



Umina/Ocean Beach Coastal Zone Management Plan Submission

Version - Final

Umina Community Group

February 2015

Supporting Umina today, its heritage and its future

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1 Introduction

Umina Community Group is a volunteer organisation which was established and incorporated on the 1st of October 2014, formed by 34 founding members who are all home owners in Umina Beach. Each of the founding members has a network of Umina Beach residents and business owners which they draw on to look at the programs which best support our community. The Umina Community Group is also expanding with the inclusion of additional members.

The Umina Community Group has an established web site at www.uminacommunitygroup.com.au which outlines our programs and provides useful information and links for the local community, tourists, and visitors to the area.

Our focus is supporting Umina Beach today, its heritage and its future, to make it a better place to live in, a better place to visit, and a better place to enjoy.

Our specific interests are:

- Protecting the environment and, in particular, our coastal dune through supporting local initiatives such as Dunecare and Bushcare.
- Working within our community to reduce graffiti, vandalism, and crime.
- Improving infrastructure including transport services, roads, kerbing and guttering.
- Fostering safety within the community with respect to our wonderful beaches at Ocean and Umina Beach and safe practices when using our waterways.

We will work cooperatively with Gosford City Council, the New South Wales Government, and the Australian Government to realise our goals and support existing programs such as Bushcare, the Surf Life Saving Clubs, local police initiatives, and through proactive volunteering.

Umina Beach is home to over 16,000 residents and through our efforts we can make it a better place.

Gosford City Council is currently conducting a [Coastal Zone Management Study](#) which includes, amongst other items, existing and new management strategies for Dune Management (*to maintain the integrity of the dune system as nature's last line of defence against wind and wave attack*). Based on this study process, the existing Coastal Zone Management Plan will be replaced with a new plan and revised planning and development instruments.

This submission by Umina Community Group provides, on behalf of the residents of Umina Beach, commentary and supplementary information to the [Coastal Zone Management Study](#) completed by consultants for Gosford City Council. There is an expectation by the residents that Gosford City Council and the consultants will integrate the key management actions of this submission into the production of the new [Coastal Zone Management Plan](#)¹, the [Gosford Local Environmental Plan](#) and [Gosford Development Control Plan](#). The majority of this feedback is in full support of the draft consultant's report to Gosford City Council and sets about extending it in detail to best suit the specifics of the local Umina Beach area.

This Submission is broken into two documents, firstly this document which details the proposed recommended management actions to be incorporated into the Management Plan and a larger addendum document which contains much of the background information used by Umina Community Group when developing these management actions.

¹ Refer to Submission Addendum section - 4.1 Gosford Council Plan Revision Process

2 Key Recommendations

It is recommended by the Umina Community Group that the final Coastal Zone Management Plan proposed by Gosford City Council, within the Umina/Ocean Beach section defined in the draft report, include the following elements:

- That the existing dune structure which protects the beach be maintained.
- That any development on the dune area protecting Umina and Ocean Beach be restricted by development controls.
- That a Dune Management Plan be implemented to sustain and enhance the current dune structure and ecosystems.

The existing Dune, as noted in the Draft Coastal Zone Management Study shows that Umina/Ocean Beach is well protected today and over the study period to 2100. The above approach does not involve significant costs to any level of government or to any other stakeholders.

3 Summary

The Umina and Ocean Beach area and foredunes are considered valuable assets by the community. The coastal hazards of beach erosion, shoreline recession (eastern end of Ocean Beach), slope instability and coastal inundation, if not properly managed, could have unacceptable impacts for current and future generations. The management plan to be put in place by Gosford City Council has a direct role to play in avoiding the risks and changing the consequences of these hazards for the Umina Beach area.

This submission supports the need for the new Coastal Zone Management Plan to greatly strengthen the protection afforded to the Umina/Ocean Beach Sand Dunes. This is in line with the community's views that the dunes should be protected for future generations, to serve as a barrier during king tides and significant storms, and are a vitally important part of the social and ecological environment of the area. The Umina Community Group sees this as the appropriate time to make this contribution which is well supported by the comments in the Gosford City Council [Coastal Zone Management Planning Fact Sheet](#) that states "*Community engagement will be undertaken through the **entire** coastal zone management planning process to enable alignment with community objectives and concerns*" and the invitation by Gosford City Council for Umina Community Group to join the Catchments & Coast (Coastal) Sub-committee as a stakeholder for the Umina area.

This submission has two distinct and important themes;

1. Protect the current natural dune amenity for future generations via formal development controls.
2. Maintain and enhance the dunes through implementation of detailed and specific Dune Management programs.

Key to this submission is that the final Coastal Zone Management Plan should prevent any development apart from essential works on the Umina/Ocean Beach Sand Dunes ([foredunes](#)²) through legislation, and continue with the management actions outlined in the 1999 Management Plan. Planning for the Umina/Ocean Beach Sand Dunes should embrace the concept of treating them as a [buffer](#)³ and specifically restrict any form of development upon the land (beyond protective fencing and essential works). This is in full compliance with the [NSW Coastal Policy 1997](#) which clearly states that only essential developments should be permitted on foredunes. These restrictions could be put in place by Gosford City Council under section 3.3 of the [Gosford Local Environmental Plan](#) and the new [Coastal Zone Management Plan](#). To complement this approach and allow for public usage, development should be allowed but [restricted](#)⁴ to the areas directly around the two Surf Life Saving Clubs. These two specific areas are small and well supported by good public infrastructure including waste management, allowing for a restricted level of development. Restricting development is advantageous since:

- By formally stopping all development on the Umina/Ocean Beach Sand Dunes, the dunes will be best protected for future generations and perform their role as a natural defence against the ravages of the coastal weather, and continue as a natural habitat for wildlife as they do today. This also provides compliance with the NSW Coastal Policy 1997.
- The protection of these sensitive Sand Dunes also supports the vision and principles of the Crown Lands Act that Gosford City Council, as Trust Manager, is bound to uphold.
- The council, as represented by the Mayor, has also recognised the importance of protecting the Sand Dunes at Umina Beach through such statements as "It's no secret our beaches are an important part of the Central Coast and important for tourism," and "Providing protection is so

² Refer to Submission Addendum section – 5 - Beach Anatomy

³ Refer to Submission Addendum section - 4.1 - Gosford Council Plan Revision Process

⁴ Refer to Submission Addendum section - 4.1 - Gosford Council Plan Revision Process

important for not only the beaches, but the assets behind the beaches.” (Quoted in the [Express Advocate](#)).

- Any move to allow development, no matter how minor, on the Sand Dunes is also strongly against the views of the residents of Umina Beach and would lead to a community outcry. By protecting the Sand Dunes in the Management Plan, the wishes of the majority of the community would be followed and processes would be established to protect the dunes for future generations.
- Due to the fragile and dynamic nature of the dunes, and their location in a coastal hazard zone, if any development (public or private) was to take place it would need to have considerable structural foundations and require sea wall type structures. The construction of such developments would have a devastating impact on the fragile foredunes, the ecosystems that operate on the dunes and beach amenity. The erection in terms of capital costs and long term maintenance of such structures would be considerable and require significant funding by ratepayers and future generations.

The 1999 Management Plan, 2014 LEP, 2013 DCP and the consultant draft Coastal Zone Management Plan do not provide the Umina/Ocean Beach Sand Dunes with legislative protection from development, as they are currently zoned Recreation (RE1) which in principle also does not comply with the [NSW Coastal Policy 1997](#).

