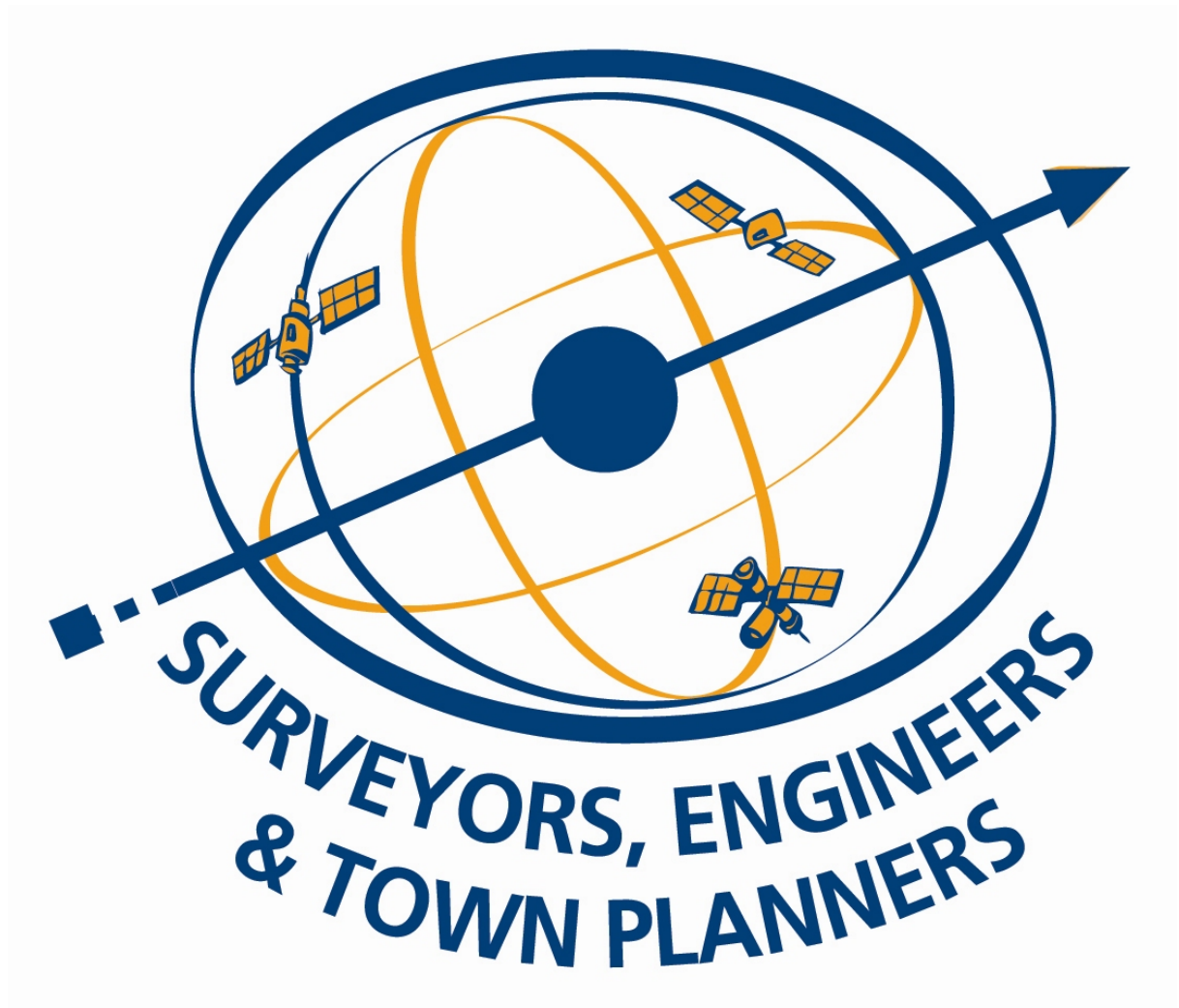


PREFERRED PROJECT REPORT



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

MAJOR PROJECT 06-0165

Prepared by:

Watkinson Apperley Pty Limited

June 2010

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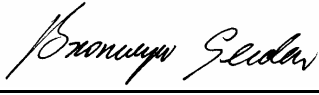
PREFERRED PROJECT REPORT UNDER PART SECTION 75H OF ENVIRONMENT PLANNING AND ASSESSMENT ACT 1979

RESIDENTIAL SUBDIVISION

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

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Date: 17th June 2010

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 Section 75H of the EP & A Act 1979.

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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 Preferred Project Report has been prepared in relation to Project Application No. 06_0165, which relates to a proposed 47 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 Preferred Project Report has been compiled from site inspections, file notes, correspondence and reports prepared by appropriately qualified consultants and is neither deliberately false nor misleading.



David Cannon
M.Env.Eng.Sc, B.Env.Sc.Adv (Hons)
Corporate Member - PIA

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1. INTRODUCTION

This report is prepared in relation to Major Project Application No. 06_0165 which is seeking consent to the subdivision of the subject site (Lot 682 DP 568678, Lot 705 DP 613881 and Lot 810 DP 247285, Manyana Drive, Manyana) into forty seven (47) residential allotments.

During the assessment of the application a number of issues have been raised by State (Department of Climate Change and Water (DECCW), Department of Planning (DOP) and local government authorities (Shoalhaven City Council (SCC) and the general public. Furthermore, the Department of Planning has met with the proponent on-site (11 November 2009 and 13 January 2010) to detail their concerns. The main issues raised were in relation to:

- Subdivision Layout (non-compliance with Shoalhaven DCP 100);
- Flora and Fauna (Impact on the Endangered Ecological Community);
- Bushfire Protection;
- Stormwater Management (the use of a constructed wetland);
- Acid Sulfate Soils (ASS);
- Flood Impact; and
- Coastal hazards.

Consideration has been given to these matters and has resulted in the proposal being modified to seek development consent to the creation of forty-six (46) Torrens Title residential allotments and one public reserve lot as outlined in Section 2 of this report.

The result of modifications to the subdivision layout has resulted in the requirement to prepare this Preferred Project Report (PPR). The purpose of this PPR is to identify the changes to the project and detail the manner in which these address the issues raised by the DOP and outline how the changes to the subdivision layout further mitigate the impact of the development. The impacts and proposed mitigation measures are discussed in Section 3.

2. PREFERRED PROJECT

The proposed subdivision layout has been amended and now seeks approval for the creation of forty-six (46) Torrens Title residential allotments covering 5.02 hectares of the 9.56 hectare site. The residual land (4.54 hectares), representing 47% of the subject site is proposed to be dedicated to Shoalhaven City Council as a public reserve lot (proposed Lot 147 in the subdivision).

The proposal has been amended in the following ways (Figure 2.1):

- 1) The amended subdivision layout has reduced the number of lots from 58 to 47;

- 2) Sunset Strip is no longer proposed to be connected (i.e. Sunset Strip will not connect as a through road to The Bulwark and beachfront), resulting in the dedication of a further 0.5ha of Endangered Ecological Community as part of the public reserve lot (Lot 147). It should be noted that while 8 lots have been removed from the proposal along Sunset Strip, the new lots located adjacent to the public reserve lot (lots 102, 105 and 106) have been increased in size to accommodate the required Asset Protection Zones (APZs).
- 3) The south-eastern section of the layout has been redesigned to remove the effects of flooding to proposed lots and to reduce the impact and provide a vegetated buffer to the EEC located on Lot 147. The redesign has reduced the number of lots in this section of the layout from 17 to 16. All lots are now located outside the 1:100 year flood level. The redesign results in part of the layout being located within the 2 (e) 'village' zoned area of the site.
- 4) The vegetated buffer to the identified EEC in the south-eastern section of the layout has been increased and ranges from 29 to 38 metres. The buffer area will be located within the public reserve lot.
- 5) The developer commits to maintaining the Endangered Ecological Community and surrounding reserve for three (3) years post the land being dedicated to Council.
- 6) The stormwater treatment has been amended to reflect the new layout. The main changes are:
 - The stormwater treatment devices only treat stormwater generated from within the proposed subdivision and not stormwater generated by the existing development.
 - With the removal of the Sunset Strip link and the adjoining lots from the proposal, piped drainage to the watercourse is no longer necessary for this area. In lieu of this, Sunset Strip is to be constructed to the end of the lot 623 at the corner of Sunset Strip and Manyana Drive on the western end (Lot 105 and 106), and on the eastern end Sunset Strip is to be extended approximately 55m with appropriate stormwater drainage and a small bio-retention pod to service four new lots (Lots 101 - 104). Proposed Lots 101 and 102 off Sunset Strip are to drain to an inter-allotment drainage line to discharge to a single point in the proposed public reserve.
 - The wetland has been removed due to potential impacts on EEC with a bio-retention basin and gross pollutant trap now proposed outside the EEC zone.
 - Rainwater tanks have been included with individual lots.
 - A bio-filtration swale has been added into the road reserve of The Barquette to treat the stormwater before it connects into the existing drainage network.
 - Inter-allotment drainage to proposed Lots 137 and 138 has been directed to Manyana Drive to reduce the flow to the existing drainage system in The Palisade. The removal of these building envelopes from the catchment draining to The Palisade will offset the potential increase in flow from

- buildings on proposed Lots 139, 140, and 141, therefore removing any requirement for on site detention on these lots.
- 7) The developer commits to maintain the water quality control infrastructure for three (3) years after their construction is complete;
 - 8) The asset protection zones have be amended to reflect the recent changes to the bushfire guidelines, "Planning for Bushfire Protection" and the Australian Standards (AS3559 -2009).
 - 9) The developer commits to entering into a Voluntary Planning Agreement with Shoalhaven City Council in relation to the provision of monetary contributions to infrastructure projects approved by the Minister for Planning in addition to those provided under Shoalhaven Council's Section 94 Contributions Management Plan.



Figure 2.1 : The amended layout plan (A) compared to the submitted layout plan (B).

In accommodating the above changes, the following plans have been prepared by Watkinson Apperley Pty Ltd and accompany this PPR:

- Amended Subdivision Layout dated 8th June 2010 (Attachment 1);
- Amended Subdivision Layout showing Building Envelopes dated 8th June 2010 (Attachment 2);
- Proposed Road Network Plan dated 8th June 2010 (Attachment 3);
- A Plan showing a typical cross-sections of the proposed roads (Attachment 4);
- Proposed Staging Plan dated 8th June 2010 (Attachment 5);
- Ecological Constraints Plan dated 8th June 2010 (Attachment 6); and
- Concept Stormwater Plan dated 16 June 2010 (Attachment 7).

3. AMENDED SUBDIVISION LAYOUT

3.1. Subdivision Layout

The proposed residential allotments and the configuration of roads are shown in Figure 3.1 and on the subdivision layout plan (Attachment 1).

