

Local Flood Plan



July 2017

To be reviewed no later than August 2022

ILLAWARRA FLOOD EMERGENCY SUB PLAN

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

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



AUTHORISATION

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 authorised by the Local Emergency Management Committee in accordance with the provisions of the **State Emergency and Rescue Management Act 1989 (NSW)**.

Recommended



NSW SES Wollongong City Local Controller

Date: 2 August 2017

Recommended



NSW SES Kiama Local Controller

Date: 3 August 2017

Recommended



NSW SES Shellharbour City Local Controller

Date: 3 August 2017

Approved



Chair, Local Emergency Management Committee

Date: 7/8/17.

CONTENTS

AUTHORISATION	i
CONTENTS	ii
LIST OF TABLES	iii
DISTRIBUTION LIST	iv
VERSION HISTORY.....	v
AMENDMENT LIST	v
LIST OF ABBREVIATIONS	vi
GLOSSARY.....	viii
PART 1 - INTRODUCTION	1
1.1 Purpose.....	1
1.2 Authority.....	1
1.3 Area Covered by the Plan	1
1.4 Description of Flooding and its Effects	1
1.5 Responsibilities	2
PART 2 - PREPAREDNESS.....	18
2.1 Maintenance of this Plan	18
2.2 Floodplain and Coastal Risk Management.....	18
2.3 Development of Flood Intelligence.....	18
2.4 Development of Warning Systems	18
2.5 Community Resilience	19
2.6 Training	19
2.7 Resources.....	20
PART 3 - RESPONSE.....	21
3.1 Control Arrangements	21
3.2 Operational Management	21
3.3 Start of Response Operations	21
3.4 Response Strategies.....	22
3.5 Operations Centres.....	24
3.6 Liaison	24
3.7 End of Response Operations.....	25
3.8 Collating Situational Information.....	25
3.9 Provision of Flood Information and Warnings.....	26
3.10 Aircraft Management	29
3.11 Assistance for Animals	30
3.12 Communication Systems	30
3.13 Preliminary Deployments	31
3.14 Road and Traffic Control.....	31
3.15 Stranded Travellers.....	31
3.16 Managing Property Protection Operations	31
3.17 Managing Flood Rescue Operations	32
3.18 Managing Evacuation Operations.....	32

3.19 Managing Resupply Operations..... 38

PART 4 - RECOVERY..... 41

4.1 Recovery Coordination at the Local level 41

4.2 Recovery Coordination at the Region and State level 41

4.3 Arrangements for Debriefs / After Action Reviews 42

ATTACHMENT 1 - Resupply Flowchart 43

ATTACHMENT 2 - Dam Failure Alert Notification Arrangements Flowchart 44

ATTACHMENT 3 - Wollongong City LGA Map 45

ATTACHMENT 4 - Kiama LGA Map 46

ATTACHMENT 5 - Shellharbour City LGA Map 47

LIST OF REFERENCES 48

LIST OF TABLES

Table 1: Dam Failure Alert Levels..... 28

DISTRIBUTION LIST

This Local Flood Plan is distributed through the NSW State Emergency Service in electronic format and is maintained on the NSW SES FloodSafe (www.floodsafe.com.au) website.

VERSION HISTORY

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

Description	Date
Wollongong City Local Flood Plan	June 2010
Wollongong City Local Flood Plan	March 2004
Kiama/Shellharbour City Local Flood Plan	June 2008

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

NSW SES Illawarra South Coast Region
 Deputy Region Controller
 PO BOX 1460
 Wollongong, NSW, 2500

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

Amendment Number	Description	Updated by	Date

Document Issue: 07072015

LIST OF ABBREVIATIONS

The following abbreviations have been used in this plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AIIMS	Australasian Inter-service Incident Management System
ARI	Average Recurrence Interval (Years)
ALERT	Automated Local Evaluation in Real Time
AWRC	Australian Water Resources Council
BUREAU	Australian Government Bureau of Meteorology
CBRN	Chemical, Biological, Radiation or Nuclear
DCF	Dam Crest Flood
DSC	Dams Safety Committee
DSEP	Dam Safety Emergency Plan
DVR	Disaster Victim Registration
EMPLAN	Emergency Management Plan
FRNSW	Fire and Rescue NSW
GIS	Geographic Information System
GRN	Government Radio Network
IAP	Incident Action Plan
IC	Incident Controller
IFF	Imminent Failure Flood
LEMC	Local Emergency Management Committee
LEOCON	Local Emergency Operations Controller
LO	Liaison Officer
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory

NOW	NSW Office of Water
NSW RFS	New South Wales Rural Fire Service
NSW SES	NSW State Emergency Service
NSW VRA	Volunteer Rescue Association
OEH	Office of Environment and Heritage (previously DECCW)
PMF	Probable Maximum Flood
PMR	Private Mobile Radio
PMP	Probable Maximum Precipitation
PIIC	Public Information and Inquiry Centre
REMC	Region Emergency Management Committee
REMO	Regional Emergency Management Officer
RMS	Roads and Maritime Services
RFS	Rural Fire Service
SEOCN	State Emergency Operations Controller
SERCON	State Emergency Recovery Controller
SEWS	Standard Emergency Warning Signal
SITREPs	Situation Reports
WICEN	Wireless Institute Civil Emergency Network

GLOSSARY

Annual Exceedance Probability (AEP). The chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood level (height) has an AEP of 5%, there is a 5% chance (that is, a one-in-20 chance) of such a level or higher occurring in any one year (see also Average Recurrence Interval).

Assistance Animal. A guide dog, a hearing assistance dog or any other animal trained to assist a person to alleviate the effect of a disability (Refer to Section 9 of the Disability Discrimination Act 1992).

Assembly Area. An assembly area is a designated location used for the assembly of emergency-affected persons before they move to temporary accommodation or a nominated evacuation centre. As such these areas do not provide welfare assistance nor are they used for long term sheltering or provision of meals. An assembly area may also be a prearranged, strategically placed area, where support response personnel, vehicles and other equipment can be held in readiness for use during an emergency.

Australian Height Datum (AHD). A common national surface level datum approximately corresponding to mean sea level.

Average Recurrence Interval (ARI). The long-term **average** number of years between the occurrence of a flood as big as, or larger than, the selected event. For example, floods reaching a height as great as, or greater than, the 20 year ARI flood event will occur **on average** once every 20 years.

Catchment (River Basin). The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Coastal Erosion. The loss of land along the shoreline predominantly by the offshore movement of sand during storms.

Coastal Flooding. Flooding due to tidal or storm-driven coastal events, including storm surges in lower coastal waterways. This can be exacerbated by wind-wave generation from storm events (1).

Combat Agency. The agency, service, organisation or authority with the legislative responsibility for control of the incident.

Dambreak Study. A Dambreak Study is undertaken to determine the likely downstream inundation areas in case of a dam failure. Modelling is undertaken for a range of

dam breach possibilities and design floods. The dambreak study includes information such as the extent of flooding, flood travel times and flood water velocities. The study can assist dam owners, regulators, and emergency agencies in the preparations of evacuation plans, dam break and other flood warning systems, and hazard classification of affected areas.

Dam Failure. The uncontrolled release of a water storage. The failure may consist of the collapse of the dam or some part of it, or excessive seepage or discharges. The most likely causes of dam failure are;

- **Flood Induced Dam Failure:** Dam failure caused by flood, either due to overtopping erosion or by subsequent structural failure.
- **Sunny Day Dam Failure:** Dam Failure as a result of factors other than flood i.e. other than flood flow into the reservoir. Causes of "Sunny Day" dam failure can include internal erosion, landslide, piping, earthquake or sabotage.

Dam Safety Emergency Plan (DSEP). A DSEP outlines the required actions of owners and their personnel at dams in response to a range of possible emergency situations. The NSW Dam Safety Committee requires a quality controlled DSEP, with associated dambreak warning procedures to be prepared for prescribed dams where persons may be at risk downstream, if the dam failed.

Design Flood (or Flood Standard). A flood of specified magnitude that is adopted for planning purposes. Selections should be based on an understanding of flood behaviour and the associated flood risk, and take account of social, economic and environmental considerations. There may be several design floods for an individual area.

Emergency Alert. The national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area, about likely or actual emergencies.

EMPLAN (Emergency Management Plan). The Plan established in accordance with the provisions in the *State Emergency Rescue Management Act 1989*. The object of an EMPLAN is to ensure the coordinated response by all agencies having responsibilities and functions in emergencies.

Essential Services. Those services, often provided by local government authorities, that are considered essential to the life of organised communities. Such services include power, lighting, water, gas, sewerage and sanitation clearance.

Evacuation. The temporary movement of people from a dangerous or potentially dangerous place to a safe location, and their eventual return. It is a safety strategy which uses distance to separate people from the danger created by the hazard.

Evacuation Order. Notification to the community, authorised by the NSW SES, when the intent of an Incident Controller is to instruct a community to immediately evacuate in response to an imminent threat.

Evacuation Warning. Notification to the community, authorised by the NSW SES, when the intent of an Incident Controller is to warn a community of the need to prepare for a possible evacuation.

Flash Flooding. Flooding which is sudden and often unexpected because it is caused by sudden local or nearby heavy rainfall. It is sometimes defined as flooding which occurs within six hours of the rain that causes it.

Flood. 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 overtopping coastline defences, including Tsunami.

Flood Classifications. Locally defined flood levels used in flood warnings to give an indication of the severity of flooding (minor, moderate or major) expected. These levels are used by the State Emergency Service and the Australian Government Bureau of Meteorology in flood bulletins and flood warnings.

Flood Intelligence. The product of collecting, collating, analysing and interpreting flood-related data to produce meaningful information (intelligence) to allow for the timely preparation, planning and warning for and response to a flood.

Flood Fringe. The remaining area of flood prone land after floodway and flood storage have been defined.

Flood Liable Land (also referred to as Flood Prone Land). Land susceptible to flooding by the Probable Maximum Flood (PMF) event. This term also describes the maximum extent of a **floodplain** which is an area of a river valley, adjacent to the river channel, which is subject to inundation in floods up to this event.

Flood of Record. Maximum observed historical flood.

Floodplain. Area of land which is subject to inundation by floods up to and including the probable maximum flood event, that is, flood prone land (2).

Floodplain Management Plan. A plan developed in accordance with the principles and guidelines in the New South Wales Floodplain Development Manual. Such a plan usually includes both written and diagrammatic information describing how particular areas of flood prone land can be used and managed to achieve defined objectives.

Flood Plan. A response strategy plan that deals specifically with flooding and is a sub-plan of an Emergency Management Plan. Flood plans describe agreed roles, responsibilities, functions, strategies and management arrangements for the conduct of flood operations and for preparing for them. A flood plan contains information and arrangements for all floods whereas an IAP is for a specific flood/event.

Flood Rescue. The rescue or retrieval of persons trapped by floodwaters.

Flood Storage Areas. Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation.

Floodway. An area where a significant volume of water flows during floods. Such areas are often aligned with obvious naturally-defined channels and are areas that, if partially blocked, would cause a significant redistribution of flood flow which may in turn adversely affect other areas. They are often, but not necessarily, the areas of deeper flow or the areas where higher velocities occur.

Flood Watch. A Flood Watch is a notification of the potential for a flood to occur as a result of a developing weather situation and consists of short generalised statements about the developing weather including forecast rainfall totals, description of catchment conditions and indicates streams at risk. The Bureau will also attempt to estimate the magnitude of likely flooding in terms of the adopted flood classifications. Flood Watches are normally issued 24 to 36 hours in advance of likely flooding. Flood watches are issued on a catchment wide basis.

Flood Warning. A Flood Warning is a gauge specific forecast of actual or imminent flooding. Flood Warnings specify the river valley, the locations expected to be flooded, the likely severity of flooding and when it will occur.

Functional Area. A category of services involved in the preparations for an emergency, including the following:

- Agriculture and Animal Services;
- Energy and Utility Services;
- Engineering Services;
- Environmental Services;
- Health Services;
- Public Information Services;
- Telecommunication Services;

- Transport Services; and
- Welfare Services.

Geographic Information System (GIS). A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analysing, and displaying all forms of geographically referenced information.

Incident Controller. The individual responsible for the management of all incident control activities across a whole incident (3).

Incident Action Plan (IAP). An action plan for managing a specific event. Information from the Local Flood Plan is used to develop the flood IAP.

Indirect Effect. Indirect effects are generally a consequence of infrastructure damage or interruption of services and can affect communities distant from the actual flood footprint i.e. floodplain. Indirect effects can also refer to indirect losses due to disruption of economic activity, both in areas which are inundated or isolated. Indirect effects are one of the three primary sources of risk in the context of flooding (the other two are inundation and isolation).

Inundation. See definition for Flood.

Isolation. Properties and/or communities where flooding cuts access to essential services or means of supply. Isolation is one of the three primary sources of risk in the context of flooding (the other two are inundation and indirect effects).

Liaison Officer (LO). A person, nominated or appointed by an organisation or functional area, to represent that organisation or functional area at a control centre, emergency operations centre, or coordination centre. A liaison officer maintains communications with and conveys directions/requests to their organisation or functional area, and provides advice on the status, capabilities, actions and requirements of their organisation or functional area (3).

Local Controller. A NSW SES chain of command position with responsibility for day-to-day management and operational preparedness of Units within a Local Government Area.

Local Emergency Management Committee (LEMC). The LEMC is responsible for the preparation of plans in relation to the prevention of, preparation for, response to and recovery from emergencies in the local government area for which it is constituted. In the exercise of its functions, the Committee is responsible to the Region Emergency Management Committee (REMC) and may communicate with the REMC for matters associated with Functional Areas that are not represented at the local Level.

Local Overland Flooding. Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

Major Flooding. Flooding which causes inundation of extensive rural areas, with properties, villages and towns isolated and/or appreciable urban areas flooded.

Minor Flooding. Flooding which causes inconvenience such as closing of minor roads and the submergence of low-level bridges. The lower limit of this class of flooding, on the reference gauge, is the initial flood level at which landholders and/or townspeople begin to be affected in a significant manner that necessitates the issuing of a public flood warning by the Australian Government Bureau of Meteorology.

Moderate Flooding. Flooding which inundates low-lying areas, requiring removal of stock and/or evacuation of some houses. Main traffic routes may be covered.

Moveable Dwellings. Any tent, or any caravan or other van or other portable device (whether on wheels or not), used for human habitation; or a manufactured home; or any conveyance, structure or thing of a class or description prescribed by the (Local Government) regulations (4).

Operations Commander. An operational management role that provides strategic advice and support to the Incident Controller when required. This position sits higher within the command structure.

Peak Height. The highest level reached, at a nominated gauging station, during a particular flood event.

Prescribed Dam. "Prescribed" dams are those listed in Schedule 1 of the Dams Safety Act 1978. The NSW Dam Safety Committee will prescribe those dams with the potential for a failure which could have a significant adverse effect on community interests.

Probable Maximum Flood (PMF). The largest flood that could conceivably be expected to occur at a particular location, usually estimated from probable maximum precipitation. The PMF defines the maximum extent of flood prone land, that is, the floodplain. It is difficult to define a meaningful Annual Exceedance Probability for the PMF, but it is commonly assumed to be of the order of 10^4 to 10^7 (once in 10,000 to 10,000,000 years).

Region Controller. A NSW SES chain of command position with responsibility for day-to-day management and operational capability of members and Units within a designated Region boundary.

Riverine Flooding. Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam. Riverine flooding

generally excludes watercourses constructed with pipes or artificial channels considered as stormwater channels (1).

Runoff. The amount of rainfall which ends up as stream flow, also known as 'rainfall excess' since it is the amount remaining after accounting for other processes such as evaporation and infiltration.

Stage Height. A level reached, at a nominated gauging station, during the development of a particular flood event.

Storm Surge. The increases in coastal water levels above predicted astronomical tide levels (i.e. tidal anomaly) resulting from a range of location dependant factors including the inverted barometer effect, wind and wave set-up and astronomical tidal waves, together with any other factors that increase tidal water level (1).

Stream Gauging Station. A place on a river or stream at which the stage height is routinely measured, either daily or continuously, and where the discharge is measured from time to time so as to develop a relationship between stage and discharge or rating curve.

Total Flood Warning System. A flood warning system is made up of components which must be integrated if the system is to operate effectively. Components of the total flood warning system include monitoring rainfall and river flows, prediction, interpretation of the likely impacts, construction and dissemination of warning messages, response by agencies and community members, and review of the warning system after flood events (6).

PART 1 - INTRODUCTION

1.1 PURPOSE

- 1.1.1 This plan covers preparedness measures, the conduct of response operations and the coordination of immediate recovery measures from flooding within the Wollongong City, Shellharbour City and Kiama LGAs. It covers operations for all levels of flooding within the Illawarra area.
- 1.1.2 The plan also covers arrangements for the management of coastal erosion in the Illawarra area.

1.2 AUTHORITY

- 1.2.1 This plan is issued under the authority of the *State Emergency and Rescue Management Act 1989* (NSW) and the *State Emergency Service Act 1989* (NSW). It has been approved by the NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers and the NSW SES Illawarra South Coast Region Controller as a NSW SES plan and endorsed by the Illawarra Local Emergency Management Committee as a sub plan of the Local EMPLAN.