The Umina/Ocean Beach Sand Dunes are represented by two deposited plans ([7175/1066208⁵](#), [7002/1122309⁶](#)) of Crown Land. Deposited plan 7002/1122309, extending from Umina Beach Surf Club to Bangalow St, Ettalong registered 9.1. 2008, by Gosford Council, is for the purpose of “Crown Land Conversion”. Plan 7175/1066208, extending from Umina Surf Club to Berrima Crescent in front of the Caravan Park, registered 15.3.2004, has a stated purpose of “Departmental”. These plans extend beyond the boundaries of, but include the 100 feet wide Ettalong Beach Reserve Trust 82759. The Trust Manager is Gosford City Council. The land is currently free of any development except for pathways to the beach and the fences that prevent public access to the dunes. Our submission is that the management plan should be to rezone that portion of these deposited plans between Berrima Cres and Ettalong Point as Environmentally Sensitive and that the 2014 LEP be extended to provide direct protection for foredunes as development excluded areas.

The second key component of this submission is to support an extension of the current management plans to better understand the natural vegetation and ecosystems of the dunes and see they are monitored, supported and restored where required. The current data available on the nature of the foredunes at Umina is lacking in detail and accuracy. There is considerable support in the community to maintain and improve the health of the dunes. The management plans should put in place actions to encourage and support these efforts. This can be achieved through the Bushcare programme currently in place and delivered by Gosford City Council officers, combined with community volunteer support targeting weed eradication, propagation of resident species and protection of native fauna. This can be carried out using existing resources and a Train-the-Trainer model to better equip local residents.

In collecting feedback for this submission, there was also considerable input from coastal home owners opposing the concept of a walkway, pathway or cycleway running through the foredunes parallel to the beach. Such a structure would in principle not comply with the development restrictions above and a number of social and economic issues were raised which impact on all Umina Beach residents and ratepayers. These have been summarised below to provide a more complete picture of the issues of foreshore development in Umina beyond protecting the dunes.

- Specific public developments such as a public access walkway, cycleway or boardwalk constructed through the foredune (adjacent to the beachside boundaries of the existing

⁵ Refer to Submission Addendum Figure 11 Lot 7175 - DP1066208

⁶ Refer to Submission Addendum Figure 12 Lot 7002 DP1122309

residences) linking the two licensed surf clubs and the privately owned bar adjacent to the Ocean Beach Surf Club trading as "Margarita Daze", could facilitate an increase in negative anti-social behaviour, including robberies, petty crime, vandalism and graffiti, while creating difficult police access, and contributing to a greater risk of fire within the vegetation on the dune from discarded cigarette ends.

- The maintenance of these structures in an area so exposed to the elements would create an economic burden to future ratepayers and therefore restrict investment in alternate public facilities.
- There is a concern such a walkway could not be patrolled by the local police vehicles due to the nature of its size and accessibility.
- Today a viable alternative exists via walkways alongside the existing roadway "The Esplanade", and this existing facility can be enhanced during events such as surf carnivals by restricting traffic as outlined in section [5.4.5 The Esplanade Walkway](#) of this report.

4 Proposed Management Plan

By strengthening the protection of the existing dunes of Umina and Ocean Beach and active management, of the coastline environment the dunes will be available in an informal natural state for current and future generations. The following Management Plan for the Umina/Ocean Beach area is proposed by the Umina Beach community for implementation by Gosford City Council via its Coastal Zone Management Plan.

4.1 Control Development

MP 1-A	Coastal Zone Management Plan to specifically state, Lot 7175/1066208 and Lot 7002/1122309 to be designated as foredunes and as a buffer zone, and no nonessential development to be allowed on these lots.
MP 1-B	Continue with current Coastal Frontage environmental controls around Umina/Ocean Beach including but not limited to Floor level controls Offsets from the 100 year hazard zone
MP 1-C	Stringent controls on major developments seaward of West Street (excluding SLSCs)
MP 1-D	Expand section 3-3 of the GCC LEP to specifically cover "foredune" protection in line with the NSW Coastal Policy
MP 1-E	The two Crown Lots (foredunes) 7175/1066208 and 7002/1122309 to be rezoned from RE1 Recreation to E2 Conservation.
MP 1-F	The two Crown Lots (foredunes) 7175/1066208 and 7002/1122309 to be added to the Coastal Frontage map in the DCP.

4.2 Active management of the dunes stability and erosion

MP 2-A	Install sand trapping fencing in the vicinity of the SLSCs
MP 2-B	Assist/encourage community groups with dune management actions including Dunecare/Bushcare
MP 2-C	Do not replace the seaward fence public fencing on the dunes
MP 2-D	Monitor storm run-up levels and dune erosion
MP 2-E	Improve catchment controls and pollutant traps and integrate with stormwater management
MP 2-F	Reform dunes after major storms including maintenance of the dune crest above the level of wave runup to prevent wave runup reaching the beachfront buildings.
MP 2-G	Use of Beach Nourishment techniques at the eastern and western ends of the beach
MP 2-H	Maintain Public Access way fencing and ensure that existing access ways are maintained in a 'dog leg' fashion to prevent 'wind tunnelling' and sand erosion.

4.3 Encourage dunes ecology

MP 3-A	Repair and maintain dune vegetation
MP 3-B	Minimise disturbance to dunes
MP 3-C	Implement a weed management plan
MP 3-D	Complete a vegetation profile for the Umina and Ocean Beach and support the natural vegetation profile.

4.4 Community participation and beach amenity

MP 4-A	Increase information signage near surf clubs on the ecology and history of Umina/Ocean Beach
MP 4-B	Construction of a disabled beach access point outside Ocean Beach SLSC
MP 4-C	Implement traffic control techniques to facilitate easy risk free pedestrian access for major events including the Surf Life Saving carnivals.
MP 4-D	Improve shade areas around the grassed areas and car parks near the SLSCs
MP 4-E	Maintain current signage and facilities on a regular basis including graffiti removal
MP 4-G	Use of low vegetation along beach dunes and foreshore
MP 4-H	Development of local area (Umina/Ocean Beach) online fact sheets and encourage local educational programs in schools regarding the dunes and waste impacts
MP 4-J	Install sand trapping fencing or other appropriate controls in beach access points where sand blowout occurs.
MP 4-K	Work with the Central Coast Surf Life Saving organisation to look at ways to support Surf Life Savings Australia's EcoSurf policy in the region – including Ocean and Umina Surf Life Saving clubs.

5 Management Plan Background

The following section outlines the background and detail behind the proposed management plan.

5.1 Control Development

The foredunes at Umina are two Crown Lots as part of Crown Reserve 82759

1. Lot 7175 - DP1066208 – Next to Caravan park and outside Umina Surf Life Saving Club
2. Lot 7002 - DP1122309 – Ocean Beach around the point to Ettalong

5.1.1 Environmentally Sensitive Areas

The [2014 Hazard Study](#) (section 1.2.1) states that *"The basic framework for managing coastline hazards in NSW is through the [NSW Coastal Policy](#) and the Coastal Protection Act 1979. This is implemented through local Councils (with financial and technical support from the NSW Government) undertaking coastline hazard studies and developing Coastal Zone Management Plans which are used to inform land-use planning, development controls and coastal activities"*.

Section "3.3 Environmentally Sensitive Areas Excluded" of the 2014 [Gosford Local Environmental Plan](#) defines areas where development **must not** be carried out as they are environmentally sensitive. The 1997 [NSW Coastal Policy](#) in the Local Government Planning section states that *"A Section 117 Direction under the EPA Act, 1979 has been issued to ensure local councils take account of the Coastal Policy in the preparation of local environmental plans (LEPs)"*. The NSW Coastal Policy (in section 2.3) covers a specific key action to protect foredunes and states *"Beaches, frontal dunes and undeveloped headlands will be protected and only minor development will be permitted for essential public purposes, eg surf lifesaving facilities"* and that *"Local councils will be required to make new local environmental plans consistent with the Coastal Policy and to adopt planning and development controls specified in the policy where appropriate"*. Considering Ocean/Umina Beach already has two large modern Surf Living Saving Clubs positioned on the hind dune area (not on the two Crown Lots / foredunes) with significant surrounding park lands there is no need to allow any development on the two Crown Lots that cover the foredunes (frontal dunes). Section 3-3 Point 2 of the [Gosford Local Environmental Plan](#) - *"environmentally sensitive area for exempt or complying development"* should be extended to state that land identified as "Beaches, frontal dunes and undeveloped headlands" should be covered ([MP 1-D](#)). The [Coastal Zone Management Study](#) includes in **section 7.6.1 Revetment or Terminal Protection Structure** a discussion on the sorts of protection that would be needed if new development was allowed on the foredune lots (based on the Coastal Engineering Manual, 2003). The Umina Community's opinion is that any new development on the dunes would require this type of structure and based on the impacts described in section 7.6.1, it would be inappropriate to allow new development and avoid the need for such imposing structures.