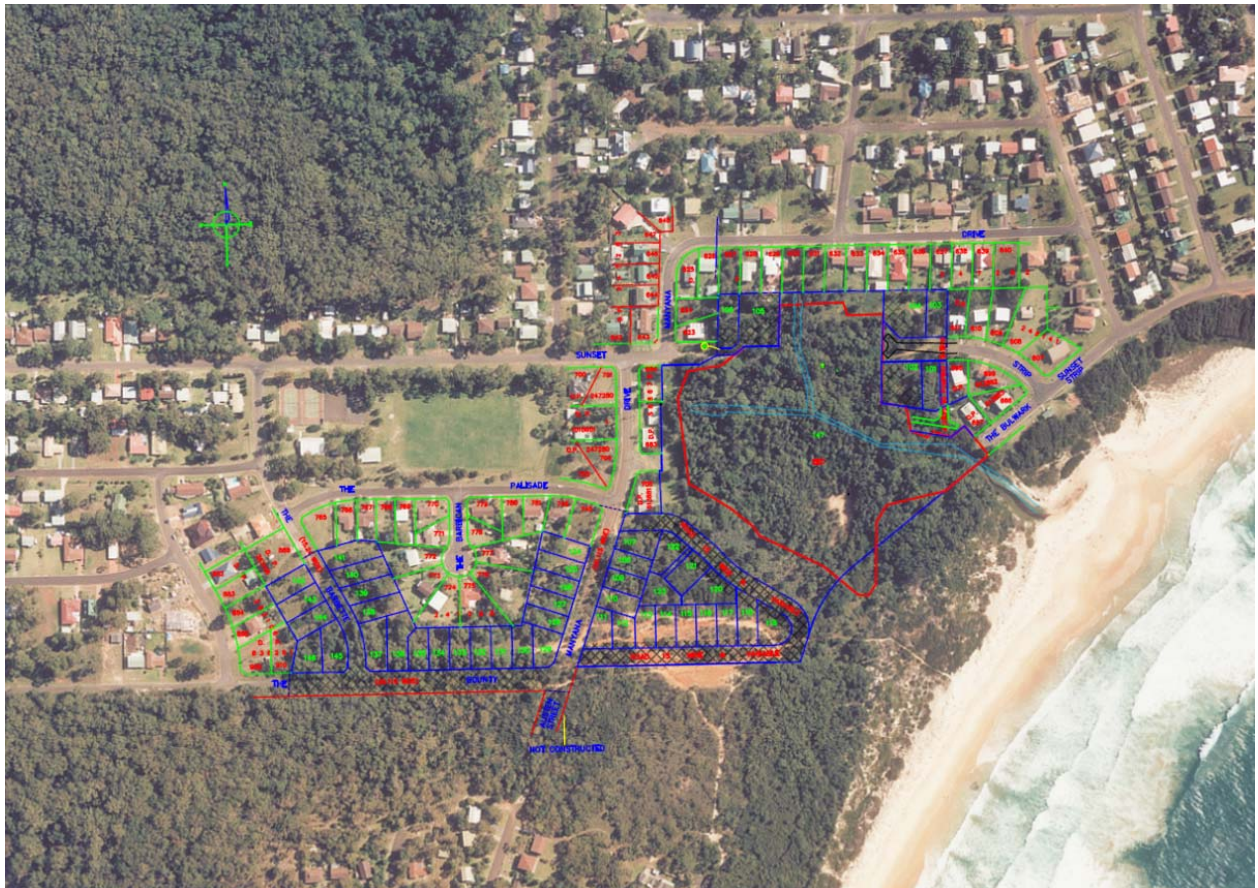


Figure 3.1: Proposed Subdivision overlaid over an aerial photo. Note: Proposed lots shown in blue, existing lots shown in green.

All forty-six residential lots will have frontage to the proposed new road network with orientation generally east-west or north-south. The lots have areas ranging in size from 586m² to 1744m² with lot 147 noticeably larger in area (4.54ha). Lot 147 contains environmentally sensitive land (Endangered Ecological Communities and a water course with associated riparian vegetation), which is proposed for dedication to Shoalhaven City Council as Public Reserve.

In accordance with our discussions with the Department of Planning and inline with the approach taken on the recently approved subdivision on Berringer Road, Manyana (Major Project number 05_0059) a vegetated buffer ranging between 29 and 36m has been provided to the ECC in south-easterly direction (as discussed in Section 4.1). This buffer area comprises part of the lot to be dedication to Council. The title of Lots 102, 104 and 105 will specify that a 1.8m solid boundary fence be erected and maintained adjacent the Council land to ensure a clear delineation between public and private land while providing a radiant heat barrier and reducing encroachment potential.

Lots 102, 104 - 107, 111 - 122, 129 - 137, 145 and 146 contain varying degrees of Asset Protection Zone in accordance with recently updated Planning for Bushfire Protection Guidelines (2006) and AS3959-2009, while accommodating suitable building area on each lot. A plan showing that all the lots have adequate building envelopes has been provided in Attachment 2. 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 reduced building setback lines.

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

- 7.5m on the lots fronting The Barbette, The Bounty, Sunset Strip and Manyana Drive in line with the existing dwellings; and
- 5.5m on the lots fronting the proposed perimeter loop off Manyana Drive.

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.
- Reducing the building line setbacks has 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.

The subdivision layout will result in the unformed parts of the existing roads; 'The Barbette', 'The Bounty', 'Sunset Strip' and 'Manyana Drive' being extended to provide access to the new residential allotments and one new loop road being created to provide access to the southern section of Lot 705 (Attachment 3). It should be noted that Sunset Strip is no longer proposed to be connected and will now only be extended 50m in a westerly direction to provide street frontage to proposed Lots 101 - 104. A y-shaped turning head has been provided in accordance with Shoalhaven DCP 100. Proposed lots 105 and 106 will have direct street frontage to the existing Sunset Strip, minor upgrade works will be required. A right of carriageway will be created over Lot 105 to ensure that Lot 106 has appropriate accessibility and manoeuvrability.

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

The perimeter loop road (Road 1) will be located off Manyana Drive approximately 7m south of The Palisade and approximately 7m north of The Bounty. The perimeter loop road (Road 1) is proposed to have a 15 metre road reserve with a 4.5 metre verge on the western side and a 2.5 metre verge on the eastern side of the street with a 8 metre carriageway. It should be noted that the perimeter loop road will be a single load road and services will be only be required on the western side of the road. A typical cross-section is provided in Attachment 4. The side of the road with the reduced verge width will abut the public reserve lot. We are of the opinion that the 1m reduction in the road reserve width is justified in this situation.

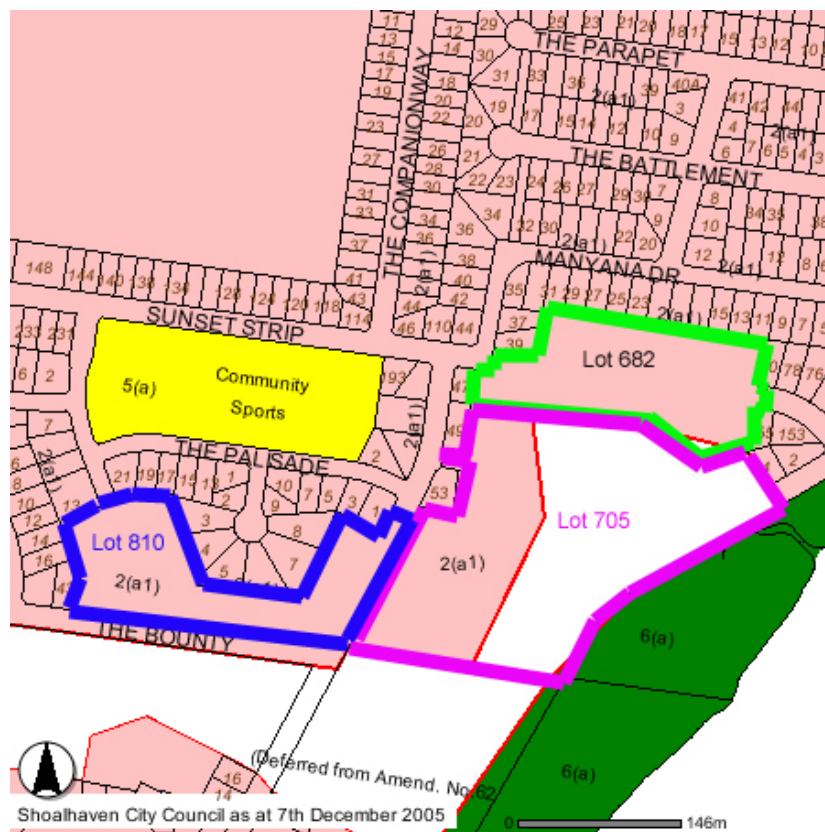
The proposed subdivision will be constructed and released in two (2) stages (Attachment 5) as described below. The timing for the release of each stage will depend upon market conditions and financing.

- Stage 1 – will involve:
 - The creation of 16 lots (lots 130 to 146);
 - The construction and extension of The Barbette and The Bounty;
 - The construction of the bio-swale along The Barbette, the construction of the bio-retention basin within Lot 147 and the installation of a Gross Pollution Trap to treat the stormwater entering the bio-retention basin.
 - The creation of an easement over Lot 147 for access to the bio-retention basin;
 - The creation of easements over Lots 129 - 137, 140 -141 and 145 for inter-allotment drainage; and
 - The creation of easements over Lot 765 drainage.

- Stage 2 – will involve:
 - The creation of 30 lots (lots 101 to 129);
 - The construction and extension of Sunset Strip and Manyana Drive;
 - The construction of the new loop road;
 - The construction of the bio-retention pod with Sunset Strip;
 - The dedication of proposed Lot 147 to Shoalhaven City Council as public reserve;
 - The creation of an easement over Lot 147 for the sub-station (padmount);
 - The creation of an easement over Lot 147 for the transfer of electricity;
 - The creation of an easement over Lot 147 for sewer;
 - The imposition of flood planning floor levels over Lot 115; and
 - The creation of easements over Lots 112 - 117 and 120 for inter-allotment drainage.

3.2. Planning Controls

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 3.1).



The objectives of zones are as follows:

Zone 2(a1)

"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."

Zone No 2 (e)

"to provide a village lifestyle with a range of residential accommodation and support urban facilities."

The proposed development utilises a range of lot sizes, from 586m² to 1744m². 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.

The proposed subdivision has been redesigned and now proposes lots and road infrastructure within the 2(e) zoned proportion of the land. The proposed subdivision is permissible within the 2(e) zoned land and satisfies the objectives of the zone. It is acknowledged that 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.

We are of the opinion that the environment studies undertaken as part of this application clearly demonstrate that the small section of proposed development within the 2(e) 'village' zone will not have a negative impact on the local environment. The remainder of the 2 (e) zoned land will be dedicated to Council as part of the public reserve lot (Lot 147). 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.

3.2.1. 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 (Table 3.1).

Table 3.1: Compliance 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 have been designed with consideration of the environmental constraints and with the intent to complete the 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.
Street and lot orientation/dimensions facilitate energy efficient dwellings		Streets aligned predominantly in a East-West and Northwest-Southeast direction.
Lot layout/design provide variety of lot sizes & enable a variety of housing types		Lot sizes ranging between 586m ² to 1744m 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 5.02 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 147 (4.54 hectares), representing 47% 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 147.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
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 Barbette, The Bounty, Manyana Drive, plus a new perimeter loop road off Manyana Drive. All the proposed roads satisfy the 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 700m.
	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 (average)	Street reserves range from 15 – 20m due to the environmental constraints of the site. The new proposed perimeter loop road will have a road reserve of 15m. This road is only proposed to be a single load road, with services provide on only one side of the road. The side of the road with the reduce verge width will abut the public reserve lot. We are of the opinion that the 1m reduction in the road reserve width is justified in this situation.
	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.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
	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	The extension of the existing will be constructed to match the existing roads (approximately 7m wide). The perimeter road will be constructed with a 8m carriageway to comply with bushfire requirements.
	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
	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.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
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 currently only provide a bus service on school days.
PUBLIC OPEN SPACE		
To provide public open space for outdoor recreational social activities that contributes to the identity and environmental health of the community	Public Reserve is provided in accordance with an approved open space strategy or DCP or Council's Section 94 Contribution Plan	Lot 147 is proposed to be dedicated to Shoalhaven City Council as Public Reserve.
UTILITY SERVICES		
Ensure adequate servicing of residential developments in terms of sewerage, water, electricity, telecommunications, etc.	Design & provision of utility services conforms to the requirements of relevant authorities.	All utilities are available to serve the site and will be in accordance with requirements of authorities. A typical cross-section of road reserve has been provided in (Attachment 5) to show the general location of services.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
STORMWATER DRAINAGE		
Subdivision design and layout provides for adequate site drainage	When site topography prevents the discharge of storm water directly to the street gutter or a council controlled piped system, inter-allotment drainage is provided to accept run-off from all existing or future impervious areas that are likely to be directly connected.	A Stormwater Management Concept has been prepared for the subject site by Watkinson Apperley Pty Ltd (Attachment 7 and discussed in Section 4.4). 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 bioretention basin, kerbside bioretention, and 30 to 50m of existing vegetated buffer (riparian zone) adjacent to the watercourse.
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.	
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.	

