

NSW STATE STORM EMERGENCY SUB PLAN EMERGENCY PLANNING IN THE COASTAL ZONE

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Cherie Parmenter¹, Nicholas Kuster¹, Belinda Davies¹ Phil Watson²

¹NSW State Emergency Service (NSW SES)

² NSW Office of Environment and Heritage (OEH)

Abstract

The latest version of the NSW State Storm Emergency Sub Plan has recently been authorised by the State Emergency Management Committee under the provisions of the NSW State and Emergency and Rescue Management Act 1989 (as amended). The Storm Plan sets out the prevention, preparation, response and initial recovery arrangements for storms, and covers arrangements relating to severe weather events which may cause strong winds, hail, snow, heavy rain, coastal flooding or erosion resulting from large waves and storm surges.

This paper presents the roles and responsibilities of the NSW SES and participant agencies in relation to emergency prevention, preparation, response and recovery to storms and coastal erosion in NSW.

Introduction

Storms are defined within the NSW State Storm Plan (Storm Plan) (NSW Government, 2013) as weather events accompanied by wind, tornadoes, intense rain, hail, snow or marine wave or water action of sufficient severity to threaten lives and cause damage to property, vehicles, infrastructure, vegetation and the coastal environment. Whilst data from Australia's most recent natural disasters is still being compiled, the Insurance Council of Australia currently lists the Sydney Hailstorm of 1999 as our most costly natural disaster (in terms of insurance losses based on normalised 2011 figures) (ICA, 2013). Between 1824 and 2007, storms killed over 770 people in Australia (Middleman, 2007). The storm that hit the central coast and Newcastle during 2007 led to the death of nine people as a result of flash flooding, the collapse of roads, and falling trees. It also caused the grounding of the bulk carrier, the Pasha Bulker on Nobbys Beach (Watson, et al., 2007; ABS, 2010).

Many different types of weather systems can produce storms which cause danger, damage and disruption in New South Wales (NSW). These include thunderstorms, tornadoes, tropical and ex-tropical cyclones, low pressure systems, cold fronts and snow (NSW Government, 2013).

In NSW, low pressure systems associated with tropical cyclones, ex-tropical cyclones and east coast lows can cause some of the largest impacts to the coastal zone. The lowering of barometric pressure, combined with strong winds, known as 'storm surge', can lead to the elevation of ocean water. This in turn can lead to coastal erosion along beaches and coastal inundation as wave run-up overtops dunes and coastal barriers (BOM, 2013). The worst impacts to the coastal zone can occur when large waves coincide with elevated ocean water levels (in particular high tides), or is exacerbated by flooding from coastal rivers (BOM, 2013).

Major coastal erosion events have occurred along the NSW coast throughout history, with some dramatic instances of houses being lost during storms (Hanslow & Gissing, 2007; Hanslow & Howard, 2005). The entire township of Sheltering Palms near Brunswick Heads was abandoned following a number of storms in the 1970's with 17 houses purchased by the Government's Coastal Lands Protection Scheme (Fitzgibbon

& Barham, 2008). As with Sheltering Palms, coastal erosion events in NSW have tended to reoccur in the same areas over time, meaning that the location of these coastal erosion 'hotspots' is well known and documented (OEH, 2013a).

The historical response to storm erosion events at these locations has included the ad hoc placement of mitigation works ranging from sandbags and rock walls, through to dumping of building waste and car bodies (Hanslow & Howard, 2005). These structures have often been found to be ineffective at reducing coastal erosion, and have left long lasting adverse effects on beaches including loss of beach amenity and exacerbation of erosion on neighbouring properties (Hanslow & Howard, 2005; Hanslow & Gissing, 2007).

In response to concerns at the time regarding the ongoing degradation of beach amenity, the *Coastal Protection Act, 1979* was amended in 2002 to improve powers to direct Local Government Councils (councils) to prepare Coastal Zone Management Plans (CZMP). These CZMPs were required to include provision for emergency actions that may be undertaken during periods of beach erosion, including carrying out of related works (Hanslow & Howard, 2005).

