Once in Manyana there are a number of routes, which can be taken to access different parts of the proposed subdivision. The main access routes are:

- Left from Inyadda Drive onto Curvers Drive, right into The Citadel and right on Sunset Strip;
- Right from Inyadda Drive onto Berringer Road, then left onto The Companionway and left on Sunset Strip;
- Right from Inyadda Drive onto Berringer Road, then left onto The Companionway, left on Sunset Strip and right on Manyana Drive;
- Right from Inyadda Drive onto Berringer Road, then left onto The Companionway, left on Sunset Strip, right on Manyana Drive and right on The Bounty; and
- Right from Inyadda Drive onto Berringer Road, then left onto The Companionway, right on Sunset Strip and left on The Barquette.

The proposed subdivision involves the extension of Sunset Strip, The Barquette, The Bounty, Manyana Drive and the creation of 2 new roads off Manyana Drive one running north-south and the other running east-west (Attachment 5).

In order to measure traffic conditions, counts were undertaken during a weekday morning (7:30 - 8:30am) and afternoon period (5:00 – 6:00pm) (during school holidays) on Thursday the 11th October 2007 at the following intersections:

- The Palisade and The Barquette;
- The Barquette and The Bartizan;
- The Barquette and Sunset Strip;
- The Palisade and Manyana Drive;
- Manyana Drive and Sunset Strip; and
- Sunset Strip and The Companionway.

The date of the survey was chosen to capture the school holiday period when the permanent occupancy rate in Manyana is likely to be closer to 100%, compared to the normal 30%. The time periods were selected because they allow for a 30 to 45 min travel time for residents who are working in the Nowra and Ulladulla area. The six intersections were chosen because they are directly affected by the proposed subdivision.

Table 7.9 provides a breakdown of the total number of vehicles using The Palisade, The Bartizan, The Barquette, Sunset Strip, Manyana Drive and The Companionway during the survey period.

Existing two-way streets (sum of both directions) peak hour traffic flows		
Road	AM (peak hour)	PM (peak hour)
The Palisade	11	1
The Barbette	4	7
The Bartizan	12	15
Sunset Strip	18	32
Manyana Drive	20	8
The Companionway	8	18
Total Movements	73	81

Table 7.9: A breakdown of the total number of vehicles using The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway during the survey period

It should be noted that Manyana Drive is not a continuous road and is offset in a westerly direction at the intersection with Sunset Strip. Therefore there are two intersections between Manyana Drive and Sunset Strip as indicated in Figure 7.9.

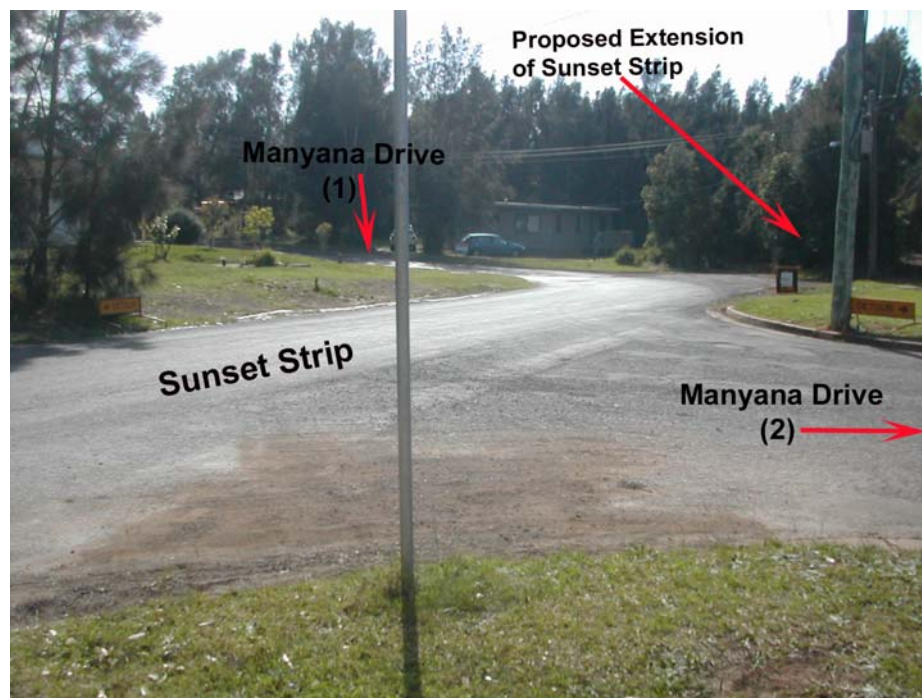


Figure 7.9: Intersection of Manyana Drive and Sunset Strip

Typically, peak hour flows represent between 8% and 12% of daily traffic flows. Using this assumption, daily traffic flows along The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway was calculated using 10% of peak hour flows (Table 7.10).

Road	Average Peak Vehicle Movements Per Hour	TDT
The Palisade	6	60
The Barbette	5.5	55
The Bartizan	14.5	145
Sunset Strip	25	250
Manyana Drive	14	140
The Companionway	13	130
Total Movements	78	780

Table 7.10: The average peak vehicle movements per hour and the Total Daily Traffic (TDT) flows along The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway

Table 7.11 provides a summary of the classification of the existing roads in the vicinity of the proposed subdivision in accordance with the RTA Guidelines and the Shoalhaven City Council DCP100.

Road Name	Approx. Carriage Width (m)	Speed limit	Road Hierarchy (RTA)	Road Hierarchy (DCP 100)
The Palisade	8.2	50	Local	Local Street
The Barbette	7.8	50	Local	Local Street
The Bartizan	8.14	50	Local	Local Street
Sunset Strip	8.5	50	Local	Local Street
Manyana Drive	9	50	Local	Local Street
The Companionway	7.3	50	Local	Collector

Table 7.11: The classification of the roads within the existing subdivision in accordance with the RTA Guidelines and the Shoalhaven City Council DCP100

Adopting the above classification, it can be seen that the existing traffic volumes of all the surveyed roads are well below the limits for a local road under the RTA road classification of 2,000 vehicles per day (TDT) and peak hour flows of 250 vehicles per hour.

The desirable maximum capacity of a road section is determined from AUSTROAD'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 The Palisade, The Bartizan, The Barbette, Sunset Strip, Manyana Drive and The Companionway, using the assumed desirable maximum hourly flow of 250 and the data from Table 7.10, the volume to capacity ratio and the level of service are shown in Table 7.12. As indicated in Table 7.12 the roads are all operating at a level of service of A. This confirms the observations during the traffic survey, when there was no congestion or delays experienced by the existing road users.

	V/C	LoS	V/C	LoS
	AM		PM	
The Palisade	0.044	A	0.004	A
The Barbette	0.016	A	0.028	A
The Bartizan	0.048	A	0.06	A
Sunset Strip	0.072	A	0.128	A
Manyana Drive	0.08	A	0.032	A
The Companionway	0.032	A	0.072	A

Table 7.12: The LoS for surveyed roads

The main intersections in the vicinity of the site are:

- The Palisade and The Barbette;
- The Barbette and The Bartizan;
- The Barbette and Sunset Strip;
- The Palisade and Manyana Drive;
- Manyana Drive and Sunset Strip; and
- Sunset Strip and The Companionway.

All these intersections are unsignalised intersections with minor roads. As the roads involved in the intersection contain relatively low volumes of cross and turning traffic, when compared to the figures provided in the AUSTROAD's Roadway Capacity guidelines, capacity analysis is considered unnecessary and thus not required.

7.10.2 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 7.13. 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 7.13: 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 57 residential lots (proposed Lot 158 contains an endangered ecological community and is proposed to be dedicated to Shoalhaven Council and thus will not have a dwelling entitlement) are summarised in Table 7.14. As can be seen from Table 7.14, the future increase in traffic flow associated with the proposed subdivision is relatively low.

Number of proposed dwellings	Daily vehicle trips	Weekday peak hour vehicle trips
57	513	48

Table 7.14: Future traffic flows due to the proposed subdivision

Table 7.15 shows the predicted increase in traffic movements resulting from the proposed 57 residential lots all using Sunset Strip. Sunset Strip has been chosen, as it will provide a link between the proposed and existing development in the west of Manyana and the public facility located at Manyana Beach. Furthermore, Sunset Strip overall recorded the highest vehicle movements of the roads surveyed. As can be see from Table 7.15, even when assuming as a worst case that all additional traffic movement uses Sunset Strip, the future peak traffic flows are well below the acceptable limit of 250 vehicles per hour. As a result the volume to capacity ratio would range between 0.268 and 0.324 resulting in a Level of Service of A, which would indicate a good level of service for future road users.

