

Hawarra (Wollongong City, Shellharbour City and Kiama Local Government Areas)

Loca Flood Plan







ILLAWARRA FLOOD EMERGENCY SUB PLAN

A Sub Plan of the Local Emergency Management Plan (EMPLAN)

Volume 1 of the Illawarra Local Flood Plan for Wollongong City, Shellharbour City and Kiama Local Government Areas

Endorsed by the Local Emergency Management Committee

1 June 2022



The Illawarra Flood Emergency Sub Plan is a sub plan of the Illawarra Local Emergency Management Plan (EMPLAN). It has been prepared in accordance with the provisions of the *State Emergency Service Act 1989* (NSW) and is endorsed by the Local Emergency Management Committee in accordance with the provisions of the *State Emergency and Rescue Management Act 1989* (NSW).

Authorised

NSW SES Wollongong Local/Unit Commander

Date: 19-12-2022

Chris WARREN

NSW SES Kiama Local/Unit Commander

Date: 16/12/2022

Date: 17/10/2022

NSW SES Shellharbour Local/Unit Commander

Endorsed

Chair, Local Emergency Management Committee

Date: 7 October 2022

VERSION HISTORY

Version Number	Description	Date

PREVIOUSLY ENDORSED VERSION PRIOR TO LGA AMALGAMATION

The below table lists all previously endorsed versions of this plan.

Description	Date
Illawarra – Wollongong LFP	Jul 2017
Wollongong City Local Flood Plan	June 2010
Wollongong City Local Flood Plan	March 2004
Kiama/Shellharbour City Local Flood Plan	June 2009

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

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Amendments in the list below have been entered in this plan.

Amendment Number	Description	Updated by	Date
	Illawarra – Wollongong LFP		Updated Aug 2017

Document issue: 12102021

DISTRIBUTION LIST

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1 OUTLINE AND SCOPE

1.1 PURPOSE

1.1.1 The purpose of this plan is to set out the multi-agency arrangements for the emergency management of flooding in the Wollongong City, Shellharbour City and Kiama Local Government Area (LGA).

1.2 AUTHORITY

- 1.2.1 This plan is written and issued under the authority of the <u>State Emergency and</u> <u>Rescue Management Act 1989 (NSW)</u> ('SERM Act'), the <u>State Emergency Service</u> <u>Act 1989 (NSW)</u> ('SES Act') and the NSW State Emergency Management Plan (EMPLAN).
- 1.2.2 This plan is a sub plan to the Illawarra Local Emergency Management Plan (EMPLAN) and is endorsed by the Emergency Management Committee (LEMC).

1.3 ACTIVATION

- 1.3.1 This plan does not require activation. The arrangements set out in this plan are always active.
- 1.3.2 The Illawarra Local Emergency Management Plan (EMPLAN) is active at all times in anticipation of the need to coordinate support and resources requested by combat agencies, including the NSW State Emergency Service (NSW SES).

1.4 SCOPE

- 1.4.1 The area covered by this plan is the Wollongong City, Shellharbour City and Kiama Council Local Government Areas (LGAs). The Wollongong City, Shellharbour City and Kiama Council LGAs and their principal towns, villages, rivers and creeks are shown in Appendix A.
- 1.4.2 The Wollongong City, Shellharbour City and Kiama Council areas are in the NSW SES South Eastern Zone and for emergency management purposes, are part of the Illawarra South Coast Emergency Management Region.
- 1.4.3 The plan sets out the Wollongong City, Shellharbour City and Kiama Councils level of emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Wollongong City, Shellharbour City and Kiama LGAs. Hazard and Risk information can be found in Volume 2 of this document, and NSW SES Response Arrangements can be found in Volume 3, where these documents exist.
- 1.4.4 In this plan a flood is defined as a relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.
- 1.4.5 The arrangements for dealing with episodes of coastal erosion by severe weather, are described in the NSW State Storm Plan.

- 1.4.6 The arrangements for the emergency management of tsunami are dealt with in the NSW State Tsunami Emergency Sub Plan.
- 1.4.7 This plan outlines the local level arrangements for the management of downstream consequences of flooding due to dam failure, however it does not cover the management of flooding of an underground mine by inrush or other cause, which should be covered by the Mine Emergency Sub Plan for the respective mine.

1.5 GOALS

- 1.5.1 The primary goals for flood emergency management in NSW are:
 - a. Protection and preservation of life.
 - b. Establishment and operation of flood warning systems.
 - c. Issuing of community information and community warnings.
 - d. Coordination of evacuation and welfare of affected communities.
 - e. Protection of critical infrastructure and community assets essential to community survival during an emergency incident.
 - f. Protection of residential property.
 - g. Protection of assets and infrastructure that support individual and community financial sustainability and aid assisting a community to recover from an incident; and
 - h. Protection of the environment and conservation values considering the cultural, biodiversity and social values of the environment.

1.6 **KEY PRINCIPLES**

- 1.6.1 The protection and preservation of human life (including the lives of responders and the community) is the highest priority.
- 1.6.2 Evacuation is the primary response strategy for people impacted by flooding.

1.7 ROLES AND RESPONSIBILITIES

- 1.7.1 General responsibilities of emergency service organisations and functional areas are set out in the NSW State EMPLAN and NSW State Flood Sub Plan.
- 1.7.2 Specific roles and responsibilities for agencies, functional areas and organisations in relation to flooding within Wollongong City, Shellharbour City and Kiama Councils are detailed within this plan, Appendix B and Appendix C.
- 1.7.1 Any agency with agreed responsibilities in this plan that are temporarily unable or no longer able to fulfil their responsibilities in response operations must as soon as possible notify the:
 - a. NSW SES Incident Controller (for local or zone level responsibilities during response operations).
 - b. NSW SES Zone Duty Commander (for regional level responsibilities outside of response operations).

1.8 PLAN MAINTENANCE AND REVIEW

- 1.8.1 The NSW SES will maintain the currency of this plan by:
 - a. Ensuring that all supporting emergency services and functional areas, organisations and officers mentioned in it are aware of their roles and responsibilities.
 - b. Conducting exercises to test arrangements.
 - c. Reviewing the contents of the plan:
 - When there are changes which alter agreed plan arrangements.
 - When changes to land use strategic plans and policies increase the population at risk.
 - After a flood including reccomendations from after action reviews, reports, or inquiries; and
 - As determined by the NSW SES Commissioner.
 - d. The plan is to be reviewed no less frequently than every five years or after a significant flood event.

1.9 SUPPLEMENTARY DOCUMENTS

- 1.9.1 Supplementary material published in previous versions of the Local Flood Emergency Sub Plan is now maintained on the NSW SES website at: <u>NSW SES</u> <u>Flood Storm and Tsunami Plans</u> including:
 - a. Flood Plan Glossary.
 - b. NSW SES Dam Failure Notification Flowchart.
 - c. NSW SES Resupply Flowchart.

2 OVERVIEW OF NSW FLOOD HAZARD AND RISK

2.1 THE FLOOD THREAT

- 2.1.1 The NSW SES maintains information on the nature of flooding and effects of flooding on the community in the Wollongong City, Shellharbour City and Kiama LGAs. This is outlined in Volume 2 Hazard and Risk in Wollongong City, where this document exists.
- 2.1.2 Declared dams in or upstream of Wollongong City, Shellharbour City and Kiama Local Government Areas.

Dam Name	Owner
Barina Park Detention Basin	Wollongong City Council
Blackbutt Reserve	Shellharbour City Council
Brokers Road Retarding Basin	Wollongong City Council
Bucklands Retarding Basin	Matt Crossingham
Coalcliff	Illawarra Coke Company
Cordeaux	WaterNSW
Dobinsons Retarding Basin	Roads and Maritime Services

Foothills Estate Retention Basin 1	Wollongong City Council
Foothills Estate Retention Basin 3	Wollongong City Council
Foothills Road Basin	Wollongong City Council
Fountaindale	Kiama Municipal Council
Gannet Place Retarding Basin	Wollongong City Council
Greenmedows Retarding Basin	Shellharbour City Council
Gunyah Park Basin	Wollongong City Council
Kanahooka Retention Basin	Forest Grove Community Association
Nyrang Park Retention Basin	Wollongong City Council
Oak Flats Reservoir	Sydney Water Corporation
St Josephs School Retarding Basin	Shellharbour City Council
St Josephs School Retarding Basin	Shellharbour City Council
Shellcove Estate Detention Basin	Shellharbour City Council
Shellharbour City Centre Basin	Shellharbour City Council
South Bulli Basin 1	Allied Coal Pty Ltd
South Bulli Stormwater	Wollongong Coal Ltd
Upper Cordeaux 2	WaterNSW
Wollongong High School Retarding Basin	Wollongong City Council

3 PREVENTION/ MITIGATION

3.1 INTRODUCTION

3.1.1 The Floodplain Development Manual outlines the NSW Government's Flood Prone Lands Policy which details the framework for managing flood prone land in New South Wales. Incorporation of floodplain risk management into land use planning is one of the key means to limit the exposure to flood risks to our communities and help build long term resilience to future flood events.

3.2 LAND USE PLANNING

3.2.1 **Strategy:** Effective land use planning is a key focus for minimising the impacts of flooding. NSW SES will work with land use planning and consent authorities to inform and influence the consideration of the risks arising from flood, storm and tsunami, to prevent the creation of intolerable impacts of these hazards on the community.

Actions:

- a. NSW SES will provide strategic input about land use planning matters which have or will create significant flood risk to life and/or property due to flooding.
- b. NSW SES will provide responses to land use planning proposal referrals that have or will create significant flood risk to life and/or property due to flooding.

3.3 FLOODPLAIN RISK MANAGEMENT

3.3.1 **Strategy**: Advocate for consideration of emergency management in decision making to reduce risks to the existing community and minimise the growth in future, continuing and residual risk due to development through input to the floodplain management program.

Actions:

- a. NSW SES will provide coordinated and consistent emergency management advice to councils and other agencies in relation to the management of land that is subject to flooding or coastal inundation; and
- b. NSW SES will provide advice, support, technical resources and training for NSW SES representatives to contribute effectively on local Floodplain Management Committees.

4 **PREPARATION**

4.1 INTRODUCTION

4.1.1 Preparation includes arrangements or plans to deal with an emergency or the effects of an emergency.

4.2 FLOOD EMERGENCY PLANNING

4.2.1 **Strategy**: NSW SES develop, review and maintain Flood Emergency Sub Plans

Actions:

- a. Develop and review this NSW SES Local Flood Emergency Sub Plan as required. Local Flood Emergency Sub Plans outline the specific arrangements for management of flood events within an LGA, and may include cross boundary arrangements; and
- b. Review plans as per <u>Section 1.8</u>.
- 4.2.2 Local EMPLAN Consequence Management Guides (CMG's) for flood are not required for communities covered by NSW SES Local Flood Emergency Sub Plans however may be utilised in place of Local Flood Emergency Sub Plan if agreed to by NSW SES.

4.3 FLOOD INTELLIGENCE SYSTEMS

4.3.1 **Strategy**: NSW SES develop and maintain a flood intelligence system to identify flood behaviour, its impact on the community and required response actions.

Actions:

- a. Gather and assess flood information for the full range of flood types and severities.
- b. Collect, collate, and assess information on the characteristics of communities at risk and the potential effects of flooding on communities at risk; and
- c. Share flood intelligence information with supporting agencies.

4.4 DEVELOPMENT OF WARNING SYSTEMS

4.4.1 **Strategy**: Develop, maintain and prepare systems for the provision of flood warnings and associated warning services.

- a. All levels of government work in partnership to develop and maintain flood warning infrastructure.
- b. NSW SES maintains a list of the requirements for flood warnings for flood gauges in NSW (including flood classifications, warning times required and key statistics) and can be found in the supplementary document to the NSW State Flood Plan (see Section 1.9). Gauges of relevance within the Wollongong City, Shellharbour City and Kiama LGAs are also listed in Volume 3 of this plan, where this document exists.
- c. The NSW SES will recommend new warning services and changes to warning alert levels for gauges to the NSW and ACT Flood Warning Consultative Committee.
- d. The State Government, in partnership with Local Government, is responsible for developing and maintaining flash flood warning systems for local catchments where required.
- e. Dam Owners will provide Dam Emergency Plans (where required) and consult with NSW SES on alert levels and messaging. Alert level definitions are listed in Dam Emergency Plans.
- f. NSW SES maintains a dedicated dam failure hotline and procedures to ensure priority dissemination of dam failure warnings.
- g. NSW SES develops and maintains warning and flood information products by:
 - Utilising flood intelligence data.
 - Developing warning and flood information products.
 - Continuously reviewing warning and flood information products.
 - Consulting with affected communities, key stakeholders, Dam Safety NSW and the NSW and ACT Flood Warning Consultative Committee; and maintain Operational Readiness; and
 - Participating in the development of public information and warning systems.
- h. Gauge owners adequately maintain flood warning gauges and systems, including those identified in the 'Service Level Specification' maintained by the Bureau of Meteorology (Bureau) and those identified in the 'Provision and Requirements for Flood Warning in New South Wales' maintained by NSW SES.

4.5 BRIEFING, TRAINING AND EXERCISING

4.5.1 **Strategy**: Ensure NSW SES, supporting agencies, functional areas and the community are prepared and familiar with the strategies and arrangements within the Flood Emergency Sub Plan and supporting documents.

- a. NSW SES will consult stakeholders throughout the development of plans.
- b. NSW SES will inform stakeholders of content changes after revisions.
- c. NSW SES will ensure their facilities and resources are maintained and operationally ready.

- d. NSW SES will train personnel for their expected flood operation roles; and
- e. NSW SES will regularly brief stakeholders on the exercise arrangements contained in the NSW Flood Emergency Sub Plan.

4.6 COMMUNITY RESILIENCE TO FLOODING

4.6.1 **Strategy**: NSW SES provides and maintains a flexible volunteer workforce to support community resilience.

Actions:

- a. Ensure ongoing recruitment and training of a diverse range of volunteers.
- b. Ensure pre-planning to facilitate the management of spontaneous volunteers and community members during a flood.
- 4.6.2 **Strategy**: NSW SES works with individuals, communities, businesses and government agencies to build flood resilience.

