NSW STATE EMERGENCY SERVICE

Eurobodalla LGA

Local Flood Emergency Sub Plan

FloodSafe

EUROBODALLA SHIRE FLOOD EMERGENCY SUB PLAN

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

Volume 1 of the Eurobodalla Shire Flood Emergency Sub Plan

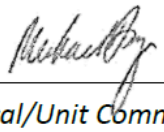
Endorsed by the Eurobodalla Shire Local Emergency Management Committee

11 July 2023

AUTHORISATION

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

Authorised

Signature: 

NSW SES Local/Unit Commander

Print Name: Michael Day, Local Commander - Eurobodalla

Date: 13/07/2023

Endorsed

Signature: 

Chair, Local Emergency Management Committee

Print Name: Rob Burke LEMO

Date: 11 July 2023

VERSION HISTORY

Version Number	Description	Date
	Eurobodalla Shire Local Flood Plan	July 2013
	Eurobodalla Shire Local Flood Plan	July 2006

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

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

Amendment Number	Description	Updated by	Date
1.0	**2.1.2 – Note added to indicate Eurobodalla Southern Storage is under construction.** **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

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 Eurobodalla Shire Local Government Area (LGA).

1.2 AUTHORITY

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

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

1.3 ACTIVATION

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

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

1.4 SCOPE

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

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

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

1.4.4 In this plan a flood is defined as a relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.

1.4.5 The arrangements for dealing with episodes of coastal erosion by severe weather, are described in the NSW State Storm Sub Plan.

1.4.6 The arrangements for the emergency management of tsunami are dealt with in the NSW State Tsunami Emergency Sub Plan.

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

1.5 GOALS

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

a. Protection and preservation of life.

b. Establishment and operation of flood warning systems.

c. Issuing of community information and community warnings.

d. Coordination of evacuation and welfare of affected communities.

e. Protection of critical infrastructure and community assets essential to community survival during an emergency incident.

f. Protection of residential property.

g. Protection of assets and infrastructure that support individual and community financial sustainability and aid assisting a community to recover from an incident.

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 Eurobodalla Shire are detailed within this plan, Appendix B and Appendix C.

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

a. The NSW SES Incident Controller (for local or zone level responsibilities during response operations).

b. The NSW SES Zone Duty Commander (for regional level responsibilities outside of response operations).

1.8 PLAN MAINTENANCE AND REVIEW

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

a. Ensuring that all supporting emergency services and functional areas, organisations and officers mentioned in it are aware of their roles and responsibilities.

b. Conduct a minimum of one exercise every five years or within two years of the plan being reviewed.

c. Reviewing the contents of the plan:

- When there are changes which alter agreed plan arrangements.
- When changes to land use strategic plans and policies increase the population at risk.
- After a flood including recommendations from after action reviews, reports, or inquiries.
- As determined by the NSW SES Commissioner.

d. The plan is to be reviewed no less frequently than every five years or after a significant flood event.

1.9 SUPPLEMENTARY DOCUMENTS

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

a. Flood Plan Glossary.

b. NSW SES Dam Failure Notification Flowchart.

c. NSW SES Resupply Flowchart.

2 OVERVIEW OF NSW FLOOD HAZARD AND RISK

2.1 THE FLOOD THREAT

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

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

Dam Name	Owner	High Risk Dam
Deep Creek Dam	Eurobodalla Shire Council	No
George Bass Drive Retention Basin	Euroboballa Shire Council	No
***Eurobodalla Southern Storage**	Eurobodalla Shire Council	No
Tilba Dam	Bega Valley Council	No
Note: * indicates this dam is still under construction.		

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. Dam Owners will provide Dam Emergency Plans (where required) and consult with NSW SES on alert levels and messaging. Alert level definitions are listed in Dam Emergency Plans.

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

g. NSW SES develops and maintains warning and flood information products by:

- Utilising flood intelligence data.
- Developing warning and flood information products.
- Continuously reviewing warning and flood information products.
- Consulting with affected communities, key stakeholders, Dam Safety NSW and the NSW and ACT Flood Warning Consultative Committee, and maintains Operational Readiness.
- Participating in the development of public information and warning systems.

h. Gauge owners adequately maintain flood warning gauges and systems, including those identified in the 'Service Level Specification' maintained by the Bureau of Meteorology (Bureau) and those identified in the 'Provision and Requirements for Flood Warning in New South Wales' maintained by NSW SES.

4.5 BRIEFING, TRAINING AND EXERCISING

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

Actions:

a. NSW SES will consult stakeholders throughout the development of plans.

b. NSW SES will inform stakeholders of content changes after revisions.

c. NSW SES will ensure their facilities and resources are maintained and operationally ready.

d. NSW SES will train personnel for their expected flood operation roles.

e. NSW SES will regularly brief stakeholders on the exercise arrangements contained in the NSW Flood Emergency Sub Plan.

4.6 COMMUNITY RESILIENCE TO FLOODING

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

Actions:

a. Ensure ongoing recruitment and training of a diverse range of volunteers.

b. Ensure pre-planning to facilitate the management of spontaneous volunteers and community members during a flood.

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

Actions:

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

b. Collate, assess and disseminate flood information to the community.

c. Collaborate with individuals, businesses, government agencies and communities when developing flood intelligence, preparedness and response information.

d. Plan for floods collaboratively with communities through community and stakeholder participation and engagement.

e. Collaborate with community sector and recognise the needs of individuals within communities who have an increased susceptibility during floods.

5 RESPONSE

5.1 INTRODUCTION

5.1.1 Flood response operations will begin:

a. On receipt of a Bureau Severe Weather Warning or Thunderstorm Warning that includes heavy rain or storm surge; or

b. On the receipt of a Bureau Flood Watch or Flood Warning; or

c. On receipt of warnings for flash flood; or

d. On receipt of a dam failure alert; or

e. When other evidence leads to an expectation of flooding.

5.2 INCIDENT MANAGEMENT ARRANGEMENTS

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

Actions:

a. NSW SES uses the Australasian Inter-service Incident Management System (AIIMS) to manage the flood response.

b. Control of flood response will be at the lowest effective level and may be scaled to suit the incident.

c. The NSW SES State Controller (or delegate) will appoint Incident Controllers and establish Incident Control Centres (see NSW SES facilities on map in Appendix A).

d. The NSW SES Incident Controller, in consultation with participating supporting emergency services and functional areas will determine the appropriate breakdown of an Area of Operations into Divisions and/or Sectors in accordance with the principles of AIIMS.

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

Actions:

a. NSW SES will operate Incident Control Centre(s) as required.

b. The NSW SES Incident Control Centre(s) will:

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

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

Actions:

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

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

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

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

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

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

g. Road closure information will be provided to the community through the following agencies/methods:

- Local Government Council websites.
- Transport for NSW 'Live Traffic' website: https://www.livetraffic.com/ or 'Transport InfoLine': 131 500. VMS messaging on roadways may also be used to advise motorists.

h. The Public Information and Inquiry Centre will be established by NSW Police Force where required to provide information regarding evacuees and emergency information. Contact details will be broadcast once the centre is established.

i. The Disaster Welfare Assistance Line will be established by Disaster Welfare Services where required to provide information on welfare services and assistance. Assistance line contact details will be broadcast once Disaster Welfare Services commence.

5.5 PROTECTION OF PROPERTY

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

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

a. The protection of properties including critical infrastructure through flood protection systems (e.g. sandbagging) to minimise entry of water into buildings.

b. The raising or moving of household furniture and commercial stock/equipment.

5.6 ROAD AND TRAFFIC CONTROL

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

Actions:

a. Eurobodalla Shire Council will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority.

b. Transport for NSW will coordinate the closure and reopening of the state road network.

c. NSW Police Force may close and re-open roads but will normally only do so (if the Eurobodalla Shire Council or Transport for NSW have not already acted and if public safety requires such action.

d. NSW SES will assist with erecting road closure signs and barriers when time and resources permit.

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

a. The NSW SES Incident Controller may direct the imposition of traffic control measures into flood affected areas in accordance with the provisions of the *State Emergency Service Act, 1989* and the *State Emergency Rescue Management Act, 1989.*

b. The NSW SES Incident Controller may request the Local Emergency Operations Controller provide suitable personnel to assist with traffic coordination.

5.7 PROTECTION OF ESSENTIAL SERVICES

5.7.1 Local and Region EMPLAN's contain infrastructure inventories.

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

Actions:

a. Transport Services Functional Area is to coordinate the provision of information about the assessment and restoration of transport network infrastructure.

b. Energy and Utility Services Functional Area is to coordinate the assessment and restoration of essential energy and utility services (not including telecommunications).

c. Telecommunications Services Functional Area is to coordinate the assessment and restoration of telecommunications and the Public Safety Network.

d. Engineering Services Functional Area is to:

- Coordinate the assessment and restoration of critical public buildings for example hospitals.
- Assessment and operation of flood protection levees.
- Protection of property.
- Construction and repair of levees.
- Dam safety assessment and dam stability.
- Water supply and sewerage operations.
- Other critical infrastructure.

e. Functional Areas and Council will keep NSW SES informed of the status of utilities and infrastructure.