	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)	18	48	66	0.264	A
PM Peak Traffic Flow (veh/hr)	32	48	80	0.32	A
Total Traffic	250	513	763		

Table 7.15: Shows the predicted increase in traffic flow on Sunset Strip as a result of the proposed subdivision

7.10.3 Mitigation Measures

The extension of The Barbette, The Bounty and Manyana Drive will be designed and constructed to match the carriageway of the existing roads in accordance with the principles of a local road as defined in Council's Subdivision Code (DCP 100). The Barbette is proposed to have a 15.24 metre reserve, with approximately 3.7 metre verges and a 7.8 metre carriageway. The Bounty and Manyana Drive are proposed to have a 20.115 metre reserve, with 6.5 metre verges and a 7 metre carriageway. All three roads will be designed to accommodate the swept paths of garbage trucks and furniture delivery vans.

The extension of Sunset Strip will be designed and constructed generally in accordance with the principles of an access street as defined in Council's Subdivision Code (DCP 100). Sunset Strip is proposed to have a 12 metre reserve, with a 4 metre verge on the northern side and a 2 metre verge on the southern side of the street with a 6 metre carriageway. A typical cross-section of a 12m wide road reserve has been provided in Attachment 22 to show the general location of services. It is also proposed to contain a bio-retention system within the verge and carriageway, reducing the road carriageway width to 5m at one point. The bio-retention system will have the dual purpose of managing stormwater flows and providing a traffic calming device similar to a chicane.

The proposed perimeter loop road (Road 1) off Manyana Drive will be designed and constructed generally in accordance with the principles of an access street as defined in Council's Subdivision Code (DCP 100). The loop road will be located off Manyana Drive approximately 20m north of The Palisade and approximately 40m north of The Bounty. Furthermore, it is proposed that an 80m long road from Manyana Drive to the loop road be constructed. The proposed connecting road (Road 2) will be located approximately 20m south of The Palisade and will service 7 lots (Attachment 5).

The perimeter loop road (Road 1) is proposed to have a variable road reserve ranging from 12 to 13 metres. The northern and eastern sections of the loop road are proposed to have a 12m road reserve, with a 4 metre verge on the western side and a 2 metre verge on the eastern side of the street with a 6 metre carriageway. A typical cross-section of a 12m wide road reserve has been provided in Attachment 19 to show the general location of services. The southern section of the loop road (Road 1) and the connecting road (Road 2) are proposed to have a road reserve of 13m, with 3.5 metre verges and a 6 metre carriageway. A typical cross-section of a 13m wide road reserve has been provided in Attachment 19 to show the general location of services.

The proposed reduction in width of the road reserve, and verges for Sunset Strip, the loop road and the connecting road has been proposed as a design solution to overcome the following environmental and economic constraints of the site:

- The subject land on the southern side and adjacent to the proposed extension of Sunset Strip contains an endangered ecological community ('*Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*'), which limits the ability to create lots along that southern side of the road frontage. As a result, the number of lots proposed along the southern side of the Sunset Strip extension has been reduced from 9 in the original subdivision layout to 4 lots.
- The total number of lots having direct street frontage to the Sunset Strip extension has been reduced from 19 in the original subdivision layout to 14 lots. Furthermore, the majority of the extension will be singly loaded according to the RTA guidelines provided in Table 7.13. This will result in 126 direct traffic movements per day (during peak holiday period when the occupation rate is at 100%), which is considered to be a low number of traffic movements.
- The land to the east of proposed perimeter loop road (lots 119, 120 and 126) comprises an endangered ecological community ('*Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions*'), which provides a limited depth of land between the EEC on Lot 158 and the proposed connecting extension to Manyana Drive. Furthermore, the layout must provide for a 16m - 20m APZ adjacent to Lot 158.

- The total number of lots proposed to be serviced from the loop road has been reduced from 20 in the original subdivision layout to 14 lots. Furthermore, the majority of the loop road will be singly loaded. According to the RTA guidelines provided in Table 7.13. This would result in 136 direct traffic movements per day (during peak holiday period when the occupation rate is at 100%), which is considered to be low amount of traffic movements.

It is considered that the proposed reduction in the road reserve, carriageway and verges will provide an enhanced environmental outcome, while providing adequate space for services and a safe road environment for both vehicles and pedestrians. The proposed reductions in the road reserve, and verges are justified for the following reasons:

- The reduction in the reserve width will reduce the impact of civil construction required within the endangered ecological community (*'Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions'*).
- The loop road (Road 1) and the extension to Sunset Strip are virtually single loaded streets, therefore it makes good design sense to maintain a narrow road reserve to manage driver behaviour and limit the opportunity for speeding. Furthermore, the single side roads provide a buffer between residential development and the endangered ecological community.
- The proposed carriageway width satisfies Shoalhaven Council requirements.
- The proposed 4m wide verge as part of a 12m wide road reserve (Attachment 22) is adequate to accommodate all services and the 2m wide verge will provide sufficient space for pedestrian movements.
- The proposed 3.5m wide verges as part of a 13m wide road reserve (Attachment 19) are adequate to accommodate all services and pedestrian movements.
- Given the location of the extension to Sunset Strip and position of the loop road (Road 1) vehicular traffic will be subservient in terms of volume to those elements of public amenity, pedestrians and cyclists. Therefore the primary functions of this section of the Sunset Strip will be to provide a link between the public open space provided at Manyana Beach and the existing and proposed residential development and to encourage pedestrian/cycle movements. The presence of pedestrians will reinforce the concepts of safety and accessibility and the casual surveillance of common areas such as parks and streets by pedestrians and neighbours may deter crime and engender confidence in residents.
- We are of the opinion that with the use of appropriate pavement treatment to inform road users that they are entering different road conditions, the proposed road widths are adequate in this location given the low traffic volumes and the short distance required to travel to entry and exit points of the roads. Furthermore, the introduction of the pavement thresholds will provide a safe shared environment for pedestrians.

- The roads in question are relatively flat and contain good sight distances in all directions.
- The proposed road widths satisfies the bushfire requirements and will allow fire trucks direct access to the public reserve from Sunset Strip and the loop road in the event of an emergency.

Having considered the subject site and its location within the Manyana village area, it is considered that the majority of the traffic flow along the proposed new roads will be generated by the proposed subdivision. Out of the proposed new roads Sunset Strip will be the most likely road to experience additional traffic movements in the future as it will create the link to the public facility and beach access located to the east at Manyana Beach. Table 7.15 demonstrates that both the total traffic movements and peak hourly movements predicted for Sunset Strip as the result of the proposed subdivision are well below the RTA guideline for a local road. Therefore, given the limited supply of developable land available in Manyana it is considered that the proposed road network will have sufficient capacity to manage the anticipated increase in traffic within the Manyana area.

The estimated additional traffic generated as a result of the proposal is 513 vehicle movements per day (during peak holiday period when the occupation rate is 100%), which is well within the capacity of the existing road network as demonstrated in this report. Therefore, it is unlikely that the proposed development will have a detrimental effect on the local traffic and driver safety on The Palisade, The Bartizan, The Barquette, Sunset Strip, Manyana Drive and The Companionway or the surrounding streets in the Manyana area.

7.11 Visual Assessment

7.11.1 *Existing Environment*

A Visual Impact Assessment has been prepared by Maurice Hayler and Associates Architects. The results and recommendations of the report (Appendix 4) are provided in the following section.

Manyana is a coastal village located on the South Coast of NSW approximately 50 km south of Nowra and 75 kms north of Batemans Bay. It is a village split between North Manyana behind Inyadda Point and South Manyana or Cunjurong adjacent to Cunjurong Point.

The village comprises of a mixed range of housing types and styles from modest weekenders (fibre-cement or 'fibro' clad houses dating from the 1950s) through to brick veneer single and double storey homes of the 70's and 80's and a few architecturally distinctive houses. The village is serviced by a general store with petrol located approximately 1.8 km by road to the south of the proposed subdivision. In addition there is also a fire brigade station and bus service.

The typical street pattern is predominately aligned east-west with interconnecting roads running north-south and some minor variations within for example cul-de-sacs like The Barbican. The road reservations are generally grassed and do not have paved footways. The streets are serviced using powerpoles (especially noticeable in Sunset Drive) and signposted with fingerboard street signs. Most of the streets are concrete kerbed.

7.11.2 *Potential Impacts*

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

- Clearing of vegetation on the developed site;
- Poor compatibility of future dwellings with the local;
- Increase area of bitumen and paved areas at prolongation of existing streets;
- Erection of houses and activities increase the visual footprint of the townscape by day and night;
- Overshadowing;
- Loss of privacy; and
- Loss of solar access.