Actions:

- a. Partners with and engage communities to understand and manage the risks associated with floods, including providing business continuity guidance (NSW SES Business FloodSafe), family preparedness (NSW SES Home FloodSafe) and other engagement strategies.
- b. NSW SES will collate, assess and disseminate flood information to the community.
- c. Collaborate with individuals, businesses, government agencies and communities when developing flood intelligence, preparedness and response information.
- d. Plan for floods collaboratively with communities through community and stakeholder participation and engagement.
- e. Collaborate with community sector and recognise the needs of individuals within communities who have an increased susceptibility during floods.

5 **RESPONSE**

5.1 INTRODUCTION

- 5.1.1 Flood response operations will begin:
 - a. On receipt of a Bureau Severe Weather Warning or Thunderstorm Warning that includes heavy rain or storm surge; or
 - b. On the receipt of a Bureau Flood Watch or Flood Warning; or
 - c. On receipt warnings for flash flood; or
 - d. On receipt of a dam failure alert; or
 - e. When other evidence leads to an expectation of flooding.

5.2 INCIDENT MANAGEMENT ARRANGEMENTS

5.2.1 **Strategy**: Maintain effective control of flood operations across New South Wales.

Actions:

- a. The NSW SES uses the Australasian Inter-service Incident Management System (AIIMS) to manage the flood response.
- b. Control of flood response will be at the lowest effective level and may be scaled to suit the incident.
- c. The NSW SES State Controller (or delegate) will appoint Incident Controllers and establish Incident Control Centres (see NSW SES facilities on map in Appendix A).
- d. The NSW SES Incident Controller, in consultation with participating supporting emergency services and Functional Areas will determine the appropriate breakdown of an Area of Operations into Divisions and/or Sectors in accordance with the principles of AIIMS.

5.2.2 **Strategy**: Maintain Incident Control Centre(s).

Actions:

- a. NSW SES will operate Incident Control Centre(s) as required.
- b. The NSW SES Incident Control Centre(s) will:
 - Control resources from NSW SES and coordinate resources of supporting emergency services and functional areas.
 - Manage Request for Assistance (RFA) tasking and ensure they are actioned in a timely manner.
 - Undertake response planning and determine future resourcing requirements; and
 - Coordinate information flow, including warnings, public information and social media.
- 5.2.3 **Strategy**: Provide effective liaison between the NSW SES and supporting agencies or functional areas in accordance with Local EMPLAN.

Actions:

- a. Supporting emergency services and Functional Areas should provide Liaison Officers to NSW SES Incident Control Centres and/or Emergency Operation Centres as required
- b. NSW SES will provide Liaison Officer(s) to Emergency Operations Centres as required; and
- c. Where possible Emergency Operation Centres to be co-located with NSW SES Incident Control Centres for Flood Emergency Response.
- 5.2.4 **Strategy**: Coordinate resources and logistics support to ensure operational effectiveness.

- a. The NSW SES Incident Controller will notify agencies of potential access issues between locations, for the consideration of pre-deploying of resources.
- b. The NSW SES may request resources and logistics support directly from a supporting emergency service or Functional Area.
- c. Wherever possible, supporting organisations are to provide their own logistic support in consultation with NSW SES where appropriate.
- d. The NSW SES Incident Controller will control air support operations and may utilise supporting agencies in the management of aircraft.

5.3 USE OF INFORMATION AND COLLECTION OF INTELLIGENCE

5.3.1 **Strategy**: Ensure flood information is effectively utilised communicated and collected during and post a flood.

Actions:

- a. Information relating to the consequences of flooding, response strategies, situational awareness and operational updates will be distributed by NSW SES to supporting emergency services and Functional Areas listed under this Plan.
- b. All supporting emergency services and Functional Areas and Council will accurately record and report information relevant to their activities and any real time flood information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established.
- c. The NSW SES may establish and operate a Joint Intelligence Unit to coordinate the collection, collation, interpretation, mapping, actioning and dissemination of information; and
- d. Reconnaissance, mapping, damage assessments, intelligence validation and post flood evaluation will be coordinated by NSW SES. This may occur post impact and continue into the recovery phase.
- e. NSW SES may request Engineering to assist with the gathering of flood intelligence including (not limited to) maximum flood extents, peak flood heights, recording major flood damage at key high velocity locations and preparation of After-Flood Report.
- 5.3.2 **Strategy**: Ensure flood intelligence is incorporated into operational decisionmaking.

Action: The NSW SES will use flood intelligence, official forecasts, warnings, and flood scenario products to undertake an assessment of the predicted impact of a flood and to inform operational decision-making.

5.4 **PROVISION OF INFORMATION AND WARNINGS TO THE COMMUNITY**

5.4.1 **Strategy**: Timely and effective warnings are distributed to the community.

Actions:

a. The Bureau issues public weather and flood warning products before and during a flood. These may include:

- Severe Thunderstorm Warnings Detailed issued for all capital cities and surrounding areas when individual severe thunderstorms are within range of the capital city radars,
- Severe Thunderstorm Warnings Broad-based issued for the entire Australian State or territories affected highlighting broad areas where severe storms may occur within the next 3 hours,
- Severe Weather Warnings with reference to heavy rainfall and/or storm surge,
- Flood Watches, and
- Flood Warnings.
- b. Dam Owners will utilise the Dam Emergency Plan to provide warnings and information to NSW SES and communities (where appropriate).
- c. NSW SES Incident Controllers will issue the following NSW SES flood information products incorporating warnings from the above, expected consequences and safety messages:
 - Livestock and Equipment Warnings
 - Local Flood Advices
 - Flood Bulletins
 - NSW SES Evacuation Warning
 - NSW SES Evacuation Order
 - NSW SES All Clear
- d. NSW SES liaises with the Bureau of Meteorology to discuss the development of flood warnings as required.
- e. NSW SES provides alerts and deliver flood information to affected communities using a combination of public information.
- f. NSW SES may request supporting agencies redistribute NSW SES alerts and information, including through the provision of doorknocking teams.
- g. Road closure information will be provided to the community through the following agencies/methods:
 - Local Government Council websites; and
 - Transport for NSW 'Live Traffic' website: www.livetraffic.com or 'Transport InfoLine': 131 500. VMS messaging on roadways may also be used to advise motorists.
- h. The Public Information and Inquiry Centre will be established by the NSW Police Force where required to provide information regarding evacuees and emergency information. Contact details will be broadcast once the centre is established.
- i. The Disaster Welfare Assistance Line will be established by Disaster Welfare Services where required to provide information on welfare services and

assistance. Assistance line contact details will be broadcast once Disaster Welfare Services commence.

5.5 **PROTECTION OF PROPERTY**

5.5.1 **Strategy**: Coordinate the protection of property including critical infrastructure from destruction or damage arising from floods.

Action: NSW SES, supporting agencies, and community volunteers will assist the community (where resources are available, feasible and safe to do so) in:

- a. The protection of properties through flood protection systems (e.g. sandbagging) to minimise entry of water into buildings; and
- b. The raising or moving of household furniture and commercial stock/equipment.

5.6 ROAD AND TRAFFIC CONTROL

5.6.1 **Strategy**: Coordinate the closing and re-opening of flood affected roads.

Actions:

- a. Wollongong City, Shellharbour City and Kiama Councils will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority.
- b. Transport for NSW will coordinate the closure and reopening of the state road network.
- c. The NSW Police Force may close and re-open roads but will normally only do so (if the Wollongong City, Shellharbour City and Kiama Councils or Transport for NSW have not already acted and if public safety requires such action;
- d. NSW SES will assist with erecting road closure signs and barriers when time and resources permit.
- 5.6.2 **Strategy**: Coordinate traffic control measures in flood affected areas.
 - a. The NSW SES Incident Controller may direct the imposition of traffic control measures into flood affected areas in accordance with the provisions of the *State Emergency Service Act, 1989* and the *State Emergency Rescue Management Act, 1989*.
 - b. The NSW SES Incident Controller may request the Local Emergency Operations Controller provide suitable personnel to assist with traffic coordination.

5.7 PROTECTION OF ESSENTIAL SERVICES

- 5.7.1 Arrangements for the protection of local assets are outlined in Volume 3, where this document exists, of the NSW SES Local Flood Emergency Sub Plan. In addition, Local and Region EMPLAN's contain infrastructure inventories.
- 5.7.2 **Strategy**: Minimise disruption to the community by ensuring protection of infrastructure and supply of essential energy, utility services and lifelines.

- a. The Transport Services Functional Area is to coordinate the provision of information about the assessment and restoration of transport network infrastructure.
- b. The Energy and Utility Services Functional Area is to coordinate the assessment and restoration of essential energy and utility services (not including telecommunications).
- c. The Telecommunications Services Functional Area is to coordinate the assessment and restoration of telecommunications and the Public Safety Network.
- d. The Engineering Services Functional Area is to
 - Coordinate the assessment and restoration of critical public buildings for example hospitals;
 - Assessment and operation of flood protection levees
 - Protection of property
 - Construction and repair of levees
 - Dam safety assessment and dam stability
 - Water supply and sewerage operations
 - Other critical infrastructure
- e. Functional Areas and Council will keep the NSW SES informed of the status of utilities and infrastructure.

5.8 EVACUATION

- 5.8.1 Evacuation is the NSW SES's primary response strategy for managing the population at risk of flooding.
- 5.8.2 Community specific evacuation arrangements are located in Volume 3 of this Plan, where this document exists.
- 5.8.3 **Strategy**: Conduct planning to ensure all evacuation constraints are considered.

- a. Evacuations will take place when there is a risk to public safety. Circumstances may include:
 - Evacuation of people when their homes or businesses are likely to flood.
 - Evacuation of people who are unsuited to living in isolated circumstances, due to flood water closing access; and
 - Evacuation of people where essential energy and/or utility services are likely to fail or where buildings have been or may be made uninhabitable; and
- b. The NSW SES will consider the following in evacuation decisions:
 - Duration of evacuation.
 - Characteristics of the community.
 - Numbers requiring evacuation.
 - Availability of evacuation routes and transport.

- The ability for existing levees or other flood protection works to fulfil their intended function.
- Time available for evacuation.
- Evacuee management requirements.
- Resources and delivery of evacuation information
- Length of isolation.
- c. NSW SES Incident Controllers, planning and intelligence officers will carefully consider the risks involved in conducting evacuations.
- d. All evacuation decisions will be made as per the current NSW SES policies and procedures, and consistent with the NSW Evacuation Management Guidelines.
- e. Potential Evacuation Centres are located in Volume 3, where this document exists / Local EMPLAN; and
- f. The NSW Police Force will coordinate the provision of overall security for evacuated areas.
- 5.8.4 **Strategy**: Evacuate people pre-emptively from dangerous or potentially dangerous places and or locations created by the flood hazard to safe locations away from the hazard.
 - a. NSW SES will control and coordinate the evacuation of affected communities.
 - b. The NSW SES Comissioner (or delegate) will warn communities to prepare for a possible evacuation, where circumstances allow such lead time.
 - c. The NSW SES Comissioner (or delegate) will order any necessary evacuations and provide information to the community about when and how to evacuate.
 - d. Support to evacuation operations may be requested from other emergency services and supporting agencies using arrangements in the local EMPLAN and supporting plans.
 - e. Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes) in consultation with the NSW SES and Welfare Services.
 - f. School administration offices (Government and Private) will coordinate the evacuation of schools in consultation with the NSW SES and Welfare Services, if not already closed.
 - g. Caravan Park proprietors will inform the NSW SES Incident Controller when caravan park evacuations have been completed.
 - h. People who are reluctant or refuse to comply with any Evacuation Order will be referred to the NSW Police Force.

5.9 EVACUEE MANAGEMENT AND WELFARE

- 5.9.1 Research and experience in flood operations shows that most evacuees go to family, friends and commercial accommodation outside the impact area.
- 5.9.2 **Strategy**: Maintain the welfare of communities and individuals affected by the impact of a flood.

Actions:

- a. NSW SES will provide initial welfare for evacuees where required but will hand the responsibility over to the Welfare Services Functional Area as soon as possible. The NSW SES will brief the Welfare Services Functional Area at the earliest opportunity regarding the level of assistance required.
- b. Welfare Services Functional Area will manage evacuation centres for affected residents and travellers in accordance with the Welfare Services Functional Area Supporting Plan.
- c. Schools Administration (Government and Private) will manage the safety of students directly affected by flooding and will work with the NSW SES in the temporary closure of schools and will coordinate with NSW SES Transport and Welfare Services in the management of school evacuees.
- d. Disaster Victim Registration will be controlled and coordinated by the NSW Police Force with the assistance of NSW SES and Welfare Services Functional Area.
- e. NSW SES will provide details of all residents assisted in evacuations to the Welfare Services Functional Area as early as possible.
- f. Where the expected remaining number of evacuees and the duration of evacuation is assessed to be beyond the capability and capacity of the established evacuation centre arrangements the SEOCON may establish Major Evacuation Centres or Mass Care facilities; and
- g. The decision to establish Major Evacuation Centres or Mass Care Facilities will be made by the NSW SES and SEOCON in consultation with members of the State Emergency Management Committee.
- 5.9.3 **Strategy**: Coordinate available and accessible health services for flood affected communities.

Action: The provision of environmental health advice, assessment of public health risks and coordination of immediate mental health support will be provided by Health Services Functional Area.

5.9.4 **Strategy**: Maintain the welfare of animals impacted by a flood.

Actions:

- a. Agriculture and Animal Services Functional Area will coordinate the welfare of livestock, pets, companion animals and wildlife including support to primary producers, animal holding establishments and community members; and
- b. Agriculture and Animal Services Functional Area role will coordinate the evacuation, emergency care of animals and assessment, humane destruction and disposal of affected animals, and supply of emergency fodder, water and aerial support where necessary.

