

**Wingecarribee Shire**

**Local  
Flood  
Emergency  
Sub Plan**



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# WINGECARRIBEE SHIRE FLOOD EMERGENCY SUB PLAN

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

**Volume 1 of the Wingecarribee Shire Flood Emergency Sub Plan**

**Endorsed by the Wingecarribee Shire Local Emergency Management  
Committee**

**27 February 2024**

# AUTHORISATION

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

## Authorised

Signature:



NSW SES Local Commander

Print Name: Chief Inspector Dylan Whitelaw

Date:

27/ii/2024

## Endorsed

Signature:



Chair, Local Emergency Management Committee

Print Name: Lisa Miscamble  
Lisa Miscamble - General Manager Wingecarribee Shire Council

Date:

27/2/2024

## VERSION HISTORY

Version Number	Description	Date
	Wingecarribee Shire Local Flood Plan	Nov 2013
	Wingecarribee Shire Local Flood Plan	May 2007

## AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

Manager Emergency Planning  
NSW State Emergency Service  
PO Box 6126, Wollongong NSW 2500  
[nswses.communityplanning@ses.nsw.gov.au](mailto:nswses.communityplanning@ses.nsw.gov.au)

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

Amendment Number	Description	Updated by	Date
1.0	5.14.1c, 6.2.2c, Appendix B – “Resilience NSW” has been replaced with “NSW Reconstruction Authority” 6.2.2f – “Resilience NSW” has been replaced with “SEOCAN and SERCON” Appendix C – Sections 2-8 of this table have been removed.	NSW SES	17/4/2023

## DISTRIBUTION LIST

Available for general use and distribution on the NSW State Emergency Service website

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# 1 OUTLINE AND SCOPE

## 1.1 PURPOSE

1.1.1 The purpose of this plan is to set out the multi-agency arrangements for the emergency management of flooding in the Wingecarribee Shire Local Government Area (LGA).

## 1.2 AUTHORITY

1.2.1 This plan is written and issued under the authority of the [State Emergency and Rescue Management Act 1989 \(NSW\)](#) ('SERM Act'), the [State Emergency Service Act 1989 \(NSW\)](#) ('SES Act') and the NSW State Emergency Management Plan (EMPLAN).

1.2.2 This plan is a sub plan to the Wingecarribee Shire Local Emergency Management Plan (EMPLAN) and is endorsed by the Local Emergency Management Committee (LEMC).

## 1.3 ACTIVATION

1.3.1 This plan does not require activation. The arrangements set out in this plan are always active.

1.3.2 The Wingecarribee Shire Emergency Management Plan (EMPLAN) is active at all times in anticipation of the need to coordinate support and resources requested by combat agencies, including the NSW State Emergency Service (NSW SES).

## 1.4 SCOPE

1.4.1 The area covered by this plan is the Wingecarribee Shire LGA. The Wingecarribee Shire LGA and its principal towns, villages, rivers and creeks are shown in Appendix A.

1.4.2 The Council area is in the NSW SES South Eastern Zone and for emergency management purposes, is part of the South Eastern Emergency Management Region.

1.4.3 The plan sets out the Wingecarribee Shire Council level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Wingecarribee Shire LGA.

1.4.4 In this plan a flood is defined as a relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse.

1.4.5 This plan outlines the local level arrangements for the management of downstream consequences of flooding due to dam failure, however it does not cover the management of flooding of an underground mine by inrush or other cause, which should be covered by the Mine Emergency Sub Plan for the respective mine.

## **1.5 GOALS**

1.5.1 The primary goals for flood emergency management in NSW are:

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

## **1.6 KEY PRINCIPLES**

1.6.1 The protection and preservation of human life (including the lives of responders and the community) is the highest priority.

1.6.2 Evacuation is the primary response strategy for people impacted by flooding.

## **1.7 ROLES AND RESPONSIBILITIES**

1.7.1 General responsibilities of emergency service organisations and functional areas are set out in the NSW State EMPLAN and NSW State Flood Sub Plan.

1.7.2 Specific roles and responsibilities for agencies, functional areas and organisations in relation to flooding within Wingecarribee Shire are detailed within this plan, Appendix B and Appendix C.

1.7.3 Any agency with agreed responsibilities in this plan that are temporarily unable, or no longer able to fulfil their responsibilities in response operations must as soon as possible notify:

- a. The NSW SES Incident Controller (for local or zone level responsibilities during response operations).
- b. The NSW SES Zone Duty Commander (for regional level responsibilities outside of response operations).

## **1.8 PLAN MAINTENANCE AND REVIEW**

1.8.1 NSW SES will maintain the currency of this plan by:

- a. Ensuring that all supporting emergency services and functional areas, organisations and officers mentioned in it are aware of their roles and responsibilities.
- b. Conduct a minimum of one exercise every five years or within two years of the plan being reviewed.



- c. Reviewing the contents of the plan:
  - When there are changes which alter agreed plan arrangements.
  - When changes to land use strategic plans and policies increase the population at risk.
  - After a flood including recommendations from after action reviews, reports, or inquiries.
  - As determined by the NSW SES Commissioner.
- d. The plan is to be reviewed no less frequently than every five years or after a significant flood event.

## 1.9 SUPPLEMENTARY DOCUMENTS

1.9.1 Supplementary and supporting material of the Local Flood Emergency Sub Plan is maintained on the [NSW SES website Flood, Storm and Tsunami Plans](#) including:

- a. Flood Plan Glossary.
- b. NSW SES Dam Failure Notification Flowchart.
- c. NSW SES Resupply Flowchart.

## 2 OVERVIEW OF NSW FLOOD HAZARD AND RISK

### 2.1 THE FLOOD THREAT

2.1.1 NSW SES maintains information on the nature of flooding and effects of flooding on the community in the Wingecarribee Shire LGA.

2.1.2 Declared dams in or upstream of the Wingecarribee Shire Local Government Area.

Dam Name	Owner	High Risk Dam
Avon Dam	WaterNSW	Yes
Bundanoon Dam	Wingecarribee Shire Council	Unknown
Fitzroy Falls Dam	WaterNSW	Yes
Glenquarry Cut Control Structure	WaterNSW	No
Medway Dam	Wingecarribee Shire Council	Unknown
Nepean Dam	WaterNSW	Yes
Wingecarribee Dam	WaterNSW	No
*Cordeaux Dam	WaterNSW	No
*Kangaroo Pipeline Control Structure	WaterNSW	No

## 3 PREVENTION/ MITIGATION

### 3.1 INTRODUCTION

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

### 3.2 LAND USE PLANNING

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

**Actions:**

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

### 3.3 FLOODPLAIN RISK MANAGEMENT

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

**Actions:**

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

## 4 PREPARATION

### 4.1 INTRODUCTION

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

### 4.2 FLOOD EMERGENCY PLANNING

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

**Actions:**

- a. Develop and review this NSW SES Local Flood Emergency Sub Plan as required. Local Flood Emergency Sub Plans outline the specific arrangements for management of flood events within an LGA, and may include cross boundary arrangements.
- b. Review plans as per Section 1.8.

4.2.2 Local EMPLAN Consequence Management Guides (CMG's) for flood are not required for communities covered by NSW SES Local Flood Emergency Sub Plans however may be utilised in place of Local Flood Emergency Sub Plan if agreed to by NSW SES.

### **4.3 FLOOD INTELLIGENCE SYSTEMS**

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

**Actions:**

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

### **4.4 DEVELOPMENT OF WARNING SYSTEMS**

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

**Actions:**

- a. All levels of government work in partnership to develop and maintain flood warning infrastructure.
- b. NSW SES maintains a list of the requirements for flood warnings for flood gauges in NSW (including flood classifications, warning times required and key statistics) and can be found in the supplementary document to the NSW State Flood Plan (see Section 1.9).
- c. NSW SES will recommend new warning services and changes to warning alert levels for gauges to the NSW and ACT Flood Warning Consultative Committee.
- d. The State Government, in partnership with Local Government, is responsible for developing and maintaining flash flood warning systems for local catchments where required.
- e. Dam Owners will provide Dam Emergency Plans (where required) and consult with NSW SES on alert levels and messaging. Alert level definitions are listed in Dam Emergency Plans.
- f. NSW SES maintains a dedicated dam failure hotline and procedures to ensure priority dissemination of dam failure warnings.
- g. NSW SES develops and maintains warning and flood information products by:

- Utilising flood intelligence data.
  - Developing warning and flood information products.
  - Continuously reviewing warning and flood information products.
  - Consulting with affected communities, key stakeholders, Dam Safety NSW and the NSW and ACT Flood Warning Consultative Committee, and maintains Operational Readiness.
  - Participating in the development of public information and warning systems.
- h. Gauge owners adequately maintain flood warning gauges and systems, including those identified in the 'Service Level Specification' maintained by the Bureau of Meteorology (Bureau) and those identified in the 'Provision and Requirements for Flood Warning in New South Wales' maintained by NSW SES.

## 4.5 BRIEFING, TRAINING AND EXERCISING

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

**Actions:**

- a. NSW SES will consult stakeholders throughout the development of plans.
- b. NSW SES will inform stakeholders of content changes after revisions.
- c. NSW SES will ensure their facilities and resources are maintained and operationally ready.
- d. NSW SES will train personnel for their expected flood operation roles.
- e. NSW SES will regularly brief stakeholders on the exercise arrangements contained in the NSW Flood Emergency Sub Plan.

## 4.6 COMMUNITY RESILIENCE TO FLOODING

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

**Actions:**

- a. Ensure ongoing recruitment and training of a diverse range of volunteers.
- b. Ensure pre-planning to facilitate the management of spontaneous volunteers and community members during a flood.

4.6.2 **Strategy:** NSW SES works with individuals, communities, businesses and government agencies to build flood resilience.

**Actions:**

- a. Partner with and engage communities to understand and manage the risks associated with floods, including providing business continuity guidance (NSW SES Business FloodSafe), family preparedness (NSW SES Home FloodSafe) and other engagement strategies.

- b. Collate, assess and disseminate flood information to the community.
- c. Collaborate with individuals, businesses, government agencies and communities when developing flood intelligence, preparedness and response information.
- d. Plan for floods collaboratively with communities through community and stakeholder participation and engagement.
- e. Collaborate with community sector and recognise the needs of individuals within communities who have an increased susceptibility during floods.

## 5 RESPONSE

### 5.1 INTRODUCTION

5.1.1 Flood response operations will begin:

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

### 5.2 INCIDENT MANAGEMENT ARRANGEMENTS

5.2.1 **Strategy:** Maintain effective control of flood operations across NSW.

**Actions:**

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

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

**Actions:**

- a. NSW SES will operate Incident Control Centre(s) as required.
- b. The NSW SES Incident Control Centre(s) will:

- Control resources from NSW SES and coordinate resources of supporting emergency services and functional areas.
- Manage Request for Assistance (RFA) tasking and ensure they are actioned in a timely manner.
- Undertake response planning and determine future resourcing requirements.
- Coordinate information flow, including warnings, public information and social media.

5.2.3 **Strategy:** Provide effective liaison between NSW SES and supporting agencies or functional areas in accordance with Local EMPLAN.

**Actions:**

- Supporting emergency services and functional areas should provide Liaison Officers to NSW SES Incident Control Centre(s) and/or Emergency Operation Centres as required.
- NSW SES will provide Liaison Officer(s) to Emergency Operations Centres as required.
- Where possible Emergency Operation Centres to be co-located with NSW SES Incident Control Centres for Flood Emergency Response.

5.2.4 **Strategy:** Coordinate resources and logistics support to ensure operational effectiveness.

**Actions:**

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

## 5.3 USE OF INFORMATION AND COLLECTION OF INTELLIGENCE

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

**Actions:**

- Information relating to the consequences of flooding, response strategies, situational awareness and operational updates will be distributed by NSW SES to supporting emergency services and functional areas listed under this Plan.
- All supporting emergency services, functional areas and Council will accurately record and report information relevant to their activities and any real time flood information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations

Centre (EOC) report, or direct from agencies where an EOC has not been established.

- c. NSW SES may establish and operate a Joint Intelligence Unit to coordinate the collection, collation, interpretation, mapping, actioning and dissemination of information.
- d. Reconnaissance, mapping, damage assessments, intelligence validation and post flood evaluation will be coordinated by NSW SES. This may occur post impact and continue into the recovery phase.
- e. NSW SES may request Engineering to assist with the gathering of flood intelligence including (not limited to) maximum flood extents, peak flood heights, recording major flood damage at key high velocity locations and preparation of After-Flood Report.

5.3.2 **Strategy:** Ensure flood intelligence is incorporated into operational decision-making.

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

## 5.4 PROVISION OF INFORMATION AND WARNINGS TO THE COMMUNITY

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

**Actions:**

- a. The Bureau issues public weather and flood warning products before and during a flood. These may include:
  - Severe Thunderstorm Warnings – Detailed - issued for all capital cities and surrounding areas when individual severe thunderstorms are within range of the capital city radars.
  - Severe Thunderstorm Warnings - Broad-based - issued for the entire Australian State or territories affected highlighting broad areas where severe storms may occur within the next 3 hours.
  - Severe Weather Warnings with reference to heavy rainfall and/or storm surge.
  - Flood Watches.
  - Flood Warnings.
- b. Dam Owners will utilise the Dam Emergency Plan to provide warnings and information to NSW SES and communities (where appropriate).
- c. NSW SES Incident Controllers will issue the following NSW SES Flood Warnings aligning to the Australian Warning System:
  - Advice.
  - Watch And Act.
  - Emergency Warning.

- d. NSW SES liaises with the Bureau to discuss the development of flood warnings as required.
- e. NSW SES provides alerts and deliver flood information to affected communities using a combination of public information.
- f. NSW SES may request supporting agencies redistribute NSW SES alerts and information, including through the provision of doorknocking teams.
- g. Road closure information will be provided to the community through the following agencies/methods:
  - Local Government Council websites.
  - Transport for NSW 'Live Traffic' website: <https://www.livetraffic.com/> or 'Transport InfoLine': 131 500. VMS messaging on roadways may also be used to advise motorists.
- h. The Public Information and Inquiry Centre will be established by NSW Police Force where required to provide information regarding evacuees and emergency information. Contact details will be broadcast once the centre is established.
- i. The Disaster Welfare Assistance Line will be established by Disaster Welfare Services where required to provide information on welfare services and assistance. Assistance line contact details will be broadcast once Disaster Welfare Services commence.

## 5.5 PROTECTION OF PROPERTY

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

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

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

## 5.6 ROAD AND TRAFFIC CONTROL

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

**Actions:**

- a. Wingecarribee Shire Council will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority.
- b. Transport for NSW will coordinate the closure and reopening of the state road network.



- c. NSW Police Force may close and re-open roads but will normally only do so (if the Wingecarribee Shire Council or Transport for NSW have not already acted and if public safety requires such action).
- d. NSW SES will assist with erecting road closure signs and barriers when time and resources permit.

5.6.2 **Strategy:** Coordinate traffic control measures in flood affected areas.

- a. The NSW SES Incident Controller may direct the imposition of traffic control measures into flood affected areas in accordance with the provisions of the *State Emergency Service Act, 1989* and the *State Emergency Rescue Management Act, 1989*.
- b. The NSW SES Incident Controller may request the Local Emergency Operations Controller provide suitable personnel to assist with traffic coordination.

## 5.7 PROTECTION OF ESSENTIAL SERVICES

5.7.1 Local and Region EMPLAN's contain infrastructure inventories.

5.7.2 **Strategy:** Minimise disruption to the community by ensuring protection of infrastructure and supply of essential energy, utility services and lifelines.

**Actions:**

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

## 5.8 EVACUATION

5.8.1 Evacuation is NSW SES's primary response strategy for managing the population at risk of flooding.

5.8.2 **Strategy:** Conduct planning to ensure all evacuation constraints are considered.

**Actions:**

- a. Evacuations will take place when there is a risk to public safety. Circumstances may include:
  - Evacuation of people when their homes or businesses are likely to flood.
  - Evacuation of people who are unsuited to living in isolated circumstances, due to flood water closing access.
  - Evacuation of people where essential energy and/or utility services are likely to fail or where buildings have been or may be made uninhabitable.
- b. NSW SES will consider the following in evacuation decisions:
  - Duration of evacuation.
  - Characteristics of the community.
  - Numbers requiring evacuation.
  - Availability of evacuation routes and transport.
  - The ability for existing levees or other flood protection works to fulfil their intended function.
  - Time available for evacuation.
  - Evacuee management requirements.
  - Resources and delivery of evacuation information.
  - Length of isolation.
- c. NSW SES Incident Controllers, planning and intelligence officers will carefully consider the risks involved in conducting evacuations.
- d. All evacuation decisions will be made as per the current NSW SES policies and procedures, and consistent with the NSW Evacuation Management Guidelines.
- e. Potential Evacuation Centres are located in the Local EMPLAN.
- f. NSW Police Force will coordinate the provision of overall security for evacuated areas.

5.8.3 **Strategy:** Evacuate people pre-emptively from dangerous or potentially dangerous places and or locations created by the flood hazard to safe locations away from the hazard.

- a. NSW SES will control and coordinate the evacuation of affected communities.
- b. The NSW SES Commissioner (or delegate) will warn communities to prepare for a possible evacuation, where circumstances allow such lead time.
- c. The NSW SES Commissioner (or delegate) will order any necessary evacuations and provide information to the community about when and how to evacuate.

- d. Support to evacuation operations may be requested from other emergency services and supporting agencies using arrangements in the local EMPLAN and supporting plans.
- e. Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes) in consultation with NSW SES and Welfare Services.
- f. School administration offices (Government and Private) will coordinate the evacuation of schools in consultation with NSW SES and Welfare Services, if not already closed.
- g. Caravan Park proprietors will inform the NSW SES Incident Controller when caravan park evacuations have been completed.
- h. People who are reluctant or refuse to comply with any Emergency Warning will be referred to NSW Police Force.

## 5.9 EVACUEE MANAGEMENT AND WELFARE

5.9.1 Research and experience in flood operations shows that most evacuees go to family, friends and commercial accommodation outside the impact area.

5.9.2 **Strategy:** Maintain the welfare of communities and individuals affected by the impact of a flood.

### **Actions:**

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

5.9.3 **Strategy:** Coordinate available and accessible health services for flood affected communities.

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

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

**Actions:**

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

## 5.10 FLOOD RESCUE

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

**Actions:**

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

## 5.11 RESUPPLY

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

**Actions:**

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

5.11.2 **Strategy:** Coordinate resupply to rural properties isolated by flooding.

**Actions:**

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

## 5.12 RETURN

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

**Actions:**

- a. The NSW SES Incident Controller will determine when it is safe to progressively return in consultation with the relevant Emergency Operations Controller and supporting agencies considering the ongoing risk to public safety.
- b. The NSW SES Incident Controller will specify the level of access to affected communities as the following:
  - Not suitable for access; or
  - Limited access by emergency services and response agencies; or
  - Limited access by residents and/or business operators; or
  - Full access.