5.8 EVACUATION

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

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

Actions:

a. Evacuations will take place when there is a risk to public safety. Circumstances may include:

- Evacuation of people when their homes or businesses are likely to flood.
- Evacuation of people who are unsuited to living in isolated circumstances, due to flood water closing access.
- Evacuation of people where essential energy and/or utility services are likely to fail or where buildings have been or may be made uninhabitable.

b. NSW SES will consider the following in evacuation decisions:

- Duration of evacuation.
- Characteristics of the community.
- Numbers requiring evacuation.
- Availability of evacuation routes and transport.
- The ability for existing levees or other flood protection works to fulfil their intended function.
- Time available for evacuation.
- Evacuee management requirements.
- Resources and delivery of evacuation information.
- Length of isolation.

c. NSW SES Incident Controllers, planning and intelligence officers will carefully consider the risks involved in conducting evacuations.

d. All evacuation decisions will be made as per the current NSW SES policies and procedures, and consistent with the NSW Evacuation Management Guidelines.

e. Potential Evacuation Centres are located in the Local EMPLAN.

f. NSW Police Force will coordinate the provision of overall security for evacuated areas.

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

a. NSW SES will control and coordinate the evacuation of affected communities.

b. The NSW SES Commissioner (or delegate) will warn communities to prepare for a possible evacuation, where circumstances allow such lead time.

c. The NSW SES Commissioner (or delegate) will order any necessary evacuations and provide information to the community about when and how to evacuate.

d. Support to evacuation operations may be requested from other emergency services and supporting agencies using arrangements in the local EMPLAN and supporting plans.

e. Health Services Functional Area will coordinate the evacuation of hospitals, health centres and aged care facilities (including nursing homes) in consultation with NSW SES and Welfare Services.

f. School administration offices (Government and Private) will coordinate the evacuation of schools in consultation with NSW SES and Welfare Services, if not already closed.

g. Caravan Park proprietors will inform the NSW SES Incident Controller when caravan park evacuations have been completed.

h. People who are reluctant or refuse to comply with any Emergency Warning will be referred to NSW Police Force.

5.9 EVACUEE MANAGEMENT AND WELFARE

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

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

Actions:

a. NSW SES will provide initial welfare for evacuees where required but will hand the responsibility over to Welfare Services Functional Area as soon as possible. NSW SES will brief Welfare Services Functional Area at the earliest opportunity regarding the level of assistance required.

b. Welfare Services Functional Area will manage evacuation centres for affected residents and travellers in accordance with Welfare Services Functional Area Supporting Plan.

c. Schools Administration (Government and Private) will manage the safety of students directly affected by flooding and will work with NSW SES in the temporary closure of schools and will coordinate with NSW SES, Transport and Welfare Services in the management of school evacuees.

d. Disaster Victim Registration will be controlled and coordinated by NSW Police Force with the assistance of NSW SES and the Welfare Services Functional Area.

e. NSW SES will provide details of all residents assisted in evacuations to the Welfare Services Functional Area as early as possible.

f. Where the expected remaining number of evacuees and the duration of evacuation is assessed to be beyond the capability and capacity of the established evacuation centre arrangements the SEOCON may establish Major Evacuation Centres or Mass Care facilities.

g. The decision to establish Major Evacuation Centres or Mass Care Facilities will be made by NSW SES and SEOCON in consultation with members of the State Emergency Management Committee.

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

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

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

Actions:

a. Agriculture and Animal Services Functional Area will coordinate the welfare of livestock, pets, companion animals and wildlife including support to primary producers, animal holding establishments and community members.

b. Agriculture and Animal Services Functional Area role will coordinate the evacuation, emergency care of animals and assessment, humane destruction and disposal of affected animals, and supply of emergency fodder, water and aerial support where necessary.

5.10 FLOOD RESCUE

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

Actions:

a. NSW SES will perform flood rescue, where training and equipment is suitable and where a risk assessment has indicated that the risk to rescuers is acceptable.

b. Flood rescue operations will be conducted in accordance with the State Rescue Board NSW State Rescue Policy which sets out the framework, governance, responsibilities and requirements for the management and conduct of flood rescue in NSW.

c. NSW SES may request other supporting emergency services to undertake flood rescues on behalf of NSW SES. Agencies must be authorised/accredited to undertake flood rescue operations in accordance with State Rescue Board requirements, as prescribed by NSW SES. Supporting emergency services must supply information regarding rescues performed to NSW SES. Notification arrangements with NSW Police Force are outlined in the State Rescue Board NSW State Rescue Policy.

d. Rescue agencies will conduct rescue of domestic small and large animals as per the State Rescue Board NSW State Rescue Policy (and may include Large Animal Rescue of family horses and cows at a residence or property). The rescue of livestock (which includes commercial animals found on farming and breeding enterprises) will be coordinated through Animal and Agriculture Services Functional Area.

5.11 RESUPPLY

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

Actions:

a. NSW SES will advise communities and businesses if flood predictions indicate that areas are likely to become isolated, and indicative timeframes where possible.

b. Retailers should be advised to ensure sufficient stock is available for the duration of the flood.

c. When isolation occurs, NSW SES will establish loading points where retailers can instruct suppliers to deliver goods.

d. NSW SES will endeavour to support the delivery of mail to isolated communities but may not be able to do so according to normal Australia Post timetables.

e. NSW SES will assist hospitals with resupply of linen and other consumables where able.

f. NSW SES may request resupply assistance from supporting agencies.

g. NSW SES may conduct resupply operations as per the designated resupply plan for the event.

h. Where additional supplies are required Engineering Services Functional Area be requested to coordinate the supply of goods and services in response to and recovery from the emergency.

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

Actions:

a. When requested, NSW SES will establish a resupply schedule and coordinate the resupply for isolated rural properties.

b. NSW SES will provide local suppliers with designated loading points. Resupply items are to be packaged by the supplier.

c. Isolated households unable to afford resupply items will be referred to Welfare Services Functional Area for assistance.

5.12 RETURN

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

Actions:

a. The NSW SES Incident Controller will determine when it is safe to progressively return in consultation with the relevant Emergency Operations Controller and supporting agencies considering the ongoing risk to public safety.

b. The NSW SES Incident Controller will specify the level of access to affected communities as the following:

- Not suitable for access; or
- Limited access by emergency services and response agencies; or
- Limited access by residents and/or business operators; or
- Full access.

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

d. NSW SES will facilitate the return of evacuees to their homes.

5.13 END OF RESPONSE OPERATIONS

5.13.1 **Strategy**: Conclude response operations.

Actions:

a. Response operations will conclude when:

- There is a reduced likelihood of additional flooding within the Area of Operation and flood waters have receded.
- All requests for assistance related to the flood have been completed.
- The need for warning and evacuation no longer exists.
- 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 Eurobodalla Shire representatives.

b. NSW SES will conduct After Action Reviews, at the conclusion of response operations, which will involve all stakeholders. Findings will be shared and incorporated into improved disaster resilience planning.

c. NSW SES will provide information and data throughout the emergency response to inform community recovery. A report will be developed at the request of the SERCON at the conclusion of the response within an area. Should a response summary report be required it will include the following:

- The emergency action plan in place at conclusion of the response emphasising any continuing activities including community meetings/ engagement activities.

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

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

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

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

6 RECOVERY OPERATIONS

6.1 INTRODUCTION

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

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

6.2 NSW SES RECOVERY ROLE

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

6.2.2 **Actions**:

