NSW STATE EMERGENCY SERVICE

Snowy Monaro Regional

Local Flood Emergency Sub Plan

FloodSafe

SNOWY MONARO REGIONAL FLOOD EMERGENCY SUB PLAN

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

Volume 1 of the Snowy Monaro Regional Flood Emergency Sub Plan

Endorsed by the Snowy Monaro Local Emergency Management Committee

August 2023

AUTHORISATION

The Snowy Monaro Regional Flood Emergency Sub Plan is a sub plan of the Snowy Monaro Regional 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/Unit Commander

Print Name: William Taylor

Date: 19 Sep 2023

Endorsed

Signature: 

Chair, Local Emergency Management Committee

Print Name: Peter Bascomb

Date: 21/08/2023

VERSION HISTORY

Version Number	Description	Date
	Snowy Monaro Regional LFP	Sept 2017

PREVIOUSLY ENDORSED VERSION PRIOR TO LGA AMALGAMATION

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

Description	Date
Bombala Local Flood Plan	August 2008
Cooma Monaro Local Flood Plan	November 2010

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

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 "SEOCON 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 www.ses.nsw.gov.au

CONTENTS

SNOWY MONARO REGIONAL FLOOD EMERGENCY SUB PLAN 1

AUTHORISATION 2

VERSION HISTORY 3

PREVIOUSLY ENDORSED VERSION PRIOR TO LGA AMALGAMATION 3

AMENDMENT LIST 3

DISTRIBUTION LIST 4

CONTENTS 5

1 OUTLINE AND SCOPE 7

1.1 Purpose 7

1.2 Authority 7

1.3 Activation 7

1.4 Scope 7

1.5 Goals 8

1.6 KEY PRINCIPLES 8

1.7 Roles and Responsibilities 8

1.8 Plan Maintenance and Review 8

1.9 Supplementary Documents 9

2 OVERVIEW OF NSW FLOOD HAZARD AND RISK 9

2.1 The Flood Threat 9

3 PREVENTION/ MITIGATION 10

3.1 Introduction 10

3.2 Land Use Planning 10

3.3 Floodplain Risk Management 10

4 PREPARATION 10

4.1 Introduction 10

4.2 Flood Emergency Planning 10

4.3 Flood Intelligence Systems 11

4.4 Development of Warning Systems 11

4.5 Briefing, training and exercising 12

4.6 Community Resilience to Flooding 12

5 RESPONSE 13

5.1 Introduction 13

5.2 Incident Management Arrangements 13

5.3 Use of Information and Collection of Intelligence 14

5.4 Provision of Information and Warnings to the Community 15
5.5 Protection of Property 16
5.6 Road and Traffic Control 16
5.7 Protection of Essential Services 17
5.8 Evacuation 18
5.9 Evacuee Management And Welfare 19
5.10 Flood Rescue 20
5.11 Resupply 20
5.12 Return 21
5.13 End of Response Operations 22
5.14 Post Impact Actions 22
6 RECOVERY OPERATIONS 23
6.1 Introduction 23
6.2 NSW SES Recovery Role 23
7 ABBREVIATIONS 24
8 GLOSSARY 24
9 APPENDIX A – MAP OF SNOWY MONARO REGIONAL LGA 25
10 APPENDIX B – ROLES AND RESPONSIBILITIES 26
11 APPENDIX C – COMMUNITY SPECIFIC ROLES AND RESPONSIBILITIES 32

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 Snowy Monaro Regional 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 Snowy Monaro Regional 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 Snowy Monaro Regional 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 Snowy Monaro Regional LGA. The Snowy Monaro Regional 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 Snowy Monaro Regional level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Snowy Monaro Regional 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, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.

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 Snowy Monaro Regional LGA 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 Snowy Monaro Regional LGA.

2.1.2 Declared dams in or upstream of the Snowy Monaro Regional Local Government Area.

Dam Name	Owner	High Risk Dam
Cowarra Creek Tailings Dam	NSW Department of Industry	Unknown
Delegate Flood Retarding Basin	Snowy Monaro Regional Council	Unknown
Eucumbene Dam	Snowy Hydro Limited	No
Gunthra Dam	Snowy Hydro Limited	No
Island Bend Dam	Snowy Hydro Limited	No
Jindabyne Dam	Snowy Hydro Limited	No
Tantangra Dam	Snowy Hydro Limited	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 or coastal inundation.

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. Snowy Monaro Regional Council has developed and maintains a flash flood warning system for Cooma Creek and Cooma Back Creek catchments. Data informs Flood Warnings issued by the Bureau and is provided to the NSW SES.

f. 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.

g. NSW SES maintains a dedicated dam failure hotline and procedures to ensure priority dissemination of dam failure warnings.

h. 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.

i. 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:

a. Supporting emergency services and functional areas should provide Liaison Officers to NSW SES Incident Control Centre(s) and/or Emergency Operation Centres as required.

b. NSW SES will provide Liaison Officer(s) to Emergency Operations Centres as required.

c. Where possible Emergency Operation Centres to be co-located with NSW SES Incident Control Centres for Flood Emergency Response.

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

Actions:

a. The NSW SES Incident Controller will notify agencies of potential access issues between locations, for the consideration of pre-deploying of resources.

b. NSW SES may request resources and logistics support directly from a supporting emergency service or functional area.

c. Wherever possible, supporting organisations are to provide their own logistic support in consultation with NSW SES where appropriate.

d. The NSW SES Incident Controller will control air support operations and may utilise supporting agencies in the management of aircraft.

5.3 USE OF INFORMATION AND COLLECTION OF INTELLIGENCE

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

Actions:

a. Information relating to the consequences of flooding, response strategies, situational awareness and operational updates will be distributed by NSW SES to supporting emergency services and functional areas listed under this Plan.

b. All supporting emergency services , 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. Councils will use the following established flash flood warning system for Cooma to provide warnings and information to NSW SES, key stakeholders and the community. Enviromon alerts.

c. Dam Owners will utilise the Dam Emergency Plan to provide warnings and information to NSW SES and communities (where appropriate).

d. NSW SES Incident Controllers will issue the following NSW SES Flood Warnings aligning to the Australian Warning System:

- Advice.
- Watch And Act.
- Emergency Warning.

e. NSW SES liaises with the Bureau to discuss the development of flood warnings as required.

f. NSW SES provides alerts and deliver flood information to affected communities using a combination of public information.

g. NSW SES may request supporting agencies redistribute NSW SES alerts and information, including through the provision of doorknocking teams.

h. 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.

i. 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.

j. 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. Snowy Monaro Regional 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 Snowy Monaro Regional 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. 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 Snowy Monaro Regional 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 Snowy Monaro Regional Council(s) on post flood data collection analysis including review of flood intelligence where necessary.

6 RECOVERY OPERATIONS

6.1 INTRODUCTION

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

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

6.2 NSW SES RECOVERY ROLE

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

6.2.2 **Actions**:

a. NSW SES will provide representation to Recovery Committees as required and may have an ongoing role in the Recovery phase.

b. NSW SES roles on Recovery Committees may include providing information about any continuing response, guidance on mitigation strategies and general advice and assistance to the committee as a subject matter specialist and/ or expert.

c. NSW SES will provide information to 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 SEOCON and SERCON.

7 ABBREVIATIONS

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

8 GLOSSARY

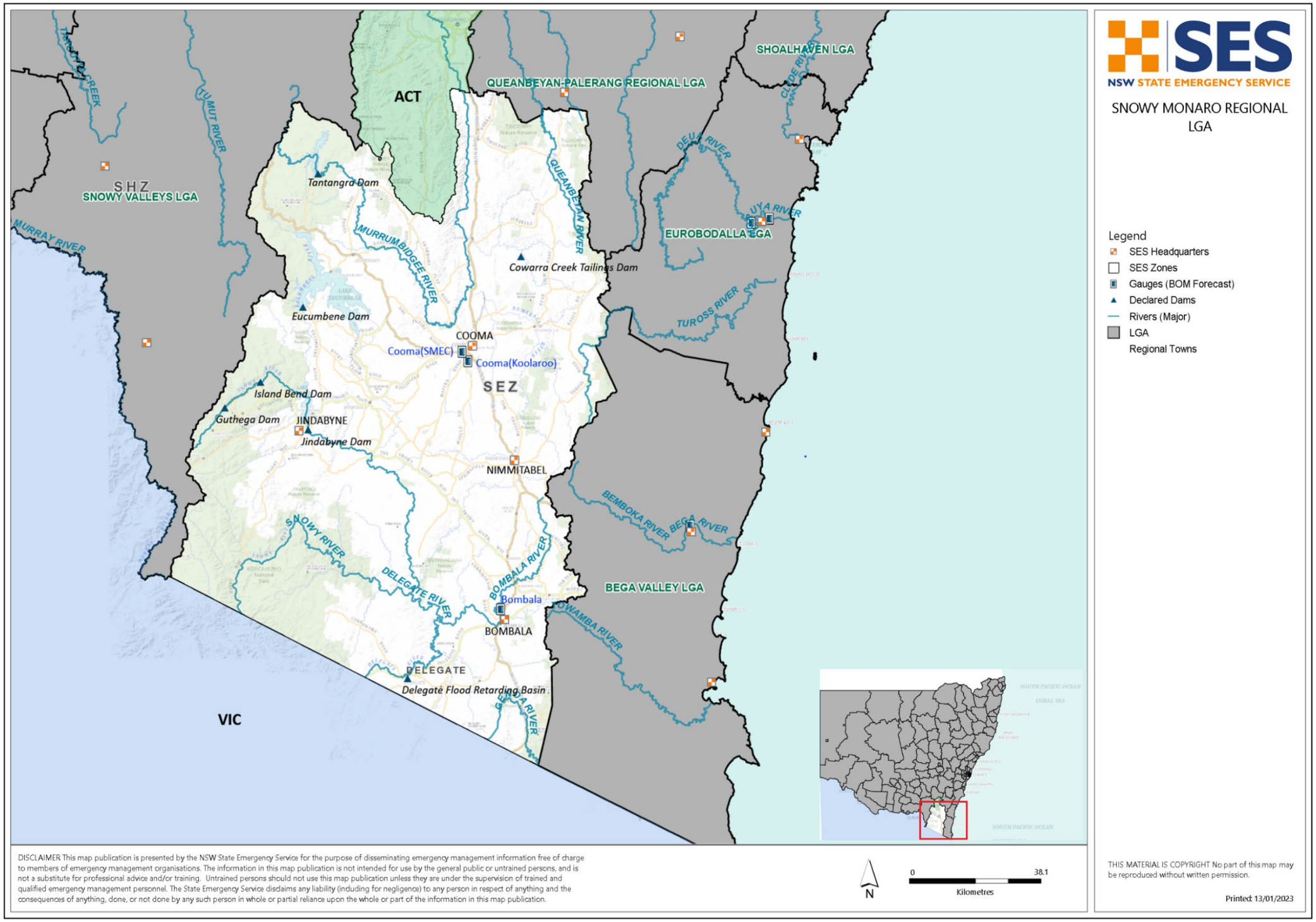
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 Snowy Monaro Regional LGA



SES
NSW STATE EMERGENCY SERVICE

SNOWY MONARO REGIONAL LGA

Legend
- SES Headquarters
- SES Zones
- Gauges (BOM Forecast)
- Declared Dams
- Rivers (Major)
- LGA
- Regional Towns

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

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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 NSW State Flood Emergency Sub Plan.

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

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

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

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

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

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

11 Appendix C – Community Specific Roles and Responsibilities

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

NSW STATE EMERGENCY SERVICE

HAZARD AND RISK IN THE FORMER BOMBALA SHIRE LGA

Volume 2 of the Snowy Monaro Regional Local Flood Plan

Last Update: July 2017

FloodSafe

AUTHORISATION

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

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Southern Highlands Region Controller

Date: 12/7/17.

Tabled at LEMC Date: 16 August 2017

CONTENTS

VERSION LIST **4**

AMENDMENT LIST **4**

1 THE FLOOD THREAT **5**

1.1 Overview 5

1.2 Landforms and River Systems 5

1.3 Storage Dams 6

1.4 Weather Systems and Flooding 7

1.5 Characteristics of Flooding 7

1.6 Flood History 9

1.7 Flood Mitigation Systems 10

1.8 Extreme Flooding 11

2 EFFECTS ON THE COMMUNITY **12**

2.1 Community Profile 12

3 SPECIFIC RISK AREAS - FLOOD **13**

3.1 Bombala 13

3.2 Delegate 18

3.3 Other Surrounding Areas 20

ROAD CLOSURES AND ISOLATED COMMUNITIES 21

3.4 Road Closures 21

3.5 Summary of Isolated Communities and Properties 23

ANNEX 1: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION **24**

ANNEX 2: SNOWY RIVER SYSTEM SCHEMATIC **26**

MAP 1: SNOWY RIVER BASIN **27**

MAP 2: BOMBALA TOWN MAP **28**

MAP 3: DELEGATE TOWN MAP **29**

MAP 4: BIBBENLUKE TOWN MAP **30**

MAP 5: CREEWAH TOWN MAP **31**

MAP 6: GLEN ALLEN TOWN MAP **32**

MAP 7: CATHCART TOWN MAP **33**

LIST OF REFERENCES **34**

LIST OF TABLES

Table 1: Prescribed Dams in the Former Bombala Shire LGA; Summary of Information. 6

Table 2: Indicative Flow Travel Time for the Bombala River 8

Table 3: Flood History for the Bombala River 10

Table 4: Census of Housing and Population data (2011) 12

Table 5: Estimated Number of Properties Inundated Above Floor Level and Over Ground in Bombala related to the Bombala Town gauge (No. 222019). 15

Table 6: Roads liable to flooding in the former Bombala Shire LGA. 21

VERSION LIST

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

Description	Date
Bombala Local Flood Plan – Annexes A and B	August 2008

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Snowy Monaro Local Controller/s

NSW State Emergency Service

Cathcart Road

Bombala NSW 2632

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

Amendment Number	Description	Updated by	Date

Document Issue: Version 2-18042016

1 THE FLOOD THREAT

1.1 OVERVIEW

1.1.1 In 2016 the former Bombala Shire Local Government Area (LGA) was amalgamated into the new Snowy Monaro Regional Council. This Local Flood Plan (LFP) only covers the footprint of the former Bombala Shire LGA which is the area located in the lower South Eastern part of the new entity. The Snowy River Basin itself is divided by the NSW/Victorian Border in this area. The main towns at risk of flooding within the former LGA are Bombala and Delegete. Bombala Town is located at the confluence of the Coolumbrooka River and Bombala River, a major tributary to the Snowy River. Flooding within the former Bombala Shire area can vary considerably depending on individual catchments within the former LGA **(1) (2) (3)**. The Snowy River Basin is shown in Map 1.

1.1.2 **Catchments within the former Bombala Shire LGA footprint include:**

a. Southern catchments of Ashton Creek, Currawong Creek, Delegate River, Little Plains River and Tombong Creek;

b. Northern catchments of Bombala River, Cambalong Creek, and Maclaughlin River; and

c. Eastern catchments of Coolumbooka River, Genoa River and Saucy Creek.

1.1.3 The most severe flooding occurs within this shire when the Bombala River and Coolumbooka River coincide. Flooding at Bombala Township can be caused by runoff from either river, or a combination of both. This can result in flooding of several streets, several homes and businesses and potential evacuations (1).

1.1.4 Surrounding localities of Creewah, Thoko-Glen Allen and Bibbenluke are also vulnerable to road closures, potential isolation, and possible flooding of a small number of residences and businesses (1).

1.1.5 Major flooding of the Bombala River has the potential to result in evacuations, and substantial public and private losses (4).

1.2 LANDFORMS AND RIVER SYSTEMS

1.2.1 The former Bombala Shire LGA adjoins the former Cooma-Monaro LGA, and the former Snowy River LGA to form the new Snowy Monaro Regional Council. The former Bombala Shire LGA footprint also adjoins the Bega Valley Shire LGA, and Victoria's East Gippsland LGA (2) (3).

1.2.2 Bombala Town is situated on the Bombala River: a major tributary of the Snowy River which enters the sea at Orbost in Victoria. The town is located at the confluence of the Bombala and Coolumbooka Rivers. At the junction, the Coolumbooka River and the Bombala Rivers have catchment areas of 200 sq km and 337 sq km respectively. Both the Bombala and Coolumbooka Rivers have their headwaters to the North-East of Bombala on the coastal range (1) (2).

1.2.3 The Bombala River originates in the Kybeyan Range, part of the Great Dividing Range which forms the eastern boundary of the valley. The highest peak in the range is Brown Mountain with an elevation of 1240m (1) (2).

1.2.4 Although most of the Shire area is contained within the Snowy River Basin (Map 1), the level of flood threat can vary considerably between individual river, stream, and creek catchments, as is further detailed in Section 1.5 Characteristics of Flooding (1) (2).

1.3 STORAGE DAMS

Delegate Flood Retarding Basin

1.3.1 Within the former Bombala Shire LGA the only prescribed dam is the Delegate Flood Retarding Basin located on the outskirts of. It is designed to reduce the flow of flood waters through part of Delegate Township. The basin is normally empty, except when holding rainfall runoff and in times of flood (5) (2). Its key features are summarised is Table 1 below and its location is shown on Map 1 – Snowy River Basin and Map 3 – Delegate Town Map.

Table 1: Prescribed Dams in the Former Bombala Shire LGA; Summary of Information.

Delegate Flood Retarding Basin (6)	
Owner / Operator	Snowy Monaro Regional Council
Dam Safety Emergency Plan (DSEP)	No DSEP exists at this time (2017).
Description of Dam	Storage Capacity of 200ML, with Unlined Channel Spillway. Spillway is 30m wide x 1m deep. Crest Height 5m, Basin Length 280m, Catchment of 4 sq km, Built in 1985 of earthfill construction.
Location	Parallel to Haydens Bog Rd and just South of Victoria Parade, Delegate.
Communities Downstream	Part of Delegate Township, approximately 12 residences, and approximately 35 people.
Monitoring System	Nil, as is normally empty.
Warning System	Nil, as is normally empty.

Coolumbooka River Weir

1.3.2 Coolumbooka River Weir (also known as Coolumbooka River Dam) is located on the Coolumbooka River just upstream of the confluence with the Bombala River. The weir has a small capacity of 245 megalitres and is not a prescribed dam. Reticulated water in the former Bombala Shire LGA footprint is supplied from this weir (Delegate is supplied from the Delegate River) (7).

Bombala Retarding Basin

1.3.3 Bombala has an informal retarding basin located in Joseph Street, Bombala to the left of the Southern Cross Care Currawanna Residential Aged Care facility. It is essentially a mound of dirt built to slow water flow into the main street (Maybe Street) (8). Refer to section 3.1 for further detail.

1.4 WEATHER SYSTEMS AND FLOODING

1.4.1 Historically the highest rainfall generally occurs in the period from December to February, with another peak in June. However, high rainfall totals can also occur outside of these periods. The 2010 Bombala Flood Study indicates that the highest average flows at Bombala over the 50 year period 1951-2001 occurred in the Winter months with the highest peaks in June. Floods can occur at any time of the year (9) (2) (4).

1.4.2 Floods within the former Bombala LGA footprint (now within Snowy Monaro Regional LGA) can be caused by the following types of weather systems:

a. Sequences of Southern air masses (frontal systems) coming from the Antarctic region and moving in North-Easterly direction over the catchment.

b. Low-pressure systems located over the East coast of Australia and causing moist airflows over the Monaro district and Snowy Mountains.

c. Short duration, high intensity convective thunderstorms also occur over small areas during summer (10).

1.5 CHARACTERISTICS OF FLOODING

Characteristics of Flooding in the LGA (former Bombala Shire footprint)

1.5.1 Although most of the former Bombala Shire area is contained within a single River Basin (the Snowy River Basin) the level of flood threat can vary considerably between individual river, stream, and creek catchments:

a. Flooding in the Southern catchments (Ashton Creek, Currawong Creek, Delegate River, Little Plains River and Tombong Creek) tends not to be as severe as in the more Northerly streams.

b. Flooding in the catchments across the Northern part of the Shire (Bombala River, Cambalong Creek and Maclaughlin River) tends to occur simultaneously because it results from rainfall along the Great Dividing Range. Considerable variation occurs with the Annual Median Rainfall to the West (less than 500mm at Delegate) being significantly less than to the East (in excess of 875mm in the top of the Bombala River catchment).

c. Flooding in the Eastern catchments (Coolumbooka River, Genoa River and Saucy Creek) can occur independently of flooding in the other catchments because it results from rainfall along the coastal escarpment.

d. The most severe flooding around Bombala and downstream occurs when flooding on the Bombala River (a Northern catchment) and on the Coolumbooka River (an Eastern catchment) coincide, such as occurred in 1934, 1971 and 1978. The 1983 flood was reported to be the highest flood on record in the upper Bombala River, but there was only a minor contribution from the Coolumbooka River. Flooding can therefore be caused by runoff from either river or a combination of both (1) (2).

e. The Bombala River catchment consists of the Bombala, Undowah, and Coolumbooka Rivers. In major storms of prolonged and heavy rainfall, runoff from the catchment is concentrated along these tributaries and can result in flooding at Bombala Town. A design storm of 36 hours in this catchment will generate the highest peak discharge of 1670m3/s at Bombala Town, equating to approximately 12m on the Bombala Town gauge (No. 222019) which is just 0.4m short of a 1% AEP (1 in 100 ARI) event (4).

1.5.2 An estimated concentration time for the Bombala River catchment is about 14 hours, with a flood peak travel time from Glen Allen to Bombala of about 4 hours, and from Bibbenluke to Bombala of about 1 to 1½ hours (Table 2) (2).

Table 2: Indicative Flow Travel Time for the Bombala River

Locations	Travel Time
Glen Allen to Bombala	Around 4 hrs
Bibbenluke to Bombala	1 to 1.5 hours

Characteristics of Flooding on the Bombala and Coolumbooka Rivers

1.5.3 The Bombala River passes through steep gorge country before opening out onto Alpine Plains for the majority of its course leading to Bombala Town. The Bombala River is joined by the Undowah River at Bibbenluke, and then later joined by the Coolumbooka River just short of Bombala Town. The Undowah and Bombala Rivers drain the Western part of the catchment (4).

1.5.4 The Coolumbooka River flows through predominantly steep gorge country before opening out onto Alpine Plains much closer to Bombala Town. The Coolumbooka River drains the Eastern part of the catchment and has been responsible for contributing the majority of flow at Bombala Town in most major historical flood events (4).

1.5.5 The Bombala River at Bombala Town reaches the bankfull stage at 7.1m on the Bombala Town gauge (No. 222019)[1] located near the Forbes Street Bridge. Beyond this height, floodwaters enter the town by overtopping the riverbank and inundating low lying areas of parkland adjacent to the Forbes Street Bridge. As flood levels continue to rise, inundation extends progressively Southwards into Therry and Maybe Streets and the Northern ends of Forbes, Caveat and Young Streets (4).

1.5.6 At 7.8m on the Bombala Town gauge (No. 222019), which equates to a 10% AEP (1 in 10 ARI) event, the Bombala River is at the upper level of a Moderate Flood. At 8m on this gauge the river reaches the Major Flood level at which point development within Bombala Town begins to be affected. Refer to Section 3.1 for further detail of impacts (1) (2) (4).

1.6 FLOOD HISTORY

1.6.1 Large floods occurred in 1934, 1941, 1943, 1945 and 1948. Flood heights are not known but the 1934 flood was the biggest in living memory. During the 1934 flood event, water from the Bombala River reached the deck level of Cunningham's Point Bridge to the North of Bombala. Floodwaters entered the township and destroyed a number of buildings and much of the surrounding farmland was flooded (2).

1.6.2 The 1971 flood reached 10.23m at the Bombala Town gauge (222019). It was not as severe in Bombala as the 1934 flood. However, flood waters entered 16 houses and at least 6 business premises on the river side of Maybe Street with flood depths of between 2 and 2.4m (1). Both approaches to the Bombala Bridge were cut with up to 2 metres of water on the town approach. A new bridge was erected in 1987 but both approaches can still potentially be cut by flooding (2).

1.6.3 Table 3 below provides a chronological history of events since 1971. The most recent events occurred in 2007, 2010, 2011, 2012, and 2014. The 2007 and 2014 events reached Minor Flood level with no significant impacts recorded. The 2010 and 2011 events reached the Moderate Flood level resulting in a caravan park in Bombala being affected by overground flooding and requiring a small number of caravans to be relocated (11) (12).

1.6.4 The 6th of June 2016 event reached the Moderate Flood level and peaked at approximately 6.25m on the Bombala Town gauge (No. 222019). As a precaution, a few caravans were relocated from the caravan park located on the Western bank near the Forbes Street Bridge at Bombala. One rural property in the Creewah area was also isolated but only very briefly due to rising creeks, and the Cathcart Bridge was also closed briefly for assessment due to possible damage (11) (12).