5.10 FLOOD RESCUE

5.10.1 Strategy: Control and coordinate flood rescue of people and domestic animals.Actions:

- a. NSW SES will perform flood rescue, where training and equipment is suitable and where a risk assessment has indicated that the risk to rescuers is acceptable.
- b. Flood rescue operations will be conducted in accordance with the State Rescue Board Land Rescue Policy and the NSW State Rescue Board Flood Rescue Policy which sets out the framework, governance, responsibilities and requirements for the management and conduct of flood rescue in NSW.
- c. NSW SES may request other supporting emergency services to undertake flood rescues on behalf of the NSW SES. Agencies must be authorised/accredited to undertake flood rescue operations in accordance with State Rescue Board requirements, as prescribed by NSW SES. Supporting emergency services must supply information regarding rescues performed to the NSW SES. Notification arrangements with NSW Police Force are outlined in the NSW State Rescue Board Flood Rescue Policy; and
- d. Rescue agencies will conduct rescue of domestic small and large animals as per the State Rescue Board Land Rescue Policy (and may include Large Animal Rescue of family horses and cows at a residence or property). The rescue of livestock (which includes commercial animals found on farming and breeding enterprises) will be coordinated through Animal and Agriculture Services Functional Area.

5.11 RESUPPLY

5.11.1 **Strategy**: Coordinate resupply to towns and villages isolated by flooding to minimise disruption to the community.

- a. NSW SES will advise communities and businesses if flood predictions indicate that areas are likely to become isolated, and indicative timeframes where possible.
- b. Retailers should be advised to ensure sufficient stock is available for the duration of the flood.
- c. When isolation occurs, NSW SES will establish loading points where retailers can instruct suppliers to deliver goods.
- d. NSW SES will endeavour to support the delivery of mail to isolated communities but may not be able to do so according to normal Australia Post timetables.
- e. NSW SES will assist hospitals with resupply of linen and other consumables where able.
- f. NSW SES may request resupply assistance from supporting agencies.
- g. NSW SES may conduct resupply operations as per the designated resupply plan for the event.
- h. Where additional supplies are required Engineering be requested to coordinate the supply of goods and services in response to and recovery from the emergency.
- 5.11.2 **Strategy**: Coordinate resupply to rural properties isolated by flooding.

Actions:

- a. When requested, NSW SES will establish a resupply schedule and coordinate the resupply for isolated rural properties.
- b. NSW SES will provide local suppliers with designated loading points. Resupply items are to be packaged by the supplier; and
- c. Isolated households unable to afford resupply items will be referred to Welfare Services Functional Area for assistance.

5.12 ALL CLEAR AND RETURN

5.12.1 **Strategy**: Coordinate the safe return of communities to flood affected areas when the immediate danger to life and property has passed.

Actions:

- a. NSW SES Incident Controller will determine when it is safe to progressively return in consultation with the relevant Emergency Operations Controller and supporting agencies considering the ongoing risk to public safety.
- b. NSW SES Incident Controller will specify the level of access to affected communities as the following:
 - Not suitable for access.
 - Limited access by emergency services and response agencies.
 - Limited access by residents and/or business operators; or
 - Full access
- c. NSW SES Incident Controller will issue an 'All Clear' message when the immediate danger to life and property has passed for areas assessed as safe; and
- d. The NSW SES will facilitate the return of evacuees to their homes.

5.13 END OF RESPONSE OPERATIONS

5.13.1 **Strategy**: Conclude response operations.

- a. Response operations will conclude when:
 - There is a reduced likelihood of additional flooding within the Area of Operation and flood waters have receded.
 - All requests for assistance related to the flood have been completed;
 - The need for warning and evacuation no longer exist.
 - There is no further likelihood of rescuing people.
 - Resupply is no longer required (resupply operations may occur concurrently with the recovery phase).
 - Response to fire and hazardous material incidents have concluded (not including subsequent clean-up of contaminated sites); and

• All affected areas have had an 'All Clear' issued.

5.14 POST IMPACT ACTIONS

5.14.1 **Strategy**: Learnings from the event are used to inform recovery and future events.

Actions:

- a. NSW SES will continue to engage with communities after significant floods through convening one or more community forums, workshops or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process. These will typically include other agencies such as the Bureau of Meteorology, Welfare Services and Wollongong City Council representatives.
- b. NSW SES will conduct After Action Reviews, at the conclusion of response operations, which will involve all stakeholders. Findings will be shared and incorporated into improved disaster resilience planning.
- c. NSW SES will provide information and data throughout the emergency response to inform community recovery. A report will be developed at the request of the SERCON at the conclusion of the response within an area. Should a response summary report be required it will include the following:
 - The emergency action plan in place at conclusion of the response emphasising any continuing activities including community meetings/ engagement activities.
 - Resources allocated to the emergency response and associated exit strategies.
 - Details of any areas or situations with potential to re-escalate the emergency;
 - A recommendation for the conclusion of the NSW SES as lead agency to transition to Resilience NSW as the lead agency for Recovery.
 - Any actions that are incomplete or outstanding.
 - Damage Assessment Data and Information obtained throughout the response phase which will further support the long-term recovery of communities.
- d. NSW SES will undertake/coordinate a comprehensive review of intelligence and plans following significant flood events.
- 5.14.2 **Strategy:** Participate in post flood data collection analysis.

Actions: NSW SES works with relevant stakeholders and Wollongong City, Shellharbour City and Kiama Councils on post flood data collection analysis including review of flood intelligence where necessary.

6 **RECOVERY OPERATIONS**

6.1 INTRODUCTION

- 6.1.1 Recovery is the process of returning an affected community to its proper level of functioning after an emergency. It will generally commence simultaneously with the Response phase.
- 6.1.2 Recovery operations will be initiated and conducted as outlined in the NSW State EMPLAN and as further detailed in the NSW Recovery Supporting Plan.

6.2 NSW SES RECOVERY ROLE

- 6.2.1 **Strategy**: NSW SES will support recovery operations and established Recovery Committees.
- 6.2.2 **Actions**:
 - a. NSW SES will provide representation to Recovery Committees as required and may have an ongoing role in the Recovery phase.
 - b. NSW SES roles on Recovery Committees may include providing information about any continuing response, guidance on mitigation strategies and general advice and assistance to the committee as a subject matter specialist and or expert.
 - c. NSW SES will provide information to Resilience NSW to support applications to Treasury for Natural Disaster Relief and Recovery Arrangements.
 - d. The NSW SES, in conjunction with a Recovery Committee, will provide a service to support the information needs of a community immediately following a flood; and
 - e. NSW SES and where required supporting agencies will assist with clean-up operations after floods, where possible when resources and personnel permit.
 - f. NSW SES may coordinate immediate relief in collaboration with Resilience NSW.

7 ABBREVIATIONS

For a full list of abbreviations refer to the NSW State Flood Plan - Abbreviations

8 GLOSSARY

Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

Readers should refer to EMPLAN Annex 9 – Definitions.

Refer to the NSW State Flood Plan for a complete glossary of terminology used throughout this plan and within NSW SES Flood Plans.

For a full list of definitions refer to the Supporting Document - State Flood Plan Glossary https://www.ses.nsw.gov.au/media/2650/glossary.pdf



Appendix A - Map of Wollongong City Council Area
Legend Gauges BOM Forecast Locations Major Rivers Levees Declared Dams (Prescribed) Local Government Areas States Australia
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Council Area

Legend

- NSW SES Headquarters
- Gauges BOM Forecast Locations
- Major Rivers
- = Levees
- Prescribed Dams
- Major Towns NSW
- Local Government Areas

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1 Appendix B – Roles and Responsibilities

AGENCY	RESPONSIBILITIES
NSW State Emergency Service	NSW SES is the designated Combat Agency for floods, storms and tsunami and controls response operations. NSW SES roles and responsibilities in relation to floods are outlined in the <u>NSW State Flood Plan</u> .

AGENCY	RESPONSIBILITIES
Agriculture and Animal Services Functional Area	The roles and responsibilities for Agriculture and Animal Services are outlined in the Agriculture and Animal Services Supporting Plan and NSW State Flood Plan.
Australian Government Bureau of Meteorology	The roles and responsibilities for the Australian Government Bureau of Meteorology are outlined in the NSW State Flood Plan.
«LGA_Name»	Preparedness
	• Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented.
	• Develop and implement floodplain risk management plans in accordance with the NSW Government's Flood Prone Land Policy and the Floodplain Development Manual.
	• Provide levee studies, flood studies and floodplain management studies to NSW SES.
	• Maintain Dam Emergency Plans for the Council owned dams and provide copies to NSW SES.
	• Provide information on the consequences of dam failure to NSW SES for incorporation into planning and flood intelligence.
	• Coordinate the development of warning services for catchments prone to flash flooding (small catchments), where appropriate.
	• Maintain council-owned flood warning networks and flood mitigation works.
	• Participate in NSW SES-led flood emergency planning meetings, to assist in the preparation of Flood Sub Plans.
	• Maintain a plant and equipment resource list for the council area.
	Contribute to community engagement activities.
	Response
	• Subject to the availability of council resources, assist NSW SES with flood operations including:
	 Traffic management on council managed roads.

AGENCY	RESPONSIBILITIES
	 Provision of assistance to NSW SES (plant, equipment and personnel where able and requested). Property protection tasks including sandbagging. Assist with the removal of caravans from caravan parks. Warning and/or evacuation of residents and other people in flood liable areas. Provision of back-up radio communications. Resupply of isolated properties. Technical advice on the impacts of flooding. Close and reopen council roads (and other roads nominated by agreement with Transport for NSW) and advise NSW SES, NSW Police Force and people who contact the council for road information. Assist NSW SES to provide filled sandbags and filling facilities to residents and business in areas which flooding is expected.
	 Assist with making facilities available for domestic pets and companion animals of evacuees during evacuations.
	 Operate flood mitigation works including critical structures such as detention basins and levees and advise NSW SES regarding their operation.
	 Manage and protect council-owned infrastructure facilities during floods.
	 Provide advice to NSW SES and the Health Services Functional Area during floods about key council managed infrastructure such as sewerage treatment and water supply.
	 Advise the Environmental Protection Authority of any sewerage overflow caused by flooding.
	 Work with NSW SES and NSW Department of Planning and Environment to collect flood related data during and after flood events.
	Recovery
	 Provide for the management of health hazards associated with flooding including removing debris and waste.
	• Ensure premises are fit and safe for reoccupation and assess any need for demolition.
	 Provide services, assistance and advice to State Government in accordance with the State Recovery Plan.
Caravan Park Proprietor(s)	 Prepare a flood emergency plan for the Caravan Park.
	 Ensure that owners and occupiers of movable dwellings are aware that the caravan park is flood liable by providing a written notice to

AGENCY	RESPONSIBILITIES
	occupiers taking up residence and displaying this notice and emergency management arrangement within the park.
	• Ensure that owners and occupiers of movable dwellings are aware that if they are expecting to be absent for extended periods, they should:
	 Provide the manager of the caravan park with a contact address and telephone number in case of an emergency. Leave any movable dwelling in a condition allowing it to be relocated in an emergency (i.e.: should ensure that the wheels, axles and draw bar of the caravans are not removed and are maintained in proper working order).
	• Ensure that occupiers are informed of Flood Information. At this time, occupiers should be advised to:
	 Ensure that they have spare batteries for their radios. Listen to a local radio station for updated flood information. Prepare for evacuation and movable dwelling (cabins) relocation.
	• Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs.
	• Coordinate the evacuation of people and the relocation of movable dwellings when floods are rising and their return when flood waters have subsided. Movable dwellings will be relocated back to the caravan park(s) by owners or by vehicles and drivers arranged by the park managers.
	 Secure any movable dwellings that are not able to be relocated to prevent floatation.
	 Inform NSW SES of the progress of evacuation and/or movable dwellings relocation operations and of any need for assistance in the conduct of these tasks.
Childcare Centres and Preschools	• When notified of possible flooding or isolation, childcare centres and preschools should.
	 Liaise with NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures. Assist with coordinating the evacuation of preschools and childcare centres.
Dams Safety NSW	The roles and responsibilities for Dams Safety NSW (formerly NSW Dam Safety Committee) are outlined in the NSW State Flood Plan.
Department of Defence	Arrangements for Defence Assistance to the Civil Community are detailed within the State EMPLAN (section 448).

AGENCY	RESPONSIBILITIES
Energy and Utilities Services Functional Area	The roles and responsibilities for Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN).
	Roles and responsibilities in addition to the Supporting Plan are:
	 Assist NSW SES with identification of infrastructure at risk of flood damage where resources are available.
	• Facilitate local utility service distribution providers (electricity, gas, water, wastewater) to:
	 Provide advice to NSW SES of any need to disconnect power/gas/water/wastewater supplies or of any timetable for reconnection.
	 Advise NSW SES of any hazards from utility services during flooding and coastal erosion/inundation.
	 Advise the public with regard to electrical hazards during flooding and coastal erosion/inundation, and to the availability or otherwise of the electricity supply.
	 Clear or make safe any hazard caused by power lines or electricity distribution equipment.
	 Reconnect customers' electrical/ gas/ water/wastewater installations, when certified safe to do so and as conditions allow. Assist NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.
Engineering Services Functional Area	The roles and responsibilities for Engineering Services are outlined in the Engineering Services Supporting Plan and NSW State Flood Plan.
Environmental Services Functional Area	The roles and responsibilities for Environmental Services are outlined in the Environmental Services (ENVIROPLAN) Supporting Plan.
Floodplain Management Australia	The roles and responsibilities for Floodplain Management Australia are outlined in the NSW State Flood Plan.
Fire and Rescue NSW	The roles and responsibilities for Fire and Rescue NSW are outlined in the NSW State Flood Plan.
Forestry Corporation of NSW	The roles and responsibilities for Forestry Corporation of NSW are outlined in the NSW State Flood Plan.
Health Services Functional Area	The roles and responsibilities for Health Services are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan.
Local Emergency Operations	Monitor flood operations.
	• If requested, coordinate support for the NSW SES Incident Controller.
Local Emergency Management Officer (LEMO)	• If requested by the NSW SES Incident Controller, advise appropriate agencies and officers of the start of response operations.