7.11.3 *Mitigation Measures*

The Coastal Policy (1997) developed by the Coastal Council of NSW and the Coastal Design Guidelines for NSW (2003) have been considered in the design of the proposed subdivision (Section 4.8). Issues and policy objectives such as protecting buildings from storm events, sea level rise and erosion, beach amenity and building on dunes have been considered in Section 7.9. Issues related to main streets, retail/commercial, shop-top housing, and car parking are not relevant to this development. However, the design objective of connecting open spaces is relevant and is satisfied through the dedication of proposed Lot 158 as public reserve. This collection of natural area is considered a valuable asset to the community as passive open space, and potential access to Manyana Beach.

The proposed street layout reinforces the existing settlement character of the locality and enhances the ecological protection and visual characteristics. Two single fronted “edge roads” have been utilised to protect the natural edge of the site and improve bushfire management. This public edge also facilitates pedestrian access inline with Coastal Design Guidelines. The street pattern provides views to the important natural features of the site. It also limits fast moving traffic with narrower street and calming devices, which facilitates pedestrian movement.

All the allotments will facilitate dwelling orientation that enables energy efficient design. There will be no overshadowing on any of the developed lots.

The bulk, scale and amenity of the proposed development will be an extension of the existing residential area. Building heights, depths and separation, setbacks to the street and side and rear setbacks are controlled by Shoalhaven Council DCP's and Policies. The maximum F.S.R. for a dwelling is 0.5 to 1 permissible under the Code. The proposal involves low density residential housing with site areas sufficient to ensure setback compliances.

The visual assessment assessed the suitability of the proposal with the surrounding area in regards to:

- Potential character;
- Bulk;
- Scale; and
- Visual amenity of the development.

Hayler concluded that the proposal would have a number of positive impacts including:

- Completion of subdivision pattern without impact on visual catchment of the beach coastal zone (Figure 7.10);
- Drainage of low lying areas;
- Preservation of coastal habitat through dedication of lot 158 to Council as Public Reserve;
- Extension of walking /running paths in vicinity;
- Linkage of North and South Manyana thus providing alternative fire egress route;
- Visual catchment and sightlines of existing residences is largely unaffected by insertion of 58 lots due to low lying profile of sites; and
- Creation of new and improved beach access.

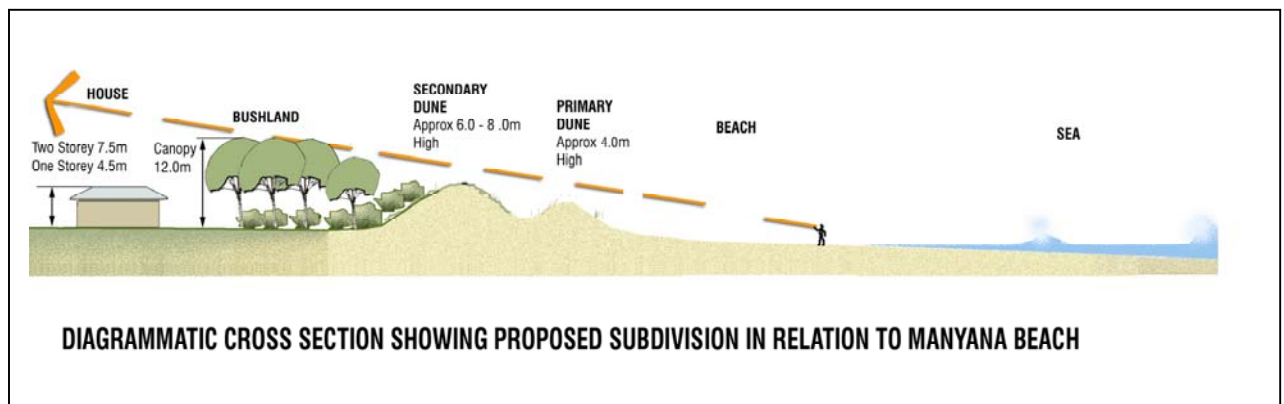


Figure 7.10: Cross section showing proposed subdivision located behind sand dunes and forest and therefore would not be visible from Manyana Beach

Hayler recommended the following measures to reduce the visual impact of the proposed subdivision:

- Low pitch roofs of 25 degrees or less throughout;
- Subdued /earth toned structures especially roofs;
- Non reflective roof colours;
- Decking/ elevated floors rather than floor slabs on ground (to improve overland stormwater flow);
- Retention of maximum tree cover on sites throughout;
- Provide large areas of landscaping and grassed areas;
- Prohibition on solar reflective glass, unshaded glazing and glass balustrades;
- Use of natural materials and finishes eg unpainted;
- Palette of subdued wall colours;
- Water conservation;
- Minimal front fences and hard stand areas;
- Underground power and connections;
- Layback kerbs;
- Low water demand indigenous planting and screening;
- Use of verandahs on 1 or 2 sides;
- Prohibition on 2 storey porticos;
- Each dwelling to have variety of external materials and finishes; and
- Encourage coastal housing style.

7.12 Landscaping

7.12.1 *Existing Environment*

The Manyana area does not have any formal landscaping or specific street tree species within the road reserves. The overall landscaping in the area is provided by the natural coastal vegetation, which is present in the public reserves, crown land, national park and undeveloped privately owned land holdings. The landscaping within the existing street network has been undertaken by individual landowners and varies from lot to lot.

7.12.2 *Potential Impacts*

Below are the potential environmental impacts of poorly designed landscaping:

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

7.12.3 *Mitigation Measures*

As the proposal is a small scale infill development, there is no intention to create any entrance statements to the proposed subdivision. A concept landscape plan

has been prepared by Captivate Landscape Design for the whole of the subdivision (Attachment 23). We will provide detail landscape plans for each of the stages at the construction certificate stage for each stage of the development. The main features of the landscaping philosophy are:

- The landscaping plan has been designed to provide:
 - Street trees within the road reserve. The street trees within the internal road network are proposed to be *Tristaniopsis laurina* 'Kanooka' (water gum) or something similar the exact species will be decided prior to the construction certificate for each stage of the development. Tree pits will be installed around all street trees.
 - Stamped pattern concrete strips are proposed to be installed in roadway at the new entrance points to inform drivers that they are entering a new driving environment.
 - Turfed Kikuyu within the road reserves.
 - Hydroseeding within the proposed blocks after construction works has been completed for stabilisation. 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.
 - Mulch to a max depth of 75mm within street tree pits.
 - An overview of the proposed wetland and vegetated swale arrangement, the exact native grasses, shrubs and sedge species which will be used will be determined during detail design and will depend on the hydraulic requirements.
- Where possible plant species will be sourced from locally endemic species to be collected from appropriately qualified growers.
- Where possible drought resistant low maintenance plant species will be used.
- No known environmental weeds, noxious weeds or known invasive plant species will be planted within the site.

7.13 Social Environment

7.13.1 Existing Environment

The proposed subdivision will result in the creation of 57 residential allotments, which is an increase of 54 lots. In order to consider the likely impacts on social infrastructure, it is necessary to establish the likely population increase resulting from the proposed development. Shoalhaven City Council has established a web based Shoalhaven Community Profile providing access to population and housing information for the 2006, 2001, 1996 and 1991. The data comes from ABS (Australian Bureau of Statistics) census figures for 1996, 2001 and 2006 (place of enumeration, excluding overseas visitors).

This report places Manyana in Area 5 Planning District, which covers the southern part of the Shoalhaven. Planning area 5 comprises a number of towns and villages in the southern section of the Shoalhaven Region including Bendalong, Bawley Point, Kioloa, Fishermans Paradise, Lake Conjola, Conjola Park, Lake Tabourie, Manyana – Cunjurong, Burrill Lake – Dolphin Point – Kings Point, Milton, Mollymook - Mollymook Beach, Narrawallee, Ulladulla and north Durras.

According to Shoalhaven City Council Population by Planning Areas 1996 – 2006 document the Manyana – Cunjurong area comprises 2.8% to 3.1% of the population within Planning area 5.

The following statistics are provided in the Shoalhaven Community Profile for Manyana. Manyana – Cunjurong area are relevant to consider potential population expansion resulting from this subdivision:

- Manyana has a permanent occupation dwelling rate of 30.6%.
- Average household size is 2.33 persons per detached house.
- The population is 566 comprising 54.9% male and 45.1% female.

The Manyana area's high levels of unoccupied dwellings are what would be expected given that it is a coastal village which could contain a large proportion of holiday houses.