[1] Bombala Town gauge (No. 222019) was previously known as Bombala Bridge gauge (No. 222905). These are the same gauge (19).

1.6.5 During 2012 Maybe Street was flooded from catchment flooding originating from above endeavour reserve. Impacts included overfloor flooding of a number of businesses in the main street (8).

Table 3: Flood History for the Bombala River[2]

Date	Bombala Town gauge [No. 222019] (NOTE: Minor 3m, Moderate 5m, Major 8m)	Approx. Elevation (mAHD)
June 2016	6.25m	Approx. 697mAHD
December 2014	4.00m	695mAHD
June 2012	4.00m	695mAHD
March 2011	7.00m	698mAHD
May 2010	5.00m	696mAHD
June 2007	3.70m	Approx. 695mAHD
February 1992	3.20m	Approx. 694mAHD
December 1992	3.70m	Approx. 695mAHD
November 1998	4.50m	695.5mAHD
November 1985	5.50m	696.5mAHD
July 1991	6.00m	697mAHD
July 1988	6.00m	697mAHD
October 1985	6.30m	Approx. 697mAHD
June 1991	6.90m	Approx. 678mAHD
April 1990	6.90m	Approx. 678mAHD
March 1983	8.00m	699mAHD
June 1978	10.08m	Approx. 701mAHD
February 1971	10.23m (Note: A 10.63m event is a 1% AEP, 1 in 100 ARI)	703mAHD

1.7 FLOOD MITIGATION SYSTEMS

1.7.1 There are currently no levee systems within the former Bombala Shire LGA footprint.

1.7.2 There is a small Flood Retarding Basin located at Delegate, a small Weir located on the Coolumbooka River at Bombala and an informal Flood Retarding Basin located in Bombala. For details refer to Section 1.3 Storage Dams, Table 1, Section 3.1.20 and Section 3.2.11. Weir and Basin locations are shown on their respective Maps (Map 1 – Snowy River Basin, MAP 2 – Bombala Town Map, Map 3 – Delegate Town Map) (2) (1) (5) (7).

[2] Some of these heights cannot be verified, but give an indication of peak flood levels (from 1996 LFP). Some figures (including the 1971 figure above) are taken from the latest 2010 Bombala Flood Study which uses Peak Discharge figures to determine heights, and therefore heights corresponding to Figure 12 of that study may differ from heights in Department of Water NSW Bombala Flood Study Report 1987, and NSW SES 1996 LFP.

1.8 EXTREME FLOODING

1.8.1 The 1971 flood, in which flood waters entered 16 houses and at least 6 business premises on the river side of Maybe Street, reached approximately 10.23m on Bombala Town gauge (No. 222019) which is around 0.4m below a 1% AEP (1 in 100 ARI) event (10.63m). Flooding above this level is possible. A 1% AEP (1 in 100 ARI) flood event would be characterised by fast rising, deep, and fast flowing floodwaters (4).

1.8.2 A Probable Maximum Flood (PMF) event would inundate large parts of Bombala with deep, high velocity, debris laden flood water. During a PMF the water depth in the channel is expected to reach approximately 20m on the Bombala Town gauge (No. 222019). A map showing the Predicted PMF Inundation Extents can be found in the 2010 Bombala Flood Study and Overland Flows Investigation (4). Maps are also shown in this study for 5% AEP (1 in 20 ARI), and 1% AEP (1 in 100 ARI) events. The PMF map shows that even with extensive inundation during such extreme flooding, there are still large parts of Bombala that remain flood free (high ground above the PMF). The town itself would be split in half by the Bombala River with higher ground areas still potentially affected by stormwater run-off and ponding (4).

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

2.1.1 The population of the former Bombala Shire LGA footprint was 2,409 at the last Census in 2011. Included in this figure was a small indigenous community of 47, and no people at all that do not speak English well. There were 485 people aged over 65yrs, and 150 people within the area who may require assistance due to illness or disability during an event. Of the 2,409 population, approximately 1,662 reside in Bombala Town, and 453 reside in Delegate Town. Table 4 below provides further detailed analysis (13).

Table 4: Census of Housing and Population data (2011)

Census Description	Former Bombala LGA	Bombala	Delegate
Total Persons	**2,409**	**1,662**	**453**
Aged 0-4 yrs	133	100	14
Aged 5-14 yrs	314	218	53
Aged 65 + yrs	485	336	99
Of Indigenous Origin	47	17	13
Who do not speak English well	0	0	0
Have a need for assistance (profound/severe disability)	150	103	27
Living alone (Total)	332	219	73
Living alone (Aged 65+)	122	70	30
Residing in caravans, cabins or houseboats or improvised dwellings	3	0	3
Occupied Private Dwellings (Households)	**1,006**	**693**	**203**
No Motor Vehicle	74	48	16
Caravan, cabin, houseboat or improvised dwell	6	0	3
Rented via State or Housing Authority	13	15	3
Rented via Housing Co-Op or Community Church Group	3	0	0
No Internet Connection	354	240	82
Unoccupied Private Dwellings	**355**	**192**	**83**
Average persons per occup dwelling	**2.2**	**2.2**	**2.2**
Average vehicles per occup dwelling	**1.8**	**1.8**	**1.8**

3 SPECIFIC RISK AREAS - FLOOD

3.1 BOMBALA

3.1.1 Bombala Town is the larger urban area within the former Bombala Shire LGA footprint. Bombala Town has a population of 1,662 which includes a community of 336 people aged over 65, a small indigenous community of 17, and approximately 103 people who are either ill or disabled and may require significant assistance during a flood event. There was no community that did not speak English well. Refer to Table 4 for detailed census data (13).

Characteristics of Flooding

3.1.2 Flooding results from over bank flooding of the Bombala River which commences at 3m (Minor Flood Level) on the Bombala Town gauge (No. 222019). Should an extreme event occur, Bombala would face a significant flood problem. Flooding in Bombala can occur quickly with flood peaks similar to 1971 event possible within approximately 24 hours from the commencement of rainfall (4). A 1978 modelled scenario (5% AEP, 1 in 20 ARI) peaked at Bombala in approximately 48 hours (4) (11).

Classification of Floodplain

3.1.3 Using the Floodplain Risk Management Guideline 2007, the Bombala Town is classified as 'Rising Road Access' (RRA) (14). These are areas where access roads exist and rise steadily in an uphill direction away from rising floodwater. Bombala Town can be split in half, but is unlikely to be completely isolated even in a PMF. Roads to the North (Monaro Hwy) and South (Cann River Hwy) are likely to remain open. If they do close then the town should only be isolated for a short period (14) (4) (15).

3.1.4 Bombala Town contains low-lying areas that people would need to be progressively evacuated from to higher ground as floodwaters rise, as fits with a RRA classification (14).

3.1.5 In an RRA classification, evacuation is possible by vehicle or on foot using these access roads as floodwaters rise. People should not become trapped in homes unless their decision to evacuate their properties is delayed. An example of this is potentially occupants of multiple storey buildings who initially thought they would stay, but later wished to leave when their evacuation route may already have been cut off (14).

Inundation

3.1.6 The 2010 Bombala Flood Study provides predicted inundation mapping for a 5% AEP (1 in 20 ARI), 1% AEP (1 in 100 ARI), and PMF events (4).

3.1.7 These predictions indicate that a 5% AEP would inundate sections of Plunkett Street, Forbes Street, High Street, Mort Street, and all of Mahratta Street in the Northern part of the town. Marhatta Street is a section of the Monaro Hwy near

Forbes Street Bridge. It would also inundate parts of Caveat Street, Young Street, Cardwell Street, Therry Street, Forbes Street and Burton Street Creek in the Southern part of the town.

3.1.8 A 1% AEP extends further into those streets and also reaches the base of the War Memorial in the mid section of Maybe Street in the Southern part of town.

3.1.9 A PMF would extend further to include parts of Stephen Street, Manning Street, and Queen Streets in the Northern part of town, and in the Southern part of town it would significantly impact the CBD area of Maybe Street, before extending as far as Wellington Street. Refer to the 2010 Bombala Flood Study for detailed prediction mapping of flood extents (4).

Minor Flooding

3.1.10 Overbank flow commences in Bombala Township when the river level at Bombala Town gauge (No. 222019) reaches about 3m (Minor Flood Level) metres.

Moderate Flooding

3.1.11 At about 5m (Moderate Flood Level), the Caravan Park on the Northern bank begins to be affected. The first impact on the Southern bank occurs at a height between 6.5 and 7 metres when water backs up in the Burton Street creek near Therry Street.

Major Flooding

3.1.12 The main impacts in Bombala begins at about 8m (Major Flood Level) when water starts to back up the creek at the low end of Young Street. This affects the area behind the Manaroo Motel and then properties on the South Western side of Caveat Street - slowly filling nearly all of the area bounded by the river and Maybe Street between Burton Street and Young Street (2) (11).

Flood of Record

3.1.13 The 1971 flood of record reached approximately 10.23m on Bombala Town gauge (No. 222019). During this event flood waters entered 16 houses and at least 6 businesses on the river side of Maybe Street, and reached the base of the War Memorial in Forbes Street. Since then Bombala has seen further development and a similar event today would have significantly more impacts.

Probable Maximum Flood

3.1.14 A Probable Maximum Flood (PMF) event would inundate large parts of Bombala with deep, high velocity, debris laden flood water expected to reach approximately 20m on the Bombala Town gauge (No. 222019). See also Section 1.8 Extreme Flooding. Maps of Predicted Inundation Extents can be found in the 2010 Bombala Flood Study (4).

Other Areas

3.1.15 The Bombala and Coolumbooka River Catchments contain rural areas and villages adjacent to rivers and creeks that can experience flooding with landholders needing to relocate livestock and equipment to higher ground, and residents potentially being isolated for short periods due to road closures (refer to section 3.2.15).

Property Inundation

3.1.16 Satellite imagery comparison against the Predicted Inundation Extent mapping shown in the 2010 Bombala Flood Study (Figure 14) suggests that a flood of 10.63m at the Bombala Gauge (222019) (1% AEP or 1 in 100 ARI) event would inundate a significant section of the Bombala CBD and nearby residences on the river side of Maybe Street. Approximately 20 businesses along the Maybe Street retail area (between Burton and Young Street), 1 business near the intersection of Mahratta Street (South bank section) and Young Streets, and approximately 22 residences spread across Burton, Forbes, Caveat, Young, Maybe, and Therry Street may be affected (4) (14).

3.1.17 Table 5 below provides estimated numbers of inundated properties within Bombala. Refer also to section 3.2.15 for further locality details (16).

Table 5: Estimated Number of Properties Inundated Above Floor Level and Over Ground in Bombala related to the Bombala Town gauge (No. 222019).

Bombala Town gauge (222019) Gauge Height (m)	% AEP ARI)	Range of Over Floor Depths (m)	No. of Properties with Over floor Flooding	No. of Properties with Over ground Flooding
10.23m	Approx 0.4m below the 1% AEP	Businesses flooded to 2m, and houses flooded to 2.4m	Expect more than 16 residences 6 businesses (in 1971 event[1])	Possibly more than previous column. Reports are not clear enough to determine numbers. The 1971 event reached the base of the War Memorial at the intersection of Forbes and Maybe Streets[1].
10.63m	1% AEP (1 in 100)	Unknown		Estimated 21 businesses and 22 residences today (based on Satellite imagery)

[1]These numbers are from the 2010 Bombala Flood Study and are based upon the 1971 flood event. This event was the Flood of Record and reached 10.23m on the Bombala Town gauge (No. 222019).

Isolation

3.1.18 Generally creeks rise and fall quickly and result in only short term isolation in some areas of up to two days, however in more extreme events some rural areas may remain isolated for longer periods due to damaged roads or infrastructure. In the June 2016 event the Cathcart Bridge was closed briefly due to unknown damage, however other access roads remained open to Cathcart. Refer to Section 3.2.15 for further details regarding access to rural areas.

3.1.19 For road closures refer to Section 3.4 Road Closures, and Section 3.5 Summary of Isolated Communities and Properties.

Flood Mitigation Systems

3.1.20 Bombala has an informal retarding basin located in Joseph Street, Bombala to the left of the Southern Cross Care Currawanna Residential Aged Care facility. This consists of a small mound of dirt which has been built to slow water flow into the main street of Bombala (Maybe St). If there is heavy rainfall upstream it can quickly run through Endevour Reserve and into town. During the 2012 event Maybe Street was flooded. Impacts included overfloor flooding of: the Bombala Maneroo Motel (No. 167), Firestation (No. 182), Caltex Petrol Station (No. 161) and Heritage Guest House Restauraunt (No. 121). The Monaro Regional Library carpark (No. 81) was also flooded (8).

Dams

3.1.21 Coolumbooka River Weir (creating the Coolumbooka River Dam) is located on the Coolumbooka River just upstream of the confluence with the Bombala River. The weir has a small capacity of 245 megalitres and is not a prescribed dam. Reticulated water in the former Bombala Shire LGA footprint is supplied from this weir (Delegate is supplied from the Delegate River) (7).

3.1.22 The Coolumbooka Weir location is shown on MAP 2 – Bombala Town Map.

At Risk Facilities

3.1.23 At 5m (Moderate Flood Level) on the Bombala Town gauge (No. 222019) a small caravan park located on the Northern riverbank near the Forbes Street Bridge begins to be impacted, requiring several vans to be relocated (2) (11).

3.1.24 At 6.5m to 7m the water backs up in the Burton Street Creek (unformed end of Burton Street) near the intersection of Therry Street and Maybe Streets, potentially affecting the Village Ford car dealership (2) (11) (15).

3.1.25 The main impacts in Bombala begin at about 8m (Major Flood Level) when water starts to back up the creek at the low end of Young Street. By 10.63m (1% AEP) nearly all businesses and properties would be flood affected. This affects the area behind the Maneroo Motel and then properties on the South Western side of Caveat Street - slowly filling nearly all of the area bounded by the river and Maybe Street between Burton Street and Young Street at which time it would then equate to around 10.63m (an approximate 1% AEP or 1 in 100 ARI) (2) (11).

3.1.26 A number of businesses may be impacted in:

a. Maybe Street between Burton Street and Young Street,

b. Forbes Street between Maybe Street and the bridge.

c. Caveat Street between Maybe Street and the river.

d. The South bank section of Mahratta Street near the intersection with Young Street, and the Bombala Swimming Pool, Therry Street.

e. At Risk Facilities can be found in Annex 1: Facilities at risk of flooding and/or isolation (4) (15).

3.2 DELEGATE

3.2.1 Delegate is located on the Southern bank of the Delegate River. It is the second urban centre within the former Bombala Shire LGA footprint. Delegate Town has a population of 453 which includes a community of 99 people aged over 65yrs, a small indigenous community of 13, and approximately 27 people who are either ill or disabled and may require significant assistance during a flood event. The community can all speak English. Refer to Table 4 above for detailed census data (13).

Characteristics of Flooding

3.2.2 There is no-longer a stream gauge at Delegate[3]. Since the 1971 flood of record in this area, road infrastructure has been upgraded between Bombala and Delegate, and a Flood Retention Basin has been constructed at Delegate. These works have lessened the impacts of flooding since their completion (17).

3.2.3 Flooding in the Delegate River Catchment can result in the short term isolation of properties, road closures, inundation of low-lying farmland, and potential evacuation of some areas adjacent to creeks.

3.2.4 Delegate Township has in the past been prone to minor flooding from an unnamed creek which approaches from the South along Haydens Bog Road. Flooding in the main street area has been reduced since the construction of the Delegate Flood Retarding Basin in 1985 which is located on the unnamed creek along Haydens Bog road to the South of the town.

Classification of Floodplain

3.2.5 Using the DECC Floodplain Risk Management Guideline 2007, Delegate Town is classified as 'Rising Road Access' (RRA) (14). These are areas where access roads exist and rise steadily uphill away from rising floodwater allowing people to evacuate. The Bombala-Delegate Road may be cut in major flood events, but is likely to remain open in lesser events. If roads were cut, short term isolation may occur (14) (4) (15).

Inundation

3.2.6 Delegate Township is prone to minor flooding from an unnamed creek from the south along Haydens Bog Road. Flooding may occur in the vicinity of the dwellings along the lower end of Bombala Street located between Church Street and Corrowong Road (2).

3.2.7 Flooding is also likely in the vicinity of the Delegate Caravan Park which is located on a dirt track between the Showground and the Delegate River. Access

[3] NSW Office of Water – Real Time Data – Indicates that a Delegate Town gauge (No. 222014) operated up until the mid 1980's, but it was discontinued at some stage prior to November 1996.

is via the Northern end of Campbell Street. Evacuation of campers and vans to higher ground may be required, most likely to the Delegate Showgrounds (2).

3.2.8 The previous level of flooding in the main street area has been reduced by the construction of the Delegate Flood Retarding Basin to the South of the town on the unnamed creek along Haydens Bog Road (2).

Isolation

3.2.9 Since the 1971 flood of record (estimated to be around 0.4m below 1% AEP, 1 in 100 ARI), bridges and culverts at waterway crossings along the Bombala-Delegate Road have been significantly improved. Whilst a major flood event may still lead to some road closures, it is far less likely to occur in lesser events, and as such the town of Delegate is less likely to become isolated today (17).

3.2.10 In a major flood event it is still possible that the Delegate River itself may cause flooding of low lying areas around Delegate that could still cut roads and cause isolation of the town for short periods (17).

Flood Mitigation Systems

3.2.11 The Delegate Flood Retarding Basin is located on the outskirts of Delegate, parallel to Haydens Bog Rd and just South of Victoria Parade. It is designed to reduce the flow of flood waters through part of Delegate Township. It stores and retards floods from an unnamed creek 0.5km South of Delegate, with a catchment area of approximately 4 sq km, and a storage of 200ML up to its crest level of 5m. The basin is normally empty, except when holding rainfall runoff and in times of flood (5) (2).

3.2.12 Discharge from the basin is onto Haydens Bog Rd. Downstream of the basin the creek flows for approximately 0.5km before passing through part of the Delegate residential area. This area is relatively flat and is flood prone (prompting the construction of the retarding basin). Several houses on either side of the floodway would be expected to be inundated to some degree if a relatively rapid dambreak event was to occur. Further details of this basin can be found under Section 1.3 Storage Dams (5) (2).

3.2.13 There are no levee systems in Delegate.

Dams

3.2.14 Refer to Section 3.2.11 (Flood Mitigation Systems) above and Section 1.3 (Storage Dams), for details of the Delegate Flood Retarding Basin. This basin is prescribed by the NSW Dam Safety Committee.

At Risk Facilities

3.2.15 There is minimal history of any significant impacts upon facilities in Delegate. The Delegate Caravan Park behind the Showground (off Campbell Street), and a couple of residences at the lower end of Bombala Street near Victoria Parade and Corrowong Road may be inundated in larger events. Further details can be found in Annex 1 (4) (15).

3.3 OTHER SURROUNDING AREAS

3.3.1 Flooding of other streams and rivers within the former Bombala Shire LGA footprint can result in the isolation of properties, road closures, inundation of low-lying farmland, and the potential evacuation of some areas adjacent to creeks. These areas are detailed below under their specific catchments:

Bombala River Catchment

a. **Bibbenluke:** The Bombala River is crossed by a high level concrete bridge, and there is now very little likelihood of flooding of the Monaro Highway. Flooding in this area may affect one residence in Bibbenluke, as happened in the 1971 flood (Map 4) (2).

b. **Creewah Area:** This area contains the highest number of people directly affected by flooding (Map 5). It can be isolated by the Bombala River and a number of small tributaries plus the Big Dipper, Native Dog, Dragon Swamp and Yellow Waterhole Creeks. Limited access can be gained by 4WD vehicles under most conditions via Packers Swamp Road which runs off the Brown Mountain Road (2).

c. **Thoko - Glen Allen Area:** Access to this area can be limited by flooding (Map 6) (2).

Coolumbooka River Catchment

d. **Cathcart Area:** Dragon Swamp Creek can cause access problems in the Cathcart area (Map 7) (2).

3.3.2 Maps of relevant villages have been included in this plan (Maps 4-7) as they may assist in locating potential road closure points referenced within Section 3.4 Road Closures (1).

ROAD CLOSURES AND ISOLATED COMMUNITIES

3.4 ROAD CLOSURES

3.4.1 Table 6 lists roads liable to flooding in the former Bombala Shire LGA footprint.

Table 6: Roads liable to flooding in the former Bombala Shire LGA.

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
BOMBALA RIVER CATCHMENT				
Creewah Road	Potentially several points along road between Bibenluke and Creewah locality.	Road may be cut by various creeks, leading to short term isolation. Generally around Moderate Flood Level on Bombala Town gauge (No. 222019)	Nil	Around Moderate Flood Level (5m) Bombala Town gauge (No. 222019)
CAMBALONG CREEK CATCHMENT				
Gunningrah Road	Bukalong	Cut by Buckalong Ck. Variable length closure.	Potentially via Buckalong Siding Road to Monaro Hwy.	Unknown
Bibbenluke to Gunningrah Road	Gunningrah	Cut by Cambalong Ck. Variable length closure.	Potentially North to Monaro Hwy.	Unknown
Cambalong Road	Cambalong locality (West North West of Bombala).	Cut by Bombala River. Variable length closure.	Potentially via Palarang and Redcliffe Roads if not closed.	Unknown
Redcliffe Road	Cambalong locality (West North West of Bombala).	Cut by Cambalong Ck. Variable length closure.	Potentially via Palarang and Redcliffe Roads if not closed.	Unknown
Redcliffe Road	Palarang locality (North West of Bombala).	Cut by Cambalong Ck. Variable length closure.	Potentially via Redcliffe and Cambalong Roads if not closed.	Unknown
Palarang Road	Merriangaa locality (North West of Bombala).	Cut off from Bombala by flooding for up to 3 days.	Nil	Unknown
CURRAWONG CREEK CATCHMENT				
Browns Camp Road	Balwins turnoff near Brooklands and Karachi	Effected at a low-level causeway near Baldwin's turnoff, near Brooklands, and at Karachi by the	Possibly only via Browns Camp road to either direction if not closed elsewhere.	Unknown

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
		Currawong Creek and its tributaries		
Settlers Road	Corrowong Creek	Affected at a number of locations by Currawong Creek and its tributaries	Nil	Unknown
Snodgreass and Kangaroo Ground Roads	Unknown	Usually accessible as far as the Kangaroo Ground boundary where a low-level crossing can cause problems.	Unknown	Unknown
Unnamed Road	Currowidgin locality (North of Currawong)	Can be isolated by flooding for up to 5 days	Nil	Unknown
DELEGATE RIVER CATCHMENT				
Browns Camp Road	Delegate River	Affected by flooding	Possibly North to Corrowong Road, or South to Delegate Road if not closed elsewhere.	Unknown
Balgownie Road	Balgownie Cattle yards	Affected by numerous creeks including Church Creek at Balgownie cattle yards and another at Alkoomie shearing shed.	Unknown	Unknown
Combens Road	Unknown	Can be affected by Church Creek	Unknown	Unknown
Quidong Road	Stephensons Crossing	Affected by the Delegate River at Stephensons Crossing and another creek at Inglewood homestead	Nil	Unknown Height. Quidong Gauge (No. 222008)
TOMBONG CREEK CATCHMENT				
Tombong Road	Near "Red Hill" property approximately 9km from intersection with the Corrowong Road	Road is cut (possibly by Tombong Creek)	Nil	Unknown

3.5 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

3.5.1 Generally creeks rise and fall quickly and result in only short term isolation in some areas of up to two days, however in more extreme events some rural areas may remain isolated for longer periods due to damaged roads or infrastructure. In the Bombala area during the June 2016 event the Cathcart Bridge was closed briefly due to unknown damage, however other access roads remained open to Cathcart. One property was also isolated for around one day near Creewah due to rising creeks cutting roads. In the Delegate area during this same event no issues were reported.

3.5.2 Refer also to Section 3.1 Bombala, subheading Isolation, Section 3.2 Delegate, subheading Isolation, and Section 3.4 Road Closures for further detail.