Section 2.4.2.1 Coastal Vegetation of the [Coastal Zone Management Study](#) further supports this premise and says *"It is essential to consider the surf zone, intertidal beach, dunefield and land behind the dunes as a single system (Brown and McLachlan 2002). As normal exchanges of sand between beaches and dunes and also along shore need to be maintained, only structures that are deemed to be economically essential should be considered for construction on beach and dune systems (Brown and McLachlan 2002)."*

5.1.2 LEP Zoning

The [NSW Coastal Policy](#) in Part B section 1.1.9 states “*Local environmental plans will be prepared with appropriate zonings and other provisions for areas of recognised conservation value*”. The Gosford Local Environment Plan – [Land Zoning Map](#) for Umina Beach currently zones the two Crown Lots as “Zone RE1 Public Recreation” and therefore does **not** provide adequate protection to the foredune and does **not** recognise the conservation value as required by the NSW Coastal Policy.

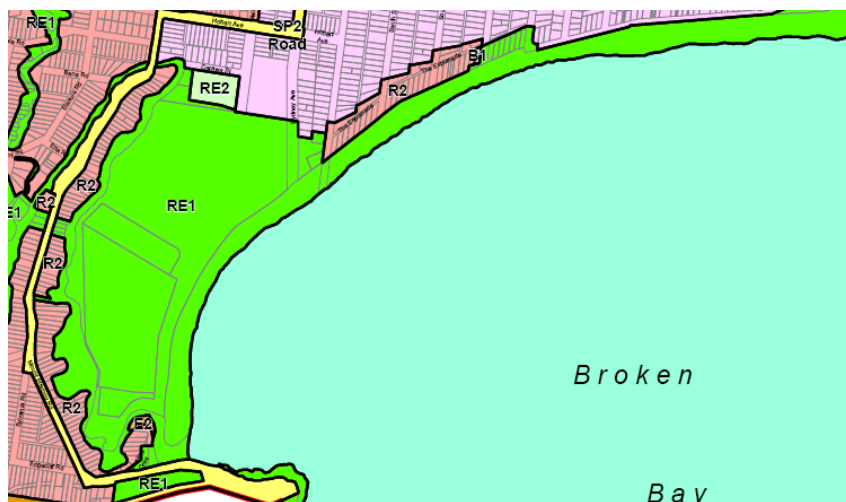


Figure 1 LEP Land Zoning Map - LZN_016A

The [Gosford Local Environmental Plan](#) does include a zone for environmentally sensitive areas called “Zone E2 Environmental Conservation”. The [Coastal Zone Management Study](#) table “*Summary of endangered ecological communities and regional significant vegetation within or near the study area*” reflects the current status for the E50A vegetation on the dunes as **Regional Significant Vegetation**. This formal designation is based on the level of vegetation left in the region compared to historical levels. In section 6.4 of the study they go on to say about the Umina area “*The primary vegetation community vulnerable to damage includes E50a Coastal Sand Foredune Scrub which currently exists on the portion of dune between Ettalong Creek entrance and the Umina Surf Club*” and “*the portion of dune east from Umina Surf Club to the entrance of Brisbane Water*”. The two Crown Lots which cover these areas should be rezoned from RE1 to E2 ([MP 1-E](#)) to best protect the dunes.

We note that in 2010 the [Peninsula Environment Group](#) ran a campaign to have Gosford City Council introduce into the LEP a zone called “[Environmental protection zone](#) (other than national parks)”. In concept this could have been a suitable zone for the Umina/Ocean Beach dunes. Without this zone in place they also lobbied that the “*Umina, Ocean Beach and Ettalong Beach Dunes including bushland areas along foreshore*” be zoned E2. This shows wider and long term community support, outside of the Umina community, for this type of approach to zoning by Gosford City Council.

The [Gosford Local Environmental Plan](#) also provides a section “5.5 Development within the coastal zone” which supports the principles of the NSW Coastal Policy (see section 5.5 1 (b) “*..to implement the principles in the NSW Coastal Policy, and in particular..*”). This section provides no additional detail on the treatment of foredunes.

5.1.3 DCP Coastal Frontal

The [2013 Gosford Development Control Plan](#) does provide section 6.2 "Coastal Frontage". The following diagram specifically highlights those Lots covered by the DCP for Coastal Frontage protection (the two Crown Lots are not covered or marked).

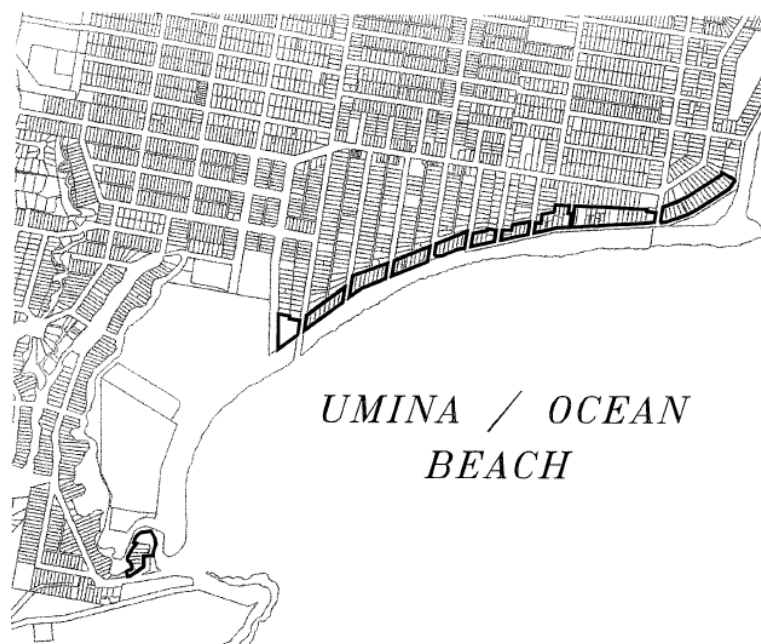


Figure 2 Sheet 6 from the 2013 DCP

The DCP Coastal Frontal section states *"This chapter applies to all land within the City of Gosford which is affected by the coastal processes of beach and/or cliff erosion"*. It should be noted that if the [2013 DCP](#) Coastal Frontage restrictions/requirements were applied to the foredunes to allow for development, including non-essential items like a footpath or cycleway, significant construction would be required to meet those requirements including beachfront revetment walls. This level of construction would devastate the foredunes and therefore should not be allowed in the first place. The sheet 6 map of the DCP Coastal Frontage should be updated to include the two Crown Lots ([MP 1-F](#)).

5.1.4 Coastline Hazard

The [2014 Hazard Study](#) section 7 made the following assumption *"It can be seen that total shoreline recession (due to both net sediment loss and sea level rise) is not predicted to occur at Ocean-Umina Beach. As such, the 2050 and 2100 Coastline Hazard Lines at this beach are equivalent to the 2011 Coastline Hazard Lines"*. It can be assumed that this is based on the existing foredunes remaining in their current state. If any development was completed these [foredunes](#) would be altered and there would be a need for this assumption to be re-examined. The photographic evidence of [residences](#)⁷ in the 1940's showed that without a foredune the erosion line would reach the existing residences at Ocean-Umina Beach. The definition of Hazard Lines used in the report includes the statement that *"Hazard Lines do not represent future predicted shorelines, but future predicted erosion escarpments after a 100 year ARI coastal storm"*.