According to the revised population projections adopted by Shoalhaven City Council 13th May 2008 the population in planning area 5 is predicted to increase in line with Table 7.16

Area / Year	2011	2016	2021	2026	2031	2036
Planning Area 5	7%	7%	6%	6%	5%	4%

Table 7.16: Population projections for planning area 5

The population age structure for the Manyana – Cunjurong area is shown in Table 7.17. As can be seen in the table 56.6% of the population is aged between 18 and 64.

Enumerated data	Number	%
Infants 0 to 4 years	23	4.0
Children 5 to 17 years	98	17.4
Adults 18 to 64 years	320	56.6
Mature adults 65 to 84 years	118	20.8
Senior citizens 85 years and over	7	1.2
Total persons	566	100.0

Table 7.17: Age structure the for Manyana – Cunjurong area

The social infrastructure in the Manyana – Cunjurong area is relatively poor with the residents predominantly required to travel to Milton and Ulladulla for shopping, schools, doctors, dentists, and aged care facilities. The Manyana – Cunjurong area does have two general stores and community open spaces such as a sporting oval and beaches.

7.13.2 *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 57 residential allotments and, assuming an occupied dwelling rate of 30.6% as is currently the case for this locality, it is expected that approximately 17 dwellings (57x 30.6%) 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 2.33 persons, as such the 17 occupied dwellings are likely to generate an additional population of 40 persons (17 x 2.33) when completed. However, during holiday periods when the occupancy rate is likely to be closer to 100%, the increase in population would be 139 people (57 x 2.33).

In addition to an anticipated overall population growth of 139 persons Table 7.18 below shows the projected additional population, divided into the various age categories assuming current age distribution rates contained in Table 7.17 above.

Enumerated data	%	Number
Infants 0 to 4 years	4.0	6
Children 5 to 17 years	17.4	24
Adults 18 to 64 years	56.6	79
Mature adults 65 to 84 years	20.8	29
Senior citizens 85 years and over	1.2	2
Total persons	100.0	139

Table 7.18: Age structure for the Manyana – Cunjurong area

While the permanent occupancy rate in the area is currently 30.6%, there is every possibility that this could change in the near future. Influences such as housing affordability and lifestyle choices are impacting housing decisions of all generations, which may have the effect of increasing permanent occupancy rates.

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 Milton-Ulladulla 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; and
- An increase in greenhouse gas emissions, largely from burning fossil fuels.

7.13.3 *Mitigation Measures*

While it is recognised that the Manyana area has limited social infrastructure available, this proposal is for infill development on land which has been zoned for residential development since the establishment of the Local Environmental Plan 1985. It is considered that the proposed subdivision will only result in a minimal increase to the local population of Manyana and as a result will have a negligible impact on the existing social infrastructure within the local region. Furthermore as discussed in Section 3.6 all the relevant stakeholders have been consulted and they have advised there is capacity within the social infrastructure within the Milton-Ulladulla area to handle the proposed increase in population. The proposed subdivision will also result in the dedication of approximately 3.97ha of native bushland to Shoalhaven City Council, which will increase public accessibility to Manyana Beach.

7.14 Cumulative Impact

7.14.1 *Existing Environment*

At the time of writing this report there was one major development and a number of potential developments (list below), which could impact on the infrastructure and services including water supply, electricity, waste disposal, gas, and social infrastructure such as health care and public schools.

- A 20.40ha Residential 2 (a1) site at Berringer Road & Cunjurong Point Roads, proposed 179 lots (part 3A in with DOP).
- The Kylor Pty Ltd site (77.98 ha), which has number of different zonings. Kylor is the process of investigating a rezoning; the site has the potential for 156 lots.
- Crown Land West Manyana 104.31 ha Residential (Deferred) currently no development application.
- Crown Land Bendalong 24 ha Residential (Deferred) currently no development application.
- Crown Land North Bendalong 46 ha Residential (Deferred) currently no development application.
- Lot 108 DP 755923 Inyadda Dr, Manyana approximately 19.78 hectares zoned rural 1 (d). New Tourist Facility - Including a Seventy-Five (long term) Site Caravan Park, Manager's Residence & Community Facilities currently in with Shoalhaven City Council.

7.14.2 *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 as health care and public schools.
- Increased pressure on the coastal ecosystems.
- A reduction in the biodiversity of the local area.
- Climate change is the end result of high quantities of greenhouse gases, including carbon dioxide and methane, being emitted into the atmosphere. These gases are produced mainly as the by-product of energy generation and use.
- An increased bushfire risk to the local community.

7.14.3 *Mitigation Measures*

We are of the opinion that overall, the proposed 58-lot subdivision (57 residential) will only have a minimal cumulative impact on the local environment. The subdivision layout has been designed to protect the natural edge of the coastal environment, and to reinforce the street pattern within the local area. The proposed road network caters for all road users including, pedestrians, cyclists, cars and buses. Overall the objective of the subdivision layout is to provide a safe, attractive, energy efficient and liveable neighbourhood that fosters a sense of community and that promotes better social, economic and environmental sustainability.

While it is recognised that the continued expansion of Manyana has the potential to place strain on the existing services and infrastructure the nature of the proposed subdivision is that of small-scale residential infill development. As discussed in section 3.6 all the relevant stakeholders have been contacted and have advised that there is adequate capacity within the local services/infrastructure to handle the increase in population as the result of the proposal. Furthermore the South Coast Regional Strategy (2006) prepared by the Department of Planning indicated that future urban development will be prioritized to support infill housing and that limited development could be accommodated in a corridor between the villages of Cunjorong and Manyana in the vicinity of the subject site.

The existing environment, potential impacts and mitigation measures that will be implemented to reduce the environmental impact have been discussed throughout Section 7 and a Draft Statement of Commitments for the proposal is provided in Section 8.

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 July 2008, 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, roadwork's, 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	Prior to the issue

Item	Commitments	Timing
	each stage of the development in accordance with the recommendations of the Environmental Assessment and requirements of Shoalhaven City Council. The developer will lodge the final plan of subdivision and Shoalhaven City Council subdivision certificates for each stage with the Department of Land and Property Information to obtain registration of the subdivision.	of Subdivision Certificates for each stage. Prior to the issue of new DP and lot titles for each stage.
Water Cycle Management	The developer will design, install and maintain water quality control measures in accordance with the following: - Kerbside bioretention will be constructed within the proposed extension of Sunset Strip to treat runoff from the new road and lots within stage 1. - Construct a vegetated swale to convey the stormwater from the bioretention systems to the existing Creek. - Retain a 30 to 50m riparian zone along the creek through dedication of proposed Lot 158. - Construct a wetland in accordance with Mitigation measure outlined in Section 7.1.3. - Install gross pollutant trap to treat stormwater entering the wetland from stage 2. - Install gross pollutant trap to treat stormwater entering the wetland from stage 3. The developer will prepare a erosion and sediment control plan to control run off during construction in accordance with the principles of the Landcom publication Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition and Construction Certificate Plans approved by Shoalhaven City Council and DCP 100.	Prior to the release of the Subdivision Certificate for stage 1. Prior to the release of the Subdivision Certificate for stage 2. Prior to the release of the Subdivision Certificate for stage 3. Prior to the issue of the Construction Certificate for each stage.
Aboriginal Heritage	The developer will manage Aboriginal historic sites in accordance with the following: Undertake Archaeological Subsurface Testing Program	Undertaken during the preparation of the Environmental Assessment.

Item	Commitments	Timing
	- One copy of the Archaeological Subsurface Testing Program report will be provided to each of the registered Aboriginal stakeholders. - Three copies of the Archaeological Subsurface Testing Program report will be provided to the NSW DECC.	On lodgement of the Environmental Assessment to the Department of Planning.
Flora and Fauna	The developer will manage vegetation and habitat in accordance with the following: - Dedicate proposed Lot 158 to Shoalhaven City Council with a 3 year maintenance period. - A Vegetation Management Plan will be prepared by a suitably qualified person for the lot 158. - Perimeter roads will be located such that they adjoin retained vegetation on proposed Lot 158 wherever possible in order to provide a line of demarcation between disturbed areas and protected areas and limit unauthorised access and dumping. - All vegetation to be retained will be protected from unauthorised access during the construction phase of the proposal. - 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.	On registration of the plan of subdivision for stage 1. Prior to the issue of the Subdivision Certificate for stage 1. Prior to the issue of the Subdivision Certificate for stage 1 and 3. During the construction phase of all stages.
Bushfire Risk	<u>Provision of Asset Protection Zones</u> The developer will establish Asset Protection Zones (APZs) in accordance with Mitigation measure outlined in Section 7.7.3 (Table 7.7). The developer will install relevant infrastructure as required, including fire hydrants. <u>Restriction as to User</u> The developer will impose a Section 88B Restriction as to User on the title of relevant allotments specifying required Asset Protection Zones (APZs) and Level of Construction in	Prior to the issue of the Subdivision Certificate for each stage. On registration of the plan of subdivision for each stage.