ANNEX 1: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION

Bombala River Valley[4]

Facility Name	Street	Suburb	Comment
CBD / Retail / Residential			
Bombala CBD Retail Area, and surrounding Streets	Maybe Street (River side) Burton Street (Creek area) Mahratta Street (South) Therry Street Caveat Street Young Street Forbes Street	Bombala	An approx. 1% AEP (1 in 100 ARI) event of 10.63m at the gauge would impact many businesses on the river side of Maybe Street (between Burton and Young Streets). It would also impact a number of businesses and residences in the surrounding Streets between the river and Maybe Street.
Schools / Education Facilities			
None known to be affected	See Comments	Bombala	Nil showing within any available Extent Mapping at this time 2016.
Child Care Centres			
None known to be affected	See Comments	Bombala	Nil showing within any available Extent Mapping at this time 2016.
Facilities for the aged and/or infirm			
None known to be affected	See Comments	Bombala	Nil showing within any available Extent Mapping at this time 2016.
Utilities and infrastructure			
Bombala Water & Sewerage system	Monaro Hwy (Southern side of River)		May be affected at approximately Moderate Flood Level (5m).
Bombala Swimming Pool	Therry Street	Bombala	May be affected at approximately Moderate Flood Level (5m).
Forbes Street Bridge	Forbes Street	Bombala	An approx. 1% AEP (1 in 100 ARI) event, 10.63m at the gauge would cut approaches to the Bridge.
Bombala Telephone Exchange	Therry Street	Bombala	

[4] This information is the result of comparing Satellite imagery against the Flood Extent Mapping shown in the 2010 Bombala Flood Study.

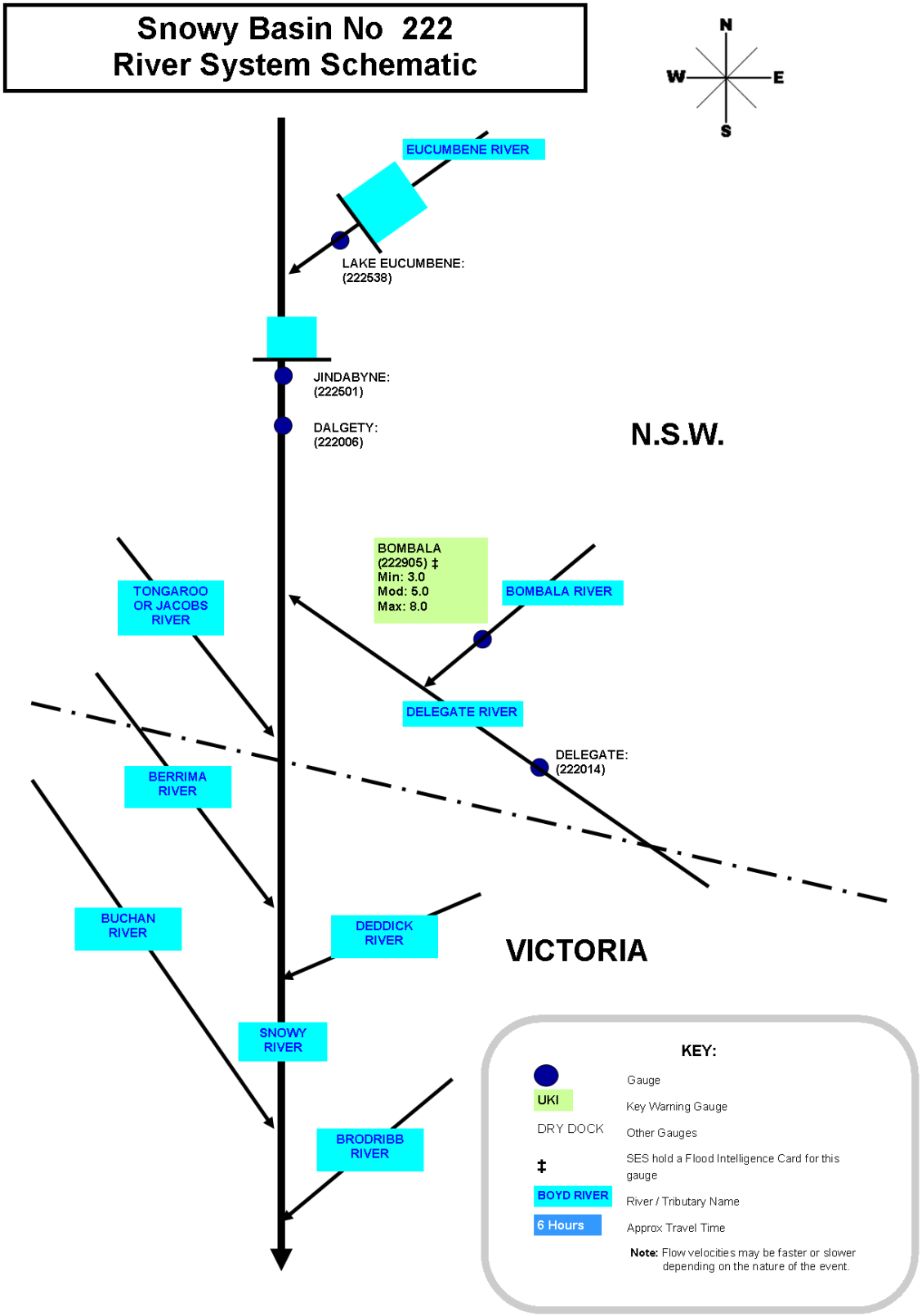
Camping Ground / Caravan Parks			
Bombala Caravan Park	Monaro Hwy (Northern side of River)	Bombala	May be affected at approximately Moderate Flood Level (5m).

Delegate River Valley[5]

Facility Name	Street	Suburb	Comment
Schools			
None known to be affected	See Comments	Delegate	Nil showing within any available Extent Mapping at this time 2016.
Child Care Centres			
None known to be affected	See Comments	Delegate	Nil showing within any available Extent Mapping at this time 2016.
Facilities for the aged and/or infirm			
None known to be affected	See Comments	Delegate	Nil showing within any available Extent Mapping at this time 2016.
Utilities and infrastructure			
Delegate Water & Sewerage system	Delegate – Bombala Road	Delegate	May be affected by flooding.
Camping Ground / Caravan Parks			
Delegate Caravan Park	Campbell Street (off the North end)	Delegate	May be affected by flooding. Located Between the Showgrounds and River.
Delegate Showgrounds	Campbell Street	Delegate	May be affected by flooding.

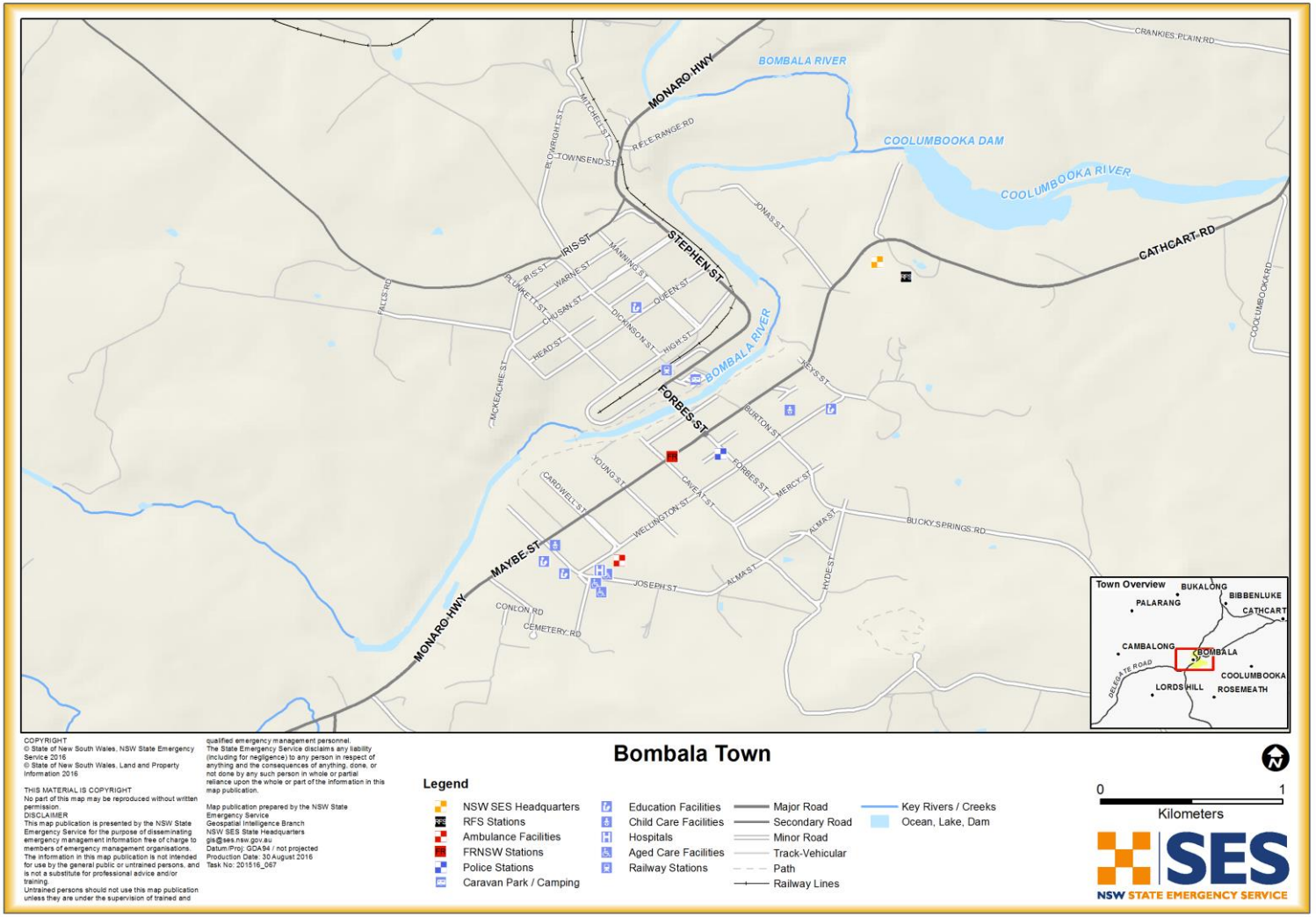
[5] As not much information exists for reference, this information is the result of comparing Satellite imagery against flood history data in the 2008 Bombala Shire LFP, and information from Bombala SES Controller.

ANNEX 2: SNOWY RIVER SYSTEM SCHEMATIC



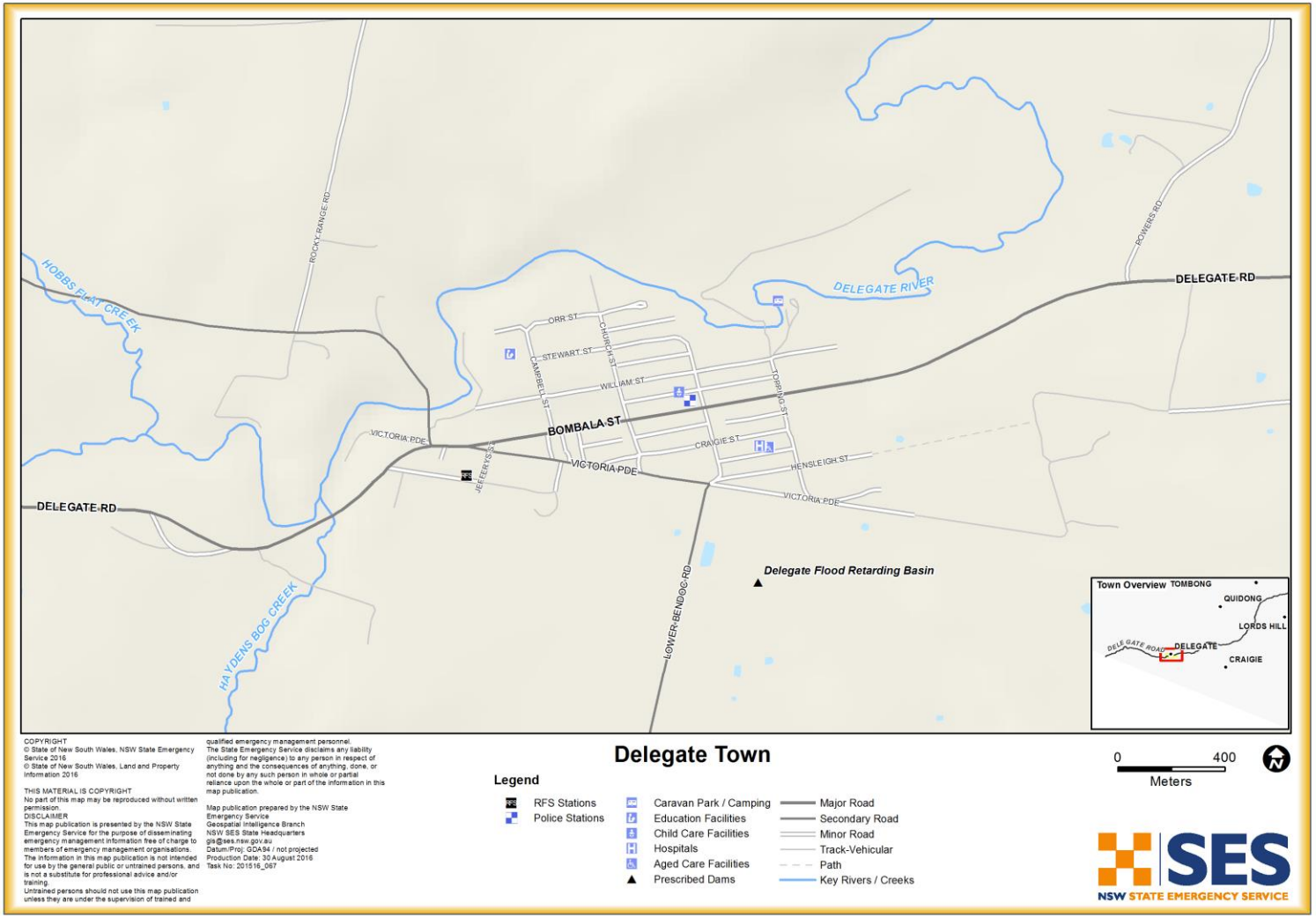
MAP 1: SNOWY RIVER BASIN

MAP 2: BOMBALA TOWN MAP

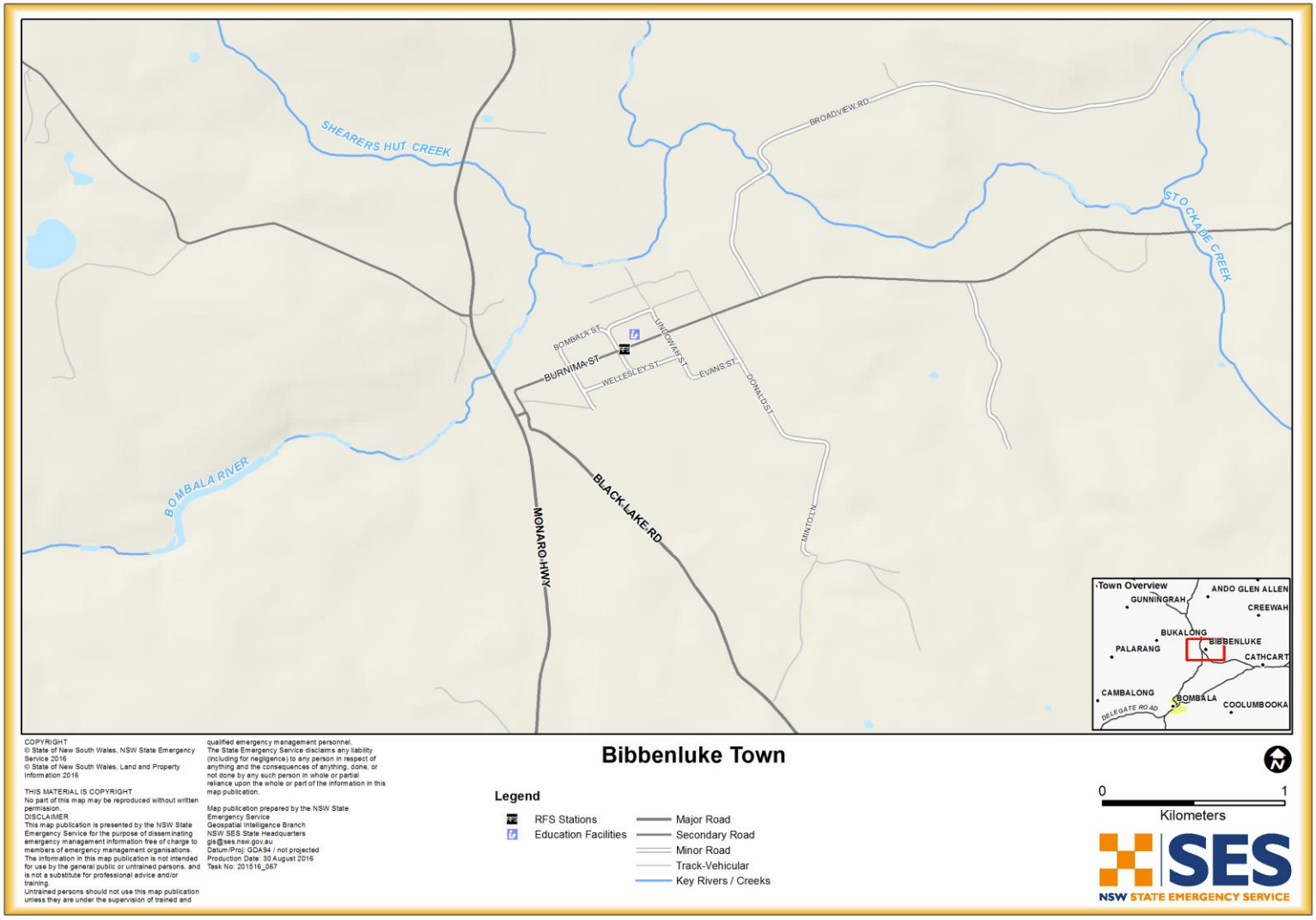


Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
NSW SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA94 / not projected
Production Date: 30 August 2016
Task No: 201516_067

MAP 3: DELEGATE TOWN MAP



MAP 4: BIBBENLUKE TOWN MAP



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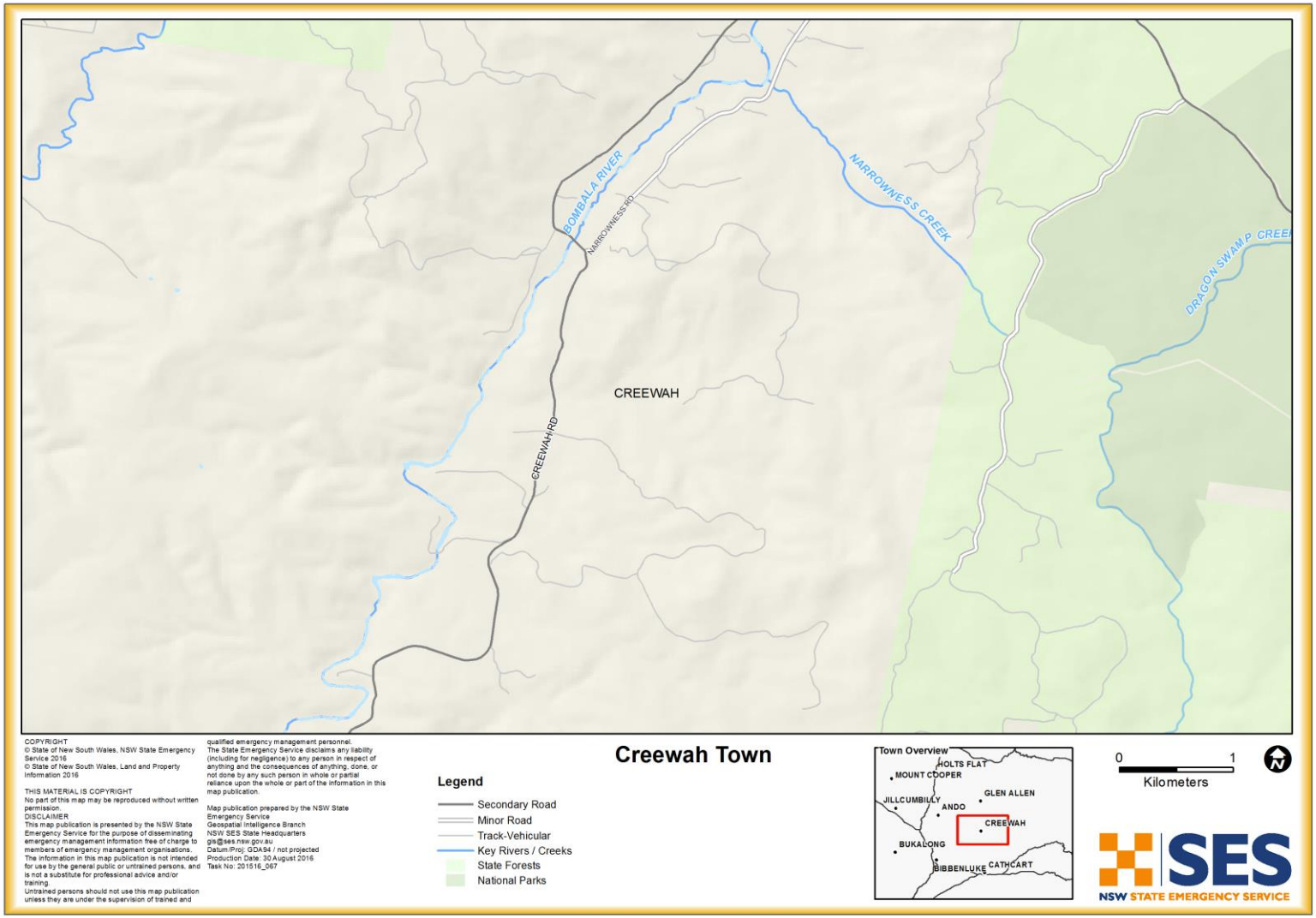
MAP 5: CREEWAH TOWN MAP



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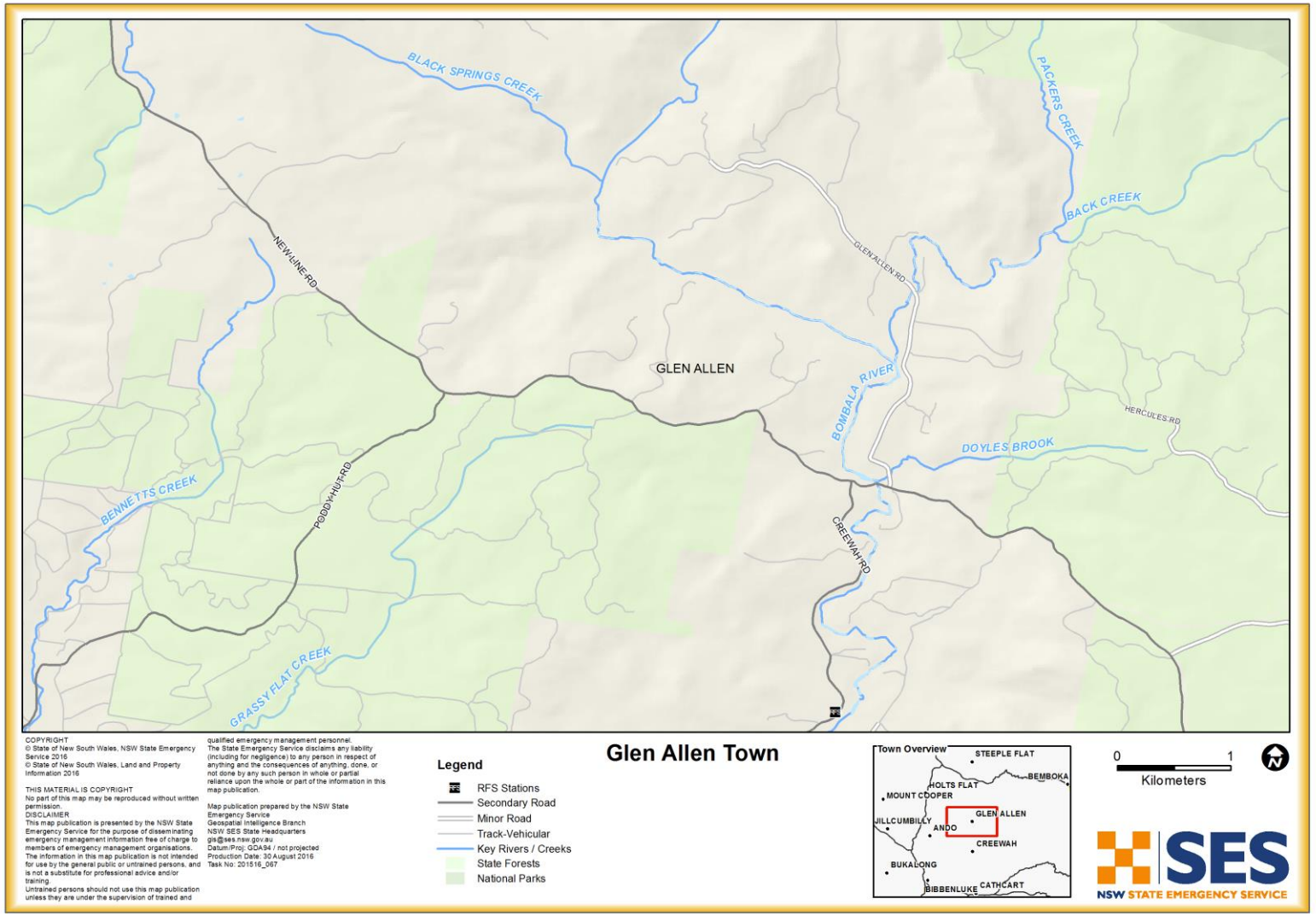
MAP 6: GLEN ALLEN TOWN MAP



