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WARRINGAH COUNCIL



# Coastal Erosion Emergency Action Subplan for Beaches in Warringah



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## COASTAL EROSION EMERGENCY ACTION SUBPLAN FOR BEACHES IN WARRINGAH

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### 1 INTRODUCTION

In the *Coastal Protection Act 1979*, an “emergency action subplan” is defined as that part of a coastal zone management plan that deals with the matter referred to in Section 55C(1)(b) of the Act relating to emergency action during periods of beach erosion, namely:

“A coastal zone management plan must make provision for emergency actions carried out during periods of beach erosion, including the carrying out of related works, such as works for the protection of property affected or likely to be affected by beach erosion, where beach erosion occurs through storm activity or an extreme or irregular event.”

On 31 January 2011, the NSW Minister for Climate Change and the Environment (and Minister administering the *Coastal Protection Act 1979*) issued the following directive:

“Under the provisions of section 55B of the *Coastal Protection Act 1979* (the Act), I direct Warringah Council to submit a draft emergency action subplan, as defined in the Act, in accordance with the requirements under Part 4A of the Act for the coastline that is a beach from the Narrabeen Lagoon entrance south to the headland at north end of Beach Road, known as Collaroy-Narrabeen Beach, to the Minister administering the Act by 31 July 2011”.

The investigation reported herein is an emergency action subplan for all of the sandy beaches in the Warringah Local Government Area as per Section 55C(1)(b) of the *Coastal Protection Act 1979*. Given that Collaroy-Narrabeen Beach is one of the beaches in Warringah, it also meets the requirements of the directive the NSW Minister for Climate Change and the Environment noted above, although is more expansive in geographical scope.

The document herein is set out as follows:

- the document herein has an accompanying more detailed volume entitled “Management of Coastal Erosion Emergencies at Beaches in Warringah” (WorleyParsons, 2011), as described in Section 2;
- the geographical setting for the investigation reported herein is provided in Section 3;
- background information based on WorleyParsons (2011) is given in Section 4;
- in Section 5, NSW Government guidelines for preparing emergency action subplans are described;
- in Section 6, emergency response actions of Council are outlined;
- key contact details are provided in Section 7;
- permitted emergency actions for landowners are described in Section 8;
- consultation undertaken as part of the investigation reported herein is outlined in Section 9; and,
- references are provided in Section 10.



## 2 ACCOMPANYING DETAILED REPORT

The document herein has an accompanying more detailed volume entitled “Management of Coastal Erosion Emergencies at Beaches in Warringah” (WorleyParsons, 2011). In WorleyParsons (2011), details are provided on:

- the geographical setting of beaches in Warringah;
- historical storms that have affected the study area and protective works that have been undertaken;
- previous coastal studies related to the study area;
- national and international approaches to coastal erosion emergency management;
- coastal processes affecting beaches in Warringah;
- coastline hazards at Warringah’s beaches, including delineation of Immediate and 2050 Hazard Lines;
- the NSW coastline management process;
- approvals required for implementation of protective works, for both Council and landowners;
- roles and responsibilities in coastal emergency management;
- potential emergency protection measures, including an evaluation in terms of cost, effectiveness, material sources, speed of placement, beach amenity, etc;
- the risk of damage to structures adjacent to Warringah’s beaches, with a property by property rating completed; and,
- consultation undertaken as part of the WorleyParsons (2011) study and the investigation reported herein.

The investigation reported herein was previously issued as Appendix I of a WorleyParsons report entitled “Coastal Erosion Emergency Action Plan for Beaches in Warringah” (Issue 4), that was placed on public exhibition from 25 May to 27 June 2011. During the public exhibition period, it was decided to create a separate stand-alone document including a summary of WorleyParsons (2011) as per the document herein.



### 3 GEOGRAPHICAL SETTING

As noted in Section 1, the document herein covers all sandy beaches in Warringah. These beaches are Collaroy-Narrabeen Beach, Fishermans Beach, Dee Why - Long Reef Beach, North Curl Curl Beach, South Curl Curl Beach and Freshwater Beach. Rocky cliff/bluff areas, which may have particular combined coastal and geotechnical hazards, have not been considered herein.

Private development is located immediately landward of much of Collaroy-Narrabeen Beach and the north-western portion of Fishermans Beach.

Key public assets located landward of Collaroy-Narrabeen Beach include four Surf Life Saving Clubs (North Narrabeen, Narrabeen, South Narrabeen and Collaroy). Along the south-eastern portion of Fishermans Beach, public assets include Long Reef Golf Club, car parking areas, a Warringah Surf Rescue building, and Long Reef Fishing Club Hut.

Dee Why - Long Reef Beach has public land landward of the beach along its entire length. Key public assets near the beach include Long Reef Surf Life Saving Club (SLSC) and Dee Why SLSC.

North Curl Curl and South Curl Curl Beach also has public land landward of the beach along its entire length. Key public assets near the beach include North Curl Curl SLSC, and South Curl Curl SLSC with an adjacent café.

Freshwater Beach has public land landward, with the most significant development adjacent to the beach being Freshwater SLSC, which comprises two main structures. The most seaward structure is an older SLSC building constructed in the 1930's, while the landward structure is a newer SLSC built in 1987. When the newer SLSC building was constructed, it is understood that it was agreed that the older SLSC building would be "sacrificial" (that is, not meant to be protected if threatened due to coastal erosion), with the newer SLSC building designed to be fully functioning without the older SLSC building in place.