Item	Commitments	Timing
	accordance with mitigation measure outlined in Section 7.7.3 (Table 7.7). The developer will impose a Section 88B Restriction as to User on the title of lot 115 specifying that a 1.8 m high colourbond fence be constructed along the eastern boundary. The developer will impose a Section 88B Restriction as to User on the title of lots 116 specifying that a 1.8 m high colourbond fence be constructed along the eastern boundary.	On registration of the plan of subdivision for stage 1. On registration of the plan of subdivision for stage 3.
Acid Sulphate Soil	The developer will manage Acid Sulphate Soils in accordance with the following: - The developer will prepare an acid sulphate soil management plan. - The soil excavated during construction of the areas identified as containing ASS will be treated in accordance with ASSMP and the mitigation measure outlined in Section 7.8.3. - Further investigation will be undertaken as construction of the subdivision proceeds over the site outside the area already tested.	Undertaken during the preparation of Environmental Assessment. During the construction phase of all stages.
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 (narrowing the road reserve) and the use of kerbside bioretention on the extension of Sunset Strip. - Traffic calming will be introduced by way of road design (narrowing the road reserve) and pavement treatment on the 2 new roads off Manyana Drive. - The developer will complete the street network within the local area through the construction of the extension of Sunset Strip (stage 1), The Barrette, The Bounty, Manyana Drive (stage 2) and the 2 new roads off Manyana Drive (stage 3).	Prior to the issue of the Subdivision Certificate for stage 1. Prior to the issue of the Subdivision Certificate for stage 3. Prior to the issue of the Subdivision Certificate for each stage.

Item	Commitments	Timing
Coast Dune Protection	Two fences will be installed: (1) a fence along the eastern edge of the 12 m wide road reserve joining the proposed wetland area at the NW corner of Lot 158, with the NE corner of Lot 131; and (2) a fence from the NE corner of Lot 131, running eastward along the northern boundary of the existing footpath and terminating at the eastern boundary of vacant Lot 158.	Prior to the issue of the Subdivision Certificate for stage 3.
Landscaping	The developer will prepare a detailed landscape plan for each stage of development in line with the concept landscape plan (Attachment 23).	Prior to the issue of the Construction Certificate for each stage.
Public Open Space	Lot 158 (3.97ha) is proposed to be dedicated to Shoalhaven City Council for the purposes of riparian corridor, public reserve and provide additional access to Manyana Beach. The developer will provide maintenance to the public reserve for a 3 year period.	On registration of the plan of subdivision for Stage 1, with the additional access to Manyana Beach provided at stage 3.
Construction	The developer will prepare a Construction Management Plan for approval by Shoalhaven Council. The plan will include education of workers on the conditions requiring compliance (including soil erosion and sediment controls, flora and fauna), details of the environmental management procedures, which are to be employed during construction and measures relating to waste minimisation and management.	Prior to the issue of the Construction Certificate for each stage.
Infrastructure	<u>Roads</u> The developer will construct the extension of Sunset Strip, The Barbette, The Bounty, Manyana Drive and the 2 new roads off Manyana Drive in accordance with mitigation measures outlined in Section 7.10 and approved Construction Certificates for Shoalhaven City Council. 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	Prior to release of the subdivision certificate for each stage. Prior to release of the subdivision certificate for each stage.

Item	Commitments	Timing
	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, reuse water and sewerage services to each lot in the subdivision in accordance with the requirements of Shoalhaven Water	Prior to release of the subdivision certificate for each stage.

Table 8.1: Draft Statement of Commitments

9 PROPOSAL JUSTIFICATION

9.1 Alternative Layouts

The original subdivision layout was for a proposed 71 Lot residential subdivision of the subject site (Figure 9.1). The proposed subdivision Layout comprised a mixture of Torrens Title lots (proposed lots 101-151) and Neighbourhood Lots (proposed Lots 1-21) under the Community Land Development Act. Proposed Lot 1 was to form an Association Property lot in favour of the Neighbourhood Lots.

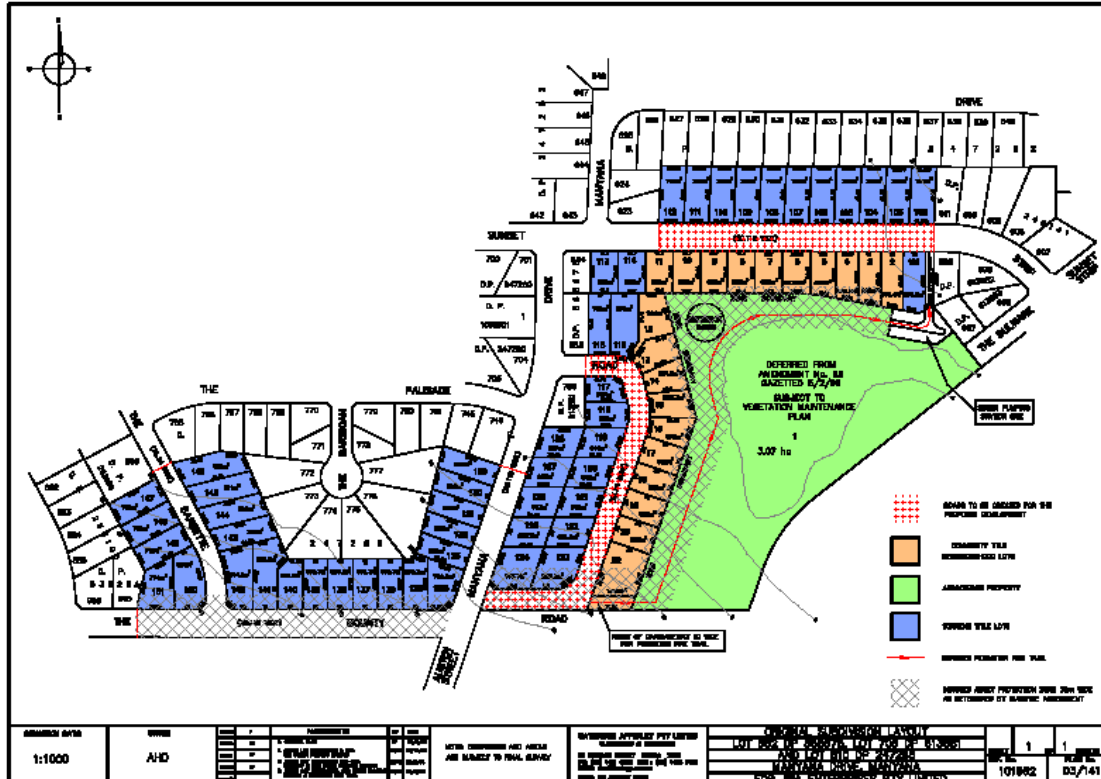


Figure 9.1: Original Subdivision Layout

After more detailed flora and fauna assessments of the subject site it was found that three endangered ecological communities (EECs) were present on the site and the proposed subdivision layout had the potential to negatively impact on two of those communities (Swamp Oak Floodplain Forest, and Swamp Sclerophyll Forest). Therefore it was concluded that 71 lots was not viable from an environmental viewpoint.

Overlaid with environmental constraints (EECs) it was determined that the subdivision layout required modification to reduce the impact on the EECs. As a result, it was determined that 14 lots along the southern side of Sunset Strip and the eastern side of the proposed loop road would need to be removed and the overall subdivision layout would need to be modified. The design team considered three alternate layouts (discussed below). After taking into account concerns raised by the Department of Planning, the Department of Natural Resources and Shoalhaven City Council, urban design principles and the environmental impacts of the proposed layouts it was decided that alternate layout 3 was the preferred layout. The justification for the preferred layout is provided in Section 9.2.

Alternative Layout 1

The driving force behind this alternative layout was to address the fact that development of the area adjacent to the deferred land would raise a host of natural resource and bushfire management issues.

The main modifications to alternative layout 1 (Figure 9.2) when compared to the original layout (Figure 9.1) are:

- All lots to become torrens title lots with the former Association Property lot (Lot 1), increased in size and proposed to be dedicated to Shoalhaven City Council as a public reserve lot.
- The number of lots along the southern side of Sunset Strip to be reduced by 9 lots and lot sizes of the remaining lots on the southern side of Sunset Strip to increase.
- Sunset Strip reduced from 20.115 to 12m road reserve.
- The number of lots along northeastern section of the loop road to be reduced by 5 lots and lot sizes of the remaining lots on the western side of the loop road to increase.
- The loop road was changed to a one-way road in a southerly direction and the road reserve reduced from 15.25m to 10m, except adjacent to lots 123 and 124 which remains 15.15m.
- The wetland to be moved from the northwestern corner of Lot 1 to be located in the former Lot 112.
- All APZs are proposed to be located within road reserve and privately owned lots.
- A fire trail was proposed along the back of proposed lots 124 to 129.