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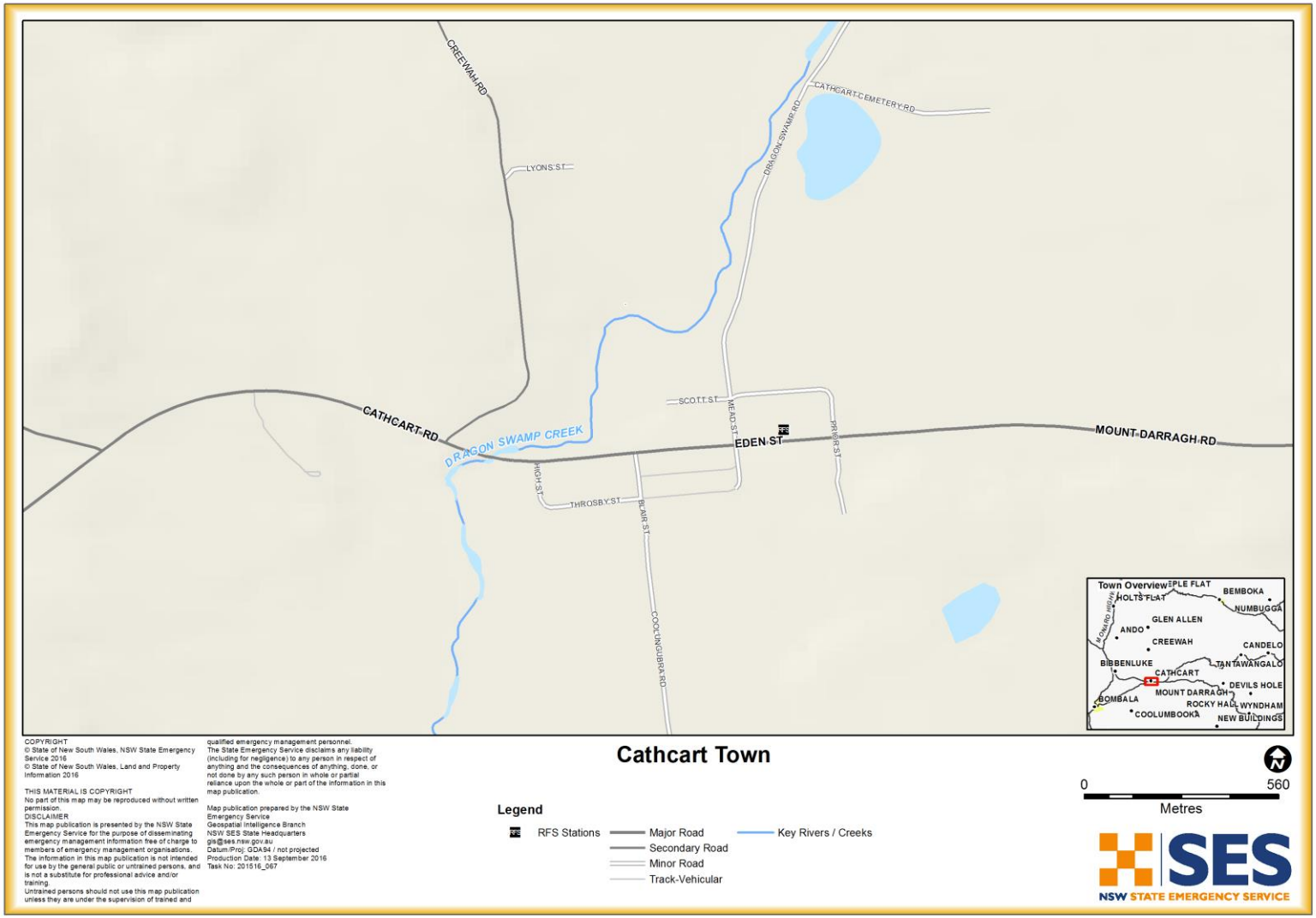
MAP 7: CATHCART TOWN MAP



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HAZARD AND RISK IN THE FORMER COOMA-MONARO LGA

Volume 2 of the Snowy Monaro Regional Local Flood Plan

Last Update: July 2017

AUTHORISATION

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

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Southern Highlands Region Controller

Date: 10/7/17.

Tabled at LEMC Date: 16 August 2017

CONTENTS

AUTHORISATION **1**

CONTENTS **2**

LIST OF TABLES **3**

VERSION LIST **4**

AMENDMENT LIST **4**

1 THE FLOOD THREAT **5**

1.1 Overview 5

1.2 Landforms and River Systems 5

1.3 Storage Dams 6

1.4 Weather Systems and Flooding 7

1.5 Characteristics of Flooding 8

1.6 Flood History 9

1.7 Flood Mitigation Systems 10

1.8 Extreme Flooding 11

2 EFFECTS ON THE COMMUNITY **12**

2.1 Community Profile 12

3 SPECIFIC RISK AREAS - FLOOD **13**

3.1 Cooma 13

3.2 Road Closures 19

3.3 Summary of Isolated Communities and Properties 20

ANNEX 1: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION **21**

ANNEX 2: MURRUMBIDGEE RIVER BASIN SCHEMATIC **23**

MAP 1 - MURRUMBIDGEE RIVER BASIN **24**

MAP 2 - COOMA TOWN MAP **25**

MAP 3 - COOMA DESIGN FLOOD EXTENTS MAP **26**

MAP 4 - NIMMITABEL TOWN MAP **27**

MAP 5 - BREDBO TOWN MAP **28**

MAP 6 - MICHELAGO TOWN MAP **29**

LIST OF REFERENCES **30**

LIST OF TABLES

Table 1: Prescribed Dams in the former Cooma-Monaro LGA; Summary of Information about each Storage. 6

Table 2: Indicative Flow Travel Time for the Cooma Creek and Cooma Back Creek 9

Table 3: Flood History from Koolaroo, Cooma Creek Gauge (410081) – Top 10 floods 10

Table 4: Census of Housing and Population data (2011) (8) 12

Table 5: Estimated number of properties inundated above floor level and over ground in Cooma related to the SMEC gauge (No. 410902). 14

Table 6: Levees in Cooma; summary of information 16

VERSION LIST

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

Description	Date
Cooma Monaro Local Flood Plan – Annexes A and B	November 2010

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Snowy Monaro Local Controller/s

NSW State Emergency Service

Geebung Street

Cooma NSW 2630

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

Amendment Number	Description	Updated by	Date

Document Issue: Version 2.0

1 THE FLOOD THREAT

1.1 OVERVIEW

1.1.1 The former Cooma Monaro Shire is located in the uppermost reaches of the Murrumbidgee River catchment. Flooding within the former council area can emanate from the Murrumbidgee River or its tributaries including Cooma Creek, Cooma Back Creek, Bredbo River, and the Numeralla River. These streams are discussed below. Cooma and Cooma Back Creeks are the only streams in the former LGA where flooding can have major effects on the community inundating roads and properties in Cooma. The effects of flooding of other streams within the former council area are minor, resulting in the isolation of a small number of properties, road closures and inundation of low-lying farmland adjacent to streams. Map 1 details the Murrumbidgee River Basin (1).

1.2 LANDFORMS AND RIVER SYSTEMS

Murrumbidgee River Basin

1.2.1 The **Murrumbidgee River** rises in the heart of the Snowy Mountains east of the Fiery Range (Map 1). The river originally flows southward into Tantangara Reservoir, being joined by the tributaries of Peppercorn, McPhersons, Boundary, Dairymans, Tantangara, Nungar and Carrolls Creeks. Downstream of Tantangara Reservoir the river flows further south, traversing steep gorge terrain, with small pockets of floodplain. East of the rivers confluence with Slacks Creek the river turns northward and joins the Numeralla River. Major tributaries along this reach include: Goorudee Rivulet and Jones, Yaouk and Slacks Creeks. North of the confluence with the Numeralla River, the river continues flowing north into the Australian Capital Territory (ACT), being joined by the Bredbo River, Michelago Creek, Ingelara Creek and the Naas River along the way. There are no large expansive floodplains along any of these reaches (1).

1.2.2 **Cooma Creek** rises south of Cooma in the foothills of the Monaro Range. Cooma Creek is joined by numerous small tributaries including Brothers Creek, before flowing through Cooma and joining Cooma Back Creek in the northern section of the town. From this confluence the creek continues to flow north eventually joining the Numeralla River. The catchment is relatively steep and small with its size totalling 103 square kilometres at its confluence with Cooma Back Creek. Map 2 details both Cooma and Cooma Back Creek catchments (1).

1.2.3 **Cooma Back Creek** rises to the south of Cooma and to the west of Cooma Creek. The creek flows through foothills passing through the western parts of Cooma before joining Cooma Creek in the northern section of the town. The catchment is relatively steep and small with its size totalling 100 square kilometres at its confluence with Cooma Creek (1).

1.2.4 **Bredbo River** rises in the Badja State Forest, east of Bredbo and flows west before joining the Murrumbidgee River close to the village of Bredbo (1).

1.2.5 **Numeralla River** begins near Kybeyan close to Nimmitabel. The river flows northwards to Numeralla then west to its junction with the Murrumbidgee River. The rivers main tributaries are the Kybeyan River, Rock Flat Creek, Big Badja River, Tom Groggins Creek and Cooma Creek (1).

1.3 STORAGE DAMS

1.3.1 There are seven Prescribed Dams within the Snowy-Monaro LGA including Tantangra, Cowarra Creek Tailings, Eucambyne, Guthega, Island Bend, Jindabyne and Delegate Flood Retarding Basin.

1.3.2 However of these, only Tantangra Dam and Cowarra Creek Tailings Dam lie within the former Cooma-Monaro LGA.

1.3.3 Dam locations are shown on MAP 1 – Murrumbidgee River Basin.

Table 1: Prescribed Dams in the former Cooma-Monaro LGA; Summary of Information about each Storage.

Tantangra Dam	
Owner / Operator	Snowy Hydro Ltd (SHL)
Dam Safety Emergency Plan (DSEP)	Snowy Hydro Limited – Dam Safety Emergency Plan Tantangara Dam – Issue Date: 7th March 2014 (2).
Description of Dam	Concrete gravity structure approximately 216m long at the crest and 45m high. Dam crest level is a RL 1,233.83m (SMA datum). It has a free overfall spillway located centrally in the dam which has capacity for flows up to 900m³/s. Capacity at normal operating Fully Supply Level (FSL) is approx. 254 GL.
Location	Located on the Murrumbidgee River in the Kosciuszko National Park.
Communities Downstream	Downstream, the Murrumbidgee River passes through farming country and approaches the outskirts of Cooma before turning north towards Canberra. Yaouk Valley and Dog Plain, north and east of Adaminaby and in the Kissops Flat/Birchgrove area. Part of the Kosciuszko National Park.
Monitoring System	SHL advises Storage Level real time monitoring is in place.
Warning System	SHL advises Nil as at 2016.
Other	No flow timelines are shown in the current Dam Safety Emergency Plan (DSEP) 2014 as at 2016 (2).

Cowarra Creek Tailings Dam	
Owner / Operator	NSW Crown Lands
Dam Safety Emergency Plan (DSEP)	Note: No current DSEP, NSW Public Works refers to the following: Cowarra Creek Mine Tailings Dam – 2015 Surveillance Report (Inspection Date 16th June 2015). Report Number: DC15137 July 2015 (3).
Description of Dam	Earth/rock fill embankment with partial geofabric lining. Embankment Length 110m and Height 24.5m. Crest Level RL 854.1m AHD. Full Supply Level (FSL) 52ML. Spillway overflow is ungated channel in meta-sedimentary rocks.
Location	Located approximately 15 km East of Bredbo on a tributary of Cowarra Creek. The Coppawidgee Trail passes in the vicinity to the West.
Communities Downstream	No nearby inhabitants: Population at Risk (PAR) <1
Monitoring System	Visual inspection every 2.5yrs (inactive but still prescribed dam in 'care and maintenance' status).
Warning System	Nil
Other	This site is managed under the Derelict Mines Program and is in a state of 'Care and Maintenance'. Visually inspected, assessed, and reported on in 2015. Reported as being designed to withstand at least up to a 1% AEP (1 in 100 ARI) (3).

1.4 WEATHER SYSTEMS AND FLOODING

1.4.1 Floods within the former Cooma Monaro council area can be caused by the following types of weather systems (1):

a. Sequences of southern air masses (frontal systems) coming from the Antarctic region and moving in a north easterly direction over the catchment. This is the principal flood producing mechanism and operates primarily between the months of April and October (1).

b. Low-pressure systems located over the east coast of Australia and causing moist airflows over the Monaro district and Snowy Mountains (1).

c. Short duration, high intensity convective thunderstorms that occur over small areas during summer. These may cause town drainage systems to surcharge and the Cooma and Cooma Back creeks to rise rapidly. Such thunderstorms do not cause mainstream riverine flooding on larger streams such as the Murrumbidgee River. However, may cause rises in small tributaries (1).

1.5 CHARACTERISTICS OF FLOODING

Characteristics of Flooding in the LGA

1.5.1 Flood warning times are typically short, with streams both rising and falling quickly. The main exception to this is the Murrumbidgee River, which can stay in flood for up to a week at a time with minor impacts to rural communities and transport routes (1).

1.5.2 Flooding in catchments tends to occur simultaneously because it results from rainfall along the Great Dividing Range (1).

1.5.3 The highest rainfalls generally occur in the period from December to February, with another peak in June. However, floods can occur at any time of year (1).

Characteristics of Flooding on Cooma Creek and Cooma Back Creeks

1.5.4 Cooma Creek and Cooma Back Creeks are both relatively steep and free of dense vegetation. Storm rainfalls in the area are typically of short duration but of moderate to high intensity. As a consequence floods on Cooma and Cooma Back creeks are characterised by flash flooding. Flash flooding is generally described as flooding which occurs within six hours of the rain that causes it. In Cooma the time to flooding from Cooma Creek and Cooma Back Creek can be as little as 30 minutes to two hours from the onset of heavy rain (1).

1.5.5 During an event reaching 2.38m on the SMEC Sharp Street gauge (No. 410902) or 4.4m on the Koolaroo gauge (No. 410081), which equates to a 5% AEP (20 year ARI) event, the floodplains adjacent to the creeks could be inundated by flood waters one metre or more deep and flowing at one metre per second or more (4). Such velocities would be sufficient to damage fences and structures, wash vehicles from causeways and pose serious danger to persons attempting to wade or swim through flood waters. Mainstream velocities may reach up to three metres per second (1).

1.5.6 Flood waters typically contain large amounts of debris, which frequently lodge on structures and trees in floodway areas, causing a reduction in flood capacity. During the 1991 flood, such a build up at Sharp Street resulted in increased flooding in the area (1).

1.5.7 It could be expected that peaks in both creeks could occur at the same time, leading to an exacerbation of flooding at their confluence (1).

Table 2: Indicative Flow Travel Time for the Cooma Creek and Cooma Back Creek

Locations	Travel Time
Cooma	As little as 30 minutes, up to two hours, from when Creeks begin to flow (dependent on rainfall) (1).

Flash Flood Alerts

1.5.8 The Australian Bureau of Meteorology (BOM) monitors rain gauges in the Cooma Town area and provides Flash Flood Alerts to external authorities such as Local Government and the NSW SES. These alerts are sent to the various authorities nominated Flash Flood phones. The BOM advises that all Cooma rain Gauges have three set thresholds for the purpose of flash flood prediction and alerts. The three thresholds are:

- Threshold 1 – equates to 30mm in 30 minutes

  (broadly based on the 1hr/10 year ARI for Cooma)
- Threshold 2 – equates to 40mm in 60 minutes

  (Indicates a sustained event)
- Threshold 3 – equates to 70mm in 3 hours

  (Generally leads to major flooding)

IMPORTANT NOTE:

The BOM advises that should any authority receive two calls in quick succession on their nominated Flash Flood phone, then that authority may need to take drastic action (5).

1.6 FLOOD HISTORY

1.6.1 Cooma Creek has a history of flooding. Flood events include March 1956, March 1961, December 1966, March 1969, June 1978, July 1991, January 1992 and February 2012. The flood of record is the 1956 flood (prior to construction of the Cooma levee) which was equivalent to a 1 in 17 year flood event (1).

1.6.2 In comparison the 1991 flood is estimated to have been 1.84m on the SMEC Sharp Street gauge (No. 410902) and 3.65m on the Koolaroo gauge (No. 410081). This 1991 flood event is estimated to have been equivalent to a 10% AEP (1 in 10 ARI) flood (1).

1.6.3 In January 2007 a localised severe thunderstorm generated about 40mm of rainfall and runoff caused Cooma Creek to reach the top of the levee, which equates to 2.38m on the SMEC Sharp Street gauge (No. 410902) or 4.4m on the Koolaroo gauge (No. 410081), a 5% AEP (1 in 20 ARI) flood. Several weeks

later this was repeated when another thunderstorm generated about 75mm of rain (1).

1.6.4 Since 1964 significant floods on the Murrumbidgee River have been recorded in 1974, 1976, 1978, 1991, 1992 and 2011 and on the Numeralla River in 1974, 1975, 1976 and 1991 (1).

1.6.5 It is important to note that floods can occur on the tributaries and headwaters of the Murrumbidgee River without any significant flooding of the Murrumbidgee River (1).

Table 3: Flood History from Koolaroo, Cooma Creek Gauge (410081) – Top 10 floods

Date	Peak Height (m)
30/12/1966	3.05
29/03/1969	3.19
24/05/1974	2.66
14/06/1978	2.79
26/11/1988	2.66
03/04/1989	2.74
10/07/1991	3.65
12/07/1991	3.04
09/01/1992	2.94
03/02/2011	2.63

1.7 FLOOD MITIGATION SYSTEMS

1.7.1 A system of levees protects the urban areas of Cooma (6). The initial sections of the system were constructed in 1960 and are mostly earthen with a concrete section between Massie and Egan Streets. The design height of the levee is 2.38m on the SMEC Sharp Street gauge (No. 410902) or 4.4m on the Koolaroo gauge (No. 410081), equating to a 5% AEP (1 in 20 ARI) flood. The levee system has been extended and some sections remediated since construction in the 1960s (6).

1.7.2 The levee system includes the following levees:

a. From Sharp Street to Egan Street along the north eastern side of Cooma Creek (built in the 1960s).

b. Extensions from Campbell St to Massie St (built 2002).

c. Cooma Back Creek/Mulach Street section of the levee starts in vicinity of the Barrack Street intersection (built 1983, raised late 1990s) (1).

1.7.3 Each levee is further described within Part 3 - Specific Risk Areas.

1.7.4 Levee locations are shown on MAP 2 – Cooma Town.

Location and sequence of inundation

1.7.5 An area near Sharp Street behind the Cooma levee has in the past flooded from local runoff resulting in the inundation of some commercial premises. Council has since implemented works to address this problem. Flooding due to local runoff is expected to occur prior to overtopping of the levee (1).

1.7.6 High ground is located behind the levee above the Probable Maximum Flood (PMF) that allows for evacuation within Cooma (1).

Levee Integrity

1.7.7 Erosion has occurred near the Cooma Creek and Cooma Back Creek confluence. Council has pursued works to remediate this, however to date this has not yet occurred. Refer to Part 3 - Specific Risk Areas for further detail (1).

1.7.8 Material used for construction of older sections of the levees is unknown (1).

1.8 EXTREME FLOODING

1.8.1 Flooding above the flood of record is possible. Extreme floods above 4.06m on the SMEC Sharp Street gauge (No. 410902) or 5.7m on the Koolaroo gauge (No. 410081), equating to a 1% AEP (1 in 100 ARI) flood are characterised by fast rising, deep and fast flowing floodwaters, with the horizontal extent of flooding across the topography increasing in magnitude (1). Map 3 shows the modelled 1% AEP flood extent in Cooma.

1.8.2 The PMF would inundate large parts of Cooma with deep, high velocity, debris laden flood water. During a PMF the water depth in the channel would exceed 7m (1). A map showing the PMF and 1 in 500 year design floods at Cooma can be found in the SMEC 1994 Cooma Floodplain Management Study Final Report (7). The maps show that even with extreme flooding there is still a large portion of Cooma that is flood free (high ground above the PMF) (1) (7).

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

2.1.1 The population of the Cooma Urban Area was 7,428 at the last Census in 2011. Included in this figure was a small indigenous community of 234, a small community of 31 who do not speak English well, and 419 people aged over 65. There are approximately 459 residents in the Cooma Urban Area who may require assistance due to illness or disability during an event. Table 4 below provides further detailed analysis (8).

Table 4: Census of Housing and Population data (2011) (8)

Census Description	Former Cooma-Monaro LGA	Cooma	Nimmitabel
Total Persons	**9,772**	**7,428**	**528**
Aged 0-4 yrs	606	468	35
Aged 5-14 yrs	1,273	931	75
Aged 65 + yrs	1,769	1,412	106
Of Indigenous Origin	263	234	12
Who do not speak English well	31	31	0
Have a need for assistance (profound/severe disability)	545	459	31
Living alone (Total)	1,167	959	66
Living alone (Aged 65+)	487	419	24
Residing in caravans, cabins or houseboats or improvised dwellings	34	12	12
Occupied Private Dwellings (Households)	**3,828**	**2,967**	**220**
No Motor Vehicle	287	280	13
Caravan, cabin, houseboat or improvised dwell	21	5	3
Rented via State or Housing Authority	94	96	0
Rented via Housing Co-Op or Community Church Group	25	20	0
No Internet Connection	978	817	66
Unoccupied Private Dwellings	910	510	122
Average persons per occup dwelling	2.3	2.3	2.4
Average vehicles per occup dwelling	1.7	1.6	1.8

3 SPECIFIC RISK AREAS - FLOOD

3.1 COOMA

3.1.1 Cooma is the only urban area within the former Cooma-Monaro LGA with a known significant flood problem (Maps 2 and 3). Flooding can either be direct flooding from Cooma Creek, Cooma Back Creek, or a combination of both (1). Flooding of other streams within the former LGA can result in the isolation of properties, road closures, inundation of low-lying farmland, and the potential evacuation of some areas adjacent to creeks (1).

Characteristics of Flooding

3.1.2 Flooding in Cooma occurs with little warning time and can be deep and fast flowing, posing a significant hazard to life (1). Flooding on Cooma Creek and Cooma Back Creek is considered to be Flash Flooding (1).

Classification of Floodplain

3.1.3 Using the DECC Floodplain Risk Management Guideline 2007 (9), the Cooma Town is classified as having 'Rising Road Access' (RRA). These are areas where access roads exist and rise steadily in an uphill direction away from rising floodwater. Cooma Town cannot be completely isolated even in a PMF (9).

3.1.4 Cooma Town contains low-lying areas that people would need to be progressively evacuated from to higher ground as floodwaters rise (9).

3.1.5 Evacuation is possible by vehicle or on foot using these access roads as floodwaters rise. People should not become trapped in homes unless their decision to evacuate their properties is delayed. An example of this is potentially occupants of multiple storey buildings who initially thought they would stay, but later wished to leave when their evacuation route may already have been cut off (9).

Inundation

3.1.6 Cooma is affected by the flooding of the Cooma and Cooma Back Creeks. Areas at risk of flooding during the 5% and 1% AEP events are shown in Map 3 and include Cooma's central business district and residential areas adjacent to the creeks (1).

3.1.7 Low-lying farmland located adjacent to rivers and creeks can also be flooded with farmers needing to relocate livestock and equipment to higher ground. It is considered unlikely that farm houses would be inundated (1).

3.1.8 The 1991 flood which reached 1.84m on the SMEC Sharp Street gauge (No. 410902) and 3.8m on the Koolaroo gauge (No. 410081) (10% AEP or 1 in 10 ARI) caused flood damage to 43 residences and 10 businesses. Eighteen of those residential properties experienced over floor flooding, as did seven of the commercial properties (Table 5) (1).

It is unclear from the SMEC 1994 Cooma Floodplain Management Study whether these properties were affected due to localised flooding inside the levee (ponding), or if they were located outside the levee. As the property locations are not listed it is also uncertain if these properties are now protected by the levee. In 1991 the Sharp St to Egan St levee was in place as was limited leveeing in the Cooma Back Creek / Mulach Street area. Since 1991 the levee system has been extended and raised in several places (7).