AGENCY	RESPONSIBILITIES
Manly Hydraulics Laboratory (MHL)	The roles and responsibilities for Manly Hydraulic Laboratory are outlined in the NSW State Flood Plan.
Marine Rescue NSW	The roles and responsibilities for Marine Rescue NSW are outlined in the NSW State Flood Plan.
NSW Ambulance	The roles and responsibilities for NSW Ambulance are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan.
NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission	The roles and responsibilities for NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission are outlined in the NSW State Flood Plan.
NSW Department of Planning and Environment (Environment and Heritage Group)	The roles and responsibilities for NSW Department of Planning and Environment (Environment and Heritage Group) are outlined in the NSW State Flood Plan (referred to as DPIE EES).
NSW Department of Planning and Environment (Water)	The roles and responsibilities for NSW Department of Planning and Environment (Water) are outlined in the NSW State Flood Plan.
NSW Food Authority	The roles and responsibilities for NSW Food Authority are outlined in the Food Safety Emergency Sub Plan.
NSW National Parks and Wildlife Services	The roles and responsibilities for NSW National Parks and Wildlife Services are outlined in the NSW State Flood Plan.
NSW Police Force	The roles and responsibilities for NSW Police Force are outlined in the NSW State Flood Plan.
NSW Rural Fire Service	The roles and responsibilities for NSW Rural Fire Service are outlined in the NSW State Flood Plan.
Owners of Declared Dams within or upstream of the LGA	The roles and responsibilities for Owners of Declared Dams are outlined in the NSW State Flood Plan.
Public Information Services Functional Area	The roles and responsibilities for Public Information Services are outlined in the Public Information Services Supporting Plan and NSW State Flood. Plan.
Resilience NSW	The roles and responsibilities for Resilience NSW are outlined in the NSW State Flood Plan.
SEOCON/SEOC	The roles and responsibilities for the SEOCON/SEOC are outlined in the NSW State Flood Plan.
Surf Life Saving NSW	The roles and responsibilities for Surf Life Saving NSW are outlined in the NSW State Flood Plan.

AGENCY	RESPONSIBILITIES
Telecommunications Services Functional Area	The roles and responsibilities for Telecommunications Services are outlined in the Telecommunications Services (TELCOPLAN) Supporting Plan.
Transport for NSW	• Transport for NSW coordinates information on road conditions for emergency services access.
	• Transport for NSW coordinates the management of the road network across all modes of transport.
	 Transport for NSW in conjunction will assist NSW SES with the evacuation of at-risk communities by maintaining access and egress routes.
	 Assist NSW SES with the communication of flood warnings and information provision to the public through Live Traffic and Social Media according to the VMS protocols and procedures.
	• Assist NSW SES with identification of road infrastructure at risk of flooding.
Transport Services	The roles and responsibilities for Transport Services are outlined in the
Functional Area	Transport Services Functional Area Supporting Plan and NSW State Flood Plan.
VRA Rescue NSW	The roles and responsibilities for VRA Rescue NSW are outlined in the NSW State Flood Plan.
Water NSW	The roles and responsibilities for Water NSW are outlined in the NSW State Flood Plan.
Welfare Services Functional Area	The roles and responsibilities for Welfare Services are outlined in the Welfare Services Functional Area Supporting Plan and NSW State Flood Plan.

2 Appendix C – Community Specific Roles and Responsibilities

Community Monthons	
Community Wembers	Preparedness
	 Understand the potential risk and impact of flooding.
	 Prepare homes and property to reduce the impact of flooding.
	 Understand warnings and other triggers for action and the safest actions to take in a flood.
	 Households, institutions and businesses develop plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours.
	Have an emergency kit; and
	Be involved in local emergency planning processes.
	Recovery
	 Assist with community clean-up if required and able to do so. Participate in After Action Reviews if required.





HAZARD AND RISK IN SHELLHARBOUR

Volume 2 of the Illawarra Local Flood Plan

Last Update: January 2017



AUTHORISATION

The Hazard and Risk in Shellharbour has been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process. The information contained herein has been compiled from the latest available technical studies.

Approved

Manager Emergency Risk Management

16/1/17 Date:

Approved

1/h

NSW SES Illawarra South Coast Region Controller

Date: 10 Jan 2017

Tabled at LEMC

Date: 1 March 2017
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VERSION LIST

The following table lists all previously approved versions of this Volume.

Description	Date
Kiama/Shellharbour City Local Flood Plan – Annex A and Annex B	June 2008

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Shellharbour Unit Local Controller

NSW State Emergency Service

PO Box 195, Albion Park, NSW, 2527

Amendments promulgated in the amendments list below have been entered in this Volume.

Amendment Number	Description	Updated by	Date

Document Issue: Version 3-02052016

1 THE FLOOD AND COASTAL EROSION THREAT

1.1 OVERVIEW

- a. The Shellharbour City Council Local Government Area is located 80km south of Sydney and is situated on the coastal plain between the Illawarra Escarpment and the Tasman Sea (Map 1). The Wollongong Coast River Basin covers all of the Shellharbour City Council LGA (Map 2). The Minnamurra River forms the southern boundary of the LGA (1).
- b. The Shellharbour City LGA surrounds the southern and south eastern side of Lake Illawarra. Illawarra Regional Airport is located at Albion Park Rail, in the Shellharbour City LGA.

1.2 LANDFORMS AND RIVER SYSTEMS

- a. The Shellharbour Council area is located on the coastal plain between the Illawarra Escarpment and the Tasman Sea. A majority of the Local Government Area drains to Lake Illawarra before discharging to the Tasman Sea via the entrance at Windang. Lake Illawarra is a shallow coastal lake to the north of the Shellharbour LGA which shares its catchment with Wollongong LGA. The foreshore is generally populated with a mix of residential commercial and industrial development (2).
- b. Some of the significant watercourses draining to Lake Illawarra include Macquarie Rivulet (with Yellow Rock and Frazers Creek in the upper tributaries), Horsley Creek and Oakey Creek. Further south there are several other watercourses within the LGA including Bensons and Tongarra Creeks which flow to Elliot Lake/Little Lake at Warilla before also discharging to the Tasman Sea. The Minnamurra River is to the south of the LGA and shares its catchment with Kiama Council. These watercourses are all located within the Wollongong Coast River Basin (2).
- c. The Wollongong Coast River Basin is shown on Map 2.

1.3 STORAGE DAMS

a. There are six prescribed dams located with the Shellharbour LGA. Dam locations are shown on Maps 1 to 8.

Blackbutt Reserve (3)			
Owner / Operator	Shellharbour Council		
Description of Dam	The Blackbutt Dam is a storage reservoir, which was constructed for farming purposes in 1957. There is a small detention basin upstream of the Blackbutt Dam. It has a storage volume of approximately 18,000m3. It has a primary concrete lined spillway as well as a secondary grass lined spillway.		
Location	Blackbutt Dam is located within the Blackbutt Forest Reserve to the west of the Shellharbour town centre.		
Communities Downstream	This dam has a sunny day failure flood risk to 100 people downstream to its east affecting 65 residential properties. These properties are mainly in Parklands Drive, but there are also some properties within Ocean Beach Drive, Teal Place, Dryandra Way and Carvie Close, Shellharbour.		
Monitoring System	Telemetric Water level monitoring as well as seepage monitoring and piezometers.		
Warning System	No specific warning system installed.		
Other	Due to the proximity of dwellings to the dam there is little or no time to respond to a dam failure (As little as 7 minutes).		

 Table 1: Prescribed Dams in Shellharbour LGA; summary of information about each storage.

Oak Flats Reservoir (4)			
Owner / Operator	Sydney Water		
Description of Dam	Earth Fill embankment which is lined internally with concrete and is roofed with aluminium. It is part of Illawarra Water Supply network. It has a capacity of 56ML.		
Location	Located in Oak Flats and borders onto Pioneer Drive and is surrounded by private property. between Albatross Drive and Pioneer Drive, Blackbutt		
Communities Downstream	Surrounding streets and the Shellharbour square shopping Centre could also experience some flooding.		
Monitoring System	No Information		
Warning System	No Information		
Other	Is located in an elevated position above residential housing. There is no catchment area associated with the storage which is covered by a roof. Inflows are controlled through pipes and valves. However dam break could occur due to failure of the reservoir wall.		

St Joseph's School Retarding Basin			
Owner / Operator	Shellharbour City Council		
Description of Dam	Stormwater Detention Basin		
Location	Located within the St Joseph's Catholic High School grounds, Macquarie Street Albion Park. On Hazelton Creek		
Communities Downstream	No information		
Monitoring System	No information		
Warning System	No information		
Other	No information		

Shell Cove Major Detention Basin 1 (5)			
Owner / Operator	Shellharbour City Council		
Description of Dam	Earth fill flood detention basin with a 5ML storage on a sunny day and 33ML storage at dam crest level. It has an uncontrolled weir.		
Location	Is located 3.5km south of Shellharbour City Centre between Hayman Crescent and Norfolk Crescent, Shell Cove		
Communities Downstream	The population at risk downstream from failure of the basin is 13.2, affecting four houses to a depth up to 0.7m.		
Monitoring System	There is no permanent monitoring system in place; attendance at the dam for monitoring is triggered by a Severe Weather Warning.		
Warning System	No specific warning system installed.		
Other	During a PMF dam failure Hinchinbrook Drive and Shallows Drive would be inundated to a maximum depth of 1.0m and 0.7m respectively.		

Green Meadows Retarding Basin (6)			
Owner / Operator	Shellharbour City Council		
Description of Dam	Consists of two dry detention basins divided by the East-West link Road. The upper basin has a storage volume of 175,000m ³ and an emergency discharge weir 100m long which will operate in floods greater than 1% AEP. The lower basin has a storage volume of 21,000m ^{3.} It has its main outlets near Woollybutt Drive and into artificial channels within the residential area.		
Location	Cnr Woollybutt Drive and East-West Link Road, Albion Park Rail		
Communities Downstream	Dwellings have been constructed immediately downstream of the detention basins in Albion Park Rail.		
Monitoring System	Is an unattended basin but does have telemetered rainfall monitoring equipment installed.		
Warning System	No specific warning system installed		
Other	Given the proximity of dwellings to the Greenmeadows Basin, there will be little or no time to respond to an imminent or actual failure.		

Shellharbour City Centre Basin (7)			
Owner / Operator	Shellharbour City Council		
Description of Dam	Earth fill flood detention basin with 8.7ML storage capacity on a sunny day plus 41.3ML detention storage. It has an uncontrolled weir.		
Location	Minga Avenue, Shellharbour City Centre. Flow is into Oaky Gully which directs water generally to the north through Oak Flats and into Lake Illawarra		
Communities Downstream	Population at risk downstream is 86, with 28 houses potentially flood affected. This includes properties primarily on Jilba Place, Oak Flats		
Monitoring System	There is no permanent monitoring system in place; attendance at the dam for monitoring is triggered by a Severe Weather Warning.		
Warning System	There is no specific warning system installed.		
Other	Peak water level at New Lake Entrance Drive would occur 22-23 minutes after the initial dam break. This road could be flooded to 1.8m.		

1.4 WEATHER SYSTEMS AND FLOODING

- a. Flooding can occur at any time of year, but in different seasons it is triggered by different rain-producing mechanisms. There is a slight bias toward the January-June period as far as flood occurrence is concerned. Floods may result from:
 - i. Low-pressure systems located off the coast and producing moisture-laden onshore winds which, when triggered by orthographic rainfall resultant from the Illawarra Range, can produce very heavy rains. Such systems generally occur during summer. In February 1984, such a system produced serious flooding immediately to the north of the council area (2).
 - ii. Frontal systems crossing the council area from west to east. Such systems can pass at any time of year, but they are most common during the winter months (2).
 - iii. High-intensity, short-duration convective thunderstorms which occur during the summer months. These storms can cause sharp rises on minor creeks and flooding in towns and villages when artificial drainage systems surcharge (2).
 - iv. King or storm tides can cause inundation of low-lying coastal areas and hold up the escape of flood waters from streams to the sea (2).
- b. Average annual precipitation varies from less than 1,100 mm along the coast to more than 1,500 mm on the high ground in the west of the council area. Daily rainfall totals of more than 200 mm have been recorded on several occasions in the council area and at nearby locations. In February 1984, more than 500 mm fell in a single event, most of it in about nine hours over a portion of the catchment of the Macquarie Rivulet. Periods of near-constant rain for several days on end have also been recorded. More than 60% of the council area's rain occurs during the summer and autumn quarters, most of it in February, March and April (2).
- c. Floods may occur at any time of year, but they are more common in the late summer-early winter period (January to June) than at other times. Most of the more serious floods in the council area have been caused by storm durations between 6 and 24 hours (2).

1.5 CHARACTERISTICS OF FLOODING

- a. Shellharbour City LGA is affected primarily by flash flooding. Overland flooding is known to occur across the LGA and flooding from Lake Illawarra occurs in suburbs adjacent to the lake (8).
- b. Floodways in the Shellharbour LGA in events below the 1% AEP are generally limited to creeks, waterways, drainage structures and rural crossings (9) (10).

- c. In events above the 1% AEP Floodways are located in Horsley Creek, Oak Flats Creek, Tongarra Creek, Bensons Creek and adjacent low lying lands. Additionally open swale drains throughout Albion Park Rail, the rail embankment at Albion Park Rail and properties and located near George Street, Warilla form part of the floodway. The floodway also crosses the Princes Highway at the Albion Park train station and Shellharbour Road at George Street (9) (10).
- d. Flood storage areas are typically located adjacent to a floodway and affect low lying properties. Flood storage areas are found throughout Albion Park Rail, Oak Flats, Warilla and Barrack Heights during all flood events (9) (10).
- e. Flood fringe areas are located in Oak Flats below the 1% AEP event, sections of Albion Park Rail and the Illawarra Regional Airport and Shadforth Wetlands in all flooding events (9) (10).
- f. Flooding also occurs in Albion Park and Lake Illawarra however floodplain descriptions have not been provided.

1.6 FLOOD HISTORY

- a. 1984 Rainfall event caused Lake Illawarra to rise to a level of 1.9m AHD at the Lake Entrance (gauge no. unknown). This resulted in foreshore flooding and caused significant disruption to traffic flow surrounding the lake as well as some property inundation. This event was likened to the PMF event, however is actually slightly less than the 1% AEP event (Table 2).
- b. 1991 Lake Illawarra (gauge no. unknown) rose to a level of 1.8m AHD. The event was approximately equivalent to a 2% AEP event (Table 2). This mainly caused inundation of the foreshore, road closures and some property flooding (2).
- c. 21 March 2011 a total daily rainfall greater than 200mm, with hourly rates as high as 85.5mm lead to flash flooding across the Shellharbour City LGA. Gauge heights of 2 and 3 metres were recorded along the Macquarie Rivulet (gauge 214402). Forty five properties around Shellharbour experienced over flood flooding, along with 173 homes in the Surfrider Caravan Park. Many locations became isolated due to floodwaters impacting major roads throughout the area. One life was lost in Warilla as a result of the flash flooding. Based on flood heights in Lake Illawarra (gauge no. unknown), this was approximately a 5% AEP event (Table 2) (1).
- d. 2016 heavy rainfall, in combination with abnormally high tides lead to flooding occurring in low lying areas surrounding Lake Illawarra. The Surfrider Caravan Park and the Lake Windemere Caravan Park required evacuations. Based on flood heights in Lake Illawarra (gauge 214416) this was approximately a 10% AEP flooding event (Table 2).