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
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	A concept landscape plan has been prepared in accordance with Council requirements and is provided in Attachment 8.
	Footpath trees maximum spacing of 10m, minimum of two trees per lot. Minimum distance from intersections 10m, provide a six month maintenance plan	
	Common design that aids street identity, lighting, signs, tree guards, bus shelters.	
	Street signs to be placed at all intersections in accordance with AC 1743 Road signs.	
ALLOTMENT LAYOUT		
To provide a range and mix of lot sizes to suit a variety of dwellings and household types, with areas & dimensions to meet user requirements.	Standard residential allotments: the minimum lot size is to be 500m²	The lot sizes range from 586m² to 1744m². The average lot size is 777 m² (excluding Lot 147).
To provide lots that enable the application of energy conservation principles.	Rectangular Corner lots: Square width min 20m, depth min 30m	There are no rectangular corner lots within the subdivision layout.

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
To provide lots of sufficient size to protect environmental features and take into account site constraints.	Rectangular Non-corner lots: Square width min 16m, Depth min 30m	All rectangular non-corner lots are above minimum standard, except; lot 101 which has width less than 16m (15.88) but a depth greater than 30m (42m) and overall area of 688m ² ; and lot 112 which has width greater than 15m (20m) but an average depth greater than 30m (29m) and overall area of 586m ² .
	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, except; lot 120 which has average depth of less than 30m, however, the lot has an overall area of 995m ² ; lot 129 which has depth of less than 30m, however, the lot has an overall area of 724.8m ² ; and lot 137 which has average depth of less than 30m, however, the lot has an overall area of 914m ² .
	Battle-axe lots: min lot size 650m ² excluding access handle	There is one proposed battle-axe lot (Lot 123). The lot complies with the DCP and has an area of 712m excluding the access handle.
Suitable building envelopes that can be developed	Rectangular building envelope of minimum dimensions 15m x 15m be available	The majority of the lots accommodate a 15m x 15m rectangular building envelope. Lot 101, 124 -129 will not be able to accommodate a 15m x 15m rectangular building envelope due to site setback requirements. However, these lots will easily accommodate a building with a similar floor space e.g. 16m x14m. A plan showing that all lots have suitable building envelopes is provided in Attachment 2.
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	Identify strands of mature	The native vegetation and fauna

PERFORMANCE CRITERIA	DCP 100 SOLUTIONS	PROPOSAL
preserving existing mature trees or provide opportunities for future planting	trees that can be retained and/or opportunities for future landscaping	habitat to be removed as a result of the proposal comprises approximately 5.02 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 147 (4.54 hectares), representing 47% 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.
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 The Bounty will also form a perimeter road as it will effectively be a single loaded road.
	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 recently updated Planning for Bushfire Protection Guidelines.
GEOTECHNICAL		
Subdivision prevented in high risk slip areas	Exclude areas with slope stability problems from development	The subject site does not have slope or stability issues.

4. IMPACT MITIGATION

4.1. Flora and Fauna

Consultation with the NSW Department of Planning (DoP) had indicated that the DoP was concerned that the proposed offsets were not sufficient and the department required quantifiable measurements to show that any proposed offsets met the NSW Department of Environment Climate Change and Water (DECCW) offset principles. Furthermore, the DoP believes that the Upland Swamp Oak Community, identified by Kevin Mills, is most likely to be Swamp Sclerophyll Endangered Ecological Community (EEC) due to a high correlation of species, location and soil type with the Final Determination for this EEC.

We are of the opinion that the Supplementary Vegetation Assessment prepared by Kevin Mills analysed the site and the vegetation in terms of the key criteria, as identified in the Final Determination and clearly demonstrates that the *Upland Swamp Oak* community does not satisfy the criteria to be classified as an EEC. Therefore, while we strongly disagree with the Department's determination that the identified *Upland Swamp Oak* should be classified as *Swamp Sclerophyll Endangered Ecological Community (EEC)*, for the purpose of this assessment we have adopted DECCW's boundary of EEC (refer to Attachment 6).

To provide quantifiable measurements showing that the proposed offset met the NSW DECCW offset principles, Eco Logical Australia (ELA) were engaged to undertake an Indicative Biodiversity Offset Assessment of the endangered ecological communities affected by the proposed residential development.

In this context an assessment of the proposed development and offset in relation to the impacts on Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest endangered ecological communities, was undertaken using the BioBanking (Biodiversity Banking and Offsets Scheme) Assessment methodology and tool (Attachment 9).

It should be noted that on the basis of the initial credit calculation assessments, the development layout was modified to reduce the impact on the EEC and the credit calculation assessment re-run on the new layout. This process was repeated a further three times until the credit calculation assessment achieved a result with a credit surplus for the Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest EECs.

Biometric vegetation types (RBVTs) are the standard vegetation types used in Biobanking assessments, with the credit calculator only able to accept these vegetation types. The following three RBVTs were identified within the site (Figure 4.1). Some areas were mapped as cleared. These areas occur primarily on the margins of the site and/or are associated with existing access tracks within the development site, and did not support native vegetation.

1. Those parts of the site where the canopy comprised a mix of Bangalay *Eucalyptus Botryoides*, Swamp Oak *Casuarina glauca* and to a lesser extent Woollybutt *Eucalyptus longifolia* were classed as - **Swamp Mahogany Swamp Sclerophyll Forest on Coastal Lowlands Sydney Basin and Southeast Corner (EEC) [SR648]**. Whilst the site does not support any Swamp Mahogany individuals (Swamp Mahogany being rare south of Jervis Bay), the community includes Bangalay as a main associated species and Swamp Oak is a diagnostic species in the Profile Source vegetation community – Coastal Sand Swamp Forest (Tozer et. a. 2006). RBVT SR648 correlates with the Swamp Sclerophyll Forest EEC.

Note: ELA acknowledged that the classification of the vegetation as best fitting the RBVT SR648 is not necessarily a conclusion that all of the vegetation mapped as RBVT SR648 comprises the Swamp Sclerophyll Forest EEC. As well documented elsewhere (Preston and Adam 2004, Larkin 2009), the range of factors identified in the final determinations to list endangered ecological communities must be considered when deciding if the community is present.

2. Those parts of the site where the canopy was dominated by Swamp Oak and there was a paucity or absence of eucalypts were classified as **Swamp Oak - Prickly Tea-tree -Swamp Paperbark Swamp Forest on Coastal Floodplains Sydney Basin and Southeast Corner (EEC) [SR649]**. RBVT SR649 correlates with the Swamp Oak Floodplain Forest EEC.
3. The remainder of the site which supported native vegetation was classified as **Coast Banksia - Coast Tea-tree Low Moist Forest on Coastal Sands and Headlands Sydney Basin and Southeast Corner [SR530]**. Those parts of the RBVT SR530 which occur on the sand dunes i.e. in the extreme east of the site, are likely to comprise the Bangalay Sand Forest EEC and have been classified as such by KMA (2008). This does not include the small area of the RBVT SR530 within the development site (Zone 5) as it occurs on a clay substrate.

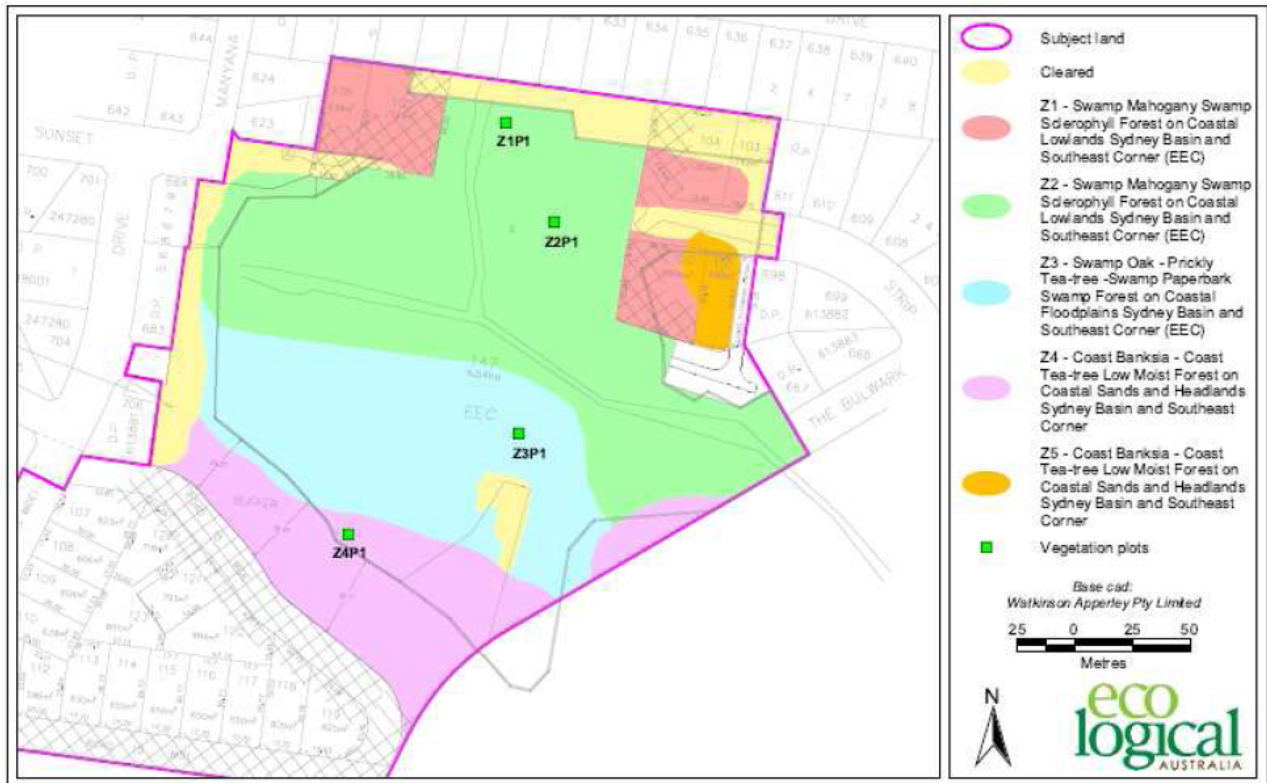


Figure 4.1: Biometric vegetation types and zones within the site

The results of the vegetation mapping and condition assessment have been used to undertake an indicative credit calculation to provide an indication of the number and types of credits that are required to offset the impact of the proposed development on the Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest EECs, and the number and types of credits that the proposed offset is able to generate. Table 4.1 provides the results of the preliminary credit calculations.

In total, the final development layout (Attachment 1) required a total of 26 ecosystem credits to offset the impacts on EECs. The proposed offset contained within Lot 147 generates a combined total of 29 Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest EEC ecosystem credits. The net effect of the proposal on RBVT SR530 is neutral as shown in Table 4.1.

Table 4.1: Summary of Preliminary Credit Calculations

Vegetation Type	Area Impacted (ha)	Credits Required	Credits Required/h	Area in Offset (ha)	Credits Generated	Credits Generated/ha	Credit Status
Swamp Mahogany Swamp Sclerophyll Forest on Coastal Lowlands Sydney Basin and Southeast Corner (EEC)-SR648	0.45	26	57.8	2.18	21	9.6	-5
Swamp Oak - Prickly Tea-tree -Swamp Paperbark Swamp Forest on Coastal Floodplains Sydney Basin and Southeast Corner (EEC)-SR649	0	0	N/A	1.21	8	6.6	8
Coast Banksia - Coast Tea-tree Low Moist Forest on Coastal Sands and Headlands Sydney Basin and Southeast Corner- SR530	0.095	4	42.1	0.84	4	4.8	0
TOTAL	0.5	30.0	55.0	4.2	33.0	7.8	3

ELA concluded that the results of the indicative biodiversity offset assessment indicate that the revised development layout, and the proposed offset (Lot 147), results in a net surplus of ecosystem credits for the endangered ecological communities Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest.