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

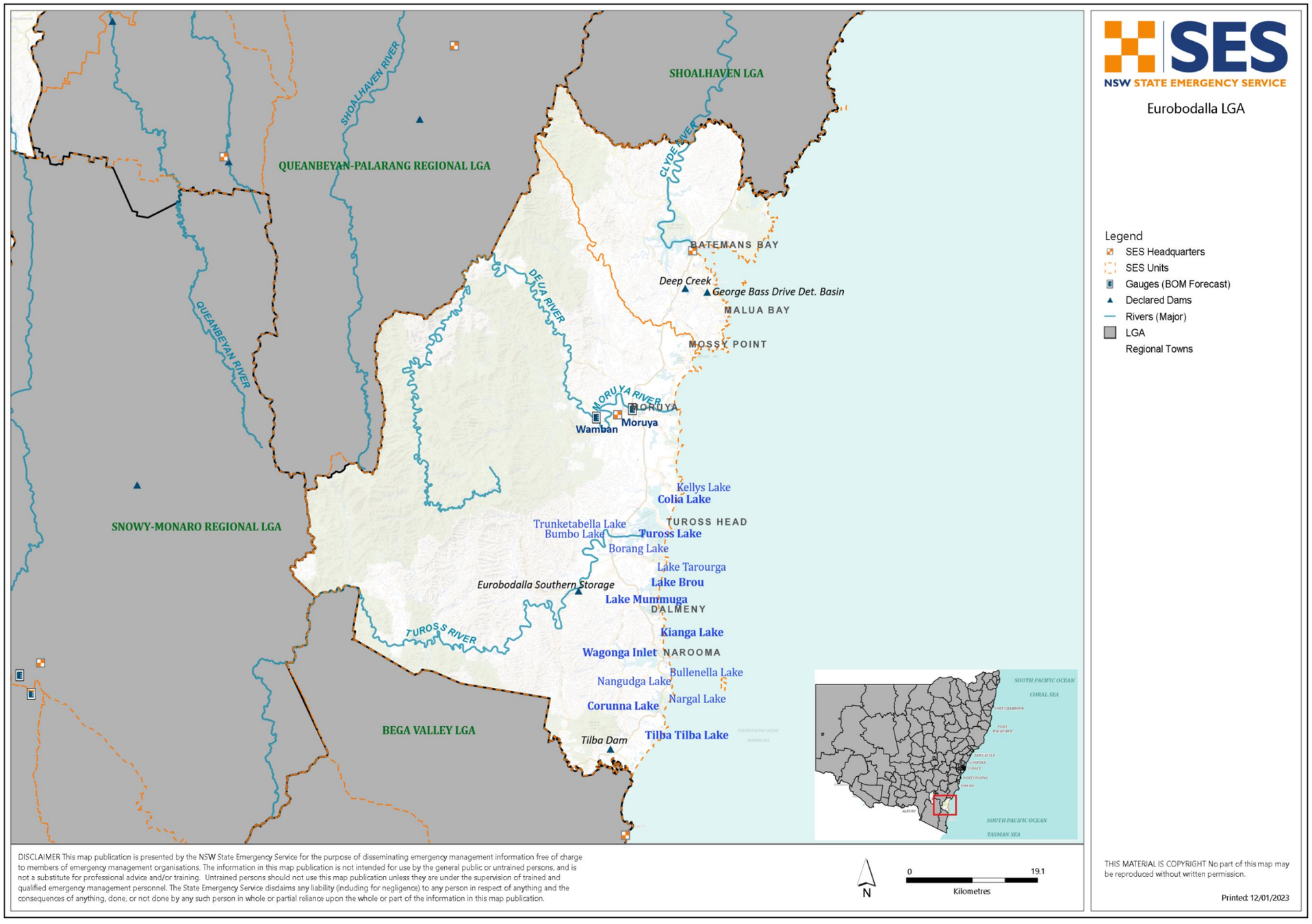
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 Eurobodalla Shire LGA



10 Appendix B – Roles and Responsibilities

AGENCY	RESPONSIBILITIES
NSW State Emergency Service	NSW SES is the designated Combat Agency for floods, storms and tsunami and controls response operations. NSW SES roles and responsibilities in relation to floods are outlined in the 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.
Eurobodalla Shire 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 Eurobodalla Shire 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. • 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. – Provision of assistance to NSW SES (plant, equipment and personnel where able and requested). – Property protection tasks including sandbagging.

AGENCY	RESPONSIBILITIES
	– 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. • Ensure that owners and occupiers of movable dwellings are aware that if they are expecting to be absent for extended periods, they should:

AGENCY	RESPONSIBILITIES
	– 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). Roles and responsibilities in addition to the Supporting Plan are:

AGENCY	RESPONSIBILITIES
	• 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.
Marine Rescue NSW	The roles and responsibilities for Marine Rescue NSW are outlined in the NSW State Flood Plan.

AGENCY	RESPONSIBILITIES
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 Autority	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.
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.

AGENCY	RESPONSIBILITIES
	• 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 EUROBODALLA SHIRE

Volume 2 of the Eurobodalla Shire Local Flood Plan

Last Update: August 2017

FloodSafe

AUTHORISATION

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

Approved

Manager Emergency Risk Management

Date: 2-8-17

Approved

Greg Murphy
Region Controller
Illawarra South Coast Region

NSW SES Illawarra South Coast Region Controller

Date: 5 May 2017

Tabled at LEMC Date:

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LIST OF TABLES

VERSION LIST

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

Description	Date
Eurobodalla Shire Local Flood Plan – Annexes A and B	July 2006

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

Illawarra South Coast Region

NSW State Emergency Service

PO Box 1460

Wollongong, NSW 2500

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 AND COASTAL EROSION THREAT

1.1 OVERVIEW OF EUROBODALLA SHIRE

a. The Eurobodalla Local Government Area is located on the NSW South Coast, approximately 250km south of Sydney. There are three river basins located within the LGA. They are; the Clyde River Basin in the north, the Moruya River Basin in the centre, and the Tuross River Basin in the south (Maps 1-3) (1).

b. The major towns located within the Eurobodalla Shire are Moruya, Batemans Bay and Narooma. Other smaller towns include Durras, Mossy Point, Broulee, Bodalla, Potato Point and Mogo. The population of the Eurobodalla Shire is mainly located on the eastern coast of the Shire. A large part of the Shire, in the west, is made up of State forests (1).

c. Flooding in the Eurobodalla Shire consists of riverine flooding on the major river systems of the Clyde, Moruya and Tuross rivers and lake-embayment flooding along the coast. Flooding along the coast itself can result from a combination of high tides, wave setup and storm surge conditions. There are several shallow tidal lakes and estuaries which at times offer only constricted flow to sea, allowing flood waters to build up (1).

1.2 LANDFORMS AND RIVER SYSTEMS

Clyde River Basin

a. The Clyde River Basin is shown on Map 1.

The Clyde River

b. The Clyde River, with its major tributary the Buckenbowra River, drains the northern portion of the council area. The headwaters of the Clyde River are in the rugged forested country of the Budawang and Turpentine ranges in the Shoalhaven Local Government area from which the river flows in a southerly direction through steep, forested country. Its main tributaries within the Shoalhaven Local Government area are the Boyne, Bimberamala, Cockwhy and Currowan creeks. Below the junction with Cockwhy Creek the Clyde comes under tidal influence, flowing south from this point for ten kilometres before entering the upper reaches of Batemans Bay. The Buckenbowra River joins the Clyde within the Eurobodalla Local Government Area about 10 kilometres above the urban centre of Batemans Bay (1).

c. Most of the area drained by the Clyde River and its tributaries is mountainous, moderating downstream to gentle valleys and finally to limited floodplains between Nelligen and Batemans Bay and on the lower Buckenbowra. The entire

catchment area comprises 3200 square kilometres ranging up to more than 1000 metres in elevation (1).

The Tomaga River

d. The headwaters of the Tomaga River are located in the eastern portion of Mogo State Forest, to the south of Deep Creek Dam in the Eurobodalla Shire Area.

e. The river flows in a southward direction through the valley located above the locality of Woodlands.

f. The river turns in a westward direction through the flat plains surrounding Mogo, and is joined by Mogo Creek and Jeremadra Creek.

g. The river then turns in a south easterly direction and flows out to the ocean at Tomakin.

Minor Watercourses

h. Flooding can occur on short coastal and inland creeks within the Clyde River Basin. These creeks include Mogo, Reedy, Short Beach, Joes, and McLeods. Hanging Rock, Maloneys Beach, Cabbage Tree, Wimbie and Candlagan Creeks (1).

Moruya River Basin

i. The Moruya River Basin is shown on Map 2.

The Moruya River

j. The Moruya River, which in its upper reaches is known as the Deua River, drains a triangular shaped catchment area of about 1,530 square kilometres between the catchments of the upper Shoalhaven, Clyde and Tuross rivers. Its headwater tributaries (Moodong, Neringla, Telowar, Bettowynd, Majors, Araluen, Georges, Parsons and Woolla creeks) drain the rugged and wooded Minuma, Bendoura and Benmanang ranges and Bendethera and Coranbene mountains with elevations greater than 1000 metres. These creeks are steep and flow within narrow valleys. Below the confluence of the Deua River and Araluen Creek the river is known as the Moruya River: from this point it flows in a south easterly direction to be joined by the Merricumbene, Oulla, Burra, Donalds, Wamban and Mogendoura creeks. In its lower reaches the river veers north-east and flows through the Mullenderee flats into the Tasman Sea at Moruya Heads (1).

k. In the upper reaches, there is some floodplain development upstream and downstream of Araluen and below the confluence of the Araluen Creek and Deua River in the Merricumbene area. A much larger floodplain begins near the junction of Burra Creek and the Moruya River and widens towards the river mouth. The coastal plain extends for about eighteen kilometres. The upper catchment consists

of mainly unpopulated state forest. The lower catchment, apart from the township of Moruya, is used primarily for grazing (1).

Tuross River Basin

l. The Tuross River Basin is shown on Map 3.