Gauge Height (meters AHD)	Flood Probability (AEP %)	Estimated Average Recurrence Interval (ARI) (years)
2.84	PMF	PMF
1.98	1%	100
1.74	2%	50
1.55	5%	20
1.35	10%	10
1.2	20%	5
0.95	50%	2

Table 2: Expected Lake Illawarra Entrance Flood Levels related to modelled flood events (8)

Table 3: Historical Flood Levels at Lake Illawarra Entrance (gauge 214417)

Year	Height at Gauge (m AHD)	Estimated Average Recurrence Interval (ARI) (years)
1984 (8)	1.9	83
1975 (8)	1.8	62.5
1977 (8)	1.8	62.5
1991 (8)	1.8	62.5
1978 (8)	1.6	28
2011 (1)	1.6 (at Cudgeree Bay gauge 214416)	16
2016	1.58 (1.5 at Cudgeree Bay gauge 214416)	> 17
1974 (8)	>1.5	> 17.5
1919 (8)	>1.5	> 17.5
1930 (8)	>1.5	> 17.5
1959 (8)	>1.5	> 17.5
1943 (8)	>1.5	> 17.5
1988 (8)	1.5	17.5
1990 (8)	1.4	12.5
1998 (8)	1.2	5

1.7 FLOOD MITIGATION SYSTEMS

- a. There is one informal levee located around the Oak Flats Train Station carpark in the Shellharbour City LGA (Refer 2.3.7).
- b. There are three Detention / Retarding Basins within the Shellharbour LGA that can pose some risk to people and properties downstream (Refer Table 1). These are:
 - i. The Greenmeadows Detention Basin;
 - ii. Shellharbour City Basin and
 - iii. Shell Cove Major Detention Basin 1.

1.8 EXTREME FLOODING

- a. As far as is known, extreme flooding has not occurred in the Shellharbour Council City LGA areas since European settlement. Such flooding is possible, however, and floods more serious than the 1% AEP (`once-in-100-years') event can occur. Extreme floods can reach much greater heights than were recorded in earlier events. They also tend to be both faster to rise and more dangerous in terms of depth and velocity than previous floods. Such floods would quickly overwhelm the storage capacities of the existing flood detention basins and cause disastrous flooding downstream (2).
- b. The last major flood event on the Lake Illawarra floodplain was in 1991 where the lake rose to a level of 1.8m AHD. The event was approximately equivalent to a 2% AEP event. This mainly caused inundation of the foreshore, road closures and some property flooding (2).
- c. PMF During a PMF flooding event at Albion Park Rail, areas along the Lake Illawarra foreshore in Oak Flats, Mt Warrigal, Warilla and Lake Illawarra would experience inundation. During the PMF event, Macquarie Estate in Albion Park would become a high level flood island. Low lying areas in Albion Park, Warilla, Shellharbour Village and Barrack Point have historically been impacted by floodwaters and would be impacted during a PMF event (8) (1).

2 EFFECTS ON THE SHELLHARBOUR COMMUNITY

2.1 COMMUNITY PROFILE

Census Description	Shellharbour LGA	Albion Park	Albion Park Rail	Oak Flats
Total Persons	63,605	12,872	7003	6310
Aged 0-4 yrs.	4,298	987	490	361
Aged 5-14 yrs.	9,267	2,131	972	825
Aged 65 + yrs.	9,078	1,265	1030	1028
Of Indigenous Origin	1,929	272	289	164
Who do not speak English well	841	54	49	71
Have a need for assistance (profound/severe disability)	3,728	604	521	377
Living alone (Total)	4,637	573	527	514
Living alone (Aged 65+)	2,009	225	211	244
Residing in caravans, cabins or houseboats or improvised dwellings	432	6	7	3
Occupied Private Dwellings (Households)	22,437	4,103	2461	2331
No Motor Vehicle	1,584	138	160	154
Caravan, cabin, houseboat or improvised dwell	290	0	6	3
Rented via State or Housing Authority	1,675	87	184	20
Rented via Housing Co-Op or Community Church Group	85	11	12	6
No Internet Connection	5,053	651	539	567
Unoccupied Private Dwellings	1,467	201	128	161
Average persons per occupied dwelling	2.7	3	2.7	2.7
Average vehicles per occupied dwelling	1.8	2	1.7	1.7

 Table 4:
 Census of Housing and Population data for the Shellharbour Community (2011) (11)

Census Description	Warilla	Barrack Point	Lake Illawarra
Total Persons	6408	627	3087
Aged 0-4 yrs.	377	40	196
Aged 5-14 yrs.	807	91	325
Aged 65 + yrs.	1392	108	629
Of Indigenous Origin	268	13	117
Who do not speak English well	126	0	54
Have a need for assistance (profound/severe disability)	597	24	244
Living alone (Total)	783	71	526
Living alone (Aged 65+)	401	25	211
Residing in caravans, cabins or houseboats or improvised dwellings	351	57	0
Occupied Private Dwellings (Households)	2506	231	1383
No Motor Vehicle	368	15	221
Caravan, cabin, houseboat or improvised dwell	238	47	0
Rented via State or Housing Authority	463	0	227
Rented via Housing Co-Op or Community Church Group	16	0	10
No Internet Connection	869	59	504
Unoccupied Private Dwellings	190	35	131
Average persons per occupied dwelling	2.4	2.4	2.15
Average vehicles per occupied dwelling	1.3	1.6	1.2

SPECIFIC RISK AREAS - FLOOD

2.2 ALBION PARK RAIL

2.2.1 Community Overview

 Albion Park Rail is located on the south western edge of Lake Illawarra in the Shellharbour City LGA (Map 3). The Princes Highway and Illawarra Highway pass through Albion Park Rail. In 2011 the population was 7,003 with 2,641 dwellings (12).

2.2.2 Characteristics of Flooding

a. Albion Park Rail is affected by a combination of flash and overland flooding (10).

2.2.3 Flood Behaviour

1% AEP

- a. During a 1% AEP event fast flowing floodways develop within the Albion Park Rail Area. These primarily follow the major creeks and drains spilling into the adjacent low lying areas including (10):
 - Horsley Creek and low lying properties on Koona Street, Wooroo Street, Industrial Road, Casuarina Street, Burroo Street and Station Road;
 - ii. The unnamed creek that passes on the northern side of the Industrial Road complex, through Keith Bond Oval feeding into Horsley Creek;
 - The open formed swale drains located on Jarrah Way, Woollybutt Drive,
 Paperback Street and between Coachwood Drive and the Princes Highway;
 - iv. Kaylaur Reserve and the southern side of the rail embankment;
 - v. A floodway crosses the Princes Highway at the Albion Park train station.
- b. During a 1% AEP event the slower moving floodwaters accumulate within flood storage areas which are generally located adjacent to these floodways. Properties that may become part of these flood storage areas include those in the following streets:
 - Koona Street, Wooroo Street, Casuarina Street, Industrial Road, Station Road, Kaylaur Crescent, Nehme Avenue, Tongarra Road, Croome Road, Maple Street, Orchid Avenue and Durgadin Drive.
- c. The Green Meadows Detention Basin and the Albion Park Rail playing fields also become flood storage areas in the 1%AEP and PMF.
- Roads that act entirely as flood storage include Jarrah Way, Croome Road, Laurel Street, Coolibah Avenue, Acacia Avenue, Cedar Street, Woollybutt Drive, Melaleuca Road and the Princes Highway northbound (10).

- e. Other flood fringe areas that may also experience some inundation during a 1% AEP event include (10):
 - i. The Illawarra Regional Airport;
 - ii. Albion Park Rail Oval;
 - Properties located on Burroo Street, Wooroo Street, Koona Street, the Princes Highway, Hargraves Avenue, Kaylaur Crescent, Nehme Avenue, Industrial Road, Station Road, Tongarra Road, Gumnut Street, Ironbark Avenue, Currajong Place, Durgadin Drive, Colden Drive, Shaban Street and Shandon Circuit;
 - Properties located in the areas bounded by: Tongarra Road, Croome Road, Oak
 Street and Ash Avenue, and Woollybutt Drive, East West Link, Princes Highway,
 Corkwood Street, Coachwood Drive and Jarrah Way (10).

PMF

- f. During a PMF event an additional floodway also runs through the Greenmeadows Detention Basin located near Woollybutt Drive.
- g. During a PMF additional flood storage areas can also develop in Industrial Road, River Oak Road, Princes Highway, Tongarra Road, and the block bounded by Coachwood Drive, Jarrah Way and Paperback Street.
- In addition to the areas listed above, during the PMF event flood fringe areas are also located at Werrang Street, Karoo Street, Boonerah Street, Pioneer Drive, Black Street, Kimbeth Crescent, Figtree Street, Currajong Place and Eucalypt Place.

2.2.4 Classification of Floodplain

a. Albion Park Rail has Rising Road Access.

2.2.5 Inundation

- a. The number of properties affected by over floor flooding has not been identified.
- b. There are no flood gauges located in this area.

2.2.6 Isolation

a. Macquarie Shores Estate, accessed off Shearwater Boulevard becomes isolated in events above the 1% AEP due to flooding from Lake Illawarra. Isolation can be for up to 24 hours. This does not take into account flooding from Albion Creek (13).

2.2.7 Flood Mitigation Systems

a. Greens Meadow Detention Basin is located on the East West Link in Albion Park Rail. This detention basin has its primary discharge near Woollybutt Drive, however also discharges into artificial channels into the residential area downstream of the East West Link (14).

2.2.8 Dams

- a. Oaks Flats Reservoir is located upstream of Albion Park Rail, on Pioneer Drive in Oak Flats.
- Failure of the Green Meadows Detention Basin could impact the residential areas downstream (To the North of the East West link Road impacting areas near Woollybutt Drive and Jarrah Way, Albion Park Rail). Given the proximity of dwellings to the Greenmeadows Basin, there will be little or no time to respond to an imminent or actual failure (14).

2.2.9 At Risk Facilities

- a. Albion Park Rail Public School is located on Tongarra Road Albion Park. The lower end of the oval becomes inundated by floodwaters in events above the 2% AEP. The school buildings are not affected by floodwaters in any event.
- Warrigal Care aged care facility is located on Pine Street in Albion Park Rail. The south western side of the facility begins to become affected by floodwaters in the 5% AEP. In the PMF event the entire western side of the complex is affected by floodwaters.
- c. Refer to Annex 2 for further details of these at risk facilities.

2.2.10 Other Considerations

a. Shellharbour City Stadium and the Croome Road Sporting Complex are located immediately to the west of Albion Park, on Croome Road.

2.3 OAK FLATS

2.3.1 Community Overview

a. Oak Flats is located on the south western shore of Lake Illawarra (Map 4). The population of Oak Flats was 6,310 in 2011 (11).

2.3.2 Characteristics of Flooding

a. Oak Flats is affected by a combination of flash flooding and overland flooding from Lake Illawarra (2).

2.3.3 Flood Behaviour

- a. During the 1% and PMF event, the unnamed creek flowing through Oak Flats into Horsley inlet acts as a floodway (10).
- b. During the PMF event, areas located adjacent to the unnamed creek become flood storage areas (10).
- c. All other flooding in events below the PMF are classified as flood fringe (10).

2.3.4 Classification of Floodplain

a. Oak Flats has Rising Road Access for all events up to the PMF (10) (13).

2.3.5 Inundation

Lake Illawarra

a. Inundation of low lying properties adjacent to Lake Illawarra on Reserve Road, The Boulevard, and The Esplanade occurs during 1% AEP and up to PMF events. Flooding also affects properties on Timbs Road, Leamington Road and Devonshire Crescent adjacent to Oaky Gully Creek. This is due to flooding from Lake Illawarra and does not take into account flooding that may occur from overland flows or flooding of the local waterways. The number of over floor affected properties is unknown (13).

Horsley Creek Catchment

 Inundation in Oak Flats occurs on low lying properties located in the areas adjacent to the unnamed creek on Lake Entrance Road, Pioneer Drive, Theodore Street, Lang Street, Cullen Street, Central Avenue, Hopetoun Street, Moore Street, Brigadoon Street, Camelot Place, Storey Street, Madden Street, Fisher Street, Miller Street and Industrial Road during all flooding events. The depth of water is all that changes between the 50% AEP and the PMF event. The number of affected properties is unknown (10).

2.3.6 Isolation

a. No properties in Oak Flats have been identified as becoming isolated in any events up to the PMF (13).

2.3.7 Flood Mitigation Systems

a. An earth constructed levee is located around the Oak Flats Train Station carpark to protect the carpark from floodwaters. There is currently no further information on this levee (10).

2.3.8 Dams

- a. Oak Flats Reservoir is located upstream of Oak Flats, on Pioneer Drive. This is a water supply reservoir that is supplied by gravity feed. It would not normally be affected by flooding as it is roofed and does not have its own catchment area. However overflows from the roof guttering during an extreme rainfall event could theoretically result in erosion of the embankment leading to dam wall failure (4).
- b. Streets potentially at risk from failure of one of the fours dam walls include: Cygnet Ave, New lake Entrance Rd, The Boulevard, Pioneer Drive, Brigadoon Court, College Ave, Glider Ave, and Bensen Ave. Shellharbour square shopping Centre could also experience some flooding with flooding approximately 30 minutes after a major breach of the southern or western walls (4). Since the Dam Safety Emergency Plan was written, further residential development has been built surrounding the reservoir such that additional properties and streets are at risk in addition to those listed above.
- c. Due to the proximity of residential dwellings to the reservoir, there would be little warning of dam failure (4).