Some private land is also located close to Freshwater Beach, but not directly adjacent to the beach (such as Pilu Restaurant), or in rocky cliff/bluff areas.



## 4 BACKGROUND INFORMATION

### 4.1 Preamble

The following is a summary of some of the more detailed background information provided in WorleyParsons (2011).

### 4.2 Need for Study

Coastal storms have caused damage to public and private property and assets in Warringah since the area was developed, particularly at Collaroy-Narrabeen Beach, Dee Why Beach, South Curl Curl Beach and Freshwater Beach. With current projections of sea level rise due to climate change, this situation is expected to deteriorate over time.

Past responses to coastal erosion events along the Warringah coastline have included the ad-hoc placement of rock walls and building waste (particularly at Collaroy-Narrabeen Beach), as well as engineered seawalls at Dee Why Beach and South Curl Curl Beach.

Warringah Council, as the local authority and land manager, is responsible for much of the day-to-day management of the beaches and Crown Land coastal areas in Warringah. As part of fulfilling its roles and responsibilities in regard to the emergency management of coastal erosion, helping to ensure that actions to be taken during storm events are planned in advance, and providing advice to relevant stakeholders, Council decided to complete the investigation reported herein and accompanying more detailed background document (WorleyParsons, 2011).

### 4.3 Historical Setting, Storms and Protective Works

Development at Collaroy-Narrabeen Beach has been damaged by coastal storms and/or emergency protective works have been implemented on numerous occasions, namely in 1920, 1925, 1944, 1945, 1967, 1974, 1998 and 2007. Most of the length of Collaroy-Narrabeen Beach south of Devitt Street at Narrabeen has existing protective works, generally buried except at times of storms.

Long Reef SLSC was threatened by inundation in 1974 storms, but has not been threatened since the establishment of a vegetated dune around the area, and stabilisation of the Dee Why Lagoon entrance.

Dee Why SLSC has no known protective works and is presumed to be on conventional foundations, and if so is at particular risk of damage from coastal erosion and inundation.

South Curl Curl SLSC has been threatened on numerous occasions, namely in 1946, 1974, 1986, 1998 and 2002. Engineered protective works were constructed seaward of South Curl Curl SLSC in 2006.

The older (seaward) Freshwater SLSC building was threatened by coastal erosion in 1974, and the older (possibly) and newer (likely) Freshwater SLSC buildings may be on piled foundations.



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Historical coastal emergency management responses (and management measures to reduce the likelihood of emergencies) in Warringah can be summarised as:

- dumping of rock and other materials to prevent property damage during storms, particularly at Collaroy-Narrabeen Beach, mostly in the 1960's and 1970's;
- constructing some development on piles (a development requirement for major structures built since about 1997 in or seaward of the Immediate Zone of Reduced Foundation Capacity);
- construction of engineered protective works at Dee Why Beach and South Curl Curl Beach;
- removing development and resuming properties as a response to damaging storms (as occurred in 1946 in the vicinity of Jenkins Street at Collaroy Beach);
- dune restoration works to establish dune vegetation and additional sand storage; and,
- relocating assets landward to reduce coastline hazard threats, as occurred at Freshwater Beach with construction of a newer landward SLSC in 1987.

### 4.4 Coastline Hazards

Immediate and Year 2050 coastline hazard lines for all beaches in the study area have been defined (at the landward edge of the Zone of Slope Adjustment), assuming an entirely sandy subsurface (that is, ignoring protective works and inerodible subsurfaces).

Assuming an entirely sandy subsurface is appropriate as it is not technically feasible to account for protective works with some but uncertain effectiveness, it is a useful planning tool as protective works may not be maintained into the future, a detailed understanding of subsurface conditions (not generally available) would be required to account for inerodible subsurface materials, areas with likely inerodible subsurfaces due to the presence of bedrock have been identified, it was agreed to do this in consultation with Council and the Office of Environment and Heritage, it is conservative to do so, and the presence of protective works was accounted for in a risk assessment for structures adjacent to Warringah's beaches herein.

Ignoring protective works, an extensive length of development is at threat from the coastline hazards of erosion and recession along Collaroy-Narrabeen Beach. This is particularly the case south of Devitt Street, with most development (about 80%) seaward of the Immediate Hazard Line, and almost all development seaward of the 2050 Hazard Line in this region. Indeed, without the protective works being in place, much of the development south of Devitt Street would have been damaged in coastal storms in the past and would be expected to be damaged in the future (with the exception of development that may be piled).

At Fishermans Beach, ignoring any potential inerodible subsurfaces that may exist in the active coastal zone, it is evident that the area between Florence Avenue and about 50m south of Ocean Grove is at particular risk.

Long Reef SLSC is well landward of the 2050 Hazard Line. At Dee Why Beach, the area immediately north of the seawall (including Dee Why SLSC) is at particular risk from coastline hazards.

At North Curl Curl Beach, ignoring protective works and rock in the active coastal zone, North Curl Curl SLSC is seaward of the Immediate Hazard Line (although is likely to be founded on rock). At South Curl Curl Beach, ignoring protective works, South Curl Curl SLSC is well seaward of the



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Immediate Hazard Line, as are parts of Carrington Avenue in the vicinity of the SLSC. At Freshwater Beach, the older SLSC is seaward of the Immediate Hazard Line.