In accordance with our discussions with the Department of Planning and inline with the approach taken on the recently approved subdivision on Berringer Road, Manyana (Major Project number 05_0059) a vegetated buffer to the EEC is required to be retained within proposed Lot 147. The primary purpose of a buffer is to insulate areas where biodiversity conservation is the primary objective from potentially damaging external influences and particularly from those caused by inappropriate forms of landuse. A buffer zone provides:

- a physical barrier from human encroachment;
- protection from stormwater;
- an increase in natural habitat and reduction of edge effects; and
- an enhancement to the environmental services provide by the nature reserve.

Land form, ecological attributes, climate, threats and abutting land use will influence the size of a buffer required to protect the integrity of a given vegetation community. Due to the lack of research the size of buffer for sensitive ecosystems should be worked out on a case by case basis after site specific investigations. The subdivision layout has been amended to provide a vegetated buffer to the ECC in a south-easterly direction ranging between 29 and 36m in width (Attachment 1). In addition, the development in the

south-eastern section of the layout is flanked by a perimeter road separating the lots from the vegetated buffer area. The use of the perimeter road in this way reduces the extent of vegetation loss and encroachments into the identified EEC buffer. Our ecologist is of the opinion that the use of perimeter roads in urban areas can assist in achieving the required ecological outcomes of a buffer zone.

We acknowledge that no vegetated buffers have been provided between proposed lots 102, 103, 105 and the ECC to be retained within Lot 147. However, the title of Lots 102, 104 and 105 will specify that a 1.8m solid boundary fence be erected and maintained adjacent the Council land to ensure a clear delineation between public and private land to reduce encroachment potential. While we agree it would be beneficial to have a buffer between these lots and the EEC, it needs to be recognised that if these lots were not developed, the EEC would still be flanked by existing development, which has no requirements in relation to providing boundary fence between the public and private land.

The removal of the EEC on Lots 101 -106 has been considered as part of the Biobanking Assessment and the dedication of the EEC within Lot 147 was found to be an appropriate offset. Furthermore, the proposed dedication of Lot 147 will be accompanied by a Vegetation Management Plan (VMP). The VMP will be prepared by a suitably qualified person to 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. The developer commits to maintaining the Endangered Ecological Community and surrounding reserve for three (3) years post the land being dedicated to Council.

4.2. Bushfire

The bushfire guidelines, "Planning for Bushfire Protection" and Australian Standard AS3959 - Construction of Buildings in a Bushfire Prone Area have been updated since the layout was originally prepared and application of the current requirements to the amended proposal is considered necessary. The Addendum to Appendix 3 of PBP 2006 (2010) recommends that the construction standards be determined in accordance with AS3959 - 2009. The changes to the guidelines were considered and addressed in the layout design and discussed within this Section. It has been determined that an updated bushfire report was not warranted.

It should be noted that in accordance with the Addendum to Appendix 3 of the PBP (2010) the vegetation classifications have been converted from David Keith's to the AUSLIG Pictorial Analysis in AS3959-2009 (Table 4.2). This conversion is based on what is considered the best representation of similar bush fire behaviour potential.

Table 4.2: Vegetation Conversion

David Keith's <i>Ocean Shores to Desert Dunes</i>	AUSLIG (1990) Pictorial Analysis (AS3959-2009)
Forests (Wet & Dry Sclerophyll)	Forest
Pine Plantations	
Forested Wetlands	Woodland
Woodlands (Grassy, Semi-Arid)	
Tall Heath (Scrub)	Scrub
Freshwater Wetlands	
Short Heath (Open Scrub)	Shrubland
Arid Shrubland	Mallee/Mulga
Alpine Complex (Sedgeland)	Tussock Moorland
Rainforest	Rainforest
Grassland	Grassland

The conversion from David Keith's to the AUSLIG Pictorial Analysis has a significant effect on the APZ requirements for the proposed subdivision as Forested Wetland is no longer a separate vegetation type and is now considered as Forest. For example a 1° downslope for Forest Wetland under the previous guideline would require a 16m Asset Protection Zone (APZ), where as under the new guidelines it requires a 24m APZ.

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. A perimeter road with an 8m wide carriageway has 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 accordance with the *PBP 2006*. Any gas services are to be installed and maintained in accordance with AS 1596.

Table 4.3 provides the APZs and the level of construction to be incorporated into residential lots that require bushfire mitigation measures. The subdivision layout provided in Attachment 1 also shows the required APZs.

Table 4.3: Assets Protection Zones and required Construction Level (AS3959 - 2009)

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
(Lots 129-137, 145 and 146)					
North, east and west	n/a	Proposed and/or existing development	n/a	BAL 12.5	
South	3° upslope	Forest	25m	BAL 19	About 20m of APZ is accommodated in The Bounty and the remainder in the building line setback from the road.

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
(Lots 111-117)					
North, east and west	n/a	Proposed and/or existing development	n/a	BAL 29	
South	3° upslope	Forest	20m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
(Lot 119)					
West	n/a	Proposed and/or existing development	n/a	BAL 29	
East	1° upslope	Forest	20m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
South	3° upslope	Forest	20m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
North	1° down slope	Forest	24m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
(Lots 118)					
East and West	n/a	Proposed and/or existing development	n/a	BAL 29	
South	3° upslope	Forest	20m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
Northeast	1° down slope	Forest	24m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
(Lot 120 - 123)					
South and west	n/a	Proposed and/or existing development	n/a	BAL 29	
North and East	1° down slope	Forest	24m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
(Lot 107)					
South and west	n/a	Proposed and/or existing development	n/a	BAL 29	
Noeth and East	1° down slope	Forest	24m	BAL 40	About 15m of APZ is accommodated in road reserve and the remainder in the building line setback from the road.
(Lot 106)					
South	1° down slope	Forest	24m	BAL 40	About 6m of APZ is accommodated in Lot 105 (ROW) the remainder in Lot.
North, East and West	n/a	Proposed and/or existing development	n/a	BAL 29	n/a
(Lot 105)					
North and West	n/a	Proposed and/or existing development	n/a	BAL 29	
South	1° down slope	Forest	24m	BAL 40	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence) on the southern boundary is recommended.
East	Level	Forest	19m	BAL 40	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence)

Direction	Slope	Predominant vegetation community	Proposed APZ	AS3959 Construction Standard	Comments
					on the eastern boundary is recommended.
(Lot 104)					
North, south and East	n/a	Proposed and/or existing development	n/a	BAL 29	
West	Level	Forest	19m	BAL 40	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence) on the western boundary is recommended.
(Lot 102)					
North and East	n/a	Proposed and/or existing development	n/a	BAL 29	
West	Level	Forest	19m	BAL 40	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence) on the western boundary is recommended.
South	1° down slope	Forest	24m	BAL 40	Entire APZ is accommodated on lot. A radiant heat barrier (1.8 m high colourbond fence) on the southern boundary is recommended.

4.3. Flood Impact

The amendments to the proposed layout remove flood impact from all lots except proposed Lot 102 which is only marginally impacted by the 1%AEP flood level allowing for climate change (Figure 4.2). The flood does not however impact on the proposed building envelope as the minimum habitable floor level is 4.93m AHD, adopting climate change and 500mm freeboard in the 1% AEP event, while the lowest point on the proposed building envelope is approximately 5.5m AHD. Additionally it is noted that all proposed water quality devices are above the 1% AEP flood level.

With regards flood modelling, taking into consideration the recently approved Malbec subdivision, it is our understanding that the subdivision has been designed and conditioned to require stormwater outflows to be equal to the pre-development flows, therefore this subdivision will have no affect on the result of the flood model for this proposal.

Figure 4.2: 1 : 100 Year ARI Inundation Limits Incorporating Climate Change

4.4. Stormwater Management

The stormwater concept plan (Attachment 7) and MUSIC water quality model have been updated to reflect the changes to the proposed subdivision layout as described in Section 3. The updated model present in this report was undertaken on MUSIC model Version 4.00 and is based on the amended stormwater concept plan. The Stormwater Concept Plan shows the conceptual layout for the stormwater management system including the following amendments from the concept layout provided in the July 2009 Stormwater concept plan:

- The stormwater treatment devices only treat stormwater generated within the proposed subdivision and not stormwater generated by other existing development.
- With the removal of the Sunset Strip link and adjoining lots from the proposal, piped drainage to the watercourse is no longer necessary for this area. In lieu of this Sunset Strip is to be constructed to the end of the lot 623 at the corner of Sunset Strip and Manyana Drive on the western end (Lot 105 and 106), and on the eastern end Sunset Strip is to be extended approximately 55m with appropriate stormwater drainage and a small bio-retention pod to service four new lots (Lots 101 - 104). Proposed Lots 101 and 102 off Sunset Strip are to drain to an inter-allotment drainage line to discharge to a single point in the proposed public reserve.

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- The wetland has been removed due to EEC impacts and a bio-retention basin and gross pollutant trap is now proposed outside the EEC zone.
- Rainwater tanks have been added to individual lots.
- A bio-filtration swale has been added into the road reserve of The Barbette to treat the stormwater before it connects into the existing drainage network.
- Inter-allotment drainage to proposed Lots 137 and 138 has been directed to Manyana Drive to reduce the flow to the existing drainage system in The Palisade. The removal of these building envelopes from the catchment draining to The Palisade will offset the potential increase in flow from buildings on proposed Lots 139, 140, and 141, therefore removing any requirement for on site detention on these lots.

The proposed stormwater management measures are based on a combination of traditional stormwater collection methods (kerbs and gutters) and Water Sensitive Urban Design principles. The water quality mitigation measures proposed aim to comply with DECCW water quality criteria which are applicable to any new development in NSW (Table 4.3).

The current guidelines were introduced in the document *Managing Urban Stormwater: Council Handbook - Draft* (EPA 1997) and provide guidance for local government agencies to adopt into their stormwater management plans. New draft guidelines were issued for consultation in 2007. The draft guidelines changed the minimum retention values, to represent improvements in best management practices for the treatment of stormwater runoff. The targets are measured by comparing average annual pollutant load (kg/y) from the proposed development without any water quality treatment against a proposed development with treatment.

The draft guidelines provided by the DECCW were identified as being the appropriate criteria to apply to the proposed subdivision.

Table 4.4: DECC current and proposed stormwater pollutant retention criteria.

Pollutant	Current Guideline (1997)	Draft Guideline (2007)
	Minimum retention (%) of the average annual load	Minimum retention (%) of the average annual load
Total Suspended Solids	80	85
Total Nitrogen	45	45
Total Phosphorus	45	65
Oil and Grease	None visible	None visible

The proposed stormwater management strategy employs a combination of primary (gross pollution traps) and secondary (biofiltration) treatment measures. The proposed stormwater management measures which are discussed in more detail below will demonstrate that stormwater runoff from the proposed subdivision is treated in a manner which complies with DECCW's Water Quality Guidelines (Table 4.3).