The NSW State Storm Plan (Storm Plan) (NSW Government, 2013) is the primary document covering the emergency management arrangements for storms in NSW. CZMPs and Coastal Erosions Emergency Action Sub Plans (EAPs) are prepared under different legislation, however reference the arrangements and responsibilities described in the Storm Plan.

Previous joint papers by Hanslow and Gissing (2007) and Hanslow and Howard (2005) both examined the arrangements for emergency management of coastal erosion in NSW. Since these papers were written Stage 1 NSW Coastal reforms have led to further changes to the *Coastal Protection Act, 1979* (OEH, 2013b). These include changes which permit landholders to more readily place temporary coastal protection works to reduce the erosion threat to their properties in specified areas ('Authorised Locations') and in accordance with specific requirements outlined in the *Code of Practice under the Coastal Protection Act 1979* (OEH, 2013b; OEH, 2013c). The Stage 2 Coastal reforms are also currently progressing, and will lead to further changes to coastal erosion management in NSW (OEH, 2013b).

This paper presents the current roles and responsibilities of the NSW SES and participant agencies in relation to the emergency management of storms and coastal erosion in NSW.

Key Emergency Management Principles in NSW

The key principles applied to emergency management in NSW are based on a comprehensive approach of prevention, preparation, response and recovery (PPRR) (NSW Government, 2012). These principles, as described in the NSW State Emergency Management Plan (EMPLAN) involve:

- **Prevention:** to eliminate or reduce the level of the risk or severity of emergencies
- **Preparation:** to enhance capacity of agencies and communities to cope with the consequences of emergencies
- **Response:** to ensure the immediate consequences of emergencies to communities are minimised
- **Recovery:** measures which support individuals and communities affected by emergencies in the reconstruction of physical infrastructure and restoration of physical, emotional, environmental and economic well being.

The benefit of this approach is that it ensures that a variety of agencies and organisations bring together their expertise and knowledge in a coordinated way to deal with all aspects of the emergency.

Legislative and Planning Framework in the Coastal Zone

NSW Emergency Management Arrangements

The NSW emergency planning framework (Figure 1) is established by the *State Emergency and Rescue Management Act 1989* (SERM Act). This Act provides the legislative basis for the preparation of the EMPLAN. This is an all hazards plan detailing the emergency preparation, response and recovery arrangements for NSW in order to ensure the coordinated response to emergencies by all agencies (NSW Government, 2012).

The framework for emergency planning in NSW requires the creation of state level sub-plans under EMPLAN for specific hazards including storm, floods and tsunami for which the NSW State Emergency Service (NSW SES) is the combat agency. The framework also requires the creation of all hazards emergency plans (previously disaster plans) at emergency management regional and local government levels. The *State Emergency Service Act, 1989* (SES Act) provides statutory direction for emergency planning by the NSW SES within this framework.

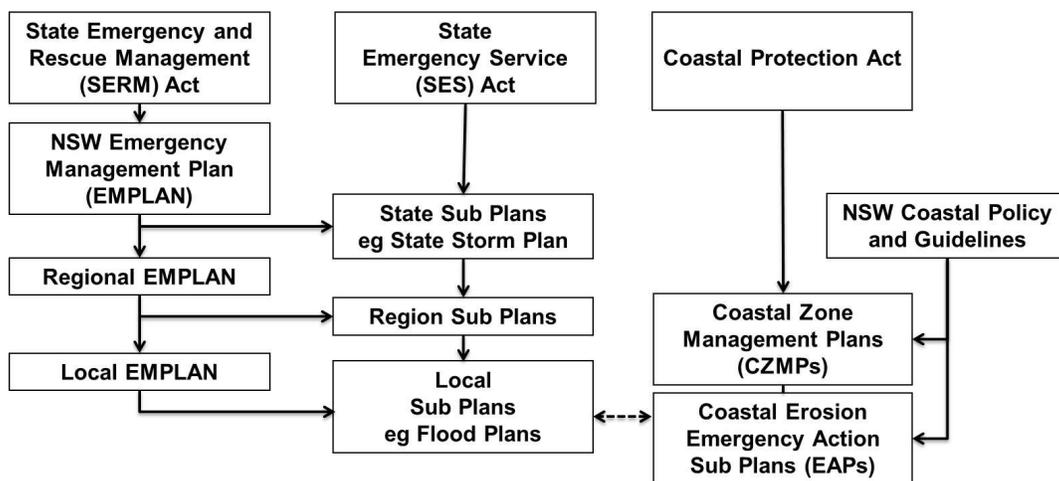


Figure 1: Simplified legislative framework for emergency management in NSW and its relationship with coastal legislation and plans regarding coastal erosion (Modified from Hanslow and Gissing (2007) and Hanslow and Howard (2005) to reflect current arrangements)