⁷ Refer to Submission Addendum Figure 8 Residence Photo of Umina Beach – 1940



Figure 3 Hazard Line Map from [2014 Study](#)

The thick green line in the map above shows the current Hazard Line for just one section of the Umina-Ocean Beach Dune. The line is similar or closer to the assets behind the beach along the rest of the beach, showing that the vast majority of the Crown Land lots (shown by the black lines in the diagram) are impacted by the potential of a 100 ARI (Annual Recurrence Interval) Coastal Storm **today**, with the current foredunes intact. With the foredunes protecting the caravan park, residences and roadways which exist within metres of the immediate Hazard Line, the two Crown Lots should be designated a [buffer](#) and Gosford City Council should not allow any non-essential development within the terms of the [NSW Coastal Policy 1997](#), to offer the maximum protection to these foredunes. The [Coastal Dune Management Manual](#) puts the need for this protection straight forward in its Introduction section, "*It is essential that local communities understand that severe beach erosion will occur again and that frontal dunes will play a vital role in mitigating erosion initiated losses*". While there is no immediate risk any development in the dune area may change the risk profile and if any development is proposed the present risk needs to be re-evaluated taking into account the developments impact prior to its initiation.

Section 3.13 NSW Coastal Planning Guideline of the [Coastal Zone Management Study](#) and Figure 17 – Suitability of development positions in relation to erosion/recession hazard lines as described by Department of Planning (2010) is clear in its wording and reference to the guidelines “that development seaward of the Immediate Hazard Line is considered to be typically unsuitable”. The Green Line in the hazard Line map above clearly shows the vast majority of the foredune lots are seaward of the immediate hazard zone.

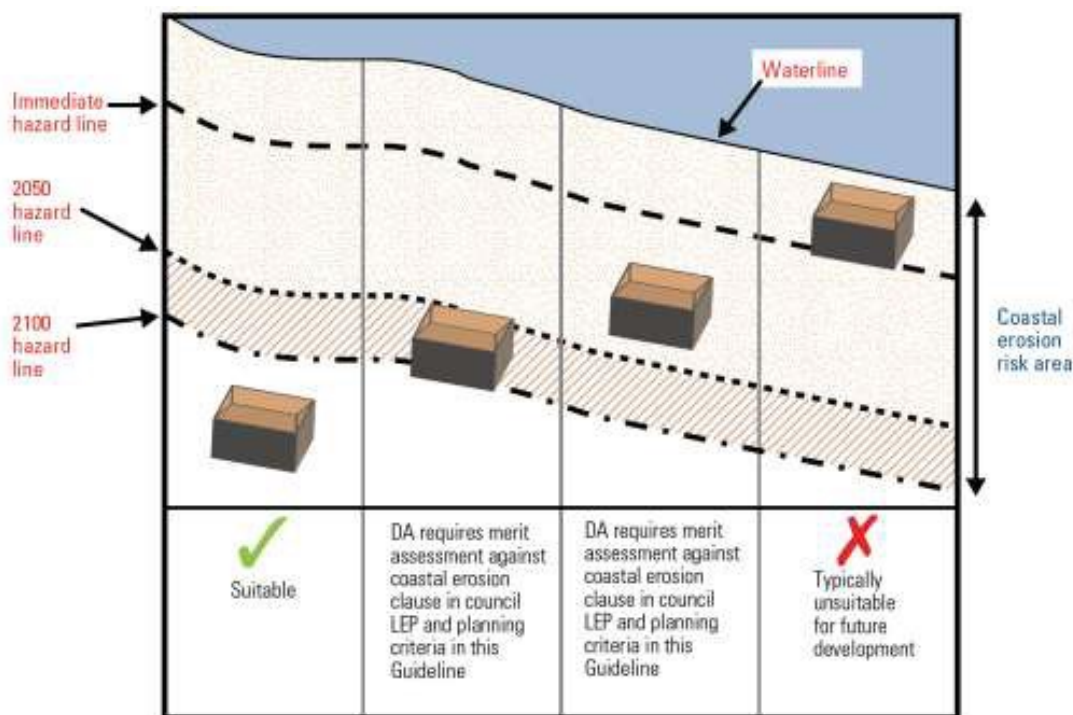


Figure 4 Suitability of development positions in relation to erosion/recession hazard

The red lines on the hazard line map further above show the [Zone of Slope Adjustment](#)⁸ (dashed red line) and the [Zone of Reduced Foundation Capacity](#)⁹ (hard red line) for the immediate time period (that is, present post storm). The [2014 Hazard Study](#) (in section 6.8) goes on to explain that within the Zone of Reduced Foundation Capacity that any development without piles “would be considered to have an inadequate factor of safety”. With over half the foredune, and in many cases all of the foredune is in this Zone of Reduced Foundation Capacity, it would be inappropriate to allow any development in these foredunes (including walkways and cycle ways) due to the need for construction processes that require significant structures. The process of a pile based construction method would devastate the foredune and cause a major community outcry. This further supports that the two Crown Lots should be designated a buffer and no development allowed, to offer the maximum protection to these foredunes ([MP 1-A](#) & [MP 1-B](#)).

5.1.5 Government Support

At the [May 13 2014 Gosford Council Meeting](#) (page 112) the minutes show the strong view of Gosford City Council to not allow any development within the Hazard Zone stating “Based on the information available to Council at this time, **any development** seaward of the 2015 hazard line is considered at immediate risk of loss or damage during a design storm event. Further, any development seaward of that zone has the potential to affect erosion and inundation of adjacent and nearby properties during that storm

⁸ Refer to Submission Addendum section – 5 - Beach Anatomy

⁹ Refer to Submission Addendum section – 5 - Beach Anatomy

event". This view should similarly support Gosford city Council prohibiting any development through the Umina-Ocean beach foredunes which includes the 2015 Hazard Line ([MP 1-B](#)).

The [NSW Coastal Policy](#), in the Implementation section, goes on to state that "It is recommended that local councils address their implementation of the Coastal Policy through the management plans which they are required to prepare under Section 402 of the Local Government Act, 1993". Therefore it is appropriate for Gosford City Council, as part of its Coastal Zone Management Plan and DCP, to enact the restrictions on the properties near the coast in the hazard zone ([MP 1-B](#)).

The [Crown Lands Act](#) in Part 1 Section 11 defines 6 principles which a Trust Manager must comply with. By not providing adequate protection to the foredunes covered by the two Crown Lots Gosford City Council (as the Trust Manager) will be acting outside these principles in these areas:

- *that environmental protection principles be observed in relation to the management and administration of Crown land,*

The NSW Coastal Policy above sets about defining a modern framework for environmental protection which "prohibits" development on foredunes.

- *that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible,*

The [Coastal Dune Management Manual](#) carefully explains a modern approach to foredune management based on securing, protecting and restoring the existing dunes and states "Dunes are now recognised as integral parts of our beach systems with intrinsic biodiversity values. The challenge is to preserve these, as well as protecting the cultural values that derive from beach settings. Restoration of sand dune ecosystems and securing their biodiversity involves protecting the relatively undisturbed vegetation that remains as well as trying to restore what has been lost". A strong protection regime against any form of development is needed to achieve this.

- *that, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity, and*

The Umina/Ocean Beach foredunes represent a fragile environment and one that is also key to the beach amenity for future generations. Without strong protection included in the new Management Plan for the two Crown Lots, the Management Plan will fail to guarantee the existence of the dunes for future generations.