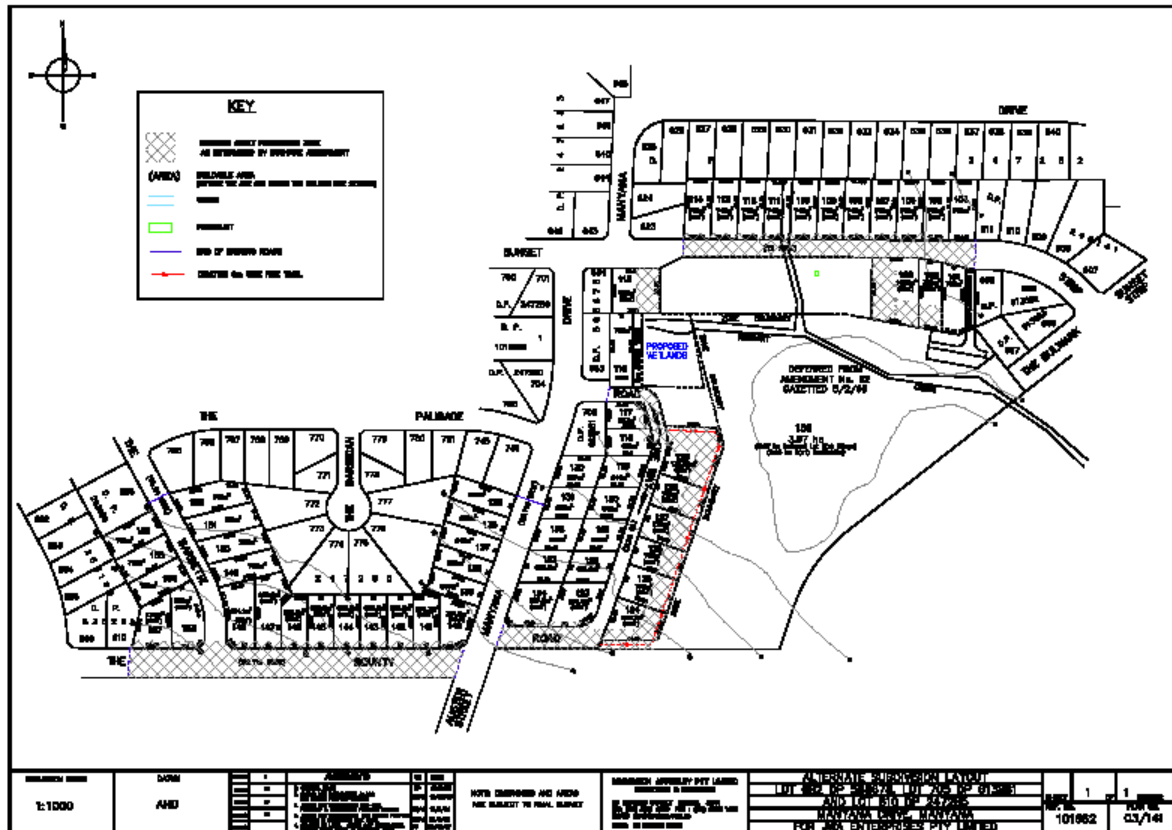


Figure 9.2: Alternative Layout 1

Alternative Layout 2

This layout goes one step further than alternative layout 1 by providing an additional perimeter loop road off Manyana Drive which further reduces the impact on the EEC, improves bushfire protection and further enhances opportunities for public access to foreshore areas.

The main modifications to alternative layout 1 (Figure 9.3) when compared to the original layout (Figure 9.1) are:

- All lots to be torrens title lots with the former Association Property lot (Lot 1), increased in size and proposed to be dedicated to Shoalhaven City Council as a public reserve lot.
- The number of lots along the southern side of Sunset Strip to be reduced by 9 lots and lot size of the remaining lots on the southern side of Sunset Strip to increase.
- Sunset Strip road reserve reduced from 20.115 to 12m.
- The number of lots along the northeastern section of the loop road was reduced by 5 lots.
- The loop road to be changed to a perimeter loop road and the lots on the eastern side of the road moved to western side on the new perimeter loop road.

- The loop road reduced from 15.25m to 12m road reserve, except adjacent to lots 123 and 124 which remains 15.15m.
- The lot layout proposed to utilise battleaxe lots off the perimeter loop road.
- The wetland was proposed to be moved from the northwestern corner of Lot 1 to be located in the former Lot 112.
- All APZs are proposed to be located within road reserve and privately owned lots.

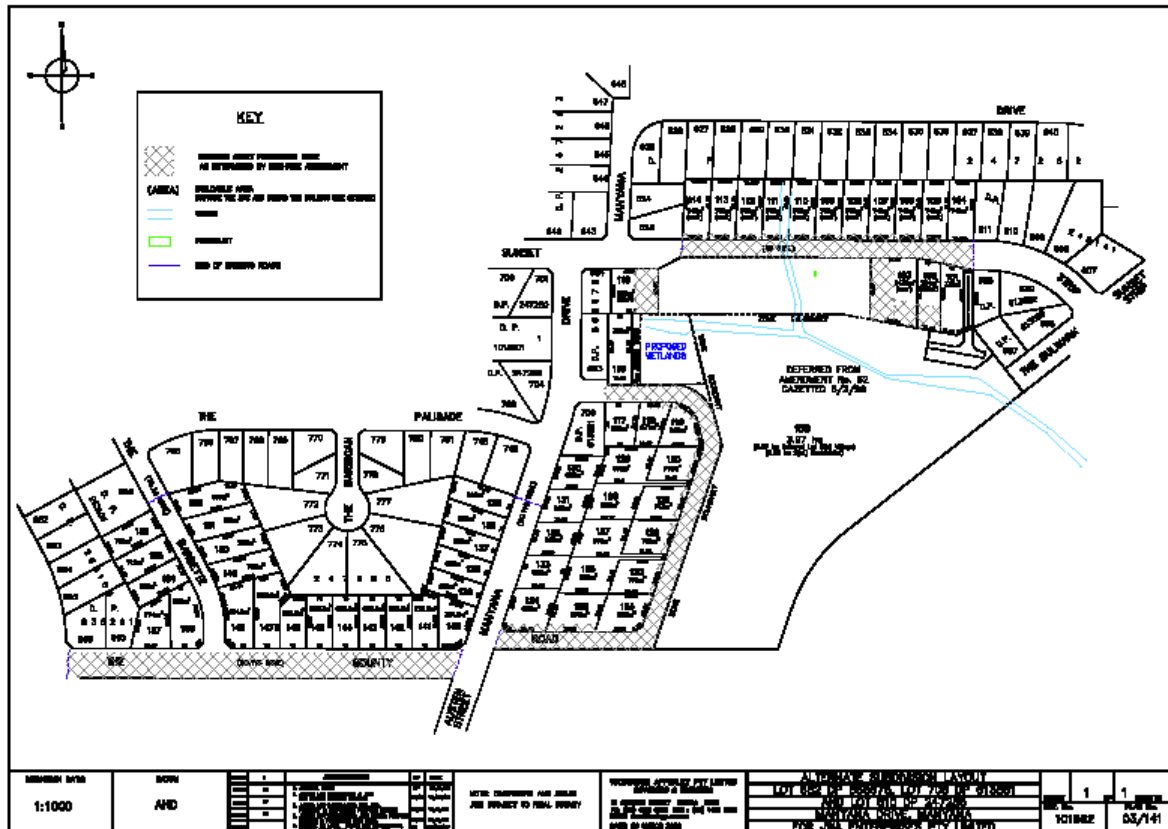


Figure 9.3: Alternative Layout 2

Alternative Layout 3 – (Preferred Layout)

This layout utilises the advantages of the additional perimeter loop road off Manyana Drive provided in alternative layout 2 while providing a further connecting road from Manyana Drive. The introduction of the new connecting road results in lots in the south eastern section of site being reduced in size. However, it was considered more beneficial to provide public road access to all lots and improve the permeability within the street network and access to public areas, than to increase the lot sizes in this location. The introduction of some smaller lots is also considered beneficial in providing some housing choice to the market place.