### 4.5 Roles and Responsibilities in Coastal Emergency Management

#### 4.5.1 State Emergency Service

The role of the State Emergency Service (SES) in coastal erosion and inundation emergencies is essentially warning and evacuation of residents at risk, and lifting and/or relocating readily moveable household goods and commercial stock and equipment. These activities would be carried out in accordance with a Coastal Erosion Annex to the SES Local Flood Sub Plan (in preparation).

SES is not authorised to undertake coastal emergency protective works (such as placement of rocks or sand-filled geotextile containers) of any form.

SES use the release of a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” from the Bureau of Meteorology as a primary test of whether or not they should be involved in a potential coastal erosion (and/or inundation) event. If required (that is if an emergency developed) when neither of these warnings had been issued, it is expected that Council would call on SES for assistance in matters that SES deal with.

#### 4.5.2 Warringah Council

The carrying out (or authorising and coordinating) of coastal emergency protective works is Warringah Council’s role, if it chooses to undertake such measures to protect public assets from coastal erosion and inundation. Council does not consider it has a responsibility to protect private property.

Council could choose to undertake physical erosion protection measures to protect public assets from coastal erosion and inundation if considered to be appropriate (assuming adequate environmental assessment had been carried out and the NSW Coastal Panel had been notified).

If a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” had been released or SES was mobilised in some other manner, Council would assist SES as required and where resources permit.

If SES was not mobilised (eg if neither of the above warnings had been released by the Bureau of Meteorology), Council may undertake some of the activities that would otherwise be conducted by SES (where resources allow, although not obligated to), but note that Council cannot order evacuation. If required, Council could request SES taking on a Combat Agency role if an actual emergency was occurring.

In practice, typical tasks that Council may undertake (where required) before, during and after a coastal erosion/inundation event (besides considering the need for and potentially implementing protective works on public land) would be as discussed in Section 6.



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### 4.5.3 Office of Environment and Heritage

The Office of Environment and Heritage (OEH) is the NSW government authority responsible for advising on coastal zone management. OEH staff may also have a similar role to Council staff in assessing protective works.

### 4.5.4 Bureau of Meteorology

The release of a “Severe Weather Warning for Damaging Surf” or “Severe Weather Warning for Storm Tides” by the Bureau of Meteorology is the trigger adopted by SES for involvement in a coastal erosion/inundation episode.

A “Severe Weather Warning for Damaging Surf” is issued if waves in the nearshore zone are forecast to exceed a significant wave height of 5m (irrespective of wave period) in the next 24 hours. A “Severe Weather Warning for Storm Tides” is included if storm surge, wave setup or and/or outflow from river flooding are expected to raise ocean water levels significantly above Highest Astronomical Tide.

### 4.5.5 NSW Police

The NSW Police Force is the agency responsible for:

- law enforcement and search and rescue;
- controlling and coordinating the evacuation of victims from the area affected by the emergency in conjunction with the combat agency; and,
- being the combat agency for terrorist acts.

Some members of the NSW Police may also be appointed as Emergency Operations Controllers.

Police would typically become involved in a coastal erosion event as follows:

- assisting SES where required (for example controlling and coordinating evacuation) when SES was acting in its Combat Agency role; or,
- if SES was not mobilised, police may undertake or coordinate activities such as evacuation, barricading, removal of the contents of buildings and the like.

In either case (if SES was or was not the Combat Agency), it is possible that Police may act according to their statutory powers to protect life and property, and therefore authorise emergency protective works. However, it is expected that in making such a decision, police would need to recognise the Combat Agency’s authority (if applicable), ensure appropriate approvals are in place for any proposed works, and seek proper advice before acting (such as from a qualified engineer and Council).

### 4.5.6 Private Landowners

In essence, landowners must act well in advance of a coastal emergency, and have a certificate allowing temporarily and conditionally placed sand or sandbags (also known as sand-filled geotextile containers), or development consent for other types of works prior to placement of any works.



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Landowners are not permitted to install coastal protective works without following these procedures, and penalties may apply if they are not followed.

### 4.6 Evaluation of Emergency Protection Measures

Various emergency measures (protective works) can be considered for implementation at beaches in Warringah, assuming appropriate approvals are in place, including:

- sand-filled geotextile containers (0.75m<sup>3</sup> and 2.5m<sup>3</sup> bags were considered, which have masses of about 1.5 tonnes and 4.5 tonnes respectively);
- rock (both basalt and sandstone); and,
- concrete blocks (using both “standard” concrete and high-density concrete).

Both 0.75m<sup>3</sup> and 2.5m<sup>3</sup> sand-filled geotextile containers are unlikely to be stable as protective works, and thus cannot be expected to provide adequate protection.

The cheapest protection option out of the above list is sandstone rock, costing about \$1,000/m for toe protection and \$1,800/m for escarpment protection, with basalt rock costing about 20% to 30% more.

Concrete blocks are significantly more expensive, costing about \$2,500/m (standard mix) and \$3,700/m (high-density mix) for toe protection.

Using a commercial sand source, 0.75m<sup>3</sup> sand-filled geotextile containers would cost about \$1,200/m for toe protection and \$3,900/m for escarpment protection.

Using a commercial sand source, 2.5m<sup>3</sup> sand-filled geotextile containers are more expensive still, and would cost about \$2,700/m for toe protection and \$5,900/m for escarpment protection (if a “free” local source of sand was used, these costs would reduce by about 25%). Vandal deterrent fabric sand-filled geotextile containers would cost more still.