The treatment system for this proposal consists of the following:

- All lots will be required to install a minimum 5,000L rainwater tank. Overflow will be piped to the road drainage system.
- Stormwater from Lots 107 - 137, the new perimeter road located in the south eastern section of the layout, The Bounty and the extension of Manyana Drive, will be collected within the road network (kerbs and gutters) and be transferred to a lined biofiltration basin located within Lot 147 via a gross pollutant trap. The treated water will then be discharged overland into the vegetated public reserve lot (Lot 147) which slopes back to the existing creek traversing Lot 147.
- Stormwater from lots 142 - 146 and The Barbette, will be collected and treated in kerbside biofiltration swales which will be provided along the eastern side of The Barbette. The treated water will then be piped into the existing stormwater system within The Barbette.
- Stormwater from Lots 138 - 141 will be collected at the rear of the lots and piped via interallotment drainage structures to existing street drainage in The Palisade.
- Stormwater from Lots 103 - 104 and the extension of Sunset Strip will be collected and treated in a kerbside biofiltration pod which will be provided in Sunset Strip road reserve. The treated water will then be discharged overland within Lot 147. A 30 to 50m vegetated buffer (riparian zone) has been provided between these lots and the watercourse.
- Stormwater from Lots 101 - 102 and the extension of Sunset Strip will be discharged overland within Lot 147. A 30 to 50m vegetated buffer (riparian zone) has been provided between these lots and the watercourse.

Rainwater Tanks

It is recommended that a minimum 5 KL rainwater tank (with first-flush device) be installed at all future dwellings. The tank should be plumbed to supply toilet flushing, laundry and irrigation therefore limiting the demand on the town water supply and regularly drawing down the storage in the tank to retain storage capacity for runoff from the site. The overflow from the rainwater will be piped to either the street drainage or the interallotment drainage pipes.

Gross Pollutant Trap

The treatment of stormwater run-off is to include at source treatment through use of an inline gross pollution trap located within the road reserve adjacent to Lot 122. The GPT will be used to remove gross pollutants, coarse sediments, hydrocarbons, oil and grease and to aid in the retention of nutrients. Several types of proprietary GPT's are available to accommodate varying flow volumes and rates such as the Ecosol RSF 4000 range. It is envisioned that routine maintenance/cleaning would be required every 6 to 12 months depending on initial monitoring results of captured pollutants. Typical pollutant removal efficiency for Ecosol RSF 4000 GPT are provided in Table 4.5.

Table 4.5: Typical pollutant removal efficiency for Ecosol RSF 4000 GPT

Litter	Vegetation	Coarse Sediment	Fine Sediment	Free Oil and Grease	Nutrients (N & P)	Attached Pollutants	Dissolved Pollutants
80 – 100%	80 – 100%	80 – 100%	60 – 80%	60 – 60%	10 – 40%	10 – 40%	10 – 40%

(source: Ecosol Wastewater Filtration Systems, Technical Specification, The in-Line/End-of-Line RSF 4000 Solid Pollutant Filter/oil & Grease Arrestor).

Bio-filtration

Water bio-filtration is the process of improving stormwater quality by filtering water through biologically influenced media. A typical bio-filtration system consists of a vegetated swale or basin or pod overlaying a porous filter medium (usually soil-based) with a drainage pipe at the bottom. Stormwater is diverted from a kerb or pipe into the bio-filtration system, where it flows through dense vegetation and temporary ponds before slowly filtering down through the filter media, where it is collected in the underdrain system for conveyance to a downstream waterway. Bio-filtration systems aim to replicate the following natural treatment processes:

- Physical: as stormwater enters the basin or trench, the dense vegetation reduces flows, causing soil particles and particulates to settle out (sedimentation). In addition, particulates are filtered from the water as it percolates down through the soil media (mechanical straining);
- Chemical: soil filter media contains clay minerals and other chemically active compounds that bind dissolved pollutants (sorption); and
- Biological: vegetation and the associated microbial community take up nutrients and some other pollutants as growth components (eg. plant and microbial uptake) (FAWB, 2009).

Bio-filtration systems can be shaped to fit into the available space and therefore can be built as a swale or basin. The proposal includes a combination of both “on-line”, conveyance (commonly referred to as bio-filtration swale) (Figure 4.3) and “off-line”, non-conveyance (known generally as bio-filtration basin or pod) (Figure 4.4) systems. The bio-filtration system can either be lined or unlined depending on site opportunities and constraints, which controls exfiltration of treated water into surrounding soils and/or intrusion of unwanted inflows from surrounding soils. The proposed bio-filtration basin and pods will be lined to stop the interaction with surrounding soils which potentially contain acid sulphate. The bio-filtration swales are located outside the area affected by ASS, are therefore the swales are not proposed to be lined.

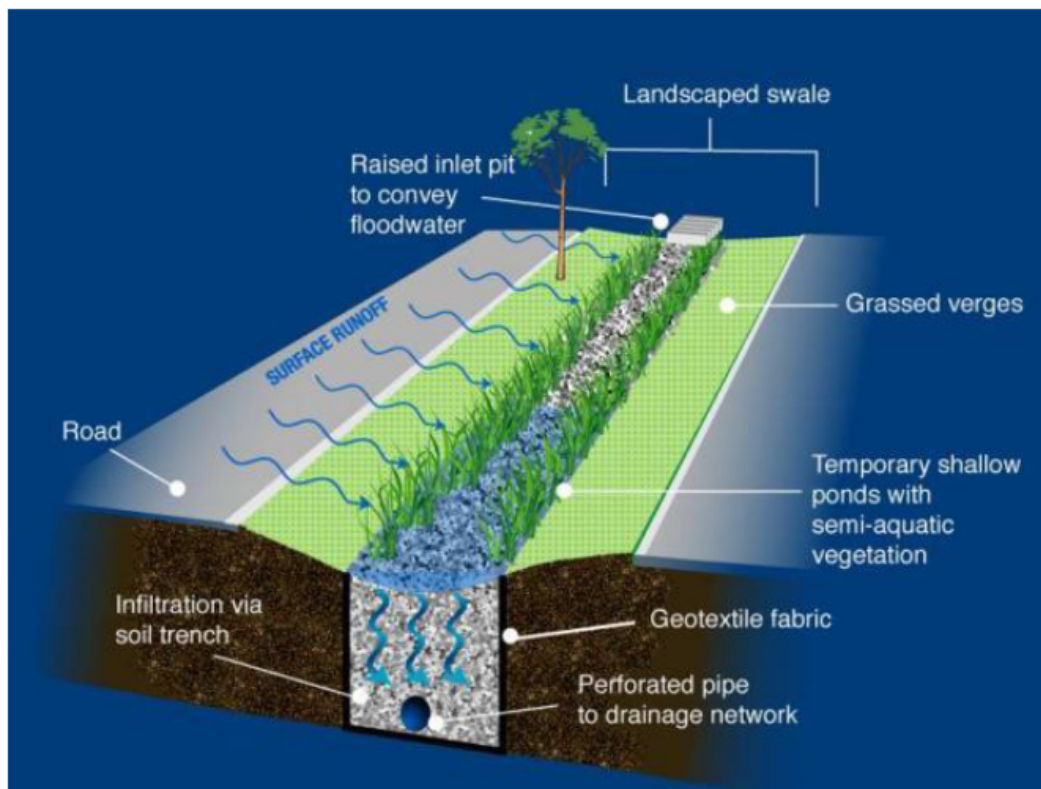


Figure 4.3: Schematic of a typical biofiltration swale system (FAWB, 2009).

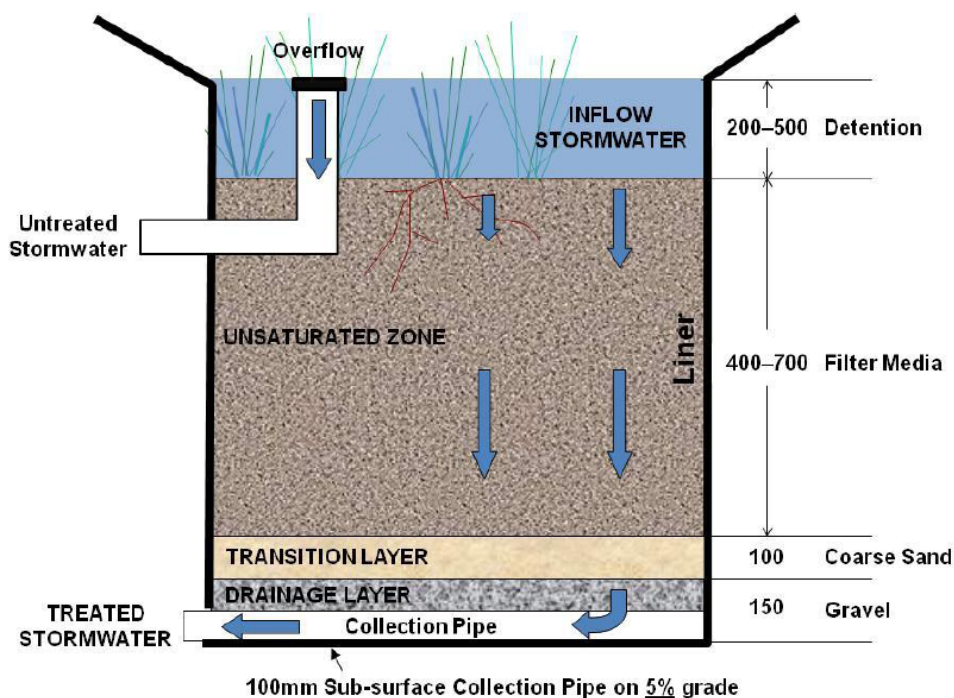


Figure 4.4: Schematic of a typical lined biofiltration basin or pod system (FAWB, 2009).

Meteorological Data

Model Configuration

- Average annual pollutant load (kg/y) from the proposed development without any water quality treatment; and
- Average annual pollutant load (kg/y) from the proposed development with treatment measures.

Watkinson Apperley Pty Limited

The following attributes/assumptions have used within the model:

- In the absence of site specific data and NSW specific data, storm flow pollutant loading rates for roads and roofs were adopted based on the Gold Coast MUSIC Modelling Guidelines 2006 Version 1.
- 5KL rainwater tanks with 4.5m³ below overflow, 0.2 extended detention depth, 2.5m² surface area and overflow pipe diameter (mm).
- A lined bio-filtration basin with a surface area of 300m², filter area of 200m², filter depth of 0.6m, extended detention depth of 0.4m, a saturated hydraulic conductivity of 300mm/hour, TN content of filter media of 800 mg/kg, proportion of organic material in filter < 5 % and orthophosphate content of filter media <55mm/kg.
- A lined bio-filtration pod with a surface area of 30m², filter area of 20m², filter depth of 0.5m, extended detention depth of 0.2m, a saturated hydraulic conductivity of 300mm/hour, TN content of filter media of 800 mg/kg, proportion of organic material in filter < 5 % and orthophosphate content of filter media <55mm/kg.
- A unlined bio-filtration swale (2.6m wide, 1m wide filter area) with a total surface area of 156m², filter area of 60m², total filter depth of 0.4m, extended detention depth of 0.2m, a saturated hydraulic conductivity of 300mm/hour, TN content of filter media of 800 mg/kg, proportion of organic material in filter < 5 % and orthophosphate content of filter media <55 mm/kg.
- The parameters for the gross pollutant trap (GPT) were originally modelled on a generic GPT. The updated model has modelled the GPT on the parameters for the Ecosol RSF 4000 Gross Pollutant Trap.

Music Model Results

Table 4.6 shows that the average annual pollutant load (kg/y) from the proposed development with the recommended treatment measures complies with the DECCW (2007) retention requirements.

Table 4.6: Predicted annual pollutant loads as the result of the proposed development

	Post-development (no mitigation measures) (kg/y)	Post-development (with mitigation measures (kg/y)	Retention (%)	Draft Guideline (2007) Minimum retention (%) of the average annual load	Comment
Total suspended solids	4630	573	87	85	Compiles with DECCW requirements
Total Phosphorus	10	2.68	73	65	Compiles with DECCW requirements
Total Nitrogen	68.4	35.9	47	45	Compiles with DECCW requirements
Gross Pollutants	715	63	87	91	

4.4.2. Stormwater Maintenance

To address the concerns of Shoalhaven City Council regarding the maintenance burden that may flow from infrastructure provided in response to this development. The developer commits to undertake the maintenance of the water quality devices on public land for a three (3) year period following their construction. This is reflected in a modified Statement of Commitments.