Emergency response and recovery operations are conducted at the lowest level of effective coordination, starting at the local level in the first instance, but progressing up to regional and state levels as required by the scale of the emergency (NSW Government, 2012).

As per EMPLAN, Storm Plan sets out the prevention, preparation, response and recovery arrangements for storm activity and outlines the roles and the responsibilities of agencies and organisations involved. It also links to the responsibilities of local government councils under the *Coastal Protection Act, 1979* in relation to coastal erosion.

As storms are inherently difficult to predict, and given that the emergency arrangements for storms do not generally change below the state level, there are no local Storm sub plans. In comparison, it is much easier to plan for floods in specific

localities. There are 131 Local Flood Sub Plans (Local Flood Plans), primarily based on risk and generally aligned to council areas across the state. Due to the nature of coastal erosion events normally occurring at known 'hot spot' locations along the NSW coast, they are one aspect of storm events that can be pre-planned at a local level. The emergency management arrangements for coastal erosion and inundation at specific localities are therefore currently included within the relevant coastal Local Flood Plan. This helps to ensure that the response to coastal erosion can be coordinated at the local level in the first instance.

As was outlined by Hanslow and Gissing (2007), the legislative and policy framework associated with coastal erosion emergency response links both land management and emergency management frameworks (Figure 1). The *Coastal Protection Act, 1979* sets out minimum requirements for Councils preparing CZMPs, which amongst other things drives the strategic, long-term response to addressing coastal erosion risks. These minimum requirements also include preparing Coastal Erosion Emergency Action Sub Plans (EAPs) which detail the actions council will take to mitigate erosion threats along beaches during an emergency. EAPs also detail where and under what conditions landowners can place Temporary Coastal Protection Works. CZMPs and EAPs need to be consistent with, and not duplicate the arrangements within NSW SES sub plans, however EAPs should make reference to them.

Roles and Responsibilities under NSW State Storm Plan

NSW State Emergency Service

As the combat agency for storms, the NSW SES is responsible for the protection of persons from danger to their safety and health, and for the protection of property from destruction or damage arising from storms (NSW Government, 2013). This role includes planning for emergency response and assisting the community to prepare for storms increasing their resilience to their impacts. The NSW SES does this through the development of plans, community education and awareness programs, and warning products.

The NSW SES is also responsible for the coordination of the emergency response to storms including reconnaissance, warning, evacuation, property protection, rescue and resupply. However, its role in property protection for coastal erosion and inundation only includes the protection of readily moveable household and business contents (if time and resources permit), and where practicable, the coordination of the sandbagging of properties at-risk of flooding from coastal inundation.

The NSW SES is not responsible for controlling, coordinating or conducting any physical mitigation works to protect properties or structures at risk from coastal erosion, either during or outside the period of storm activity. This includes, but is not limited to, the placement of rocks or other materials on beaches or foreshore areas, and the construction of temporary walls made of sandbags, geotechnical tubes or other materials. The NSW SES also has a role in ensuring that initial recovery operations are commenced, and that any recovery committee established is appropriately briefed.

The Australian Government Bureau of Meteorology

The Australian Bureau of Meteorology (the Bureau) is responsible under Storm Plan for providing the NSW SES with warnings of potential and ongoing storm activity (NSW Government, 2013). The Bureau also distributes these warnings to a range of media outlets, and makes them available to the general public on their Internet site. This includes issuing storm warnings when storm surge and large waves (equal to or exceeding 5m height in the surf zone) could potentially lead to coastal erosion. The Bureau is obligated to include NSW SES safety messages within their weather warnings.

Local Government Councils

Local government councils (councils) have a range of preparation responsibilities under Storm Plan (NSW Government, 2013). These include contributing to community storm education initiatives, and assisting the NSW SES with community awareness programs to ensure people in locations potentially threatened by coastal erosion understand the threat and its management.