- c. The NSW SES Incident Controller will issue an Advice Warning advising 'Reduced Threat: Return with Caution' when the immediate danger to life and property has passed for areas.
- d. NSW SES will facilitate the return of evacuees to their homes.

## **5.13 END OF RESPONSE OPERATIONS**

5.13.1 **Strategy:** Conclude response operations.

**Actions:**

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

## **5.14 POST IMPACT ACTIONS**

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

**Actions:**

- a. NSW SES will continue to engage with communities after significant floods through convening one or more community forums, workshops or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process. These will typically include other agencies such as the Bureau, Welfare Services and Wingecarribee Shire representatives.
- b. NSW SES will conduct After Action Reviews, at the conclusion of response operations, which will involve all stakeholders. Findings will be shared and incorporated into improved disaster resilience planning.
- c. NSW SES will provide information and data throughout the emergency response to inform community recovery. A report will be developed at the request of the SERCON at the conclusion of the response within an area. Should a response summary report be required it will include the following:
  - The emergency action plan in place at conclusion of the response emphasising any continuing activities including community meetings/ engagement activities.

- Resources allocated to the emergency response and associated exit strategies.
- Details of any areas or situations with potential to re-escalate the emergency.
- A recommendation for the conclusion of NSW SES as lead agency to transition to NSW Reconstruction Authority as the lead agency for Recovery.
- Any actions that are incomplete or outstanding.
- Damage Assessment Data and Information obtained throughout the response phase which will further support the long-term recovery of communities.

d. NSW SES will undertake/coordinate a comprehensive review of intelligence and plans following significant flood events.

5.14.2 **Strategy:** Participate in post flood data collection analysis.

**Actions:** NSW SES works with relevant stakeholders and Wingecarribee Shire Council on post flood data collection analysis including review of flood intelligence where necessary.

## 6 RECOVERY OPERATIONS

### 6.1 INTRODUCTION

6.1.1 Recovery is the process of returning an affected community to its proper level of functioning after an emergency. It will generally commence simultaneously with the Response phase.

6.1.2 Recovery operations will be initiated and conducted as outlined in the NSW State EMPLAN and as further detailed in the NSW Recovery Supporting Plan.

### 6.2 NSW SES RECOVERY ROLE

6.2.1 **Strategy:** NSW SES will support recovery operations and established Recovery Committees.

6.2.2 **Actions:**

- NSW SES will provide representation to Recovery Committees as required and may have an ongoing role in the Recovery phase.
- NSW SES roles on Recovery Committees may include providing information about any continuing response, guidance on mitigation strategies and general advice and assistance to the committee as a subject matter specialist and/ or expert.
- NSW SES will provide information to NSW Reconstruction Authority to support applications to Treasury for Natural Disaster Relief and Recovery Arrangements.

- d. NSW SES, in conjunction with a Recovery Committee, will provide a service to support the information needs of a community immediately following a flood.
- e. NSW SES and where required supporting agencies will assist with clean-up operations after floods, where possible when resources and personnel permit.
- f. NSW SES may coordinate immediate relief in collaboration with SEOCAN and SERCON.

## 7 ABBREVIATIONS

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

## 8 GLOSSARY

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

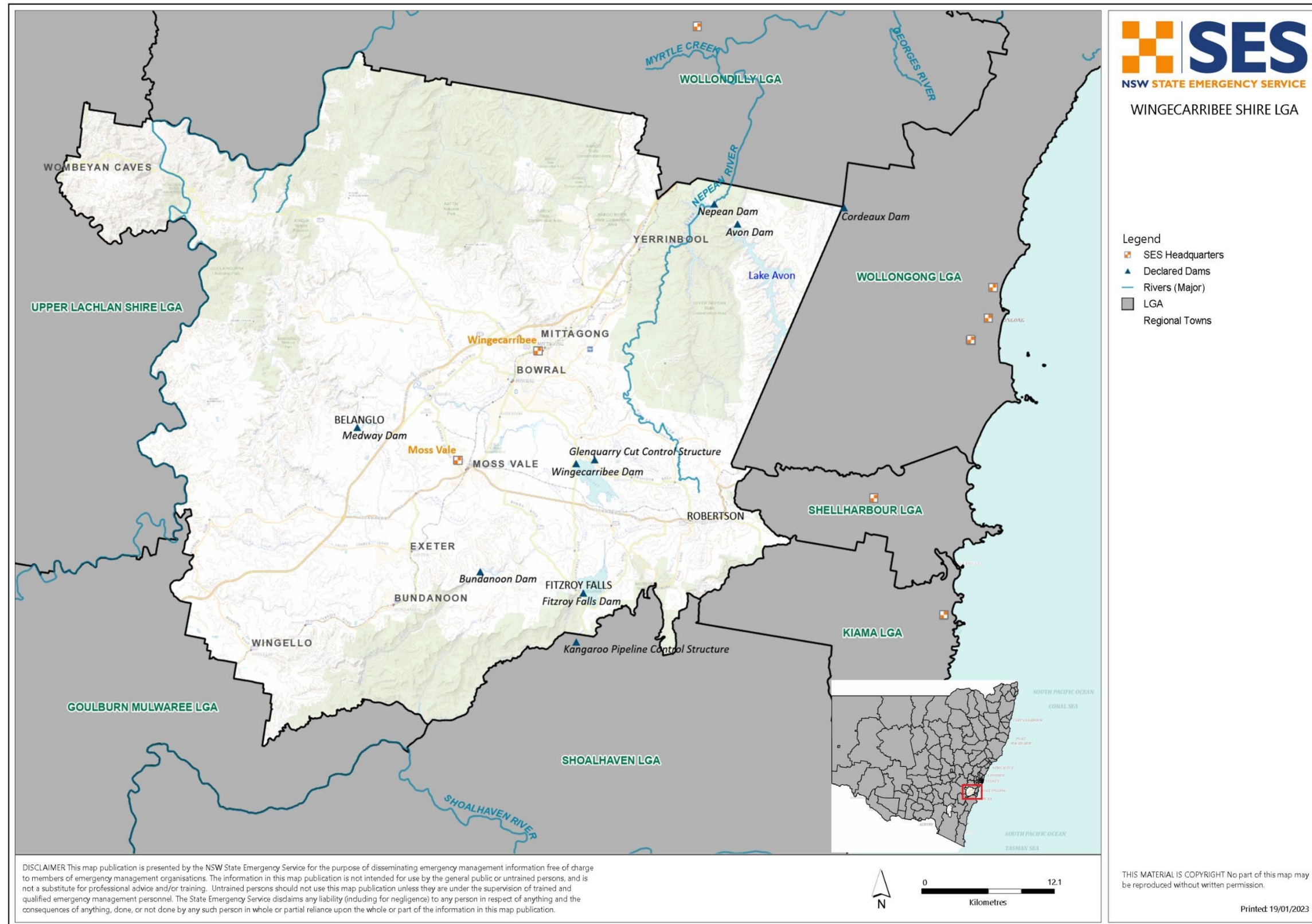
Readers should refer to EMPLAN Annex 9 – Definitions.

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

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



# 9 Appendix A – Map of Wingecarribee Shire LGA



## 10 Appendix B – Roles and Responsibilities

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

AGENCY	RESPONSIBILITIES
Agriculture and Animal Services Functional Area	The roles and responsibilities for Agriculture and Animal Services are outlined in the Agriculture and Animal Services Supporting Plan and NSW State Flood Plan.
Australian Government Bureau of Meteorology	The roles and responsibilities for the Australian Government Bureau of Meteorology (Bureau) are outlined in the NSW State Flood Plan.
Wingecarribee Shire Council	<p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>• Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented.</li> <li>• Develop and implement floodplain risk management plans in accordance with the NSW Government’s Flood Prone Land Policy and the Floodplain Development Manual.</li> <li>• Provide levee studies, flood studies and floodplain management studies to NSW SES.</li> <li>• Maintain Dam Emergency Plans for the Wingecarribee Shire Council dams and provide copies to NSW SES.</li> <li>• Provide information on the consequences of dam failure to NSW SES for incorporation into planning and flood intelligence.</li> <li>• Maintain council-owned flood warning networks and flood mitigation works.</li> <li>• Participate in NSW SES-led flood emergency planning meetings, to assist in the preparation of Flood Sub Plans.</li> <li>• Maintain a plant and equipment resource list for the council area.</li> <li>• Contribute to community engagement activities.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>• Subject to the availability of council resources, assist NSW SES with flood operations including: <ul style="list-style-type: none"> <li>– Traffic management on council managed roads.</li> <li>– Provision of assistance to NSW SES (plant, equipment and personnel where able and requested).</li> </ul> </li> </ul>

AGENCY	RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>– Property protection tasks including sandbagging.</li> <li>– Assist with the removal of caravans from caravan parks.</li> <li>– Warning and/or evacuation of residents and other people in flood liable areas.</li> <li>– Provision of back-up radio communications.</li> <li>– Resupply of isolated properties.</li> <li>– Technical advice on the impacts of flooding.</li> <li>– Close and reopen council roads (and other roads nominated by agreement with Transport for NSW) and advise NSW SES, NSW Police Force and people who contact the council for road information.</li> <li>– Assist NSW SES to provide filled sandbags and filling facilities to residents and business in areas which flooding is expected.</li> </ul> <ul style="list-style-type: none"> <li>• Assist with making facilities available for domestic pets and companion animals of evacuees during evacuations.</li> <li>• Operate flood mitigation works including critical structures such as detention basins and levees and advise NSW SES regarding their operation.</li> <li>• Manage and protect council-owned infrastructure facilities during floods.</li> <li>• Provide advice to NSW SES and the Health Services Functional Area during floods about key council managed infrastructure such as sewerage treatment and water supply.</li> <li>• Advise the Environmental Protection Authority of any sewerage overflow caused by flooding.</li> <li>• Work with NSW SES and NSW Department of Planning and Environment to collect flood related data during and after flood events.</li> </ul> <p><b>Recovery</b></p> <ul style="list-style-type: none"> <li>• Provide for the management of health hazards associated with flooding including removing debris and waste.</li> <li>• Ensure premises are fit and safe for reoccupation and assess any need for demolition.</li> <li>• Provide services, assistance and advice to State Government in accordance with the State Recovery Plan.</li> </ul>
<b>Caravan Park Proprietor(s)</b>	<ul style="list-style-type: none"> <li>• Ensure that owners and occupiers of movable dwellings are aware that the caravan park is flood liable by providing a written notice to occupiers taking up residence and displaying this notice and emergency management arrangement within the park.</li> <li>• Ensure that owners and occupiers of movable dwellings are aware that if they are expecting to be absent for extended periods, they should:</li> </ul>

AGENCY	RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>– Provide the manager of the caravan park with a contact address and telephone number in case of an emergency.</li> <li>– 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).</li> <li>• Ensure that occupiers are informed of Flood Information. At this time, occupiers should be advised to: <ul style="list-style-type: none"> <li>– Ensure that they have spare batteries for their radios.</li> <li>– Listen to a local radio station for updated flood information.</li> <li>– Prepare for evacuation and movable dwelling (cabins) relocation.</li> </ul> </li> <li>• Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs.</li> <li>• 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.</li> <li>• Secure any movable dwellings that are not able to be relocated to prevent floatation.</li> <li>• Inform NSW SES of the progress of evacuation and/or movable dwellings relocation operations and of any need for assistance in the conduct of these tasks.</li> </ul>
<b>Childcare Centres and Preschools</b>	<ul style="list-style-type: none"> <li>• When notified of possible flooding or isolation, childcare centres and preschools should. <ul style="list-style-type: none"> <li>– Liaise with NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures.</li> <li>– Assist with coordinating the evacuation of preschools and childcare centres.</li> </ul> </li> </ul>
<b>Dams Safety NSW</b>	The roles and responsibilities for Dams Safety NSW (formerly NSW Dam Safety Committee) are outlined in the NSW State Flood Plan.
<b>Department of Defence</b>	Arrangements for Defence Assistance to the Civil Community are detailed within the State EMPLAN (section 448).
<b>Energy and Utilities Services Functional Area</b>	<p>The roles and responsibilities for Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN).</p> <p>Roles and responsibilities in addition to the Supporting Plan are:</p>

AGENCY	RESPONSIBILITIES
	<ul style="list-style-type: none"> <li>• Assist NSW SES with identification of infrastructure at risk of flood damage where resources are available.</li> <li>• Facilitate local utility service distribution providers (electricity, gas, water, wastewater) to: <ul style="list-style-type: none"> <li>– Provide advice to NSW SES of any need to disconnect power/gas/water/wastewater supplies or of any timetable for reconnection.</li> <li>– Advise NSW SES of any hazards from utility services during flooding and coastal erosion/inundation.</li> <li>– Advise the public with regard to electrical hazards during flooding and coastal erosion/inundation, and to the availability or otherwise of the electricity supply.</li> <li>– Clear or make safe any hazard caused by power lines or electricity distribution equipment.</li> <li>– Reconnect customers' electrical / gas / water / wastewater installations, when certified safe to do so and as conditions allow.</li> <li>– Assist NSW SES to identify infrastructure at risk of flooding for incorporation into planning and intelligence.</li> </ul> </li> </ul>
<b>Engineering Services Functional Area</b>	The roles and responsibilities for Engineering Services are outlined in the Engineering Services Supporting Plan and NSW State Flood Plan.
<b>Environmental Services Functional Area</b>	The roles and responsibilities for Environmental Services are outlined in the Environmental Services (ENVIROPLAN) Supporting Plan.
<b>Floodplain Management Australia</b>	The roles and responsibilities for Floodplain Management Australia are outlined in the NSW State Flood Plan.
<b>Fire and Rescue NSW</b>	The roles and responsibilities for Fire and Rescue NSW are outlined in the NSW State Flood Plan.
<b>Forestry Corporation of NSW</b>	The roles and responsibilities for Forestry Corporation of NSW are outlined in the NSW State Flood Plan.
<b>Health Services Functional Area</b>	The roles and responsibilities for Health Services are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan.
<b>Local Emergency Operations Controller (LEOCON)</b>	<ul style="list-style-type: none"> <li>• Monitor flood operations.</li> <li>• If requested, coordinate support for the NSW SES Incident Controller.</li> </ul>
<b>Local Emergency Management Officer (LEMO)</b>	<ul style="list-style-type: none"> <li>• If requested by the NSW SES Incident Controller, advise appropriate agencies and officers of the start of response operations.</li> </ul>
<b>Manly Hydraulics Laboratory (MHL)</b>	The roles and responsibilities for Manly Hydraulic Laboratory are outlined in the NSW State Flood Plan.
<b>Marine Rescue NSW</b>	The roles and responsibilities for Marine Rescue NSW are outlined in the NSW State Flood Plan.

<b>AGENCY</b>	<b>RESPONSIBILITIES</b>
<b>NSW Ambulance</b>	The roles and responsibilities for NSW Ambulance are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan.
<b>NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission</b>	The roles and responsibilities for NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission are outlined in the NSW State Flood Plan.
<b>NSW Department of Planning and Environment (Environment and Heritage Group)</b>	The roles and responsibilities for NSW Department of Planning and Environment (Environment and Heritage Group) are outlined in the NSW State Flood Plan (referred to as DPIE EES).
<b>NSW Department of Planning and Environment (Water)</b>	The roles and responsibilities for NSW Department of Planning and Environment (Water) are outlined in the NSW State Flood Plan.
<b>NSW Food Authority</b>	The roles and responsibilities for NSW Food Authority are outlined in the Food Safety Emergency Sub Plan.
<b>NSW National Parks and Wildlife Services</b>	The roles and responsibilities for NSW National Parks and Wildlife Services are outlined in the NSW State Flood Plan.
<b>NSW Police Force</b>	The roles and responsibilities for NSW Police Force are outlined in the NSW State Flood Plan.
<b>NSW Reconstruction Authority</b>	The roles and responsibilities for NSW Reconstruction Authority are outlined in the NSW State Flood Plan.
<b>NSW Rural Fire Service</b>	The roles and responsibilities for NSW Rural Fire Service are outlined in the NSW State Flood Plan.
<b>Owners of Declared Dams within or upstream of the LGA</b>	The roles and responsibilities for Owners of Declared Dams are outlined in the NSW State Flood Plan.
<b>Public Information Services Functional Area</b>	The roles and responsibilities for Public Information Services are outlined in the Public Information Services Supporting Plan and NSW State Flood Plan.
<b>SEOC/SEOC</b>	The roles and responsibilities for the SEOC/SEOC are outlined in the NSW State Flood Plan.
<b>Surf Life Saving NSW</b>	The roles and responsibilities for Surf Life Saving NSW are outlined in the NSW State Flood Plan.
<b>Telecommunications Services Functional Area</b>	The roles and responsibilities for Telecommunications Services are outlined in the Telecommunications Services (TELCOPLAN) Supporting Plan.
<b>Transport for NSW</b>	<ul style="list-style-type: none"> <li>• Transport for NSW coordinates information on road conditions for emergency services access.</li> </ul>

<b>AGENCY</b>	<b>RESPONSIBILITIES</b>
	<ul style="list-style-type: none"> <li>• Transport for NSW coordinates the management of the road network across all modes of transport.</li> <li>• Transport for NSW in conjunction will assist NSW SES with the evacuation of at-risk communities by maintaining access and egress routes.</li> <li>• Assist NSW SES with the communication of flood warnings and information provision to the public through Live Traffic and Social Media according to the VMS protocols and procedures.</li> <li>• Assist NSW SES with identification of road infrastructure at risk of flooding.</li> </ul>
<b>Transport Services Functional Area</b>	The roles and responsibilities for Transport Services are outlined in the Transport Services Functional Area Supporting Plan and NSW State Flood Plan.
<b>VRA Rescue NSW</b>	The roles and responsibilities for VRA Rescue NSW are outlined in the NSW State Flood Plan.
<b>Water NSW</b>	The roles and responsibilities for Water NSW are outlined in the NSW State Flood Plan.
<b>Welfare Services Functional Area</b>	The roles and responsibilities for Welfare Services are outlined in the Welfare Services Functional Area Supporting Plan and NSW State Flood Plan.

## 11 Appendix C – Community Specific Roles and Responsibilities

<b>Community Members</b>	<p><b>Preparedness</b></p> <ul style="list-style-type: none"><li>• Understand the potential risk and impact of flooding.</li><li>• Prepare homes and property to reduce the impact of flooding.</li><li>• Understand warnings and other triggers for action and the safest actions to take in a flood.</li><li>• Households, institutions and businesses develop plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours.</li><li>• Have an emergency kit.</li><li>• Be involved in local emergency planning processes.</li></ul> <p><b>Recovery</b></p> <ul style="list-style-type: none"><li>• Assist with community clean-up if required and able to do so.</li><li>• Participate in After Action Reviews if required.</li></ul>
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# HAZARD AND RISK IN WINGECARRIBEE SHIRE

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**Volume 2 of the Wingecarribee Shire Local Flood Plan**

**Last Update: January 2017**

## AUTHORISATION

Hazard and Risk in Wingecarribee Shire 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



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Manager Emergency Risk Management

Date:

16/1/17

Approved



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NSW SES Illawarra South Coast Region Controller

Date:

10 Jan 2017

Tabled at LEMC

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Date:

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## VERSION LIST

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

Description	Date
Wingecarribee Shire Local Flood Plan – Annexes A, B, F and G	May 2007

## AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Wingecarribee Shire Local Controller

NSW State Emergency Service

PO Box 694, BOWRAL NSW 2576

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 THREAT

## 1.1 LANDFORMS AND RIVER SYSTEMS

- a. The Wingecarribee Shire is made up of rugged country in the north-west, north-east and south, and low-lying or undulating country in its central portions. This Shire is an important catchment area of water supply to Sydney, Wollongong and the Northern Shoalhaven with much of the Shire located 640 metres above sea level (1).
- b. The Shire is predominately covered by the Hawkesbury - Nepean River Basin, with the eastern portion of the Shire falling in the Wollongong Coast Basin and the south in the Shoalhaven River Basin.
- c. These River Basins are shown in Maps 1-4.