2.3.9 At Risk Facilities

- a. Oak Flats High School is located in Oak Flats. It is not affected by flooding from Lake Illawarra, however the main access on The Esplanade may be closed by flooding in the PMF event (13).
- b. Corpus Christi Catholic High School is located in Oak Flats. The school was constructed after the flood study was completed so accuracy of flooding is unknown.
 It is however located in a flood prone area (10).

2.3.10 Other Considerations

- a. Oak Flats Railway Station is located in Oak Flats. The carpark area is protected from floodwaters by an earth built levee (13).
- B. Lake Illawarra LAC is located in Oak Flats. Access to the station may be affected by flooding in the PMF event (15).

2.4 WARILLA/BARRACK POINT

2.4.1 Community Overview

a. Warilla and Barrack Point are located on the eastern side of the Shellharbour City LGA adjacent to the Pacific Ocean (Maps 5 and 6). In 2011 Warilla had a population of 6,408 and Barrack Point had a population of 627 (11).

2.4.2 Characteristics of Flooding

a. Warilla and Barrack Point are affected by flash flooding (9).

2.4.3 Flood Behaviour

Below 5% AEP

- a. In events below the 5% AEP the floodway is contained to Tongarra and Bensons Creeks (11).
- In events below the 5% AEP flood storage areas are located adjacent to the floodways in: Lake Windemere Caravan Park, Surfrider Caravan Park, Oaklands Park, Sunset Avenue, George Street, Joan Avenue, Terry Street and properties located between O'Neill Street/Johnston Street and Lake Entrance Road (11).
- c. Flood fringe areas in events below the 5% AEP event are located on Jason Avenue, Brian Avenue, Woodford Avenue and Benaud Crescent (11).

1% AEP

- d. During the 1% AEP Shellharbour Road, George Street, Lake Entrance Road and some local surrounding streets also act as part of the floodway. This is mainly due to drainage issues (9).
- e. Flood storage areas in the 1% AEP also include: the Shellharbour Sewerage Works, Iluka Road, Jason Avenue, Headland Parade, Osbourne Parade, Sunset Avenue, Oakleigh Park, Lake Windemere Caravan Park and Warilla Bowling and Recreation Park, properties located east of Shellharbour Road between Terry Avenue and Woodford Avenue (including properties located along Osborne Parade) and properties located in the area bounded by Shellharbour Road, Lake Entrance Road and Benaud Crescent (9).
- f. Flood fringe areas in the 1% AEP are located adjacent to the flood storage areas on Brian Avenue, Belfast Avenue and Antrim Avenue (9).

PMF

g. PMF – During the PMF event Tongarra Creek and Bensons Creek act as a floodway. The low lying areas adjacent to Tongarra Creek also act as a floodway, including the Shadforth wetlands, Shellharbour Sewerage Treatment Works, Surfrider Caravan Park, Warilla Bowls and Recreation Club and properties located on Bass Street and Headland Parade. The low lying areas adjacent to Bensons Creek also form part of the floodway. These include Lake Windemere Caravan Park, Oakleigh Park, Warilla Sports Club, properties located east of Shellharbour Road, between Terry Avenue and Woodford Avenue, including properties located along Osborne Parade and properties located in the area bounded by Shellharbour Road, Lake Entrance Road and Benaud Crescent. Some properties located near the corner of The Kingsway and Pleasant Avenue, adjacent to Bensons Creek may also form part of the floodway (9).

- During the PMF event flood storage areas are located adjacent to the floodway and also may affect properties located on Sunset Avenue, McGregor Avenue and properties located in the area bounded by Andrew Crescent, Benaud Crescent Lake Entrance Road and Johnston Street (9).
- i. Flood fringe areas in the PMF event are located on Ocean Beach Drive, Junction Road and within the Shadforth wetlands (9).

2.4.4 Classification of Floodplain

a. Warilla and Barrack Point have Rising Road Access in all events up to the PMF (9).

2.4.5 Inundation

- a. In events below the 5% AEP inundation may occur in Lake Windemere Caravan Park, Surfrider Caravan Park, Oaklands Park, Sunset Avenue, George Street, Joan Avenue, Terry Street, Jason Avenue, Brian Avenue, Woodford Avenue, Benaud Crescent and properties located between O'Neill Street/Johnston Street and Lake Entrance Road (9).
- b. 1% AEP The low lying areas adjacent to Tongarra and Bensons Creeks may experience inundations. These include Shellharbour Sewerage Treatment Works, Surfrider Caravan Park, Warilla Bowls and Recreation Club, Lake Windemere Caravan Park, Oakleigh Park, Headland Parade, Sunset Avenue, properties located east of Shellharbour Road between Terry Avenue and Woodford Avenue (including properties located along Osborne Parade), properties located in the area bounded by Shellharbour Road, Lake Entrance Road and Benaud Crescent (9).
- c. PMF –In addition to those areas already flood affected in a 1% AEP, low lying properties on Ocean Beach Drive, Junction Road, and, McGregor Avenue, would also be flood affected in a PMF (9).
- d. Properties experiencing over floor flooding have not been identified.

2.4.6 Isolation

a. There are no known isolations in Warilla or Barrack Point (9).

2.4.7 Flood Mitigation Systems

 An embankment upstream of Tongarra Creek, adjacent to Shellharbour Road prevents salt water migration. It also includes a supplementary weir which is set at 2.7mAHD (9).

2.4.8 Dams

- a. Blackbutt Dam is located upstream of Barrack Point. In the event of a wall failure, water will enter the Tongarra Creek System.
- b. This dam has a sunny day failure flood risk to 100 people downstream to its east affecting 65 residential properties. These properties are mainly in Parklands Drive, but there are also some properties within Ocean Beach Drive, Teal Place, Dryandra Way and Carvie Close, Shellharbour (3).
- c. Due to the proximity of dwellings to the dam there is little or no time to respond to a dam failure (As little as 7 minutes) (3).

2.4.9 At Risk Facilities

- a. **The Surfrider Caravan Park** is located on Junction Road in Barrack Point and is affected by floodwaters in events above the 20% AEP. The caravan park experiences total inundation in events above the 1% AEP (9).
- b. **The Lake Windemere Caravan Park** is located on Osborne Parade in Warilla and is affected by floodwaters in events above the 20% AEP. The Caravan Park experiences total inundation in the PMF event (9).
- c. **Amity College Illawarra Campus** is located on Shellharbour Road and is affected by flooding in events above the 20% AEP (9).
- d. **Warilla Neighbourhood Centre** is located on Benaud Crescent and is affected by floodwaters in events above the 20% AEP (9).
- e. **The Warrigal Care Aged Care Facility** is located on Arcadia Street in Warilla. The eastern side of the facility, on the eastern side of Bensons Creek, is affected by floodwaters in events above the 20% AEP. The western side of the facility, on the western side of Bensons Creek, is affected by floodwaters in events above the 1% AEP (9).
- f. **The Shellharbour Sewage Treatment Works** located in the Barracks Swamp on Junction Road and is affected by flooding in events above the 20 % AEP. It experiences total inundation in the PMF event (11).
- g. Refer to Annex 2 for further details on at Risk facilities.

2.4.10 Other Considerations

A. No other known.

2.5 ALBION PARK

2.5.1 Community Overview

- a. Albion Park is located 7km to the west of the Shellharbour City Centre (Map 7). The town is surrounded by rural farmlands, with the Illawarra escarpment to the west, and flood prone lands to the north and east.
- b. The population of Albion Park was 12,872 in 2011 (11).

2.5.2 Characteristics of Flooding

a. Historically Albion Park is affected by flash flooding and overland flooding.

2.5.3 Flood Behaviour

a. Unknown.

2.5.4 Classification of Floodplain

- a. Albion Park has Rising Road Access in the 1% AEP event (15).
- b. The suburb of Tullimbar has Overland Access in the 1% AEP event, although historically this begins at a much lower unknown flood level (15).

2.5.5 Inundation

- During the 1% AEP The Illawarra Highway, to the west and north of Albion Park, Tongarra Road to the east, Terry Street, Calderwood Road, Church Street and Taylor Road and experience inundation (15).
- b. During the 1% AEP event low lying properties on Polock Crescent, Tripoli Way, Hamilton Road, Taylor Road, Terry Road, Tongarra Road, McGrath Lane, Webb Lane, O'Gorman Street, Cawdell Drive, Russell Street, Church Street, Fraser Crescent, Badgery Street, Centenary Road, Wiley Street, Mayo Crescent and Propane Street experience inundation (15).
- c. The number of properties affected by over floor flooding is unknown.

2.5.6 Isolation

a. Tullimbar becomes isolated by road in the 1% AEP event however isolation is known to occur at a much lower flood height. The last isolation occurred in the June 2016 event (15).

2.5.7 Flood Mitigation Systems

a. St Joseph's School Retarding Basin is located in Albion Park on Macquarie Street. There is currently no Dam Safety Emergency Plan for this Basin.

2.5.8 Dams

a. There are no dams located upstream of Albion Park.

2.5.9 At Risk Facilities

- a. **St Pauls Catholic Primary School** is located on Tongarra Road at Albion Park. Flood impacts are currently unconfirmed.
- b. **St Joseph's Catholic High School** is located on Macquarie Street in Albion Park. Flood impacts are currently unconfirmed.
- c. **Albion Park Public School** is located on Tongarra Road in Albion Park and is affected by flooding in the 1% AEP event (15).
- d. **Albion Park High School** is located on Church Street in Albion Park and is affected by flooding in the 1% AEP event (15).
- e. **Tullimbar Public School** is located on Exeter Place in Tullimbar and is affected by flooding in the 1% AEP event (15).
- f. Refer to Annex 2 for further details on at Risk facilities.

2.5.10 Other Considerations

a. No other known considerations.

2.6 LAKE ILLAWARRA

2.6.1 Community Overview

a. Lake Illawarra is a suburb of the Shellharbour City LGA and is located on the southern side of the Lake Illawarra entrance (Map 8). The population was 3,119 in 2006.

2.6.2 Characteristics of Flooding

a. Lake Illawarra is affected by overland flooding.

2.6.3 Flood Behaviour

a. Unknown.

2.6.4 Classification of Floodplain

a. Lake Illawarra has Rising Road Access in all events up to the PMF (13).

2.6.5 Inundation

- a. In the PMF event inundation occurs on low lying properties between Woolworths Avenue/ Commerce Drive to Lake Illawarra in the north, and Addison Avenue to Lake Illawarra in the north (13).
- b. During the 1% AEP event inundation of low lying properties occurs in the area from Grove Circuit to Reddall Parade, and Addison Avenue to Lake Illawarra (13).

2.6.6 Isolation

a. No isolations occur in Lake Illawarra (8).

2.6.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Lake Illawarra.

2.6.8 Dams

a. There are no dams located upstream of Lake Illawarra.

2.6.9 At Risk Facilities

- a. Lake Illawarra South Public School is located on Reddall Parade in Lake Illawarra and is affected by floodwaters in the 1% and PMF events. It is unknown at what level floodwaters begin to affect the school (8).
- b. Warrigal Care Retirement Village is located on Grove Circuit in Lake Illawarra and is affected by floodwaters in the 1% and PMF events. It is unknown at what level floodwaters begin to affect the village (8).

2.6.10 Other Considerations

a. No other considerations.

ROAD CLOSURES AND ISOLATED COMMUNITIES

2.7 ROAD CLOSURES

a. Table 5 lists roads liable to flooding in the Shellharbour LGA.

Table 5: Roads liable to flooding in Shellharbour LGA (2).

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Princes Highway	Between Mallee St and Airport Rd	Usually affected for the period of rainfall		
Princes Highway	Just south of Station Road	Usually affected for the period of rainfall		
Princes Highway	Various locations	Storm run-off building up resulting in inundation of numerous traffic lanes in either direction		
Station Road	Between Princes Hwy and Black St	Can be affected by flooding from Horsley Creek		
Illawarra Highway	Between Croome Lane and Taylor Street	Can be affected by flooding from Macquarie Rivulet. During intense rain periods may close for a number of days.		
Tongarra Road	Between Croome Rd and Stapleton Ave	Can be affected by flooding in Frazers Creek, or by backup flooding from Macquarie Rivulet		
Calderwood Road	Between and North Macquarie Road	Can be affected by flooding from Macquarie Rivulet		
Industrial Road	Various locations	Usually affected for the period of rainfall		
Local Roads	Including Jarrah Way, Croome Road, Laurel Street, Coolibah Avenue, Acacia Avenue, Cedar Street, Woollybutt Drive and Melaleuca Road			

2.8 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

a. Table 6 lists communities liable to isolation and potential periods of isolation. Information presented here is based on historical events and does not reflect the duration of isolation expected in larger and extreme events.

Table 6:	Potential Periods of Isolation for communities in the Shellharbour LGA experienced during past flood events.

Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	NOTES
Macquarie Shores Estate, Albion Park Rail			Up to 24 hours	Becomes isolated in events above the 1% AEP
Tullimbar, Albion Park				Becomes isolated in events below the 1% AEP

Note: Periods of isolation are a guide only. Liaison with the Local Controller and communities/residents involved is essential during periods of potential and actual isolation.