Storm Plan outlines council responsibilities for the preparation and maintenance of CZMPs and EAPs in accordance with the *Coastal Protection Act, 1979*. Storm Plan also requires that councils ensure that they consult with the NSW SES and other agencies when developing these plans.

Subject to the availability of resources, councils have responsibilities in relation to assisting the NSW SES with responding to storm emergency events. This assistance can include things such as reconnaissance, traffic management on council managed roads, and clearing of debris from roads and public places.

Councils are responsible for distributing warnings to beachgoers (where life guard services are provided by council) and closing beaches when dangerous surf conditions are present.

In relation to coastal erosion and inundation, councils have a role in the installation of temporary fencing and/or signage to protect the public against unsafe conditions caused by erosion. Under Storm Plan, the responsibility for undertaking any protection works deemed necessary to combat erosion along beaches is vested in local councils as detailed in their CZMPs and EAPs.

Where fencing, signage and/or temporary emergency works have been installed by Council in response to coastal erosion and/or inundation events, they are also responsible for removing these or mitigating their impacts. If resources allow, councils may assist the NSW SES with the protection of readily moveable household and business contents from properties in areas where coastal storms are likely to result in coastal erosion and/or inundation.

NSW Office of Environment and Heritage

Under Storm Plan, the NSW Office of Environment and Heritage (OEH) have an advisory role to the NSW SES and councils in relation to those areas subject to coastal erosion and/or inundation (NSW Government, 2013). It is also responsible for providing advice in relation to coastal management. This includes procedures for addressing coastal hazards, coastal processes and risks, management options and coastal policies.

NSW Police Force

Under Storm Plan the NSW Police Force are responsible for assisting with evacuations, controlling search and rescue operations, traffic management, assisting with reconnaissance, coordinating security of evacuated and damaged areas and providing specialist response teams to assist the NSW SES (NSW Government, 2013).

Under SERM Act a Local Emergency Operations Controller (LEOCON), may sometimes assume the responsibility for an emergency occurring in an area instead of a combat agency depending on the circumstances. Generally this occurs where no combat agency exists for the particular emergency. As with the NSW SES, neither the NSW Police Force, nor the LEOCON is responsible for controlling, coordinating or conducting any physical mitigation works to protect properties or structures at risk from coastal erosion.

Surf Life Saving NSW

Surf Life Saving NSW plays an important role in distributing advice contained in weather warnings to people on beaches where dangerous surf conditions are predicted. They are also responsible for closing these beaches should conditions be considered too dangerous (NSW Government, 2013).

Other Agencies

There are a large number of additional supporting agencies and functional areas listed under Storm Plan not covered by this paper that also play vital roles in the prevention, preparation, response and recovery aspects of storm emergencies. Further information about these is provided within Storm Plan (NSW Government, 2013).

Emergency Management of Coastal Erosion in NSW

NSW Coastal Reforms

The NSW Coastal Reforms are a two stage process. The first stage is now complete and included legislative amendments to the *Coastal Protection Act 1979*, which came into effect in January 2013 (OEH, 2013b). These regulatory changes give councils flexibility to consider coastal hazards in the context of their local circumstances. They also allow property owners to more readily place sand or sand filled geotextile bags as a temporary measure to reduce their coastal erosion threat (OEH, 2013b; OEH, 2013c).

The current Stage 2 reforms have a more strategic focus and, are intended to achieve the following: establish a simpler and more integrated legal and policy framework for coastal management; provide improved guidance and technical advice to councils; and identify potential funding options, particularly to implement coastal asset management strategies (OEH, 2013b).

Permanent Coastal Erosion Protection Works

The purpose of CZMPs is to describe the proposed actions to be implemented by a council, and others to address priority management issues in the coastal zone over a defined implementation period (OEH, 2013d). These actions can include, among other things, the installation of mitigation works to protect properties from coastal erosion. These mitigation works can be permanent fixtures, temporary works installed by councils during an emergency, or else temporary works installed by beachfront property owners.