### Hawkesbury- Nepean River Basin

#### Wollondilly River

- d. The Wollondilly River drains the majority of the Shire and marks its western boundary. Its principle tributary within the Shire is the Wingecarribee River. The Wollondilly River flows through the west of the Shire before entering deep sandstone valleys and eventually running into Lake Burragorang, Sydney's main water supply formed by Warragamba Dam (1).
- e. The Wollondilly River is shown on Maps 1 and 2.

#### Wingecarribee River

- f. The Wingecarribee River rises near Robertson and flows in a westerly direction past Bong Bong, Moss Vale, Burradoo, Bowral, then Berrima and New Berrima before entering rugged sandstone country and eventually ending up within Lake Burragorang formed by Warragamba Dam (1).
- g. The main tributaries of the Wingecarribee River are Kellys, Stony, Cordeaux, Whites and Joadja creeks, Mittagong and Medway (Carrada) rivulets and Paddys River (2). The Whites Creek and Mittagong Creek are among the larger tributaries of the Wingecarribee River (1).
- h. Burradoo BU2 Catchment is a sub-catchment of Mittagong Creek which is a tributary of the Wingecarribee River flowing through the suburb of Burradoo (1).
- i. The Wingecarribee River has been dammed 14 kilometres upstream of Bowral to form the Wingecarribee Reservoir.
- j. The Wingecarribee Reservoir is a link between the Shoalhaven River system and both the Warragamba and Nepean Dam systems.
- k. The Wingecarribee River is shown on Maps 1 and 2.

### Nattai River

- l. The Nattai River originates just to the south of Mittagong and drains in a northerly direction through Mittagong before flowing through Nattai National Park and into Lake Burragorang.
- m. Headwaters tributaries of the Nattai River, include Wangenderry, Chinamans, Gibbergunyah, Drapers, Running Water and Rocky Waterholes creeks (2).

### Nepean River

- n. Some headwater tributaries of the Nepean River, including the Avon and Burke rivers drain the rugged, largely undeveloped north-eastern portion of the Shire (2).

### **Shoalhaven River Basin**

- o. Some headwater tributaries of the Shoalhaven River, including the Kangaroo River and Barrengarry, Wildes Meadow, Yarrunga and Bundanoon creeks drain the southern portion of the Shire, including the Morton National Park (2).
- p. The Shoalhaven River Basin is shown on Map 3.

### **Wollongong Coast Basin**

- a. Only a very small portion of the Wingecarribee LGA to the east of Robertson is located within the Wollongong Coast Basin. The catchment here is on the edge of the steep Illawarra escarpment near the top of Jamberoo Mountain Road and Macquarie Pass. There are no major water courses present within the Wingecarribee LGA part of the Wollongong Coast Basin and no know flood consequences. The Wollongong Coast Basin is shown on Map 4.

## 1.2 STORAGE DAMS

- a. Dam locations are shown on MAP 1 - Hawkesbury-Nepean Riverbasin, MAP 2 – Hawkesbury Nepean River Basin (within the Wingecarribee LGA), MAP 3 – Shoalhaven Riverbasin and MAP 4 – Wollongong Coast Riverbasin.

**Table 1: Prescribed Dams in Wingecarribee Shire LGA; summary of information about each storage.**

<b>Bingara Gorge Pond (3)</b>	
Owner / Operator	Lend Lease Communities (Wilton)
Description of Dam	Temporary storage of treated effluent from sewage treatment works
Location	Located near the Bingara Gorge subdivision near Wilton on an unnamed creek which eventually flows into the Nepean River.
Communities Downstream	There is no known Dam Safety Emergency Plan for this Dam, however mapping and aerial photography indicates that downstream of the dam is a golf course, some farmland and bushland.
Monitoring System	No information
Warning System	No information
Other	No information

<b>Bundanoon Dam</b>	
Owner / Operator	Wingecarribee Shire Council
Description of Dam	Forms part of the Wingecarribee Water supply system with Welby, Medway and Wingecarribee dams.
Location	Is located south of Moss Vale on Bundanoon Creek which eventually drains into the Shoalhaven River.
Communities Downstream	There is no known Dam Safety Emergency Plan for this dam, however mapping suggests it flows into bushland (part of the Meryla State Forest)
Monitoring System	No information
Warning System	No information
Other	No information



<b>Fitzroy Falls Dam (4)</b>	
Owner / Operator	WaterNSW
Description of Dam	Fitzroy Falls Dam is an earth and rock fill embankment, including three Saddle Dams. Fitzroy Falls has a fixed crest side channel spillway located near the centre of the dam. It has a storage capacity of 23,500 ML
Location	Fitzroy Falls Dam is located on Yarrunga Creek, approximately 16 km south-east of Moss Vale
Communities Downstream	<p>The reservoir is located just upstream of Fitzroy Falls visitor centre area and Fitzroy Falls walking track and lookout. Any sudden release of water would have an immediate impact on the visitor centre and a few downstream properties.</p> <p>For a Main Dam dambreak there is little warning available for the picnic areas, visitors centre and lookouts. The flood wave arrives within 10 minutes and rises to 1.5 m above the visitors centre within 35 minutes.</p>
Monitoring System	Water levels are monitored by automatic telemetry systems. WaterNSW has in place a seismic monitoring network that continuously monitors the occurrence of earthquakes that could affect WaterNSW assets and determines their location and magnitude.
Warning System	Nil
Other	<p>Fitzroy Falls Dam is connected to Wingecarribee Reservoir via the Wildes Meadow Canal and Burrawang Tunnel and Bendeela Pondage (and eventually into Lake Yarrunga) via the Fitzroy Canal and the Kangaroo Pipeline and Tunnel.</p> <p>There are currently no confirmed deficiencies at this dam, which could lead to failure during normal operation. However, the downstream filter of the dam does not extend to the crest. Hence there is a very small risk of piping through the top section of the dam during high water levels about Full Supply Level (FSL).</p>

<b>Glenquarry Cut Control Structure (5)</b>	
Owner / Operator	WaterNSW
Description of Dam	Glenquarry Cut Control Structure is an 18 metre high, 39 metre long concrete gravity dam. Together with the Wingecarribee Dam it impounds a total storage of 34,500ML. This structure controls releases from Wingecarribee Reservoir to Glenquarry Creek and then on to Nepean Reservoir. Water releases through the structure are controlled by two 1.8 m x 3.2 m high fixed wheel steel gates arranged in series.
Location	Glenquarry Cut Control Structure is located approximately 11km east of Moss Vale, NSW. It is located on the Wingecarribee Reservoir and is approximately 1.5 km NE of Wingecarribee Dam.
Communities Downstream	There are no identifiable lives at risk downstream of Glenquarry Cut Control Structure. Surveys are being carried out at 2-yearly intervals. Seismic monitoring network continuously monitors the occurrence of earthquakes that could affect WaterNSW assets and determines their location and magnitude.
Monitoring System	Storage level is recorded continuously on an automatic chart recorder and read daily.
Warning System	Nil

<b>Medway Dam</b>	
Owner / Operator	Wingecarribee Shire Council
Description of Dam	Part of the Wingecarribee Water Supply system with Welby, Bundanoon and Wingecarribee dams.
Location	Located approximately 8km east of Berrima on the Medway Rivulet within the Hawkesbury-Nepean Basin.
Communities Downstream	There is no known Dam Safety Emergency Plan for this Dam.
Monitoring System	No information
Warning System	No information
Other	No information

<b>Wingecarribee Dam (6)</b>	
Owner / Operator	WaterNSW
Description of Dam	The dam is a zoned earth and rock fill embankment. The dam operates mainly for water supply purposes. The dam has a gated spillway and incorporates outlet works for riparian releases and water supply to Bowral. Three saddle dams are located near the southern (left) end of the main dam wall. It has a total storage capacity of 34,500 ML.
Location	Wingecarribee Dam is located approximately 14.5 km south-east of Bowral, and 10 km east of Moss Vale.
Communities Downstream	Berrima is located 21km downstream. Parts of Berrima Township could be affected along with sixteen farm homesteads and an industrial area in Burradoo.
Monitoring System	A SCADA network monitors water levels. A seismic monitoring network monitors the occurrence of earthquakes and determines their location and magnitude.
Warning System	There are no warning systems at the dam to directly warn nearby or downstream residents of an emergency at the dam.
Other	Floating peat within the reservoir creates some risk to the dam wall during extreme flood events.  The two major items of infrastructure at risk during a dam failure are the Sheepwash Bridge on Sheepwash Road and the Bowral-Mittagong Water Treatment Works. The electricity sub-station at Bong Bong can also be flooded potentially affecting supply.

- b. Other prescribed storage dams located within the Wingecarribee Shire LGA which have no downstream impacts on communities the LGA include:
- i. Avon Dam – Owned by Water NSW, located on the Avon River near Bargo. Downstream communities which may be impacted are located within the Wollondilly Shire, Camden, and Penrith City LGAs (7).
  - ii. Nepean Dam – owned by WaterNSW, located on the Nepean River south of Pheasants Nest. Downstream communities which may be impacted include Menangle, Camden, Brownlow Hill, Theresa Park and Wallacia which are located within the Wollondilly, Camden and Penrith City LGAs (8).

### **1.3 WEATHER SYSTEMS AND FLOODING**

- a. Flood-producing rains can occur over all of these catchments and at any time of the year. They can be caused by severe thunderstorm activity or by the passage of frontal systems. Most floods have occurred soon after short, sharp bursts of rain falling within the council area, but floods on the Wollondilly River proper may emanate from areas well to the south and take longer to rise. Most thunderstorm activity is in the summer months, frontal systems being more common in winter.

Much of the flooding which affects the Shire, particularly its more populated areas, is 'flash' flooding (2).

## 1.4 CHARACTERISTICS OF FLOODING

### Hawkesbury- Nepean River Basin

#### Wingecarribee River

- a. Within the Wingecarribee River Basin flooding can be short duration flash flooding within Bowral, Berrima, Moss Vale or Budaroo.
- b. The floodplain area of the Wingecarribee River has a history of mainstream flooding affecting the township of Berrima (1).
- c. The Wingecarribee floodplain in its upper reaches is up to 1km wide with low hydraulic gradient, while the downstream section to the east of the junction with Stony Creek is significantly narrower being confined to the valley between the hills surrounding Berrima (1).
- d. The Wingecarribee floodplain generally follows the river with the only significant redirection occurring in PMF conditions between Burradoo and Bong Bong. Flooding affects a number of nearby townships, (specifically southern parts of Berrima and Burradoo and parts of Moss Vale/Bong Bong to the north). The affectation is intensified in less frequent flood events and in particular the PMF. East Bowral and New Berrima are located on the higher ground and as such not subject to river flooding (1) (9).
- e. The key river water level gauge within the Wingecarribee River is the Greenstead gauge (212009). Warnings are not provided to this gauge by the Bureau of Meteorology. A schematic location of this gauge in relation to others in the Hawkesbury-Nepean River Basin is shown in Annex 1.

#### Nattai River

- f. Flooding within the Nattai River catchment mainly affects the township of Mittagong. Flooding across this catchment can occur as a result of major watercourses overtopping their banks, as well as overland flooding when the capacity of stormwater systems are exceeded (10) (11).

### Shoalhaven River Basin

- g. There are no known flood consequences within the Wingecarribee LGA part of the Shoalhaven River Basin.

### Wollongong Coast Basin

- h. There are no known flood consequences within the Wingecarribee LGA part of the Wollongong Coast Basin.

## 1.5 FLOOD HISTORY

- a. The Wingecarribee River Catchment has experienced several large flood events. Historical accounts of large floods extend back to 1897/98 and 1964. Stream gauging commenced at the Berrima Weir in 1975 and the river flow records indicate that since that time the highest flood in Berrima was recorded in August 1978 followed by April 1988, August 1998 and August 1990 (1) (9).
- b. Other events in August 1986, July 1988 and June 1991 were just smaller than the August 1990 flood and there was also a relatively minor flood in February 1993 (1).
- c. Flooding occurred in June 2016 in the Wingecarribee Shire when 163mm of rain fell over three days, with 125mm of this occurring on the 5<sup>th</sup> of June (12). This flooding event caused the flooding of many residences and the isolation of communities from each other due to major road closures. Unfortunately one life was lost after a vehicle was swept off a causeway in Bowral.

## 1.6 FLOOD MITIGATION SYSTEMS

- a. There is one levee within the Wingecarribee Shire LGA:
  - i. Farmborough Close located at Bowral.
- b. This levee is further described within Part 2 - Specific Risk Areas.
- c. There is a non-prescribed detention basin located on the South Arm of Mittagong Creek, adjacent to East Bowral, upstream of Old South Road (13).
- d. There are also two informal detention basins, known as Pony Club basin and Informal basin located just east of Moss Vale Road at Burradoo (14).

## 1.7 EXTREME FLOODING

- a. Floods larger than those experienced in the past should be expected within the Wingecarribee LGA. Bowral and Berrima are at risk of flooding from the Wingecarribee River.
  - i. Bowral is particularly at risk with overfloor flooding beginning in Bowral in events as small as a 20% (1 in 5 year) event, with many more properties at risk of overfloor flooding during extreme flood events.
  - ii. Most of Berrima is located on high ground, however properties located in lower lying parts of the town can be flooded over floor level, particularly in flood events at or exceeding the 1% AEP extents.
- b. Extreme flash flooding and overland flow events also pose a risk within Bowral, Burradoo, Berrima, Moss Vale, Robertson and Mittagong.

- c. Refer to Section 2 for more details on extreme flooding within each of these Specific Risk Areas.

## 2 EFFECTS ON THE COMMUNITY

### 2.1 COMMUNITY PROFILE

Table 2: Census of Housing and Population data (2011)

Census Description	Bowral	Bundanoon	Colo Vale	Exeter	Hill Top
<b>Total Persons</b>	<b>13,735</b>	<b>3,111</b>	<b>1,718</b>	<b>680</b>	<b>2,545</b>
Aged 0-4 yrs	686	140	116	30	206
Aged 5-14 yrs	1,654	372	279	83	446
Aged 65 + yrs	3,955	907	209	151	238
Of Indigenous Origin	166	16	28	0	65
Who do not speak English well	28	12	0	0	0
Have a need for assistance (profound/severe disability)	871	221	57	20	118
Living alone (Total)	1,443	359	100	63	145
Living alone (Aged 65+)	867	182	39	27	53
Residing in caravans, cabins or houseboats or improvised dwellings	0	0	0	0	10
<b>Occupied Private Dwellings (Households)</b>	<b>5,311</b>	<b>1,262</b>	<b>582</b>	<b>265</b>	<b>844</b>
No Motor Vehicle	280	45	9	4	31
Caravan, cabin, houseboat or improvised dwell	0	3	3	0	0
Rented via State or Housing Authority	73	0	0	0	6
Rented via Housing Co-Op or Community Church Group	59	6	0	0	0
No Internet Connection	937	234	91	47	141
<b>Unoccupied Private Dwellings</b>	<b>971</b>	<b>312</b>	<b>72</b>	<b>69</b>	<b>77</b>
<b>Average persons per occup dwelling</b>	<b>2.4</b>	<b>2.3</b>	<b>2.9</b>	<b>2.6</b>	<b>2.8</b>
<b>Average vehicles per occup dwelling</b>	<b>1.7</b>	<b>1.7</b>	<b>2.1</b>	<b>1.9</b>	<b>2.1</b>

<b>Census Description</b>	<b>Mittagong</b>	<b>Moss Vale</b>	<b>Robertson</b>	<b>Wingello</b>	<b>Yerrinbool</b>
<b>Total Persons</b>	<b>6,738</b>	<b>7,292</b>	<b>1,845</b>	<b>588</b>	<b>1,089</b>
Aged 0-4 yrs	407	486	119	35	97
Aged 5-14 yrs	901	1,019	301	77	196
Aged 65 + yrs	1,403	1,351	277	113	126
Of Indigenous Origin	146	172	30	14	36
Who do not speak English well	23	25	0	0	3
Have a need for assistance (profound/severe disability)	467	300	58	28	36
Living alone (Total)	760	814	133	52	67
Living alone (Aged 65+)	355	386	43	17	29
Residing in caravans, cabins or houseboats or improvised dwellings	54	25	4	0	6
<b>Occupied Private Dwellings (Households)</b>	<b>2,556</b>	<b>2,845</b>	<b>658</b>	<b>205</b>	<b>352</b>
No Motor Vehicle	164	253	10	9	12
Caravan, cabin, houseboat or improvised dwell	40	8	3	0	0
Rented via State or Housing Authority	93	191	4	0	0
Rented via Housing Co-Op or Community Church Group	42	60	3	0	0
No Internet Connection	645	685	110	50	61
<b>Unoccupied Private Dwellings</b>	<b>319</b>	<b>267</b>	<b>188</b>	<b>72</b>	<b>27</b>
<b>Average persons per occup dwelling</b>	<b>2.2</b>	<b>2.3</b>	<b>2.5</b>	<b>2.6</b>	<b>3.0</b>
<b>Average vehicles per occup dwelling</b>	<b>1.7</b>	<b>1.7</b>	<b>2.0</b>	<b>2.0</b>	<b>2.1</b>



## SPECIFIC RISK AREAS - FLOOD

### Hawkesbury-Nepean Basin

## 2.2 BOWRAL

### 2.2.1 Community Overview

- a. Bowral is located 115km south –west of Sydney. It is the largest town in the Southern Highlands and the main business and entertainment precinct of the Wingecarribee Shire and Highlands (Map 5). The population of Bowral is 13,735 with the median/average age of the people in Bowral 49 years (1).
- b. Bowral has a high proportion of residents (22%) aged over 65, who are likely to be less capable of evacuating before severe flooding (1).

### 2.2.2 Characteristics of flooding

- a. Bowral is affected by flash flooding from Mittagong Creek and its tributaries (13).

### 2.2.3 Flood Behaviour

- a. No information is given in the Bowral flood study.

### 2.2.4 Classification of Floodplain

- a. The majority of the town of Bowral has Rising Road Access to high ground in all events up the PMF (13). However the town itself can become isolated for short periods due to road closures.
- b. However the Bowral Childcare Centre can become isolated on a High Flood Island during a PMF event (13).
- c. Mittagong Creek (or Rivulet) runs through Bowral. The town can be cut in half by floodwaters, but each half can still be accessed by alternative routes (1).