1.3 AREA COVERED BY THE PLAN

- 1.3.1 The area covered by the plan is the Wollongong City, Shellharbour City and Kiama LGAs.
- 1.3.2 The Wollongong City LGA includes a number of urban and suburban areas from Helensburgh to the north to Yallah and Windang in the south. The south LGA surrounds Lake Illawarra and contains many creek systems.
- 1.3.3 The Shellharbour City LGA is bounded to the north by Lake Illawarra and the Minnamurra River to the south.
- 1.3.4 The Kiama LGA is bounded to the north by the Minnamurra River and by Foxground and Gerroa to the south.
- 1.3.5 The LGAs and their principal rivers and creeks are shown in Attachments 3, 4 and 5.
- 1.3.6 The three LGAs are in the NSW SES Illawarra South Coast Region and for emergency management purposes are part of the Illawarra South Coast Emergency Management Region.

1.4 DESCRIPTION OF FLOODING AND ITS EFFECTS

- 1.4.1 The NSW SES maintains information on the nature of flooding and effects of flooding on the community in the Wollongong City, Kiama and Shellharbour City LGAs. This information can be found in the Wollongong City, Shellharbour City and Kiama Local Flood Plan Volume 2 – Hazard and Risk documents.

1.5 RESPONSIBILITIES

1.5.1 The general responsibilities of emergency service organisations and supporting services (functional areas) are listed in the Local and State Emergency Management Plans (EMPLAN). Some specific responsibilities are expanded upon in the following paragraphs. The extent of their implementation will depend on the severity of the flooding. Specific responsibilities of agencies and organisations as they relate to tsunami are detailed in the State Tsunami Emergency Sub Plan.

1.5.2 **NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers.** The NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers are responsible for managing floods as detailed in the State Flood Plan, and will;

Preparedness

- a. Maintain a Local Headquarters at:
 - i. Wollongong City Unit: Montague Street, North Wollongong
 - ii. Coniston Unit: Corner Masters and Drummond Roads, Coniston
 - iii. Shellharbour City Unit: 127 Tongarra Road, Albion Park
 - iv. Kiama Unit: 205 Terralong Road, Kiama
- b. Ensure that NSW SES members are trained to undertake operations in accordance with current policy as outlined in the NSW SES Controllers' Guide and the NSW SES Incident Management Framework.
- c. Coordinate the development and operation of a flood warning service for the community.
- d. Participate in floodplain and coastal risk management initiatives organised by Wollongong City Council, Shellharbour City Council or Kiama Municipal Council.
- e. Coordinate a community engagement and capacity building program regarding local flood issues and associated risks to assist communities in building resilience to floods.
- f. Identify and monitor people and/or communities at risk of flooding and coastal erosion.
- g. Ensure that the currency of this plan is maintained.

Response

- h. Exercise financial delegations relating to the use of emergency orders as laid down in the NSW SES Controller's Guide.
- 1.5.3 **NSW SES Incident Controller.**
- a. The NSW SES Incident Controller is responsible for managing floods as detailed in the State Flood Plan, and will;

Response

- b. The Incident Controller will;
 - i. Control flood and storm response operations. This includes;
 - Directing the activities of the NSW SES members operating within the Illawarra area.
 - Coordinating the activities of supporting agencies and organisations and ensuring that liaison is established with them.
 - Prepare an Incident Action Plan to provide information on incident objectives and strategies for the control of the flooding incident.
 - ii. Coordinate the provision of information services in relation to;
 - Flood heights and flood behaviour.
 - Coastal erosion / inundation.
 - Road conditions and closures.
 - Advice on methods of limiting property damage.
 - Confirmation of evacuation warnings and evacuation orders.
 - iii. Coordinate Flood Rescue operations.
 - iv. Coordinate the provision of the evacuation of people and/or communities.
 - v. Provide immediate welfare support for evacuated people.
 - vi. Coordinate the provision of emergency food and medical supplies to isolated people and/or communities.
 - vii. Coordinate operations to assist the community to protect property. This may include;
 - Arranging resources for sandbagging operations.
 - Lifting or moving household furniture.
 - Lifting or moving commercial stock and equipment.
 - viii. Where possible, arrange for support (for example, accommodation and meals) for emergency service organisation members and volunteers assisting them.
 - ix. Ensure that the managers of caravan/tourist parks are advised of flood warnings and the details of any evacuation order.
 - x. If NSW SES resources are available, assist with emergency fodder supply operations conducted by Agriculture and Animal Services.
 - xi. If NSW SES resources are available, assist the NSW Police Force, RMS and Council with road closure and traffic control operations.

- xii. Coordinate the collection of flood and coastal erosion / inundation information for development of intelligence.
- xiii. Submit Situation Reports to the NSW SES Illawarra South Coast Region Headquarters and agencies assisting within the Illawarra area. These should contain information on;
 - Significant incidents
 - Impact on critical infrastructure
 - Road conditions and closures
 - Current flood behaviour
 - Current operational activities
 - Likely future flood behaviour
 - Likely future operational activities
 - Probable resource needs
- xiv. Keep the Local Emergency Operations Controller advised of the flood situation and the operational response.
- xv. Issue the 'All Clear' when Evacuation Orders are lifted and people can return to their properties.

Recovery

- c. Ensure that appropriate After Action Reviews are held after floods.
- d. Where possible, encourage the inclusion of a Recovery Officer in the Incident Management Team to support the transition from Response to Recovery during an incident.
- e. Provide appropriate representation to the Recovery Committee as agreed during the Recovery phase.
- f.

1.5.4 **NSW SES Wollongong, Coniston, Kiama and Shellharbour City Unit Members**

- a. Carry out flood and coastal erosion response tasks. These may include;
 - i. The management of the NSW SES Wollongong City, Coniston, Kiama and Shellharbour City Local and Unit Headquarters facilities and Operations Centres.
 - ii. Assist in the collection of flood and coastal erosion/inundation information for the development of intelligence.
 - iii. Flood Rescue.
 - iv. Evacuation of at-risk or affected communities.
 - v. Providing immediate welfare for evacuated people.
 - vi. Delivery of warnings and information.
 - vii. Resupply.
 - viii. Sandbagging.

- ix. Lifting and/or moving household furniture and commercial stock.
 - x. Animal rescue.
 - xi. Assisting with road closure and traffic control operations.
 - xii. Assisting with emergency fodder supply operations.
- b. Assist with preparedness activities.
 - c. Undertake training in flood and storm response operations.
- 1.5.5 **Illawarra Local Emergency Operations Controller (LEOCON)**
- a. Monitor flood operations.
 - b. Coordinate support to the NSW SES Incident Controller if requested to do so.
- 1.5.6 **Illawarra Local Emergency Management Officer**
- a. Provide executive support to the LEMC and LEOCON in accordance with the Illawarra Local Emergency Management Plan.
 - b. At the request of the NSW SES Wollongong City, Kiama or Shellharbour City Local Controller, advise appropriate agencies and officers of the start of response operations.
- 1.5.7 **Wollongong City Council, Kiama Municipal Council and Shellharbour City Council**
- Preparedness**
- a. Develop and implement floodplain risk management plans in accordance with the NSW Government's Flood Prone Land Policy and the Floodplain Development Manual.
 - b. Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented on such committees.
 - c. Provide flood studies, floodplain management studies and coastal management studies to the NSW SES.
 - d. Wollongong City Council to maintain Dam Safety Emergency Plans for the Barina Park Detention Basin, Brokers Road Retarding Basin, Dapto Heights Retarding Basin, Edgewood Detention Basin, Foothills Road Basin, Foothills Estate Retarding Basin 3, Gannet Place Retarding Basin, Gunyah Park Retarding Basin, Nyrang Park Retention Basin, Wollongong High School Detention Basin, and the Foothills Estate Retarding Basin 1 and provide copies to the NSW SES.
 - e. Kiama Municipal Council to maintain Dam Safety Emergency Plans for Fountaindale Dam and provide copies to the NSW SES.
 - f. Shellharbour City to maintain Dam Safety Emergency Plans for Blackbutt Reserve, Green Meadows Retarding Basin, Shellcove Estate Detention

Basin 1, Shellharbour City Centre Basin and St Josephs School Retarding Basin and provide copies to the NSW SES.

- g. Provide information on the consequences of dam failure to the NSW SES for incorporation into planning and flood intelligence.
- h. Maintain a plant and equipment resource list for the LGA.
- i. Work with NSW SES on the development and implementation of a community engagement and capacity building program.

Response

- j. At the request of the NSW SES Incident Controller, deploy personnel and resources for flood and coastal erosion related activities.
- k. Close and reopen council roads (and other roads nominated by agreement with the RMS) and advise the NSW SES Incident Controller and the Police.
- l. Provide information on the status of roads.
- m. Provide filled sandbags to urban and village areas in which flooding is expected.
- n. Assist with the removal of caravans from caravan parks.
- o. Provide back-up radio communications.
- p. In the event of evacuations, assist with making facilities available for the domestic pets and companion animals of evacuees.
- q. During periods of coastal erosion and/or inundation from ocean storms:
 - i. Assist the NSW SES with reconnaissance of coastal erosion and inundation risk areas.
 - ii. Liaise with the NSW SES Incident Controller to provide advice regarding the need for response actions by the NSW SES such as evacuations.
 - iii. Activate the Wollongong City Council, Kiama Municipal Council and Shellharbour City Council Coastal Zone Management Plan – Emergency Action Plan.

Recovery

- r. Provide for the management of health hazards associated with flooding. This includes removing debris and waste.
- s. Ensure premises are fit and safe for reoccupation and assess any need for demolition.
- t. Arrange for storage of evacuees' furniture as required.

1.5.8 Community Members

Preparedness

- a. Understanding the potential risk and impact of flooding;

- b. Preparing homes and property to reduce the impact of flooding;
- c. Understanding warnings and other triggers for action and the safest actions to take in a flood;
- d. Households, institutions and businesses developing plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours;
- e. Having an emergency kit;
- f. Being involved in local emergency planning processes.

1.5.9 **Agriculture and Animal Services Functional Area**

- a. When requested by NSW SES;
 - i. Activate the Agriculture and Animal Services Supporting Plan as required and coordinate the provision of required services which may include;
 - Co-ordinate response for all animals including pets, livestock and wildlife.
 - Supply and delivery of emergency fodder.
 - Emergency water replacement in certain circumstances.
 - Coordinate the management of livestock and farm animals.
 - Advice on dealing with dead and injured farm animals.
 - Financial, welfare and damage assessment assistance to flood affected farmers.
 - Co-ordinate the establishment of animal shelter compound facilities for the domestic pets and companion animals of evacuees.

1.5.10 **Australian Government Bureau of Meteorology (The Bureau)**

- a. Provide Flood Watches for the affected River Basins and catchment areas.
- b. Provide Flood Warnings, incorporating height-time predictions, for gauges in the Illawarra area.
- c. Provide Severe Weather Warnings when large waves and/or storm surge conditions are forecast to result in coastal erosion/inundation.
- d. Provide Severe Weather Warnings when flash flooding and/or damaging surf is likely to occur.

1.5.11 **Caravan Park Proprietor(s)**

- a. Prepare a flood emergency plan for the Caravan Park.
- b. Ensure that owners and occupiers of movable dwellings are aware that the caravan park is flood prone by;

- i. Providing a written notice to occupiers taking up residence. The notice will indicate that the caravan park is at risk of flooding and designate the location of flood liable land within the park.
 - ii. Displaying this notice and the emergency arrangements for the Caravan Park prominently in the park.
- c. Ensure that owners and occupiers of movable dwellings are aware that if they are expecting to be absent for extended periods, they should:
 - i. Provide the manager of the caravan park with a contact address and telephone number in case of an emergency.
 - ii. 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) (7).
- d. Ensure that occupiers are informed of Flood Information. At this time, occupiers should be advised to;
 - i. Ensure that they have spare batteries for their radios.
 - ii. Listen to a local radio station for updated flood information.
 - iii. Prepare for evacuation and movable dwelling relocation.
- e. Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs.
- f. 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.
- g. Secure any movable dwellings that are not able to be relocated to prevent floatation.
- h. Inform the 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.

1.5.12 **Child Care Centres and Preschools**

- a. Prepare a flood emergency plan for the childcare facility.
- b. Childcare facilities may be contacted by the NSW SES in the event of possible flooding or isolation.
- c. When notified the child care centres and preschools should;
 - i. Liaise with the NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures.

- ii. Assist with coordinating the evacuation of preschools and child care centres.

1.5.13 Energy and Utility Services Functional Area

- a. When requested by NSW SES;
 - i. Implement the Energy and Utilities Services Functional Area Supporting Plan.
 - ii. Where required, coordinate energy and utility services emergency management planning, preparation, response and recovery, including the restoration of services following a flood event.
 - iii. Coordinate advice to the NSW SES of any need to disconnect electricity, gas, water or wastewater services.
 - iv. Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.
 - v. Identify any secondary impacts of flooding on utility services and advise the NSW SES.
 - vi. Assist the NSW SES with advisory notices relating to hazards from utility services during flooding.
 - vii. Coordinate with utilities on restoration of services, including advisory notices relating to estimated time for restoration and mandatory safety checks prior to reconnection. Advise the NSW SES and the relevant recovery committee and coordinator of the timetable for restoration.
- b. Local utility service distribution providers (electricity, gas, water, waste water):
 - i. Provide advice to the NSW SES Incident Controller of any need to disconnect power/gas/water/waste water supplies or of any timetable for reconnection.
 - ii. Advise the NSW SES of any hazards from utility services during flooding and coastal erosion/inundation.
 - iii. Advise the public with regard to electrical hazards during flooding and coastal erosion/inundation, and to the availability or otherwise of the electricity supply.
 - iv. Clear or make safe any hazard caused by power lines or electricity distribution equipment.
 - v. Reconnect customers' electrical/ gas/ water/waste water installations, when certified safe to do so and as conditions allow.
 - vi. Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.

1.5.14 Engineering Services Functional Area

- a. When requested by NSW SES;

- i. Provide engineering advice regarding the integrity of damaged structures.
 - ii. Assist the NSW SES with damage assessment.
 - iii. Acquire and/or provide specialist technical engineering expertise.
 - iv. Assist the NSW SES and councils with the assessment and operation of flood protection levees when requested.
 - v. Assist with property protection, including the construction or repair of levees.
 - vi. Coordinate the restoration of critical public facilities.
 - b. When requested by the Recovery Coordinator:
 - i. Establish Recovery Centres by the procurement and fit-out of suitable properties.
- 1.5.15 Environmental Services Functional Area**
- a. When requested by NSW SES;
 - i. Implement the Environmental Services Functional Area (Enviroplan) Supporting Plan if required.
- 1.5.16 Fire and Rescue NSW, Wollongong, Coledale, Scarborough, Helensburgh, Balgownie, Unanderra, Corrimal, Warrawong, Bulli, Dapto, Thirroul, Albion Park Rail, Kiama and Shellharbour**
- a. FRNSW responsibilities are primarily confined to the FRNSW Fire District. Any deployment of FRNSW resources to assist NSW SES in flood events rests with the respective FRNSW Commander which must be a Senior Officer.
 - b. The FRNSW Commander will assess the capability of FRNSW to assist NSW SES in the following tasks:
 - i. Assist the NSW SES with the warning and/or evacuation of at risk communities.
 - ii. Assist the NSW SES with the monitoring / reconnaissance of flood prone areas.
 - iii. Assist the NSW SES with the resupply of isolated communities and/or properties.
 - iv. Assist the NSW SES with property protection tasks including sandbagging.
 - v. Provide suitably qualified members for flood rescue operations.
 - vi. Provide resources for pumping flood water out of buildings and from low-lying areas.
 - vii. Assist with clean-up operations, including the hosing out of flood affected properties.

- viii. Coordinate the pre-deployment of fire resources to communities within Fire and Rescue NSW fire districts if access is expected to be lost, in consultation with the NSW SES (e.g. West Dapto area).

1.5.17 **Forestry Corporation of NSW**

- a. Close and evacuate at risk camping grounds in State Forest managed areas and advise NSW SES of its status.
- b. Close and reopen Forestry Corporation of NSW roads when affected by flood waters and advise the NSW SES of its status.
- c. Facilitate the safe reliable access of emergency resources on Forestry Corporation managed roads.
- d. Assist the NSW SES with identification of road infrastructure at risk of flooding.
- e. Manage traffic on roads managed by Forestry Corporation of NSW.
- f. Assist the NSW SES with the communication of warnings and information provision to the public through variable message signs and other appropriate means.

1.5.18 **Health Services Functional Area**

- a. When requested by NSW SES;
 - i. Activate Healthplan if required.
 - ii. Ensure that appropriate business continuity plans are developed for essential health infrastructure and are activated during floods.
 - iii. Provide medical support to the NSW SES.
 - iv. Establish health surveillance in affected areas.
 - v. Assess potential public health risks that either acutely endanger the health of human populations or are thought to have longer term consequences.
 - vi. Provide environmental health advice.
 - vii. Provide public health warnings and advice to affected communities.
 - viii. Provide psychological counselling support to the community and emergency response workers impacted, via NSW Health Mental Health Division.
 - ix. Assist the NSW SES with the warning and evacuation of public hospitals, private hospitals and residential aged care facilities.
 - x. Undertake vulnerable persons assessment for mental health and drug and alcohol dependant persons, dialysis, frail and/or aged and oxygen dependant persons in the community, known to the health service.

1.5.19 **Marine Rescue NSW**

- a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.