ANNEX 1: ILLAWARRA RIVER BASIN SCHEMATIC



ANNEX 2: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION

Table 7:	Facilities at risk of flooding	g in the Shellharbour LGA
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Facility Name	Street	Suburb	Comment
Schools			
Albion Park High School	Church Street	Albion Park	Affected by flooding in the 1% AEP (15).
Albion Park Public School	Tongarra Road	Albion Park	Affected by flooding in the 1% AEP (15).
Albion Park Rail Public School	Tongarra Rd and Hamilton Rd	Albion Park Rail	The lower end of the oval becomes inundated by floodwaters in events above the 2% AEP. The school buildings are not affected by floodwaters in any event.
Amity College Illawarra Campus	399 Shellharbour Road	Shellharbour	
Tullimbar Public School	Exeter Place	Tullimbar	Is affected by flooding in the 1% AEP event (15).
Lake Illawarra South Public School	119-129 Reddall Parade	Lake Illawarra	
Corpus Christi Catholic High School	Cnr Industrial Road and Moore Street	Oak Flats	The school was constructed after the flood study was completed so accuracy of flooding is unknown. It is however located in a flood prone area
Lake Illawarra High School	Reddall Parade	Lake Illawarra	
Oak Flats High School	The Esplanade	Oak Flats	It is not affected by flooding from Lake Illawarra, however the main access on The Esplanade may be closed by flooding in the PMF event (15).
Child Care Centres			
Lake Illawarra PCYC Kidzcare	156 Reddall Parade	Warilla	
Shellharbour City Family Day Care	103 Fisher Street	Oak Flats	
Shellharbour-Kiama Family Day Care	12-18 Adam Murray Way	Flinders	

Facility Name	Street	Suburb	Comment
Warilla Occasional Childcare Centre	14 Belfast Avenue	Warilla	
Facilities for the aged and/or infirm			
Warrigal Care Lake Illawarra	Grove Circuit	Lake Illawarra	
Warrigal Care Albion Park Rail	2 Pine Street	Albion Park Rail	
Warrigal Care Warilla	1 Arcadia Street	Warilla	Is affected in events above 20% (eastern side) and above 1% (western side)
Other			
Warilla Neighbourhood Centre	Benaud Crescent		Affected by floodwaters in events above the 20% AEP
Utilities and infrastructure			
Illawarra Airport			A 1% AEP flood on the rivulet would cause water to flow across the Albion Park Aerodrome, which could potentially close the runways. In such a flood, water would enter the Albion Creek catchment and close the Princes Highway.
Oak Flats Railway Station	Off Stanford Drive	Oak Flats	Carpark area located on the northern side of the rail line is protected by an earth levee
Warilla Telephone Exchange	125 Shellharbour Road	Warilla	
Shellharbour Wastewater Treatment Plant	92 Junction Road	Shellharbour	Located in Barracks Swamp and is affected by flooding in events above the 20% AEP. It is completely inundated in a PMF.
Camping Ground / Caravan Parks			
Lake Windemere Caravan Park	120 Osborne Parade	Warilla	
Surf Rider Caravan Park	Junction Rd	Barrack Point	

Note: This list is not exhaustive. It was based on the best information at the time.









MAP 3: ALBION PARK RAIL TOWN MAP



MAP 4: OAK FLATS TOWN MAP



MAP 5: WARILLA TOWN MAP



MAP 6: BARRACK POINT TOWN MAP


MAP 7: ALBION PARK TOWN MAP



MAP 8: LAKE ILLAWARRA TOWN MAP



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SES RESPONSE ARRANGEMENTS FOR KIAMA-SHELLHARBOUR

Volume 3 of the Illawarra Local Flood Plan

Last Update: June 2008



ANNEX C - EFFECTS OF FLOODING ON THE KIAMA COMMUNITY

Community Profile

Census Description	Total LGA	Kiama	Gerringong	Gerroa	Jamberoo Village
Total Persons	18,988	12,288	3,588	475	937
Total Dwellings	6,818	4,553	1,219	188	312
Total persons aged 65 years and over	3,573	2,299	721	122	144
Total persons aged below 15 years	3,589	2,284	754	66	208
Total persons of indigenous origin	219	123	69	3	9
Total persons using Internet	4,515	2,958	789	119	230
Single parent families	650	464	109	16	35
Persons living alone	1,536	1,061	285	53	44
Total persons who do not speak English well	53	42	3	3	0
Total persons who lived at a different address 5 years ago	5,462	3,573	1,086	181	210
Households without vehicles	416	311	82	9	8
Total persons residing in caravans, cabins or houseboats	58	40	0	10	0
Have a disability requiring assistance	849	506	253	26	30
Average household size	3	3	3	2	3

Source: Australian Census of Housing and Population 2006

Specific Risk Areas

1. There are few records of flooding and its consequences, but floods are relatively infrequent and usually not severe. Inundation of low-lying farm lands along the lower Minnamurra River and in Terragong Swamp, in the Omega, Toolijooa, Rose Valley, Willow Vale, Broughton Creek areas and in Foys Swamp. Such flooding requires the lifting of pumps and the movement of farm animals.

- 2. Inundation of low-lying properties in villages and towns as a result of the surcharging of drains. Small numbers of houses can experience inundation of basements and floors.
- 3. On very rare occasions, small numbers of evacuations or rescues may be necessary.

Road Closures

4. The following roads within the Kiama Local Government Area are flood liable.

Road	Affected at	Comments/Implications
Princes Hwy	At Omega Flat	Closure is infrequent and brief at this point and is usually restricted to light vehicles.
Kiama - Jamberoo Road (Main Road 264)	At Colyers, Fountaindale, Jerrara and Spring creeks	Usually for the period of intense rain fall with a number of hours after.
Albion Park – Jamberoo Road Main Road 264 & 266)	At Hyams and Turpentine creeks,	Usually for the period of intense rain fall with a number of hours after.
Roads across the lower reaches of the Minnamurra River	Including: Minnamurra Lane, Factory Lane, Browns Lane and Swamp Rd.	Usually for the period of intense rain fall with a number of hours after. Swamp Rd can be non-trafficable for periods of up to a week.
Numerous other local roads	Including: Falls Rd, Wyalla Rd, Curramore Rd, Fountaindale Rd, Mt Brandon Rd and Foxground Rd at creek crossings and causeways	Usually for the period of intense rain fall with a number of hours after.
Fern St	Between the Princes Highway (at Omega) and Gerringong	Sometimes for more than 12 hours.

5. In addition, roads can be cut by landslides during periods of heavy rain. This has occurred on the Princes Highway at Mt Pleasant and at several locations on Jamberoo Mountain Rd.

ANNEX D - GAUGES MONITORED BY THE KIAMA / SHELLHARBOUR SES LOCAL HEADQUARTERS

Gauge Name	Туре	AWRC No	Stream	Flood Classification		ication	Reading Arrangements
				Min	Mod	Maj	
Macquarie Rivulet – Albion Park	Automatic	214003	Macquarie Rivulet				Manly Hydraulics Website
Macquarie Rivulet – Princes Hwy		214402	Macquarie Rivulet				DWE
Lake Illawarra – Cudgeree Bay	Automatic	966060					Manly Hydraulics Website
Little Lake	Automatic						Manly Hydraulics Website
Tongarra		214002	Tongarra Creek				DWE
Jamberoo		214004	Minnamurra River				DWE

ANNEX E - DISSEMINATION OF SES FLOOD BULLETINS

The Illawarra South Coast SES Region Headquarters distributes SES Flood Bulletins and other flood related information (including Flood Warnings) to the following regional media outlets:

Television Stations:

Station	Location
WIN TV	Wollongong
Prime TV	Berkeley
Capital TEN	Canberra, ACT
Southern Cross TEN	Warrawong
ABC TV	Wollongong
SBS	Artarmon

Radio Stations:

Station	Location	Frequency
i98 Radio	Wollongong	98.1 FM
Wave FM	Warrawong	96.5 FM
ABC Radio Illawarra	Wollongong	97.3 FM
Power FM	Nowra	94.9 FM
Ninefourone FM	Coniston	94.1 FM
VOX FM	Wollongong	106.9 FM

Newspapers:

Name	Location
Illawarra Mercury	Wollongong

Other Agencies:

Name	Location
Shellharbour City Council.	Shellharbour
The Council for the Municipality of Kiama	Kiama
NSW Police Southern Region Command	Wollongong
SES Local Controller	Kiama
SES Local Controller	Shellharbour
RTA – Southern Region	Wollongong
NSW Ambulance Service - Southern Region Control Centre	Wollongong
NSW Fire Brigades – Illawarra Area Command	Wollongong
NSW Rural Fire Service – South Region East	Homebush Bay
Dept of Community Services – Kiama/Shellharbour Local Area	Shellharbour

ANNEX F - TEMPLATE EVACUATION WARNING MESSAGE FOR [ENTER NAME OF AREA]

Evacuation Warning f	or []
Date/Time of Issue:	[]
Authorised By:	[]

[Insert details of current and forecast flood situation]]

It is recommended that you prepare to evacuate/for evacuation within the next [] hours. If you leave it later, the roads may be congested or closed.

To prepare for evacuation, you should:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. Some items may be able to be placed in ceilings.
- Gather medicines, personal and financial documents and mementos together to take with you.
- Listen to radio stations [enter station] for further information and to confirm this warning.
- If possible, check to see whether your neighbours need help.
- Make arrangements for care of pets or companion animals.

If evacuation is necessary:

- Turn off the electricity, gas and water.
- Take three days' supply of clothes with you.
- If you have a car, drive to the evacuation centre at [] (specify route if appropriate).
- If you don't have a car, buses will operate on normal routes. Special transport can also be provided on request if necessary, telephone [].
- So that you can be accounted for, it is important that you register at the evacuation centre.
- After registering, you may go to the house of a friend or relative. Alternatively, accommodation will be arranged for you.
- The Police will provide security for your property while you are away.

ANNEX G - ARRANGEMENTS FOR THE EVACUATION OF CARAVAN PARKS AND THE RELOCATION OF CARAVANS

General

1. The following caravan parks are flood liable:

Shellharbour

- a. Lake Windemere Caravan Park: from Bensons Creek.
- b. Oakleigh Caravan Park
- c. Surfrider Caravan Park

Kiama

- d. Easts Beach Caravan Park
- e. Kendalls Beach Caravan Park

Caravan Parks

- 1. Flooding of low-lying caravan parks at Kendalls and Easts beaches as a result of sea-water invasion and local drainage (including flooding of Munna Munnora Creek in the case of East Beach). Such flooding is rare, having last occurred in the mid-1970s.
- 2. Gerroa Shores and Seven Mile Beach Caravan Park at Gerroa experiences flooding due to Crooked River estuarine flooding. Such flooding is rare and only occurs when the river entrance is blocked by Sand from Seven Mile Beach. Minor nuisance flooding of some van and caravan sites will occur until the river entrance breaks through into the ocean.
- 3. In the absence of a gauge specific flood warning, Flood Watches and Severe Weather Warnings should be heeded in order to make adequate preparations for the possibility of flooding.
- 4. Tidal Surge is a potential threat for these caravan parks. Predictive capacity is limited due to the qualitative nature of Severe Weather Warnings.

Advising Procedures

- 5. Caravan Park proprietors are encouraged to ensure that the owners and occupiers of caravans are:
 - a. Made aware that the caravan park is flood liable by:

- Handing a printed notice to occupiers taking up residence. The notice will indicate that the caravan park is liable to flooding and outline the evacuation and van relocation arrangements as detailed in this Annex.
- Displaying this notice prominently in each van.
- b. Made aware that if they are expecting to be absent from their vans for extended periods, they must:
 - Provide the manager with a key; in a sealed envelope; to the van.
 - Provide a contact address and telephone number.
 - Inform the manager if a vehicle will be required to relocate the van during flood time.
 - Leave any mobile van in a condition allowing it to be towed in an emergency (ie: tyres inflated, jacks wound up, personal effects secured and annexes and lines for water, sewer, electricity and gas readily detachable).
- c. Informed when a flood is rising. At this time, occupiers will be advised to:
 - Ensure that they have spare batteries for their radios.
 - Listen to a local radio station for updated flood information.
 - Prepare for evacuation and van relocation.
- 6. The SES Local Operations Controller will ensure that the managers of caravan parks are advised of flood watches or severe weather warnings and the details of any evacuation order.

Evacuation of Occupants and Relocation of Vans

- 7. Caravan park proprietors are encouraged to install flood depth indicators and road alignment markers within their caravan parks.
- 8. When an evacuation order is given:
 - a. Occupiers of non-movable vans should:
 - Secure their vans by tying them down to prevent flotation.
 - Isolate power to their vans.
 - Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.
 - Lift the other contents of their vans as high as possible within the van.

- Move to a designated evacuation centre at the Police-Citizens Youth Club if they have their own transport, or move to the caravan office to await transport.
- b. Where possible, vans that can be moved will be relocated by their owners. Park managers will arrange for the relocation of mobile vans whose owners do not have a vehicle. Council and SES personnel will assist if required and may be able to provide additional vehicles. Vans are to be moved to the following locations:
 - Easts Beach Caravan Park: movement from low ground to high land within the park. Relocations will be co-ordinated by the park proprietor with the assistance of the SES.
 - Kendalls Beach Caravan Park: movement to local streets and Bonaira St Reserve. Relocations will be co-ordinated by the council with the assistance of the SES.
- 9. Caravan park managers are encouraged to:
 - a. Ensure that their caravan park is capable of being evacuated within a reasonable timeframe. Guidance can be provided by SES during the planning stages.
 - b. Advise the SES Local Operations Controller of:
 - The number of people requiring transport.
 - Details of any medical evacuations required.
 - Whether additional assistance is required to effect the evacuation.
 - c. Check that no people remain in non-removable vans that are likely to be inundated.
 - d. Inform the SES Local Operations Controller when the evacuation of the caravan park has been completed.
 - e. Provide the SES Local Operations Controller with a register of people that have been evacuated.

Return of Occupants and Vans

- 10. The SES Local Operations Controller, using council resources as necessary, will advise when it is safe for the caravan parks to be re-occupied.
- 11. Vans will be towed back to the caravan park(s) by van owners or by vehicles and drivers arranged by the park managers. Again, Council and SES personnel will assist if available.

ANNEX H - EVACUATION ARRANGEMENTS FOR GENERAL EVACUATIONS

Background

- 1. Some parts of Kiama/Shellharbour may require short-term evacuations because of flooding from river systems or their tributaries within the following areas:
 - a. Albion Park
 - b. Albion Park Rail
- 2. Evacuations may be necessary because of oceanic flooding within the following areas:
 - a. Warilla
 - b. Barrack Point
 - c. Shellharbour
 - d. Minnamurra
 - e. Gerroa

Arrangements

3. **Control.** Evacuations will be controlled by SES during floods, the threat of coastal erosion or threat of oceanic inundation.

Within their respective council areas, evacuations will be controlled by the SES Local Operations Controller and conducted by supporting agency personnel as outlined in <u>Part 2 - Responsibilities.</u>

- 4. **Conduct**. Evacuations will be conducted in four phases:
 - a. Phase 1 Warning
 - b. Phase 2 Withdrawal
 - c. Phase 3 Shelter
 - d. Phase 4 Return
 - Decision to evacuate.