### 2.2.5 Inundation

#### Below 10% AEP

- a. In flood events below the 10% AEP industrial properties on Alcorn, Loftus, Kiama Streets and Oxleys Hill and Kirkham Roads may experience inundation.
- b. Additionally low lying properties located directly adjacent to Mittagong Creek may experience inundation. This includes properties on:
  - i. Farmborough Close, Albert Street, Holly Street, Bowral Street, Boolwey Street, Shepherd Street, Merrigang Street, Jasmine Street, Banksia Street, Rose Street, Victoria Street and Oxley Drive (13).

**Table 3: Estimated number of properties inundated above floor level and over ground in Bowral**

Annual Exceedance Probability (Annual Return Interval)	Number of houses with over –floor flooding	Total number of buildings with over-floor flooding
20% (1 in 5 year flood)	11	18
10% (1 in 10 year flood)	20	29
2% (1 in 50 year flood)	63	84
1% (1 in 100 year flood)	76	99
Probable Maximum Flood	397	467

**2% AEP**

- c. In the 2% AEP event 84 properties are at risk of overfloor flooding (Table 3). In addition to those affected in the 10 % AEP this includes low lying properties located on Woodbine Street, Una Street, Glebe Street, Bradman Avenue and Ascot Road (13).

**1% AEP**

- d. In the 1% AEP, up to 99 buildings are at risk of overfloor flooding (Table 3). Properties that may experience inundation in addition to those affected by the 2% AEP event include, properties in low lying areas of Romney Place, Nerang Street, Moss Vale Road, Beavan Place, David Street, Mount Road and Gordon Road.
- e. The main roads of Moss Vale Road and Mittagong Road may also experience inundation (13).

**PMF**

- f. During the PMF additional inundation may occur in Bundaroo Street, Station Street, Mittagong Road, Tynedale Crescent, Ellis Circuit, McDonald Street, Cassandra Place, Sandra Circuit and Old South Road. Also the train line at Burradoo and Bowral Train Stations are expected to flood, along with Glebe Park. Depths over 2m may be experienced by properties close to Mittagong Creek (13).
- g. Historically flooding is also known to occur in Robina Drive, Rowland Road, Thompson Street and Daphne Street.

**2.2.6 Isolation**

- a. In historical flooding events Bowral has become isolated from other towns when major roads become closed due to floodwaters. The period of isolation has been short (hours), with floodwaters receding quickly (Refer to Table 10).

### 2.2.7 Flood Mitigation Systems

- a. A detention basin is located on the South Arm of Mittagong Creek, adjacent to East Bowral, upstream of Old South Road (13).
- b. There are no levees located in Bowral.

### 2.2.8 Dams

- a. There are no dams located upstream of Bowral.

### 2.2.9 At Risk Facilities

#### Schools and Childcare Centres

- a. There is one school and three childcare centres within Bowral potentially affected by flooding (Refer also to Annex 2). These are:
  - i. **St Thomas Aquinas Catholic School** located on Bundaroo Street in Bowral may be impacted by floodwaters in the PMF event (13).
  - ii. **Kamalei Childcare Centre** located on Kirkham Road in Bowral access to the south may be impacted during a PMF event (13).
  - iii. **Bambinos Kindergarten** located on Bowral Street in Bowral and may be affected by floodwaters in the PMF event (13).
  - iv. **Bowral Street Childcare** located on Bowral Street in Bowral and may be affected by floodwaters in the PMF event. It also becomes isolated as a high flood island during the PMF event (13).

#### Aged and Infirm

- b. There are two Retirement Villages and one Hospital with some potential flood affects during a PMF event within Bowral (Refer also to Annex 2). These are:
  - i. **Mt Eymard Retirement Village** is located on Moss Vale Road and its north eastern boundary is affected by floodwaters in the PMF event (13).
  - ii. **Park Linn Haven Retirement Village** is located on Bowral Street in Bowral and is affected by floodwaters in the PMF event (13).
  - iii. **Bowral and District Hospital** is located on Mona Road in Bowral and is not affected by floodwaters, however during the PMF event the entrance on the corner of Bowral Street and Mona Road may be flooded. Alternative routes into and out of the hospital to the West and north would still be possible (13).

### 2.2.10 Other Considerations

- a. Bowral is known for its boutiques, gourmet restaurants, Corbett Gardens and Bradman's Museum. Tulip Time in Bowral is held every year in late September and early October (lasts up to 14 days), and attracts thousands of visitors (1).

## 2.3 BERRIMA

### 2.3.1 Community Overview

- a. Berrima is a historic village in the Southern Highlands of New South Wales approximately 106 km from Sydney (Map 6). The village is located on the Old Hume Highway between Canberra and Sydney. The Berrima Township is located on the northern side of the Wingecarribee River as it meanders in a general westerly direction. The population of Berrima is 1,145. The median/average age of the people in Berrima is 47 years of age (1).

### 2.3.2 Characteristics of Flooding

- a. Berrima is affected by a combination of riverine flooding from the Wingecarribee River and localised flash flooding (9).

### 2.3.3 Flood Behaviour

- a. The floodplain upstream of Berrima significantly narrows such that through Berrima the floodplain generally closely follows the course of the Wingecarribee River. Breakouts from the river can affect low lying properties along the river particularly in the southern parts of Berrima (9).
- b. During a PMF event significantly larger areas of Berrima can be flood affected compared to lesser modelled events (9).
- c. Berrima Weir has a considerable effect on flood depths upstream with modelling showing that during a 1% AEP floodwaters back up behind the weir (9).

### 2.3.4 Classification of Floodplain

- a. Most areas of Berrima have Rising Road Access in all events up to the PMF.
- b. However, the area around the corner of Argyle Street and Market Place containing the Holy Trinity Anglican Church becomes a high flood island during the PMF event.

### 2.3.5 Inundation

The Wingecarribee River flows through Berrima. A series of design floods have been modelled as part of the Berrima Floodplain Risk Management Study and Plan (15).

- a. Table 4 below indicates the number of buildings with expected over-floor flooding at the various design flood levels (2) (15).

**Table 4: Estimated number of properties inundated above floor level and over ground in Berrima**

Annual Exceedance Probability (Annual Return Interval)	Number of houses with over –floor flooding	Total number of buildings with over-floor flooding
20% (1 in 5 year flood)	0	1
10% (1 in 10 year flood)	1	3
2% (1 in 50 year flood)	1	13
1% (1 in 100 year flood)	11	35
Probable Maximum Flood	36	80

- b. Much of the township is located on high ground, however properties located in lower areas of the town can be affected by flooding. Properties in the lower areas along Wingecarribee Street, Wilkinson Street, and Villiers Street upstream of the Hume Highway, and Jellore Street, Surrey Street, Oxley Street and Fountain Street downstream of the highway, have previously been affected by flood waters (1).
- c. In major flood events flows initially spread out into the developed area around the Wingecarribee Street and Wilkinson Street intersection. Continuing westward, flood waters become largely confined by an incised reach which extends to almost the Old Hume Highway Bridge. Downstream of the bridge, floodwaters spread out particularly on the eastern side in the vicinity of Jellore Street (1).
- d. Downstream of Jellore Street, flows are confined on the eastern side by the steep bank where the Berrima Gaol is sited. Downstream of the gaol the bank topography flattens out on both sides of the river which results in significant inundation between Oxley Street and Shelly Street (1) (16).

### 2.3.6 Isolation

- a. During the PMF flooding event the Holy Trinity Anglican Church on Argyle Street and surrounding areas become isolated on a High Flood Island (9).
- b. There are no other known isolations in Berrima.

### 2.3.7 Flood Mitigation Systems

- a. None known.

### 2.3.8 Dams

- a. Wingecarribee Dam is located 21km upstream of Berrima. Currently there are no known deficiencies at the dam which could lead to dam failure with remedial work to rectify some previous deficiencies completed in 2012. The dam complies with modern design criteria and the risk of dam failure is considered to be very low (6).
- b. There is however some potential for the floating peat swamp within the reservoir to block the narrow inlet channel of the dam during flood events. This situation could cause overtopping of the dam and there is some risk that the dam wall could sustain damage during an extreme flood event. Recent upgraded works are believed to have reduced the risk of the peat breaching the spillway structure (6).
- c. Failure of the Wingecarribee Dam has been modelled to predict potential consequences to the Berrima area which include damage to (6):
  - i. Parts of Berrima township
  - ii. The Old Hume Highway Bridge at Berrima and numerous small river crossings
  - iii. Rural properties including some homesteads and outbuildings
  - iv. Berrima Weir
- d. Travel times to Berrima for a Sunny Day failure are 4hrs till the start of rise and 7hrs till the peak. Such a flood would reach approximately 3m below the deck level of the Bridge on the Old Hume Highway (6).
- e. Travel times for a PMF Dam failure are shorter. Waters would begin to rise at Berrima 2.1hrs following a dam break, peaking at 4.3hrs. Such a flood would reach the deck level of the bridge on the Old Hume Highway (6).

### 2.3.9 At Risk Facilities

- a. **The Berrima Scout Camp** is located in Apple Street just off Fountain Street in Berrima, alongside the Wingecarribee River. It is affected by floodwaters in events larger than the 5% AEP flood extent. It is not known during which event flooding begins.
- b. **Holy Trinity Anglican Church:** During the PMF flood event the Holy Trinity Anglican Church on Argyle Street and surrounding areas become isolated on a High Flood Island (8).
- c. **Historical buildings:** A number of historical buildings within Berrima are also at risk of flooding.
- d. Refer to Annex 2 for further details.

### 2.3.10 Other Considerations

- a. None known

## 2.4 MITTAGONG

### 2.4.1 Community Overview

- a. Mittagong is a town located in the Southern Highlands, approx. 113 km south west of Sydney. The population of Mittagong is 6,738 (1).
- b. Mittagong is shown on Map 7.
- c. There are two main sub-catchments which can cause flood affects within Mittagong, the Nattai River catchment and its tributary the Gibbergunyah Creek catchment.
- d. Flood Studies of both of these catchments have recently been placed on public exhibition and have been used to provide some preliminary information to inform this flood plan (10) (11).

### 2.4.2 Characteristics of Flooding

- a. Riverine flooding from Nattai River, Gibbergunyah Creek and other local creeks as well as overland flow. Characterised by fast rates of rise resulting in short warning and evacuation times (11).

### 2.4.3 Flood Behaviour

#### Nattai River

- a. The Nattai River originates near the intersection of Range Road and Old South Road at Mittagong and drains in a northerly direction through the eastern sections of Mittagong. The catchment is drained primarily by natural watercourses. However, the urbanised sections of the catchment are drained by a stormwater system which carries local catchment runoff into the watercourses via a network of stormwater pipes, pits, open channels and culverts (11).
- b. During periods of heavy rainfall, there is potential for the capacity of the stormwater system to be exceeded and for water to overtop the banks of the natural watercourses and inundate the adjoining floodplain (11).
- c. Flooding across the majority of the Nattai River catchment is typically characterised by relatively shallow depths of inundation (0.3 metres), however more significant depths are predicted along and immediately adjacent to waterways (17).
- d. Accordingly there is potential for inundation of properties located in close proximity to the creeks and drainage lines within Mittagong (11).
- e. Flooding has been experienced on several occasions in the past, particularly across properties fronting Evans Street between Payten and Colo Street. Other flooding hotspots include the Mittagong Swimming Centre and Oxley Drive between Bracken and Reservoir Street (11).

- f. The Nattai River catchment can experience a fast rate of rise. This can be up to 1.5-2m per hour in the Evans Street waterway, and 2.5-3.5m per hour in the Nattai River upstream of the Old Hume Highway (11).

### Gibbergunyah Creek

- g. The Gibbergunyah Creek catchment flooding affects the south western parts of Mittagong but does not generally impact Welby. Flooding can be caused by two flood mechanisms, the overtopping of creek banks of Gibbergunyah, Chinamens and Iron Mines Creek as well as overland flow (10).
- h. Flood liable locations that have been identified within this catchment include: Main Street, Bessemer Street and at the crossings of Gibbergunyah Creek, Chinamans Creek and Iron Mines Creek with the Highway.
  - i. Main Street intersects with an overland flow path, and when the trunk drainage capacity is exceeded water backs up over the road and along the row of shops between Alice Street and Victoria Street (10).
  - ii. Overland flow is conveyed down Bessemer Street from beneath the railway line inundating properties particularly on the western side of Bessemer Street before entering Iron Mines Creek (10).
  - iii. Iron Mines Creek overtops the Hume Highway when the capacity of the culvert underneath the road is exceeded. The floodwaters flow westwards inundating Highlands Marketplace on the corner of Roscoe Street (10).
- i. The Gibbergunyah Creek catchment can experience a fast rate of rise (up to 2-2.5 m/h) and flood prone areas will become inundated soon after the rainfall event begins.

#### 2.4.4 Classification of Floodplain

- a. A number of flood islands can potentially develop within Mittagong isolating properties within them, particularly within the Gibbergunyah Creek catchment (18).
- b. Low Flood Islands:
  - i. A number of low flood islands can develop between Welby and the centre of Mittagong as Gibbergunyah, Chinamans and Iron Mines creeks cut access to the Old Hume Highway and other local streets. The railway line also forms a natural barrier to the south (10).
  - ii. A flood island can also develop between the railway line and the Nattai River just upstream of the Old Hume Highway becoming inundated during an extreme event (11).



- c. **High Flood Islands:**
- i. A number of High Flood Islands can develop on high ground between Gibbergunyah, Chinamans, Iron Mines and the Nattai River (10).
  - ii. A High Flood island can develop in part of the Frensham School located on Range Rd, Mittagong (11).
- d. **Overland Escape Route** – The majority of areas within Mittagong that are within the Nattai River catchment are considered to have overland escape routes even if roads themselves are cut.

#### 2.4.5 Inundation

- a. Inundation within Mittagong is based on flooding within the catchments of either Nattai River (eastern side of town) or Gibbergunyah Creek (western side of town).

##### Nattai Creek

- b. Within the Nattai Creek catchment, flooding is generally confined to the creek channels and some minor overland flow paths up to the 0.5% AEP event, with only 7 properties experiencing flooding and of these only 3 experiencing above floor flooding (Table 9) (11).
- c. In the PMF event, the flood extent increases as the capacity of the culvert under the Old Hume Highway and railway line is exceeded. Both of these embankments act as weirs resulting in 18 properties being flooded above floor level (Table 5) (11).

**Table 5: Estimated number of properties inundated above floor level and over ground in Mittagong from Nattai River catchment**

AEP %	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
20%	1	2
10%	1	3
5%	3	4
2%	3	5
1%	3	5
0.5%	3	7
PMF	18	26

##### Gibbergunyah Creek

- d. Within the Gibbergunyah Creek catchment, properties including both residential and commercial can be flood affected in smaller flood events with 14 expected to be flooded over-floor during a 20% AEP event, 40 in a 1% AEP and up to 136 in a PMF event (Table 6) (10).

- e. During a 1% AEP in Gibbergunyah Creek most flood prone properties have flood depths of 0.3m or less. Areas with depths greater than this include: Main Street, Highland Marketplace, Edward Street and Helena Street (10).

**Table 6: Estimated number of properties inundated above floor level and over ground in Mittagong from Gibbergunyah Creek**

AEP %	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
20%	14	30
10%	21	42
5%	28	57
2%	35	64
1%	40	75
0.5%	50	91
PMF	136	198

#### 2.4.6 Isolation

- a. Main Street and the Old Hume Highway are the main roads from Mittagong, providing access between Mittagong, Welby and surrounding areas. These roads become high hazard floodways in the 1% AEP and PMF events. Parts of Mittagong can become isolated on High and Low Flood Islands when these and other roads are cut (10).

#### 2.4.7 Flood Mitigation Systems

- a. Various flood mitigation options have been presented in the recent publically exhibited Flood Plain Risk Management Studies and Plans for Nattai River and Gibbergunyah Creeks, however these have not yet been implemented (11) (10).

#### 2.4.8 Dams

- a. There are no dams located upstream of Mittagong.

#### 2.4.9 At Risk Facilities

- a. **The Mittagong Swimming Centre:** Is located on top of the Nattai River downstream of the Old Hume Highway off Hawkins Road. Flows are normally conveyed beneath the swimming pool, however the swimming pool is overtopped in all design flood events by more than 1 metre (11) (17). There is a significant risk to people located within this vicinity during flood events (17).
- b. **The Highlands Golf Club:** Is adjacent to the Mittagong Swimming Centre, and the Nattai River runs through the middle of its grounds (11).
- c. **Fensham School:** Is located on Range Road, Mittagong. The school building and infrastructure is not predicted to be inundated during any design events up to including the PMF. However access may be cut due to overtopping of the Old Hume

Highway. The school games fields and 'Holt Farm' are inundated in all design events (17).

- d. **The Abbey Nursing Home:** Is located on Range Road, Mittagong. Access may be lost due to flooding of the Old Hume Highway, however buildings are expected to remain flood free during all flood events including the PMF (17).
- e. **The Mittagong Caravan Park:** Is located on Beatrice Street Mittagong. It is expected to experience shallow flooding during all design events, with depths of 0.1m expected in a 1% AEP increasing up to 0.6m during a PMF. Some inundation of cabins or vans may occur during large flood events (17).
- f. **Main Southern Railway:** This line is expected to be overtopped at the following locations (17):
  - i. Near the western Ferguson Road overpass (adjacent to the Old Hume Highway) with depths of 0.1m during a 20% AEP event up to 1.3m during a PMF.
  - ii. Near the eastern Ferguson Road overpass (adjacent to Bong Bong Road) with depths of 0.1m during a 20% AEP event up to 1.5m during a PMF
- g. The **Macdonald's** at Mittagong on Bessemer Street can be inundated from overland flows (10).
- h. **Springs Resort** on Bessemer Street can be inundated from overland flows (10).

#### 2.4.10 Other Considerations

- a. No other considerations known.

## 2.5 MOSS VALE

### 2.5.1 Community Overview

- a. Moss Vale is a town in the Southern Highlands located 130km south-west of Sydney. It is cited on the Illawarra Highway which connects to Wollongong and the Illawarra Coast via Macquarie Pass. The population of Moss Vale is 7,292 (1).
- b. Moss Vale is shown on Map 8.

### 2.5.2 Characteristics of Flooding

- a. Moss Vale is affected by flash flooding as well as inundation from Whites Creek.

### 2.5.3 Flood Behaviour

- a. In Moss Vale, property is affected by both flood water leaving Whites Creek and overland flow that is making its way to the creek. The major overland flow path is along Railway Street to the south west of Whites Creek (19).
- b. Moss Vale is located relatively high in the Whites Creek catchment and therefore has short response time. This means that there is a short duration between water falling on the catchment and reaching the town (19).

### 2.5.4 Classification of Floodplain

- a. Moss Vale has Rising Road Access in all flooding events (19).