As the government body responsible for the two Crown Lots, Gosford City Council is to be applauded for responsible management actions to date, fulfilling a duty of care to prevent any damage to the assets (roadways, caravan park and residences) behind the foredune by creating, protecting and maintaining the foredune. The Umina Community Group recognises and supports Council actions and recommends solidifying mandated protection of the dune area from non-essential development, by re-zoning the area E2 Environmental Protection.

5.1.6 Coastal Buffers

The [Gosford Council Coastal Management Option Fact Sheet](#) describes a number of management options available to Gosford City Council to "provide a suite of methods for protecting our coastal areas over the longer term". Within those options are two which could be applied to not prevent development on the two Crown Lots due to these areas being sensitive foredunes for Umina/Ocean Beach. These options are

- **Environmental Planning:** Buffers to allow the natural fluctuations of the coastal areas to be accommodated within an area *protected from development*, and,
- **Development Control:** Dune protection that can *ensure the integrity* of the foredune system.

These options show that Gosford City Council has within its own current plans, the options necessary to strengthen the protection afforded to the Umina/Ocean Beach sand dunes by designating them a buffer zone and not allowing any development on the two Crown Lots ([MP 1-A](#), [MP 1-D](#), [MP 1-F](#)).

5.2 Active management of the dunes stability and erosion

5.2.1 Beach Pathways

There are currently 24 public beach access walkways for Umina and Ocean Beaches.



Figure 5 Beach Access Walkways

The beach access walkways provide the public with generous access to the beach but also put the sand dunes at risk of damage and the amenity of the area at risk due to sand blowouts. By building and maintaining fencing along the beach access ways (especially the more popular pathways around the surf clubs and the caravan park) the dunes can be better protected to act as a natural buffer zone. It is recommended that \$18,000 per year be allocated to the maintenance and replacement of the beach access pathways, that 3 pathways receive renovation each year and that the others are checked to ensure safety. By repairing/replacing the worst 3 each year the whole set will be serviced over approximately 8 years ([MP 2-H](#)).

The [Dune Management Manual](#) in section 4.7.3, under “alignment” recommends that pathways do not run across the dune parallel to the beach, that “*accessways should cross the dunes at right angles to provide the shortest route to the beach*”. In many instances, due to the onshore winds at Umina and Ocean Beaches, accessways at right angle to the beach lead to sand blowouts and weaken the dune vegetation. Due to this, the alignment of the accessways when they are being serviced should be changed to be in line with the recommendations in the Dune Management Manual that “*major re-orientation or simply inclusion of a dog leg in the accessway to avoid these impacts*”.

The existing fencing is based on a “plain wire” fence, the [Dune Management Manual](#) in section 4.6 describes this as an appropriate and cost effective method of protecting the dunes. The look of the fencing is in keeping with a casual looking beach and supported by the community. The Dune

Management Manual goes on to describe the importance of maintenance to keep down the costs to the Council saying “All fences must be subject to an on-going maintenance program. Inspections and repairs should be undertaken on a regular basis and after storm periods to ensure that fences are kept in good repair, and retain their function of protecting vegetation and keeping the area safe for the public. Maintenance work should be documented thoroughly in case of future litigation.... Continual maintenance will increase the life expectancy of fence materials, maintain the protective function of the fences and defer the cost of complete replacement”.

By maintaining the fencing the public will be encouraged to not walk through the dunes and this will enhance the look of the dunes (improving the beach amenity for all). The dunes will also further flourish and enhance their ability to act as a buffer zone for the area ([MP 3-B](#)).

The pathway for each beach access will need to take into consideration the local physical conditions, but the community supports the continued use of “Board and Chain Accessways” as described in section 4.7 of the [Dune Management Manual](#) as an effective path, where the gradient or level of use requires it. This type of pathway is in keeping with the current beach amenity. A different approach would be required to provide a disabled access path at the Ocean Beach Surf Club ([MP 4-B](#)).

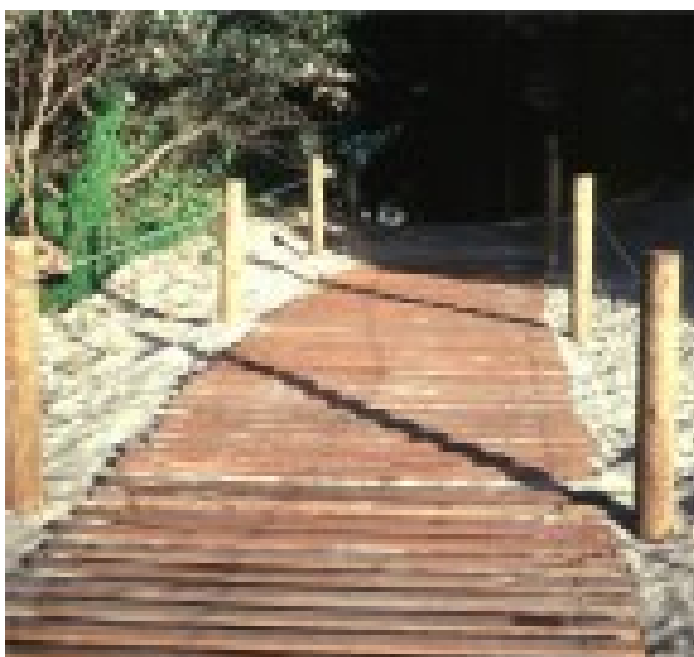


Figure 6 Example Wire Fence and Boards - Dune Management Manual

Sand Trapping fencing should also continue to be used and expanded around the two Surf Life Saving Clubs to avoid sand blowouts outside these areas ([MP 2-A](#)).

5.3 Encourage dune ecology

5.3.1 Fauna

The dunes provide a working ecosystem with kookaburras and kestrels looking for snakes and lizards, sulphur crested cockatoos for seeds, blue tongue lizards for snails and spiders. Even the snake the kookaburra is holding (below) is protected (a baby black-bellied swamp snake). In addition there is the protected lapwing plover, long beaked corellas, short beaked corellas, tom tits and blue wrens. The continued restoration of the flora on the dunes will only enhance this ecosystem. The cockatoos use the dune area as a flight path because they will not fly over large expanses of water. They feed on the grasses and seeds of the wattle and banksia trees near the dunes.



Figure 7 Kookaburra catches snake from the dunes



Figure 8 Cockatoos feeding on the dunes

Black-bellied swamp snakes are found along the east coast of New South Wales and Queensland. Their diet consists mainly of frogs and skinks. In discussions, local residents confirmed, they use the vegetated dune as a corridor to move along the Umina beachfront. These snakes are mostly found at the western end of Umina Beach near the creek at the caravan park. More common in the dune area, but also protected (all snakes are protected), is the red bellied black snake which is important to the local ecology. They eat the mice and rats that would overpopulate the dune area due to food scraps found in garbage on the beach. One resident remarked they had knowledge of a death adder being identified in the dune area while another recently photographed a red bellied black snake in his yard that came from the dune.



Figure 9 Kestrel resting

The [Coastal Zone Management Study](#) in section 2.4.2.2 SANDY BEACH HABITATS goes on to discuss the diverse ecology of the dunes including

- *"Supralittoral areas of sandy beaches (i.e. above the high tide mark) may provide important nesting areas for shorebirds and marine turtles. Occasional sightings of sea turtles, including green turtles, have been recorded on Gosford's beaches, including at Wamberal, Terrigal, MacMasters and Umina beaches".*
- *"Evidence of burrowing macrofauna can often be seen along the beach berms..."* (in Umina White Beach Sand Crabs proliferate the sand dune providing food for kookaburras, curlews, egrets)

Local residents have documented Leopard Seal's (*Hydrurga leptonyx*) on Umina Beach during winter (see [Facebook pictures](#))

The [Coastal Zone Management Study](#) in section 2.4.2.2 SANDY BEACH HABITATS also discusses the impact of allowing development in the dunes stating *"...construction activities on sand beaches can cause direct mortality of eggs and young of beach nesting shorebirds, turtles and fish (Martin et al. 2006)".*

5.3.2 Flora

There are a number of historical articles that provide some insight into the vegetation that existed on the dunes at Umina. The Beach History section of the Submission Addendum shows a photographic history of the dunes over the last 100 years.