- b. Assist the NSW SES with the conduct of evacuations.
- 1.5.20 **New South Wales Ambulance**
- a. Assist with the evacuation of at risk communities (in particular elderly and/or infirm people).
 - b. Deploy ambulance resources to appropriate locations if access is expected to be lost.
 - c. Assist the NSW SES with flood rescue operations.
- 1.5.21 **NSW Office of Water**
- a. Collect and maintain flood data including data relating to flood heights, velocities and discharges.
 - b. Provide the Bureau of Meteorology and NSW SES real-time or near real-time access to river height gauges and height data for the development of official flood warnings.
 - c. Provide flow rating charts for river height gauges.
 - d. Manage (with technical support from OEH) the approval process under the Water Act 1912 and Water Management Act 2000 for flood control works (earthworks, embankments and levees which can affect the distribution of floodwaters) including;
 - i. Assessment and approval of flood control works (including flood mitigation works) in rural areas designated under the Acts.
 - ii. Use of floodplain management plans prepared by OEH in rural areas designated under the Acts to assess flood control work approvals.
 - iii. Giving the NSW SES access to relevant studies regarding flooding and studies supporting floodplain management plans prepared by OEH including flood studies, floodplain risk management studies and flood behaviour investigations.
- 1.5.22 **NSW Police Force (Lake Illawarra and Wollongong Local Area Commands (LAC))**
- a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.
 - b. Assist the NSW SES with the conduct of evacuation operations.
 - c. Conduct road and traffic control operations in conjunction with councils and/or RMS.
 - d. Coordinate the registration of evacuees.
 - e. Secure evacuated areas.
 - f. Assist the NSW SES with flood rescue operations.
- 1.5.23 **NSW Rural Fire Service (RFS Illawarra)**
- a. Provide personnel in rural areas and villages to;

- i. Inform the NSW SES Incident Controller about flood conditions and response needs in their own communities, and
 - ii. Disseminate flood information.
- b. Provide personnel and high-clearance vehicles for flood related activities.
- c. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.
- d. Assist the NSW SES with the conduct of evacuations.
- e. Provide equipment for pumping flood water out of buildings and from low-lying areas.
- f. Assist with the removal of caravans.
- g. Assist with clean-up operations, including the hosing of flood affected properties.
- h. Deploy fire resources to appropriate locations if access is expected to be lost (e.g. West Dapto area).
- i. Provide personnel in the following rural communities and villages to inform the NSW SES about flood conditions and response needs and disseminate flood information:
 - i. Wongawilli;
 - ii. Darkes Forest.

1.5.24 **Office of Environment and Heritage**

- a. Assist the NSW SES gain access to relevant studies regarding flooding, including Flood Studies and Floodplain Risk Management Studies undertaken under the Floodplain Management Program.
- b. Assist the NSW SES in obtaining required outputs from Flood Studies and Floodplain Risk Management Studies under the Floodplain Management Program which assist the NSW SES in effective emergency response planning and incorporating information into the NSW Floods Database.
- c. Coordinate the collection of post event flood data, in consultation with the NSW SES.
- d. Provide specialist advice to the NSW SES on flood related matters on;
 - i. The identification of flood risks.
 - ii. Conditions which may lead to coastal flooding or retarded river drainage near the coast.
- e. Collect and maintain flood data relating to flood heights, velocities and discharges in coastal areas of NSW (through a contract with MHL as referenced in Section 3.8.4 (d)).
- f. Provide data to the Bureau of Meteorology and NSW SES real-time or near real-time access to river height gauges and height data for the

development of official flood warnings (through a contract with MHL as described in the Response section of this plan).

- g. Assist the NSW SES in the exercising of this Flood Plan.
- h. **Parks and Wildlife Service**
 - i. Close and reopen Parks and Wildlife Service roads when affected by flood waters and advise the NSW SES of its status.
 - ii. Facilitate the safe reliable access of emergency resources on National Parks and Wildlife Service managed roads.
 - iii. Assist the NSW SES with identification of road infrastructure at risk of flooding.
 - iv. Manage traffic on Parks and Wildlife Service roads.
 - v. Assist the NSW SES with the communication of warnings and information provision to the public through variable message signs and other appropriate means.
 - vi. Monitor the effects of prolonged or intense rainfall in the Illawarra Escarpment State Conservation Area with a view to closing public access to management trails and evacuating the Scout and Guide camps at Mt Keira.

1.5.25 Owners of Prescribed Dams within or upstream of Wollongong City, Kiama and Shellharbour City LGAs

Dam	Owner
Barina Park Detention Basin	Wollongong City Council
Blackbutt Reserve Dam	Shellharbour City Council
Brokers Road Retarding Basin	Wollongong City Council
Bucklands Retarding Basin	Matt Crossingham
Coalcliff	Illawarra Coke Company
Cordeaux Dam	NSW Water
Dapto Heights Retarding Basin	Wollongong City Council
Edgewood Detention Basin	Wollongong City Council
Foothills Estate Retarding Basin 1	Wollongong City Council
Foothills Estate Retarding Basin 3	Wollongong City Council
Foothills Road Retarding Basin	Wollongong City Council
Fountaindale Dam	Kiama Municipal Council
Gannet Place Retarding Basin	Wollongong City Council
Green Meadows Retarding Basin	Shellharbour City Council
Gunyah Park Retarding Basin	Wollongong City Council

Dam	Owner
Kanahooka Retention Basin	Forest Grove Community Association
Nyrang Park Retention Basin	Wollongong City Council
Oak Flats Reservoir	Sydney Water Corporation
Shellharbour City Centre Basin	Shellharbour City Council
Shellcove Estate Detention Basin 1	Shellharbour City Council
St Josephs School Retarding Basin	Shellharbour City Council
South Bulli Basin 1	Allied Coal Pty Ltd
South Bulli Stormwater Dam	Wollongong Coal Pty Ltd
Upper Cordeaux 2 Dam	NSW Water
Wollongong High School Retarding Basin	Wollongong City Council

- a. Maintain and operate the Dam Failure Warning System for their Dam(s).
- b. Contribute to the development and implementation of community engagement and capacity building programs on flooding.
- c. Consult with NSW SES on the determination of dam failure alert levels and notification arrangements when developing Dam Safety Emergency Plans.
- d. Maintain a Dam Safety Emergency Plan and provide copies to the NSW SES.
- e. Provide information on the consequences of dam failure to the NSW SES for incorporation into planning and flood intelligence.

1.5.26 Public Information Services Functional Area

- a. When requested by NSW SES;
 - i. Assist the NSW SES in the establishment and operation of a Joint Media Information Centre.
 - ii. Assist NSW SES in the release of public information during an actual or imminent emergency as requested.

1.5.27 Roads and Maritime Services

- a. Manage traffic on state roads, state highways and waterways affected by flood waters and advise the NSW SES of their status including the Princes Highway, Illawarra Highway and Tongarra Road.
- b. Facilitate the safe reliable access of emergency resources on RMS managed roads.
- c. Assist the NSW SES with identification of road infrastructure at risk of flooding.

- d. Assist in Traffic management associated with evacuations where necessary.
 - e. Enter state road closure information into the Live Traffic site.
 - f. Assist the NSW SES and councils with the communication of warnings and information provision to the public through variable message signs.
 - g. Cooperate with the Transport Services Functional Area Coordinator.
- 1.5.28 **School Administration Offices (including Catholic Education Office Diocese of Wollongong, Department of Education Wollongong and Private Schools)**
- a. Liaise with the NSW SES and arrange for the early release of students whose travel arrangements are likely to be disrupted by flooding and/or road closures (or where required, for students to be moved to a suitable location until normal school closing time).
 - b. Pass information to school bus drivers/companies and/or other schools on expected or actual impacts of flooding.
 - c. Assist with coordinating the evacuation of schools when flooding or isolation is expected to occur.
 - d. Provide space in schools for evacuation centres where necessary.
- 1.5.29 **Surf Life Saving NSW**
- a. Assist the NSW SES with the warning and/or evacuation of at risk communities;
 - b. Provide space in Surf Life Saving facilities for evacuation centres where required; and
 - c. Assist the NSW SES with flood rescue operations.
- 1.5.30 **Telecommunication Services Functional Area**
- a. When requested by NSW SES;
 - i. Coordinate the restoration of telephone facilities damaged by flooding.
 - ii. Assist the NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.
- 1.5.31 **Illawarra Transport Services Functional Area Coordinator (TSFAC)**
- a. The TSFAC will assist NSW SES, emergency services and other functional areas through the provision of transport services, including;
 - i. The movement of emergency equipment and personnel.
 - ii. The movement of emergency supplies and goods, including water, fuel and food.
 - iii. The evacuation of people and animals.
 - iv. Assistance for medical transport.
 - v. Transportation of animals and infectious material/dangerous goods.

- vi. Maintaining and operating a transport route advisory service to the NSW SES, emergency services organisations and other Functional Areas and members of the community.
- vii. Coordinate the provision of traffic and transport operations as consistent with the roles of transport organisations.

1.5.32 **NSW Train Link and Sydney Trains**

- a. Operate NSW regional rail services through the Wollongong City, Kiama and Shellharbour City LGAs including the management of railway services affected by flood waters and advise the NSW SES.
- b. Assist the NSW SES with the movement or evacuation of people during flood response operations if required.
- c. Convey flood information and flood warnings to passengers and travellers on NSW and Sydney trains.
- d. Cooperate with, and assist the NSW SES Incident Controller in relation to public safety during flood emergencies.
- e. Cooperate with the Illawarra Transport Services Functional Area Coordinator.

1.5.33 **NSW Volunteer Rescue Association (VRA)**

- a. Assist the NSW SES with the delivery of evacuation warnings and evacuation orders.
- b. Assist the NSW SES with the conduct of evacuations.

1.5.34 **Welfare Services Functional Area**

- a. When requested by NSW SES;
 - i. Establish and manage evacuation centres, and provide disaster welfare services from recovery centres.
 - ii. Administer the Personal Hardship and Distress component of the NSW Disaster Relief Scheme established to provide financial assistance to people affected by emergencies.

PART 2 - PREPAREDNESS

2.1 MAINTENANCE OF THIS PLAN

- 2.1.1 The NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers will maintain the currency of this plan by;
- a. Ensuring that all agencies, 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;
 - i. After each flood operation.
 - ii. When significant changes in land-use or community characteristics occur.
 - iii. When new information from flood studies becomes available.
 - iv. When flood control or mitigation works are implemented or altered.
 - v. When there are changes that alter agreed plan arrangements.
- 2.1.2 The plan is to be reviewed no less frequently than every five years.

2.2 FLOODPLAIN AND COASTAL RISK MANAGEMENT

- 2.2.1 The NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers will ensure that;
- a. NSW SES participates in local floodplain and coastal risk management committee activities when those committees are formed, in accordance with the protocols outlined in the NSW SES Controllers' Guide.
 - b. The NSW SES Illawarra South Coast Region Headquarters is informed of involvement in floodplain and coastal risk management activities.

2.3 DEVELOPMENT OF FLOOD INTELLIGENCE

- 2.3.1 Flood intelligence describes flood behaviour and its effects on the community.
- 2.3.2 The NSW SES maintains a centralised flood intelligence system.

2.4 DEVELOPMENT OF WARNING SYSTEMS

- 2.4.1 The NSW SES establishes total flood warning systems for areas affected by flooding. This requires;
- a. An identification of the potential clients of flood warning information at different levels of flooding (i.e. who would be affected in floods of differing severities).

- b. Available information about the estimated impacts of flooding at different heights.
- c. Identification of required actions and the amounts of time needed to carry them out.
- d. Appropriate means of disseminating warnings to different clients and at different flood levels.

2.5 COMMUNITY RESILIENCE

- 2.5.1 The community needs to be as prepared as emergency agencies for the impact of all hazards (6), including flooding.
- 2.5.2 As the combat agency, NSW SES has the primary responsibility for the collation, assessment and public dissemination of information relating to flooding (3). To do this, NSW SES will require assistance from other agencies, particularly local government councils, dam owners, and the Bureau of Meteorology in the development and delivery of materials.
- 2.5.3 During flooding incidents, the NSW SES Incident Controller is responsible for the collation, assessment and public dissemination of information relating to flooding (3).
- 2.5.4 During times of preparedness, the NSW SES Wollongong City, Kiama and Shellharbour City Local Controllers are responsible for community engagement strategies to be employed with NSW communities that may include:
 - a. Community planning programs.
 - b. Dissemination of flood-related brochures and booklets in flood liable areas.
 - c. Dissemination of coastal erosion related brochures in coastal erosion liable areas.
 - d. Talks and displays orientated to at-risk groups, community organisations, businesses and schools.
 - e. Publicity given to this plan and to flood-orientated NSW SES activities through local media outlets, including articles in local newspapers about the flood threat and appropriate responses.

2.6 TRAINING

- 2.6.1 Throughout this document there are references to functions that must be carried out by the members of the NSW SES Wollongong City, Shellharbour City and Kiama Units. The NSW SES Wollongong City, Kiama and Shellharbour City Local Controllers are responsible for ensuring that the members are;
 - a. Familiar with the contents of this plan.

- b. Trained in the skills necessary to carry out the tasks the NSW SES is responsible for.

2.7 RESOURCES

- 2.7.1 The NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers are responsible for maintaining the condition and state of readiness of NSW SES equipment and the NSW SES facilities in the Illawarra area.

PART 3 - RESPONSE

CONTROL

3.1 CONTROL ARRANGEMENTS

- 3.1.1 The NSW SES is the legislated Combat Agency for floods and is responsible for the control of flood operations. This includes the coordination of other agencies and organisations for flood management tasks.
- 3.1.2 The NSW SES is the designated Combat Agency for damage control for storms. This includes damage control for coastal erosion and inundation from storm activity, specifically the protection of life and the coordination of the protection of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works.
- 3.1.3 The Local EMPLAN will operate to provide support as requested by the NSW SES Incident Controller.

3.2 OPERATIONAL MANAGEMENT

- 3.2.1 NSW SES utilises the Australasian Inter-service Incident Management System (AIIMS), which is based on five principles;
 - a. Flexibility;
 - b. Functional management;
 - c. Management by objectives;
 - d. Unity of Command; and
 - e. Span of Control.
- 3.2.2 AIIMS provides for different incident levels based on the complexity of management.
- 3.2.3 The Illawarra Area may be divided into sectors and divisions to manage the flood and/or coastal erosion event (divisions are usually a group of sectors).
- 3.2.4 Sectors and divisions may be based on floodplain classifications, local government area, geographical, physical or functional boundaries. A town, city or suburb may be one sector or split into several sectors and divisions.

3.3 START OF RESPONSE OPERATIONS

- 3.3.1 This plan is always active to ensure that preparedness actions detailed in this plan are completed.
- 3.3.2 Response operations will begin;

- a. On receipt of a Bureau of Meteorology issued, Flood Watch, Flood Warning, Severe Thunderstorm Warning or a Severe Weather Warning for flash flooding or severe ocean conditions.
 - b. On receipt of a dam failure alert.
 - c. When other evidence leads to an expectation of flooding or coastal erosion within the Illawarra area.
- 3.3.3 Contact with the Bureau of Meteorology to discuss the development of flood warnings will normally be through the NSW SES Illawarra South Coast Region Headquarters and/or NSW SES State Headquarters.
- 3.3.4 The following persons and organisations will be advised of the start of response operations regardless of the location and severity of the flooding anticipated:
- a. NSW SES Illawarra South Coast Region Headquarters.
 - b. NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers.
 - c. NSW SES Wollongong, Coniston, Kiama and Shellharbour City Unit members.
 - d. Illawarra Local Emergency Operations Controller (for transmission to the NSW Police Force Local Area Command Headquarters).
 - e. Illawarra Local Emergency Management Officer (for transmission to appropriate council officers and departments).
 - f. Wollongong City Council Mayor.
 - g. Kiama Municipal Council Mayor.
 - h. Shellharbour City Council Mayor.
 - i. Other agencies listed in this plan will be advised by the Local Emergency Management Officer on the request of the NSW SES Incident Controller and as appropriate to the location and nature of the threat.

3.4 RESPONSE STRATEGIES

- 3.4.1 The main response strategies for NSW SES flood operations will follow the strategic priorities of the NSW SES State Controller including;
- a. Information Provision and Warning
 - i. Issue of timely Flood Warnings and safety advice to affected communities.
 - ii. Inform the community regarding the potential impacts of a flood and what actions to undertake in preparation for flooding.
 - iii. Inform the community regarding the potential impacts of coastal erosion and what preparatory actions to undertake.
 - iv. Issue of Evacuation Warnings and Orders if and when necessary.

- v. Provide timely and accurate preparedness information to the community.
 - b. Property protection
 - i. Assistance with the protection of critical infrastructure.
 - ii. Protect the property of residents and businesses at risk of flood damage.
 - iii. Assistance with property protection by way of sandbagging and the lifting or transporting of furniture, personal effects, commercial stock and caravans.
 - iv. Assistance with the relocation of readily moveable household goods and commercial stock and equipment from properties threatened by coastal erosion.
 - c. Evacuation
 - i. Evacuation is a risk management strategy that may be used to mitigate the effects of an emergency on a community. It involves the movement of people to a safer location and their return. For an evacuation to be effective it must be appropriately planned and implemented (8).
 - d. Flood Rescue
 - i. The rescue or safe retrieval of persons or domestic animals trapped by floodwaters.
 - e. Resupply
 - i. Minimise disruption upon the community by resupplying areas which have become isolated as a consequence of flooding.
 - ii. Ensure supplies are maintained to property owners by coordinating the resupply of properties which have become isolated as a consequence of flooding.
- 3.4.2 The NSW SES Incident Controller will select the appropriate response strategy to deal with the expected impact of the flood in each sector and/or community. The impact may vary so a number of different strategies may need to be selected and implemented across the whole operational area. The available strategies for each sector and/or community are maintained by the NSW SES.
- 3.4.3 Supporting agency strategies may include;
- a. Protect the community from incidents involving fire and hazardous materials.
 - b. Support evacuations through the establishment of Evacuation Centres and maintaining a register of evacuated persons.
 - c. Maintain the welfare of communities and individuals affected by the impact of a flood.