4.4.3. Conclusion

If the stormwater management for the proposed subdivision is designed and installed in accordance the recommendations in this Report, the stormwater runoff will be collected and treated prior to discharge from the site. Water quality modelling (MUSIC) suggests the recommended treatment systems will comply with the DECCW retention requirements.

4.5. Cultural Heritage Implications

Navin Officer were requested to provided advice regarding any implications for the management of cultural heritage values as a consequence of a revised subdivision layout (Attachment 11).

Navin Officer Heritage Consultants (Navin Officer Heritage Consultants (NOHC) have conducted a sequence of cultural heritage assessments in relation (directly or indirectly) to the subject subdivision lands since 1998:

- Navin Officer Heritage Consultants 1998 Lake Conjola Sewerage Scheme. Cultural Heritage Study. Report to the NSW Department of Public Works and Services.
- Navin Officer Heritage Consultants 1999a Addendum: Lake Conjola Sewerage Scheme Cultural Heritage Study - Assessment of STP Site 9. Report to NSW Department of Public Works and Services.
- Navin Officer Heritage Consultants 1999b Addendum 2: Lake Conjola Sewerage Scheme Cultural Heritage Study Assessment of STP Site 8a. Report to NSW Department of Public Works and Services.
- Navin Officer Heritage Consultants 1999c Development Application for an Extension to Sand Quarry, Portion 206, Lake Conjola, NSW Archaeological Subsurface Testing Program. Report to Cowman Stoddart Pty Ltd.
- Navin Officer Heritage Consultants 2000 Conjola Regional Sewerage Scheme REF for Proposed Access Track and Exfiltration Site Cultural Heritage Assessment. A Summary Report to CH2MHill.
- Navin Officer Heritage Consultants 2001a Conjola Lake Regional Sewerage Scheme. Possible Alternative Pipeline Route from Fishermans Paradise to Conjola Park. Cultural Heritage Assessment. (Letter) report to CH2MHill Pty Ltd.
- Navin Officer Heritage Consultants 2001b Conjola Regional Sewerage Scheme EIS. Cultural Heritage Component. Report to CH2MHill Pty Ltd.
- Navin Officer Heritage Consultants 2001c Conjola Regional Sewerage Scheme EIS. Cultural Heritage Component. Report to CH2MHill Pty Ltd.

- Navin Officer Heritage Consultants 2002 Conjola Regional Sewerage Scheme EIS. Cultural Heritage Component. Addendum. Report to CH2MHill Pty Ltd.
- Navin Officer Heritage Consultants 2004 Conjola Regional Sewerage Scheme Design Modifications. Cultural Heritage Assessment. Report to NSW Department of Commerce.
- Navin Officer Heritage Consultants 2005a 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.
- Navin Officer Heritage Consultants 2008 Proposed Residential Subdivision Lots 682 (DP 568678, 705 (DP 613881) and 810 (DP 247285) Manyana, NSW. A Report to Watkinson Apperley Pty Ltd for JWA Pty Ltd

These investigations have included Aboriginal community consultation, predictive modelling, comprehensive archaeological surface survey, archaeological test excavation and archaeological salvage.

A program of subsurface test excavations was conducted across the eastern portion of the Manyana subdivision study area by NOHC in 2005 (NOHC 2005a and b) as part of the assessment of the Conjola Region Sewerage Scheme (refer Figures 4.6 and 4.7). This investigation included a number of sites and archaeological test areas which occur within the Manyana study area: PADs 1 and 4, and site CS25 (situated within PAD4). Based on the results of the test excavations, the investigation concluded that no further archaeological investigation was necessary at PADs1 and 4 (inclusive of site CS25).

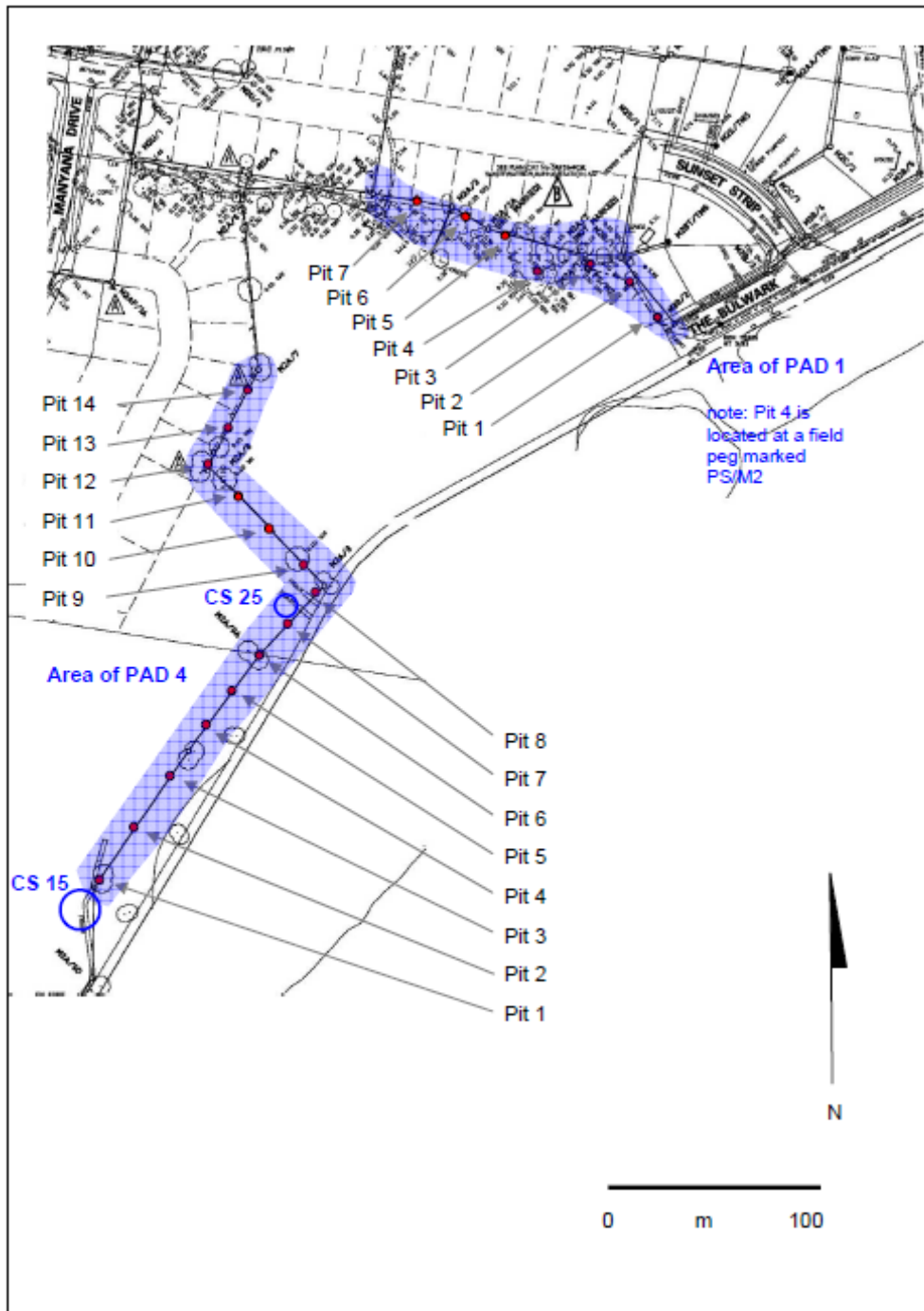


Figure 4.6: Plan of PADs 1 and 4, surface evidence for sites CS15 and 25, and test pit locations as identified and conducted by NOHC in 2005, (NOHC 2005b: Figure 6.11).

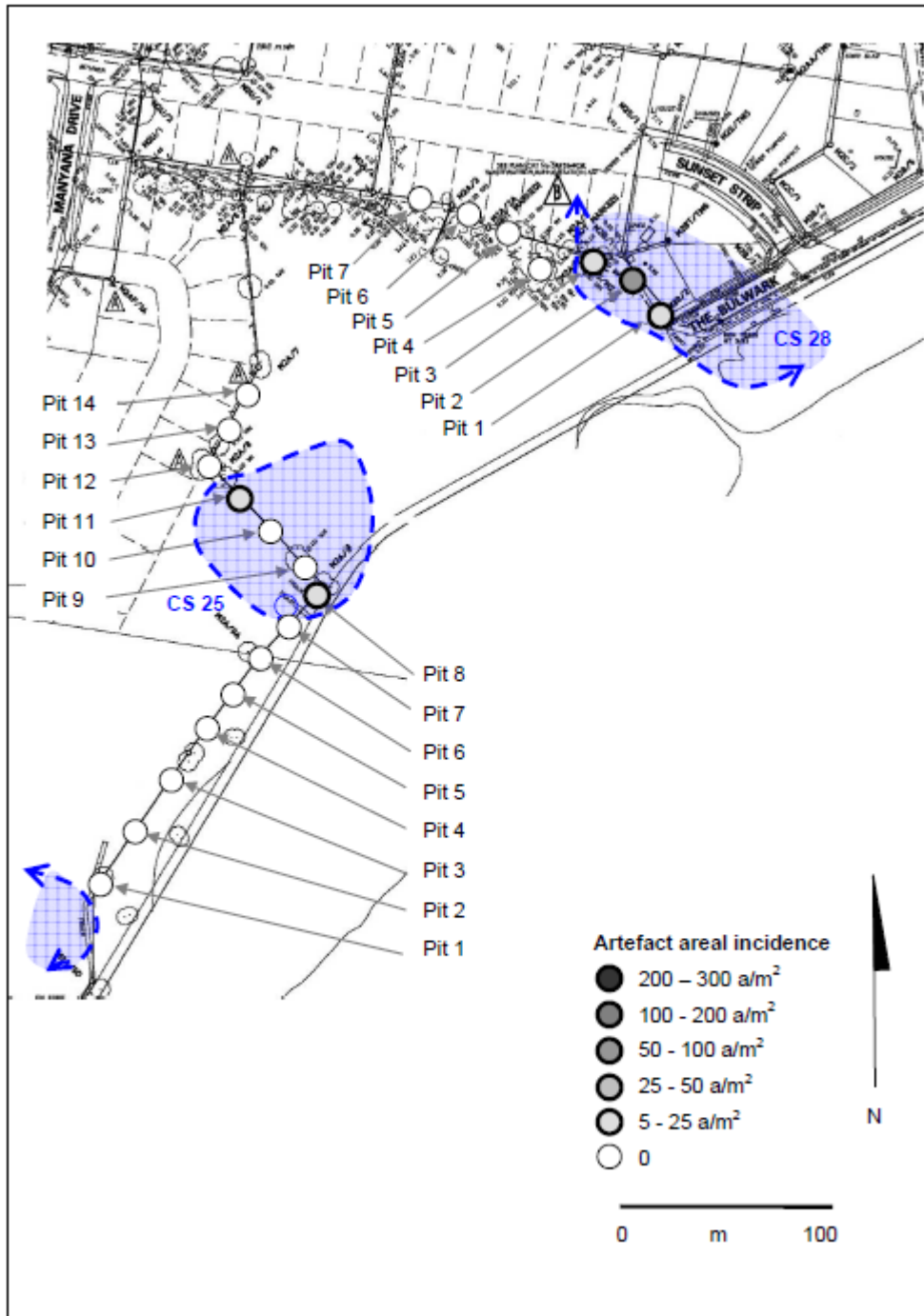


Figure 4.7: Plan showing artefact areal incidence from test pits at PADs 1 and 4, and an interpretation of the extent of subsurface archaeological material (blue), as identified and conducted by NOHC in 2005 (NOHC 2005b: Figure 6.12).