Rock and concrete blocks have well established and accepted design guidelines, and can be sized to provide adequate protection. Rock and concrete blocks also have much faster placement rates than sand-filled geotextile containers, and can generally be placed at times of storms. That stated, exposed rock and concrete blocks after a storm would be unacceptable, and would require removal except when they would be covered with sand during natural beach recovery.

### 4.7 Risk Assessment for Structures Adjacent to Warringah’s Beaches

Risk can be defined as likelihood multiplied by consequence. A risk assessment of all significant public and private coastal structures in Warringah has been undertaken based on:

- the likelihood of the erosion scarp caused by the 100 year ARI storm reaching the seaward face of an asset in the next 10 years (ignoring protective works and inerodible subsurfaces);
- consequence being defined as “the degree of damage to assets and surrounding property resulting from coastal erosion associated with the occurrence of a 100 year ARI storm event”, depending on the position of the Immediate Hazard Line relative to assets, whether the asset is



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supported on piles, whether there are existing protective works seaward of the asset, and the likely effectiveness of any protective works; and,

- resulting risk being discretised into five categories, namely Very High, High, Moderate, Low and Very Low.

Example of risk ratings (from south to north) include:

- older Freshwater SLSC – High;
- newer Freshwater SLSC – Low;
- Dee Why SLSC – Very High;
- Long Reef SLSC – Very Low;
- Long Reef Golf Club – Low;
- Fishermans Beach residential property structures – Very Low to Very High;
- Collaroy SLSC – Medium;
- Collaroy Services Beach Club – Very High;
- Jenkins Street to Ramsay Street Collaroy structures – Medium to Very High;
- Ramsay Street to Stuart Street Collaroy structures – High to Very High;
- Stuart Street to Wetherill Street Collaroy structures – mostly Medium;
- Wetherill Street to Clarke Street Narrabeen structures – mostly Medium;
- Clarke Street to Devitt Street Narrabeen structures – Very Low to Medium;
- Narrabeen SLSC – Very Low;
- structures north of Narrabeen SLSC – mostly Very Low (some Low); and,
- North Narrabeen SLSC – Very Low.



## 5 GUIDELINES FOR PREPARING EMERGENCY ACTION SUBPLANS

Draft NSW Government guidelines for preparing emergency action subplans were recently released (on 1 June 2011) for public consultation as Office of Environment and Heritage [OEH] (2011). In these guidelines it is stated that preparing and implementing a coastal zone management plan (CZMP) is the key long-term strategic mechanism to manage the hazards of coastal erosion and inundation at a particular location, and that an emergency action subplan forms an integral component of a CZMP.

OEH (2011) stated that in an emergency action subplan a Council's intended response to a coastal erosion emergency should be outlined, as well details being provided on how and where beachfront property owners can undertake placement of "emergency coastal protection works".

"Emergency coastal protection works" has a specific meaning in relation to the *Coastal Protection Act 1979*, generally being sand or sandbags (also known as sand-filled geotextile containers) temporarily placed on a beach to reduce beach erosion impacts. To distinguish this specific meaning from the general meaning of emergency coastal protection works in coastal engineering practice (being any works implemented to limit coastal erosion in an emergency), the specific meaning is denoted as "Part 4c sand/sandbags ECPW" herein in reference to the Section in the *Coastal Protection Act 1979* in which they are described.

In DECCW (2010), it is stated that an emergency action subplan is to describe:

- intended emergency actions to be carried out during periods of beach erosion such as coastal protection works for property or asset protection, other than matters dealt with in any plan made under the *State Emergency and Rescue Management Act 1989* relating to emergency response;
- any site-specific requirements for landowner emergency coastal protection works ("Part 4c sand/sandbags ECPW") beyond those in the *Coastal Protection Act 1979*; and,
- the consultation carried out with the owners of land affected by a subplan.

OEH (2011) noted that the following are considered key elements of an emergency action subplan:

- a clear and concise description of the emergency response actions Council would take in a coastal erosion event (see Section 6 herein); and,
- determination of the criteria or threshold that would be used to initiate actions under the emergency action subplan.

With regard to criteria or thresholds, it is considered that a prescriptive set of trigger conditions that would be used to initiate actions to undertake physical protection works are impractical to stipulate in Warringah LGA. This is because such conditions would be exceedingly complex to devise, and would still be unlikely to cover every situation. Examples of complexities include variability in storm conditions (wave height and period, wave direction, water level), state of the tide, antecedent conditions, forecasts, existing protective works, and existing structure types (in particular foundations). In the case of protective works and foundations, there may also be unknowns regarding the nature of the works.



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A more practical approach is considered to be to apply expert engineering judgement at times of storms to assess when to initiate protective works actions as required.

OEH (2011) also noted that:

- the actions outlined in an emergency action subplan should not be inconsistent with a CZMP for the same area, nor should they hinder its preparation and implementation<sup>1</sup>; and,
- the emergency action subplan should ideally be reviewed at least annually, to ensure the document and key contacts are current, along with up-to-date relevant legislation, government policies and changes to 'authorised locations' for "Part 4c sand/sandbags ECPW"<sup>2</sup>.

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<sup>1</sup> The existing 1997 *Collaroy Narrabeen Coastline Management Plan* contained a management strategy of moderate beach nourishment along with selective reconstruction of existing seawalls and infilling of gaps. The intention of Council to protect public assets in emergencies (where appropriate) does not hinder the implementation of this strategy. That stated, the future completion of Coastal Zone Management Plans for Collaroy-Narrabeen Beach and other beaches in Warringah would provide an opportunity to modify the emergency action subplan herein as required, where any inconsistencies develop.