5.

a. <u>The decision to evacuate</u>. The responsibility for issuing any general evacuation order during flooding rests with the SES Local Operations Controllers who exercises their authority in accordance with Section 22(1) of The State Emergency Service Act 1989. However, the decision to evacuate will usually be made after consultation with the Local

Emergency Operations Controller and the SES Region Operations Controller.

- b. <u>When evacuation should occur.</u> As far as possible, evacuation will be carried out before inundation occurs.
- c. <u>Self-motivated evacuation</u>. Some residents may make their own decision to evacuate and move to alternative accommodation using their own transport. Such evacuees must be advised via the media to inform the Police or the SES of their evacuation and their temporary address.
- d. **Evacuation Centres.** When evacuations are likely, the SES Local Operations Controller will advise relevant DoCS personnel so that evacuation centres and welfare support can be set up in timely fashion.

6. **PHASE 1 - Warning**

- a. **Evacuation warnings.** On the receipt of flood intelligence or other warning products indicating the possibility of flooding, the SES Local Operations Controller will consult as necessary with other emergency managers to determine the level of the threat and the need to consider evacuations. As soon as possible after the decision to evacuate is made, the SES Local Operations Controller will issue evacuation warnings to the 'at risk' residents, indicating what people should do before evacuating and when actually doing so.
- b. **Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at <u>Annex F</u>. These are disseminated via:
 - The radio and TV stations listed in Annex D.
 - SES Flood Bulletins
 - Door-knocks by emergency service personnel.
 - Public address systems from emergency service vehicles.
 - Telephone.

7. PHASE 2 – Withdrawal

- a. **Introduction.** Withdrawal involves the actual removal of the community/individuals from dangerous or potentially dangerous areas to safer areas.
- b. **Movement.** Evacuees are to be encouraged to move using their own transport where possible. The SES Local Operations Controllers will arrange transport for those people without their own vehicles.

Some residents may make their own decision to evacuate and move to alternative accommodation using their own transport. Such evacuees must be advised via the media to inform the Police or the SES of their evacuation and their temporary address.

- c. **Evacuation routes.** Evacuation routes will be communicated to evacuees and management of movement will be vested into the relevant Councils and/or NSW Police undertaking support roles.
- d. **Animals.** Assistance animals (guide dogs, hearing assistance animals, etc) will remain in the care of their owners throughout the evacuation. This includes transport and access into evacuation centres etc. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners when being transported via aircraft or flood rescue boats. DPI will make separate arrangements for the evacuation and care of companion animals.
- e. **Doorknocking.** Field teams conducting doorknocks will record and report back the following information back to the Operations Centre:
 - Addresses and locations of houses doorknocked and/or evacuated.
 - The number of occupants.
 - Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).
 - Details of residents who refuse to comply with the evacuation order.

The field teams will then carry out evacuations as required. Details of these premises will be passed to the Lake Illawarra Local Area Command.

- f. **Refusal to evacuate.** Field teams should not waste time dealing with people who are reluctant or refuse to comply with any evacuation order. These cases should be referred to the Local Emergency Management Operations Controller who will arrange for Police to ensure their evacuation.
- g. **Identification of evacuated premises**. An appropriate marking visible from the street is to be used, as directed, to identify those premises that have been evacuated. Details of these premises will be passed to the SES Operations Centre and Lake Illawarra Local Area Command
- h. **Security.** The NSW Police will provide security for evacuated premises/areas.
- i. **Transport and Storage**. Transport and storage of furniture from flood threatened properties will be arranged as time and resources permit.
- j. **Caravan Parks.** The caravan parks known to be flood liable are listed in <u>Annex G</u>, along with arrangements relating to the evacuation of residents and the removal of caravans.

8. **PHASE 3 – Shelter**

a. **Evacuation centres.** Evacuees will be taken to or advised to go to the nearest accessible evacuation centre, which may initially be established at the direction of the SES Local Operations Controller but which will be

managed as soon as possible by the Department of Community Services. Any or all of the following sites may be used as evacuation centres:

Evacuation centres are listed in the Shellharbour/Kiama Local Disaster Plan.

- b. Action on arrival. On arrival, evacuees will be:
 - registered;
 - medically checked, if necessary; and
 - provided with their immediate welfare needs.
- c. **Registration.** NSW Police will ensure that evacuees and other displaced persons are registered in accordance with the standard Disaster Victim Registration procedures

Assistance with registration will be provided by persons who have the appropriate training/oversight and capabilities as determined by NSW Police

d. **Animal shelter compounds.** Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees. These facilities will be coordinated by the Department of Primary Industries (DPI).

Assistance animals are to accompany and/or remain in the care of their owners at all times. This includes transport and access into evacuation centres etc.

e. Assistance for Animals.

Matters relating to the welfare of livestock, companion animals and wildlife (including feeding, rescue and emergency housing) are to be referred to Department of Primary Industries (DPI).

Requests for emergency supply and/or delivery of fodder to stranded livestock, or for livestock

9. PHASE 4 - Return

- a. Once it is considered safe to do so, the SES Local Operations Controller will authorise the return of evacuees to their normal or alternative place of residence. This decision will be made in consultation with appropriate officers in regard to matters such as the electrical safety of buildings.
- b. The return will be controlled by the SES Local Operations Controller and may be conducted, at his/her request, by DoCS

ANNEX I - MANAGEMENT OF COASTAL EROSION / INUNDATION

1. THE PROBLEM AND THE AREAS AT RISK

- 1.1 The coastal erosion / inundation problem in the local government area takes two forms:
 - a. Undercutting of the seashore, threatening the collapse of dwellings and other buildings.
 - b. The potential breaking through of the dunes by seawater, causing flooding and isolation of property on the landward side of the dunes.
- 1.2 The most severe problems of coastal erosion / inundation occur as a result of oceanic storm conditions associated with the passage of East Coast low-pressure systems. These storms may cause temporary sea level rises with large associated waves. The worst erosion is likely when severe weather conditions occur in conjunction with unusually high tides.
- 1.3 Storm activity is sometimes accompanied by heavy rain causing flooding in the creeks behind the sand dunes. This flooding can be exacerbated by an elevated sea level preventing the escape of floodwaters to the sea.
- 1.4 The role of the SES as the combat agency for storms does not include coastal erosion and inundation caused by astronomical high tides when severe weather is not actually developing or occurring.
- 1.5 Warilla Beach has been identified as a coastal erosion hotspot within the Shellharbour City council area.
 - a. Warilla Beach is located on the south side of the entrance of Lake Illawarra some 15 kilometres south of Wollongong. The main concern at Warilla beach is erosion at the southern end threatening development built on the foredune.
 - b. Foreshore land along the southern section of Warilla Beach was developed with dwelling mainly in the early 1950's following subdivision of the land commencing in December 1948. Between 1948 and 1966 the beach area adjacent to the development receded to such an extent that erosion during the 1966 storms threatened private properties and a sewer main servicing the properties.
 - c. To halt the recession, rock-fill was dumped along the toe of the erosion scrap at the back of the beach over two years from 1966. Maintenance, upgrading and extension of the rock seawall were carried out following the major storm events in 1974 and 1978. The seawall has caused a dramatic reduction in amenity with no beach for most of states of the tide.

d. The assets presently located behind the seawall include 49 residential dwellings, a refuge centre (previously Warilla Surf Club); four vacant properties purchased by council, a sewer main and open space recreation areas.

2. CONCEPT OF OPERATIONS

1.1 **Control**

- a. The SES is the designated combat agency for damage control from storms, including coastal erosion and inundation from storm activity.
- b. Within this role and as specified under the State Storm Plan the SES is responsible for the following during and in the period immediately prior to a storm event occurring out at sea:
 - i Advising the community at risk of the likely problem and actions they should take;
 - ii The protection of life through the warning and evacuation of residents at risk; and
 - iii The coordination of the lifting and/or relocation of readily movable household items and commercial stock and equipment.
- c. The role of the SES as the combat agency for storms does not include coastal erosion and inundation caused by astronomical high tides when severe weather is not actually developing or occurring.
- 1.2 **DECC** will provide ongoing advice to local councils and coastal zone management committees on the formulation and implementation of coastal zone management plans including procedures for addressing coastal processes, coastline hazards and risks, management options and coastal policies.
- 1.3 **BoM** will provide Severe Weather Warnings as a product to assist the SES in determining triggers for action.

3. RESPONSIBILITIES

3.1 Before the Storm

- a. The **SES** will:
 - i Consult with councils, Coastal Zone Management Committees, Department of Natural Resources and other agencies during the development of emergency arrangements for the management of coastal erosion / inundation for inclusion in SES Sub-plans and Coastal Zone Management Plans;
 - ii Prepare, coordinate and deliver community awareness programs and educational material with the assistance of the local councils to ensure

that people in locations potentially threatened by coastal erosion / inundation understand the threat and its management;

iii Develop and maintain a coastal erosion / inundation intelligence system

b. BoM will:

i Formulate and issue official forecasts and Severe Weather Warnings and provide them to the SES, radio stations and other organisations prior to and during potential and actual coastal erosion events. (Note: Severe Weather Warnings for dangerous surf are issued when onshore waves in the surf zone are expected to reach at least 5 metres within the following 24 hours or when a storm surge of 0.5 metres or greater is anticipated).

c. **DECC** will:

- i Develop and advise on state wide coastal policy, planning and management.
- ii Provide ongoing advice to local councils and Coastal Zone Management Committees on coast and estuary management including procedures for addressing coastal hazards, coastal processes and risks, management options and coastal policies.
- iii Provide the SES and councils with advice on likely erosion 'hotspots' along the New South Wales coastline.

d. Shellharbour City Council and Kiama Municipal Council will:

- i Carry out ecologically sustainable planning and management of the coastal zone;
- ii Prepare Coastal Zone Management Plans in accordance with the Coastal Protection Act, 1979 including arrangements for the emergency management of coastal erosion (see section 4.3 for more details);
- iii Provide SES with copies of coastal hazard and management studies to assist with emergency planning and operational intelligence systems;
- iv Consult with the SES and other relevant agencies when developing emergency management arrangements for inclusion in Coastal Zone Management Plans;
- v Establish and maintain Coastal Zone Management Committees to facilitate the development of the Coastal Zone Management Plans and ensure that key agencies are represented on such committees;

vi Assist the SES with community awareness programs to ensure people in locations potentially threatened by coastal erosion understand the threat and its management;

3.2 **During the Storm**

a. Response operations will be initiated when:

- i The BoM issues a severe weather warning for dangerous waves or storm surge (forecast on-shore waves of 5 metres or more, or storm surge of 0.5 metres or more) for the NSW north coast.
- ii Response operations may also be initiated by the SES when large storm induced waves are observed locally and no BoM warning has been issued.
- b. The **SES** will:
- i Advise local council and other emergency agencies of the likelihood of coastal erosion in the council area.
- ii Advise the community at-risk of the likely problem and actions they should take;
- iii Coordinate regular reconnaissance at locations identified as being susceptible to coastal erosion / inundation;
- iv Coordinate the evacuation of people at risk;
- v Coordinate the transport of removable household and business contents (if time and resources permit);
- vi Provide a 'phone-in' service via 132 500 for the local community to take requests for assistance and give advice as necessary; and
- vii Where practicable coordinate the sandbagging of properties at-risk of flooding from coastal inundation.
- viii Note the SES is not responsible for controlling 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:
- ix The placement of rocks or other materials on beaches or foreshore areas; and
- x The construction of temporary walls made of sandbags, geotechnical tubes or other materials.

c. Shellharbour City Council and Kiama Municipal Council will:

- i Assist the SES with reconnaissance of areas susceptible to coastal erosion / inundation;
- ii Where emergency physical mitigation works to protect coastal property or other structures have been identified as being required in a Coastal Zone Management Plan, construct works. Where no Coastal Zone Management Plan exists Councils should seek appropriate technical, legal and environmental advice before constructing or allowing the construction of physical mitigation works to protect coastal property or other structures. These works should ensure protection of beach environments and beach amenity and allow continuing and undiminished access to beaches, headlands and waterways; and
- iii Assist the SES with lifting and/or relocating readily moveable household and business contents in areas where coastal storms (likely to result in coastal erosion / inundation) are forecast or occurring.
- d. **BoM** will formulate and issue official forecasts and Severe Weather Warnings and provide them to the SES, radio stations and other organisations prior to and during potential and actual coastal erosion events.
- e. **Other supporting agencies** may be requested to assist where necessary, particularly with warning and evacuation tasks.

3.3 After the Storm

- f. The SES will:
- i Assign personnel to gather intelligence in areas susceptible to coastal erosion/inundation;
- ii Review and update the arrangements for managing coastal erosion/inundation; and
- iii Liaise with DECC to obtain information on the impact of storm events on coastal properties, once the storm has abated.

g. Shellharbour City Council and Kiama Municipal Council will:

- i Liaise with DECC to determine any changes to the coastal zone and any new areas at risk following storms at sea;
- ii Maintain and review council Coastal Zone Management Plans in consultation with other stakeholders; and
- iii Review and update changes to the emergency action plan for coastal erosion in the Coastal Zone Management Plan; and

- iv Remove and/or mitigate the impact of temporary physical protective measures on the beach if applicable.
- h. **DECC** will provide the SES and council with updates on the current state of the coastal zone and any new areas at risk following a storm event.

ANNEX J - FLOOD INTELLIGENCE COLLECTION SHEET

Date:	Unit:	Observer:	Contact No:
Time	Location	Description	
Exam	ple		

	-r	
Time	Location	Description
0900	Smith St, Karodan	Six houses in lower end of Smith St flooded to one metre over-floor
0900	Thomas St, Karodan	Thomas Street beginning to flood. Water coming across from Regal Park
1100	Benson Hwy	Benson Hwy not flooded at Fords Bridge

o Complete sheet by recording the time of observation, location of observation and flood effects observed

• Remember it is just as important to record the observation of effects that are not occurring as it is to record the effects that are occurring

• Return completed sheet to Planning Officer of the OMT. Planning section to collate sheets and forward to Region Headquarters

MAP 1 - SHELLHARBOUR LGA & RIVER BASIN



Kiama / Shellharbour City Local Flood Plan, June 2008



Kiama / Shellharbour City Local Flood Plan, June 2008