### 2.5.5 Inundation

- a. In the upper catchment, flooding mainly affects properties closest to Whites Creek; this is particularly so for the north branch. Fast overland flows to the north of Whites Creek occur in defined channels (1).
- b. Floodwaters also affect properties along Mack St, Arthur St to Argyle St, where most of the flow is diverted north in Whites Creek towards the intersection with Railway St and Lackey Road. Water depths in this area for the 1% AEP design event vary from 0.05m at Mack St to 0.9m at Argyle St (19).
- c. There are a number of properties and shops in Argyle St as well as the Central Hotel car park that can become inundated (Table 7). When flows combine in this low-lying area, water depths may be in excess of 1m during a 1% AEP design event (1).

Table 7: Number of properties in the Whites Creek catchment affected by flooding (existing) (19)

AEP %	Residential		Non-Residential		Total	
	Flood Affected	Flood Damaged	Flood Affected	Flood Damaged	Flood Affected	Flood Damaged
20	20	11	4	4	24	15
10	21	11	4	4	25	15
5	25	11	5	5	30	16
2	27	13	6	6	33	19
1	29	14	7	7	36	21

- d. Mack St, Kirkham St, Railway St, Clarence St, Arthur St, Innes Rd, Wattle St, Willow Dr, Dangar St, Lackey Rd, Argyle St, Elizabeth St are all inundated in a PMF (19).

### 2.5.6 Isolation

- a. There are no known isolations in Moss Vale (19).

### 2.5.7 Flood Mitigation Systems

- a. There are no known flood mitigation systems located in Moss Vale.

### 2.5.8 Dams

- a. Glenquarry Cut Control Centre is located upstream of Moss Vale however failure of this dam in both the PMF and sunny day event will not lead to any impacts on Moss Vale (5).

### 2.5.9 At Risk Facilities

- a. **St Paul's International College** is located on Argyle Street in Moss Vale. The grounds are affected by flooding in the 1% AEP and building may experience inundation in the PMF event (Refer also to Annex 2).
- b. **Moss Vale Police Station** is located on Elizabeth Street in Moss Vale and is expected to be affected by flooding during the PMF event (Refer also to Annex 2).

### 2.5.10 Other Considerations

- a. Moss Vale Farmers and Flea Market – fourth Sunday of every month Moss Vale Showground (1).
- b. Southern regional livestock exchange – cattle sales every Wednesday (1).

## 2.6 BURRADOO

### 2.6.1 Community Overview

- a. Burradoo is a suburb of Bowral and is located to the south of the Bowral town centre Burradoo is shown on Map 9.
- b. In 2011 the population of Burradoo was 2,555. Burradoo has a high proportion of elderly residents living within the area with over 50% of the population being over 60 years of age (14).

### 2.6.2 Characteristics of Flooding

- a. Burradoo is affected by a combination of flash and riverine flooding with water draining westwards into Mittagong Creek which is a tributary of the Wingecarribee River.

### 2.6.3 Flood Behaviour

- a. Flooding within Burradoo can occur following storms with a critical duration of around 2 hours. Water flows overland varying from a defined channel near Stratford Way, to a generally unformed depression west of Moss Vale Road (14).
- b. Flooding of properties is likely to occur within a short period after rainfall and only be for a relatively short duration, potentially less than one hour (14).

### 2.6.4 Classification of Floodplain

- a. Burradoo has Rising Road Access or else Overland Escape in all events (14).

### 2.6.5 Inundation

- a. In the 20% and 5% AEP properties that are located in Stratford Way, Sunninghill Road, Osbourne Road, Holly Road, Moss Vale Road and Burradoo Road and are adjacent to the creek system may be impacted by floodwaters (14).
- b. In the 1% AEP properties that are located directly next to the valley and formed creek system in Stratford Way, Ranelagh Road, Toongoon Road, Moss Vale Road, Sunninghill Road, Osbourne Road, Holly Road and Burradoo Road may experience inundation (14).
- c. In the PMF event properties located in Stratford Way, Ranelagh Road, Toongoon Road, Moss Vale Road, Sunninghill Road, Osbourne Road, Holly Road and Burradoo Road may experience inundation (14).

### 2.6.6 Isolation

- a. No known properties in Burradoo are at risk of isolation (14).

### 2.6.7 Flood Mitigation Systems

- a. Two informal detention basins, known as Pony Club basin and Informal basin, are located just east of Moss Vale Road. Modelling shows that these detention basins would spill in a 1% AEP flood event directing flows south. These have been identified as high hazard areas (14).

### 2.6.8 Dams

- a. Wingecarribee Dam is located upstream of Burradoo. Failure of the Wingecarribee Dam has been modelled to predict potential consequences to the Burradoo area which include damage to (6):
  - i. The bridge at Burradoo Crossing on Main Southern Rail line. This may have some impacts, however it is unlikely to suffer severe damage as the velocities would be low.
  - ii. An industrial area in Burradoo adjacent to the rail bridge has some potential to be flooded.
  - iii. An electricity sub-station next to the Bong Bridge could be flooded to approximately 1.5m above ground level which may result in disruption to local electricity supply.
- b. Travel times to Burradoo for a Sunny Day failure are 2.5 hours till the start of rise and 5 hours till the peak with flood depths of up to 4.3m (6).
- c. Travel times for a PMF Dam failure are shorter. Waters would begin to rise at Burradoo 1.5 hours following a dam break, peaking at 4.2 hours with a flood depth of up to 7.6m.

### 2.6.9 At Risk Facilities

- a. **Burradoo Railway Station.** The Burradoo railway station located on Burradoo Rd, Burradoo is potentially flood affected (14).
- b. Electricity substation. The electricity substation near Bong Bridge, Burradoo could be flood affected during failure of the Wingecarribee Dam (6).
- c. No information is available on other potentially flood effected facilities.
- d. Refer to Annex 2 for further details.

### 2.6.10 Other Considerations

- a. No other considerations.

## Wollongong Coast Riverbasin

### 2.7 ROBERTSON

#### 2.7.1 Community Overview

- a. Robertson is located within the Wingecarribee Shire LGA on the edge of the Illawarra Escarpment in a very high intensive rainfall zone (20). It is located approximately 35km from the coast (Map 10).
- b. The population of Robertson in 2011 was 1,845 with 658 private dwellings. Of these, a large proportion of dwellings are unoccupied (188) (21).
- c. The village lacks a comprehensive formal drainage system and instead consists of a series of overland flow paths, swales, open channels, drainage through roads and small length piped drains (20).
- d. Caalang Creek bisects Robertson flowing into the Wingecarribee River and ultimately forming part of the Hawkesbury-Nepean Basin (20).
- e. An overland flow study is currently being finalised by Wingecarribee Council for Robertson. Information from this draft study has been provided here, however this will need to be reviewed once this study had been finalised.

#### 2.7.2 Characteristics of Flooding

- a. Mainstream flooding along Caalong Creek, local flooding particularly along Hoddle Street and numerous overland flowpaths throughout the town (20).

#### 2.7.3 Flood Behaviour

- a. The western end of Hoddle Street (Illawarra Highway) near the railway is relatively flat and includes a sag which is cut off by flood events as low as 20% AEP (20). The drainage system at Hoddle Street is undersized and is generally limited to deep road side swales and small pipe crossings, which ultimately discharge to Caalong Creek via swales / flowpaths through residential properties (20).
- b. Mainstream flooding can also occur across Caalong Creek which drains into the Wingecarribee River. Caalong Creek becomes a high hazard floodway during flood events (20). This creek bisects through the rear of existing properties with most flooding occurring on the southern side of Caalong Creek where it is generally flatter than the steeper northern side (20).

#### 2.7.4 Classification of Floodplain

- a. Flood Emergency Classifications have not been defined for Robertson, however flood mapping suggests that numerous roads will become flooded and a number of streets



(e.g Shackelton Way and the western end of Burrawang St) as well as individual properties can become isolated during flood events.

### 2.7.5 Inundation

- a. Flooding can enter the commercial properties located on the corner of Hoddle Street (79-81) and Meryla Street. With significant flood depths expected during the 1% AEP event (20).
- b. Properties along Hoddle Street between Caalong Street and Wallanagunda Street can be flooded when an existing channel is overtopped (19).
- c. In the upper reach of Caalong Creek, mainstream flooding can effect numerous residential properties along Shackelton Street (20).
- d. Overland flow through three properties in Devonshire Road has historically occurred, and modelling suggests that these properties will be flooded even in a minor 20% AEP event (20).
- e. A summary of the estimated number of properties with over floor flooding or damages during 20% and 1% AEP events is provided in Table 8. Refer to the Robertson Overland Flood study for detailed flood mapping (20).

**Table 8: Estimated number of properties flooded or damaged in Robertson**

Annual Exceedance Probability (Annual Return Interval)	Properties with over floor flooding	Properties with damage
20% (1 in 5 year flood)	14	117
1% (1 in 100 year flood)	35	104

### 2.7.6 Isolation

- a. No specific isolation details are available, however flood mapping indicates that due to flooded roads a large number of properties could lose their access out and become isolated during flood events within Robertson. Shackelton Way and the western end of Burrawang St are two specific streets that can be cut isolating residents, however many other properties can also be affected (20).

### 2.7.7 Flood Mitigation Systems

- a. There currently are no known flood mitigation systems located in Robertson.

### 2.7.8 Dams

- a. There are no dams located upstream of Robertson.

### **2.7.9 At Risk Facilities**

- a. Hoddle Street (Illawarra Highway), bisects the Village and is cut off by flood events as low as the 20% AEP. This area is a hub for non-residential activity. Such facilities include the School of Arts hall, pre-school, primary school, community centre, recreation club, police station and commercial properties (20).

### **2.7.10 Other Considerations**

- a. No other considerations known.

## ROAD CLOSURES AND ISOLATED COMMUNITIES

### 2.8 ROAD CLOSURES

- a. Table 9 lists the main roads liable to flooding in the Wingecarribee Shire LGA.

**Table 9: Roads liable to flooding in Wingecarribee Shire LGA (2) (14).**

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Albert St, Bowral	Between Ascot Rd & Bowral Rd			
Banksia St, Bowral	Western end			
Bowral St, Bowral	Between Albert St & McDonald St			
Bowral St, Bowral	Between Gordon Rd & Holly St			
Farmborough Close, Bowral				
Kirkham Rd, Bowral	Between Mount Road & Centennial Road			
Merrigang St, Bowral	Between Rose St & Jasmine St			
Mittagong St, Bowral	Between Victoria St & Oxley Dr			
Mount Rd, Bowral				
Old South Rd, Bowral	At Merrigang St			
Oxley Hill Rd, Bowral	West of railway line			
Rose St, Bowral	Between Woodbine St & Victoria St			
Shepherd St, Bowral	Between Glebe St & Holly St			
Sherwood Ave, Bowral				
Victoria St, Bowral	Eastern end			
Willow Rd, Bowral				
Argyle St, Berrima	Between Oldbury St & Market Pl			
Fountain St, Berrima	Northern end			
Iran St, Berrima				

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Jellore St, Berrima	Between Sutton St & Old Hume Hwy			
Old Hume Hwy, Berrima	Between Nicholson St & 7 Market Pl			
Oxley St, Berrima	Between Fountain St & Sutton Street			
Quarry Rd, Berrima	Southern end			
Shelley St, Berrima	Northern end			
Stockade St, Berrima				
Surrey St, Berrima	Northern end			
Sutton St, Berrima	Between Jellore St & Nathan St			
Wilkinson St, Berrima	At Countess St junction			
Wilshire St, Berrima	Western end			
Wingecarribee St, Berrima	Eastern end			
Wingecarribee St, Berrima	Between Surrey St & Old Hume Hwy			
Burradoo Road, Burradoo	Western end	Affects local traffic		
Holly Road, Burradoo	Between Ranelagh Rd and Moss Vale Rd	Affects local traffic		
Moss Vale Road, Burradoo	Between Osborne Rd and Burradoo Rd	Major access road requiring diversions	Eridge Park Road	Flood events greater than the 1% AEP
Colo St, Mittagong (11)	Between Evan St and Southey St			Overland Flow Path (5 yr)
Old Hume Hwy, Mittagong (11)	Between Hawkins Drive and Bong Rd			Nattai River Flooding (5yr)
Old Hume Hwy, Mittagong (10)	Between Bessemer St and Brewster St			Iron Mills Ck (5 yr)
	Crn Old Hume Hwy and Etheridge St			Overland Flow Path (10 yr)
	Between Etheridge St and Frankland St			Chinamans Ck (5 yr)
	Between Owen St and Nattai St			Gibbergunyah Ck (200yr) and

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
				Overland Flow Path (50 yr)
Ferguson Cr, Mittagong (11)	Between Bong Road and Railway Line			Overland Flow Path (5 yr)
Colo St, Mittagong (11)	Between Railway Pde and Evans St			Nattai River Flooding (5yr)
Southey St, Mittagong (11)	Between Colo St and Payten St			Overland Flow Path (5 yr)
Payten St, Mittagong (11)	Between Evans St and Southey St and End of road at Frencham School			Overland Flow Path (5 yr)
Webb St, Mittagong (11)	Near Payten St			Overland Flow Path (10 yr)
Mary St, Mittagong (11)	Near Farnham Cl			Overland Flow Path (5 yr)
Range Rd, Mittagong (11)	Near intersection Tyndall St			Nattai River Flooding (5yr)
Robinson and Devon St, Mittagong (11)	Corner			Overland Flow Path (5 yr)
Oxley Drive, Mittagong (11)	Near intersection Reservoir St			Overland Flow Path (5 yr)
Old South Rd & Range Rd, Mittagong (11)	Near intersection			Overland Flow Path (5 yr)
Range Rd, Mittagong (11)	Between Webb St and Range Rd			Overland Flow Path (10 yr)
Evans St, Mittagong (11)	Between Payten St and Colo St			Overland Flow Path (50yr)
Priestley St, Mittagong (10)	Between Etheridge St and Cavendish St			Chinamans Ck (5yr)
Main St, Mittagong (10)	Between Church Lane and Alice Street			Overland Flow Path (5yr)
Bessemer St and Regent St,	Corner			Overland Flow Path (5yr)

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Mittagong (10)				
Bowral Rd and Bessemer St, Mittagong (10)	Intersection			Overland Flow Path (5yr)
Bowral Rd, Mittagong (10)	Between Bessemer St and Henderson Ave			Iron Mines Ck (5yr)
Caalong Street Bridge crossing, Robertson (20)	Crossing over Caalong Creek			Flooded from a 20% AEP event
Hoddle St (Illawarra Highway), Robertson (20)	Cut at numerous locations: -Western end near railway -Near sag -Near Wallangunda St & -Near School	Ponding of water near railway line which is then directed east along highway to the sag in the township		Flooded between 0.1 and 0.35m in a 20% AEP event
Burrawang St	West and East	Potentially isolates properties at the western end		
Sassafras Way, Robertson	Near Railway			
Shackleton Way, Robertson	Near Caalang Ck crossing	Potentially isolates residents within Shackleton Way		
Meryla St, Robertson	South and North	Minor Road		
May St, Robertson	Private cul-de-sac	Minor Road		
High St, Robertson	West and East	Minor Road		

## 2.9 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

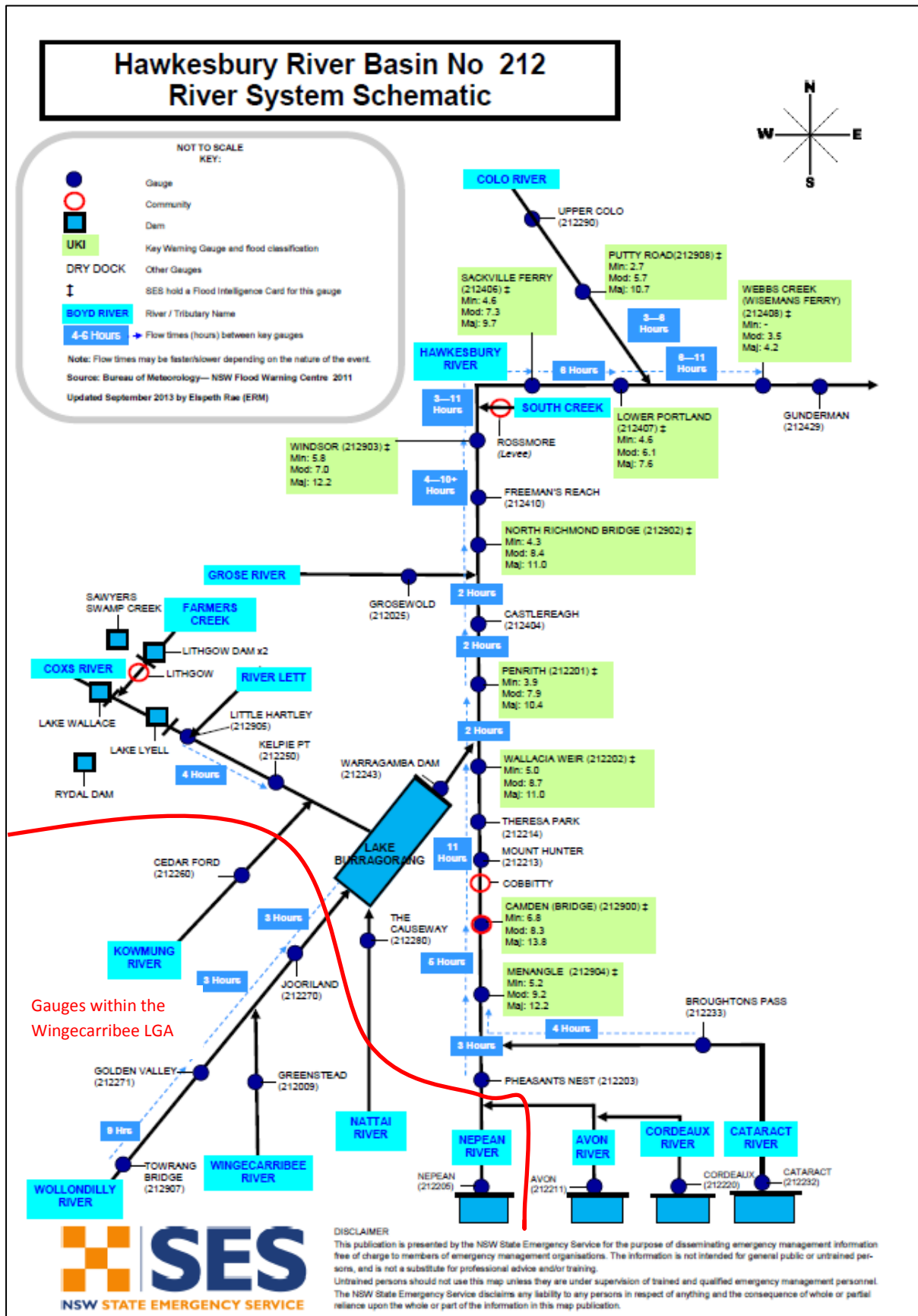
- a. Table 10 lists communities liable to isolation and potential periods of isolation. Information presented here is based on historical events and predictions from flood studies and does not reflect the duration of isolation expected in larger and extreme events.
- b. In addition to the Isolations described in Section 2, the Wollondilly River can also cut access to properties at Goodman's Ford, with washouts and landslips causing road cuts at multiple locations. The communities in this area are also vulnerable to power losses during floods and storms because of a single line power supply (2).