<sup>2</sup> Note that revised subplans must be certified according to Section 55G of the *Coastal Protection Act 1979*.



## 6 EMERGENCY RESPONSE ACTIONS OF COUNCIL

### 6.1 Preamble

For Council, based on *State Environmental Planning Policy (Infrastructure) 2007*, coastal protection works can be carried out without consent on any land. Given this, Part 5 of the *Environmental Planning and Assessment Act 1979* applies to coastal protection works (emergency or long term) undertaken by Council on public or private land, unless the works can be considered to be exempt development.

If the works are not exempt development, before installing protective works it would be necessary for Council to:

- undertake an environmental assessment, either a Review of Environmental Factors or Environmental Impact Statement (the latter if significant impacts were expected); and,
- (until a Coastal Zone Management Plan is in force on the land) notify the NSW Coastal Panel before carrying out the works and take into consideration any response received from the Coastal Panel within 21 days of the notification, unless the proposed works only comprise the placement of sand or sandbags, or only replacement, repair or maintenance of works is proposed.

Council would generally be the determining authority for these works.

A number of emergency works may be considered to be exempt development under *State Environmental Planning Policy (Infrastructure) 2007*, including emergency works undertaken by Council to protect roads and stormwater management systems, as long as the works are of minimal environmental impact and structurally adequate.

### 6.2 Intended Protection Strategy for Public Assets

As noted in Section 4.5.2, Council can choose to undertake physical erosion protection measures to protect public assets from coastal erosion and inundation if considered to be appropriate (assuming adequate environmental assessment has been carried out and the NSW Coastal Panel has been notified), but is not necessarily obligated to do so. Council does not consider it has a responsibility to protect private property.

It is not possible to specifically state sites or assets that would be protected as this is subject to an environmental assessment being carried out, and would depend on the number of assets threatened in a particular emergency and the available resources of Council to respond at that time. It is also not possible to state the method of protection that would be used if required, as design concepts would need to be developed particular to the structure being considered.

However, likely sites (that may be at immediate risk) that it is the intention to protect if threatened (at least until a Coastal Zone Management Plan is in place for these areas, and subject to an environmental assessment and NSW Coastal Panel comment) may include (from south to north):

- South Curl Curl SLSC (unlikely to be necessary due to engineered protective works);
- North Curl Curl SLSC (unlikely to be necessary due to probable foundations on rock);



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- Dee Why SLSC;
- Long Reef Fishing Club hut;
- Warringah Surf Rescue building;
- car park east of Long Reef Golf Club building at Fishermans Beach;
- Long Reef Golf Club building;
- road heads at Anzac Avenue, Ocean Grove and Florence Avenue at Fishermans Beach;
- car park north of Florence Avenue at Fishermans Beach;
- Collaroy SLSC (may not be necessary due to existing protective works);
- car park north of Collaroy Services Beach Club;
- road heads along Collaroy-Narrabeen Beach (may not be necessary due to existing protective works); and,
- South Narrabeen SLSC (may not be necessary due to existing protective works).

If through the environmental assessment process it is found that protective works would be acceptable for some or all of the above or other assets (also taking NSW Coastal Panel comment into consideration), it is recommended that Council:

- completes a cost:benefit assessment of the value of protection of the relevant assets, to determine whether protection would be justified;
- completes designs and methods of works for protective actions that it is intended to undertake (where justified), based on the specific materials to be employed, cost, minimal environmental impact and practical construction methods including consideration of any existing protective works, site access issues, etc; and,
- develops a priority ranking of the order in which assets may be protected based on the relative cost:benefit of protection, to guide actions when multiple assets may be at risk at a particular time and resources may not be available to protect all of these assets.

As part of the above, consideration of the cost:benefit and intention to protect or not protect the older Freshwater SLSC should be made.

If through the above assessment process it was found that protection of some assets was intended if required, it would then be necessary for Council to:

- pre-purchase and stockpile relevant resources (materials and plant and equipment) for use in emergencies; and,
- identify appropriate personnel that would place any emergency works (internal and/or external) and ensure appropriate training or understanding of requirements for these personnel in advance of an emergency.

Note that Council does not intend to protect relatively minor assets such as dune fencing, lifeguard sheds and the like. That stated, where possible lifeguard sheds would be moved landward to prevent damage from beach erosion if required.

### 6.3 Trigger Conditions

The stages in a coastal erosion emergency can be delineated as follows:

- monitoring and pre-storm activities;



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- standby;
- mobilisation;
- standdown; and,
- restoration and clean-up.

Monitoring is the key to maximising warning time, preparedness and predictive capability in regard to emergency coastal erosion events.

Monitoring of physical environmental conditions would include weather conditions (measurements, warnings and forecasts), wave forecasts (height and direction), water level (tidal) predictions, real time wave data (height, period and direction), real time water level data (including consideration of elevated water levels due to storm surge), and beach behaviour (extent of erosion, beach width, understanding of historical beach behaviour at times of storms).

In the event of standby, it would be expected that beach areas would be inspected at least daily, particularly at high tide, where resources permit.

As noted in Section 5, it is not practical to develop a prescriptive set of trigger conditions that would be used to initiate standby or actions to undertake physical protection works. A more practical approach is considered to be to apply expert engineering judgement at times of storms to assess when to initiate protective works actions as required. This would require monitoring of beach behaviour and monitoring impending coastal storm activity. It is also expected that beachfront residents or other community members would provide early warning to Council of coastal erosion emergencies.