- d. Minimise disruption to the community by ensuring supply of essential energy and utility services.
- e. Ensure coordinated health services are available to and accessible by the flood affected communities.
- f. Maintain the welfare of animals affected by the impact of a flood.

3.5 OPERATIONS CENTRES

- 3.5.1 The NSW SES Wollongong City Operations Centre is located at Montague Street, North Wollongong.
- 3.5.2 The NSW SES Kiama Operations Centre is located at 205 Terralong Street, Kiama.
- 3.5.3 The NSW SES Shellharbour City Operations Centre is located at 127 Tongarra Road, Albion Park.
- 3.5.4 Supporting Emergency Operation Centres are located at;
 - a. The Wollongong City Emergency Operations Centre is located at Level 10, Wollongong City Council Administration Building, 41 Burelli Street, Wollongong.
 - b. The Illawarra Emergency Operations Centre is located at 37 Airport Road, Albion Park Rail.
 - c. The Kiama Emergency Operations Centre is located at 205 Terralong St, Kiama.
 - d. The Shellharbour City Emergency Operations Centre is located at 127 Tongarra Road, Albion Park.

3.6 LIAISON

- 3.6.1 Any agency with responsibilities identified in this plan may be requested by the NSW SES to provide liaison (including a liaison officer where necessary) to the relevant NSW SES Operations Centre, or designated Emergency Operations Centre.
- 3.6.2 In accordance with NSW EMPLAN, Liaison Officers will;
 - a. Maintain communication with and convey directions/requests to their organisation or functional area;
 - b. Provide advice on the status, resource availability, capabilities, actions and requirements of their organisation or functional area, and
 - c. Where appropriate, have the authority to deploy the resources of their parent organisation at the request of the NSW SES Incident Controller.

3.7 END OF RESPONSE OPERATIONS

- 3.7.1 Where an evacuation product has been issued, and the immediate danger to life and property has passed the NSW SES Incident Controller will issue an 'All Clear' message signifying that response operations have been completed. The message will be distributed through the same media outlets as earlier evacuation messages. The NSW SES Incident Controller will also advise details of recovery coordination arrangements, arrangements made for clean-up operations prior to evacuees being allowed to return to their homes, and stand-down instructions for agencies not required for recovery operations.

PLANNING

3.8 COLLATING SITUATIONAL INFORMATION

Strategy

- 3.8.1 The NSW SES maintains and records situational awareness of current impacts and response activities.

Actions

- 3.8.2 The NSW SES Wollongong City, Shellharbour City and Kiama Local Headquarters will collate information on the current situation in the Wollongong City, Shellharbour City and Kiama LGAs and incorporate in Situation Reports.
- 3.8.3 The NSW SES Illawarra South Coast Region Headquarters collates Region-wide information for inclusion in NSW SES Region Situation Reports.
- 3.8.4 Sources of situational information during times of flooding are;
- a. **Agency Situation Reports.** Agencies and functional areas provide regular situation reports (SITREPs) to the NSW SES.
 - b. **Active Reconnaissance.** The NSW SES Incident Controller is responsible for coordinating the reconnaissance of impact areas, recording and communicating observations. Reconnaissance can be performed on the ground and using remote sensing (more commonly aerial). The NSW SES monitors the following problem areas:
 - i. Lake Illawarra
 - ii. Identified Flash Flood Hotspots
 - iii. Rivers and Creeks
 - c. The **Bureau of Meteorology's Flood Warning Centre** provides river height and rainfall information, data is available on the website <http://www.bom.gov.au/nsw/flood/>.
 - d. **Manly Hydraulics Laboratory** automated river watch system funded by the Office of Environment and Heritage. This system provides river

height and rainfall readings for a number of gauges in the Wollongong City, Shellharbour City and Kiama LGAs. Recent data from this system is available on the Manly Hydraulic Laboratory website:

<http://www.mhl.nsw.gov.au>. A history of area floods is also available upon request via the website.

- e. **NSW Office of Water.** Daily river reports containing information on gauge heights and river flows are available from the website: <http://waterinfo.nsw.gov.au/>.
 - f. **NSW SES Illawarra South Coast Region Headquarters.** The Region Headquarters provides information on flooding and its consequences, including those in nearby LGAs (this information is documented in Bulletins and Situation Reports).
 - g. **Water NSW.** Provide the NSW SES real-time or near real-time access to river height gauges and height data.
 - h. **Wollongong City Council, Kiama Municipal Council and Shellharbour City Council.** Councils provide situational awareness information in the form of road closures, impact on critical infrastructure and debris removal.
- 3.8.5 During flood operations sources of information on roads closed by flooding include;
- a. Wollongong City Council, Kiama Municipal Council and Shellharbour City Council (website/Facebook page)
 - b. Lake Illawarra and Wollongong Police Local Area Command.
 - c. Roads and Maritime Services (website and/or telephone service).
 - d. NSW SES Illawarra South Coast Region Headquarters.
 - e. NSW SES Wollongong City, Shellharbour City and Kiama Local Headquarters.
- 3.8.6 Situational information relating to consequences of flooding and/or coastal erosion should be used to verify and validate NSW SES Flood Intelligence records.

3.9 PROVISION OF FLOOD INFORMATION AND WARNINGS

Strategy

- 3.9.1 The NSW SES Wollongong City, Shellharbour City and Kiama Local Headquarters provides advice to the NSW SES Illawarra South Coast Region Headquarters on current and expected impacts of flooding in the Wollongong City, Shellharbour City and Kiama LGAs.
- 3.9.2 The NSW SES Illawarra South Coast Region Headquarters issues NSW SES Flood Bulletins, NSW SES Livestock and Equipment Warnings, Evacuation Warnings, Evacuation Orders and 'All Clear' notifications to media outlets and agencies on behalf of all NSW SES Units in the Region.

Actions

- 3.9.3 The **NSW SES Incident Controller** will ensure that the NSW SES Operations Commander is regularly briefed on the progress of operations.
- 3.9.4 **NSW SES Wollongong City, Shellharbour City and Kiama Local Headquarters staff** will be briefed regularly by the Incident Controller so they can provide information in response to inquiries received in person or by other means such as phone or fax.
- 3.9.5 **Bureau of Meteorology Severe Thunderstorm Warning.** These are issued direct to the media by the Bureau when severe thunderstorms are expected to produce dangerous or damaging conditions, including flash flooding. Severe thunderstorms are usually smaller in scale than events covered by Flood Watches and Severe Weather Warnings.
- 3.9.6 **Bureau of Meteorology Severe Weather Warnings for Flash Flooding.** These are issued direct to the media by the Bureau and provide a warning of the possibility for flash flooding as a result of intense rainfall. These warnings are issued when severe weather is expected to affect land based communities with 6 to 24 hours. Severe Weather Warnings may also include other conditions such as Damaging Surf, Dangerous Surf or tides, or Damaging Winds.
- 3.9.7 **Bureau of Meteorology Flood Watches.** Flood Watches are issued by the Bureau to advise people of the potential for flooding in a catchment area based on predicted or actual rainfall. Flood Watches will be included in NSW SES Flood Bulletins issued by the NSW SES Illawarra South Coast Region Headquarters.
- 3.9.8 **Bureau of Meteorology Flood Warnings.** The NSW SES Illawarra South Coast Region Headquarters will send a copy of Bureau Flood Warnings to the NSW SES Wollongong City, Shellharbour City and Kiama Units. On receipt the NSW SES Incident Controller will provide the NSW SES Illawarra South Coast Region Headquarters with information on the estimated impacts of flooding at the predicted heights for inclusion in NSW SES Region Flood Bulletins.
- 3.9.9 **NSW SES Livestock and Equipment Warnings.** Following heavy rain or when there are indications of significant creek or river rises (even to levels below Minor Flood heights), the NSW SES Incident Controller will advise the NSW SES Illawarra South Coast Region Headquarters which will issue NSW SES Livestock and Equipment Warnings.
- 3.9.10 **NSW SES Local Flood Advices.** The NSW SES Incident Controller may issue Local Flood Advices for locations not covered by Bureau Flood Warnings. They may be provided verbally in response to phone inquiries but will normally be incorporated into NSW SES Region Flood Bulletins.
- 3.9.11 **NSW SES Flood Bulletins.** The NSW SES Illawarra South Coast Region Headquarters will regularly issue NSW SES Flood Bulletins which describe information on the estimated impacts of flooding at the predicted heights (using information from Bureau Flood Warnings and NSW SES Local Flood

Advices) to NSW SES units, media outlets and agencies on behalf of all NSW SES units in the Region. When operations relating to coastal erosion/inundation are being undertaken, NSW SES Region Bulletins will contain information and advice about property damage mitigation measures and evacuation in affected areas.

- 3.9.12 **NSW SES Evacuation Warnings and Evacuation Orders.** These are usually issued to the media by the NSW SES Operations Commander on behalf of the NSW SES Incident Controller.
- 3.9.13 **Dam Failure Alerts.** Dam failure alerts are issued to NSW SES by the dam owner, in accordance with arrangements in the Dam Safety Emergency Plan (DSEP), the system involves the Dam Owner notifying NSW SES State Operations Centre, who in turn distribute the warning to the NSW SES Region and Unit Headquarters.
- 3.9.14 A flow chart illustrating the notification arrangements for potential dam failure is shown in Attachment 2.
- 3.9.15 Dam failure alert levels are set in consultation with the NSW SES and are used to trigger appropriate response actions. The conditions that define each of the alert levels are listed in the relevant DSEP. Responses escalate as the alert level migrates from white to amber to red. Table 1 briefly outlines example defining conditions and appropriate NSW SES responses associated with each alert.

Alert Level	Example Defining Condition	NSW SES Response	NSW SES Warning Product
White	May be a structural anomaly. May be increased monitoring in response to a heavy rainfall event	Implements notification flowchart. Check operational readiness.	This is a preliminary alert to assist the NSW SES in its preparation. This is not a public alert.
Amber	Failure possible if storage level continues to rise or structural anomaly not fixed	Implements notification flowchart. Warn downstream population at risk to prepare to evacuate	NSW SES Evacuation Warning
Red	Failure imminent or occurred	Implements notification flowchart. Evacuation of downstream populations	NSW SES Evacuation Order

Table 1: Dam Failure Alert Levels

Note: Some DSEPs will have alert levels that proceed directly from White to Red. This is the case if adequate time does not exist between the three alert levels to evacuate the downstream population at risk. The decision to omit the Amber Alert level, and the general setting of Alert levels should be undertaken in consultation with the NSW SES.

- 3.9.16 The NSW SES / Dam Owner will disseminate warnings to the population at risk of dam failure (these arrangements are specific to each dam, are negotiated between the Dam Owner and NSW SES, and are documented in the DSEP).
- 3.9.17 Special arrangements apply in the case of severe flooding that may have the potential to cause the failure of Barina Park Detention Basin and Wollongong High School R. Basin. Details of these arrangements are maintained by the NSW SES.
- 3.9.18 **Standard Emergency Warning Signal (SEWS).** This signal may be played over radio and television stations to alert communities to Evacuation Warnings, Evacuation Orders, Special Warnings or Dam-Failure Warnings. Approval to use the signal is the responsibility of the NSW SES Incident Controller.
- 3.9.19 **The Public Information and Inquiry Centre (PIIC)** (operated by the NSW Police Force) will answer calls from the public regarding registered evacuees.
- 3.9.20 **The Disaster Welfare Assistance line** is a central support and contact point for disaster affected people inquiring about welfare services advice and assistance. This normally operates during business hours, but can be extended when required.
- 3.9.21 **The RMS Transport Information Line** will provide advice to callers on the status of roads. The RMS website also lists road closure information.
- 3.9.22 Wollongong City Council, Kiama Municipal Council and Shellharbour City Council will provide information on the status of local roads.
- 3.9.23 Collation and dissemination of road information is actioned as follows:
- a. As part of Situation Reports, the NSW SES Incident Controller provides road status reports for main roads in the LGAs to the NSW SES Illawarra South Coast Region Headquarters.
 - b. The NSW SES Illawarra South Coast Region Headquarters distributes information on main roads to NSW SES units, media outlets and agencies as part of NSW SES Flood Bulletins.

OPERATIONS

3.10 AIRCRAFT MANAGEMENT

- 3.10.1 Aircraft can be used for a variety of purposes during flood operations including evacuation, rescue, resupply, reconnaissance and emergency travel.
- 3.10.2 Air support operations will be conducted under the control of the NSW SES Region Headquarters, which may allocate aircraft to Units if applicable.
- 3.10.3 NSW SES maintains the following information for the Wollongong City, Kiama and Shellharbour City LGAs;
- a. Locations of suitable helicopter landing points.

- b. Locations of suitable airports and records detailing aircraft size and type that can land at airports.
- c. Intelligence on when access to these locations is expected to be lost.

3.11 ASSISTANCE FOR ANIMALS

- 3.11.1 Matters relating to the welfare of livestock, companion animals and wildlife are to be referred to Agriculture and Animal Services Functional Area.
- 3.11.2 Requests for emergency supply and/or delivery of fodder to stranded livestock, or for livestock rescue, are to be referred to Agriculture and Animal Services Functional Area.
- 3.11.3 Requests for animal rescue should be referred to the NSW SES.

3.12 COMMUNICATION SYSTEMS

- 3.12.1 The primary means of communications between fixed locations is by telephone and email.
- 3.12.2 The primary means of communication to and between deployed NSW SES resources is by GRN and through the Beacon operational management system.
- 3.12.3 All liaison officers will provide their own communication links back to their respective agencies.
- 3.12.4 All other organisations will provide communications as necessary to their deployed field teams.
- 3.12.5 Back-up communications are provided as follows:
 - a. Wollongong:
 - i. GSM/CDMA Mobile telephones
 - ii. Alternatively all NSW SES GRN radios have capability to operate on UHF.
 - b. Kiama:
 - i. Council VHF radio network.
 - c. Shellharbour City:
 - i. Portable repeater and specialist communications equipment
 - ii. Illawarra Emergency Service VHF Liaison Channel.
 - iii. Bush Fire Brigades VHF radio network.
 - iv. Council UHF radio network.

3.13 PRELIMINARY DEPLOYMENTS

- 3.13.1 When flooding is expected to be severe enough to cut road access to communities, the NSW SES Incident Controller will ensure that resources are in place for the distribution of consumable items and medical supplies to the areas that could become isolated.
- 3.13.2 When access between locations is expected to be cut, the NSW SES Incident Controller will advise appropriate agencies so that resources (including sandbags, fire fighting appliances, ambulances, etc.) are pre-deployed to ensure that operational capability is maintained.

3.14 ROAD AND TRAFFIC CONTROL

- 3.14.1 A number of roads within the Illawarra area are affected by flooding. NSW SES maintains details of these at-risk roads.
- 3.14.2 The Council closes and re-opens its own roads. It may also close and re-open any road managed by the RMS in its capacity as an agent of the RMS.
- 3.14.3 The NSW Police Force has the authority to close and re-open roads but will normally only do so (if the Council or the RMS have not already acted) if public safety requires such action.
- 3.14.4 When resources permit, the NSW SES may assist Council, RMS or the Police by erecting road closure signs and barriers.
- 3.14.5 In flood events, the NSW SES Incident Controller may direct the implementation of traffic control measures. The entry into flood affected areas will be controlled in accordance with the provisions of the State Emergency Service Act, 1989 (Part 5, Sections 19, 20, 21 and 22) and the State Emergency Rescue Management Act, 1989 (Part 4, Sections 60KA, 60L and 61).
- 3.14.6 Police, RMS or Council officers closing or re-opening roads or bridges affected by flooding are to advise the NSW SES Incident Controller, who will then provide a road information service to local emergency services, the public and the NSW SES Illawarra South Coast Region Headquarters. All such information will also be passed to the Police, RMS and the Council.

3.15 STRANDED TRAVELLERS

- 3.15.1 Flood waters can strand travellers. Travellers seeking assistance will be referred to the Welfare Services Functional Area for the arrangement of emergency accommodation and provisions.

3.16 MANAGING PROPERTY PROTECTION OPERATIONS

Strategy

- 3.16.1 Protect the property of residents and businesses at risk of flood damage.

Actions

- 3.16.2 The NSW SES is the responsible agency for the coordination of operations to protect property.
- 3.16.3 Property may be protected from floods by;
- a. Lifting or moving of household furniture.
 - b. Lifting or moving commercial stock and equipment.
 - c. Sandbagging to minimise entry of water into buildings.
- 3.16.4 The NSW SES maintains stocks of sandbags and will provide advice to the community on strategic sandbag pick up locations if, and when they are required.
- 3.16.5 Property protection options are however very limited in the Wollongong City, Shellharbour City and Kiama LGAs due to the large number of properties that can be affected by flash flooding.
- 3.16.6 Property protection measures for the threat of coastal erosion involves the relocation of readily moveable household goods and commercial stock and equipment. The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works.

3.17 MANAGING FLOOD RESCUE OPERATIONS

Strategy

- 3.17.1 Rescue of people and domestic animals from floods.

Actions

- 3.17.2 The NSW SES Incident Controller controls all flood rescue in Wollongong City, Shellharbour City and Kiama LGAs during a flood emergency.
- 3.17.3 Flood rescues, may be carried out by accredited Units in accordance with appropriate standards.
- 3.17.4 Additional flood boats and crews can be requested through the NSW SES Illawarra South Coast Region Headquarters.
- 3.17.5 There may be some residual population which did not evacuate during the early stages of flooding and which require rescue.

3.18 MANAGING EVACUATION OPERATIONS

Strategy

- 3.18.1 When there is a risk to public safety by floodwater, evacuation is the primary strategy. Circumstances may include;
- a. Evacuation of people when their homes or businesses are likely to flood.
 - b. Evacuation of people who are unsuited to living in isolated circumstances, due to flood water closing access.