The Tuross River

m. The headwaters of the Tuross River are in the Kybean and Tuross ranges in the Monaro and Bega Valley council areas. The main tributaries are the Woila, Yowrie, Wandello, Belimba, Gulph and Reedy creeks and the Wadbilliga River (1).

n. Most of the catchment is forested and mountainous and even near the coast there are no extensive areas of flat land. The river flows in a predominantly westerly direction into Tuross Lake, which discharges into the Tasman Sea (1).

o. Flooding is common on the Tuross River and usually occurs as a result of intense rainfall over the upper reaches of the catchment where high relief and steep slopes combine to produce rapid concentration of flood waters in stream channels. Because these channels are deep and narrow in the upper reaches, flood waves attenuate only very slightly in their passage downstream. In the lower reaches, where the bed slope and topography is flatter, some inundation of low-lying areas occurs. The intensity of major floods can be aggravated if floodwaters coincide with high tides (1).

Minor Watercourses

p. Other watercourses draining the Tuross River Basin are Lawlers, Whittakers, Stony, Coila and Reedy Creeks. Little information exists on these creeks (1).

Coastal Lakes

q. Coila Lake is located on the northern side of Tuross Head. It is fed by Coila Creek. Coila Lake entrance can become closed due to a build-up of sand, but is opened by Council when heavy rainfalls occur (1).

r. Tuross Lake is located on the western side of Tuross Head. It is fed by the Tuross River. The Tuross River then continues to the ocean (1).

s. Lake Brou is located south of Potato Point. It is fed by Stoney Creek (1).

t. Lake Mummuga is located north of Dalmeny. It is fed by Lawlers Creek. It covers an area of 140ha (1).

u. Kianga Lake is located to the north of Kianga. It covers an area of 15ha and the mouth of usually blocked (1).

v. Wagonga Inlet is located at Narooma. The inlet extends 9km upstream of the ocean. The inlet is permanently open to the ocean with twin breakwaters extending seaward (1).

w. Corunna Lake is located south of Narooma. The lake entrance can become closed due to sand build-up, however the entrance is opened by Council during high rainfall periods (1).

x. Wallaga Lake is located on the southern boundary of the Eurobodalla LGA. It is fed by Dignams and Narira Creeks (1). Wallaga Lake Township is located within the neighbouring Bega LGA.

1.3 STORAGE DAMS

a. Deep Creek Dam is the only prescribed dam within the Eurobodalla LGA. Its location is shown on Map 1 and further details are provided in Table 1 below.

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

Deep Creek Dam (2)	
Owner / Operator	Eurobodalla Shire Council
Description of Dam	Deep Creek Dam is a 32 metre high earthfill reservoir with a 4,900 ML capacity.
Location	The dam is located approx. 5km South of Batemans Bay. Part of the Clyde River-Jervis Bay basin.
Communities Downstream	Deep Creek and Botanic Gardens
Monitoring System	Constant visual and mechanical monitoring. Daily storage level rainfall and seepage readings, visual inspection (3 times per week), Piezometer readings (every 6 months), Deformation survey (2 yearly), monthly vibrating strain stall tests to detect for movement in the dam wall.
Warning System	There are no warning systems identified for downstream communities.

1.4 WEATHER SYSTEMS AND FLOODING

a. Most flood producing rains result from incursions of moist tropical air masses or occasional cold fronts, or very heavy storm rainfalls generated by active depressions centred off the coast. Storms resulting from off-coast depressions have occurred about twice per year on average and can produce 24-hour falls of more than 350mm. The most severe storms result from weather configurations in which a high pressure system located over Victoria or Tasmania is combined with a deep, slow moving low-pressure cell over the south coast of NSW. A vigorous on-shore flow of moist, warm air occurs under these circumstances and heavy rains fall on

the coast and over the range country. The magnitude of the resulting discharges depends on the level of antecedent moisture as well as on the distribution, duration and volume of rainfall (1).

b. These storms are more likely to form during the summer and autumn months than at other times of the year. The Australian Alps shelter the Eurobodalla area from the moist south-westerly airstreams which are the predominant rain-producing systems over southern NSW during the winter and spring months. As a result of this shelter, the months from August to November are relatively dry (1).

c. Although there are areas of rain shadow in the inland parts of the Shire (notably the Deua River valley and the central western section of the Tuross River), rainfall generally increases with land elevation as a result of orographic influences. Annual mean rainfall varies from about 750mm on parts of the coast and in the rain shadow areas to more than 1300mmm in the higher range country (1).

d. The flood pattern of the Eurobodalla shows a bias towards the period between February and June. About three-quarters of the floods recorded there have occurred in these five months. However, flooding at other times of the year is possible (1).

e. Short-term, high intensity convective thunderstorms can cause local 'flash' flooding, especially during summer months when thunderstorms are most frequent. Minor creeks may rise, but main river levels are not affected. When such thunderstorms occur over built-up areas stormwater flooding may occur (1).

1.5 CHARACTERISTICS OF FLOODING

a. The Clyde River Basin is affected by riverine and overland flooding (1).

b. The Tuross River Basin is affected by riverine and overland flooding (1).

c. The Moruya Basin is affected by riverine flooding. The Moruya River acts as a floodway for all flooding events. The area from the Moruya River to 1km into the Mullenderee Flats acts as a floodway in events above the 1% AEP. In the lower end of the catchment the Mullenderee Flats and Malabar Lagoon act as flood storage during all flooding events (3).

d. The key gauges used to monitor water levels within the Clyde and Moruya River Basins are shown schematically in Annex 1 and 2. The Bureau of Meteorology provides flood warnings to the Wamban (217002) and Moruya (217900) gauges on the Moruya River. An automatic gauge is present on the Deua River at Riverview (217007) which is used by the Bureau to predict to the Wamban gauge. Flood warnings are not provided for other gauges in the Eurobodalla LGA. Estimated travel times between gauges on the Moruya River are provided in Table 2 and Annex 2.

Table 2: Indicative Flow Travel Time for the Moruya River

Locations	Travel Time
McGregors Creek to Wamban Gauge	2 hours
Wamban Gauge to Moruya Gauge	3 hours

e. Council Flood Studies have been undertaken within these catchments to model what is expected during various size flood events, up to the Probable Maximum Flood (PMF) extent. These are normally expressed as Annual Exceedance Probability (AEP) and can also be related to the height at a gauge where one exists.

f. AEP is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood level (height) has an AEP of 5%, there is a 5% chance (that is, a one-in-20 chance) of such a level or higher occurring in any one year.

1.6 FLOOD HISTORY

Clyde River

a. The highest floods recorded on the Clyde River at Brooman to the north of the council boundary, were in November 1961 and March 1963 when peak heights of 13.18 and 12.62 metres respectively were recorded. Other significant recent floods occurred in April 1961 and August 1974. Earlier, ungauged floods were recorded in 1860 (when rainfall of 475mm was experienced in a four-day period), 1867, 1898, 1914, 1916, 1925, 1934, 1941, 1942 and 1945. The 1934 event was apparently more severe on the Clyde River than the 1925 one which created records on many of the other rivers of the South Coast (1).

Moruya River

b. Since European occupation there have been increases in water and sediment discharges in the Moruya River valley and flooding has been frequent.

c. The most significant flood at Moruya was in 1925 and reached 5.4m at the Moruya Bridge.

Table 3: Flood History from Moruya Gauge (217900) – Floods above Major (3.2m) (1; 4) (5) (6)

Date	Gauge Height (m AHD)
May 1925	5.4
May 1870	5.2
Feb 1898	5.2
Mar 1914	4.6
Jan 1934	4.4
Feb 1860	4.3
Mar 1867	4.2
Feb 1934	3.8
Mar 1975	3.7
Apr 1945	3.7
June/July 1852	3.7
20/11/1961	3.65
28/08/1974	3.65
16/10/1976	3.35
21/03/1978	3.35
11/02/1992	3.20

Table 4: Flood History from Wamban Gauge (217002) – Floods above Major (8.0m)

Date	Peak Height (m)
30/10/1959	9.02
20/11/1961	10.14
28/08/1974	9.26
11/03/1975	9.68
17/10/1976	8.54
21/03/1978	9.18
12/06/1991	8.22
10/02/1992	8.85

Current at end Dec 2016

d. The most recent significant floods, which occurred in June 1991 and February 1992, reached levels of 2.9 metres and 3.2 metres respectively on the Moruya gauge (217900). These equate roughly to the 5-year and 7-year events and are the only floods to have caused inundation in the town since the slightly more serious floods of 1976 and 1978 which reached a height of 3.35 metres. Adopted design flood levels (along with an estimate for 'extreme' flooding roughly equivalent to that of the Probable Maximum Flood) are noted below for several locations on the lower floodplain of the Moruya River. All heights are expressed in metres AHD (1):

Table 5: Design flood levels for the lower Moruya floodplain (1)

	5% AEP (1-in 20 year)	2% AEP (1-in-50 year)	1% AEP (1-in-100 year)	Extreme
Wamban	12.8	13.9	14.7	17.6
Kiora Bridge	10.8	11.9	12.7	15.5
Yarragee	7.8	8.7	9.4	11.4
Moruya Bridge	4.2	4.7	5.1	6.9
Malabar Creek	3.5	4.0	4.5	6.3
Garlandtown	2.4	2.8	3.1	4.5

1.7 FLOOD MITIGATION SYSTEMS

a. Low level levees have been constructed on the foreshores of Malabar lagoon. Their purpose is to prevent the lagoon from encroaching onto adjacent farmland during times of low level flooding and to prevent tidal intrusion onto low-lying agricultural land. The levees are located downstream of communities on the Moruya River and are overtopped at a low flood level and do not have any effect on flood levels (3).