An information dossier (Patterson Britton & Partners, 2005) is available to assist in assessing the extent of protective works at Collaroy-Narrabeen Beach between Collaroy Services Beach Club and Devitt Street. This is designed to be able to be used in the field during emergency management situations. Relevant information on all coastal beach properties in Warringah is also included in WorleyParsons (2011).

Some of the factors to consider in potentially mobilising to install protective works would be as follows:

- features and value of the assets potentially at risk, including existing protective works and nature of foundations; and,
- extent of erosion (proximity of erosion escarpment to asset and rate of movement; signs of impending slope instability such as distortions to structures, ground depressions and tension cracks; forecast environmental conditions such as waves, water levels and rainfall<sup>3</sup>).

Standdown would be triggered when adverse conditions contributing to the emergency had ceased and all emergency works deemed necessary to mitigate coastal erosion hazards had been completed. Note that adverse conditions can persist for many days after the peak of a storm, particularly if a beach remains in an eroded state.

Following standdown of any resources mobilised for emergency works, Council would restore and clean-up property and beaches under its control. This may include the following activities:

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<sup>3</sup> Rainfall may affect groundwater conditions and stormwater outlets and their surrounds.



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- remedial works to restore safe beach access;
- beach scraping, beach sand replenishment, and/or beach sand nourishment to assist in restoration of beach amenity (generally after a storm);
- repairing damaged stormwater infrastructure;
- repairing any damage to roads; and,
- cleansing the beach of debris and other inappropriate materials.

### 6.4 Responsibility Structure Within Warringah Council

Responsibilities of the various units within Council before, during and after coastal erosion emergencies are as listed in **Table 1**. In a significant emergency requiring coordination across multiple units, Council’s General Manager may assume that coordination role.

Note that all Council units would have a responsibility to document records of decisions made and the reasoning in making those decisions (before, during and after coastal erosion emergencies).

**Table 1: Responsibilities of various units within Council in coastal erosion emergencies**

Functional Unit	Responsibilities
Natural Environment Unit	<ul style="list-style-type: none"> <li>• completing environmental assessments for locations at which new or upgraded protective works may be undertaken;</li> <li>• completing a cost:benefit assessment of the value of protection of relevant assets, to determine whether protection would be justified (in consultation with Property and Commercial Development Unit);</li> <li>• completing designs and methods of works for protective actions that it is intended to undertake, where justified;</li> <li>• developing a ranking of the order in which assets may be protected (in consultation with Property and Commercial Development Unit);</li> <li>• if found that protection of some assets would be justified, pre-purchasing and stockpiling relevant resources for use in emergencies and identifying appropriate personnel that would place any emergency works;</li> <li>• carrying out sustainable planning and management of the coastal zone;</li> <li>• preparing Coastal Zone Management Plans, including arrangements for emergency management of coastal erosion;</li> <li>• consulting with SES and other relevant agencies when developing emergency management arrangements;</li> <li>• providing SES with copies of coastal hazard and management studies to assist with emergency planning and operational intelligence systems;</li> <li>• monitoring unauthorised coastal protection works (in consultation with Compliance Unit);</li> <li>• ensuring sufficient safety signage is available to be erected at short notice;</li> <li>• monitoring physical environmental conditions (weather, wave data, water level data, beach behaviour);</li> </ul>



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Functional Unit	Responsibilities
	<ul style="list-style-type: none"> <li>• triggering standby and mobilisation for installation of protective works, as required;</li> <li>• engaging experienced coastal and geotechnical engineer where required to provide advice;</li> <li>• seeking advice from OEH staff as required</li> <li>• providing technical advice on emergency works;</li> <li>• maintaining a register of coastal protection works at properties;</li> <li>• assessing the need for safety signage and barricades to be installed to minimise risk to public safety;</li> <li>• opening slip-rail gates at authorised beach access locations if "Part 4c sand/sandbags ECPW" are to be installed;</li> <li>• rehabilitation of damaged dune vegetation;</li> <li>• beach scraping, beach sand replenishment and or sand nourishment to restore beach amenity after a storm;</li> <li>• maintaining photographic records;</li> <li>• preparing report on any emergency works installed, if required;</li> <li>• assessing and issuing (where appropriate) "Part 4c sand/sandbags ECPW" certificates submitted by landowners, and maintaining a register of certificates issued;</li> <li>• ensuring "Part 4c sand/sandbags ECPW" are implemented in accordance with certificate conditions and DECCW (2011).</li> </ul>
Community and Safety Services Unit	<ul style="list-style-type: none"> <li>• monitoring physical environmental conditions;</li> <li>• ensuring sufficient safety signage is available to be erected at short notice;</li> <li>• assessing the need for safety signage and barricades to be installed to minimise risk to public safety.</li> </ul>
Marketing and Communications Unit	<ul style="list-style-type: none"> <li>• considering need to develop a communications strategy to keep affected communities informed during an erosion emergency, and developing strategy if required;</li> <li>• releasing information to the media;</li> <li>• provision of information and advice to beachfront landowners and wider community.</li> </ul>
Roads, Traffic and Waste Unit	<ul style="list-style-type: none"> <li>• erecting barricades and safety signage if required;</li> <li>• repairing damage to roads;</li> <li>• repairing damaged stormwater infrastructure in consultation with Natural Environment Unit;</li> <li>• cleansing the beach of debris and other inappropriate materials.</li> </ul>
Parks, Reserves and Foreshores Unit	<ul style="list-style-type: none"> <li>• erecting barricades and safety signage if required;</li> <li>• restoring damaged dune fencing and beach accessways in consultation with Natural Environment Unit;</li> </ul>