**Table 10: Potential Periods of Isolation for communities in the Wingecarribee Shire LGA.**

Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	NOTES
Bowral	13,735pp, 5,311 dwellings	Town Isolated	Short (hours)	Bowral has previously been isolated due to road closures however period of isolation have only lasted a few hours.
Berrima (part)	1 building (church)	High flood Island	Unknown	During the PMF flooding event the Holy Trinity Anglican Church on Argyle Street and surrounding areas become isolated (9).
Mittagong	6,738 pp, 2556 dwellings	Numerous Flood Islands	Unknown	No known however, flood mapping suggests that numerous flood islands can develop within Mittagong isolating properties.
Robertson (parts)	Unknown	Isolated properties	Unknown	Not known however flood mapping suggests numerous properties could become isolated. Shackelton Way and the western end of Burrawang St are two specific streets that can be cut isolating residents, however many other properties can also be affected
Goodmans Ford	Unknown	Isolated properties	Unknown	Washouts and landslips can cause road cuts at multiple locations

**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: HAWKESBURY NEPEAN RIVER BASIN SCHEMATIC





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

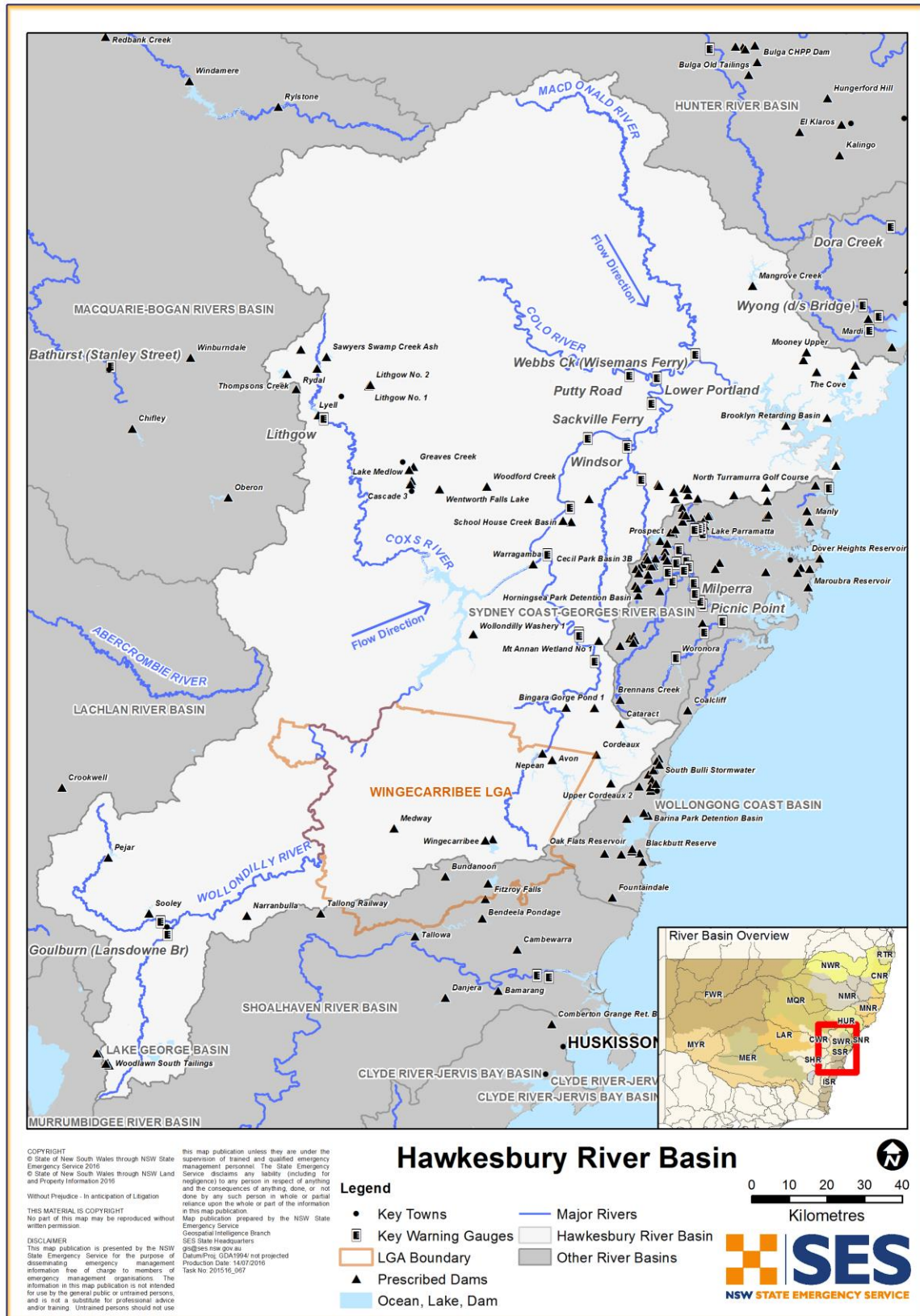
### Hawkesbury-Nepean River Basin

Facility Name	Street	Suburb	Comment
<b>Schools</b>			
Frensham School	Range Road	Mittagong	School becomes isolated during a PMF. Fields inundated during all design events (17).
St Thomas Aquinas Catholic School (13)	Bundaroo Street	Bowral	
St Paul's International College	Argyle St	Moss Vale	The grounds are affected by flooding in the 1% AEP and building may experience inundation in the PMF event.
See also Camping facilities			
<b>Child Care Centres</b>			
Bowral Street Preschool (13)	182-188 Bowral Street	Bowral	Is affected by floodwaters in the PMF event. It also becomes isolated as a high flood island during the PMF event (12).
Bambinos Kindergarten (13)	Bowral Street	Bowral	Is affected by floodwaters in the PMF event (12)
Kamalei Childcare Centre	Kirkham Rd	Bowral	Access to the south may be impacted during a PMF event (13).
<b>Facilities for the aged and/or infirm</b>			
Bowral and District Hospital	Mona Rd	Bowral	Is not affected by floodwaters, however during the PMF event the entrance on the corner of Bowral Street and Mona Road may be flooded. Alternatives entrances exist (12).
The Abbey Nursing Home	Range Road	Mittagong	Access may be lost during a PMF (17)
Mt Eymard Retirement Village	Moss Vale Rd	Bowral	Its north eastern boundary is potentially affected by floodwaters

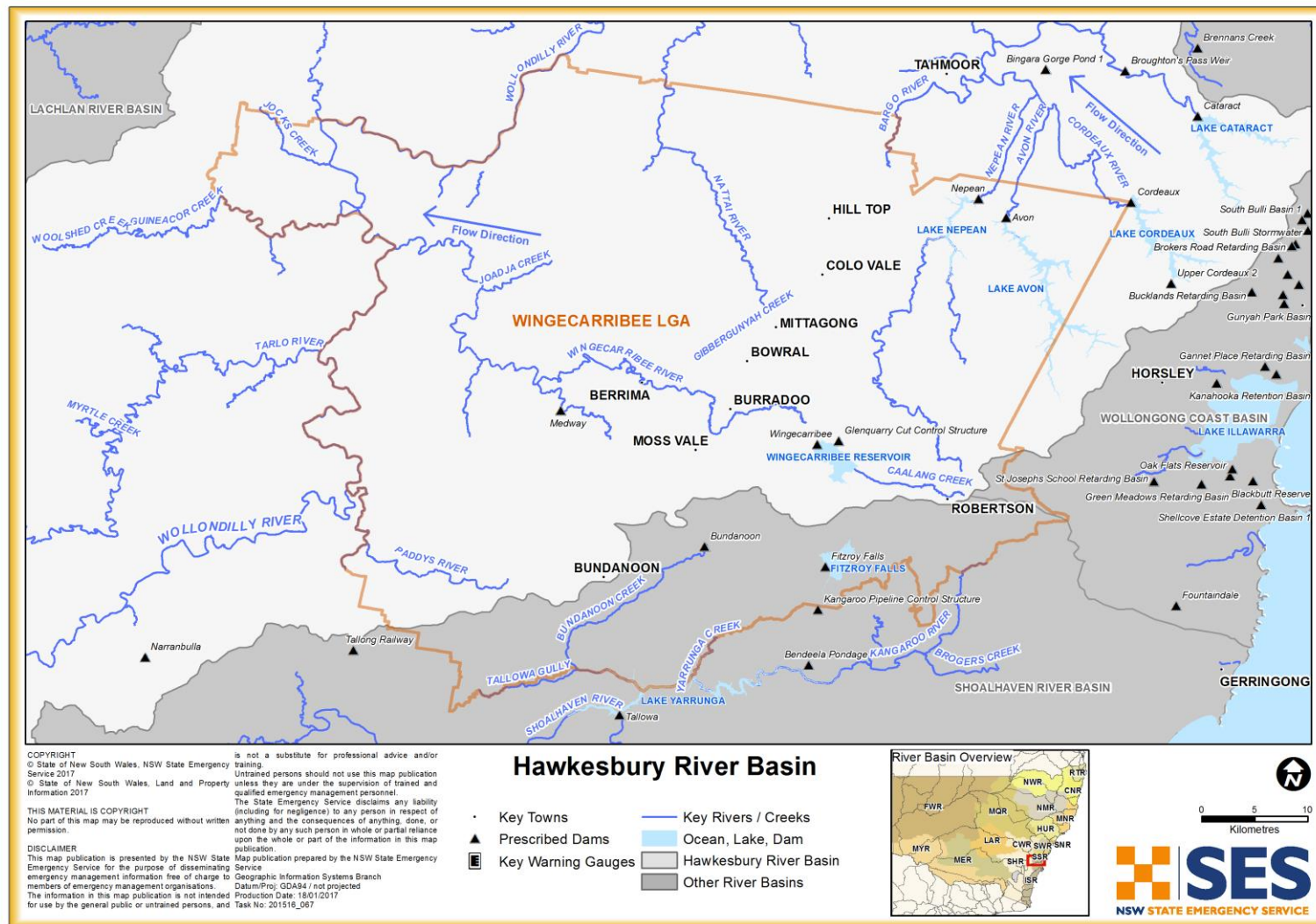
Facility Name	Street	Suburb	Comment
			in the PMF event (12).
Park Linn Haven Retirement Village	Bowral St	Bowral	Is potentially affected by floodwaters in the PMF event (12).
<b>Utilities and infrastructure</b>			
Bowral Bowling Club (2)	40 Shepard Street	Bowral	
Bowral Sewage Treatment Plant (2)	Burradoo Road	Bowral	
Bowral Swimming Pool (2)	Cnr Mittagong Road & Oxley Drive	Bowral	
Moss Vale Police Station (19)	Elizabeth Street	Moss Vale	PMF
Burradoo Train Station (14)	Burradoo Rd	Burradoo	
Main Southern Railway Line	Near Ferguson Road	Mittagong	Is overtopped in a 1% AEP event (17).
Electricity substation (6)	Near Bong Bridge	Burradoo	At risk from failure of Wingecarribee Dam
Mittagong Swimming Centre	Hawkins Road	Mittagong	Pool is located above the Nattai River. Can be inundated in all design events (17) (11).
The Highlands Golf Club	Old Hume Highway	Mittagong	The Nattai River runs through the middle of the golf course (11).
<b>Culturally Significant Sites</b>			
Bradman Oval and Collection of Cricket Memorabilia (1)	Glebe Street	Bowral	
Bowral Fire Station (1)			
Bradmans Cottage (1)	20 Glebe Street	Bowral	
Cottage (another Bradman residence) (1)	52 Shepherd Street	Bowral	
Retford Park (1)	Old South Road	Bowral	
Bowral Railway Station Group (cottage, platform buildings,			Just beyond PMF

Facility Name	Street	Suburb	Comment
overbridge) (1)			
Cottage (1)	23 Shepherd Street	Bowral	Just beyond PMF
Laurel House (1)	47 Merrigang Street	Bowral	
Holy Trinity Anglican Church	Argyle St	Berrima	Not flooded but is on a High Flood Island during a PMF event.
Heritage buildings (2)	Jellore St	Berrima	
Heritage buildings (2)	Market Pl	Berrima	
Heritage buildings (2)	Wingecarribee St	Berrima	
Heritage buildings (2)	Stockade St	Berrima	
<b>Camping Ground / Caravan Parks</b>			
Berrima Scout Camp	Apple St (off Fountain St)	Berrima	Affected by floodwaters in events above the 5% AEP
Mittagong Caravan Park	Beatrice St	Mittagong	Shallow inundation during all events (0.1m up to 0.6m during a PMF) (17).