The main modifications to alternative layout 1 (Figure 9.4) when compared to the original layout (Figure 9.1) are:

- All lots are proposed as torrens title lots with the former Association Property lot (Lot 1), increased in size and proposed to be dedicated to Shoalhaven City Council as a public reserve lot.
- The number of lots along the southern side of Sunset Strip is proposed to be reduced by 9 lots and lot size of the remaining lots on the southern side of Sunset Strip to increase.
- Sunset Strip road reserve is reduced from 20.115 to 12m.
- The number of lots along the northeastern section of the loop is reduced by 5 lots.
- The loop road is changed to a perimeter loop road and an additional connecting road between Manyana Drive and the loop road (Road 1) to provide road frontage & access to all lots. The loop road is proposed to be reduced from 15.25m to 12m, except adjacent to lots 131 to 134, which was proposed to be reduced 13m. The connecting road is proposed to be 13m wide.
- The lots on the eastern side of the loop road are located on the western side of the new perimeter loop road.
- The lots in the south eastern section of site have been reduced in size to allow for the new connecting road.
- The wetland was proposed to be relocated from the northwestern corner of Lot 1 to be located in the former Lot 112. Therefore, the wetland is now proposed to be located in the northwestern corner of Lot 158.
- All APZs are proposed to be located within road reserve and privately owned lots.



The subject site is considered to be at the urban fringe, which in this case is the interface between an existing urban area and the coastline. The general principle for development in a fringe area is to respect the natural environment, create an appropriate edge and to provide visual and physical linkages between the existing urban character and the coastline.

The urban design principles used in deciding which subdivision layout to use considered the inter-relationship among future buildings, streets, private open space, and publicly-accessible open spaces. The proposal seeks to establish functional relationships that foster a healthy community, add economic value, and enhance aesthetic character of the local area. The proposed subdivision layout (alternate layout 3) was chosen as it essentially establishes a sense of place by enhancing the public domain. This is evident by the establishment of a street network, which connects the proposed development to the existing development, provides safe streets and equity of access to Manyana Beach and the proposed public reserve.

The proposed subdivision is justified on the subject site for the following reasons:

- This development provides the opportunity for residential properties to be located in a unique coastal setting within an existing urban area.
- Residents of the future will have the convenience of easy access to natural areas including an expanse of coastal beaches. While at the same time, dwellings will not impact public views to or from the coastal foreshores.
- The nature of the proposed subdivision is that of small scale residential infill which is situated immediately adjacent to existing residential development.
- The proposed development will result in the creation of an additional 57 residential lots, which are similar in size to those in the locality.
- The development proposed makes the highest and best use of existing residential zoned land without negatively impacting the existing urban amenity.
- The subdivision layout has been designed so that the ecologically sensitive parts of the site are protected through their proposed dedication to Shoalhaven City Council as public lands.
- The subdivision layout has been dictated by the existing road network and utilises these roads, creating extensions and linkages to complete the street network.
- The subdivision layout promotes inclusiveness and lots sizes which offer a variety of housing options. Housing diversity allows all stages of life to be accommodated within the same community. It also provides opportunities to know and interact with neighbours from all walks of life, which benefits the health of the community as a whole.
- The subdivision layout reinforces existing services within the local area. Furthermore, it is proposed to bundle service conduits, installing compatible cables and pipes within the same trench/conduit.
- The subdivision layout utilises Water Sensitive Urban Design using Best Management Practices (BMP's), which will improve water quality in the local area.

Figure 9.5 provides a subdivision layout plan overlain with the position of all ecological constraints (hollow-bearing trees, EECs, threatened species habitat/sightings). Furthermore, a line showing a 50m buffer to the EEC has been provided in accordance with the Department of Environment and Climate Change requirements. The DECC suggest that a 50 metre wide "buffer area" should be set around the EEC; we would comment that:

- There is no scientific basis for establishing a 50 metre wide buffer.
- Setbacks for development (buffer areas) may provide some protection for a stand of an EEC, but this depends upon the threat and other measures that can be implemented to protect the EEC.
- This is an urban site and a 50 metre buffer area would cover much land that is already developed.

- We believe that the extension of Sunset Strip would provide an appropriate buffer edge to the north (note that the EEC as defined in this report is to the south of this street).
- The water quality pond located in the western part of the land will improve water quality in the EEC and associated creek and is itself a form of buffer between the EEC and the existing residential land to the west.
- The road at Lot 119 provides a buffer to the EEC at that location, although it is recognised that a small area of the edge of the EEC would be lost.
- The effectiveness of the above buffer facilities will depend upon (i) subdivision design that ensures stormwater is appropriately controlled, and (ii) the rehabilitation and long term management of the EEC and adjoining land.
- It is noted that with appropriate rehabilitation the EEC can be re-instated to some land on the southern edge of the EEC from where it has been cleared.

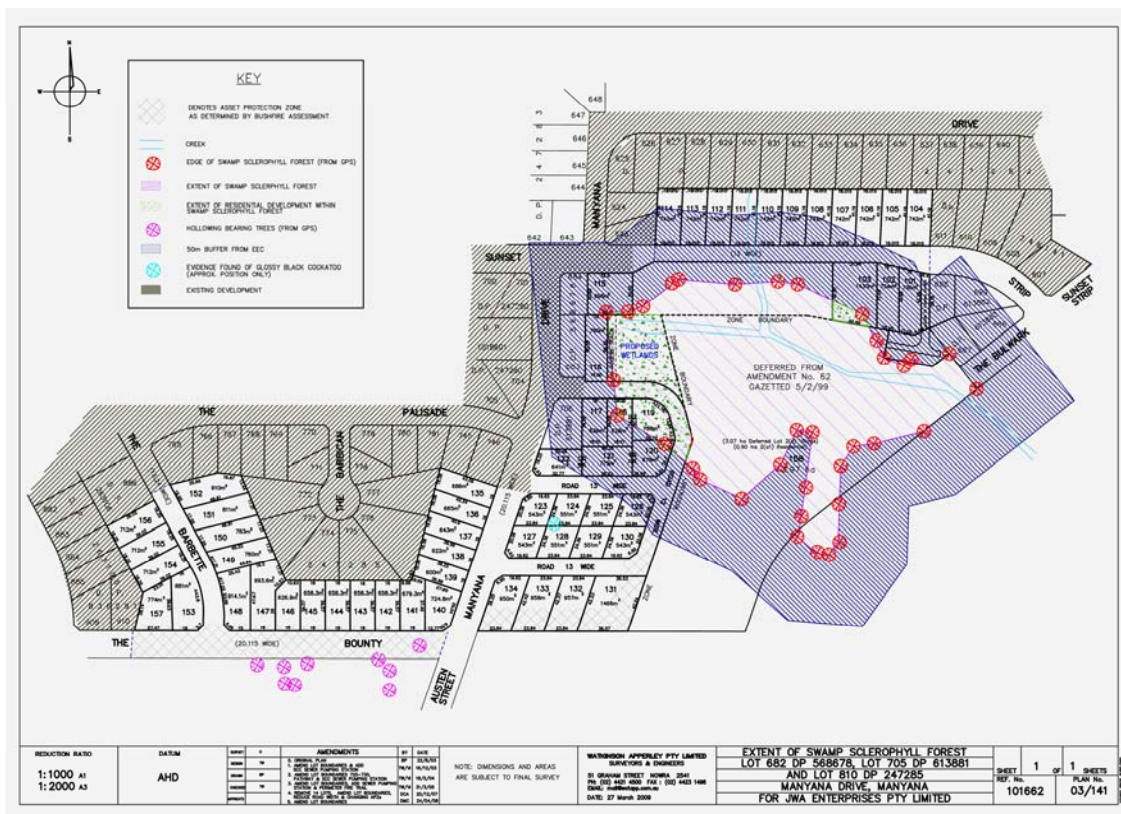


Figure 9.5: Subdivision layout plan overlain with the position of all ecological constraints

In accordance with the DRAFT Guidelines for Threatened Species Assessment prepared by the Department of Environment and Conservation and the Department of Primary Industries (July 2005), a justification of the preferred option based on the key thresholds is provided below.

KEY THRESHOLDS

- whether or not the proposal, including actions to avoid or mitigate impacts or compensate to prevent unavoidable impacts will maintain or improve biodiversity values.

Native vegetation will be cleared to develop the subdivision and to establish the civil infrastructure and the Assets Protection Zones to protect the subdivision from bushfire. The native vegetation to be cleared and/or under-scrubbed consists of about 5.59 hectares comprising 0.4 hectares or 15 percent of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains, all of the Blackbutt - Bloodwood Forest and about half of the disturbed woodland/forest. The native vegetation to be retained is proposed to be dedicated to Shoalhaven City Council as public reserve and consists of about 85 percent (2.4ha) of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains, the small area of Bangalay Sand Forest, and about half of the disturbed woodland/forest.