Table 6: Prescribed Dams in Eurobodalla LGA.

Surf Beach Detention Basin (7)	
Owner / Operator	Eurobodalla Shire Council
Description of Dam	It is an earth fill detention basin with a 10ML capacity.
Location	The detention basin is located above George Bass Drive, between Surf Beach Ave and Towrang Ave. The wall is incorporated into the filled section of George Bass Drive.
Communities Downstream	Surf Beach
Monitoring System	Monitored by site visits.
Warning System	There are no identified warning systems.
Other	15 residences would be affected downstream should the detention basin fail.

1.8 EXTREME FLOODING

a. While the Eurobodalla Local Government Area had some flood experience during the 1990s, it is a long time since genuinely severe flooding has occurred. At Moruya in fact, no flooding worse than a 5% AEP flood has occurred since the 1925 flood in which the Moruya River overtopped the bridge by 0.6m and broke both banks causing extensive flooding in the Mullenderee area north of the town as well as inundating a significant portion of the town centre (estimated to have been 5.4m at Moruya Bridge) (6).

b. Flooding of this and greater severity will occur in the future, however, and on very rare occasions floods could be more serious than has ever previously been recorded. When severe floods occur they often reach much higher than other floods and are generally both faster to rise and more dangerous in terms of depth and velocity than previously known flood events.

c. At Moruya, the extreme flood event (the worst believed to be possible at the town) would be approximately 1.5 metres higher than the worst flood recorded there since European settlement of the area (5.4m AHD in 1925). During an extreme flooding event North Moruya and Moruya CBD will become completely inundated. North Moruya will become a low flood island. Inundation will also occur in Mynora, Gundary and on rural properties (3).In such a flood, peak average velocities of flow in the river could reach 4.6 metres per second in comparison with 2.6, 2.9 and 3.2 m/s for the 5%, 2% and 1% flood events.

d. Extreme floods on other rivers in the Eurobodalla Shire would also be much higher and more dangerous than the floods previously recorded on them. The effects of extreme flooding in the Clyde and Tuross River Basins are unknown.

1.9 COASTAL EROSION

a. Numerous locations along the Eurobodalla coastline are subject to coastal hazards including coastal erosion and coastal inundation (8).

b. Wharf Road, North Batemans Bay has specifically been identified as being one of the NSW coastal erosion 'hot spots' (9). With 8ha of private property, a public road and water and sewage infrastructure at risk (10).

c. In the Batemans Bay area coastal erosion is also a potential hazard at:

- Surfside Beach
- Cullendulla Beach and
- Long Beach

d. Batemans Bay CBD is particularly vulnerable to inundation as a result of wave overtopping of the training wall and wave impacts along the immediate foreshore during major storm / tide events (11).

e. Specific areas at risk of coastal inundation within Batemans Bay include (11):

- Beach Road
- Wharf Road
- Surfside Beach
- Corrigans Beach and
- Caseys Beach

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

Table 7: Census of Housing and Population data (2011)

Census Description	Eurobodalla (A)	Batemans Bay	Bodalla	Dalmeny	Durras
Total Persons	**35,741**	**13,035**	**781**	**2,329**	**563**
Aged 0-4 yrs	1,821	756	42	103	35
Aged 5-14 yrs	4,065	1,530	93	208	84
Aged 65 + yrs	9,239	3,410	134	816	93
Of Indigenous Origin	1,815	669	99	105	8
Who do not speak English well	97	48	0	0	0
Have a need for assistance (profound/severe disability)	2,486	1,017	43	321	11
Living alone (Total)	4,157	1,475	93	289	64
Living alone (Aged 65+)	2,019	756	28	171	25
Residing in caravans, cabins or houseboats or improvised dwellings	388	137	4	5	25
Occupied Private Dwellings (Households)	**14,339**	**5,074**	**315**	**922**	**206**
No Motor Vehicle	885	393	16	49	3
Caravan, cabin, houseboat or improvised dwell	262	95	0	0	22
Rented via State or Housing Authority	416	214	9	9	0
Rented via Housing Co-Op or Community Church Group	122	40	8	6	0
No Internet Connection	3,776	1,393	89	261	44
Unoccupied Private Dwellings	**7,013**	**1,893**	**141**	**384**	**344**
Average persons per occup dwelling	**2.3**	**2.2**	**2.4**	**1.9**	**2.4**
Average vehicles per occup dwelling	**1.6**	**1.5**	**1.8**	**1.5**	**1.8**

Census Description	Long Beach	Malua Bay	Mogo	Moruya	Moruya Heads
Total Persons	**765**	**2,055**	**497**	**3,630**	**920**
Aged 0-4 yrs	53	98	21	210	44
Aged 5-14 yrs	98	245	71	460	117
Aged 65 + yrs	182	528	72	819	184
Of Indigenous Origin	9	40	96	318	42
Who do not speak English well	3	3	0	9	0
Have a need for assistance (profound/severe disability)	47	81	29	237	52
Living alone (Total)	71	172	33	424	78
Living alone (Aged 65+)	36	90	13	198	34
Residing in caravans, cabins or houseboats or improvised dwellings	0	0	3	34	8
Occupied Private Dwellings (Households)	**291**	**805**	**179**	**1,450**	**356**
No Motor Vehicle	7	24	3	146	10
Caravan, cabin, houseboat or improvised dwell	0	0	3	17	3
Rented via State or Housing Authority	0	0	4	116	3
Rented via Housing Co-Op or Community Church Group	0	4	4	20	0
No Internet Connection	56	148	50	469	82
Unoccupied Private Dwellings	**300**	**702**	**36**	**188**	**171**
Average persons per occup dwelling	**1.7**	**2.3**	**2.6**	**2.4**	**2.4**
Average vehicles per occup dwelling	**1.8**	**1.7**	**1.9**	**1.6**	**1.7**

Census Description	Mossy Point-Broulee	Narooma	Nelligen	Tomakin	Tuross Heads
Total Persons	**2,524**	**3,331**	**563**	**537**	**2,621**
Aged 0-4 yrs	120	154	21	28	109
Aged 5-14 yrs	310	276	68	56	229
Aged 65 + yrs	647	961	92	129	824
Of Indigenous Origin	61	139	10	26	54
Who do not speak English well	0	15	0	0	3
Have a need for assistance (profound/severe disability)	146	237	36	27	140
Living alone (Total)	351	483	52	56	323
Living alone (Aged 65+)	176	234	14	30	163
Residing in caravans, cabins or houseboats or improvised dwellings	45	79	6	43	10
Occupied Private Dwellings (Households)	**1,021**	**1,476**	**215**	**221**	**1,169**
No Motor Vehicle	51	128	7	11	33
Caravan, cabin, houseboat or improvised dwell	33	59	4	27	3
Rented via State or Housing Authority	0	59	0	3	3
Rented via Housing Co-Op or Community Church Group	3	6	0	0	0
No Internet Connection	236	441	42	50	294
Unoccupied Private Dwellings	**880**	**584**	**104**	**306**	**774**
Average persons per occup dwelling	**2.3**	**1.8**	**2.4**	**2.4**	**2.2**
Average vehicles per occup dwelling	**1.5**	**1.5**	**2.0**	**1.7**	**1.6**

SPECIFIC RISK AREAS - FLOOD

Moruya Valley Basin

2.2 BENDETHERA CAMPING GROUND

2.2.1 Overview

a. Bendethera camping ground is located within the Moruya River Basin. It is located on the Deua River (Map 2). Access to the campground is via the Dampier Mountain Fire Trail and requires 4WD access.

b. Bendethera Camping Ground becomes isolated when the Deua River cuts off the access road. Historically isolation can occur for over a week. The area is difficult to access and has no phone or radio coverage.

c. There are no stream gauges located near Bendethera, however there is a rain gauge located at Moruya (Plumwood 069145) at the head of the Deua River which could potentially provide some indication of isolations.

d. The most recent isolation event occurred in January 2016 when significant rainfall occurred in the upper reaches of the catchment. In this case 41 campers were isolated for over 6 days. During a four day period 410mm of rainfall fell at the Plumwood Gauge, 360mm of which fell within the first two days (12).

2.3 UPSTREAM OF MORUYA

2.3.1 Community Overview

a. Upstream rural properties are located in the Moruya River Valley, upstream of Moruya. Properties mostly contain agricultural lands (3) (Map 4).

2.3.2 Characteristics of Flooding

a. The river valley is affected by riverine flooding from the Moruya River (3).

2.3.3 Flood Behaviour

a. Unknown.