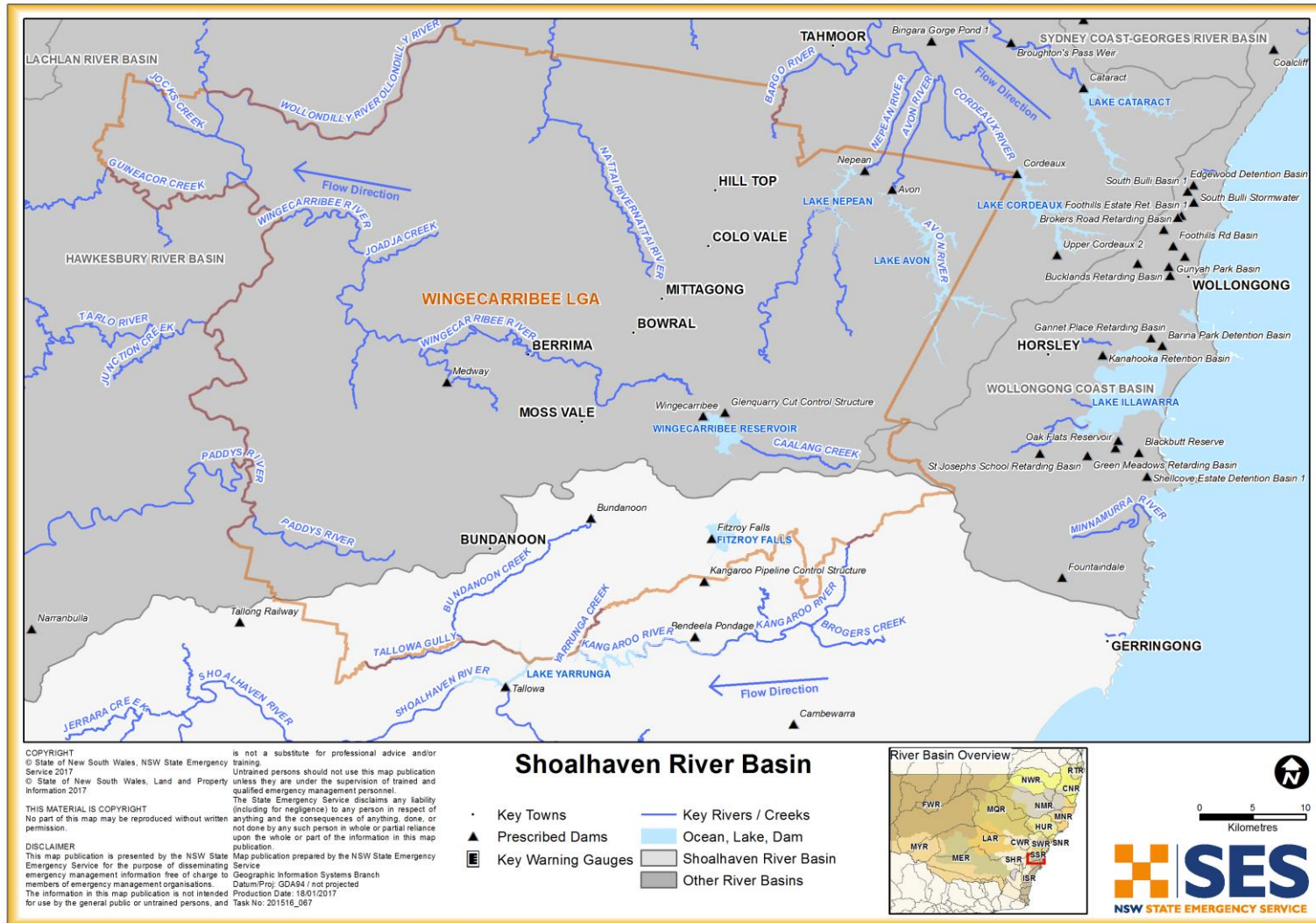
# MAP 1: HAWKESBURY-NEPEAN RIVERBASIN



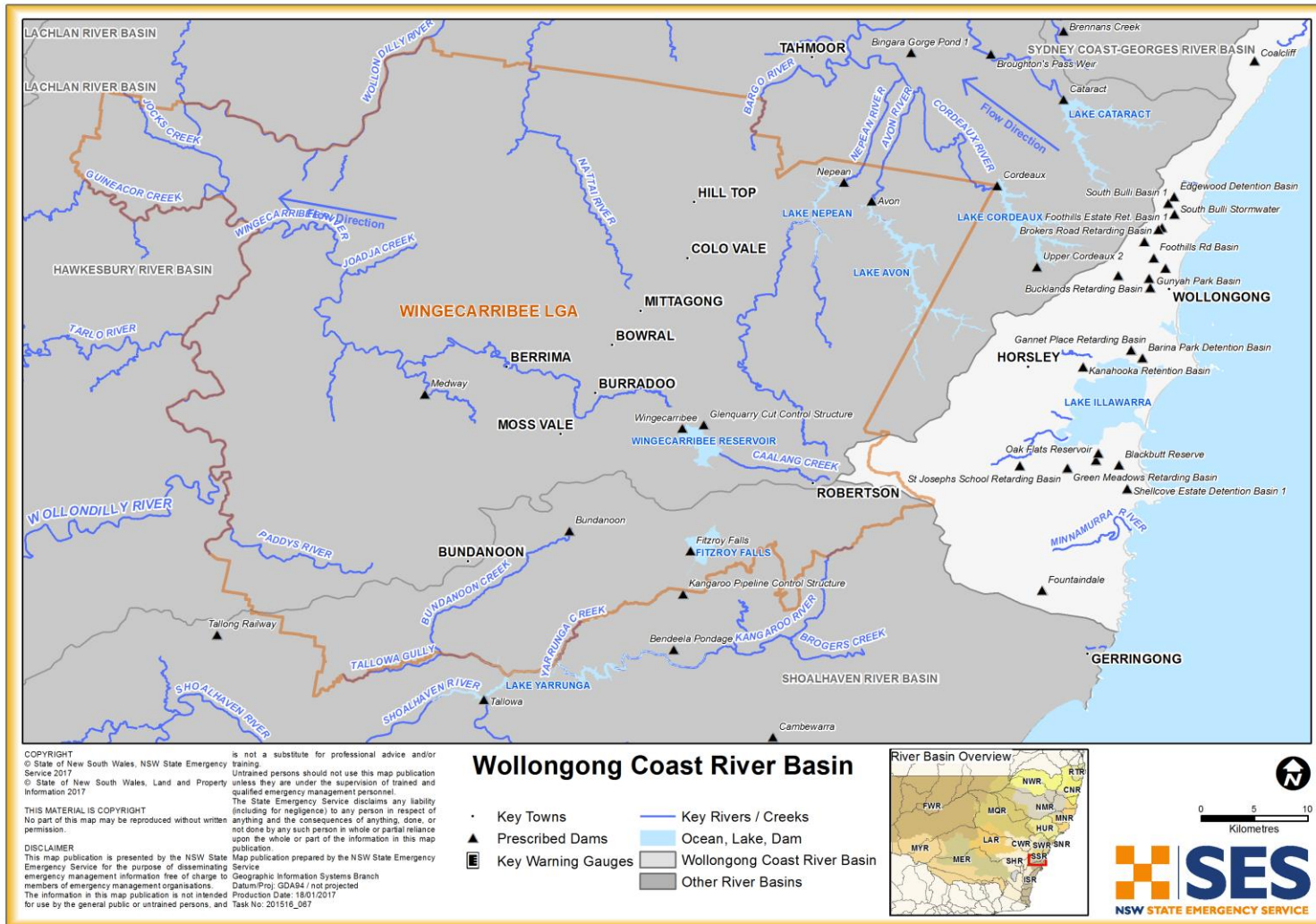
## MAP 2: HAWKESBURY-NEPEAN RIVERBASIN (WITHIN THE WINGECARRIBEE LGA) -



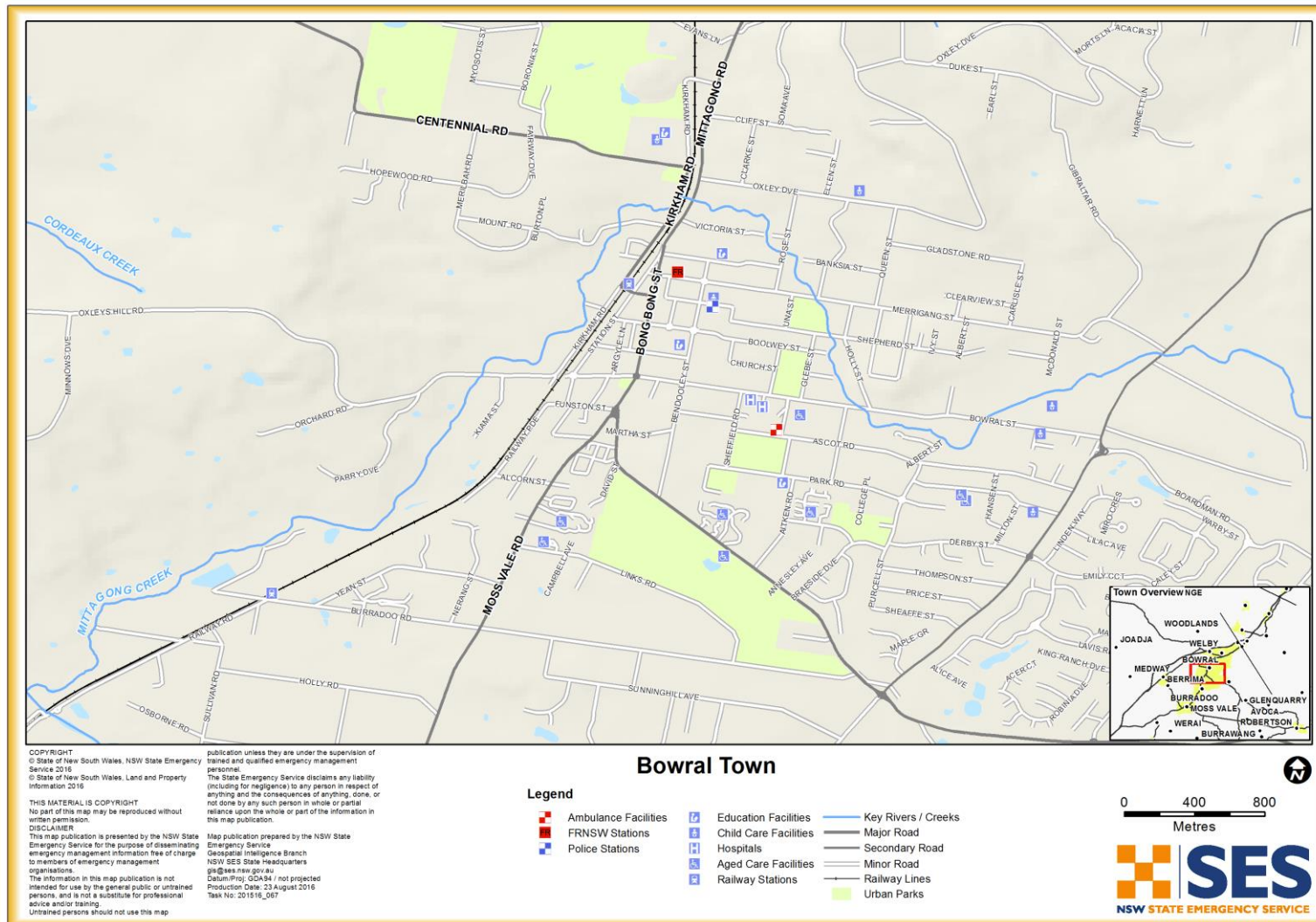
### MAP 3: SHOALHAVEN RIVERBASIN (WITHIN THE WINGECARRIBEE LGA)