The following mitigation measures have been incorporated into the proposal to reduce the impact of the clearing of the native vegetation:

- A vegetation management plan will be prepared to deal with the short to long term protection and management of the public reserve to maintain and re-establish the floristic structure and other features of the coastal vegetation community. In time the disturbed woodland/forest will regenerate to become typical woodland/forest of the local sandstone soils.
- The majority of the residential lots are proposed to be flanked by perimeter roads separating the lots from the bushland areas, which are proposed to be retained. The use of the perimeter roads has two main benefits:
 1. The perimeter roads will comprise a large portion of the required bushfire asset protection requirements for the site, significantly reducing the extent of vegetation loss and encroachments into the identified EEC for asset protection purposes; and
 2. The use of perimeter roads clearly defines the vegetation to be retained, minimises the edge effect and discourages land holders from dumping garden refuse onto the adjacent bushland (which is currently the case).

The proposed development will result in a small loss of biodiversity value within the subject site. However, the dedication of 3.97ha (41.5%) of the subject site comprising 2.2ha the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest, the small area of Bangalay Sand Forest, and about half of the disturbed woodland/forest along with a vegetation management plan to maintain and re-establish the floristic structure and other features of the coastal vegetation

community will result in an improvement to the biodiversity value of the vegetation to be retained.

Biodiversity refers to the variety of life forms, the different plants, animals and micro-organisms, the genes they contain, their habitats and the ecosystems of which they form a part. Therefore as the Blackbutt - Bloodwood Forest is well represented within the Shoalhaven Region and the local area we are of the opinion that the proposal will maintain the biodiversity value of the subject site by improving the biodiversity value of the vegetation to be retained within public ownership.

- whether or not the proposal is likely to reduce the long-term viability of a local population of the species, population or ecological community.

A Flora and Fauna Assessment was prepared by Kevin Mills & Associates which discussed in Section 7.6. The Flora and Fauna Assessment identified the following threatened species and endangered ecological communities which could be affected by the proposed subdivision:

- Glossy Black-Cockatoo;
- Grey-headed Flying-fox;
- Gang-gang Cockatoo;
- Threatened microbat species (Gould's Wattled Bat (*Chalinolobus gouldii*), Little Forest Bat (*Vespadelus vulturnus*);
- Glossy Black-Cockatoo; and
- Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest on Coastal Floodplains.

The flora and fauna assessment concluded that while four or five hectares of potential foraging habitat for Grey-headed Flying-foxes, Gang-gang Cockatoo and the Threatened microbat species (Gould's Wattled Bat (*Chalinolobus gouldii*), Little Forest Bat (*Vespadelus vulturnus*)) will be cleared as a result of the proposed action, the clearing of this vegetation will not cause their habitat to become fragmented or isolated and that these animals are wide ranging and highly mobile and have a very large home range, of which such a small site would be a negligible part.

Kevin Mills and Associates undertook a survey in March 2008 in the Manyana locality (between North Bendalong, in the north and Narrawallee Nature Reserve, in the south) to identify the distribution of the Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest vegetation community and Glossy Black-Cockatoo habitat. Mills concluded that:

- The Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest to be removed is a small proportion of the extent of this community complex in the locality. The removal of the 0.81 hectares on the

subject land is not likely to compromise the long-term survival of the communities in the locality.

- The survey of feeding habitat in the locality found abundant feeding areas, mostly located on land set aside for conservation. In these circumstances, the importance of the stand of casuarinas on the subject land is likely to be low.

The proposed subdivision is not likely to compromise the long-term survival of the identified threatened species or endangered ecological communities in the locality.

- whether or not the proposal is likely to accelerate the extinction of the species, population or ecological community or place it at risk of extinction.

As noted earlier in this report, the proposal will involve clearing approximately 0.4 hectares or 15 percent of the Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest on Coastal Floodplains complex. The remaining area of this community complex will be retained within a dedicated public reserve. The proposal acknowledges that such a small area of endangered ecological communities will be at greater risk of extinction and more vulnerable to weed invasion, disturbance from human activities and bushfires in the medium to long term if not properly managed. To counter this a vegetation management plan dealing with the short to long term protection and management of the area will be prepared and implemented. Furthermore, as discussed above the survey of the distribution of endangered ecological communities in the locality found that the communities occurring on the subject land are common in the locality and almost totally on land set aside for conservation purposes. Therefore there is no risk of extinction of the communities in the locality. The establishment of an appropriate and an adequate management regime as proposed by the preparation of a vegetation management plan will reduce the potential for an acceleration of extinction of the community on the subject site

As the Grey-headed Flying-foxes, Gang-gang Cockatoo and the Threatened microbat species (Gould's Wattled Bat (*Chalinolobus gouldii*), Little Forest Bat (*Vespadelus vulturinus*) are wide ranging and highly mobile with a very large home range, of which the subject site would only be a small part, the proposal is not likely to accelerate the extinction of the abovementioned or place them at risk of extinction.

- whether or not the proposal will adversely affect critical habitat.

Critical habitat refers only to those areas of land listed in the Registers of Critical Habitat. No critical habitat has been declared on the subject land.

Conclusion

As discussed throughout this report the proposed subdivision will result in the removal of 0.4 hectares or 15 percent of the endangered Swamp Oak Floodplain Forest/Swamp Sclerophyll Forest, with the remaining 85 percent (2.4ha) proposed to be retained within public reserve to be dedicated to Shoalhaven City Council.

As demonstrated in Figure 9.5 approximately a third of the EEC 50m buffer falls within Manyana Beach reserve and land to be dedicated to Council located to south and south east of the site. The remaining two thirds of the EEC 50m buffer falls within proposed or existing development. This emphasises the point that the nature of the proposed subdivision is that of small-scale residential infill situated within existing residential developed land. The subdivision layout has been dictated by the existing road network and utilises these roads, creating extensions and linkages to complete the planned street network. There have been a number of alternate subdivision layouts considered throughout the design process, these are discussed in section 9.1. The preferred subdivision layout utilises perimeter roads to separate the majority of the residential lots from the EEC, proposed to be retained. The use of the perimeter roads clearly defines the vegetation to be retained, minimises the edge effect and significantly reduces the extent of vegetation loss and encroachments into the identified EEC for asset protection purposes.

9.3 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 principles of Ecologically Sustainable Development (ESD) have been incorporated into the design of the proposed subdivision and have been taken into consideration during the preparation of the Environmental Assessment and are discussed below.

9.3.1 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 EA and are discussed in section 7. It is unlikely that an increase of 57 residential lots containing approximately 139 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 improve water quality of the local creek and beach.

9.3.2 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 5.7ha 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

3.97ha of land (41.5% of subject site) to Shoalhaven City Council for public reserve that the impact on the local environmental can be reduced.

9.3.3 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. Furthermore, a soil and water management plan will be prepared prior to commencement of construction to ensure that sedimentation of the creek which runs through the property does not occur.

The proposed subdivision will result in 3.97ha (41.5% of the subject site) of coastal vegetation being dedicated to Shoalhaven City Council for public reserve. The 3.97ha of land comprises three endangered ecological communities (Swamp Oak Floodplain Forest; Swamp Sclerophyll Forest; and Banksia - Bangalay Forest). A vegetation management plan will be prepared prior to dedication to ensure that the endangered ecological communities are managed in an appropriate manner.

9.3.4 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 EA demonstrates how the consultant team has addressed the key issues set out in the Director-General's Requirements and has designed a subdivision layout, which minimises its impact on the environment. This assessment demonstrates that the proposed development is consistent with local, state and national legislation and guidelines.

Where potential environmental impacts have been identified, appropriate investigations have been undertaken and the recommended mitigation measures and environmental safeguards have been either designed into the subdivision layout, or are proposed be constructed as part of the civil infrastructure. The mitigation measures and environmental safeguards discussed in sections 7 and 8 will enable the potential environmental impacts to be reduced or contained to within acceptable standards or levels. The dedication of 3.97ha (41.5% of the subject site) of coastal vegetation to Shoalhaven City Council along with a vegetation management plan will ensure the long term survival of three endangered ecological communities (Swamp Oak Floodplain Forest; Swamp Sclerophyll Forest; and Banksia - Bangalay Forest) while water sensitive urban design will improve the water quality within the local area. Therefore this proposal will not significantly affect an endangered ecological community or threatened species.

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 543m² to 1466m². 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 where possible 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 EA 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).

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