2.3.4 Classification of Floodplain

a. Properties have Rising Road Access during all flooding events (3).

2.3.5 Inundation

a. The properties affected by flooding during various design flood events are provided in Table 8 below.

Table 8: Estimated number of properties inundated above floor level and over ground in Upstream of Moruya related to the Moruya Gauge

Moruya Gauge (217900), Gauge Height (m)	AEP %	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
2.75m	50	-	0	0
3.4m	20	-	0	0
4.2m	5	-	0	3
4.7m	2	1.10	3	3
5.1m	1	1.95	3	6
6.9m	Extreme	3.78	6	6

2.3.6 Isolation

a. 8 properties become isolated from Moruya when Kiora Road crossing is closed (1.0m at the Moruya Gauge) (3).

b. 9 properties become isolated from Moruya when the Wamban Bridge is closed. It is unknown at what flood level this occurs at (3).

c. 4 properties become isolated from Moruya when Eastern Boundary Road is flooded. It is unknown at what level this occurs (3).

d. Glendeuart Estate containing over 60 properties becomes isolated from Moruya when Larrys Mountain Road and the Princes Highway close. This occurs at 2.6m at the Moruya Gauge (3).

e. Isolations can occur for several days (3).

2.3.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in the Moruya Valley.

2.3.8 Dams

a. There are no dams located upstream of Moruya.

2.3.9 At Risk Facilities

a. There are no schools or at risk facilities identified to be located within this area upstream of Moruya.

2.3.10 Other Considerations

a. No other considerations.

2.4 WEST MORUYA (GUNDARY AREA)

2.4.1 Community Overview

a. The Gundary area is part of Moruya located directly west of the CBD (near the Gundary Oval) and comprises of residential lands (3) (Map 5).

2.4.2 Characteristics of Flooding

a. The Gundary Area is affected by riverine flooding and overland flooding (3).

2.4.3 Flood Behaviour

a. The Gundary area becomes a flood storage area in all events up to the PMF. Flooding begins with floodwaters from the river backing up the drainage system and is subsequently joined by the overtopping of the Moruya River banks (3).

2.4.4 Classification of Floodplain

a. West Moruya (Gundary) has rising road access for all events up to the PMF (3).

2.4.5 Inundation

Table 9: Estimated number of properties inundated above floor level and over ground in West Moruya (Gundary) related to the Moruya Gauge (3)

Moruya Gauge(217900), Gauge Height (m)	AEP %	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
	50		0	4
	20		0	10
4.2m	5	0.49	8	21
4.7m	2	0.62	11	27
5.1m	1	0.81	16	30
6.9m	Extreme	1.55	48	56

a. Inundation occurs on properties located in the low lying areas of River, Shore, Campbell, Foreman, Evans and Murray Streets, adjacent to Gundary Creek (3).

b. The Moruya Bowling and Recreation Club is located on Shore Street adjacent to the Moruya River. The club becomes inundated at the Moruya gauge height of 3.7m (13).

2.4.6 Isolation

a. The western side of Gundary becomes isolated from the eastern side and the Moruya CBD when River, Shore, Campbell and Murray Street become inundated. This occurs in events above the 5% AEP (4.2m at the Moruya Gauge) (3).

b. The Moruya Bowling and Recreation Club becomes isolated at the Moruya gauge height of 3.65m (13).

2.4.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Gundary.

2.4.8 Dams

a. There are no dams upstream of Gundary.

2.4.9 At Risk Facilities

a. **The Moruya District Hospital** is located in Gundary on River Street. It becomes isolated in events above the 5% AEP (4.2m at the Moruya Gauge). The grounds and low lying parts of the hospital are affected by floodwaters at the 5%AEP (4.2m at the Moruya Gauge). Inundation would occur prior to this level however the exact level this occurs is unknown (3).

b. **IRT Moruya**, an aged care facility is located in Gundary adjacent to Gundary Creek on River Street. It becomes isolated in events above the 5% AEP (4.2m at the Moruya Gauge). The grounds and low lying parts of the facility are affected by floodwaters at the 5%AEP (4.2m at the Moruya Gauge). Inundation would occur prior to this level however the exact level this occurs is unknown (3).

c. **Moruya Preschool** is located on Campbell Street in Gundary. It becomes isolated in events above the 5% AEP (4.2m at the Moruya Gauge) (3).

2.4.10 Other Considerations

a. No other considerations.

2.5 MORUYA CBD

2.5.1 Community Overview

a. The Moray CBD is located on the southern side of the Moruya River, 305km south of Sydney. The CBD is low lying and flat and is scattered with commercial and industrial buildings (3) (Map 5).

b. The Princes Highway runs through the Moruya CBD.

2.5.2 Characteristics of Flooding

a. The Moruya CBD is affected by a combination of riverine flooding and overland flooding (3).

2.5.3 Flood Behaviour

a. The Moruya CBD area is typified by low, flat land and is classified as flood storage in all events up to the PMF. The flood storage areas fill slowly (3).

b. During events above the 1% AEP (5.1m at the Moruya Gauge) Riverside Park adjacent to the Moruya River becomes a floodway (3).

2.5.4 Classification of Floodplain

a. The Moruya CBD is classified as having Rising Road Access in all events up to the PMF (3).

2.5.5 Inundation

Table 10: Estimated number of properties inundated above floor level and over ground in Moruya CBD related to the Moruya gauge (3)

Moruya Gauge, Gauge Height (m)	AEP %	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
2.75m	50	0	0	2
3.4m	20	0.29	11	48
4.2m	5	0.51	92	117
4.7m	2	0.82	124	144
5.1m	1	1.16	140	163
6.9m	Extreme	2.46	191	193

a. In the early stages flood waters back up along Ryans and Racecourse Creek from the river inundating adjacent land. Water rises slowly in these flood storage areas, as the area of inundation is large. Inundation may last for up to 24 hours after the peak flood height is reached (3).

b. Properties in the Moruya CBD located to the east of the Princes Highway and north of the Moruya Golf Club are all inundated by floodwaters from the 5% AEP (4.2m at

the Moruya Gauge) event and above (3). Inundation in the CBD begins to occur at the Moruya gauge height of 2.6m (13).

c. Properties located on the western side of the Princes Highway/Vulcan Street including Campbell Street, Murray Street and Mirrabrooka Avenue between Page Street and the Princes Highway become inundated with floodwaters in events above the 5% AEP (4.2m at the Moruya Gauge) (3).

d. Properties located adjacent to Racecourse Creek (including the golf course) on Albert, Moruya, Haslingden and Vulcan Streets become inundated in events above the 5% AEP (4.2m at the Moruya Gauge) (3).

e. A small group of properties located on the eastern side of John Street, between Albert and Bergalia Streets, including Carrie Crescent become inundated in events above the 1% AEP (5.1m at the Moruya Gauge) (3).

2.5.6 Isolation

a. The Moruya CBD can become inaccessible by road from the north and east when floodwaters reach the roads at the levels of; Princes Highway north (3.02m at the Moruya Gauge), Princes Highway east (3.2m at the Moruya Gauge).

b. Arulan Road (1.0m at the Moruya Gauge) and South Head Drive (4.2m at the Moruya Gauge) may also become inundated and closed.

c. Closure may be for up to 24 hours after the peak flood (13).

2.5.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Moruya CBD.

2.5.8 Dams

a. There are no dams located upstream of the Moruya CBD.

2.5.9 At Risk Facilities

a. Moruya High School – Ovals inundated above 1% AEP (5.1m at the Moruya Gauge) (3).

b. St Marys Primary School – Ovals inundated above 1% AEP (5.1m at the Moruya Gauge) (3).

c. Moruya Veterinary Hospital – inundated prior to 5% AEP (4.2m at the Moruya Gauge) – height unknown (3).

d. Moruya Medical Centre – inundated prior to 5% AEP (4.2m at the Moruya Gauge) – height unknown (3).

e. Moruya Kindergarten and Day Care Centre – inundated above the 1% AEP (5.1m at the Moruya Gauge) (3).

f. The Northside Early Leaning Centre on the Princes Highway and the Eurobodalla Family Day Care Centre on Vulcan St may also have flood affects.

g. The Moruya Sewage Treatment Plant on Queens Street may also have flood affects.

h. Further details of these at risk facilities are provided in Annex 2.

2.5.10 Other Considerations

a. No other considerations.

2.6 NORTH MORUYA

2.6.1 Community Overview

a. North Moruya is located on the northern side of the Moruya River, directly opposite the Moruya CBD. It is a small community with 24 properties. It also contains the Moruya Waterfront Hotel and the Riverbreeze Caravan Park.

b. The Princes Highway runs directly through North Moruya.

c. North Moruya is shown on Map 6.

2.6.2 Characteristics of flooding

a. North Moruya is affected by both riverine flooding and overland flooding. Riverine flooding occurs from the Moruya River breaking its banks at the south, and backwaters from the Mullenderee Flats cause overland flooding from all other directions (3).