- c. Evacuation of people where essential energy and utility services are likely to fail, have failed or where buildings have been made uninhabitable.
- d. Evacuation of people when their homes or business are at threat of collapse from coastal erosion.

Actions

- 3.18.2 The evacuation operation will have the following stages:
 - a. Decision to evacuate.
 - b. Mobilisation (mobilisation may begin prior to the decision to evacuate).
 - c. Evacuation Warning delivery.
 - d. Evacuation Order delivery.
 - e. Withdrawal.
 - f. Shelter.
 - g. Return.
- 3.18.3 During floods evacuations will be controlled by the NSW SES Incident Controller.

Decision to evacuate

- 3.18.4 The decision to evacuate rests with the NSW SES Incident Controller 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 NSW SES Operations Commander and the Local Emergency Operations Controller.
- 3.18.5 Some people will make their own decision to evacuate earlier and move to alternate accommodation, using their own transport. This is referred to as self-managed evacuation (9).

Mobilisation

- 3.18.6 The NSW SES Incident Controller will request the following personnel for doorknock teams for designated Sectors/locations:
 - a. NSW SES Wollongong City, Shellharbour City and Kiama Unit members.
 - b. RFS Illawarra members via the RFS Fire Control Officer.
 - c. Local Police Force officers via the local area command.
- 3.18.7 The NSW SES Operations Commander will assist with any additional personnel required to assist with doorknock teams using;
 - a. NSW SES members from other NSW SES Regions.
 - b. FRNSW personnel arranged via the FRNSW Liaison Officer.
 - c. RFS personnel arranged via the RFS Liaison Officer.

- 3.18.8 The NSW SES Incident Controller may request the Chairperson of the LEMC to provide Council personnel to assist with traffic coordination within Sector(s)/Community.
- 3.18.9 The NSW SES Incident Controller will arrange liaison officers for Sector Command Centres.
- 3.18.10 The NSW SES Incident Controller may request support for the transport of evacuees within Sectors via the Transport Services Functional Area.

Delivery of Evacuation Warnings and Evacuation Orders

- 3.18.11 The NSW SES will advise the community of the requirements to evacuate. The NSW SES will issue an **Evacuation Warning** when the intent of an NSW SES Incident Controller is to warn the community of the need to prepare for a possible evacuation.
- 3.18.12 The NSW SES will issue an **Evacuation Order** when the intent of the NSW SES Incident Controller is to instruct a community to immediately evacuate in response to an imminent threat.
- 3.18.13 The NSW SES Incident Controller will distribute Evacuation Warnings and Evacuation Orders to;
- a. Sector / Division Command Centres (where established).
 - b. All members of the Illawarra LEMC
 - c. Radio Stations.
 - d. Relevant media outlets and agencies.
 - e. Other local agencies and specified individuals.
- 3.18.14 The NSW SES Operations Commander will ensure distribution of Evacuation Warnings and Evacuation Orders to;
- a. The NSW SES State Operations Centre.
 - b. The NSW SES Incident Controller.
 - c. Affected communities via dial-out warning systems where installed or applicable.
- 3.18.15 Evacuation Warnings and Evacuation Orders may be delivered through;
- a. Radio and television stations.
 - b. Doorknocking by emergency service personnel.
 - c. Public address systems (fixed or mobile).
 - d. Telephony-based systems (including Emergency Alert).
 - e. Two-way Radio.
 - f. Direct access to local Radio Stations and ABC Emergency Broadcasting.
- 3.18.16 The Standard Emergency Warning Signal (SEWS) may be used to precede all Evacuation Orders broadcast on Radio Stations.

- 3.18.17 Sector Commanders, where established, will distribute Evacuation Orders via Emergency Service personnel in doorknock teams to areas under threat of inundation.
- 3.18.18 Doorknock teams will work at the direction of;
- The Sector Commander if a Sector Command Centre is established.
 - The relevant Division Commander where a Sector Command Centre has not been established or,
 - The Incident Controller.
- 3.18.19 Field teams and supporting personnel conducting doorknocks will record and report back the following information to their Sector Commander/Division Commander/ Incident Controller;
- 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.
- 3.18.20 Refusal to evacuate. Field teams and supporting personnel should not waste time dealing with people who are reluctant or refuse to comply with any Evacuation Order. These cases are to be referred to the NSW Police Force.

Withdrawal

- 3.18.21 Evacuations will generally be carried out in stages starting from the lowest areas, low flood islands and low trapped perimeters; and progressively to higher areas.
- 3.18.22 The most desirable method of evacuation is via road using private transport. This may be supplemented by buses for car-less people. However, other means of evacuation may also be used if available and as necessary (e.g. by foot, rail, air).
- 3.18.23 Evacuees who require emergency accommodation or disaster welfare assistance will be directed to designated evacuation centres. Evacuees who have made their own accommodation arrangements will not be directed to evacuation centres. It is not possible to determine in advance how many will fall into this category.
- 3.18.24 Evacuees will:
- Move under local traffic arrangements from the relevant Sectors/Community if safe to do so;
 - Continue along the suburban/regional/rural road network to allocated Evacuation Centres.

- 3.18.25 **Welfare Services.** The Welfare Services Functional Area will, at the request of the NSW SES Incident Controller, assist in the identification and establishment of suitable locations to serve as Evacuation Centres.
- 3.18.26 **Health Services.** The Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes).
- 3.18.27 **Schools.** School administration offices (Department of Education, Catholic Education Office and Private Schools) will coordinate the evacuation of schools if not already closed.
- 3.18.28 If there is sufficient time between the start of response operations and the evacuation of communities, the NSW SES Incident Controller will discuss the temporary closure of appropriate schools with the Regional Director, Illawarra and South East Region, Department of Education. This will enable pupils to stay at home or be returned home so they can be evacuated (if required) with their families.
- 3.18.29 Note that in the Wollongong City, Shellharbour City and Kiama LGAs, school principals may close some schools affected by flooding in the early stages of flooding.
- 3.18.30 **Caravan parks.** When an evacuation order is given occupiers of movable dwellings should:
- a. Isolate power to moveable dwellings.
 - b. Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.
 - c. Lift the other contents in any remaining dwellings as high as possible.
 - d. Move to friends, relatives or a designated evacuation centre if they have their own transport, or move to the caravan office to await transport.
 - e. If undertaking self-managed evacuation, register their movements with the caravan park management upon leaving the park.
- 3.18.31 Where possible, dwellings that can be moved will be relocated by their owners. Park managers will arrange for the relocation of movable dwellings as required. Council and NSW SES personnel may assist if required.
- 3.18.32 Caravan park managers will ensure that their caravan park is capable of being evacuated in a timely and safe manner.
- 3.18.33 Advise the NSW SES Incident Controller of:
- a. The number of people requiring transport.
 - b. Details of any medical evacuations required.
 - c. Whether additional assistance is required to effect the evacuation.
- 3.18.34 Check that all residents and visitors are accounted for.
- 3.18.35 Inform the NSW SES Incident Controller when the evacuation of the caravan park has been completed.

- 3.18.36 Provide the NSW SES Incident Controller with a register of people that have been evacuated.
- 3.18.37 **Assistance Animals, Pets and Companion Animals of Evacuees:** 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.
- 3.18.38 Where possible owners should take their companion animals with them when they are asked to evacuate. 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 boat. In such circumstances Agriculture and Animal Services will coordinate separate arrangements for evacuation and care of companion animals.
- 3.18.39 **Transport and storage:** Transport and storage of furniture from flood and/or coastal erosion threatened properties will be arranged by the NSW SES if time and resources permit.
- 3.18.40 **Security:** The NSW Police Force will coordinate the provision of overall security for evacuated areas.
- 3.18.41 **Assembly areas:** An assembly area may be used for the assembly of emergency-affected persons before they move to temporary accommodation or a nominated evacuation centre. As such these areas do not provide welfare assistance nor are they used for long term sheltering or provision of meals. An assembly area may also be a prearranged, strategically placed area, where support response personnel, vehicles and other equipment can be held in readiness for use during an emergency.

Shelter

- 3.18.42 **Evacuation Centres:** Evacuees will be advised to go to friends or relatives, or else be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the NSW SES Incident Controller, but managed as soon as possible by Welfare Services.
- 3.18.43 The Illawarra EMPLAN identifies locations suitable for an evacuation centre.
- 3.18.44 **Registration:** The NSW Police Force will facilitate the requirement of Disaster Victim Registration for people evacuated to designated evacuation centres.
- 3.18.45 **Animal Shelter:** Facilities to hold and care for companion animals of evacuees will be coordinated by Agriculture and Animal Services if required. If required, Agriculture and Animal Services will also coordinate refuge areas for livestock (eg horses) where feasible.

Return

- 3.18.46 The NSW SES Incident Controller will advise when return to evacuated areas is safe after flood waters have receded and reliable access is available and will issue an "All Clear" notification.

- 3.18.47 The NSW SES Incident Controller will determine when it is safe for evacuees to return to their homes in consultation with:
- a. The Recovery Coordinating Committee (if established)
 - b. Welfare Services Functional Area Coordinator (welfare of evacuees)
 - c. Engineering Services Functional Area Co-ordinator (safety of buildings, structural integrity of levees/dams)
 - d. Health Service Functional Area Coordinator (public health)
 - e. Transport Services Functional Areas Coordinator (arrangement of transport)
 - f. The Illawarra LEOCON
 - g. The Wollongong City Council, Kiama Municipal Council and Shellharbour City Council
 - h. NSW SES Operations Commander
 - i. Other appropriate agencies/functional areas as required (mitigation and advice regarding identified risks resulting from the flood and/or coastal erosion event).
- 3.18.48 Once it is considered safe to do so, the NSW SES Incident Controller will authorise the return of evacuees.
- 3.18.49 The return will be controlled by the NSW SES Incident Controller and may be conducted, at their request, by the Recovery Coordinator.

3.19 MANAGING RESUPPLY OPERATIONS

- 3.19.1 The NSW SES is responsible for the coordination of the resupply of isolated communities and properties.
- 3.19.2 If isolation is expected to occur, residents should be encouraged to consider their needs and suitability for an unknown period of isolation.
- 3.19.3 If properties/communities are going to remain in locations expected to become isolated, households/retailers should be encouraged to stock up on essential supplies.
- 3.19.4 In certain circumstances, and where practicable, once supplies are delivered to the NSW SES designated loading point, the NSW SES Incident Controller will arrange for the delivery of essential foodstuffs, fuels or urgent medical supplies required by an isolated property or community.
- 3.19.5 All reasonable efforts will be made to deliver supplies, however where necessary the NSW SES will prioritise the delivery of items.

Resupply of Isolated Communities

Strategy

- 3.19.6 Minimise disruption upon the community by resupplying communities which have become isolated as a consequence of flooding.

Actions

- 3.19.7 The NSW SES is responsible for the coordination of the resupply of isolated communities.
- 3.19.8 If flood predictions indicate that areas are likely to become isolated, the NSW SES Incident Controller will issue warning advice that essential retailers (e.g. pharmacy and grocery stores) should stock up.
- 3.19.9 The NSW SES is prepared to deliver mail to isolated communities but may not be able to do so according to normal Australia Post timetables.
- 3.19.10 The NSW SES will assist hospitals with resupply of medical resources such as medications, essential equipment, linen and other consumables where able.

Resupply of Isolated Properties

Strategy

- 3.19.11 Ensure supplies are maintained to properties by coordinating the resupply of properties which have become isolated as a consequence of flooding.

Actions

- 3.19.12 The resupply of isolated properties is a common requirement during floods and coordination can be difficult because requests can emanate from a variety of sources. Isolated properties may call their suppliers direct, place their orders through their own social networks or contact the NSW SES.
- 3.19.13 The principles to be applied when planning for the resupply of isolated properties are;
- The NSW SES will coordinate resupply and establish a schedule.
 - Some isolated households will not have the ability to purchase essential grocery items due to financial hardship. If an isolated household seeks resupply from the NSW SES and claims to be, or is considered to be, in dire circumstances, he/she is to be referred to Welfare Services for assessment of eligibility. Where financial eligibility criteria are met, Welfare Services will assist with the purchase of essential grocery items. Welfare Services will deliver the essential grocery items to the NSW SES designated loading point for transport.
 - Local suppliers will liaise with the NSW SES regarding delivery of resupply items to the designated loading point.
 - Local suppliers are responsible for packaging resupply items for delivery.

- 3.19.14 A flowchart illustrating the Resupply process is shown in Attachment 1. Please note that the flowchart outlines the resupply process but does not encompass all potential situations and/or outcomes.

PART 4 - RECOVERY

4.1 RECOVERY COORDINATION AT THE LOCAL LEVEL

- 4.1.1 The NSW SES Incident Controller will ensure that planning for long-term recovery operations begins at the earliest opportunity, initially through briefing the Local Emergency Management Committee (LEMC). As soon as possible the LEMC will meet to discuss recovery implications including the need for a Local Recovery Committee. The LEMC will consider any impact assessment in determining the need for recovery arrangements. This is conveyed in the first instance to the State Emergency Operations Controller (SEOCN) for confirmation with the State Emergency Recovery Controller (SERCON).
- 4.1.2 Once the need for recovery has been identified, the SERCON, in consultation with the SEOCN, may recommend the appointment of a Local Recovery Coordinator and nominate an appropriate candidate to the Minister for Emergency Services.
- 4.1.3 The SERCON may send a representative to the LEMC and subsequent recovery meetings to provide expert recovery advice and guidance.
- 4.1.4 The NSW SES Incident Controller and Local Emergency Operations Controller (LEOCN) should attend recovery meetings to provide an overview of the emergency response operation.
- 4.1.5 The NSW SES Region Controller, the Regional Emergency Management Officer and appropriate Regional Functional Area Coordinators will be invited to the initial local meeting and to subsequent meetings as required.
- 4.1.6 The recovery committee will:
- a. Develop and maintain a Recovery Action Plan with an agreed exit strategy and timeline.
 - b. Monitor and coordinate the activities of agencies with responsibility for the delivery of services during recovery.
 - c. Ensure that relevant stakeholders, especially the communities affected, are involved in the development and implementation of recovery objectives and strategies and are informed of progress made.
 - d. Provide the SERCON and NSW SES with an end of recovery report.
 - e. Ensure the recovery is in line with the National Principles of Disaster Recovery and the NSW tenets.

4.2 RECOVERY COORDINATION AT THE REGION AND STATE LEVEL

- 4.2.1 In the event that an emergency affects several local areas, a Region Emergency Management Committee (REMC) will meet to discuss recovery implications including the need for a Region Recovery Committee. This is

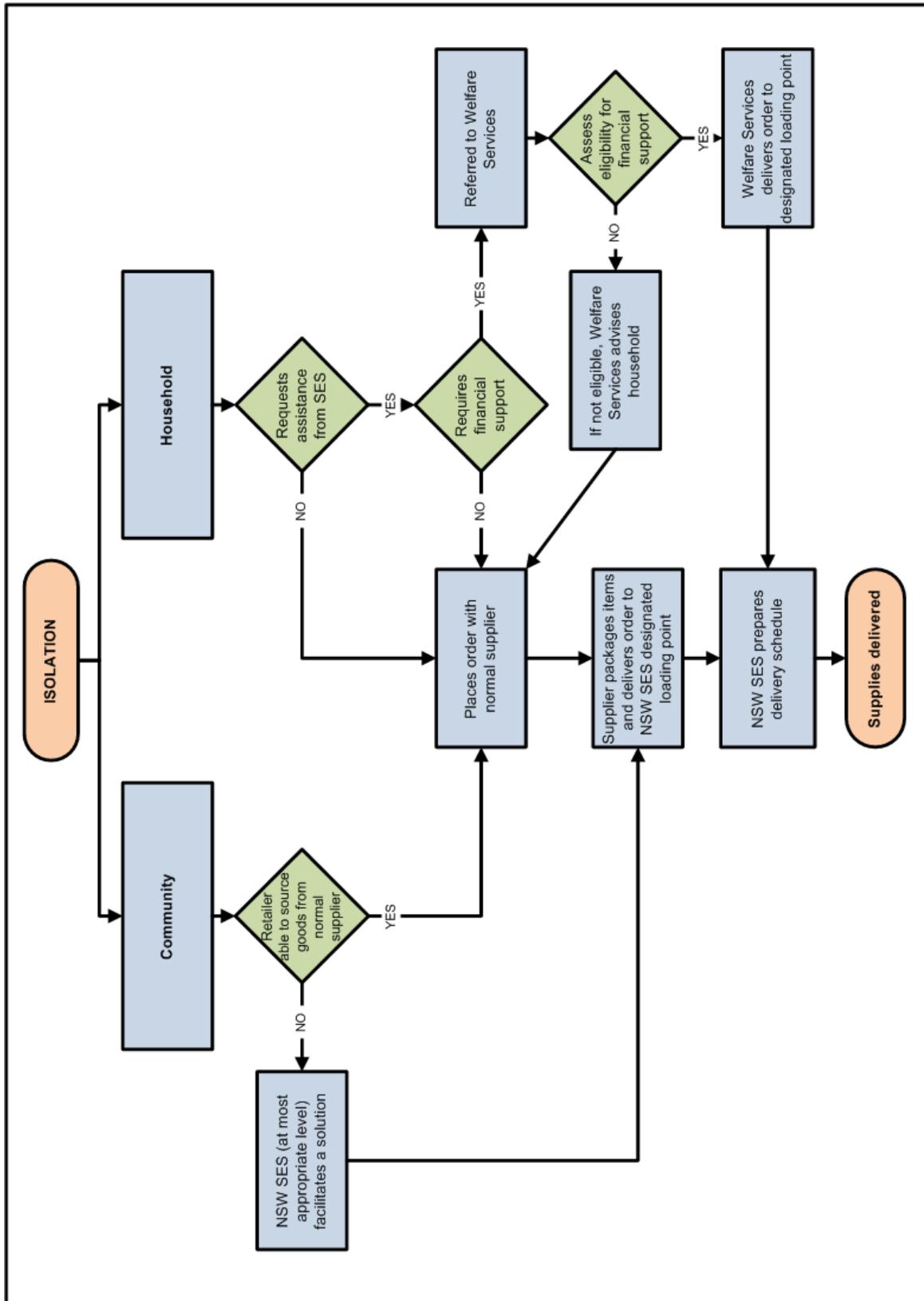
conveyed in the first instance to the SEOCAN for confirmation with the SERCON.