## COASTAL EROSION EMERGENCY ACTION SUBPLAN FOR BEACHES IN WARRINGAH

Functional Unit	Responsibilities
	<ul style="list-style-type: none"> <li>remedial works to restore safe beach access.</li> </ul>
Compliance Unit	<ul style="list-style-type: none"> <li>enforcement of the <i>Coastal Protection Act 1979</i> (monitoring unauthorised coastal protection works) in consultation with Natural Environment Unit;</li> <li>monitoring unauthorised coastal protection works.</li> </ul>
Strategic Planning Unit	<ul style="list-style-type: none"> <li>updating Section 149 certificates to include information on properties with "Part 4c sand/sandbags ECPW".</li> </ul>
Property and Commercial Development Unit	<ul style="list-style-type: none"> <li>completing a cost:benefit assessment of the value of protection of relevant assets, to determine whether protection would be justified (in consultation with Natural Environment Unit);</li> <li>developing a priority ranking of the order in which assets may be protected (in consultation with Natural Environment Unit);</li> <li>where possible and safe to do so, moving lifeguard sheds landward if it is likely a shed will be damaged during a period of beach erosion.</li> </ul>

Note that the above shows the responsibility structure within Council, which would remain the same whether SES was or was not mobilised.

It should also be noted that if SES was mobilised, Council has a Local Emergency Management Officer (LEMO). A LEMO is appointed under Section 32 of the *State Emergency and Rescue Management Act 1989*, in which it is stated that "A council is to provide executive support facilities for the Local Emergency Management Committee and the Local Emergency Operations Controller in its area. The principal executive officer is to be known as the Local Emergency Management Officer".

In the Manly, Warringah and Pittwater Local Government Areas, the Local Emergency Operations Controller (also known as LEOCON) is a Senior Member of the Police Service stationed in the Manly, Warringah and Pittwater area. The functions of the LEOCON are described in Section 31 of the *State Emergency and Rescue Management Act 1989*.



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### 7 KEY CONTACT DETAILS

- State Emergency Service (SES), telephone 132 500  
Local Controller: Mr Wayne Lyne (mobile 0412 656 484)
- Local Emergency Operations Controller (LEOCON)
  - Police Service Local Area Commander, telephone 9971 3399 (Dee Why Police Station)
  - alternate LEOCON: Manly Police, telephone 9977 9499
- Local Emergency Management Officer (LEMO) is Mr Ross Picard (Warringah Council), telephone 9942 2527, facsimile 9942 2448 and mobile 0419 684 084
- Deputy LEMO is Mr Tony Walmsley (telephone 9942 2761, mobile 0407 403 754)
- Warringah Council units:
  - Office of the General Manager: Mr Rik Hart (General Manager), telephone 9942 2327
  - Natural Environment Unit: Mr Daylan Cameron (Senior Environment Officer, Natural Hazards), telephone 9942 2718, mobile 0419 264 645
  - Roads, Traffic and Waste Unit: Mr Ross Picard (Team Leader Roads Drainage Maintenance and Construction), telephone 9942 2527, mobile 0419 684 084
  - Parks, Reserves and Foreshores Unit: Mr Scot Hedge (Team Leader Business Development), telephone 9942 2724, mobile 0417 486 955
  - Community and Safety Services Unit: Mr Clint Rose (Coordinator Beach Services), telephone 9942 2644, mobile 0408 469 269
  - Property and Commercial Development Unit: Mr Adam Vine (Business and Risk Manager), telephone 9942 2684, mobile 0407 247 876
  - Strategic Planning Unit: Mr David Kerr (Manager), telephone 9942 2768, mobile 0407 431 071
  - Marketing and Communications Unit: Mr Graham Middleton (Manager), telephone 9942 2590, mobile 0418 261 601
- Warringah Council general switch telephone 9942 2111



## 8 PERMITTED EMERGENCY ACTIONS FOR LANDOWNERS

For landowners, there are two options available for coastal protective works, namely:

- temporarily and conditionally placed sand or sandbags (also known as sand-filled geotextile containers), denoted herein as “Part 4c sand/sandbags emergency coastal protection works [ECPW]” based on the specific Section in the *Coastal Protection Act 1979* in which they are described; and,
- long term protective works and other forms of emergency protective works that are not “Part 4c sand/sandbags ECPW”.

Although permissible under the *Coastal Protection Act 1979*, “Part 4c sand/sandbags ECPW” sandbag works can not be recommended for use given lack of stability and difficulty in placement at times of storms. Also, a relatively low cost:benefit ratio is likely for sand placement for “Part 4c sand/sandbags ECPW”.