3.1.9 During floods greater than 4.06m on the SMEC gauge (No. 410902) or 5.7m on the Koolaroo gauge (No. 410081) (1% AEP or 1 in 100 ARI), the Cooma TAFE and the former Cooma Monaro Shire Council basement and car park may be flooded (1).

3.1.10 During a PMF large parts of Cooma would be inundated with deep, high velocity, debris laden flood waters. However even in such an extreme event the mapping from the SMEC 1994 Cooma Floodplain Management Study shows that large portions of Cooma would still remain flood free with high ground available above the PMF (7).

3.1.11 Snowy Monaro Shire Council engineering staff advise that council is seeking funds to conduct further flood modelling of the Cooma Town and surrounding rural areas.

Table 5: Estimated number of properties inundated above floor level and over ground in Cooma related to the SMEC gauge (No. 410902).

Gauge Name/Number Gauge Height (m)	% AEP (? in Yr.)	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
SMEC gauge No. 410902 (1.84m) **and** Koolaroo gauge No. 410081 (3.8m)	10% AEP (1 in 10)	Unknown	18 residences 7 businesses (in 1991 event[1])	43 residences 10 businesses (in 1991 event[1], inclusive of figures from previous column)
SMEC gauge No. 410902 (2.38m) **and** Koolaroo gauge No. 410081 (4.4m)	5% AEP (1 in 20)	Unknown	Nil[1]	Nil[1] – but beyond this height low lying areas may experience inundation
SMEC gauge No. 410902 (4.06m) **and** Koolaroo gauge No. 410081 (5.7m)	1% AEP (1 in 100)	Unknown	Unknown	30-40 residences[2] 20 businesses[2] Cooma TAFE and Cooma Monaro Shire Council basement and carpark may be flooded.

[1]Note: there is a discrepancy between the affected property figures for the 10% AEP in 1991 and the 5% AEP figures (not dated). Since 1991 further levee works have occurred that may be reflected in these figures.

[2]Note: the Draft Cooma Creek FIC at SHR indicates that ground truthing by NSW SES members in 2009 identified likely affected property figures within the 1% AEP extent (10).

Isolation

3.1.12 Generally creeks rise and fall quickly and result in only short term isolation in some rural areas of up to two days, however in more extreme events some rural areas may remain isolated for up to one week. Such isolation is due to flooded roads. A small number of properties in the former Cooma Monaro Shire located on the Numeralla, Kydra, Badja, Bredbo, Tuross and Murrumbidgee Rivers can be isolated for up to a week (1).

3.1.13 Smiths Road 'The Angle' NSW, is a small dispersed rural community along Smiths Road which may become isolated for short periods due to several small creeks rising along Naas Road between Tharwa (ACT) and Smiths Road properties within NSW. The Smiths Road area is part of the former Cooma Monaro LGA. However, by way of agreement between SES Units this community is serviced by NSW SES Queanbeyan Unit due its closer proximity. Further detail regarding this area is found in the Queanbeyan – Palerang Local Flood Plan, under Section 1.6 Cross Border Assistance Arrangements (11).

3.1.14 See Section 3.3 Summary of Isolated Communities and Properties for further detail. For road closures refer to Section 3.2.

Flood Mitigation Systems

3.1.1 Cooma is protected by a system of levee banks up to the level of 2.38m on the SMEC Sharp Street gauge (No. 410902) or 4.4m on the Koolaroo gauge (No. 4100815). This is equivalent to a 5% AEP (1 in 20) flood event. Up to this point the levee provides protection for approximately 30 properties. After this point low-lying parts of Cooma begin to experience inundation (1). A summary of information regarding levee systems in Cooma and the potential numbers of threatened properties is provided in Table 6. These levees are also shown on Map 2.

3.1.2 Low-set properties adjacent to the creeks in Bombala, Campbell, Albert, Victoria, Dension, Egan, Murray, Commissioner, Sharp, Massie, Amos, Vale, Barrack, Kerwan, Tumut, Lambie, Boundary, Vulcan, Mulach streets and Church Road are protected by the levee system and would be susceptible to varying degrees of flooding once the levee is overtopped (1).

Table 6: Levees in Cooma; summary of information

Cooma Town Levee System	
Locations	Sharp Street to Egan Street Campbell to Massie Street Cooma Back Creek/Mulach Street
Type of Levee (ring etc)	A 'Levee System' incorporating the three locations described above.
Owner	Snowy Monaro Council
Design Height and freeboard	Levee design height and recommended works from SMEC 1994 Cooma Floodplain Management Study (7) were for 2.38m on the SMEC gauge (No. 410902), and 4.4m on the Koolaroo gauge (No. 410081), a 5% AEP with 0.5m freeboard. Works have since been undertaken, but height is not confirmed.
Overtopping Height	Varies, and will be identified further in planned remodel for 2017.
No. of properties protected	Approximately 43 residences and 10 businesses.
Known low points	Since 1994 the former Cooma-Monaro Council has undertaken works to address low points.
Location and sequence of inundation	This detail is unclear, however Snowy Monaro Council is currently seeking funding to review their flood modelling as it has not been done since approximately 2000.
Consequences of levee overtopping or failure	In the 1991 (10% AEP) flood event 43 residences and 10 businesses experienced over-ground flooding. Of those, 18 residences and 7 businesses experienced over-floor flooding (1). Since 1991 however the Levee System has been extended. Cooma has a flood classification of Rising Road Access (RAA) and in the event of an evacuation there is high ground located behind the levee that is above PMF level (9).
List any deficiencies	This detail is unclear at this time, however Snowy Monaro Council is currently seeking funding to review their flood modelling as it has not been done since approximately 2000.

Dams

Tantangara Dam - Consequences of dam failure for the former Cooma Monaro LGA

3.1.3 There is limited information available with regard to Tantangara Dam design flood specifications, however Snowy Hydro Limited are reviewing the specifications of this dam at this time. Updated information is likely to be released in future versions of the DSEP (2).

3.1.4 Snowy Hydro Limited advises that the storage level of Tantangara is generally around 20% full. Tantangara is a shallow dam and once storage levels reach 20-25%, diversions to Lake Eucumbene commence as part of Snowy Hydro's evaporation minimisation efforts (12).

3.1.5 Downstream of Tantangara Dam, the Murrumbidgee River passes through the Kosciuszko National Park which contains a number of walking trails and camping grounds. The river then travels through predominantly farming lands before it then turns north towards Canberra. This area contains isolated dwellings, huts and sheds adjacent to the river. Small settlement clusters exist in Yaouk Valley and Dog Plain to the North and East of Adaminaby, and in the Kissops Flat/Birchgrove area. Many properties along the river are used as holiday homes in summer (2).

3.1.6 Flood inundation downstream of Tantangara Dam is generally through narrow steep valleys, broadening out along the floodplains of Yaouk, Second Flat, and East of Adaminaby. The largest flooded area is East of Adaminaby where the Murrumbidgee River is joined by the Goorudee Rivulet, Long Corner Creek and Back Creek (2).

3.1.7 The Tanangara Dam, Dam Safety Emergency Plan indicates dam failure scenarios having a maximum flood extent which reach parts of the Snowy Mountains Highway, Adaminaby Racecourse and Boboyan Road adjacent to Long Corner Creek. Refer to the DSEP for further detail (2).

At Risk Facilities

3.1.8 During floods greater than 4.06m on the SMEC Sharp Street gauge (No. 410902) or 5.7m on the Koolaroo gauge (No. 410081) (1% AEP or 1 in 100 ARI) flood event, the Cooma TAFE and the former Cooma Monaro Shire Council basement and car park may be flooded. TAFE have an evacuation plan that will be implemented upon advice from the NSW SES or other emergency services officer (1).

3.1.9 The Cooma Hospital in Bombala St is not expected to flood even during a PMF event (1).

3.1.10 Based on the information available, no schools or campgrounds in the Local Government Area are expected to be inundated due to riverine flooding (1).

3.1.11 Satellite imagery comparison against the flood extent mapping identifies:

a. Cooma TAFE Campus in Commissioner Street, Caltex Service Station in Sharp Street, and Region Service Station in Bombala Street could all be impacted in an event reaching 2.38m on the SMEC Sharp Street gauge (No. 410902) or 4.4m on the Koolaroo gauge (No. 4100815) which equates to a 5% AEP (1 in 20 ARI) event. The Cooma Bowling Club in Mawson Street is just outside the 5% AEP extent but may also be impacted (13) (1).

b. Similarly, the Cooma Universities Centre in Bombala Street, Cooma Lambie Street Preschool, Caltex Cooma in Sharp Street and the Cooma Bowling Club could be impacted in an event reaching 4.06m on the SMEC Sharp Street gauge (No. 410902) or 5.7m on the Koolaroo gauge (No. 410081) which equates to a 1% AEP (1 in 100 ARI) event. The Sir William Hudson Memorial Centre in Fachin Street is just outside the 1% AEP Extent but may also be impacted (13) (1).

3.1.12 For further detail refer to Annex 1 - facilities at risk of flooding and/or isolation within the former Cooma Monaro LGA. Note: This list is not necessarily comprehensive.

Surrounding Villages

3.1.13 As earlier stated, Cooma Town is the only urban area within the former LGA that has a significant flood problem. Surrounding villages may however be affected by short term road closures. The Snowy Monaro Shire Council is seeking funding to conduct a new flood study that may include greater reference to surrounding villages such as Michelago, Bredbo, and Nimmittabel. Maps of these villages have been included in this plan as they may assist in locating potential road closure points referenced within Section 3.2 Road Closures (See Maps 4, 5, and 6) (1).

ROAD CLOSURES AND ISOLATED COMMUNITIES

3.2 ROAD CLOSURES

3.2.1 Many rural roads as well as a major highway within the LGA are susceptible to flooding from local creeks, with low level crossings closed by fast flowing flood waters. Excluding closure of the highway, the major impact from rural road closures is to prevent rural residents from leaving or returning to their properties. Generally the creeks rise and fall quite quickly (periods of several hours). However in a prolonged widespread flood event, the duration of floods closing these rural roads may run into days (1).

3.2.2 The following roads can experience flooding resulting in their closure:

a. The **Monaro Highway** can be closed for periods up to a day by Cooma Creek at Bunyan. The RTA closes and signposts this location. It can also be closed by local creek flooding at Colinton for between two and three hours at a time. While local alternate routes are available, these are via unsealed roads which may also be affected by flooding of local creeks, and are not suitable for heavy vehicles. Major alternate routes are the Princess Highway to the East and the Hume Highway to the West.

b. **Tinderry Road** to the West of Michelago village at Michelago Creek isolating rural residents along Tinderry Road. Access is unlikely from the Jerangle Road due flooding by other creeks and the Queanbeyan River crossing.

c. The low level causeway across the Murrumbidgee River on **Bumbalong Road** can be cut isolating about five properties. There is no alternate access to the West, however the community is self-sufficient for at least 48 hours.

d. **Billingara Road** can be cut by the Murrumbidgee River, although access remains open to the West through to Shannons Flat.

e. **Peak View Road** can be cut at:

- The Bredbo River causeway.
- The Cowra Creek causeway.
- At Frog's Hole Creek.

f. **Cowra Creek Road** can be cut at the Bredbo River.

g. **Rose Valley Road** can be cut by Rock Flat Creek and by the Numeralla River at 'Rose Valley' station (1).

3.2.3 A number of roads and property access roads can be cut in the area East of Cooma, South of Numeralla and North of Nimmitabel. However the rivers and creeks generally rise and fall quite quickly (matter of several hours) and there is only a minor impact to the community. These roads include:

a. **Numeralla/Carlaminda area** along the Numeralla River.

b. **Kybean Road, The Old Bega Road** at Steeple Flat and near 'Woodlands'

c. **Tom Groggin Road**

d. **Nimmitabel** to **Bobundara Road**

e. **Numeralla Road** at Rock Flat Creek.

f. **Dry Plains Road** at the Slacks Creek low-lying causeway (1).

3.2.4 **Smiths Road** 'The Angle' NSW - rural properties along Smiths Road may also be isolated for short periods due to several small creeks rising and cutting the Naas Road between Tharwa (ACT) and Smiths Road properties within NSW (1).

3.2.5 Four low-level causeways cross Cooma Creek (**Massie and Commissioner Streets** and **Banksia Lane**) and Cooma Back Creek (**Barrack Street**) and may be flooded in relatively small floods, requiring their closure. Council closes these causeways when they are overtopped or in flood. Larger floods may affect traffic over the **Sharp St Bridge**. Access to Cooma is maintained via Polo Flat Road and the southern part of the Monaro Highway (1).

3.3 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

3.3.1 Generally the creeks rise and fall quite quickly (periods of several hours) however in a prolonged widespread flood event, the duration of floods closing rural roads may run into days causing inconvenience and some isolations (1).

3.3.2 Refer also to Section 3.1 Cooma, subheading Isolation, and Section 3.2 Road Closures for further detail.

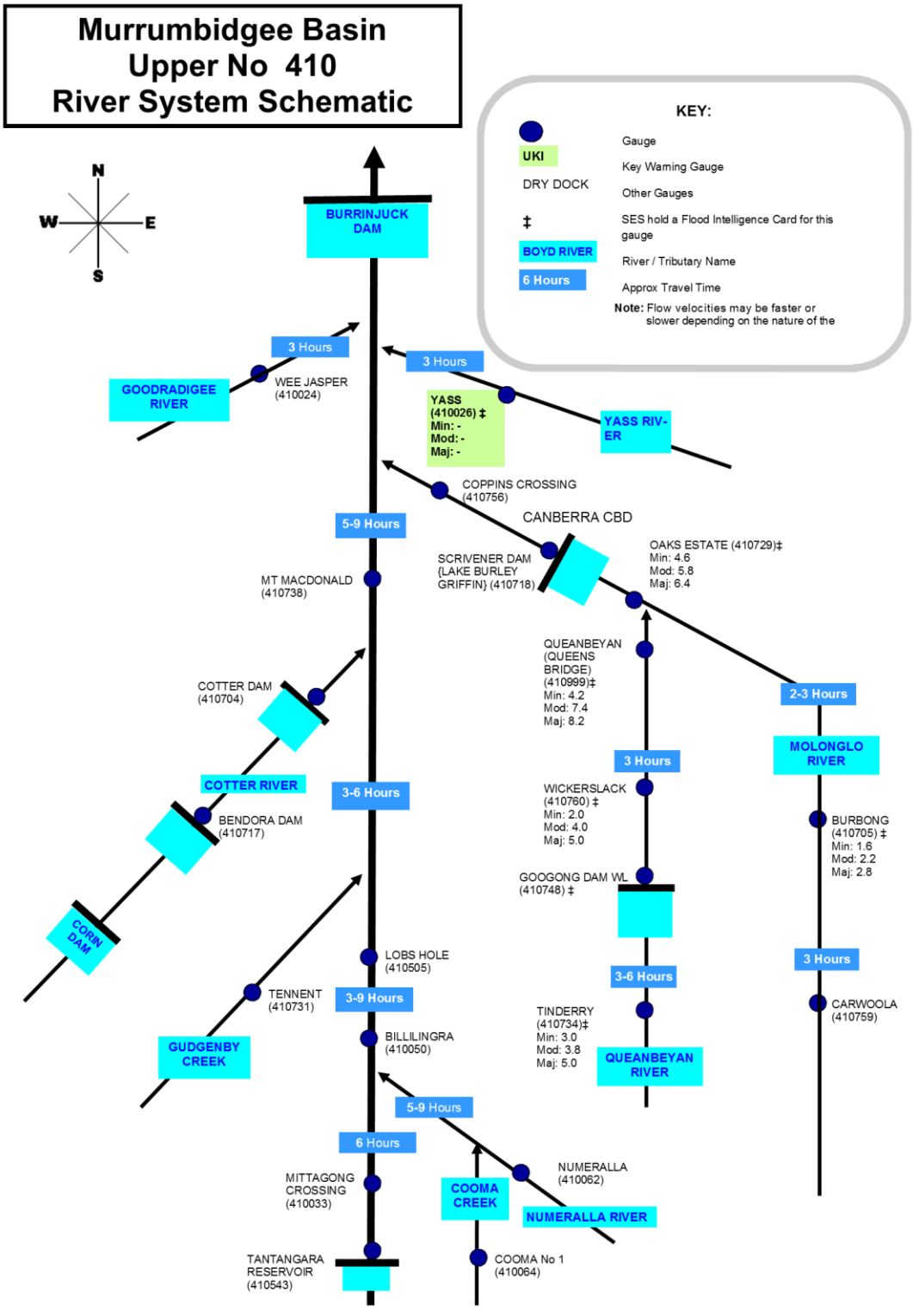
ANNEX 1: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION

Former Cooma Monaro LGA

Facility Name	Street	Suburb	Comment (based on modelled flood extents)
Schools / Education Facilities			
TAFE Illawarra – Cooma Campus	66 Commissioner Street	Cooma	Lies within the **5% AEP** (1 in 20 ARI) Extent and would be impacted in such an event. Equates to 2.38m on the SMEC Sharp Street gauge (No. 410902), 4.4m on the Koolaroo gauge (No. 4100815).
Cooma Universities Centre	38 Bombala Street	Cooma	May be impacted in **1% AEP** (1 in 100 ARI) event, as is just on the edge of this flood extent. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081).
Child Care Centres			
Cooma Lambie Street Pre-school Inc.	3/5 Lambie Street	Cooma	May be impacted in **1% AEP** (1 in 100 ARI) event, as is just outside of this flood extent. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081).
Facilities for the aged and/or infirm			
Sir William Hudson Memorial Centre	8 Fachin Street	Cooma	May be impacted in **1% AEP** (1 in 100 ARI) event, as is just outside of this flood extent. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081).
Correctional Facilities			
Cooma Community Corrections Office	27A Vulcan Street	Cooma	May be isolated in **1% AEP** (1 in 100 ARI) event, as is just on edge of this flood extent. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081).

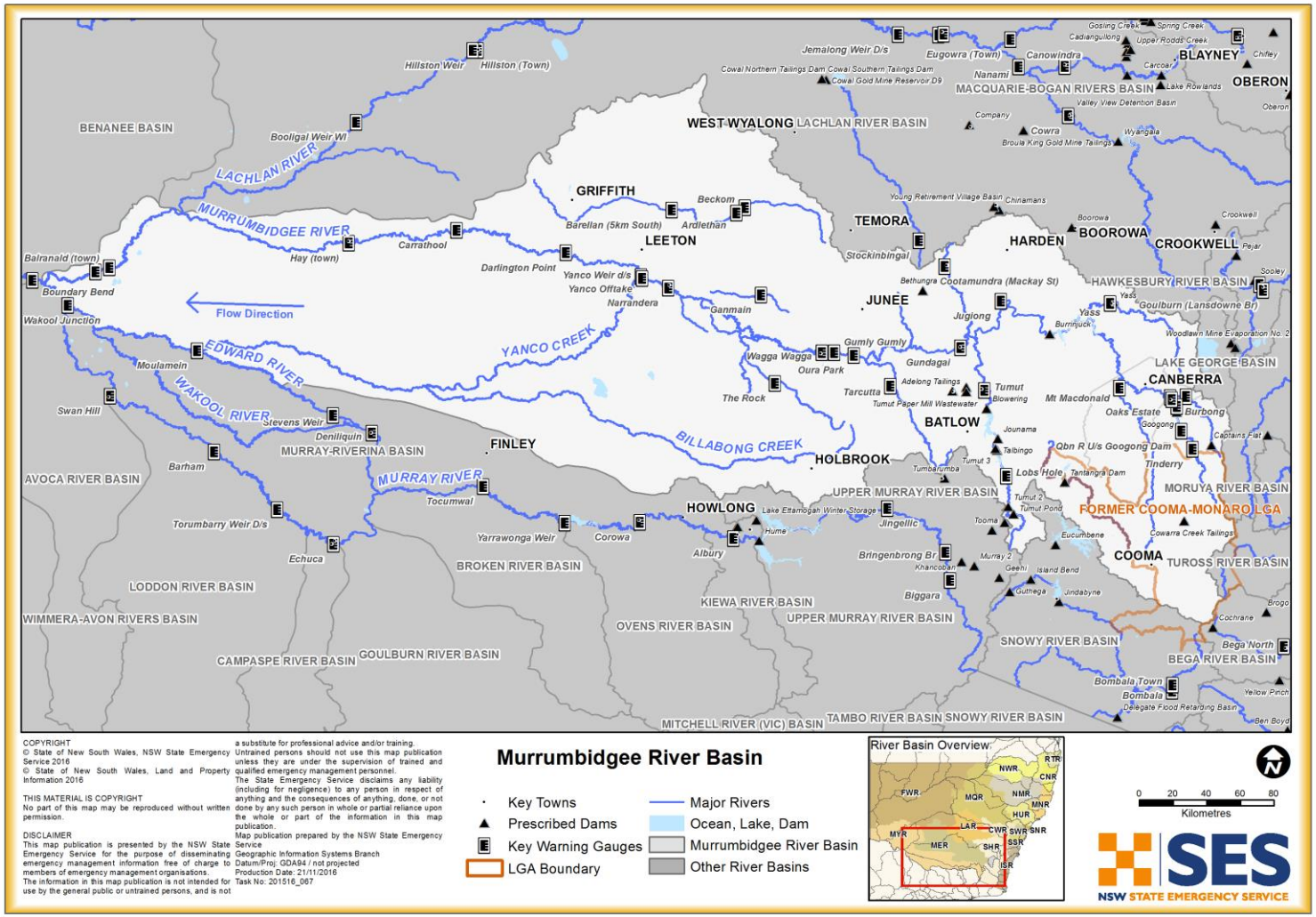
Facility Name	Street	Suburb	Comment (based on modelled flood extents)
Community Facilities			
Cooma Bowling Club	Mawson Street	Cooma	Lies within the **1% AEP** (1 in 100 ARI) extent and would be impacted in such an event. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081). May also be impacted in the **5% AEP** (1 in 20 ARI) event, as is just on edge of this flood extent. Equates to 2.38m on the SMEC Sharp Street gauge (No. 410902), 4.4m on the Koolaroo gauge (No. 4100815).
Utilities and infrastructure			
See comments	See comments	Cooma	Nil showing within any available extent mapping at this time 2016
Other			
Caltex Service Station	Cnr Massie and Bombala Streets	Cooma	Lies within the **5% AEP** (1 in 20 ARI) extent and is expected to be impacted in such an event. Equates to 2.38m on the SMEC Sharp Street gauge (No. 410902), 4.4m on the Koolaroo gauge (No. 4100815).
Region Service Station	51/53 Sharp Street	Cooma	Lies within the **5% AEP** (1 in 20 ARI) extent and is expected be impacted in such an event. Equates to 2.38m on the SMEC Sharp Street gauge (No. 410902), 4.4m on the Koolaroo gauge (No. 4100815).
Caltex Cooma	41 Sharp Street	Cooma	May be impacted in **1% AEP** (1 in 100 ARI) event, as is just on edge of this extent. Equates to 4.06m on the SMEC Sharp Street gauge (No. 410902), 5.7m on the Koolaroo gauge (No. 410081).