- 4.2.2 In the event of an emergency which affects multiple regions, or is of state or national consequence, or where complex, long term recovery and reconstruction is required, it may be necessary to establish a State Recovery Committee and the appointment of a State Recovery Coordinator.

4.3 ARRANGEMENTS FOR DEBRIEFS / AFTER ACTION REVIEWS

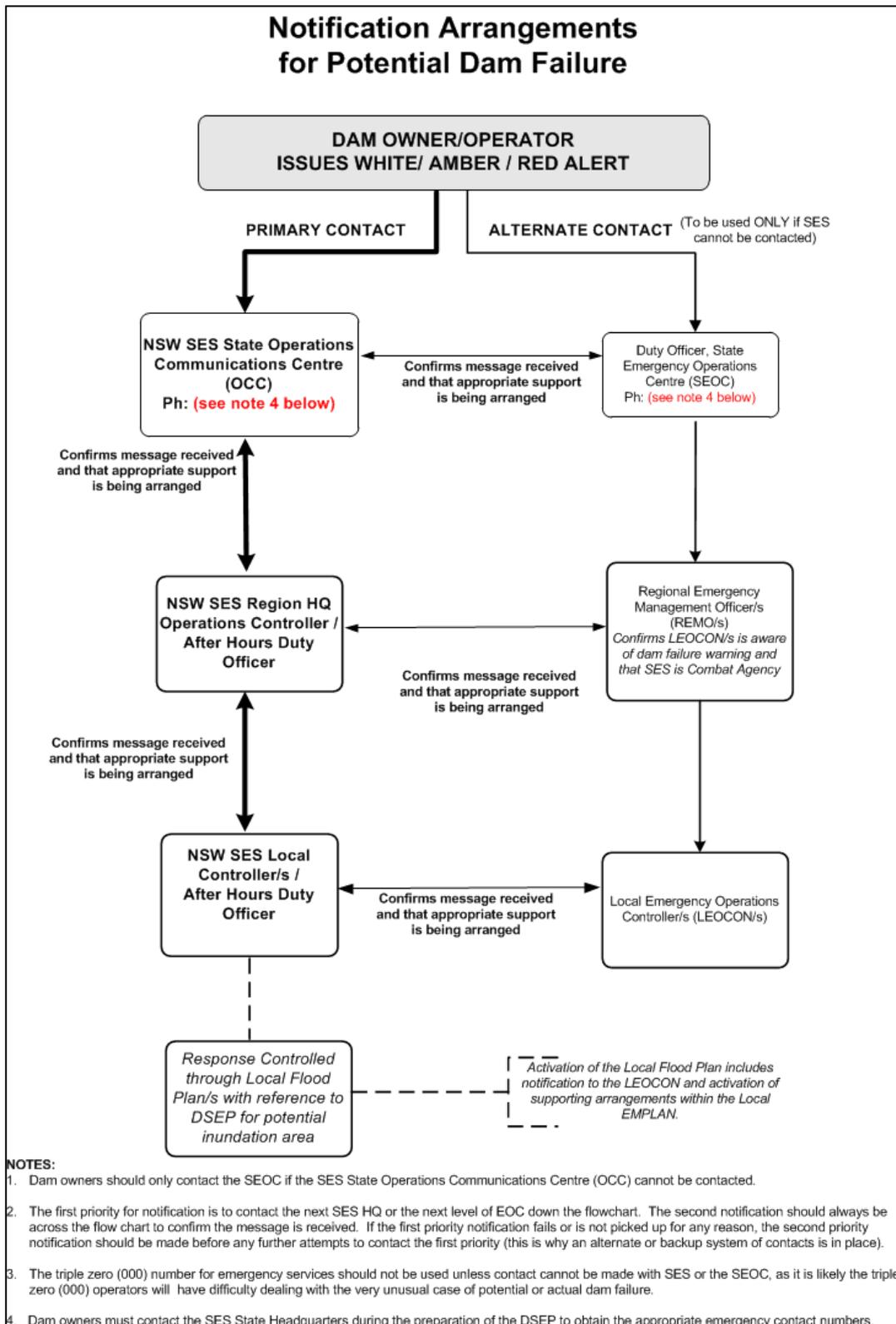
- 4.3.1 As soon as possible after flooding has abated, the NSW SES Incident Controller will advise participating organisations of details of response operation after action review arrangements.
- 4.3.2 The NSW SES Wollongong City, Shellharbour City and Kiama Local Controllers will ensure that adequate arrangements are in place to record details of the after action review and each item requiring further action is delegated to an organisation or individual to implement.
- 4.3.3 Follow-up to ensure the satisfactory completion of these actions will be undertaken by the Illawarra Local Emergency Management Committee.

ATTACHMENT 1 - RESUPPLY FLOWCHART



Please Note: The chart outlines the resupply process, but does not encompass all potential situations and outcomes.

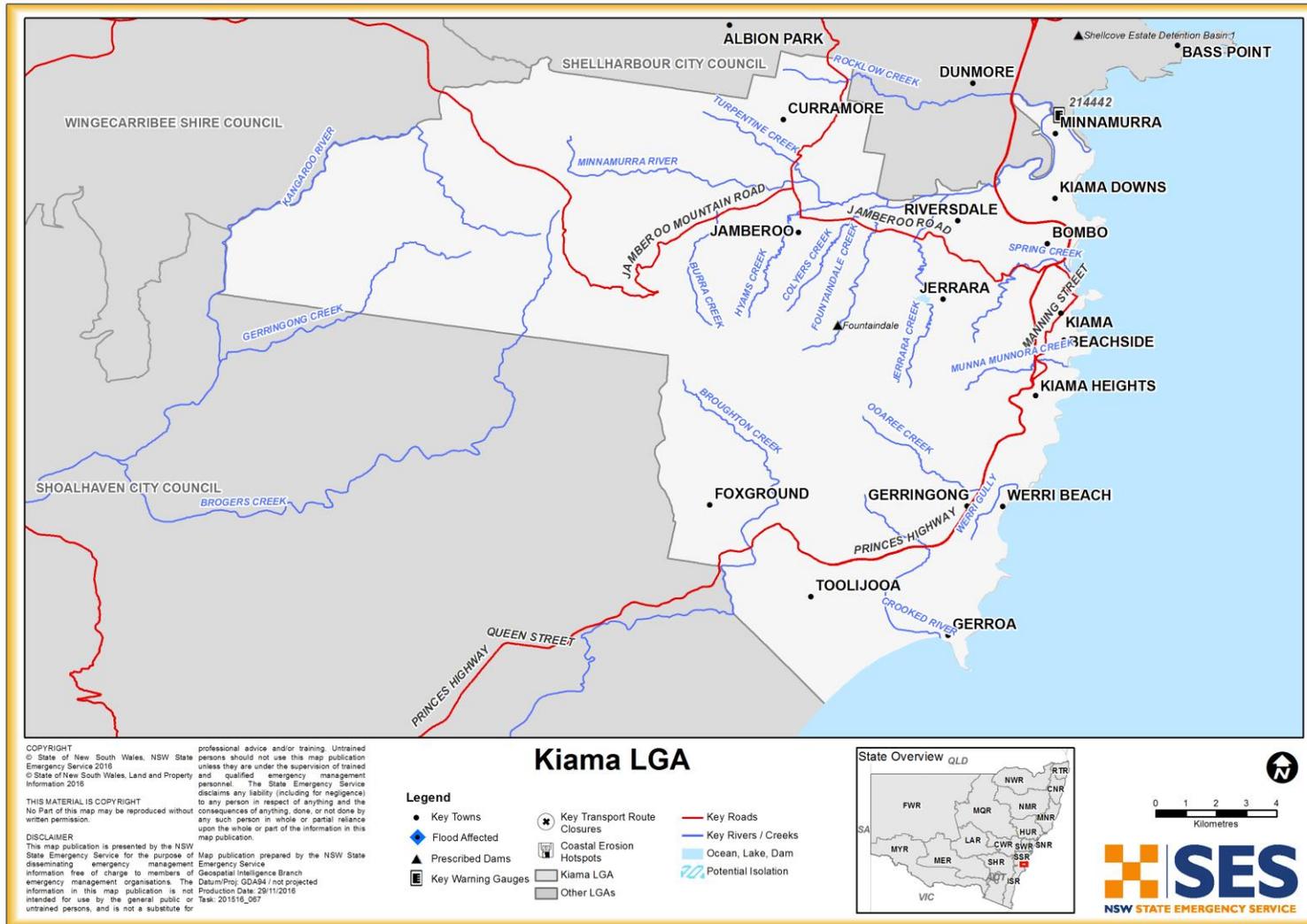
ATTACHMENT 2 - DAM FAILURE ALERT NOTIFICATION ARRANGEMENTS FLOWCHART



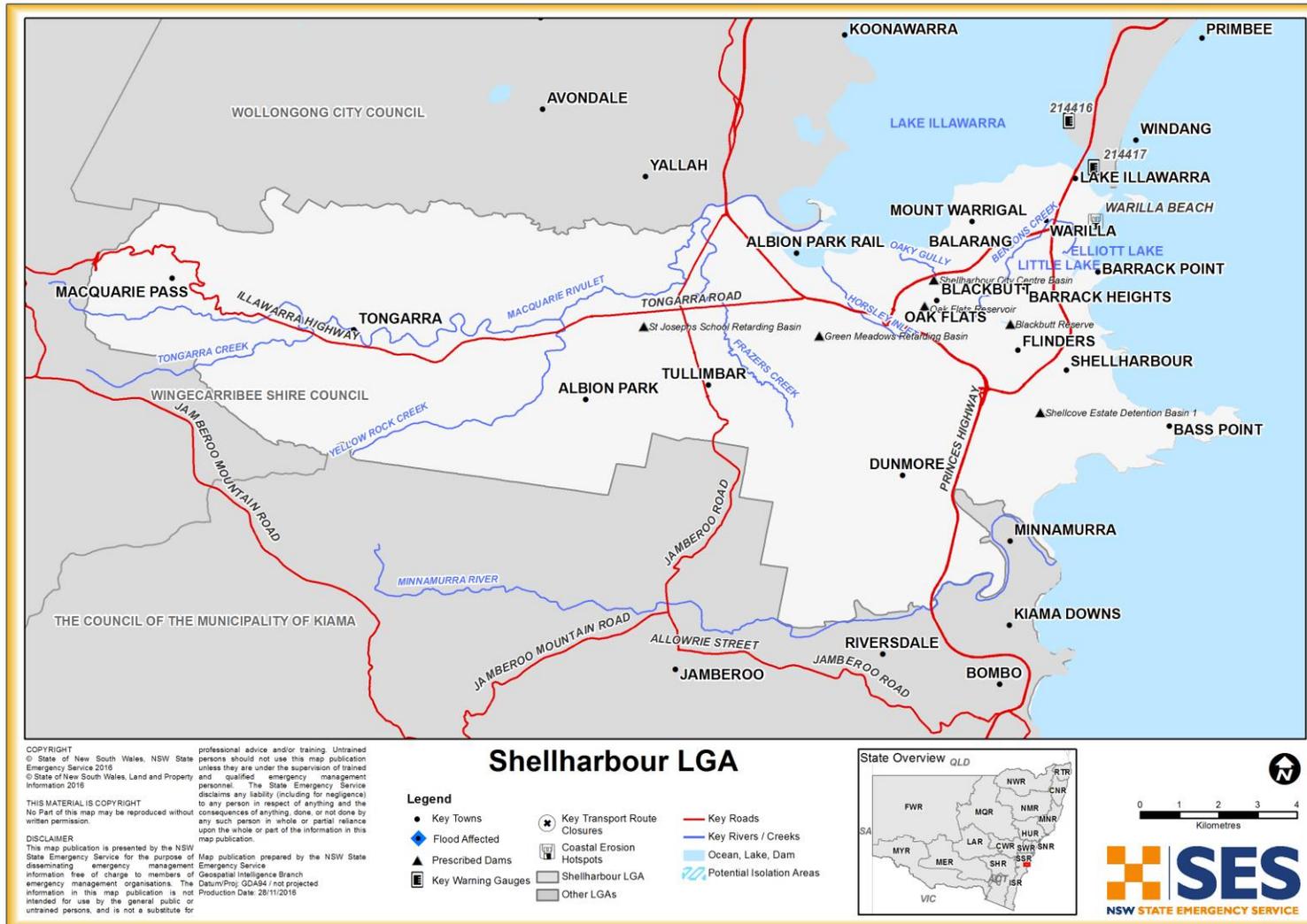
ATTACHMENT 3 - WOLLONGONG CITY LGA MAP



ATTACHMENT 4 - KIAMA LGA MAP



ATTACHMENT 5 - SHELLHARBOUR CITY LGA MAP



LIST OF REFERENCES

1. **Emergency Management Australia.** *Managing the floodplain: a guide to best practice in flood risk management in Australia.* s.l. : Attorney-General's Department, 2013.
2. **Department of Infrastructure, Planning and Natural Resources.** *Floodplain Development Manual.* 2005.
3. **Ministry for Police and Emergency Services (MPES).** *New South Wales State Emergency Management Plan (EMPLAN).* 2012.
4. **NSW Government.** *Local Government Act 1993 No 30.* 1993.
5. **Emergency Management Australia.** *Flood Warning: Australian Emergency Manuals Series Manual 21.* s.l. : Attorney-General's Department, 2009.
6. **NSW Government.** *Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings Regulation.* 2005.
7. **Emergency Management Australia.** *Evacuation Planning: Australian Emergency Management Handbook Series Handbook 4.* s.l. : Attorney-General's Department, 2013.
8. **SEMC Evacuations Working Group.** *Evacuation Management Guidelines.* 2014.
9. **NSW SES.** *Incident Management Policy.* 2015.



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

Date: 16/1/17

Approved



NSW SES Illawarra South Coast Region Controller

Date: 10 Jan 2017

Tabled at LEMC

Date: 1 March 2017

CONTENTS

VERSION LIST.....	4
AMENDMENT LIST	4
1 THE FLOOD AND COASTAL EROSION THREAT	5
1.1 Overview.....	5
1.2 Landforms and River Systems.....	5
1.3 Storage Dams.....	5
1.4 Weather Systems and Flooding	9
1.5 Characteristics of Flooding	9
1.6 Flood History.....	10
1.7 Flood Mitigation Systems	12
1.8 Extreme Flooding.....	12
2 EFFECTS ON THE SHELLHARBOUR COMMUNITY	13
2.1 Community Profile.....	13
SPECIFIC RISK AREAS - FLOOD	15
2.2 Albion Park Rail.....	15
2.3 Oak Flats	18
2.4 Warilla/Barrack point.....	20
2.5 Albion Park.....	23
2.6 Lake Illawarra.....	25
ROAD CLOSURES AND ISOLATED COMMUNITIES	27
2.7 Road Closures	27
2.8 Summary of isolated communities and properties	28
ANNEX 1: ILLAWARRA RIVER BASIN SCHEMATIC	29
ANNEX 2: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION	30
MAP 1: SHELLHARBOUR LOCAL GOVERNMENT AREA	32
MAP 2: SHELLHARBOUR – WOLLONGONG COAST RIVER BASIN	33
MAP 3: ALBION PARK RAIL TOWN MAP	34
MAP 4: OAK FLATS TOWN MAP	35
MAP 5: WARILLA TOWN MAP	36
MAP 6: BARRACK POINT TOWN MAP.....	37
MAP 7: ALBION PARK TOWN MAP	38
MAP 8: LAKE ILLAWARRA TOWN MAP	39

LIST OF REFERENCES 40

LIST OF TABLES

Table 1: Prescribed Dams in Shellharbour LGA; summary of information about each storage. 6

Table 2: Expected Lake Illawarra Entrance Flood Levels related to modelled flood events (8) 11

Table 3: Historical Flood Levels at Lake Illawarra Entrance (gauge 214417) 11

Table 4: Census of Housing and Population data for the Shellharbour Community (2011) (11) .. 13

Table 5: Roads liable to flooding in Shellharbour LGA (2)..... 27

Table 6: Potential Periods of Isolation for communities in the Shellharbour LGA experienced during past flood events..... 28

Table 7: Facilities at risk of flooding in the Shellharbour LGA 30

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.

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

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 18,000m ³ . 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).

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 on-shore winds which, when triggered by orographic 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).

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

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 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 Cudgerie Bay gauge 214416)	16
2016	1.58 (1.5 at Cudgerie 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

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

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

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

- a. 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):
 - i. Horsley Creek and low lying properties on Koono 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;
 - iii. 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:
 - i. Koono 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.
- d. 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;
 - iii. Properties located on Burroo Street, Wooroo Street, Koono 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;
 - iv. 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.
- h. 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.
- b. 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.
- b. 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

- b. 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 four 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).
- b. 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).