In 2008, NOHC conducted an archaeological assessment, including a program of test excavation relative to the Manyana subdivision area, as proposed at that time (NOHC 2008), (refer Figure 4.8). This investigation included the testing of known sites CS14, and MS2 and 3, and a large proportion of the remaining proposed subdivision. Based on the results of the test excavations, the investigation concluded that no further archaeological investigation was required within the proposed subdivision. For detail

regarding these investigations, the reader is referred to the individual cited investigation reports.

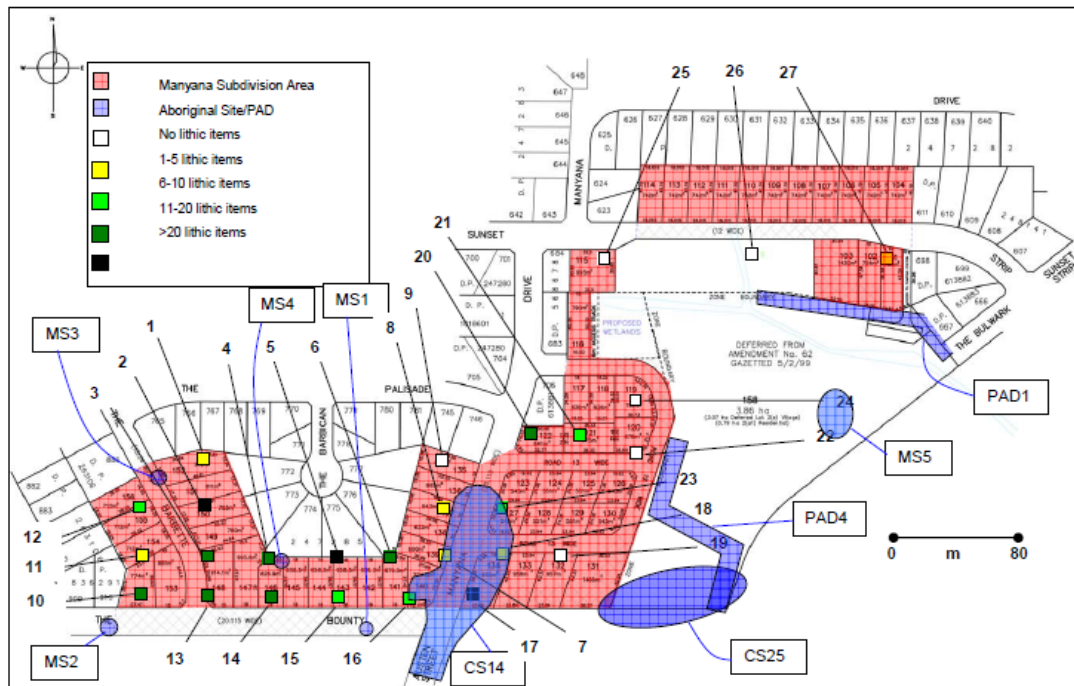


Figure 4.8: Location and ID nos of archaeological test pits conducted in 2008 investigation, relative to former proposed subdivision layout and previous recordings and numbers of lithic items retrieved from pits (base plan supplied by Watkinson Apperley) (NOHC 200)

The previous studies conducted within the Manyana subdivision study area have provided an effective assessment of the cultural heritage values, and the known and potential archaeological resource within that area, including the revised subdivision layout.

Navin Officer concluded that the additional proposed development that would be a consequence of the subdivision layout revision would impact Aboriginal recordings PAD1 and 4 (the latter including site CS25). These recordings and associated areas have been effectively assessed as part of the assessment for the construction of the Conjola Region sewerage scheme. Based on the effective coverage, test excavations and assessment achieved by previous studies, it is concluded that no further archaeological investigation is required within the area of the revised Manyana subdivision layout. The revised Manyana subdivision layout does not introduce issues of cultural heritage management which are outside of, or in addition to, those already addressed in the previous assessments cited.

4.6. Coastal Hazard Assessment

Gary Blumberg & Associates Pty Ltd submitted a report on 7/7/08 for a 57 lot subdivision (07-7/r728). Following comments from the NSW Department of Planning and SCC in relation to updated sea level rise predictions and policy benchmarks, changes to the subdivisions layout to remove lots from the

effects of flooding and EEC, GBAC has provided a revised Coastal Engineering Assessment.

GBAC found that the crest of the primary dune at Manyana is observed to stand over 10 m above the beach. This dune crest coincides approximately with the seaward boundary of Lot 147. The seaward-most subdivided residential allotments are located further landward, set back between approximately 20 and 60 m from the dune crest. The existing MHWL is 150 m seaward of the dune crest.

The assessment has been updated to consider the combination of design elements for the 100 year ARI, beach erosion and shoreline recession, including the effects of 0.9 m SLR as per DECCW policy benchmark (DECC, 2009) on the combined Beach Erosion and Shoreline Recession. The re-assessment has resulted in the following changes:

- **Slope Instability** - The Line of Wave Impact is assessed to be located 27 m seaward of the SE corner of the site (*reduced from 50m in the previous assessment*), but 30 m landward or inside the NE corner (*increased from 6m in the previous assessment*). The Zone of Reduced Foundation Capacity is well seaward of the property at its southern end, crossing the seaward property boundary (*Lot 147*) in the vicinity of the creek close to the NE corner (Figure 4.9). The report concluded that no beach erosion and shoreline recession hazard applies to the subdivision layout as proposed (*layout at 4/6/10*). Since all residential allotments fall within the Stable Foundation Zone, no special foundation treatments would be required.

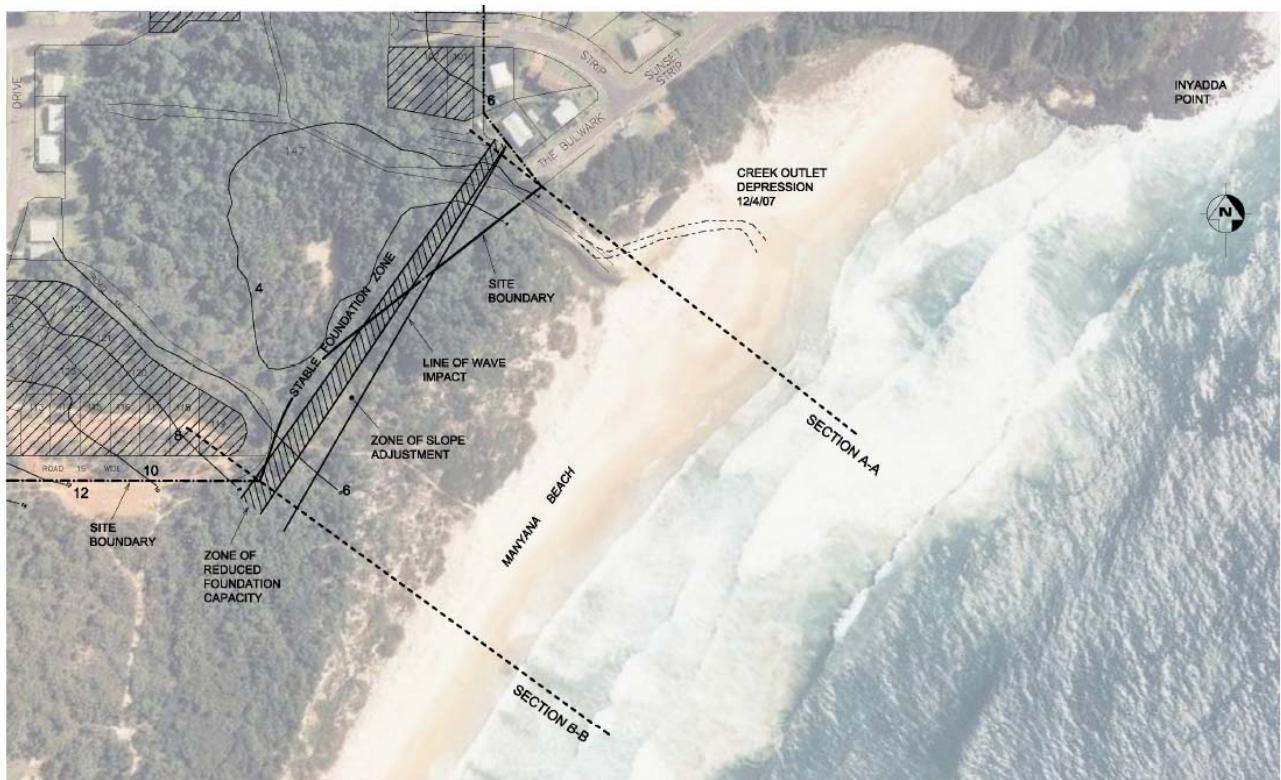


Figure 4.9: Plan arrangement for coastal stability zones. Source: gbaCoastal, June 2010.

- **Wave Runup and Overtopping** - Allowing for a Greenhouse SLR of 0.9 m (*up from 0.5 in the previous assessment*) over the 100 year planning period GBAC calculates design 2% wave run up level at RL 6.7 (*up from 6.3 in the previous assessment*) at the primary coastal dune, and RL 5.7 (*up from 5.3 in the previous assessment*) at the flooded creek margin inside the entrance. A summary of GBAC's coastal hazard inundation assessment is presented in Figure 4:10.



Figure 4.10: A summary of GBAC's coastal hazard inundation assessment. Source: gbaCoastal, June 2010.

- **Sand Drift** - the substantial separation of the proposed allotments from the unstabilised back beach areas (>140 m) (*reduced from <150m in the previous assessment*), together with the natural topographic shielding and abundance of intervening vegetation, ensure that sand drift is not an issue for the proposed subdivision.
- **SLR Contribution to Shoreline Recession** - Over the next 100 years, the Bruun Rule predicts shoreline recession due to SLR of approximately 54m (0.9 x 60) (*up from 30m in the previous*

assessment). It is therefore proposed to adopt a SLR recession for the subdivision of 54m over the next 100 years. This may be slightly conservative for a variety of technical reasons (*eg base planning dates, SLR offsets over past 50-100 years etc*), however as these are not investigated here, they have been neglected.

- **SLR Contribution to Coastal Inundation** - It would be reasonable to raise the wave run up level by 0.9 m (*up from 0.5 m in the previous assessment*) 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 6.7 (*up from 6.3 in the previous assessment*) at the primary coastal dune, and RL 5.7 (*up from 5.3 in the previous assessment*) at the flooded creek margin inside the entrance

GBAC recommends that:

- The residential allotments proposed at Lots 101, 102 and 104 have regard to the design RL 5.7 coastal inundation level. The residential allotments proposed on the western side of Lot 147 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.
- Consideration be given to incorporating a fence in to the proposal. This fence, of approximate total length 100 m, would be installed in the public reserve lot (*Lot 147*) generally to the north-east of the perimeter road. The proponent would install and maintain the fence for the first three years, after which maintenance for the fence would become the responsibility of SCC as managers of the public reserve (Figure 4.11). The fence 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.