ANNEX 2: MURRUMBIDGEE RIVER BASIN SCHEMATIC

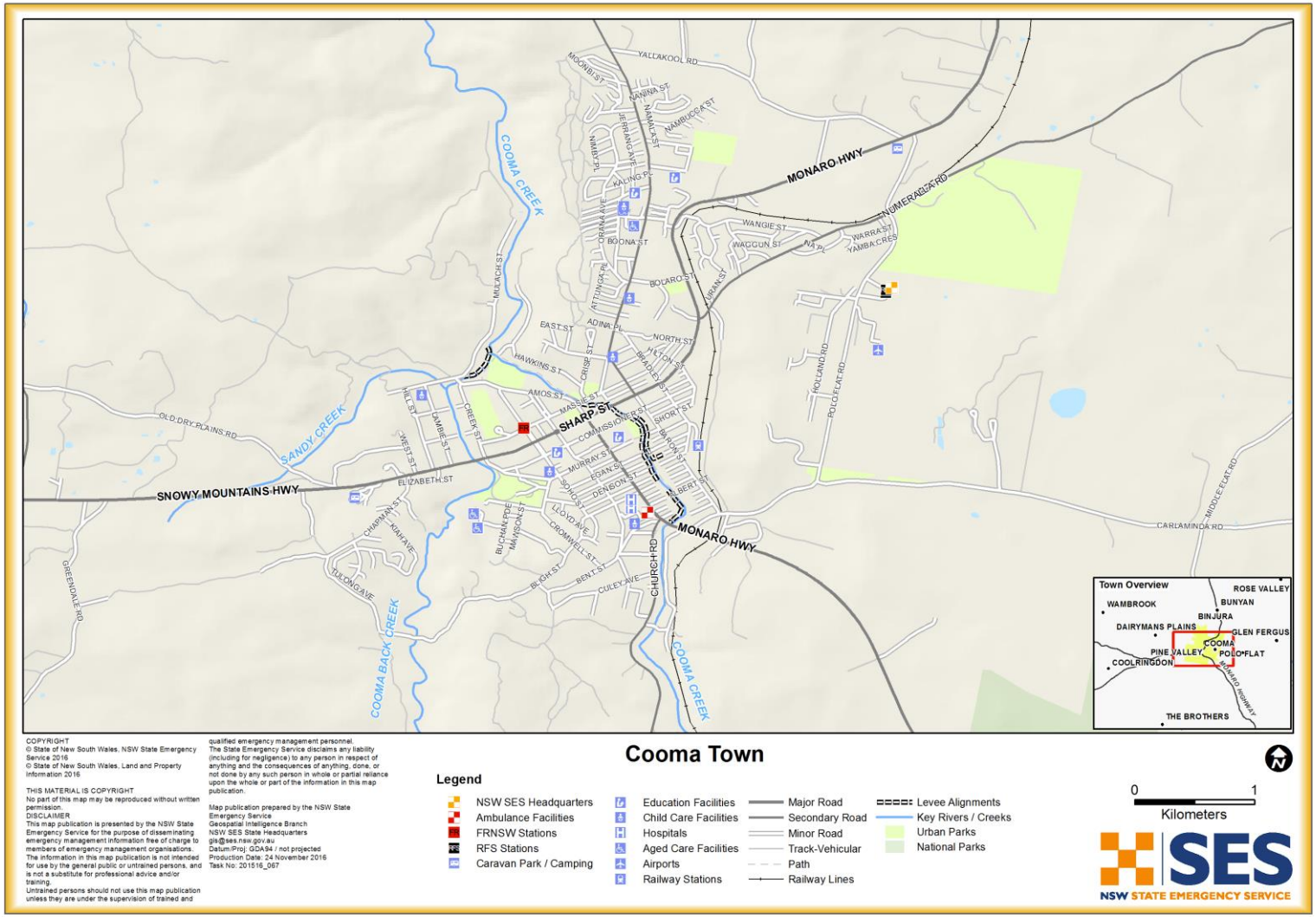


Source: Bureau of Meteorology— NSW Flood Warning Centre 2011

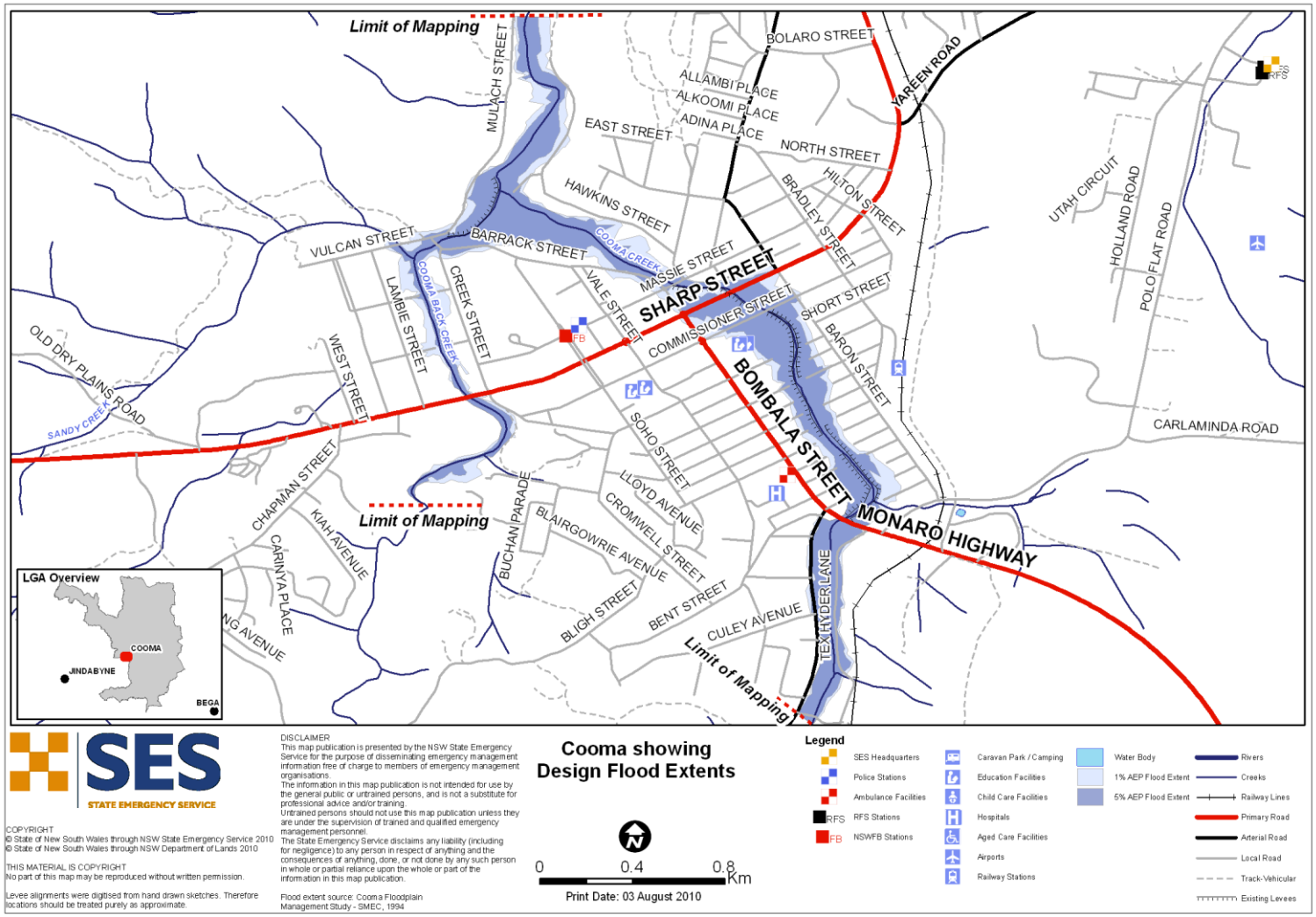
MAP 1 - MURRUMBIDGEE RIVER BASIN



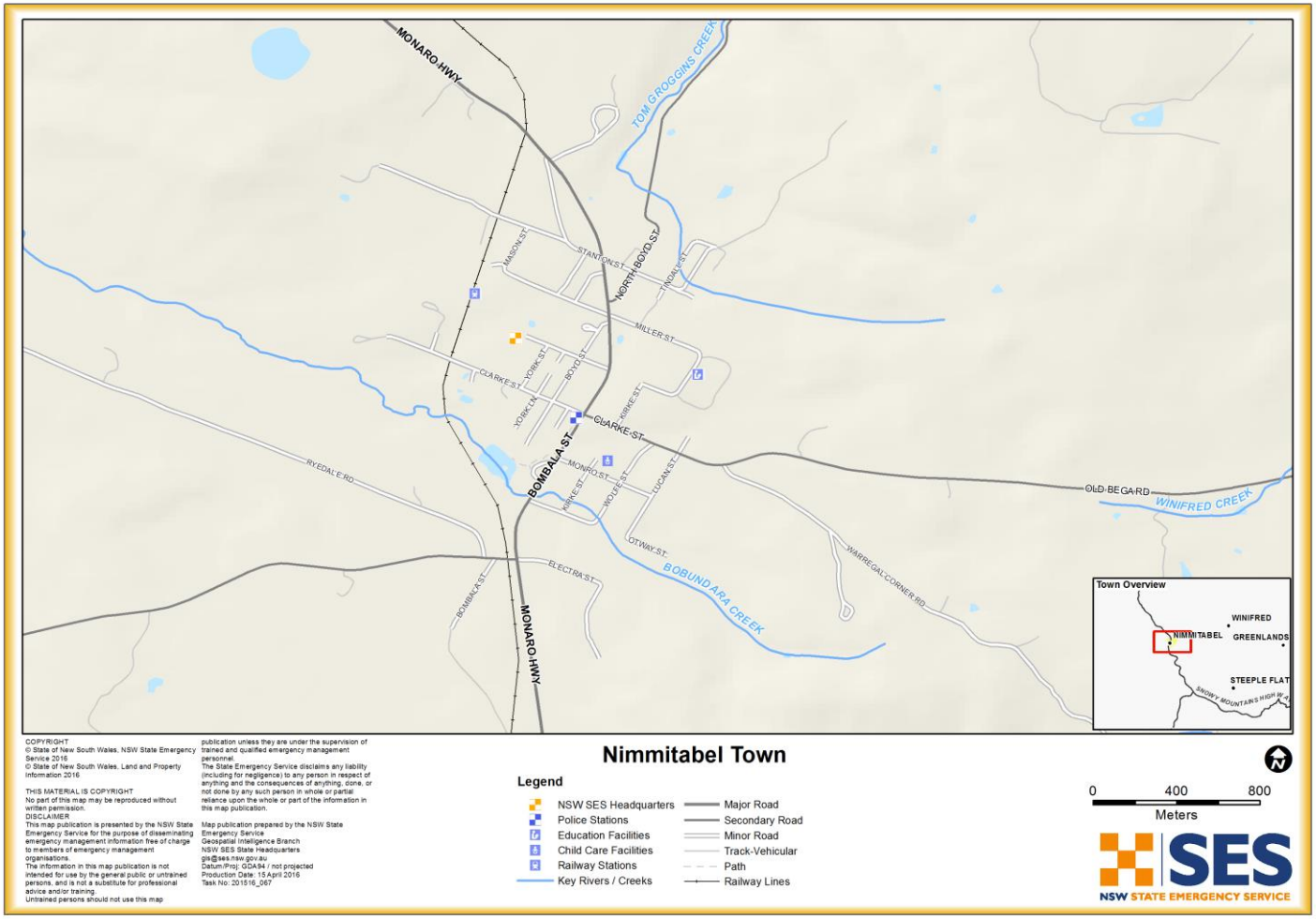
MAP 2 - COOMA TOWN MAP



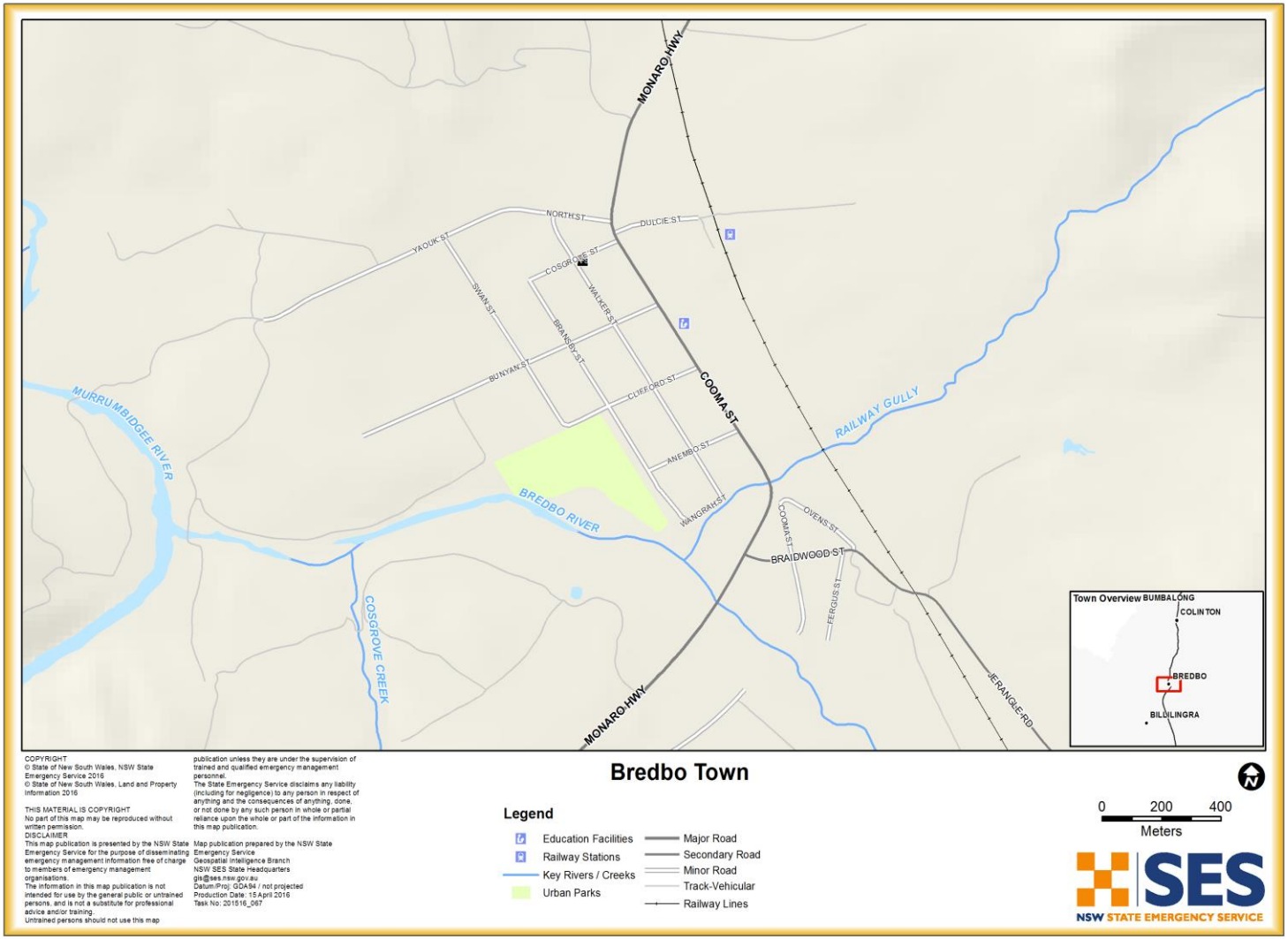
MAP 3 - COOMA DESIGN FLOOD EXTENTS MAP



MAP 4 - NIMMITABEL TOWN MAP

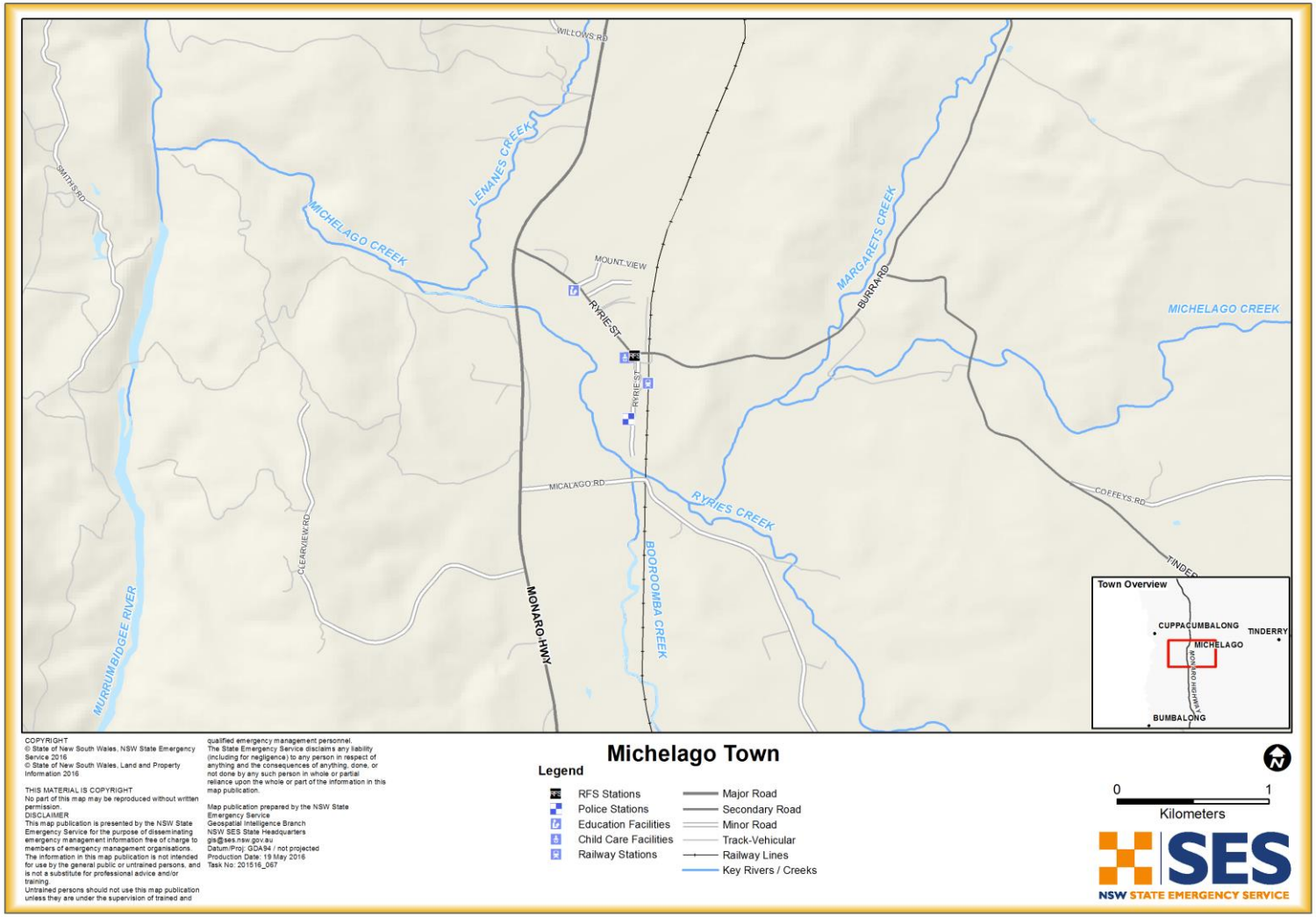


MAP 5 - BREDBO TOWN MAP



Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
NSW SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA94 / not projected
Production Date: 15 April 2016
Task No: 201516_067

MAP 6 - MICHELAGO TOWN MAP



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11. **NSW SES.** *Queanbeyan City Local Flood Plan.* 2013.

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SES RESPONSE ARRANGEMENTS FOR THE FORMER BOMBALA SHIRE LGA

Volume 3 of the Snowy Monaro Regional Local Flood Plan

Last Update: August 2008

ANNEX C - GAUGES MONITORED BY THE BOMBALA SES UNIT

Gauge Name	Type	AWR C No	Stream	Flood Classification			Reading Arrangements	Owner
				Min	Mod	Maj		
Bombala * † ‡	Telemeter	222019	Bombala River	3.00	5.00	8.00	Read staff gauge on bridge, check with DNR reading on website.	DNR
Coolumbooka	Staff		Coolumbooka River				Coolumbooka Bridge, Cathcart Road	

Notes:

1. The Bureau of Meteorology provides flood warnings for the gauges marked with an asterisk (*).
2. SES Local Flood Advices are provided for the gauges marked with a single cross (†).
3. The SES holds a Flood Intelligence Card for the gauges marked with a double cross (‡).

ANNEX D - DISSEMINATION OF SES FLOOD BULLETINS

The Southern Highlands 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
CAPITAL	Canberra
WIN	Canberra
PRIME	Canberra
ABC	Canberra

Radio Stations:

Station	Location
2XL /Snow FM	Cooma (AM 918)
ABC Regional South East	Bombala (FM 94.1)
2MNO	Bombala (FM 103.7)

Newspapers:

Name	Location
Bombala Times	Bombala

ANNEX E - TEMPLATE EVACUATION WARNING & ORDER MESSAGES FOR BOMBALA TOWNSHIP

Evacuation Warning

Southern Highlands Region Headquarters

56 – 58 Knox Street
Goulburn NSW 2580

Telephone: (02) 4828 5555

Fax: (02) 4828 5570

Email: shr.ops@ses.nsw.gov.au

Issued *[day] [date]* at *[time in civilian format (am,pm)]*

Radio stations are asked to immediately read this message to listeners and repeat it often.

Evacuation Warning for Bombala Township

Authorised By: [ ]

The Bureau of Meteorology has predicted a flood level of 8 metres at the Bombala River Gauge adjacent to the bridge at [ ] ***(time).*** This means that the area including Maybe Street between Cardwell and Stephen Streets, and the Bombala Caravan park may be flooded at **[ ]** ***(time).***

The State Emergency Service encourages residents within these areas to maintain a vigilant watch on the situation and to prepare to evacuate [enter time if necessary].

The State Emergency Service is monitoring the situation and will advise you when it will be necessary to leave your property.

If flooding does occur in your area, remaining within your home or business will be dangerous and you may need to be rescued. Even if your home or business is raised it may become a refuge for vermin, snakes and spiders. There may be no water, sewerage, power, telephone or other services and you may be unable to call for help in an emergency.

Evacuation centres will be established at [ ] ***(specify route if appropriate)***. At these centres assistance will be available to meet your needs including, temporary accommodation, financial help, personal support, refreshments and meals, clothing and personal needs and help in contacting friends and family. You may also choose to go to a friends or relatives house.

Special transport can be provided on request if necessary, telephone [ ].

To prepare for possible evacuation you should:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. You may be able to place light weight items in the roof space.
- Collect together medicines, personal and financial documents, mementos and photos
- If possible, check to see whether your neighbours need help
- Make arrangements for care of pets or other animals, you may take your pets with if you when you evacuate

If you have to evacuate:

- Turn off the electricity and water.
- Take three days' supply of clothes, medicines, documents, mementos and photos with you
- Continue to listen to a local radio station for updates

Don't walk or drive through floodwaters – this is the main cause of death and injury during flooding

If you require assistance contact the SES on 132 500

End

This Evacuation Warning remains current until [time, date] when an updated Evacuation Warning will be issued.

For further information contact:

Evacuation Order

Southern Highlands Region Headquarters

56 – 58 Knox Street
Goulburn NSW 2580

Telephone: (02) 4828 5555

Fax: (02) 4828 5570

Email: shr.ops@ses.nsw.gov.au

Issued *[day] [date]* at *[time in civilian format (am,pm)]*

Radio stations are asked to immediately read this message to listeners and repeat it often.

Please use the Standard Emergency Warning Signal with this message

Evacuation Order for [Enter locations]

Authorised By: **Region Controller**

The Bureau of Meteorology has predicted a flood level of 8 metres at The Bombala Bridge river gauge ***(place)*** at [ ] ***(time).*** This means that areas including Maybe Street between Cardwell and Stephen Streets as well as the Bombala Caravan Park will become flooded.

The State Emergency Service instructs residents within these areas to evacuate within the next [ ] hours. If you delay your evacuation, roads may be congested or closed and you could become trapped and need to be rescued. Remaining in flooded areas is dangerous.

When you evacuate you may go to the house of a friend or relative. Alternatively, if you go to an evacuation centre, accommodation and other assistance can be arranged for you.

If you do not attend an evacuation centre it is important to inform the State Emergency Service of your location by calling Bombala Unit on 6458 3765

You can drive to an evacuation centre located at [ ] ***(specify route if appropriate)***.

Special transport can be provided on request if necessary, telephone 6458 3765.

Before evacuating, you should prepare yourself and your property for flooding:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. You may be able to place some light-weight items in the roof space.

- Collect together essential medicines, important documents, mementos and photos to take these with you.
- If possible, check to see whether your neighbours need help.
- Make arrangements for care of pets or other animals or take pets with you to an evacuation centre.
- Turn off the electricity and gas.
- Take three days' supply of clothes with you.
- Do not drive or walk through floodwater
- Continue to listen to a local radio station for updates

End _____

This Evacuation Order remains current until cancelled

For further information contact:

The worst in nature
the best in us

ANNEX F - EVACUATION ARRANGEMENTS FOR THE BOMBALA COUNCIL AREA

Background

1. Evacuations may be required when the Bombala River is likely to inundate the area of Bombala township on the river side of Maybe Street, between Young and Burton Streets, and prior to inundation of the Caravan park.

Arrangements

2. **Control.** During floods evacuations will be controlled by the NSW SES. Small-scale evacuations will be controlled by the Bombala SES Local Controller. Should the evacuations operations escalate beyond the capabilities of local resources control may be handed over to the Southern Highlands Region SES Region Controller.

3. **Conduct.** Evacuations will be controlled by the SES and conducted in four phases:

   a. Phase 1 - Warning.

   b. Phase 2 – Withdrawal.

   c. Phase 3 – Shelter.

   d. Phase 4 – Return.

Phase 1 – Decision to Evacuate

4. The decision to evacuate. The responsibility for issuing any general evacuation order during flooding rests with the Bombala SES Local Controller who exercises his/her authority in accordance with Section 22(1) of The State Emergency Service Act 1989. However, the decision to evacuate will usually be made after consultation with the Local Emergency Operations Controller and the Southern Highlands Region SES Region Controller.

5. When evacuation should occur. As far as possible, evacuation will be carried out before inundation occurs.

6. Self-motivated evacuation. Some people will make their own decision to evacuate earlier and move to alternative accommodation using their own transport. These evacuees will be advised, via the media, to inform the Police or SES of their evacuation and their temporary address.