The Sand Plains of the Umina and Woy Woy area are significant in world terms due to the way they were formed 5000 years ago with a 3.7 Km wide level plain of sand ridges (Thom 1978). This rare feature meant the area was a popular area for the study of soil and sand deposits. There are studies going back to the 1950's focussed on the soil, but these also give a small insight to recent flora on the dunes. Burgess and Drover's (1953) work on soil development, done before the extensive suburban development of the 1960s and 70s reported that *Banksia Integrifolia* (*Leptospermum Laevigatum*) occurred as a frontal dune community about 90 m (100 yards) wide behind Umina Beach.

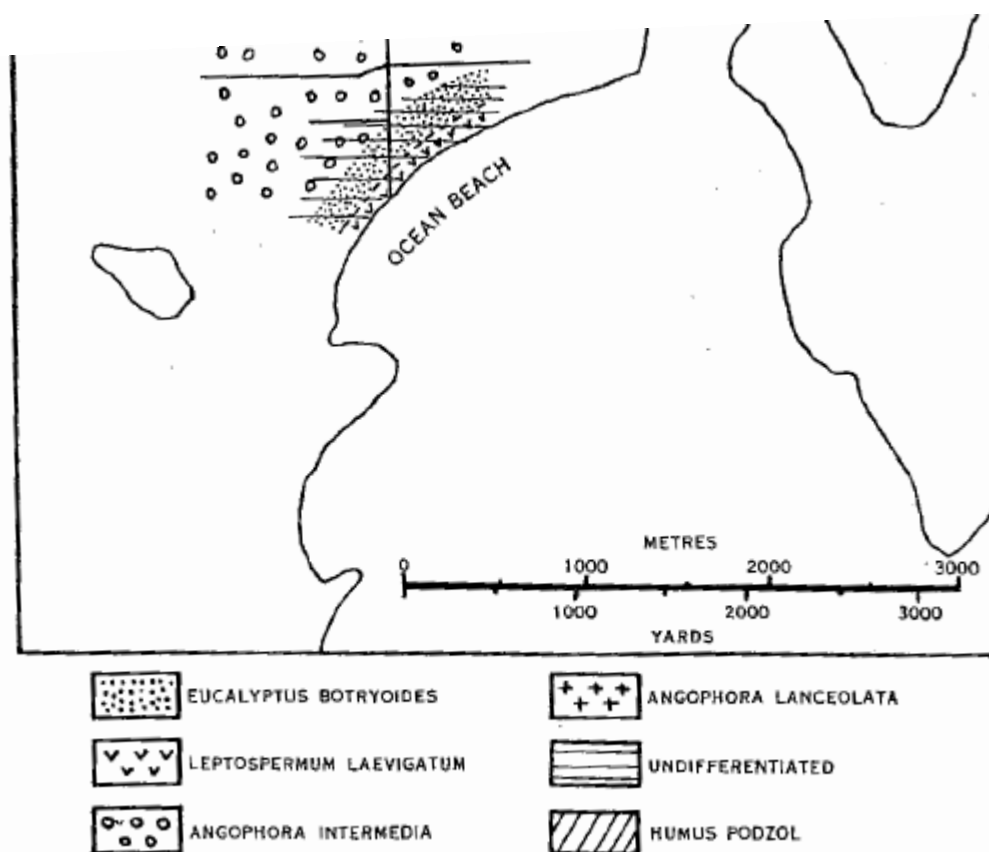


Figure 10 Distribution of vegetation by Burgess & Drover 1953

In 1978 Hails as parts of his extensive study of the Sand Plains made a more informative statement with "The umina dune is fixed by sand-binding grasses, such as *Festuca littoralis*, and *Spinifex hirsutus*, which often trails into the tidal zone in sheltered areas. These grasses grade into a cover of succulent plants which include *Hydrocotyle* spp., *Hibbertia volubilis*, *H. scandens* and *Sporobolus* with *Lomandra longifolia*."

Payne in 2010 made this statement on the vegetation information available for Umina "Except for brief mentions in the soils-oriented work of Burgess & Drover (1953) and Hails (1969), the nature and floristic composition of the Central Coast sandplain vegetation are poorly known. Sandplain vegetation was not recorded adequately in the initial inventory for the Lower Hunter – Central Coast regional mapping (House 2003) and Gosford local government area mapping (Bell 2004), though it has been included in a recent update by Hunter Councils (Somerville 2008)". Even though this report goes on to study the sand plains of Umina little further information is provided for the foredunes.

Today the vegetation definition used for the foredunes is primarily based on the aerial photography mapping completed as part of the 2004 and 2009 [vegetation profiling](#) by Bell for Gosford City Council. It should be noted that it is likely this mapping is not supported with ground truthing, this is reflected in the lack of detailed information provided for E50a Coastal Sand Fore dune Scrub communities in Bell's reports. The [Vegetation Community Profiles](#) report contains no Vegetation Structure or Key Diagnostic Species for Coastal Sand Fore dune Scrub. The [Coastal Zone Management Study](#) (in Table 3 Summary of endangered ecological communities and regional significant vegetation within or near the study area) notes E50a Coastal Sand Fore dune Scrub is a **Regional Significant Vegetation**. This classification reflects the significant reduction of the area existing today compared to pre settlement in the Gosford area. It is an important issue that no detailed information / profile exists for Coastal Sand Fore dune Scrub even though it is classified in the Gosford LGA as **Regional Significant Vegetation** ([MP 3-D](#)).

The [Coastal Zone Management Study](#) (in section 7.6.6 Dune Management) explains "*Dune vegetation can prevent wind erosion by decreasing wind speed at ground level, provide a protective cover over the dune, provide habitat for native fauna and reduce (but not prevent) damage from wave erosion. Dune vegetation can also regenerate after storm activity and facilitate natural recovery of the dune*". The study in **Section 6.4 Ocean-Umina Beach** goes on to state "*Significant expanses of dune vegetation may be lost during significant storm events in current, 2050 and 2100 conditions. The primary vegetation community vulnerable to damage includes E50a Coastal Sand Fore dune Scrub which currently exists on the portion of dune between Ettalong Creek entrance and the Umina Surf Club*". Efforts should be made after any significant storm event to assist the rehabilitation of the dune ecosystems ([MP 3-A](#)).

The Umina community seeks a beach with an informal and natural look that is sustainable for the long term. A key component of this, is having healthy vegetation covering over dunes and understanding that this is as close as possible to the naturally occurring habitat of the dunes, thus promoting biodiversity along the beach and the suburb as a whole. The ability to provide guidance to volunteers working within the community in the management of this vegetation would be greatly increased by completion of a better local vegetation profile, Vegetation Structure or Key Diagnostic Species, specifically in the Umina area ([MP 3-E](#)).

Section **3.13 NSW Coastal Planning Guideline** of the [Coastal Zone Planning Study](#) describes the planning criteria by the Department of Planning (2010) and that it covers "*coastal ecosystems are protected from development impacts*". The Umina Community see that the understanding and documentation of our local ecosystems will help to provide protection for the Umina foredunes and their ecosystems.

The [Dune Management Manual](#) in section 2.8 explains the importance placed on biodiversity as "*Dune vegetation is recognised widely as an integrated botanical system exhibiting interdependence in both community structure and floristics and providing food and shelter for a variety of fauna. The need to protect, maintain and restore these intrinsic ecosystem values is a key element in conserving biodiversity. Conservation of biodiversity is a fundamental principle of ESD (Environmentally Sustainable Development) and provides one of the foundation stones upon which the NSW Coastal Policy was developed (NSW Government 1997). The priorities and actions for conserving biodiversity are described in the NSW Biodiversity Strategy (NSW National Parks & Wildlife Service 1999)*".