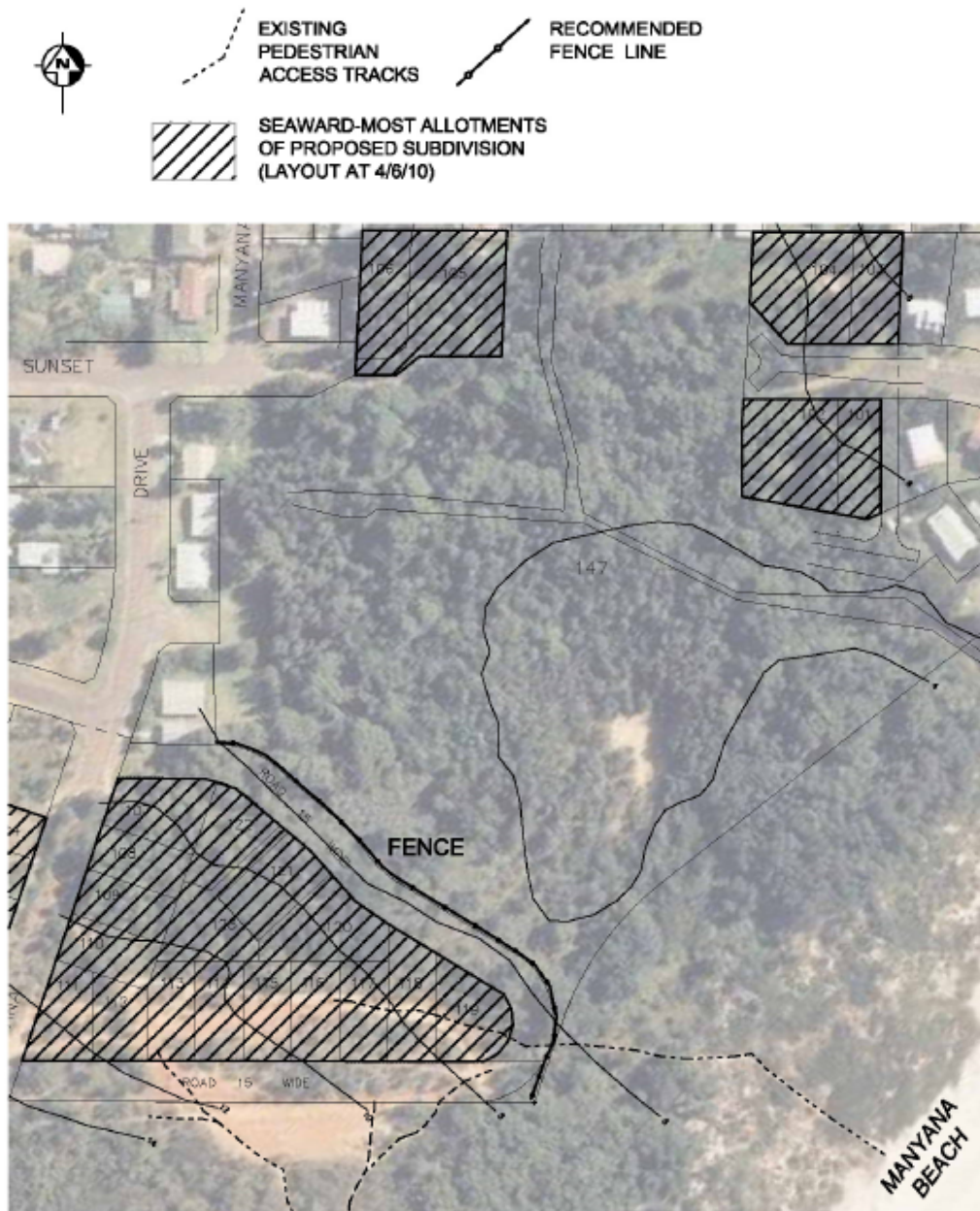


Figure 4.11: Recommended fencing to protect coastal dune and vegetation. Source: gba Coastal, June 2010.

4.7. Acid Sulphate Soils (ASS)

The ASS assessment covered the area of the proposed bio-retention basin and pod. While the assessment only undertook limited samples in this area the report concluded that there was potential for ASS to be present, therefore an ASS management plan was prepared for the treatment of the soil during construction. The proposed bio-retention basin and pod will be lined to stop the interaction between the stormwater being treated and the surrounding soil material and ground water.

We understand that DOP has concerns regarding the language used in the management plan i.e the language used in the Management Plan is often

expressed in terms of suggestions and recommendations for actions. We are of the opinion that the previously submitted management plan prepared by a suitability qualified consultant adequately covered the scope required in accordance with the Assessment Guidelines of the Acid Sulphate Soil Manual (1998). However as agreed with the DOP officers, an updated management plan written as a series of commitments to actions with specifics about sampling regimes and treatment methods will be provided at the Construction Certificate stage for Stage 2. The Statement of Commitments has been updated to reflect this.

5. MONETARY CONTRIBUTION FOR FACILITIES OVER AND ABOVE COUNCIL'S ADOPTED SECTION 94 CONTRIBUTIONS PLAN

The proposed subdivision will be required to pay Contributions in accordance with Council's S.94 Contributions Management Plan.

During Council's consideration of this application and the Malbec (MP050059) proposal, Shoalhaven City Council identified other infrastructure projects they felt warranted further developer contributions in addition to the standard S.94 Contributions. JWA Enterprises Pty Ltd has agreed to enter into a Voluntary Planning Agreement (VPA) for additional works outside of the Contributions Plan as may be directed by the Minister for Planning. JWA Enterprises Pty Ltd has agreed to pay additional contributions equivalent to those required for the Malbec (MP050059) project, based on a pro-rate basis i.e. per lot rate.

In relation to specific contributions for public open space, JWA Enterprises will be seeking an exemption in lieu of the dedication of Lot 147.

6. AMENDED STATEMENT OF COMMITMENTS (SOC)

Table 6.1: Statement of Commitments

Item	Commitments	Timing
General	The developer will carry out the development in accordance with Preferred Planning Report, prepared by Watkinson Apperley Pty Ltd dated June 2010, 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 accordance with the recommendations of the Environmental Assessment Act 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.	Prior to the issue 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 bio-retention pod will be constructed within the proposed extension	Prior to the release of the Subdivision Certificate for

Item	Commitments	Timing
	of Sunset Strip. - Retain a 30 to 50m riparian zone along the creek through dedication of proposed Lot 158. - Construct a bio-retention basin in accordance with Section 4.4 and Attachment 7. - Install gross pollutant trap to treat stormwater entering the bio-retention basin. - Construct a bio-retention swale along The Barbette in accordance with Section 4.4 and Attachment 7. 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.	stage 2. Prior to the release of the Subdivision Certificate for stage 1. Prior to the issue of the Construction Certificate for each stage.
Flora and Fauna	The developer will manage vegetation and habitat in accordance with the following: - Dedicate proposed Lot 147 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 147. - Perimeter roads will be located such that they adjoin retained vegetation on proposed Lot 147 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 2. Prior to the issue of the Subdivision Certificate for stage 2. Prior to the issue of the Subdivision Certificate for stage 2. During the construction phase of all stages.

Item	Commitments	Timing
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 4.2. 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 accordance with mitigation measure outlined in Section 4.2. The developer will impose a Section 88B Restriction as to User on the title of lot 102, 104 and 105 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 their boundaries adjoining Lot 147 in accordance with mitigation measures outlined in Section 4.2.	Prior to the issue of the Subdivision Certificate for each stage. On registration of the plan of subdivision for each stage. On registration of the plan of subdivision for stage 1. On registration of the plan of subdivision for stage 2.
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. Written as a series of commitments to actions with specifics about sampling regimes and treatment methods. - The soil excavated during construction of the areas identified as containing ASS will be treated in accordance with ASSMP. - Further investigation will be undertaken as construction of the subdivision proceeds over the site outside the area already tested.	Prior to construction certificate from stage 2.
Coast Dune Protection	A fence will be constructed along the eastern edge of the new perimeter loop road reserve adjoining lot 147.	Prior to the issue of the Subdivision Certificate for stage 2.
Landscaping	The developer will prepare a detailed landscape plan for each stage of development in line with the concept landscape plan (Attachment 8).	Prior to the issue of the Construction Certificate for each stage.

Item	Commitments	Timing
Public Open Space	Lot 147 (4.54ha) 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 2.
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 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 (Stage 2), The Barbette (Stage 1), The Bounty (Stage 1), Manyana Drive (Stage 2) and one new loop road off Manyana Drive (stage 2). The developer will provide street signs in accordance with the requirements of Shoalhaven City Council. <u>Electricity and Telecommunications</u> The developer will provide underground power to each residential lot in the subdivision in accordance with the requirements of Integral Energy The developer will provide underground telecommunications infrastructure to each lot in the subdivision in accordance with requirements of Telstra. <u>Water and Sewer Services – Residential Allotments</u> The developer will provide reticulated water, 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. Prior to release of the subdivision certificate for each stage. Prior to release of the subdivision certificate for each stage.

7. CONCLUSION

The proposal has been amended in the following ways (Figure 2.1):

- 1) The amended subdivision layout has reduced the number of lots from 58 to 47;
- 2) Sunset Strip is no longer proposed to be connected (i.e. Sunset Strip will not connect as a through road to The Bulwark and beachfront), resulting in the dedication of a further 0.5ha of Endangered Ecological Community as part of the public reserve lot (Lot 147). It should be noted that while 8 lots have been removed from along Sunset Strip, the new lots located adjacent to the public reserve lot (lots 102, 105 and 106) have been increased in size to accommodate the required Asset Protection Zones (APZs).
- 3) The south-eastern section of the layout has been redesigned to remove the effects of flooding from the proposed lots and to reduce impact and provide a vegetated buffer to the EEC located on Lot 147. The redesign has reduced the number of lots in this section of the layout from 17 to 16. All lots are now located outside the 1:100 year flood level. The redesign has resulted in part of the layout being located within the 2 (e) 'village' zoned area of the site.
- 4) The vegetated buffer to the identified EEC in the south-eastern section of the layout has been increased and ranges from 29 to 38 metres. The buffer area will be located within the public reserve lot.
- 5) The developer commits to maintaining the Endangered Ecological Community and surrounding reserve for three (3) years post the land being dedicated to Council.
- 6) The stormwater treatment has been amended to reflect the new layout. The main changes are:
 - The stormwater treatment devices only treat stormwater generated within the proposed subdivision and not stormwater generated by the other existing development beyond the subject land.
 - With the removal of the Sunset Strip link and the adjoining lots from the proposal, piped drainage to the watercourse is no longer necessary for this area. In lieu of this Sunset Strip is to be constructed to the end of lot 623 at the corner of Sunset Strip and Manyana Drive on the west end (Lot 105 and 106), and on the eastern end Sunset Strip is to be extended approximately 55m with appropriate stormwater drainage and a small bio-retention pod to service four new lots (Lots 101 - 104). Proposed Lots 101 and 102 off Sunset Strip are to drain to an inter-allotment drainage line to discharge to a single point in the proposed public reserve.
 - The wetland has been removed due to EEC impacts and a bio-retention basin and gross pollutant trap is now proposed outside the EEC zone.
 - Rainwater tanks have been added to individual lots.

- A bio-filtration swale has been added into the road reserve of The Barbette to treat the stormwater before it connects into the existing drainage network.
 - Inter-allotment drainage to proposed Lots 137 and 138 has been directed to Manyana Drive to reduce the flow to the existing drainage system in The Palisade. The removal of these building envelopes from the catchment draining to The Palisade will offset the potential increase in flow from buildings on proposed Lots 139, 140, and 141, therefore removing any requirement for on site detention on these lots.
- 7) The developer commits to maintain the water quality control infrastructure for three (3) years after their construction is complete;
 - 8) The asset protection zones have been amended to reflect the recent changes to the bushfire guidelines, "Planning for Bushfire Protection" and the Australian Standards (AS3559 -2009).
 - 9) The developer commits to entering into a Voluntary Planning Agreement with Shoalhaven City Council in relation to the provision of monetary contributions for infrastructure as determined by the Minister for Planning, in addition to those provided under Shoalhaven Council's Section 94 Contribution Management Plan.

These modifications to the proposal address concerns raised by various government agencies, Shoalhaven City Council and the local community. These modifications are considered to satisfactorily mitigate impacts associated with the development having regard to all relevant planning controls, ecological impacts, Bushfire Protection, Stormwater Management, Acid Sulphate Soils (ASS), Flood Impact, traffic, visual impacts, suitability of proposed public open space and its maintenance. Furthermore, the results of the indicative biodiversity offset assessment indicate that the revised development layout, and the proposed offset (Lot 147), results in a net surplus of ecosystem credits for the endangered ecological communities Swamp Oak Floodplain Forest and Swamp Sclerophyll Forest.

8. REFERENCES

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