Division 25 of SEPP (Infrastructure) (NSW Government, 2007) makes provision for the consideration and approval of permanent coastal erosion protection works. The approval process varies depending on whether the proposed works are being undertaken by a public authority or other persons and whether there is an existing CZMP pertaining to the area of interest.

Works installed by Councils in response to a Coastal Erosion Emergency

The purpose of Coastal Zone EAPs is to outline Councils intended response to a coastal erosion emergency. Councils may consider making provisions within these EAPs for the installation of works in response to a coastal erosion emergency. The details of any proposed works that might be installed by Councils need to be clearly outlined within the EAP. Any such mitigation works also need to be carefully considered, pre-planned and if at all possible, installed prior to an erosion event developing. This pre-planning needs to include organising materials, access permissions, undertaking necessary environmental assessments and obtaining appropriate development approvals prior to any works being installed (OEH, 2011).

Temporary Coastal Erosion Protection Works installed by Property Owners

In addition to outlining the physical response of a council to an erosion emergency, EAPs must also outline where and under what local conditions beachfront property owners can place temporary coastal protection works in accordance with provisions of the *Coastal Protection Act 1979*. The locations where temporary coastal protection works are able to be installed are known as 'authorised locations' (OEH, 2013a; OEH, 2013e)

Recently the NSW SES has released a *Coastal Erosion StormSafe Guide* (NSW SES, 2013) for landholders, available on the NSW SES StormSafe website through www.ses.nsw.gov.au. This guide was developed in close association with OEH, and assists beachfront property owners to understand the requirements for both permanent and temporary coastal protection works. It also includes information on who they should contact for further information and approvals, and what actions they can take in response to coastal erosion threats before, during and after storm events.

Temporary coastal protection works must be constructed in accordance with the *Code of Practice under the Coastal Protection Act 1979* (OEH, 2013a) and the *Guide to the Statutory Requirements for Temporary Coastal Protection Works* (OEH, 2013e). These documents include strict requirements on the location, timing, materials, and construction methods to be used, as well as insurance liability requirements. Property owners subject to coastal erosion can construct these works on their own property, but must notify their council that they have done so. If they intend to install them on public land such as beaches they will first need to obtain a certificate under the *Coastal Protection Act 1979* from their council or OEH to allow them to use the land for this purpose (OEH, 2013e).

If these temporary coastal protection works have not been constructed according to the relevant requirements; they have been left in place for too long; are causing erosion elsewhere; or there are safety concerns; Authorised Officers from public authorities are able to order that these works be removed (OEH, 2013e).

As with other physical mitigation works to reduce coastal erosion risks, temporary erosion protection works need to be pre-planned well before a coastal erosion storm event develops. Landowners are not allowed to install these works during storm conditions unless they have obtained a written opinion from a professional coastal engineer that states that it is safe to do so (OEH, 2013e).

As stated previously, neither the NSW SES, the LEOCON, nor the NSW Police have any role in controlling, coordinating or constructing these coastal erosion protection works (NSW Government, 2013).

Discussion

Storms can have a serious impact on NSW coastal communities. Emergency management arrangements in NSW are well established to deal with a variety of natural disasters. The benefit of these arrangements is that they draw together the specialist knowledge and experience of a large number of agencies and organisations in a coordinated way. This allows them to help prevent or reduce impacts, prepare for emergencies, respond to them when they do occur and assist communities to recover.

The arrangements under Storm Plan involve a large number of agencies and functional support areas including, but not limited to the NSW SES, councils, the Bureau of Meteorology, OEH and Surf Life Saving NSW. These organisations all play key roles in the overall emergency response to storm events. By outlining their responsibilities under Storm Plan, each agency is able to understand, agree to and plan their response prior to an emergency situation.

In the past, there has been some confusion regarding the role of emergency services in relation to protecting properties from coastal erosion events. There has previously been some expectation from the community, as well as other agencies that the NSW SES or the LEOCON would assist property owners to construct emergency works to protect their houses during coastal erosion events (e.g. Byron Bay). Under Storm Plan the NSW SES is responsible generally for property protection during storms. However, where there is a coastal erosion emergency this role specifically excludes the controlling, coordination and construction of physical mitigation works to protect properties or structures at risk of coastal erosion. Rather, the CZMPS and EAPs overseen by councils make provision for emergency actions that may be undertaken during periods of beach erosion, including carrying out of related works where they have been deemed to be appropriate.