7. **Evacuation triggers.**

   When the river height reaches 5 meters at the Bombala Bridge gauge, evacuations of the Caravan Park should commence.

When the river height reaches 8 meters, evacuations of low lying areas of town should be considered.

Phase 2 – Warning

8. **Evacuation warnings.** On the receipt of flood warnings predicting peak heights of 5 metres and above at the Bombala Bridge gauge; the Bombala SES Local Controller will consult as necessary to determine the level of the threat and the need to consider evacuations. As soon as possible after the decision to evacuate is made, the Bombala SES Local Controller will issue evacuation warnings to the 'at risk' residents, indicating what people should do before evacuating and when actually doing so.

9. **Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at Annex E. These are disseminated via:

    - The radio and TV stations listed in Annex D.
    - Door-knocks by emergency service personnel.
    - Public address systems from emergency service vehicles.
    - Telephone.
    - Two-way radio.
    - Direct access to Community Radio Station 2MNO Bombala
    - SES Flood Bulletins.

Phase 3 – Withdrawal

10. **Introduction.** Withdrawal involves the actual removal of the community/individuals from dangerous or potentially dangerous areas to safer areas.

11. **Movement.** Evacuees are to be encouraged to move using their own transport where possible. The Bombala SES Local Controller will arrange transport for those people without their own vehicles.

12. **Evacuation routes.** Evacuation routes will be determined by the Controller at the time of issuing evacuation orders. The Controller will take into account which roads and bridges have been or may be cut by flood waters. In Bombala, evacuation routes will generally be to higher ground away from the river.

13. **Special Needs Groups.** None have been identified.

14. **Animals.** Assistance animals (guide dogs, hearing assistance animals, etc) will remain in the care of their owners throughout the evacuation. This includes transport and access into evacuation centres etc. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners

when being transported via aircraft or flood rescue boats. Department of Primary Industries will make separate arrangements for the evacuation and care of companion animals.

15. **Doorknocking.** Field teams conducting doorknocks will record and report back the following information back to the Operations Centre:

    - Addresses and locations of houses doorknocked and/or evacuated.
    - The number of occupants.
    - Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).
    - Details of residents who refuse to comply with the evacuation order.

16. **Refusal to evacuate.** Field teams should not waste time dealing with people who are reluctant or refuse to comply with any evacuation order. These cases should be referred to the Local Emergency Management Operations Controller who will arrange for Police to ensure their evacuation.

17. **Security.** The NSW Police Force will provide security for evacuated areas.

18. **Transport and storage**. Transport and storage of furniture from flood threatened properties will be arranged as time and resources permit.

Phase 4 – Shelter

19. **Evacuation centres.** The usual purpose of evacuation centres is to meet the immediate needs of victims, not to provide them with accommodation. Evacuees will be advised to go to or be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the Bombala SES Local Controller but managed as soon as possible by the Department of Community Services. Either of the following sites may be used as evacuation centres:

    a. Multi-Purpose Hall

    b. Bombala High School.

20. Action on arrival. On arrival, evacuees will be:

    a. registered;

    b. medically checked, if necessary; and

    c. provided with their immediate welfare needs.

21. Registration. The NSW Police will ensure that all evacuees are registered on arrival at the designated evacuation centres.

22. Animal shelter compounds. Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees. These facilities will be operated by Bombala Council.

Phase 5 – Return

23. Once it is considered safe to do so, the Bombala SES Local Controller will authorise the return of evacuees to their normal or alternative place of residence. This decision will be made in consultation with appropriate officers in regard to matters such as the electrical safety of buildings.

24. The return will be controlled by the Bombala SES Local Controller and may be conducted, at his/her request, by DoCS.

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

General

1. The following caravan parks are flood liable:

   a. Bombala Caravan Park

   b. Delegate Caravan Park

Advising Procedures

2. Bombala Council as the Caravan Park proprietors will ensure that the owners and occupiers of caravans are:

   a. Made aware that the caravan park is flood liable by:

   - Handing a printed notice to occupiers taking up residence. The notice will indicate that the caravan park is liable to flooding and outline the evacuation and van relocation arrangements as detailed in this Annex.

   - Displaying this notice prominently in each van.

   b. Made aware that if they are expecting to be absent from their vans for extended periods, they must:

   - Provide the manager with a key; in a sealed envelope; to the van.

   - Provide a contact address and telephone number.

   - Inform the manager if a vehicle will be required to relocate the van during flood time.

   - Leave any mobile van in a condition allowing it to be towed in an emergency (i.e. tyres inflated, jacks wound up, personal effects secured and annexes and lines for water, sewer, electricity and gas readily detachable).

   c. Informed when a flood is rising. At this time, occupiers will be advised to:

   - Ensure that they have spare batteries for their radios.

   - Listen to a local radio station for updated flood information.

   - Prepare for evacuation and van relocation.

3. The Bombala SES Local Controller will ensure that the managers of caravan parks are advised of flood warnings and the details of any evacuation order.

Evacuation of Occupants and Relocation of Vans

4. Caravan park proprietors will be encouraged to install flood depth indicators and road alignment markers within their caravan parks.

5. When an evacuation order is given:

   a. Occupiers of non-movable vans should:

   - Secure their vans by tying them down to prevent flotation.
   - Isolate power to their vans.
   - Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.
   - Lift the other contents of their vans as high as possible within the van.
   - Move to a designated evacuation centre in Bombala or Delegate (as appropriate) if they have their own transport, or move to the caravan office to await transport.

   b. Where possible, vans that can be moved will be relocated by their owners. Park managers will arrange for the relocation of mobile vans whose owners do not have a vehicle. Council and SES personnel will assist if required and may be able to provide additional vehicles. Vans are to be moved to the following locations:

   - The High Street side of the disused Railway Yard in Bombala
   - To the Delegate Showgrounds in Delegate.

6. Caravan park managers will be encouraged to:

   a. Ensure that their caravan park is capable of being evacuated within the timeframe required by the Bombala SES Local Controller.

   b. Advise the Bombala SES Local Controller of:

   - The number of people requiring transport.
   - Details of any medical evacuations required.
   - Whether additional assistance is required to effect the evacuation.

   c. Check that no people remain in non-removable vans that are likely to be inundated.

d. Inform the Bombala SES Local Controller when the evacuation of the caravan park has been completed.

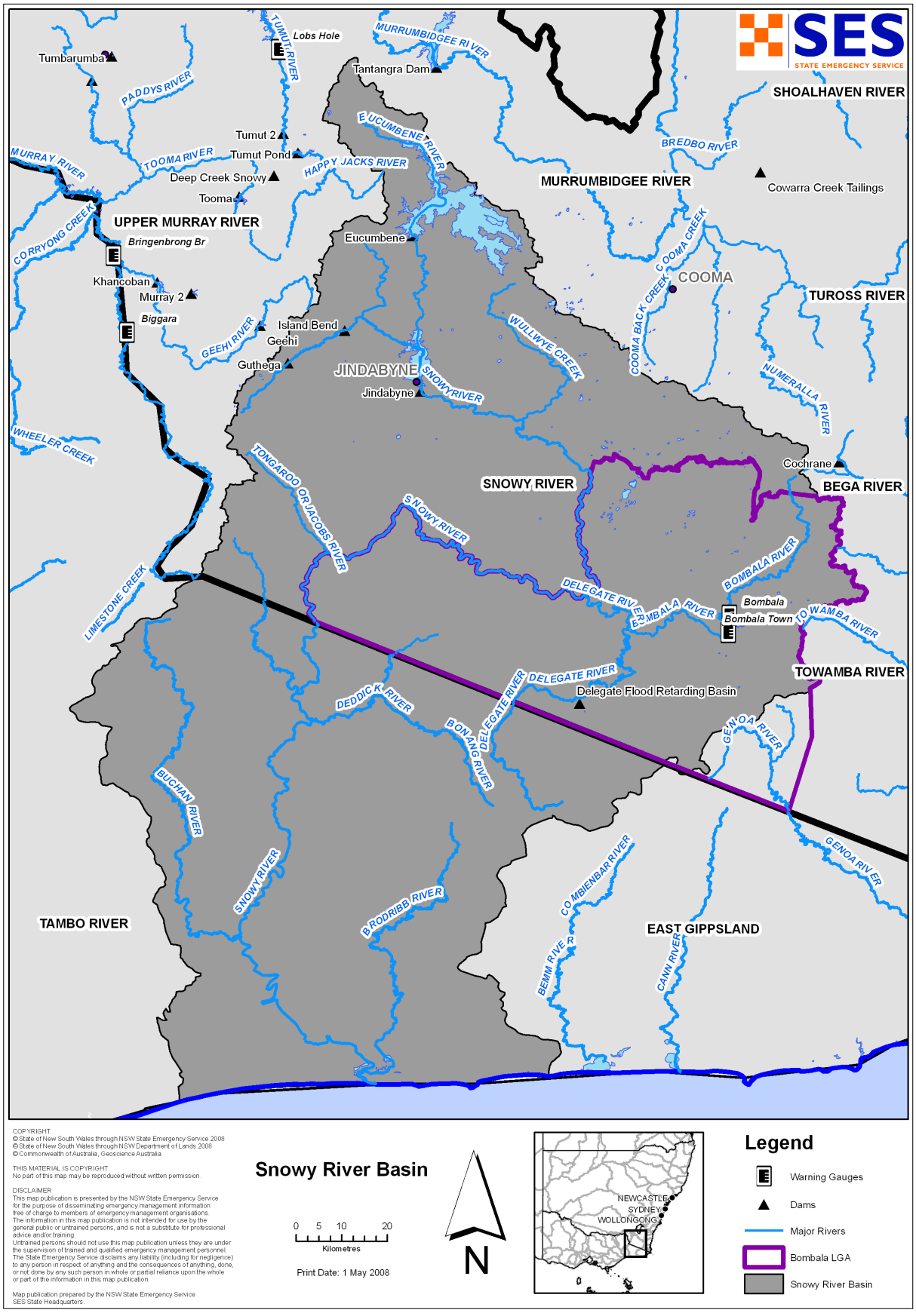
e. Provide the Bombala SES Local Controller with a register of people that have been evacuated.

Return of Occupants and Vans

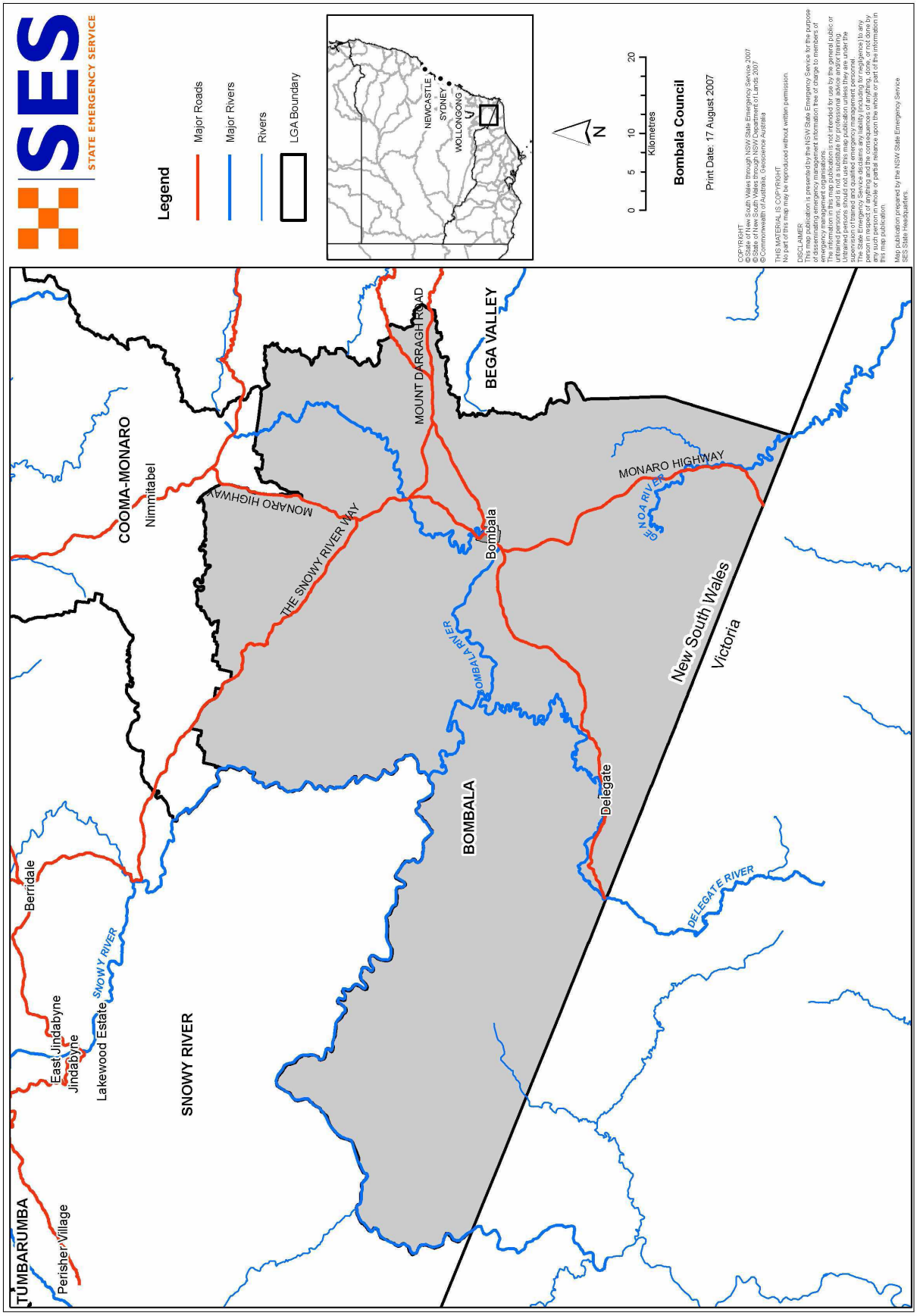
7. The Bombala SES Local Controller, using council resources as necessary, will advise when it is safe for the caravan parks to be re-occupied.

8. Vans will be towed back to the caravan park(s) by van owners or by vehicles and drivers arranged by the park managers. Council and SES personnel will assist if available.

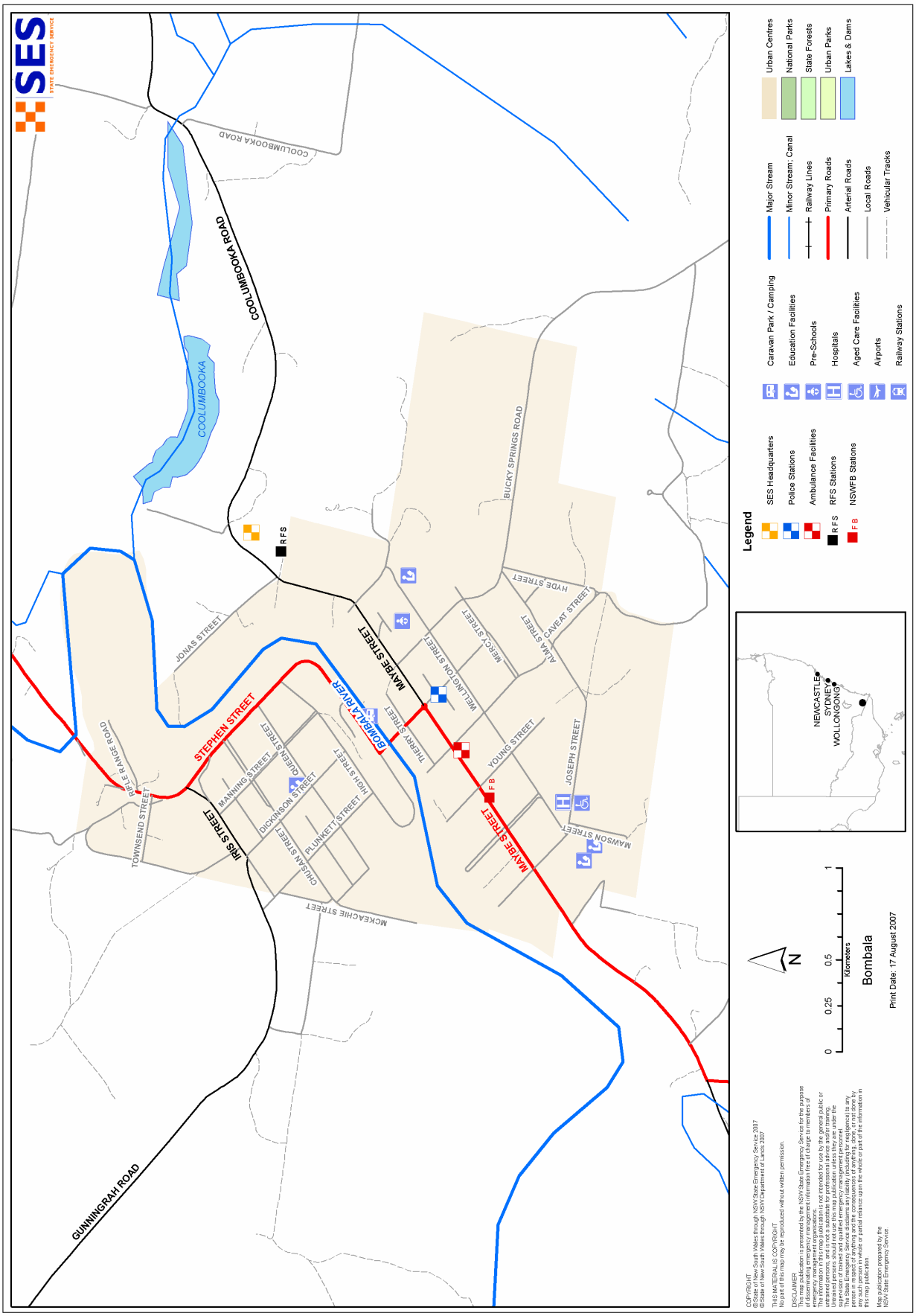
MAP 1 - SNOWY RIVER BASIN



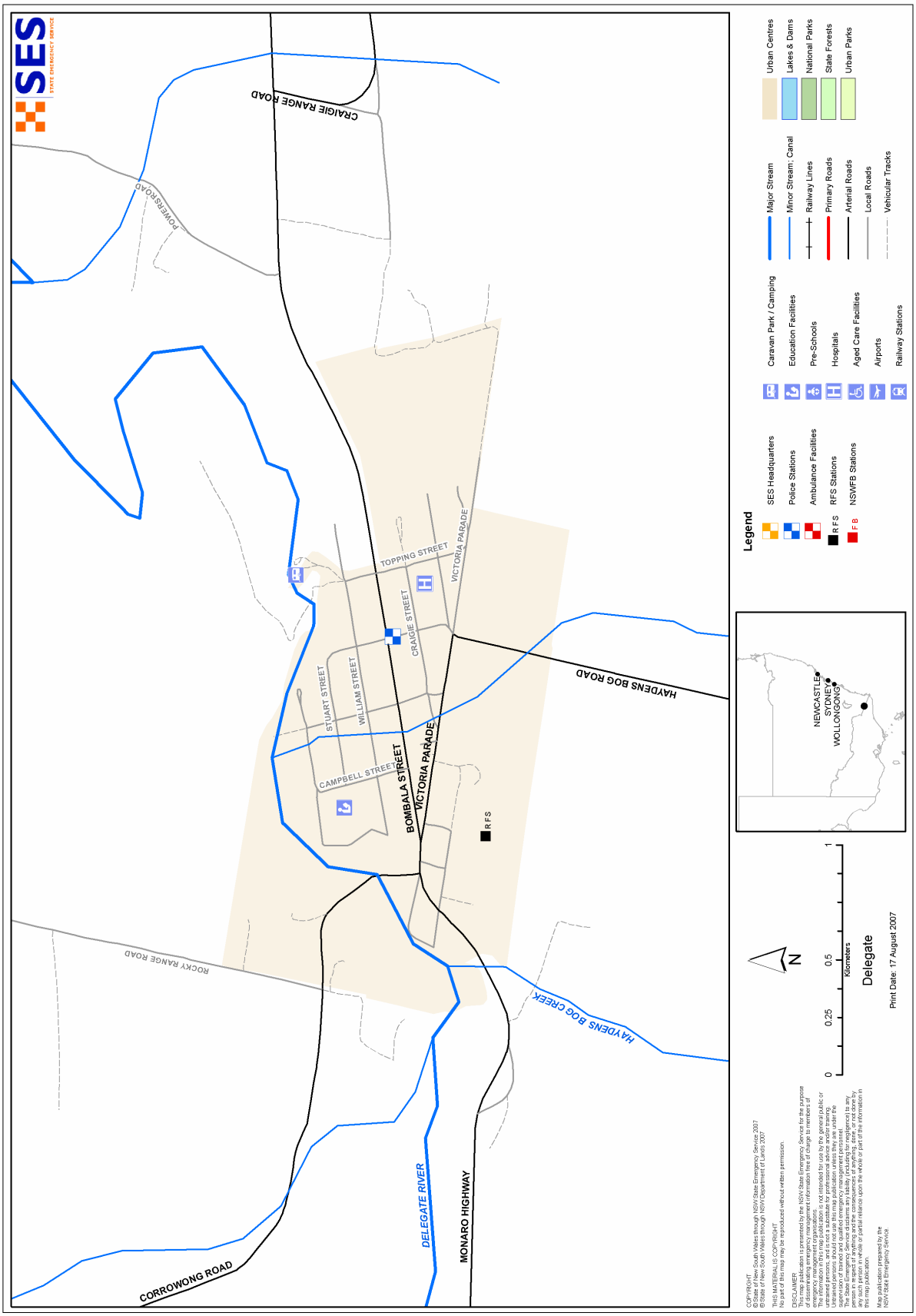
MAP 2 - BOMBALA COUNCIL AREA



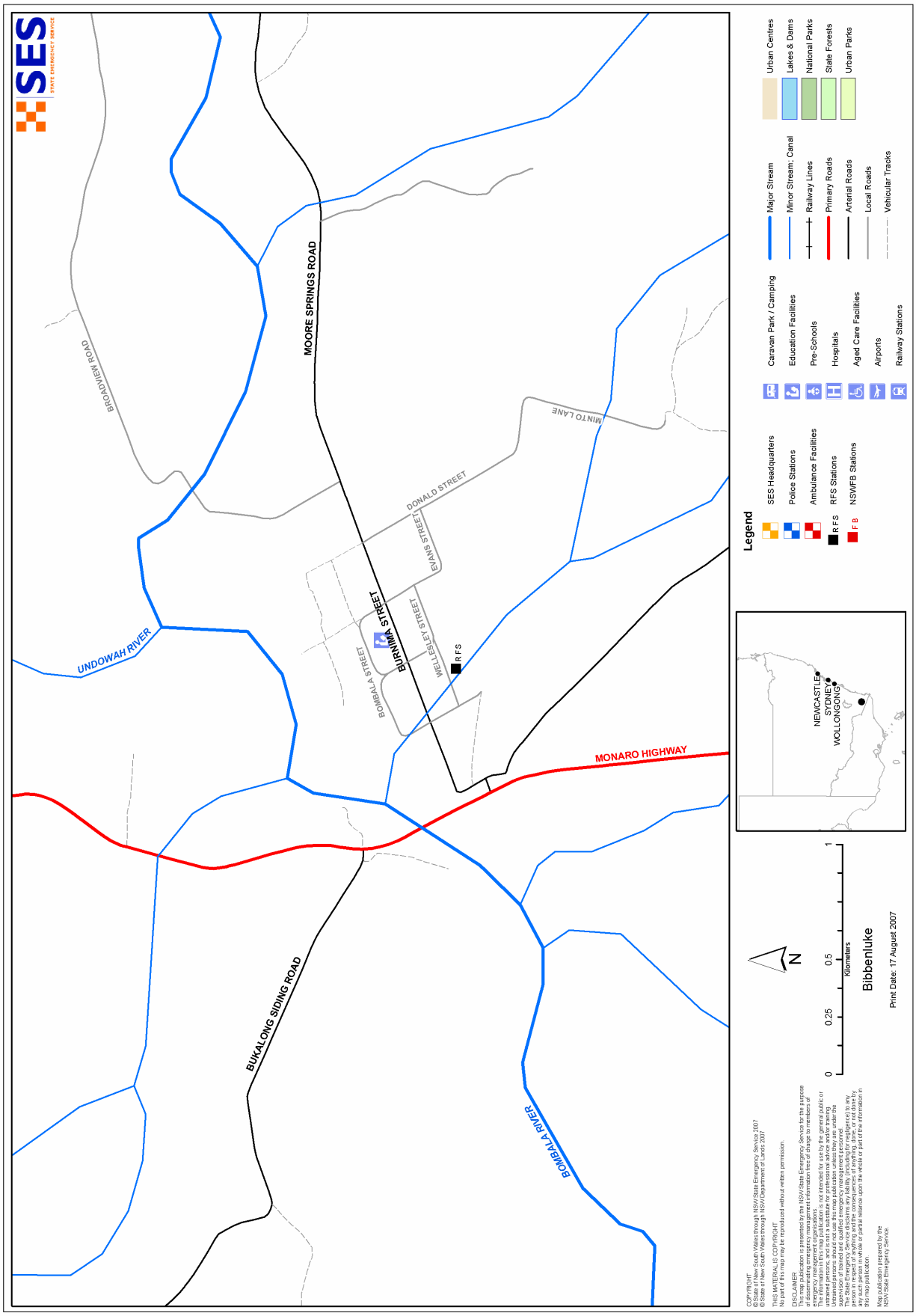
MAP 3 - BOMBALA TOWN AREA



MAP 4 - DELEGATE TOWN AREA



MAP 5 - BIBBENLUKE AREA



SES RESPONSE ARRANGEMENTS FOR THE FORMER COOMA-MONARO LGA

Volume 3 of the Snowy Monaro Regional Local Flood Plan

Last Update: Nov 2010

ANNEX C - GAUGES MONITORED BY THE COOMA MONARO SES LOCAL HEADQUARTERS

Gauge Name / Read By	Type	AWRC No	Stream	Flood Classification		
				Min	Mod	Maj
Bolaro / Adaminaby RFS	Manual	410514	Murrumbidgee River			
Tantangara Reservoir	Manual	410543	Murrumbidgee River			
Tantangara Reservoir (Upstream)	Manual	410535	Murrumbidgee River			
The Peaks	Manual	410140	Murrumbidgee River			
Mittagang Crossing^	Telemeter	410033	Murrumbidgee River			
Numeralla^	**Telemeter**	410062	Numeralla River			
Billilingra^	**Telemeter**	410050	Murrumbidgee River			
Kybeyan /Numeralla RFS	Manual	410075	Kybeyan River			
SEMC (Sharp St)*	**Telemeter**	410902	Cooma Back Creek			1.8
Koolaroo*	**Telemeter**	410081	Cooma Creek	0.5		3.8

Notes:

1. The BoM provides flood warnings for the gauges marked with an asterisk (*).
2. SES Local Flood Advices are provided for the gauges marked with a single cross (†).
3. Daily average levels are available on-line at http://atlas.canri.nsw.gov.au for gauges marked with a (^)
4. The SES holds a Flood Intelligence Card for the gauges marked with a double cross (‡).