5.3.3 Bushcare

Umina has an active [Bushcare](#) group which is dedicated to repairing and enhancing the vegetation on the foredunes and is run in cooperation with [Gosford City Council](#). This program allows the Umina community to be intimately involved in the protection and revegetation of the dunes. The program is also a cost effective solution for Council offering volunteer labour to work on the dunes under a level of supervision.

Sustaining this process will require a level of support from Gosford City Council including

- Annual ongoing funding of Bushcare supervisors
- Annual ongoing funding for training courses for volunteers
- Implementation of Train-the-Trainer programs for Bushcare supervision, providing accreditation of volunteers who can lead initiatives such as weed control and plant propagation
- Funding for a vegetation study to be completed for the Umina dune area to identify the correct species for vegetation on the dunes

The community would also like to see a second “green bin” provided to registered volunteers at no cost to facilitate weed disposal from Bushcare activities.

It is believed that funding of the Bushcare program will enable the program to be further expanded as community participation is expected to grow based on these measures.

5.4 Community participation and beach amenity

5.4.1 Economic and Social Value

The flora and fauna in the foredune provides vital support to the dunes, provides the community with a natural informal landscape, and supports locally significant vegetation and biodiversity. To the broader community and businesses in the area, healthy dunes provide a tourist draw card. The Gosford City Council Fact Sheet on the “[Value of our Coastline](#)” provides a good summary of this link between the economic and other value to society of the dunes and the potential damage this brings to the dunes, also the negative effect on the local economy if the dunes biodiversity is not protected. The fact sheet states “*Central Coast Tourism reported that the beaches of Gosford are highly valued by residents and a key asset in attracting visitors to the area. In 2011/12, the total tourism and hospitality sales in Gosford City was \$504.1m, with visitors spending an additional \$216.8m in the local economy. Tourism supports more than 11,000 jobs on the Central Coast*”. With a large caravan park and many holiday rentals located within Umina, the local community are fully aware of the influx of visitors and the value they bring to the local economy. Also, the local community and existing residents were drawn to Umina because of many factors including the beach landscape, while also understanding their fragility.

Damage to the dunes from erosion, development, or human traffic, will reduce the economic and social value of these natural assets. This loss in value would carry over from the Umina residents to all levels of government as they generate revenue via rates, land tax, stamp duty and GST, which are driven by tourism activity and through land and property values in Umina. To add to this if the dunes are lost or damaged, the cost to repair them would far outweigh the cost of maintenance.

Furthermore there is a responsibility to provide generational equity so the beaches we pass onto future generations are equal to or better than those we enjoy today.

5.4.2 Community Education

For new residents and visitors there is a need to provide information to help them understand the sensitivity of the dunes and, in general, most will want to help protect the dunes ([MP 4-A](#)). The management plans for the dunes should include a number of education items, including more informational signage (without it becoming visual pollution). Around the two Surf Clubs there is room for Umina specific information about the Umina Sand Plains and the Umina Woodlands. These and existing signs will need year-to-year up keep to continue to be effective ([MP 4-E](#)).

An education program based on online fact sheets could be developed in conjunction with the local primary schools to ensure families and residents gain an appreciation of the fragility of the Umina sand dunes, their link to our community, and the role the dunes play as a buffer to coastal hazards ([MP 4-H](#)). Waste management and rubbish controls can be reinforced in these programs.

5.4.3 Beach Access

Today the Umina and Ocean Beaches enjoy extensive public access with car parking at the two surf clubs, viewing decks, numerous beach access points and extensive tourism access from the caravan park. This access is to be maintained in the proposed management plan and would be enhanced by the construction of a disabled access point outside Ocean Beach Surf Life Saving Club ([MP 4-B](#)). The addition of greater disabled access to the beach would improve access for both local residents and visitors to the area, and help to provide a more inclusive community. Also see the section [Beach Pathways](#) for a discussion on maintaining the access ways.

The parkland areas around the two surf clubs are currently well supported with parking, cafes and amenities. These areas have good quality seating that is well maintained. This approach should be extended with continued investment in shade producing trees and structures, and additional seating ([MP 4-D](#)). This expansion would allow residents and visitors the ability to enjoy the coastal area, the views and maybe a walk along the beach. The more the coastal area is accessed and used, the higher the value the community places on it and increases support for its protection. It also brings greater demands on waste management and rubbish control.

5.4.4 Surf Life Saving Community

Surf Life Saving Australia (SLSA) is the country's peak coastal water safety, drowning prevention and rescue authority with 129 affiliated clubs in NSW, including the Umina Beach Surf Life Saving and Ocean Beach Surf Life Saving clubs. SLSA is committed to the ecologically sustainable use of the coastal environment and demonstrates this commitment through its [EcoSurf policy](#). This policy gives the following insight into the relationship of Surf Clubs and the surrounding environment

- *Surf Life Saving Clubs operate in a fragile environment that is also an important habitat for native flora and fauna.*
- *Beaches play an important part in the Australian way of life. Coastal activities are dependent on healthy coastal environments, and the capacity to ensure ecologically sustainable use and development of that environment is imperative for all Australians.*

The policy goes on to state the importance SLSA places on the protection of the environment and what that brings to surf life savers and the broader community. The policy also describes a number of practices clubs can follow to support the policy including:

- *Ensuring the environmental impact of surf lifesaving is minimised through careful siting and design of buildings and associated infrastructure in ecologically sensitive areas.*
- *Raising member and community awareness of coastal management issues.*
- *Establishing guidelines to ensure environmental protection is a key objective in the effective management of surf lifesaving events and activities.*
- *Encouraging greater participation in coast protection activities by becoming involved in community action plans such as Landcare, Coastcare, Bushcare, Dunecare, Waterwatch, Saltwatch and similar schemes,*
- *establishing (where required), maintaining and protecting wildlife corridors in areas adjacent to clubrooms;*
- *protecting open space including areas of significant conservation value, eg indigenous sites, endangered plants, etc, coastal vegetation and animals by developing effective management plans;*

This SLS Australia policy strongly aligns with the need to protect and manage the dunes at Umina and Ocean Beach. The local community commitment to this is reflected in that Umina SLSC at present has this important message on its web site "Keep the beach clean, put your rubbish in a bin and **keep off the dune areas**". Gosford City Council should work with the [Surf Life Saving Central Coast](#) organisation to assist them to implement the EcoSurf policy in the region ([MP 4-K](#))

The commitment to protect the dunes and their ecosystems by SLS NSW, Umina SLSC and Gosford City Council was also demonstrated in 2004, when as part of the approval to run the Surf Life Saving Carnival the three groups negotiated and committed to protecting the fragile dunes. The [Gosford City Council meeting minutes](#) show the agreement reached for the protection of the dunes included:

1. *Provision to not erect any structures over sand dune vegetation or to remove any sand dune vegetation to erect any such structures.*
2. *Provision to minimise entry from Umina Beach Club to foreshore area to three (3) openings only for vehicular access to beach area.*
3. *Provision to allow fencing in and around sand dune vegetation, along access ways and foreshore area.*
4. *Provision to have staff present at all times when Carnival is underway to prevent and/or minimise disturbance of dune vegetation.*
5. *Provision of an agreement committing remedial works necessary to reinstate the dune ecosystem after the event.*
6. *Provision for NSW SLS to outlay a security bond for any damage caused to sand dune vegetation to enable remedial work.*
7. *Provision to minimise beach area required for Carnival 2005, being the distance between the water and incipient dune (as per the agreed plan between the parties).*

5.4.5 The Esplanade Walkway

The following photo (captured from Google Maps Street view from 2009) shows the typical sand blowout that occurs at the beach entrance near Barrenjoey Road. The residents have remarked that this is an ongoing issue that causes an unsafe environment for small children on bikes and difficulties for disabled access and prams. This is also an area with a very narrow foredune that already experiences significant erosion in small storms (see evidence in the Submission Addendum Figure 17 Beach Erosion - Barrenjoey Rd - Nov 2014).