If beachfront property owner's buildings are at threat of collapse due to coastal erosion, the NSW SES will respond by evacuating people from their properties, and/or rescuing them if required. Where resources and time permits, the NSW SES may also assist property owners to protect their readily moveable household and business items. Sometimes coastal erosion can be caused by wave energy associated with storms that are occurring far out to sea where severe weather is not actually occurring locally. Where these storms results in a coastal erosion or inundation emergency, the NSW SES would respond to protect lives and property as outlined above, even if no warning has been issued by the Bureau, provided that it has sufficient resources available to do so.

As discussed in Hanslow and Gissing (2007), the intent of the NSW coastal management process has always been to provide for the long term sustainable management of the coast by avoiding the need to undertake emergency works. This fits well within the emergency management principles of NSW as outlined in EMPLAN, which encourage prevention and preparation as a way of minimising the need for emergency response and recovery operations.

The likely location of future coastal erosion events along the NSW coast is generally well known, therefore any necessary physical mitigation works, or other strategies to address coastal erosion issues can be planned for at the local level through the CZMP and EAP process. The requirements for the materials and construction of any physical mitigation works implemented as part of these plans are quite specific (OEH, 2013a; OEH, 2013e), and therefore any such works must be planned well in advance of a storm event. It is envisaged that this pre-planning will assist in the prevention of further ad hoc works being placed on beaches in the future such that beach environments, beach amenity and access can be preserved.

CZMPs and EAPs should also take into consideration projected climate change impacts on risks from coastal hazards (OEH, 2013d). Climate change is expected to result in increased coastal erosion and inundation as extreme weather events become more frequent, storm intensity increases and sea levels rise (IPCC, 2012; DCC, 2009). In their report on the risks of climate change to coastal buildings and infrastructure in Australia, the Commonwealth Department of Climate Change and Energy Efficiency estimated that between 44,000 and 68,000 residential buildings in NSW are at risk of inundation and shoreline recession by the year 2100 based on a projected upper limit sea level rise of 1.1m (DCCEE, 2011). Significant additional impacts were also described for commercial buildings and infrastructure in coastal NSW. Avoidance of future risk, or prevention strategies by councils and coastal landowners, are expected to be the most effective adaptation to climate change predictions, particularly in coastal areas that have not yet been developed (DCC, 2009).

Increasing population growth in coastal communities, and ageing coastal infrastructure, will force large changes in how the coastline will be managed in response to sea level rise and shoreline recession. Council and OEH's contribution to prevention of future

coastal erosion risk through the implementation of CZMPs will be a key driver to reduce future risk in the coastal areas of NSW.

The NSW Emergency Management framework covers the full range of preparation and response scalable for local, regional or state level emergencies. Emergency management agencies such as the NSW SES are therefore already able to adapt to climate change provided that the resources they have available are sufficient.

The successful execution of emergency management responsibilities under Storm Plan and CZMPs to deal with Storm events in the coastal zone of NSW is dependent on the continuing development of strong, cooperative relationships between the organisations involved in their implementation, as well as with the broader community. It is also dependant on a coordinated and sustainable approach to coastal zone management.

Conclusion

The Emergency Management arrangements set out within the NSW State Storm Plan coupled with the coastal erosion management arrangements set out within Coastal Zone Management Plans (CZMPs) and their associated Emergency Action Sub Plans (EAPs) provide a comprehensive approach to dealing with storm emergencies in NSW. The implementation of these plans is dependent on strong cooperative relationships with the organisations involved as well as with the broader community.

The NSW SES is responsible for the protection of life and property from destruction or damage during storm events. However, in relation to coastal erosion, this role does not extend to the control, coordination or construction of physical mitigation works. Provisions for any such works (if deemed appropriate) are provided for under CZMPs and EAPs, primarily overseen by councils.

It is envisaged that the preparation and response strategies outlined under Storm Plan, together with the implementation of preventative and mitigation measures by way of CZMPs, will reduce the need to undertake emergency works in response to future coastal erosion events. This will help to provide for the long term sustainable management of the NSW coastline into the future.

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