The “Part 4c sand/sandbags ECPW”:

- can only be placed at limited locations in Warringah (at Collaroy-Narrabeen Beach only, and only in areas without existing protective works, that is north of Devitt Street, at the lot south of Clarke Street, and between Ramsay Street and Stuart Street for private landowners);
- must be placed in accordance with the requirements of a *Code of Practice under the Coastal Protection Act 1979* and any specific requirements in an Emergency Action Subplan as per WorleyParsons (2011) or its subsequent versions;
- can only be deployed on land with a building lawfully used for residential, commercial or community purposes, where the erosion escarpment is within 20 metres of the most seaward wall of the building;
- must not be placed until a certificate (which is valid for 2 years) is obtained from the NSW Office of Environment and Heritage or Council and a fee (currently \$110) is paid;
- can only be placed once on a particular parcel of land;
- can only use externally sourced sand (sand must not be taken from a beach or a sand dune adjacent to a beach, which includes Narrabeen Lagoon for example);
- must not be placed at any location where other coastal protection works exist;
- can not be excavated into the beach or erosion escarpment;
- can not be placed at a steeper slope than 34 degrees from the horizontal;
- must have surrounding safety fencing installed when being placed; and,
- can generally not be placed during storm conditions.

Note that there is no requirement to submit a Development Application (DA) for “Part 4c sand/sandbags ECPW”.

If sandbags (sand-filled geotextile containers) are used as “Part 4c sand/sandbags ECPW”:

- the height of the works must not exceed 1.5 metres from the base (toe) of the escarpment;
- the works must be placed within 4m from the escarpment on the seaward side;



## COASTAL EROSION EMERGENCY ACTION SUBPLAN FOR BEACHES IN WARRINGAH

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- there are to be no voids on any exposed faces of the works, or between the works and the escarpment, of a size that may present a public safety risk;
- they are to be manufactured from geotextiles or woven polypropylene fabric with specified minimum standards and have a maximum volume of 0.75m<sup>3</sup> when filled;
- they must be sewn or tied closed before placement;
- if the works are not installed correctly they must be relocated or removed;
- works damaged by storms are to be repaired or removed as soon as practicable after the storm ceases;
- the works must be placed and removed (with restoration of land) within 12 months (or longer if a DA is lodged for longer term or alternate temporary coastal protection works) and penalties may apply if they are not removed; and,
- to remove sandbags from the beach they are to be opened and the sand distributed on the beach, resulting in a reasonably even beach terrain, with emptied sandbags removed from the beach.

If sand is used as “Part 4c sand/sandbags ECPW”:

- sand must be placed against the erosion escarpment on the seaward side, and extend no higher than the escarpment;
- the sand must be free of contaminants and mainly composed of silica, with a median grain size between 0.15mm and 0.5mm;
- the colour of the sand must be a similar colour to the native surrounding sand;
- if the sand is obtained from a sand supplier, a written statement must be obtained from the supplier certifying that the sand meets the specified requirements; and,
- there is no requirement to remove the placed sand after 12 months.

*A Guide to the Statutory Requirements for Emergency Coastal Protection Works* has been released to assist beachfront landowners in understanding the requirements for placing “Part 4c sand/sandbags ECPW”. No specific additional requirements for “Part 4c sand/sandbags ECPW” have been included herein.

If landowners were considering placement of “Part 4c sand/sandbags ECPW” it is emphasised that they must act well in advance of a storm: obtaining a certificate, pre-purchasing and stockpiling relevant resources, gathering knowledge of relevant plant and equipment suppliers, and identifying appropriate personnel to place the works.

For long term protective works and other forms of emergency protective works that are not “Part 4c sand/sandbags ECPW”, landowners are not specifically restricted in terms of the materials that can be used and the designs that can be employed.

However, for these general works, consent is required under *State Environmental Planning Policy (Infrastructure) 2007*, and Part 4 of the *Environmental Planning and Assessment Act 1979* would apply to the works. Therefore, before installing general protective works it would be necessary for landowners to:

- undertake an environmental assessment, either a Statement of Environmental Effects or Environmental Impact Statement (the latter if significant impacts were expected); and,
- lodge a Development Application (DA) with a consent authority.



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Until a Coastal Zone Management Plan is in force on the land, the NSW Coastal Panel is the consent authority.

Issues considered by the consent authority in assessing the DA would be expected to include public access issues, effects on beach amenity, and the likely impact of coastal processes and coastal hazards on the development and any likely impacts of the development on coastal processes and coastal hazards.

Satisfactory arrangements must also be made (by conditions imposed on the consent) for restoration of areas impacted (due to increased erosion) by the works, and maintenance of the works. These arrangements include securing adequate funding for these activities by legally binding obligations (such as a bond) and/or by payment to Council of an annual charge for coastal protection services.



## 9 CONSULTATION

As described in more detail in WorleyParsons (2011), extensive consultation has been undertaken with Warringah Council, OEH, SES and Bureau of Meteorology staff.

Two public forums have also been held (in August 2010 and June 2011), and a previous version of the investigation reported herein was placed on public exhibition from 25 May to 27 June 2011.

A total of 18 written submissions were received in response to the public exhibition and June 2011 public forum, as discussed in WorleyParsons (2011).



## 10 REFERENCES

Department of Environment, Climate Change and Water [DECCW] (2011), *Code of Practice under the Coastal Protection Act 1979*, DECCW 2011/0223, March, ISBN 978 1 74293 211 8

Office of Environment and Heritage [OEH] (2011), *Coastal Zone Management Guide Note, Emergency Action Subplans, Consultation Draft*, ISBN 978-1-74293-257-6, OEH 2011/0394, May

Patterson Britton & Partners (2005), "Collaroy/Narrabeen Beachfront Property Information Dossier", April

WorleyParsons (2011), *Management of Coastal Erosion Emergencies at Beaches in Warringah*, Issue No. 5, 13 July, for Warringah Council