2.6.3 Flood Behaviour

a. The majority of the land at North Moruya is slightly elevated above the general level of Mullenderee Flats, and except for some of the outer lower lying lots, is free of inundation during events below the 50% AEP (2.75m at the Moruya Gauge). Flooding within these low lying areas is classified as flood storage (3).

b. Above the 50% AEP (2.75m at the Moruya Gauge) North Moruya becomes inundated and classified as flood storage (3).

c. During events above the 1% AEP (5.1m at the Moruya Gauge) North Moruya becomes classified as a floodway. The exact flood height at which North Moruya transitions from flood storage to a floodway is unknown (3).

2.6.4 Classification of Floodplain

a. North Moruya is classified as having Rising Road Access for flooding events up to the 20% AEP (3.4m at the Moruya Gauge) (3).

b. Between the 20% AEP (3.4m at the Moruya Gauge) and the 5% AEP (4.2m at the Moruya Gauge) North Moruya transitions from having Rising Road Access to becoming a Low Flood Island. The exact flooding level this occurs at is unknown (3).

c. For flooding events above the 5% AEP (4.2m at the Moruya Gauge) North Moruya is a Low Flood Island (3).

2.6.5 Inundation

a. Inundation in North Moruya begins at Guthrie Street in the 50% AEP (2.75m at the Moruya Gauge). Properties along the Princes Highway and North Head Drive are

the last to become inundated which occurs at and above the 20% AEP (3.4m at the Moruya Gauge) (3).

b. For flooding events above the 5% AEP (4.2m at the Moruya Gauge) all 24 properties in North Moruya become inundated over floor level (3).

Table 11: Estimated number of properties inundated above floor level and over ground in North Moruya related to the Moruya Gauge (217900)– data from 1995 (3)

Moruya Gauge (217900), Gauge Height (m)	AEP %	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
2.75m	50	0.10m	2	7
3.4m	20	0.31m	15	21
4.2m	5	0.89m	24	24
4.7m	2	1.39m	24	24
5.1m	1	1.79m	24	24
6.9m	Extreme	3.57m (av)	24	24

2.6.6 Isolation

a. North Moruya becomes isolated to the north and east when the Princes Highway across Mullenderee Flats and North Head Road become flooded – the exact height this occurs is unknown however historical accounts suggest this begins to occur at the moderate flood level of 2.6m at the Moruya Gauge. During this time access to Moruya CBD to the south remains open (3).

b. North Moruya becomes completely isolated simultaneously with complete inundation of the community. This occurs between the 20% AEP (3.4m at the Moruya Gauge) and the 5% AEP (4.2m at the Moruya Gauge) when flooding inundates the Princes Highway on both sides of the Moruya Bridge. The exact height this occurs is unknown (3).

c. Isolation can be for up to 24 hours, longer if structural damage has occurred to transport infrastructure (3).

d. Isolation to the north and east can be for up to 5 days, depending on the time Mullenderee Flats takes to drain (3).

2.6.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in North Moruya.

2.6.8 Dams

a. There are no dams in the area that will impact North Moruya.

2.6.9 At Risk Facilities

a. There are no schools located in North Moruya.

b. The Riverbreeze Tourist Park is located in North Moruya on the western side of the Princes Highway, adjacent to the Moruya River.

c. The Moruya Waterfront Hotel is located in North Moruya adjacent to the Moruya River on the western side of the Princes Highway.

2.6.10 Other Considerations

a. Access to the Moruya Airport may be lost from Moruya.

2.7 MULLENDEREE FLATS

2.7.1 Community Overview

a. Mullenderee Flats is a low-lying floodplain located north of the Moruya River, and comprises mainly of rural lands, with some rural residential dwellings scattered across the flats (3) (Map 6).

b. The Princes Highway runs directly through the Mullenderee Flats.

2.7.2 Characteristics of Flooding

a. Mullenderee Flats is affected by a combination of riverine and overland flooding and is a very high hazard area due to potentially extreme flood depths (3).

2.7.3 Flood Behaviour

a. Mullenderee Flats acts as flood storage during all flooding event. Overflows from the Moruya River enter the Flats north west of Moruya in addition to the overland flows in the immediate catchment. Water in Mullenderee Flats is drained by the Malabar Lagoon, located directly to the east of the Flats (3).

b. Mullenderee Flats , up to 1km north of the Moruya River bank becomes a floodway during events above the 1% AEP (5.1m at the Moruya Gauge) (3).

c. During a severe flood, Mullenderee Flats is a very high hazard area, with flood depths over 2m and velocities in the order of 0.5metres/second. For an extreme event flood depths can be up to 6m (3).

2.7.4 Classification of Floodplain

a. Mullenderee Flats consists of rural properties. The classification of each property is unknown however the area is likely to be considered a low flood island as properties become isolated and inundated. Flood depths can be extreme (3).

2.7.5 Inundation

a. Properties located in the lower lying areas of the Mullenderee Flats adjacent to the Princes Highway, Mullenderee Creek, Dooga Creek and Malabar Creek are susceptible to early flood inundation. The exact level this occurs is unknown (3).

b. During an extreme event, Mullenderee Flats can be inundated by floodwaters up to 6m deep. This level of flooding will completely cover most single story houses in the area. Properties may experience over roof flooding in events above the 1% AEP (5.1m at the Moruya Gauge) (3).

Table 12: Estimated number of properties flooded above floor level and over ground in Mullenderee Flats related to the Moruya gauge (3)

Moruya Gauge(217900), Gauge Height (m)	Average Above Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
50% AEP	-	0	8
20% AEP	0.41	9	11
5% AEP (4.2m)	0.93	15	15
2% AEP (4.7m)	1.24	18	18
1% AEP (5.1m)	1.52	20	20
Extreme (6.9m)	2.84	26	26

2.7.6 Isolation

a. Properties in the Mullenderee Flats become isolated from Moruya in the south when flood levels reach the moderate flood level of 2.6m at the Moruya Gauge, caused by the closure of the Princes Highway (3).

b. Properties in the Mullenderee Flats become completely isolated prior to the 5% AEP (4.2m at the Moruya Gauge). It is unknown at what height each property becomes isolated (3).

c. Isolations can occur for up to 5 days, depending on how fast the flats drain into Malabar Lagoon (3).

2.7.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Mullenderee.

2.7.8 Dams

a. There are no dams located upstream of Mullenderee.

2.7.9 At Risk Facilities

a. Moruya Motel is located on the Princes Highway in the Mullenderee Flats. It is impacted by flooding prior to the 5% AEP event (4.2m at the Moruya Gauge) (3).

2.7.10 Other Considerations

a. No other considerations.

2.8 EAST MORUYA (MYNORA)

2.8.1 Community Overview

a. Mynora is a satellite community located to the east of the Moruya CBD on South Head Road. It contains approximately 70 residences (3) (Map 5).

2.8.2 Characteristics of Flooding

a. Mynora is affected by riverine flooding from the Moruya River (3).

2.8.3 Flood Behaviour

a. Mynora is only affected by fringe flooding. This only occurs in events above the 1% AEP (5.1m at the Moruya Gauge) (3).

2.8.4 Classification of Floodplain

a. Mynora has potential overland access during all flooding events (3).

2.8.5 Inundation

Table 13: Estimated number of properties inundated above floor level and over ground in Mynora related to the Mynora gauge (3)

Mynora Gauge(217900), Gauge Height (m)	AEP%	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
-	50	-	0	0
-	20	-	0	0
4.2m	5	-	0	0
4.7m	2	-	0	3
5.1m	1	-	0	4
6.9m	Extreme	1.33 (av)	4	14

a. In events above a 1% AEP flood, 14 properties located in Maunsell Street and on South Head Drive become affected by flooding (3).

2.8.6 Isolation

a. Mynora becomes completely isolated by road during a 1% AEP (5.1m at the Moruya Gauge) when South Head Road and Congo Road become inundated. Isolation can last for up to 24 hours (3).

2.8.7 Flood Mitigation Systems

a. There are no levees located within Mynora.

2.8.8 Dams

a. There are no dams upstream of Mynora.

2.8.9 At Risk Facilities

a. There are no at risk facilities located within Mynora that have been identified as being affected by flooding.

2.8.10 Other Considerations

a. No other considerations.

2.9 DOWNSTREAM OF MORUYA

2.9.1 Community Overview

a. Properties downstream of Moruya include the satellite community of Moruya Heads including North and South Heads and the permissive occupancies located at Garlandtown (3) (Map 7).

2.9.2 Characteristics of Flooding

a. Properties located downstream of Moruya are affected by riverine flooding (3).

2.9.3 Flood Behaviour

a. Unknown.

2.9.4 Classification of Floodplain

a. Properties downstream of Moruya have Rising Road Access during all flooding events (3).

2.9.5 Inundation

a. The properties affected by flooding during various design flood events are provided in Table 14 below.