- h. 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

- a. 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 Surfriider 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

- a. 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 Pollock 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

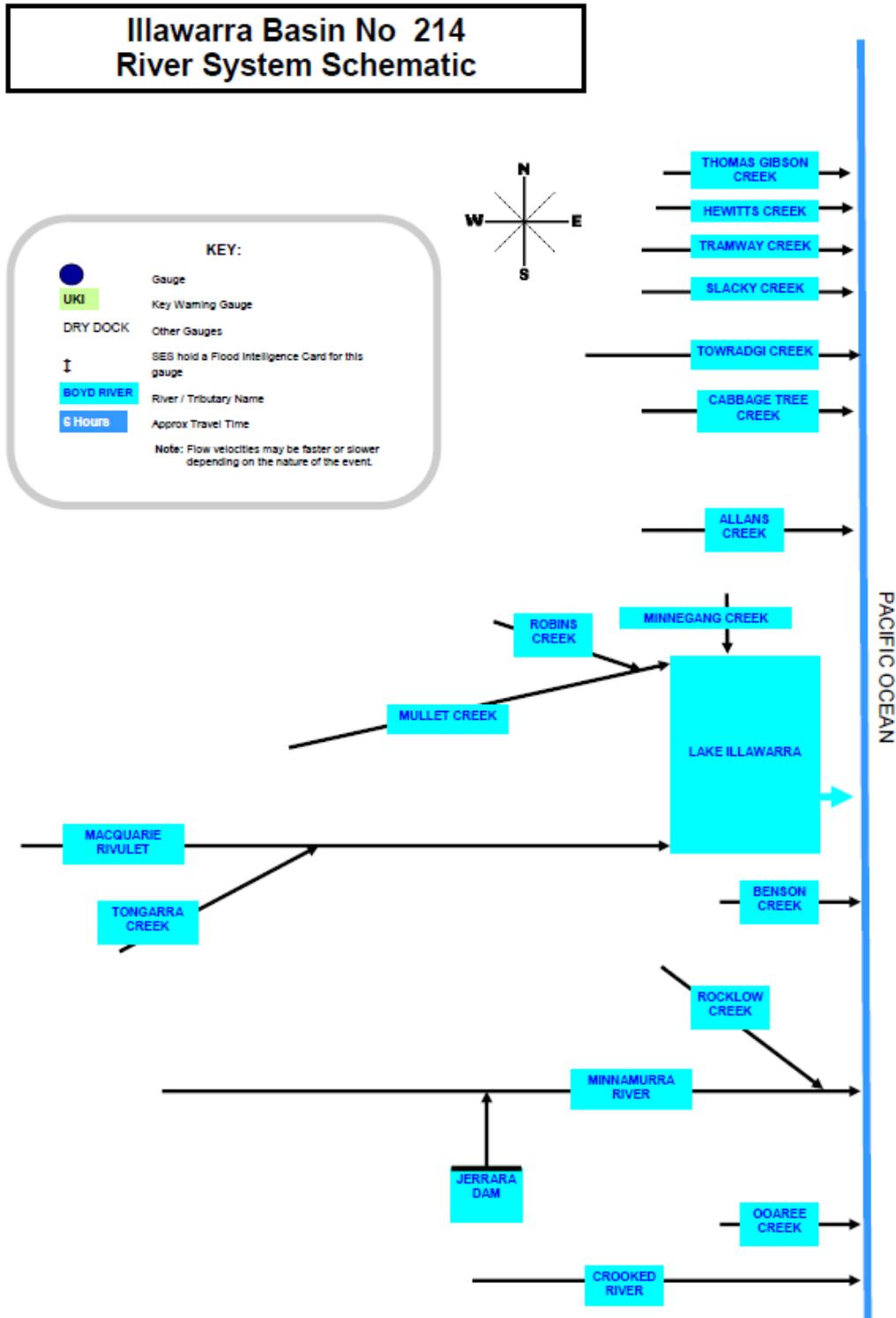
- a. Table 6 lists communities liable to isolation and potential periods of isolation. Information presented here is based on historical events and does not reflect the duration of isolation expected in larger and extreme events.

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

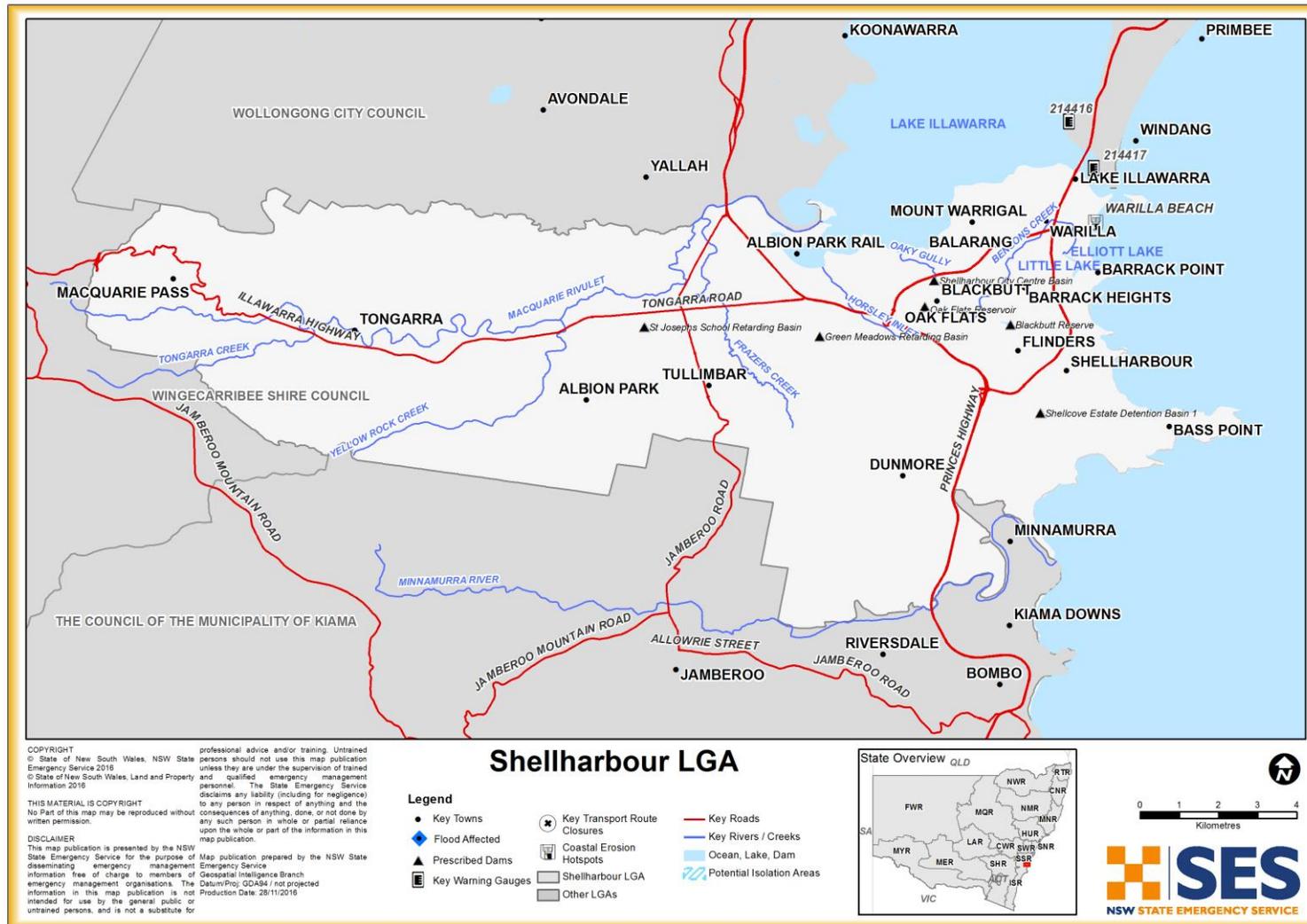
Table 7: Facilities at risk of flooding in the Shellharbour LGA

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	

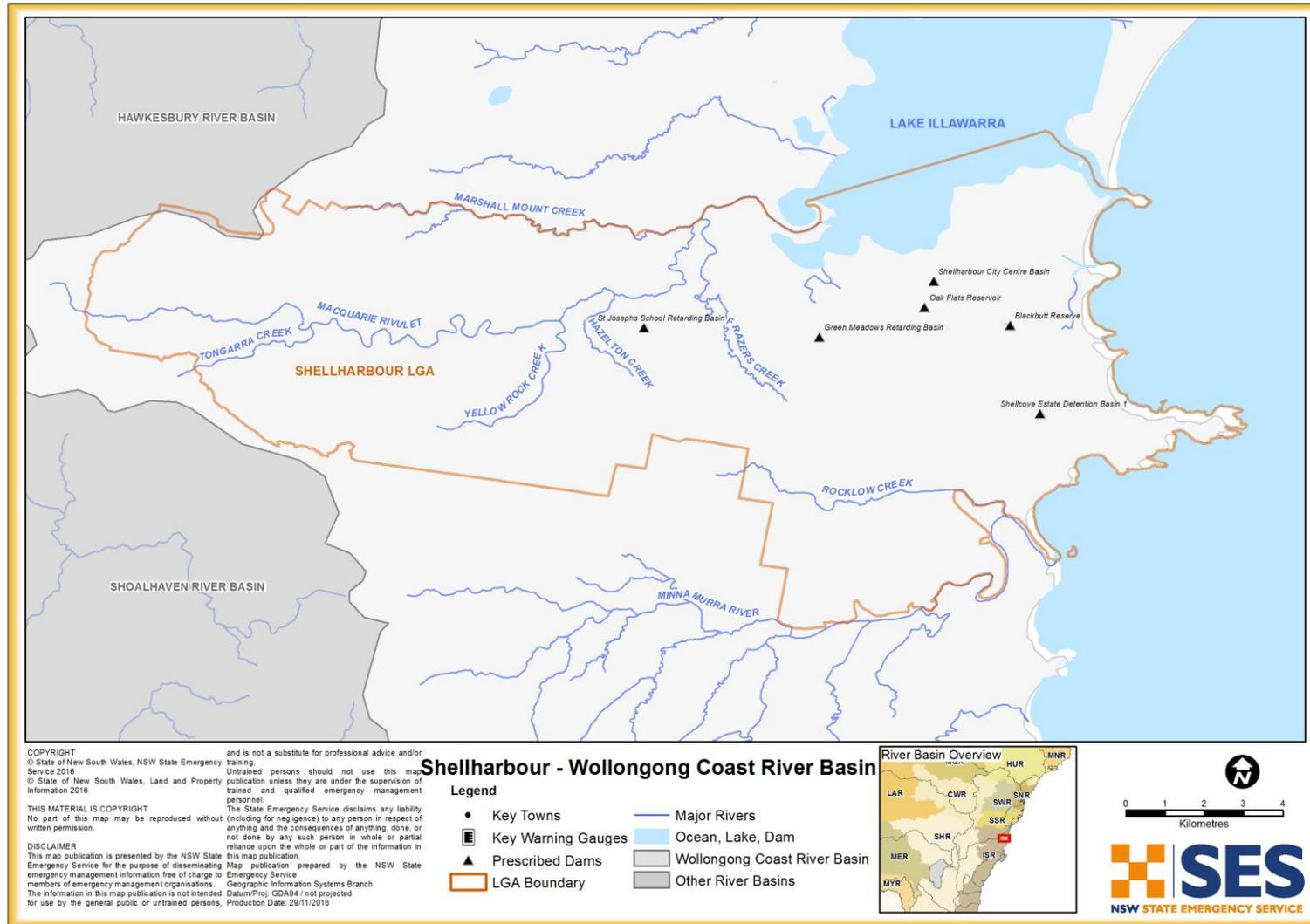
Facility Name	Street	Suburb	Comment
Warilla Occasional Childcare Centre	14 Belfast Avenue	Warilla	
Facilities for the aged and/or infirm			
Warrigal Care Lake Illawarra	Grove Circuit	Lake Illawarra	
Warrigal Care Albion Park Rail	2 Pine Street	Albion Park Rail	
Warrigal Care Warilla	1 Arcadia Street	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.

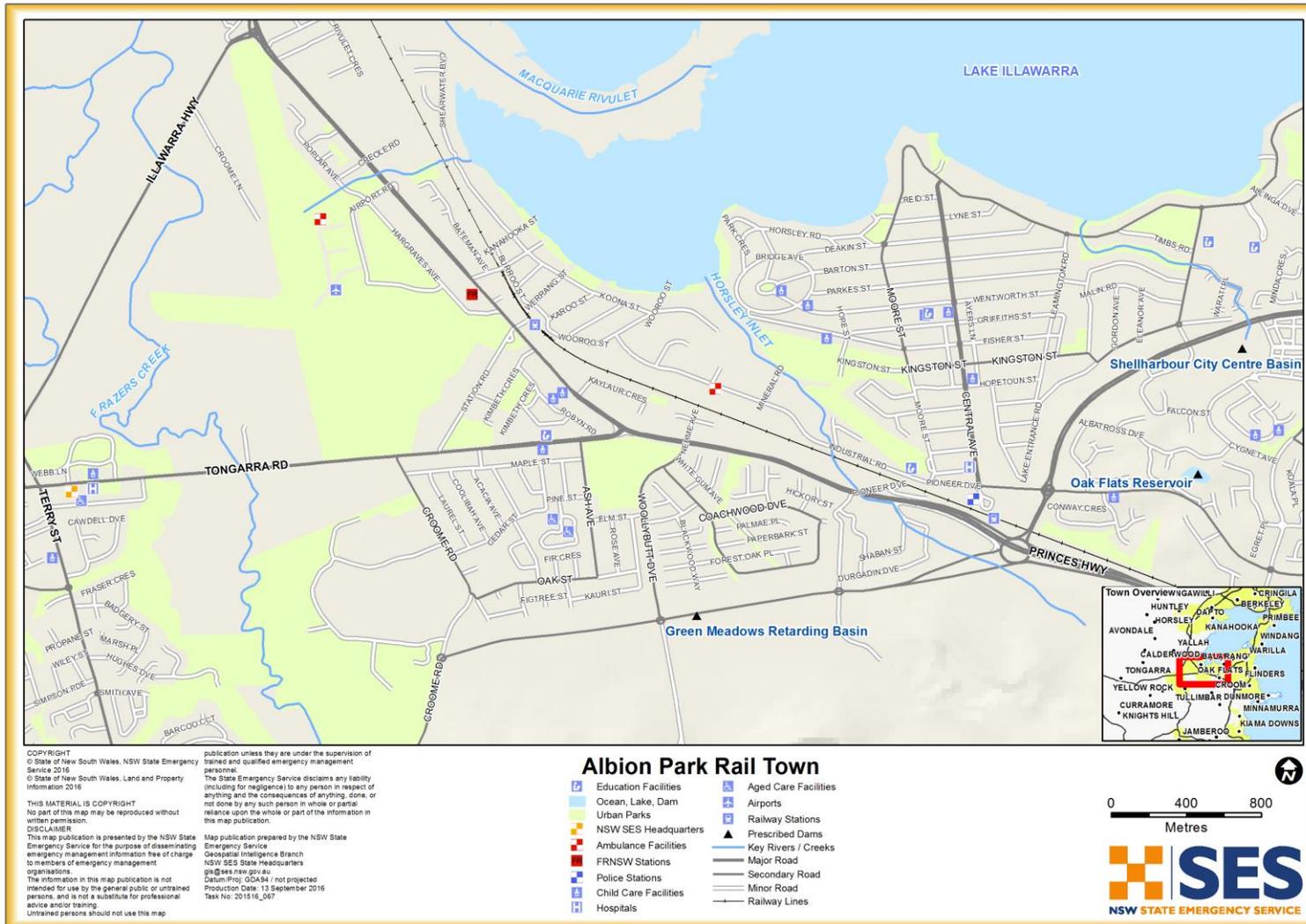
MAP 1: SHELLHARBOUR LOCAL GOVERNMENT AREA