ANNEX D - DISSEMINATION OF SES FLOOD BULLETINS

The Southern Highlands 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
Capital	Canberra
WIN	Canberra
Prime	Canberra

Radio Stations:

Station	Location	Frequency	Modulation
2XL	Cooma	AM	918
ABC Bega	Bega	AM	1602
ABC 666	Canberra	AM	666
Snow FM	Cooma	FM	97.7
2MNO Monaro Community Radio	Cooma	FM	90.5 93.3

Newspapers:

Name	Location
Cooma Monaro Express	Cooma
Monaro Post	Cooma

ANNEX E - TEMPLATE EVACUATION WARNING AND EVACUATION ORDER MESSAGES

Evacuation Warning

[###] Region Headquarters

[Enter Address]

Issued *[day] [date]* at *[time in civilian format (am,pm)]*

Telephone: (02) [#########]

Fax: (02) [##########]

Email: [############]

Radio stations are asked to immediately broadcast this message and repeat it.

Use of the Standard Emergency Warning Signal (SEWS) with this message is authorised

Flood Evacuation Warning for [*Enter location/s*]

Authorised By: [(*operational position title)*]
As a result of the flood level predicted by the Bureau of Meteorology for [*location*] at [*date/time*] the State Emergency Service recommends that residents within the nominated areas should prepare to evacuate within the next [*number*] hours.

Residents should monitor the situation and be prepared to evacuate when instructed to do so. A Flood Evacuation Order will be issued by the SES if evacuation is required.

Evacuation centres will be established at [*location/s*] where you can obtain temporary accommodation and other help. You can also choose to go to friends or relatives.

To prepare for possible evacuation you should:

- Raise belongings by placing them on tables, beds and benches. Put electrical items on top. You may be able to place light weight items in the roof space.
- Collect together medicines, personal and financial documents, mementos and photos
- If possible, check to see if your neighbours need help
- Make arrangements for care of pets or other animals, or take your pets with you when you evacuate
- Take three days' supply of clothing and medicines
- Find out where to turn off the electricity and gas
- Continue to listen to a local radio station for updates

Don't walk ride or drive through floodwaters – this is the main cause of death and injury during floods

For emergency assistance telephone the SES on 132 500

Web site: www.ses.nsw.gov.au

End SES Flood Evacuation Warning

[enter update and currency details]

For further information contact:

The worst in nature
the best in us

Evacuation Order

[###] Region Headquarters

[Enter Address]

Telephone: (02) [#########]

Fax: (02) [##########]

Email: [############]

Issued *[day] [date]* at *[time in civilian format (am,pm)]*

Radio stations are asked to immediately broadcast this message and repeat it.

Use of the Standard Emergency Warning Signal (SEWS) with this message is authorised

Flood Evacuation Order for [Enter locations]

Authorised By: [*(name & operational position title)*]

As a result of the flood level predicted by the Bureau of Meteorology for [*location*] at [*date/time*] the State Emergency Service is directing residents within the nominated areas to evacuate within the next [*number*] hours.

Do not delay your evacuation. Roads will be congested or closed. You could become trapped and need rescue. Remaining in flooded areas is dangerous and may place your life at risk.

Evacuation centres will be established at [*location/s*] where you can obtain temporary accommodation and other help. You can also choose to go to friends or relatives.

If you don't go to an evacuation centre please telephone [*telephone number*] to report your safety.

Delete as required {If you don't have a car, buses may operate where possible on normal routes. Special transport can also be provided on request if necessary, telephone [*telephone number*]}

As you evacuate you should:

- Take your important documents, mementos and photos
- Take your spare clothing and medicines
- If possible, check to see if your neighbours need help
- Turn off the electricity and gas
- Do not walk ride or drive through floodwater
- Continue to listen to a local radio station for updates

For emergency assistance telephone the SES on 132500

SES web site: www.ses.nsw.gov.au

End SES Flood Evacuation Order

This Evacuation Order remains current until the All Clear has been issued

For further information contact:

The worst in nature
the best in us

ANNEX F - EVACUATION ARRANGEMENTS FOR THE COOMA MONARO COUNCIL AREA

Background

1. A system of levee banks protects urban areas of Cooma from flooding up to a level of the 5% AEP flood (2.38m on the SMEC gauge 410902, 4.4m on the Koolaroo gauge 410081[6]). Flooding in excess of this level is likely to require evacuations from low lying properties near Cooma Creek and Cooma Back Creek.

2. As the flood risk is generally characterised as flash flooding, warning times are short and there may be only 1 – 2 hours notice of impending evacuations.

Arrangements

3. **Control.** During floods evacuations will be controlled by the NSW SES. Small-scale evacuations will be controlled by the Cooma Monaro SES Local Controller. Should the evacuations escalate beyond the capabilities of local resources control may be handed over to the SES Region Controller.

4. **Conduct.** Evacuations will be controlled by the SES and conducted in four phases:

    - Phase 1 - Warning.
    - Phase 2 – Withdrawal.
    - Phase 3 – Shelter.
    - Phase 4 – Return.

Decision to Evacuate

5. The decision to evacuate. The responsibility for issuing any general evacuation order during flooding rests with the Cooma Monaro SES Local Controller who exercises his/her authority in accordance with Section 22(1) of The State Emergency Service Act 1989. However, the decision to evacuate will usually be made after consultation with the Local Emergency Operations Controller and the Southern Highlands Region SES Region Controller.

6. When evacuation should occur. As far as possible, evacuation will be carried out before inundation occurs.

7. Self-motivated evacuation. Some people will make their own decision to evacuate earlier and move to alternative accommodation using their own transport. These evacuees will be advised, via the media, to inform the Police or SES of their evacuation and their temporary address.

[6] Design flood heights have been sourced from the 2007 Cooma Creek Flood Warning Directive produced by the Bureau of Meteorology.
Note - SMEC (Sharp St) gauge (AWRC 410902): no official ratings table exist for Cooma Back Creek. River levels are taken from the SMEC Flood Study and are estimated by computer hydraulic simulation.
Note - Koolaroo gauge (AWRC 410081): Official DLWC rating is limited to 6m at Koolaroo.

8. **Evacuation triggers.** The following evacuation triggers should be used as guide when deciding to evacuate.

    - **Flood Warning Prediction.** Prediction of potential major flooding may indicate conditions where evacuations are necessary for Cooma Creek and Cooma Back Creek:

        - **Major Flood Level**: 3.8 m at Koolaroo (Cooma Creek), 1.8 m at SMEC (Cooma back Creek)

    - **Failure of Essential Services.** The failure of essential services such as sewerage, power, telephones and water may pose a significant health risk to residents on the floodplain. In the event of any or all of these systems failing; the need for an evacuation will be discussed with the relevant utility provider.

9. When evacuations are possible, the Cooma Monaro SES Local Controller will advise relevant Welfare Services personnel so that evacuation centres and welfare support can be set up in timely fashion.

10. The topography of Cooma is such that in the case of flooding within the town evacuees would simply be moved from the lower sections of town to the higher sections.

11. Field teams conducting doorknocks will record the following details and report back to the Operations Centre:

    - Addresses and locations of houses doorknocked and/or evacuated.
    - Number of occupants.
    - Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).

12. The NSW Police will provide security for evacuated areas.

13. Evacuees will be taken to or advised to go to the nearest accessible evacuation centre, which will be managed by representatives of the Welfare Services functional area. Any or all of the following sites may be used as evacuation centres:

    - Monaro High School, Mittagang Road, Cooma
    - St Patrick's Parish School, Murray Street, Cooma
    - Cooma Multifunction Centre, Cromwell St, Cooma
    - Cooma Ex-Serviceman's Club, Vale Street, Cooma

Phase 1 – Warning

14. **Evacuation warnings.** On the receipt of flood warnings predicting Major flooding the Cooma Monaro SES Local Controller will determine the level of the threat and the need for evacuations. As soon as possible after the decision to evacuate is made, the Cooma Monaro SES Local Controller will issue evacuation warnings to the 'at risk' residents, indicating what people should do before evacuating and when actually doing so.

15. **Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at Annex E. These are disseminated via:

    - The radio and TV stations listed in Annex D.
    - Door-knocks by emergency service personnel.
    - Public address systems from emergency service vehicles.
    - Telephone.
    - Included in SES Flood Bulletins.

Phase 2 – Withdrawal

16. **Introduction.** Withdrawal involves the actual removal of the community/individuals from dangerous or potentially dangerous areas to safer areas.

17. **Movement.** Evacuees are to be encouraged to move using their own transport where possible. The Cooma Monaro SES Local Controller will coordinate transport for those people without their own vehicles.

18. **Evacuation routes.** Evacuation routes will not access roads and structures already closed or likely to be closed by floodwaters and will be advised in media bulletins.

19. **Animals.** Assistance animals (guide dogs, hearing assistance animals, etc) will remain in the care of their owners throughout the evacuation. This includes transport and access into evacuation centres etc. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners when being transported via aircraft or flood rescue boats. Industry and Investment NSW will make separate arrangements for the evacuation and care of companion animals.

20. **Doorknocking.** Field teams conducting doorknocks will record and report back the following information back to the Operations Centre:

    - Addresses and locations of houses doorknocked and/or evacuated.
    - The number of occupants.
    - Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).
    - Details of residents who refuse to comply with the evacuation order.

21. **Refusal to evacuate.** Field teams should not waste time dealing with people who are reluctant or refuse to comply with any evacuation order. These cases should be referred to the Local Emergency Management Operations Controller who will arrange for Police to ensure their evacuation.

22. **Security.** The NSW Police Force will provide security for evacuated areas.

23. **Transport and storage.** Transport and storage of furniture from flood threatened properties will be arranged as time and resources permit.

Phase 3 – Shelter

24. **Evacuation centres.** The usual purpose of evacuation centres is to meet the immediate needs of victims, not to provide them with accommodation. Evacuees will be advised to go to or be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the Cooma Monaro SES Local Controller but managed as soon as possible by the Community Services. Locations of Evacuation Centres will be determined and advertised to the community via the media and in Evacuation Warning messages.

25. **Action on arrival.** On arrival, evacuees will be:

- registered;
- medically checked, if necessary; and
- provided with their immediate welfare needs.

26. **Registration.** The NSW Police Force will ensure that all evacuees are registered on arrival at the designated evacuation centres.

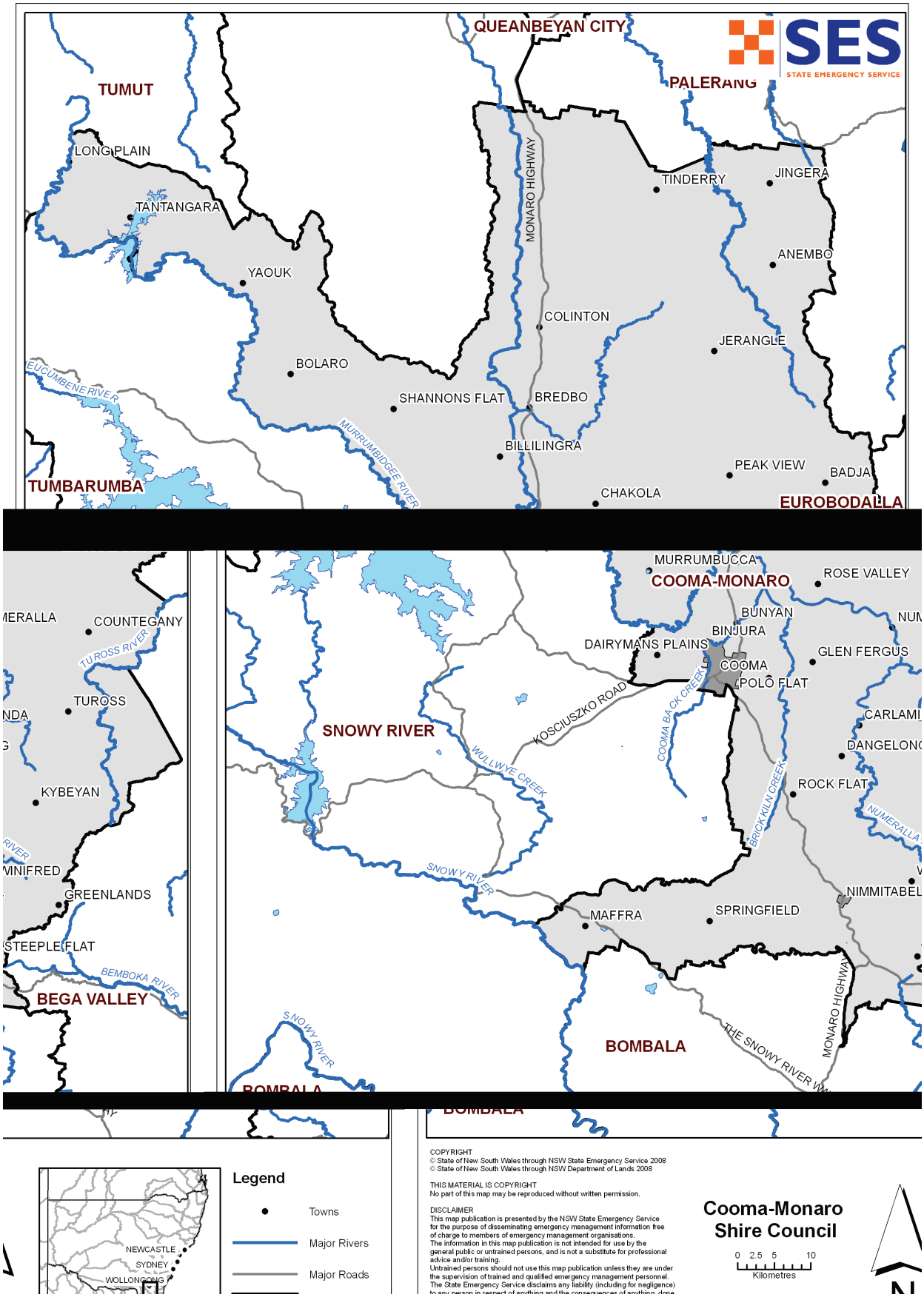
27. **Animal shelter compounds.** Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees. These facilities will be operated by Industry and Investment NSW and identified in Evacuation Warnings and other media bulletins.

Phase 4 – Return

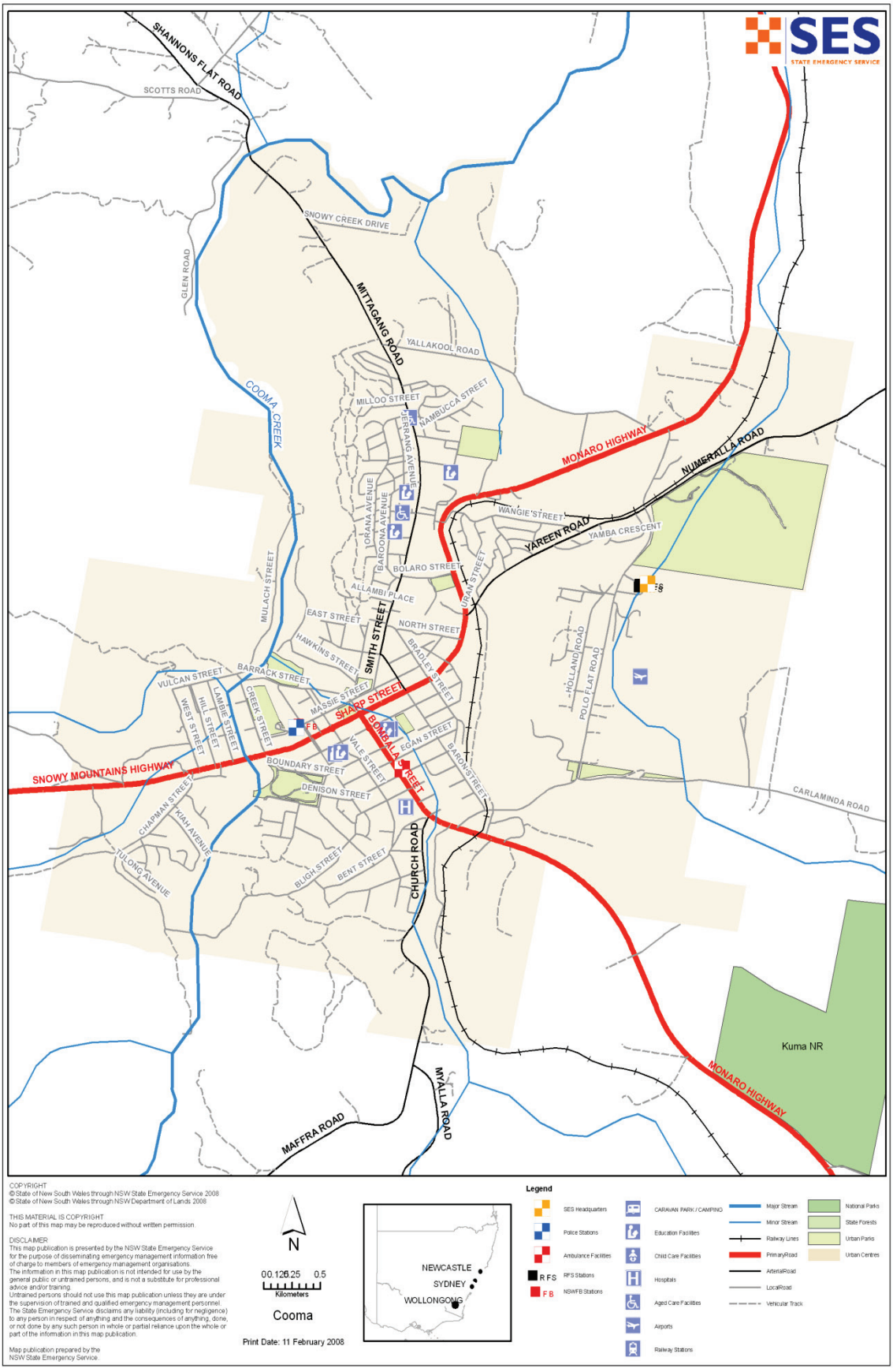
28. Once it is considered safe to do so, the Cooma Monaro SES Local Controller will authorise the return of evacuees to their normal or alternative place of residence. This decision will be made in consultation with appropriate officers in regard to matters such as the safety of dwellings, roads and the provision of services.

29. The return will be controlled by the Cooma Monaro SES Local Controller and may be coordinated by the LEOCON.

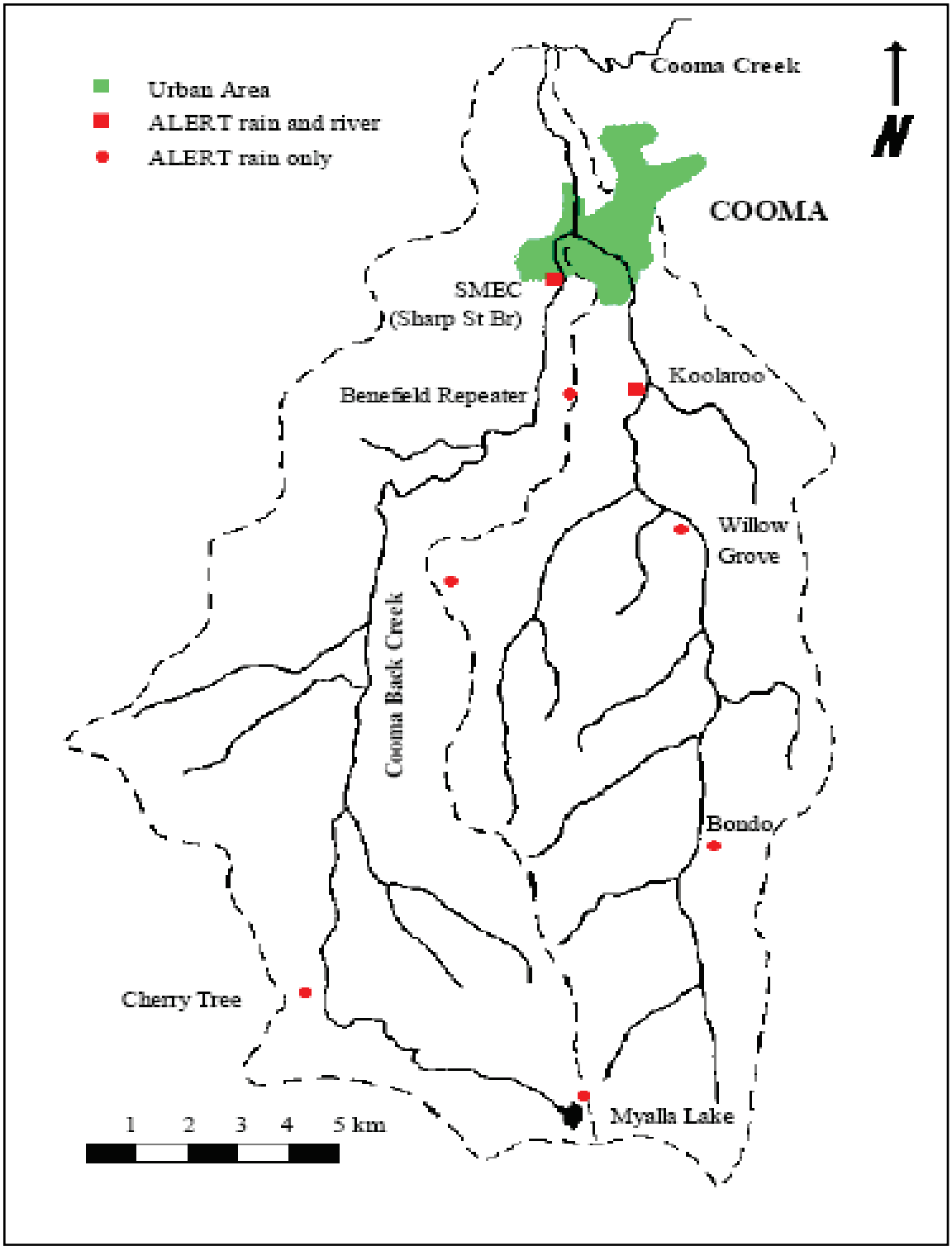
Map 1 Cooma Monaro Council Area



Map 2 Cooma Town Area



Map 4 Cooma Creek And Cooma Back Creek Catchments



Map 5 Cooma Showing Design Flood Extents