### MAP 4: WOLLONGONG COAST RIVERBASIN (WITHIN THE WINGECARRIBEE LGA)

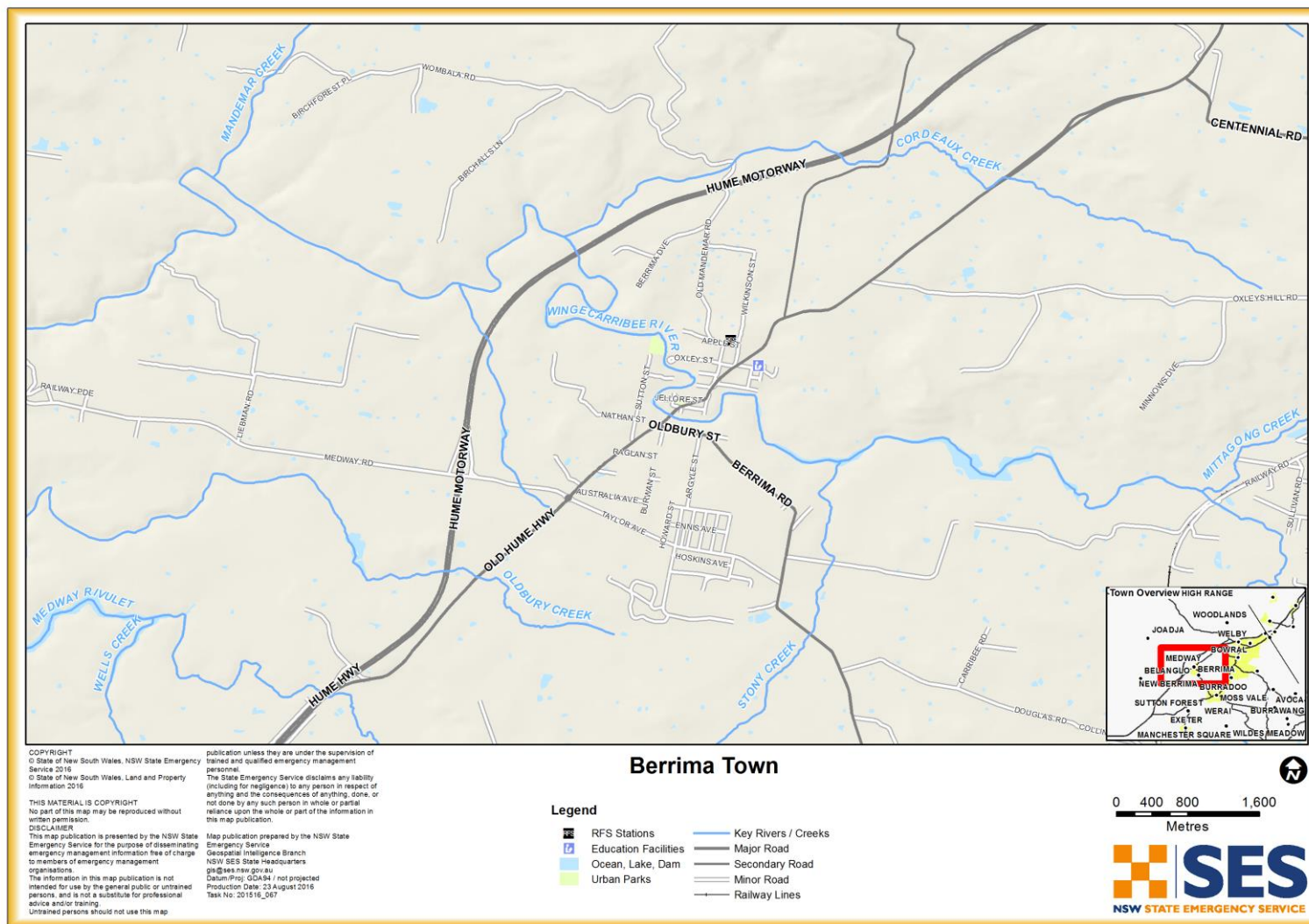


# MAP 5: BOWRAL TOWN MAP

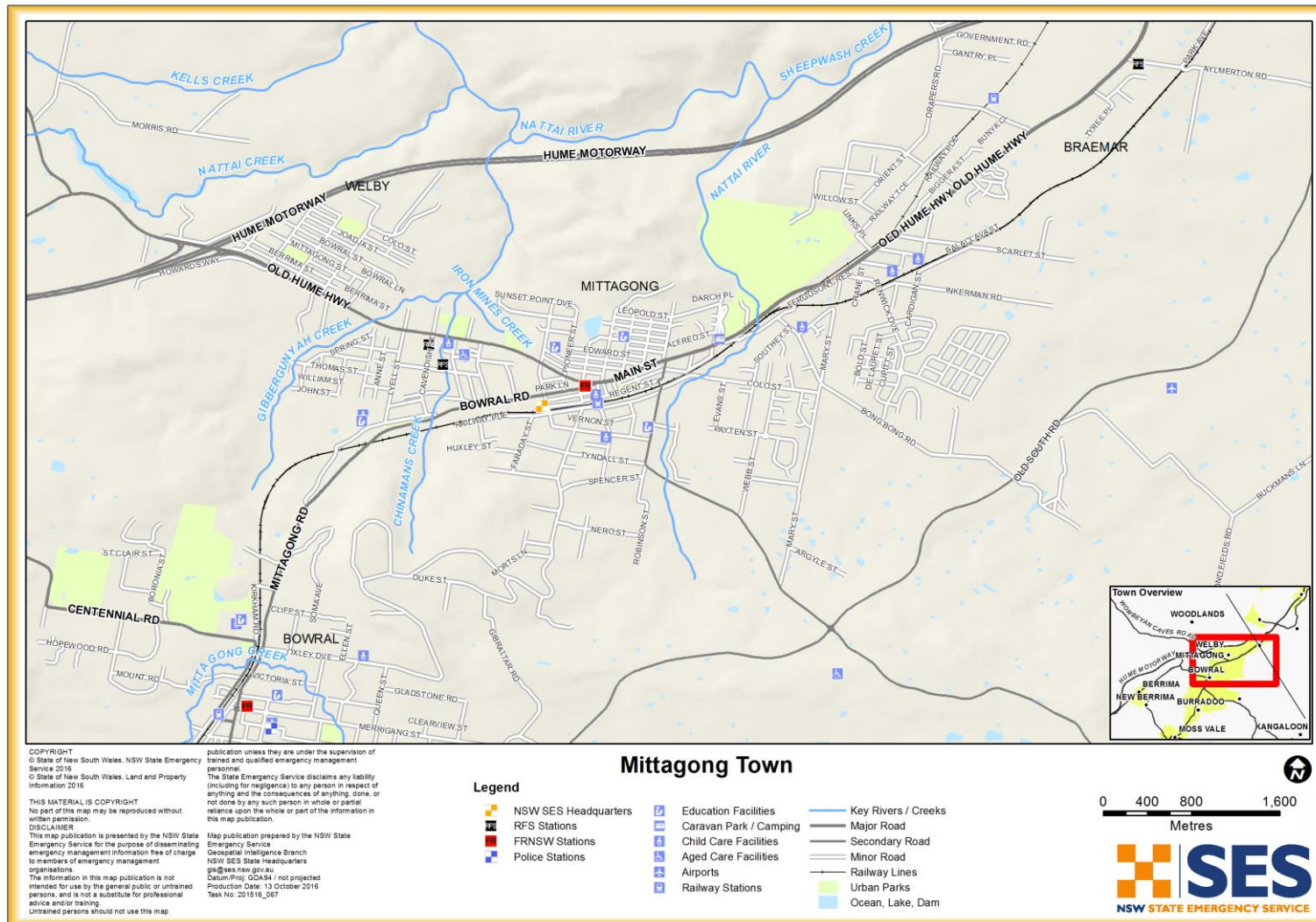




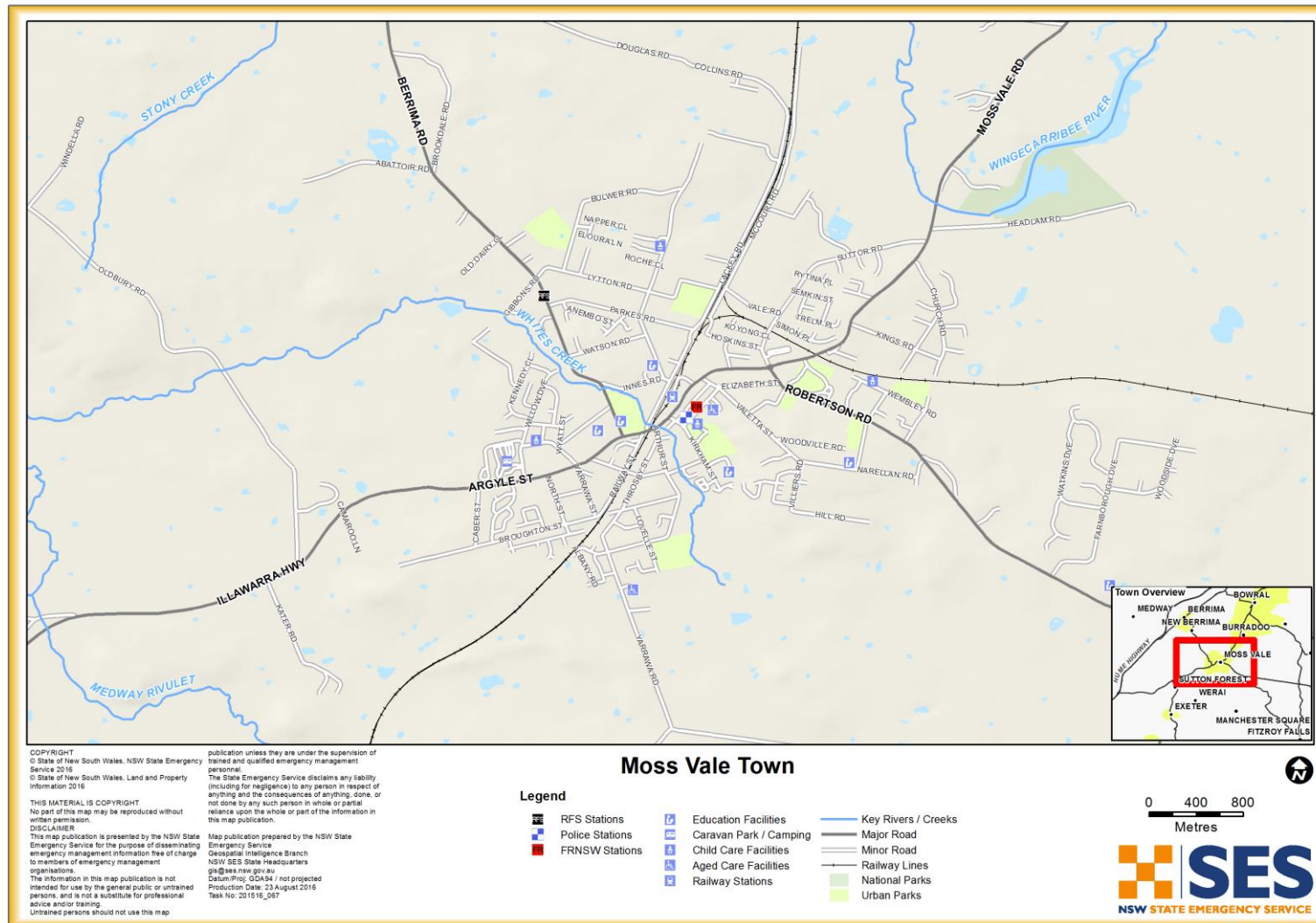
# MAP 6: BERRIMA TOWN MAP



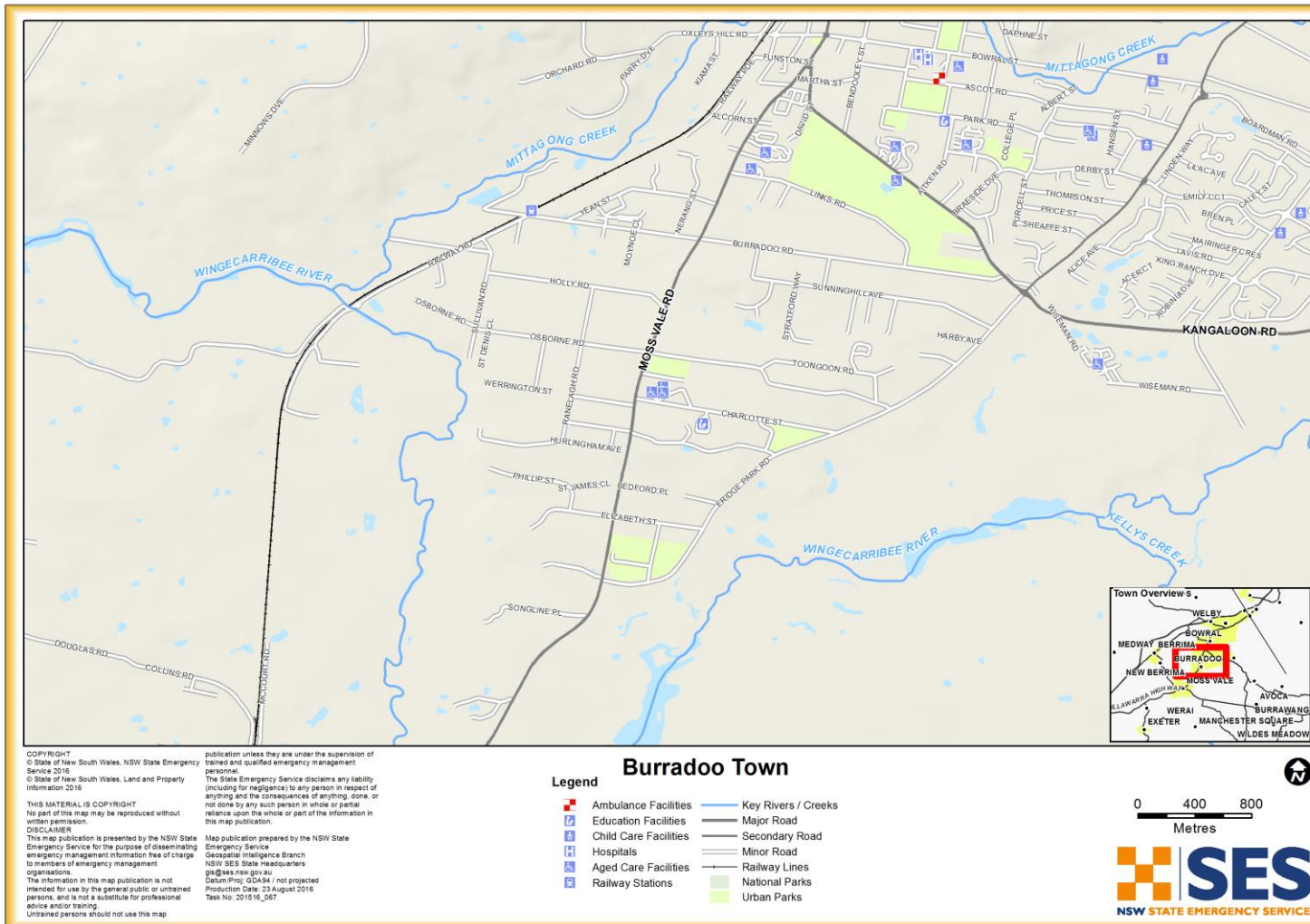
# MAP 7: MITTAGONG TOWN MAP



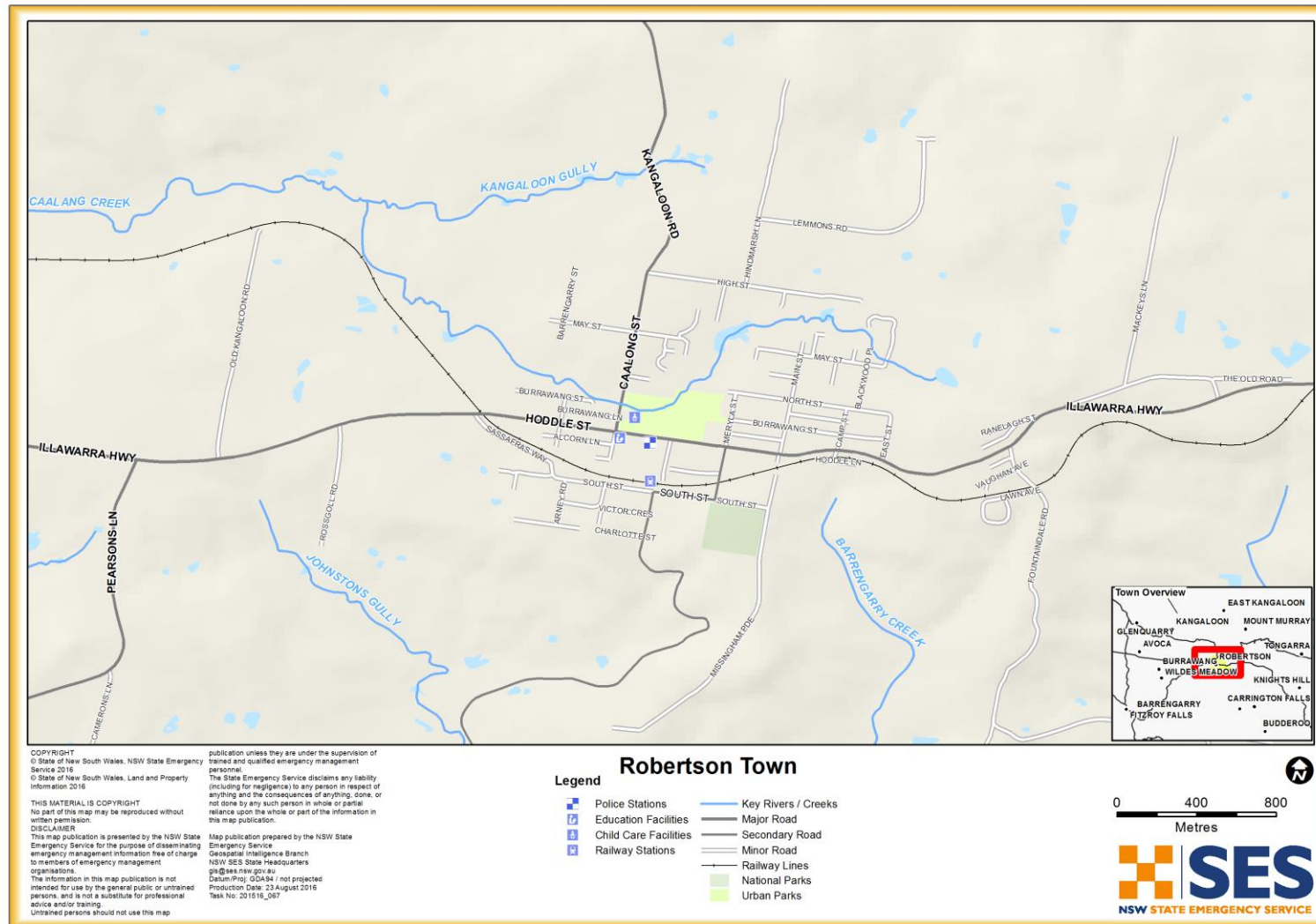
# MAP 8: MOSS VALE TOWN MAP



# MAP 9: BURRADOO TOWN MAP



# MAP 10: ROBERTSON TOWN MAP



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# **SES RESPONSE ARRANGEMENTS FOR WINGECARRIBEE SHIRE**

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**Volume 3 of the Wingecarribee Shire Local Flood Plan**

Last Update: May 2007



## ANNEX C - 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
Southern Cross TEN	Warrawong
Capital TEN	Canberra, ACT
PRIME	Wollongong
ABC TV	Wollongong
SBS	Artarmon

### Radio Stations:

Station	Location	Frequency	Modulation
2ST	Bowral	102.9	FM
Power FM	Bowral	94.9	FM
Wave FM	Wollongong	96.5	FM
i98	Wollongong	98.1	FM
Eagle FM	Goulburn	93.5	FM
2WKT-FM	Mittagong	107.1	FM
MVH-FM	Moss Vale	92.5	FM
ABC Illawarra	Wollongong	97.3	FM
All Sydney FM			

## **ANNEX D - TEMPLATE EVACUATION WARNING MESSAGE FOR [ENTER NAME OF AREA]**

### **Evacuation Warning for "[Enter Name of Area]"**

**Date/Time of Issue:** "[Enter dd/month/yyyy 24 hour time]"

**Authorised By:** "[Enter name of authorised person]"

The Bureau of Meteorology has predicted a flood level of [ ] metres at [Place] at "[Enter 24 hour time]". This means that the following area(s) may be inundated "[Enter area or street names]"

It is recommended that you prepare to evacuate/for evacuation within the next "[Enter hours]" 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 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 "[Insert location and specify route if necessary]" If you don't have a car, buses will operate on normal routes. Special transport can also be provided on request if necessary, telephone "[Inset phone number]"
- 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 E - DAM FAILURE WARNING AND EVACUATION FOR WINGECARRIBEE DAM**

### **Wingecarribee Dam and Risk of Failure**

1. Wingecarribee Dam is located on the Wingecarribee River, upstream of Burradoo, approximately 14 kilometres south east of Bowral. The dam has a total storage capacity of 34,500 ML.
2. There are **no confirmed deficiencies at the Dam and the risk of failure is considered to be low** (Sydney Catchment Authority, 2004). There is however, a peat island in the centre of the reservoir which has been immobilised by a barrier fence. There is some potential for the peat island to become re-mobilised during a significant storm event, and move towards and block the spillway entrance. This could restrict the flood discharge capacity of the dam, increasing the risk of embankment overtopping and eventual failure.
3. At the time of this plan's preparation, Sydney Catchment Authority (SCA) is undertaking risk assessment studies to quantify the risks associated with the Dam and any need for remedial works.

### **Effects of Dam Failure**

4. Any sudden release of water from the Dam due to failure would have an immediate impact on Sheepwash Rd and the rural community downstream of the Dam. Up to four houses would be flooded by a sunny day dam failure.
5. In the case of an Imminent Failure Flood (IFF), at 60% of PMF, 12 houses which are not flooded by the 'IFF without dambreak' would be flooded above floor level by 'IFF with dambreak'. The Wingecarribee Dam Dam Safety Emergency Plan (DSEP) contains maps showing modelled extents of inundation from any dam failure.

### **Response to Potential Dam Failure**

6. If Wingecarribee Dam wall has failed or is likely to fail, SCA will notify SES State Headquarters. SES State Headquarters will notify the SES Region HQ who will notify Wingecarribee SES Unit and response operations will be initiated. The Wingecarribee Dam DSEP contains other supplementary and back-up notification protocols in case of an emergency.
7. If failure of the Dam is expected, the SES will evacuate properties identified as flood liable, working with teams each side of the Wingecarribee River, commencing with properties closest to the Dam and working downstream.

### **Reference:**

Sydney Catchment Authority (2004) *Wingecarribee Dam, Dam Safety Emergency Plan*, SCA: Penrith.

## ANNEX F - VULNERABLE FACILITIES

<b>BOWRAL</b>		
<b>Facility</b>	<b>Location</b>	<b>Contact</b>
Bowral Bowling Club	40 Shepard Street, BOWRAL	
Bowral Sewage Treatment Plant	Burradoo Road, BOWRAL	Wingecarribee Council Technical Services
Bowral Swimming Pool	Cnr Mittagong Road & Oxley Drive, BOWRAL	

<b>BERRIMA</b>		
<b>Facility</b>	<b>Location</b>	<b>Contact</b>
Heritage buildings	Jellore St	
Heritage buildings	Market Pl	
Heritage buildings	Wingecarribee St	
Heritage buildings	Stockade St	

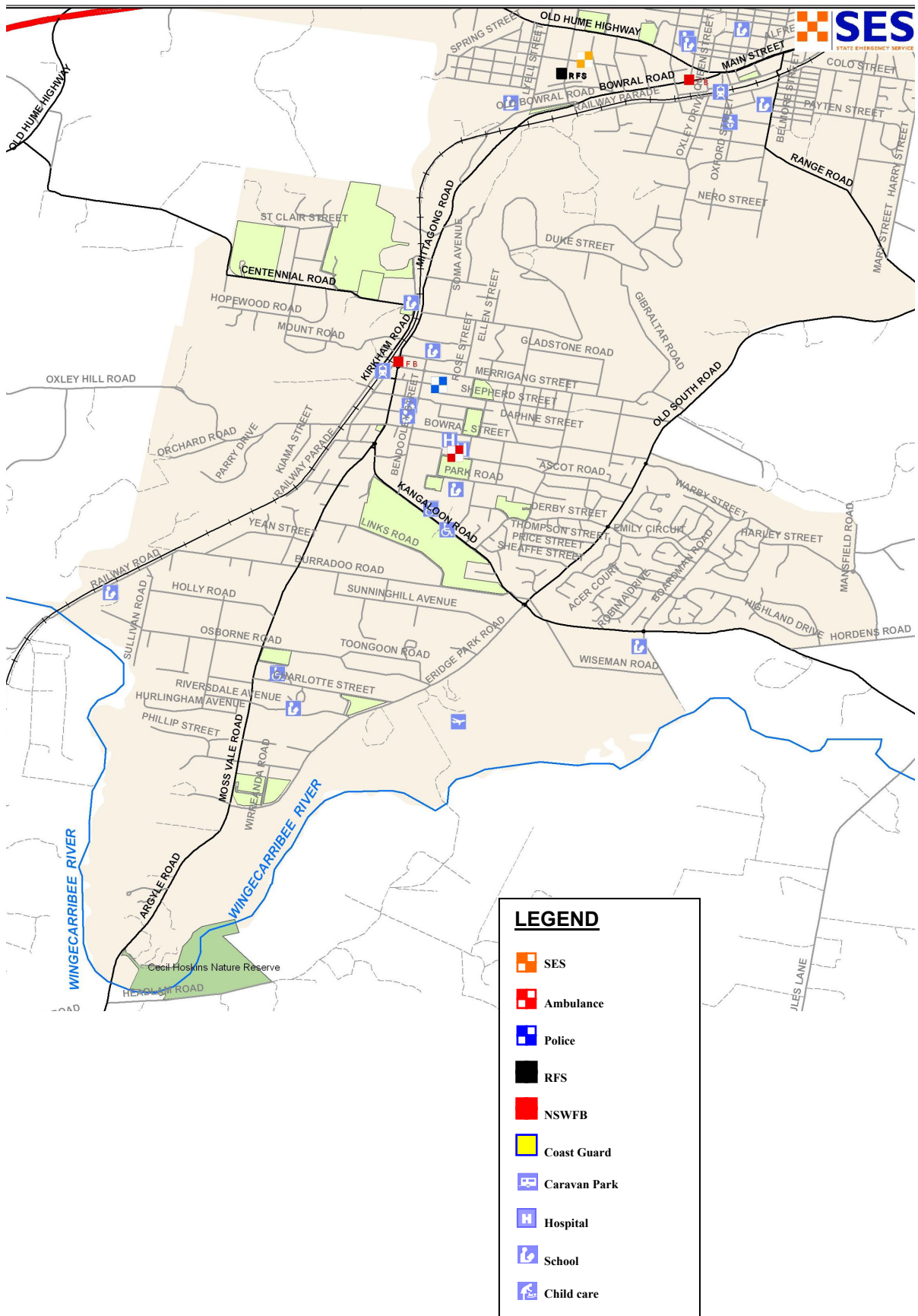
## ANNEX G - ROADS SUBJECT TO FLOODING

<b>BOWRAL</b>	<b>BERRIMA</b>
Albert St – between Ascot Rd & Bowral Rd	Argyle St – between Oldbury St & Market Pl
Banksia St – western end	Fountain St – northern end
Bowral St – between Albert St & McDonald St	Iran St
Bowral St – between Gordon Rd & Holly St	Jellore St – between Sutton St & Old Hume Hwy
Farmborough Close	Old Hume Hwy – between Nicholson St & Market Pl
Kirkham Rd - between Mount Road & Centennial Road	Oxley St – between Fountain St & Sutton Street
Merrigang St – between Rose St & Jasmine St	Quarry rd – southern end
Mittagong St - between Victoria St & Oxley Dr	Shelley St – northern end
Mount Rd	Stockade St
Old South Rd – at Merrigang St	Surrey St – northern end
Oxley Hill Rd - west of railway line	Sutton St – between Jellore St & Nathan St
Rose St – between Woodbine St & Victoria St	Wilkinson St – at Countess St junction
Shepherd St – between Glebe St & Holly St	Wilshire St – western end
Sherwood Ave	Wingecarribee St – eastern end
Victoria St – eastern end	Wingecarribee St – between Surrey St & Old Hume Hwy
Willow Rd	

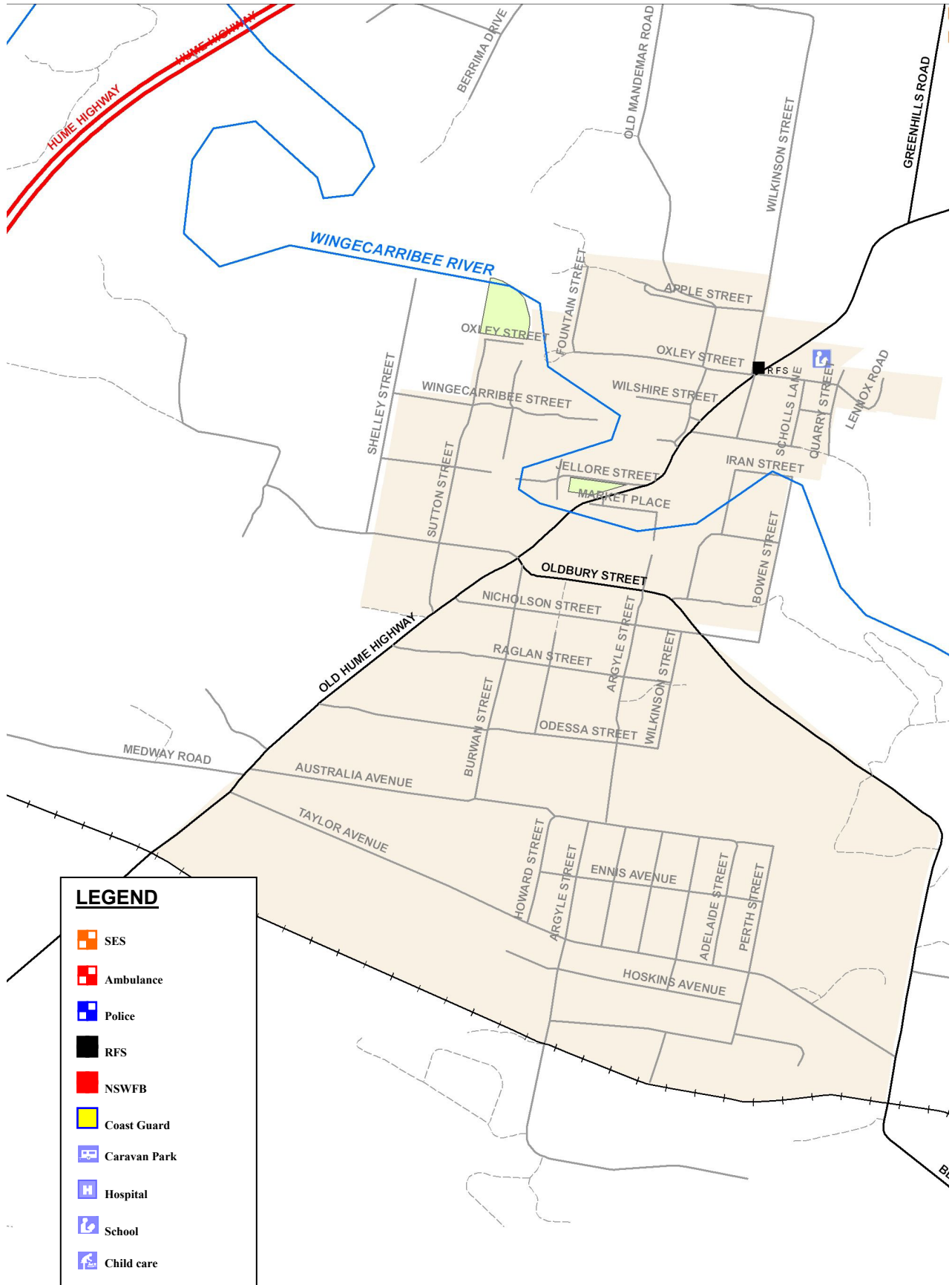
# MAP 1 - WINGECARRIBEE SHIRE



# MAP 2 - BOWRAL



# MAP 3 - BERRIMA





# MAP 4 - MITTAGONG