MAP 2: SHELLHARBOUR – WOLLONGONG COAST RIVER BASIN



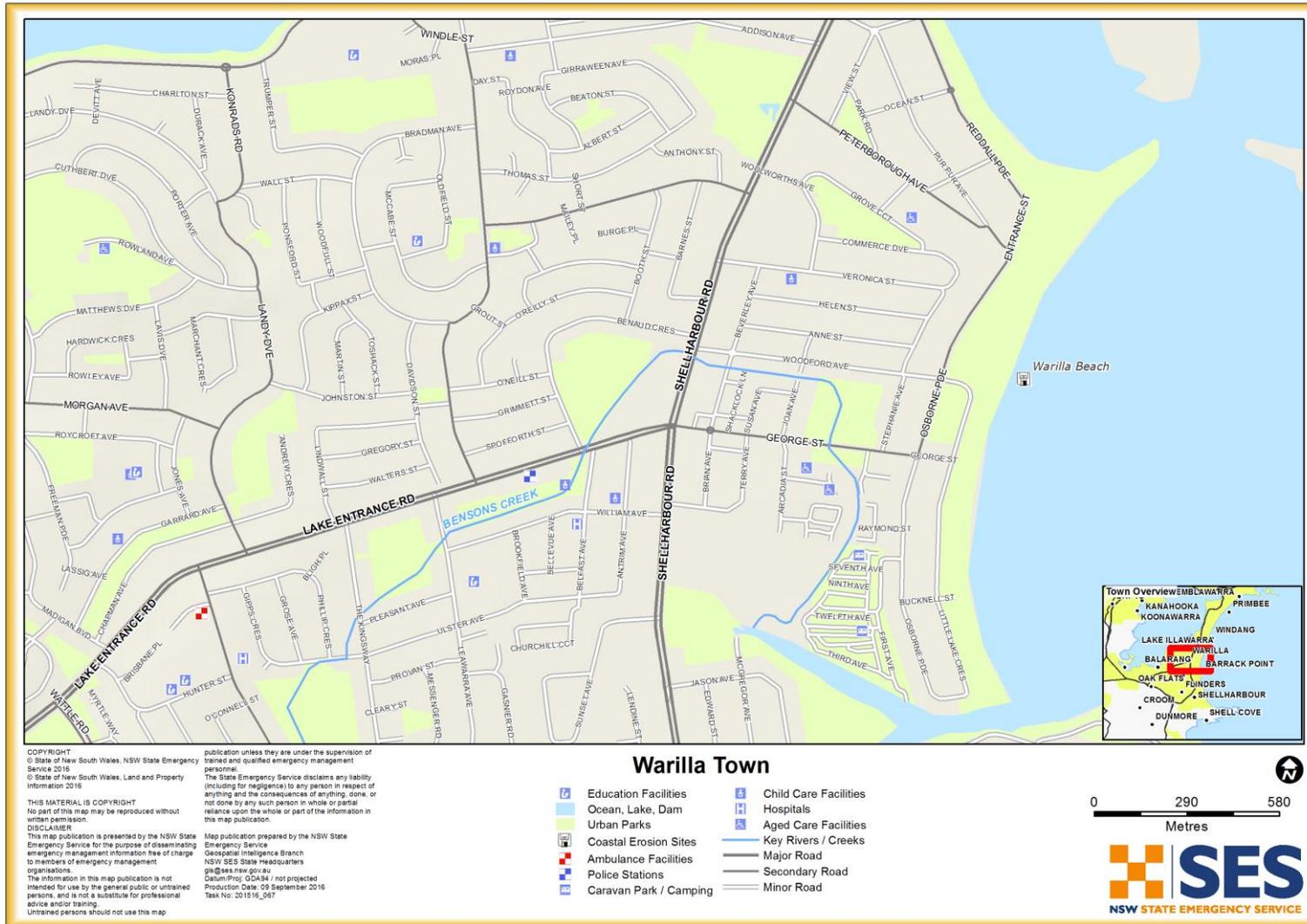
MAP 3: ALBION PARK RAIL TOWN MAP



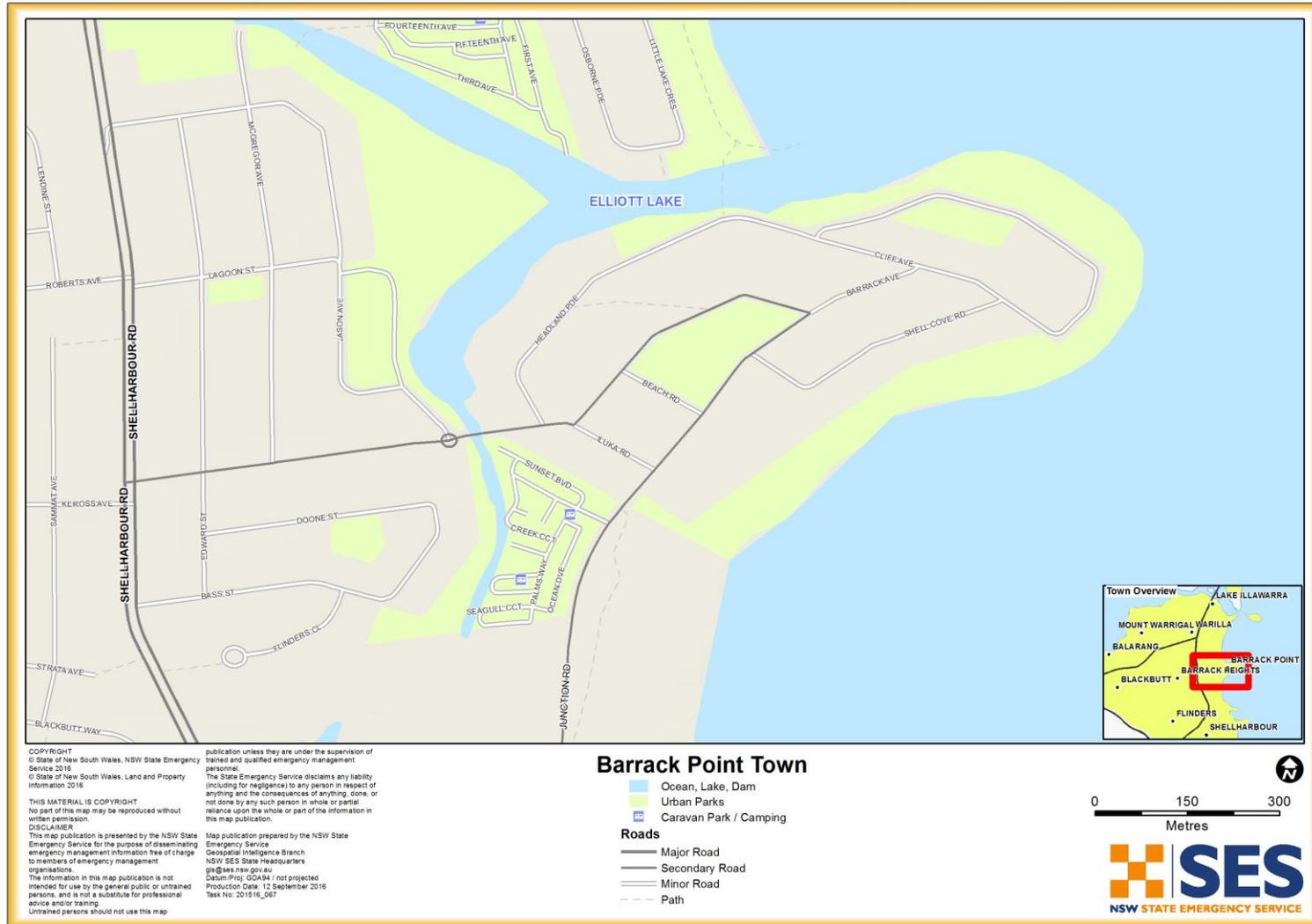
MAP 4: OAK FLATS TOWN MAP



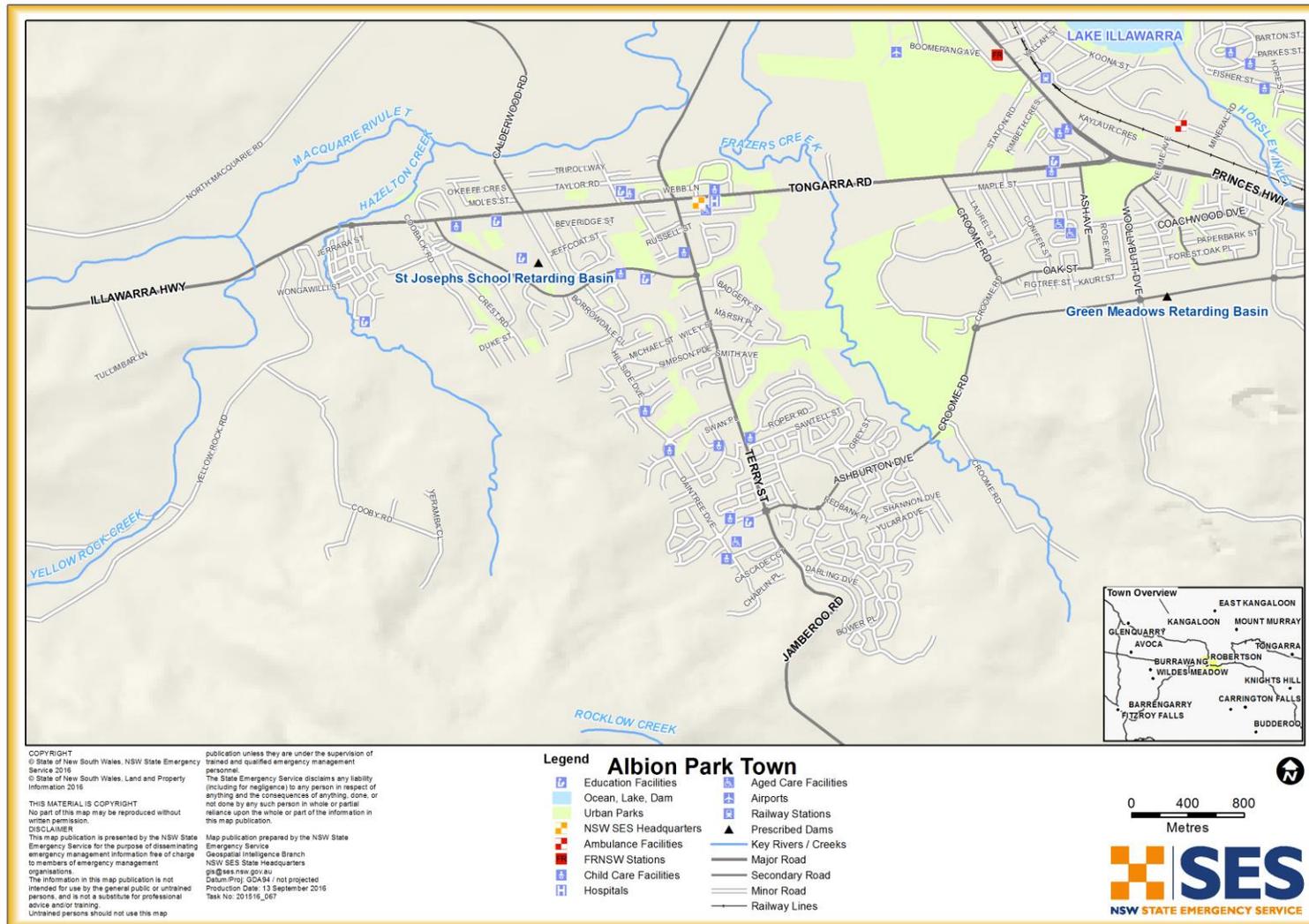
MAP 5: WARILLA TOWN MAP



MAP 6: BARRACK POINT TOWN MAP



MAP 7: ALBION PARK TOWN MAP



MAP 8: LAKE ILLAWARRA TOWN MAP



LIST OF REFERENCES

1. **Risk Frontiers.** *An integrated research assessment of the physical and social aspects of the March 2011 flash flooding in Shellharbour, Kiama and Bega Valley, NSW.* s.l. : Risk Frontiers, 2013.
2. **NSW SES.** *Kiama/Shellharbour City Local Flood Plan, June 2008.* 2008.
3. **Shellharbour City Council.** *Dam Safety Emergency Plan for Blackbutt Dam.* s.l. : Shellharbour City Council, 2012.
4. **Sydney Water.** *Oaks Flats Reservoir.* s.l. : Prepared for SCA Dam Safety Division, 2005.
5. **Cardno.** *Dam Safety Emergency Plan - Shell Cove Major Detention Basin 1.* s.l. : Prepared for Shellharbour City Council, August 2015.
6. **Shellharbour City Council.** *Dam Safety Emergency Plan for Greemnmeadows Detention Basin.* 2007.
7. **Cardno.** *Dam Safety Emergency Plan - Shellharbour City Basin.* s.l. : Prepared for Shellharbour City Council, August 2015.
8. —. *Lake Illawarra Floodplain Risk Management Study.* s.l. : Cardno, 2012.
9. —. *Elliot Lake - Little Lake Flood Study.* s.l. : Cardno, 2006.
10. **Rienco Consulting.** *Horsley Creek Flood Study.* s.l. : Rienco Consulting, 2011.
11. **Australian Bureau of Statistics.** 2011 Census of Population and Housing. 2012.
12. 2011 Census QuickStats. *Census Data.* [Online] 2013.
http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/SSC10019?opendocument&navpos=220.
13. **Collier, Louise.** *Flood Hazard Mapping - Lake Illawarra.* s.l. : Cardno Lawson Treloar, 2006.
14. *Dam Safety Emergency Plan (DSEP) for Greenmeadows Detention Basin.* 2007.
15. **Kinhill Engineers Pty Ltd.** *Extension to Albion Park Flood Study.* s.l. : Kinhill Engineers Pty Ltd, 1991.

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	Type	AWRC No	Stream	Flood Classification			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 for []

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 [Part 2 - Responsibilities](#).

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
5. **Decision to evacuate.**
 - a. The decision to evacuate. 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. When evacuation should occur. As far as possible, evacuation will be carried out before inundation occurs.
- c. Self-motivated evacuation. 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 [Annex F](#). 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 [Annex G](#), 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 scarp 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:

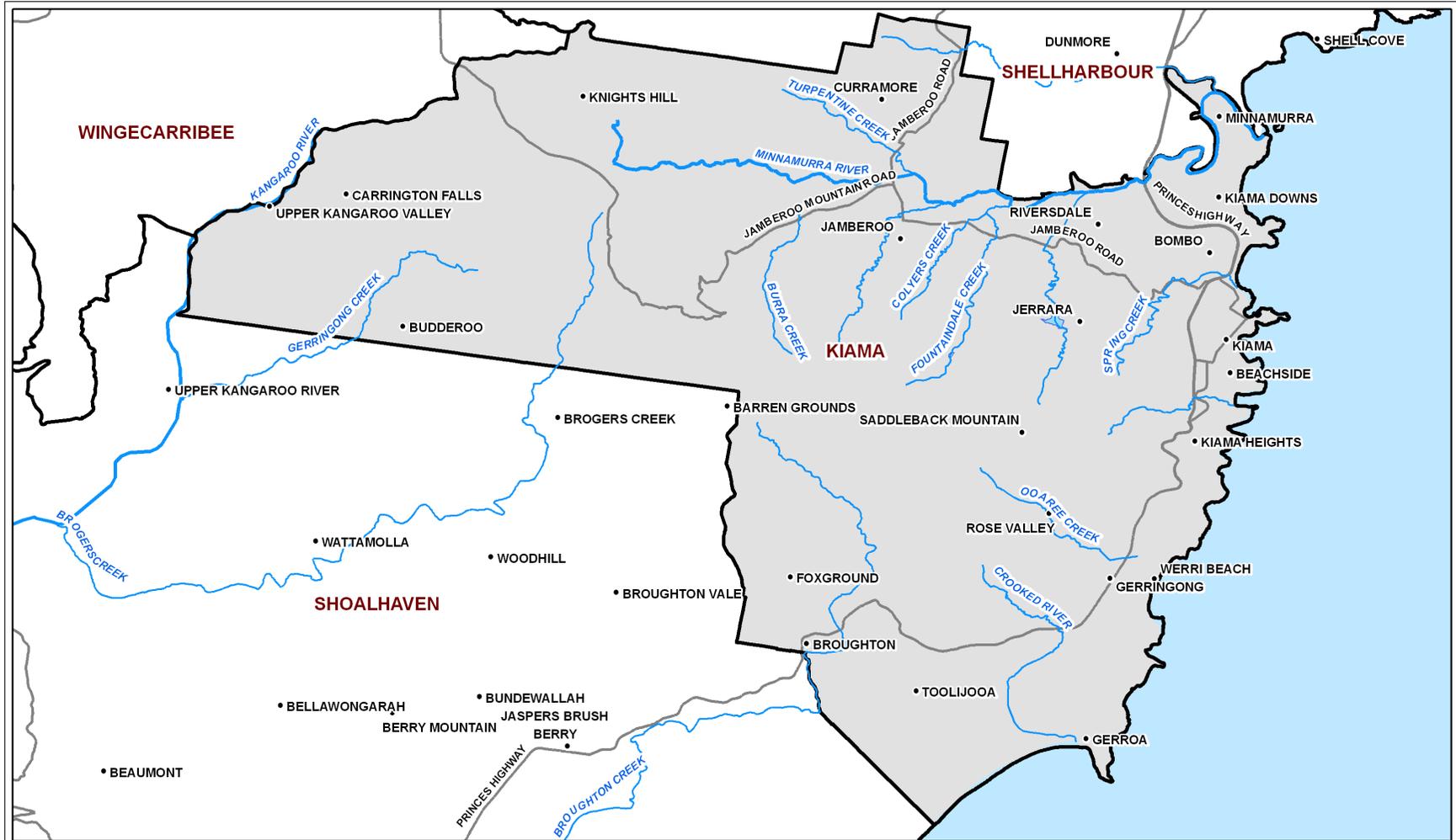
Time	Location	Description

Example

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

- 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 2 - KIAMA LGA & RIVER BASIN

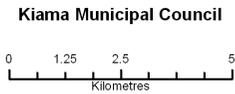


COPYRIGHT
 © State of New South Wales through NSW State Emergency Service 2008
 © State of New South Wales through NSW Department of Lands 2008

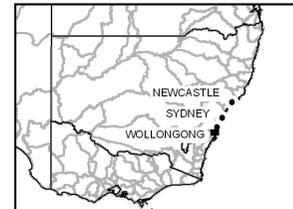
THIS MATERIAL IS COPYRIGHT
 No part of this map may be reproduced without written permission.

DISCLAIMER
 This map publication is presented by the NSW State Emergency Service for the purpose of disseminating emergency management information free of charge to members of emergency management organisations. The information in this map publication is not intended for use by the general public or untrained persons, and is not a substitute for professional advice and/or training. Untrained persons should not use this map publication unless they are under the supervision of trained and qualified emergency management personnel. The State Emergency Service disclaims any liability (including for negligence) to any person in respect of anything and the consequences of anything, done, or not done by any such person in whole or partial reliance upon the whole or part of the information in this map publication.

Map publication prepared by the NSW State Emergency Service.



Print Date: 22 July 2008



Legend

- LGA Boundary
- Rivers
- Major Roads
- Ocean