Figure 11 Sand Blowout at Barrenjoey Rd Entrance - 2009

Remodelling of this entrance and sand trapping fencing was completed in 2014, this has improved the situation (as shown below) but this should be further improved to increase beach amenity (improve the look of the entrance) and stop the sand still blowing onto this important walkway.



Figure 12 Sand Blowout at Barrenjeoy Rd Entrance - 2015

Suggestions for use of "The Esplanade" during Surf Life Saving carnivals involving both clubs should include closure of "The Esplanade" to all traffic except local residents and official vehicles between the surf clubs as this would facilitate safe transit for competitors and spectators along the existing path and roadway. This would be a low cost option to cover these peak usage situations and could be funded by the Surf Life Saving Clubs with Council support ([MP 4-C](#)).

6 Attachments / References

Open Coast and Broken Bay Beaches Coastal Processes and Hazard Definition Study

<http://www.gosford.nsw.gov.au/docs/default-source/Community/open-coast-and-broken-bay-beaches-coastal-processes-and-hazard-definition-study.pdf>

Crown Lands Act

<http://www.legislation.nsw.gov.au/xref/inforce/?xref=Type%3Dact%20AND%20Year%3D1989%20AND%20no%3D6&nohits=y>

LPMA Example Reserve Management Plans

http://www.lpma.nsw.gov.au/crown_land/crown_reserves/management/adopted_plans_of_management

1997 NSW Coastal Policy

Part A - <http://www.planning.nsw.gov.au/plansforaction/pdf/PPARTA.PDF>

Part B - <http://www.planning.nsw.gov.au/plansforaction/pdf/PPARTB.PDF>

GOSFORD CITY COUNCIL - Open Coast and Broken Bay Beaches - Coastal Processes and Hazard Definition Study

<http://www.gosford.nsw.gov.au/docs/default-source/Community/open-coast-and-broken-bay-beaches-coastal-processes-and-hazard-definition-study.pdf>

GOSFORD CITY COUNCIL - Open Coast and Broken Bay Beaches - Coastal Processes and Hazard Definition Study - Umina Ocean Beach Coastal Hazard Map

<http://www.gosford.nsw.gov.au/docs/default-source/environment-and-waste-documents/environmental-management-and-planning/umina-ocean-beach-coastal-hazard-map.pdf>

Coastal Zone Management Study – Draft - 27 Oct 2014

Not published and not available online.

Coastal Zone Management Study – Draft – 15 Jan 2015

<http://www.gosford.nsw.gov.au/about-council/general-information-rates/items-on-exhibition/draft-coastal-zone-management-study-for-the-open-coast-and-broken-bay-beaches---15-january-2015-to-15-february-2015>

Gosford City Council - Coastal Management Options Fact Sheet

<http://www.gosford.nsw.gov.au/docs/default-source/environment-and-waste-documents/environmental-management-and-planning/coastal-management-options-fact-sheet.pdf?sfvrsn=2>

Gosford City Council - Coastal Zone Management Planning Fact Sheet

<http://www.gosford.nsw.gov.au/docs/default-source/environment-and-waste-documents/environmental-management-and-planning/coastal-zone-management-planning-fact-sheet.pdf?sfvrsn=2>

Gosford City Council - Broken Bay Beaches Coastal Management Plan 1999

<http://www.gosford.nsw.gov.au/docs/default-source/environment-and-waste-documents/environmental-management-and-planning/broken-bay-beaches-coastal-management-plan.pdf?sfvrsn=2>

SEPP 71

<http://www.legislation.nsw.gov.au/viewtop/inforce/epi+816+2002+cd+o+N/>

Crown Lands Act

<http://www.legislation.nsw.gov.au/xref/inforce/?xref=Type%3Dact%20AND%20Year%3D1989%20AND%20no%3D6&nohits=y>

Express Advocate – Grant to Maintain Dunes

<http://newslocal.newspaperdirect.com/epaper/showlink.aspx?bookmarkid=LQ4NLVKJICF7&preview=article&linkid=1154582c-85af-42d2-b59d-e7e4cf7106eb&pdaffid=fITgDoN%2bsncNIRju4zoiMw%3d%3d>

Coastal Sandplain Vegetation at Brisbane Water and Broken Bay – reconstructing the past to plan for the future

www.rbg Syd.nsw.gov.au/_data/assets/pdf_file/0013/106213/Cun113Pay295.pdf

www.rbg Syd.nsw.gov.au/science/Scientific_publications/cunninghamia

Coastal Dune Management Manual

<http://www.planning.nsw.gov.au/rdaguidelines/documents/coastal%20dune%20management%20manual.pdf>

Surf Life Saving Australia - POLICY STATEMENT – ECOSurf Program

<http://www.surfrescue.com.au/docs/develop/Ecosurf%20policy%20and%20tool%20kit.pdf>

Gosford Council - ORDINARY MEETING MINUTES (2014/8) - Tuesday, 13 May 2014

<http://www.gosford.nsw.gov.au/docs/default-source/minutes-2014/minutes---13-may-2014.docx?sfvrsn=2>

Gosford Council - ORDINARY MEETING MINUTES (2004/22) Tuesday, 14 December 2004

Available from the Council on request

NSW Coastline Management Manual

<http://www.environment.gov.au/archive/coasts/publications/nswmanual/index.html>

Gosford Local Environmental Plan (LEP) 2014

<http://www.legislation.nsw.gov.au/viewtop/inforce/epi+42+2014+cd+o+N>

Gosford Development Control Plan 2013

<https://plan.gosford.nsw.gov.au/Pages/Plan/Book.aspx?exhibit=GCCPlanAug2014&hid=3086>

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Bell, S.A.J. (2004) The natural vegetation of the Gosford Local Government Area, Central Coast, New South Wales: Technical Report. Unpublished Report to Gosford City Council, April 2004. Eastcoast Flora Survey.

Bell, S.A.J. (2009) The natural vegetation of Gosford Local Government Area, Central Coast, New South Wales: Technical Report. Revised & Updated. Version 3.0. Unpublished Report to Gosford City Council, November 2009. Eastcoast Flora Survey.

Gosford Vegetation Map

<http://gems1.gosford.nsw.gov.au/vegetation/>

Gosford Council – Value of our coastline - Fact Sheet

<http://www.gosford.nsw.gov.au/docs/default-source/environment-and-waste-documents/environmental-management-and-planning/value-of-our-coastline---fact-sheet.pdf?sfvrsn=2>

Gosford Local Environmental Plan 2014 - Land Zone Mapping for LZN_016A – Umina

<http://www.legislation.nsw.gov.au/mapindex?type=epi&year=2014&no=42#>

Umina Coastal Sandplain Woodland - Listing

<http://www.environment.nsw.gov.au/determinations/UminaCoastalSandplainWoodlandEndComListing.htm>

Burgess, A. & Drover, D.P. (1953) The rate of podzol development in the sands of the Woy Woy district, NSW. Australian Journal of Botany 1: 83-94.

B.G. Thom, H.A. Polach [and] G.M. Bowman (1978) Holocene age structure of coastal sand barriers in New South Wales, Australia.

Hails, J.R. (1969) The origin and development of the Umina-Woy Woy beach ridge system, Broken Bay New South Wales, Australian Geographer 11:1-12.

Gosford City Council Design Specification for Survey, Road and Drainage works

<http://www.gosford.nsw.gov.au/docs/default-source/building-and-development-forms/design-specification-for-survey-roads-and-drainage-works.pdf?sfvrsn=0>