Table 14: Estimated number of properties inundated above floor level and over ground in properties downstream of Moruya related to the Moruya gauge (3)

Moruya Gauge(217900), Gauge Height (m)	AEP	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
2.75m	50	-	0	2
3.4m	20	0.02	1	6
4.2m	5	0.19	7	13
4.7m	2	0.32	11	14
5.1m	1	0.51	13	26
6.9m	Extreme	1.09	27	29

2.9.6 Isolation

a. Properties downstream of Moruya become isolated from Moruya when North Heads Road and South Heads Road close at 2.6m at the Moruya Gauge and 4.2m at the Moruya Gauge. Isolation can occur for 1-2 days (3).

2.9.7 Flood Mitigation Systems

a. There are no flood mitigation systems located downstream of Moruya.

2.9.8 Dams

a. There are no dams that will affected downstream of Moruya.

2.9.9 At Risk Facilities

a. The Big 4 Moruya Heads Easts Dolphin Beach Holiday Park is located in Moruya Heads. It is unknown if it is at risk of inundation, however it will become isolated from Moruya at 4.2m at the Moruya Gauge (3).

b. The Moruya Airport located at North Head may be isolated from Moruya when North Head Drive is cut (14).

2.9.10 Other Considerations

a. No other considerations.

Tuross River Basin

2.10 TUROSS HEAD

2.10.1 Community Overview

a. Tuross Heads is located between Narooma and Moruya on the South Coast of NSW (Map 8). It is located next to Coila Lake, Tuross Lake and the Tuross River. In 2011 the population of Tuross Head was 2,621 with 1,169 dwellings (15).

2.10.2 Characteristics of Flooding

a. This locality is affected by flooding from the Tuross River estuary and inflows to Coila Lake, as well as potential storm surge and sea level rise. It can also be isolated through localised flooding of Hector McWilliam Drive. There are significant overland flow issues in this locality (16).

2.10.3 Flood Behaviour

a. Riverine flooding, storm surge and overland flow.

2.10.4 Classification of Floodplain

a. Unknown.

2.10.5 Inundation

a. Council's maps indicate properties may be affected along Monash Avenue and Marion Close (14).Most residential houses are set relatively high.

2.10.6 Isolation

a. Historically, Tuross Heads becomes isolated when Hector McWilliam Drive becomes inundated with floodwaters. The exact height this occurs is unknown (16).

2.10.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Tuross Head.

2.10.8 Dams

a. There are no dams located upstream of Tuross Head.

2.10.9 At Risk Facilities

a. At risk facilities are unknown, however within Tuross Head there are the following key facilities to be considered for their potential flood risk:

- Two tourist park facilities (Tuross Lakeside Tourist Park and Tuross Beach Holiday Park)
- One child care centre (Tuross Child Care Centre)

b. There are no schools located in Tuross Head.

2.10.10 Other Considerations

a. No other considerations.

2.11 DALMENY

2.11.1 Community Overview

a. Dalmeny is located 7km north of Narooma (Map 9). In 2011 the population of Dalmeny was 2,329 with 922 dwellings (15).

2.11.2 Characteristics of Flooding

a. This locality is affected by flooding from the Mummuga Lake and, potentially, storm surge and sea level rise at the southern end of the town. There are significant overland flow issues in this locality (16).

2.11.3 Flood Behaviour

a. No information.

2.11.4 Classification of Floodplain

a. During a 1% AEP Dalmeny has Rising Road Access (1).

2.11.5 Inundation

a. During a 1% AEP event properties located on Mort Avenue, the Southern end of Eucalyptus Drive, Dalmeny Drive, George Place and Tatiara Street may experience inundation (1).

b. Council's maps indicate more than 30 properties may be affected (16).

2.11.6 Isolation

a. During a 1% AEP there are no known isolations in Dalmeny (1).

2.11.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Dalmeny.

2.11.8 Dams

a. There are no dams located upstream of Dalmeny.

2.11.9 At Risk Facilities

a. The Dalmeny Rural Fire Service building located on Mort Avenue is subject to flooding and has required sandbagging in previous flood events.

b. Other at risk facilities are unknown.

2.11.10 Other Considerations

a. No other considerations.

2.12 KIANGA

2.12.1 Community Overview

a. Kianga is located immediately to the north of Narooma. It is located to the south of Kianga Lake and the north of Wagonga Inlet (Map 10). The population in 2011 was 738 (15).

2.12.2 Characteristics of Flooding

a. This locality is potentially affected by flooding from Kianga Lake, Wagonga Inlet and various local watercourses. Kianga is also potentially exposed to storm surge and sea level rise (16).

b. A flood study is currently being undertaken by Eurobodalla Shire Council which will provide further information on the flood risk.

2.12.3 Flood Behaviour

a. Historical flooding to date has affected the yards of properties adjoining Kianga Lake, however residential dwellings have not been flooded over floor (17).

2.12.4 Classification of Floodplain

a. Unknown

2.12.5 Inundation

a. Unknown

2.12.6 Isolation

a. Unknown

2.12.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Kianga.

2.12.8 Dams

a. There are no dams located upstream of Kianga.

2.12.9 At Risk Facilities

a. There are no schools located in Kianga.

2.12.10 Other Considerations

a. No other considerations.

2.13 NAROOMA

2.13.1 Community Overview

a. Narooma is located 347 km south of Sydney on the South Coast of NSW (Map 11). The population was 3,331 in 2011 with 1,476 residences (15). Narooma is located between Wagonga Inlet and the Pacific Ocean. The low lying parts of Narooma, south of Wagonga Inlet, between the Princes Highway and the Inlet are locally known as Narooma Flats (16).

b. Eurobodalla Shire Council is currently finalising the Narooma Coastal Inlet Flood Study.

2.13.2 Characteristics of Flooding

a. This locality is affected by flooding from Wagonga Inlet and various local watercourses as well as potentially storm surge and sea level rise. There are significant overland flow issues throughout Narooma (16).

2.13.3 Flood Behaviour

a. Unknown

2.13.4 Classification of Floodplain

a. Unknown

2.13.5 Inundation

a. Historically inundation mostly affects the low lying areas of Narooma Flats. Every property in Narooma Flats is potentially affected to varying degrees (16).

b. Overland flow issues can occur throughout Narooma (16).

2.13.6 Isolation

a. Unknown

2.13.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Narooma.

2.13.8 Dams

a. There are no dams located upstream of Narooma.

2.13.9 At Risk Facilities

a. At risk facilities in Narooma are unknown however the Big 4 Narooma Easts Holiday Park should be reviewed for their flood risk.

2.13.10 Other Considerations

a. High tourist population area particularly in summer.

Clyde River Basin

2.14 TOMAKIN / MOSSY POINT / BROULEE

2.14.1 Community Overview

a. Tomakin, Mossy Point and Broulee are located at the mouth of the Tomaga River, south of Batemans Bay (Map 12).

b. The population in 2011 in Tomakin was 537 with 221 residences (15).

c. The population of Mossy Point/ Broulee in 2011 was 2,524 with 1,021 residences (15).

d. A flood study for this area is currently being finalised by Eurobodalla Shire Council.

2.14.2 Characteristics of Flooding

a. Tomakin, Mossy Point and Broulee are subject to tidal inundation and overland flooding. Tomakin can also experience mainstream flooding from the Tomakin River.

2.14.3 Flood Behaviour

Tomakin

a. The township of Tomakin is subject to different flood mechanisms across different areas. The area to the west of Sunpatch Parade and north of Parks Parade is predominantly subject to tidal inundation and mainstream flooding. The area to the east of Sunpatch Parade is subject to overland flooding (18).

Mossy Point

b. North of River Road is predominantly tidal inundation and mainstream flooding. The remainder of Mossy Point is subject to overland flooding (18).

Broulee

c. Some properties adjacent to Candlagan Creek are subject to tidal inundation, however most properties are above the tidal range.

d. South of Iluka Avenue, the township of Broulee is subject to overland flooding that drains south (18).

2.14.4 Classification of Floodplain

a. During the 1% AEP properties in Mossy Point have Rising Road Access (1).

b. During a 1% AEP event properties in Tomakin have Rising Road Access (1).

2.14.5 Inundation

a. Properties located on Connells Close, River Road and Annette Parade in Mossy Point may be affected by floodwaters during the 1% AEP event (1).

b. Properties located on Sunpatch Parade, Ainslie Parade and properties on the north side of George Bass Drive in Tomakin may be affected by floodwaters during the 1% AEP event (1).

2.14.6 Isolation

a. There are no known isolations in this area.

2.14.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in this area.

2.14.8 Dams

a. There are no dams located upstream of this area.

2.14.9 At Risk Facilities

a. At risk facilities in Tomakin, Mossy Point, Broulee are unknown however the following facilities should be reviewed for their flood risk however many of these properties are relatively high and may be unaffected.

- Broulee Carroll College (school)
- Banksia Villages Broulee (retirement village)
- Big 4 Broulee Beach Holiday Park
- Broulee Public School
- St Peters Anglican College (school)
- Broulee Long Day Care Centre
- Broulee Early Learning Centre
- Tomago River Tourist Park
- Barlings Beach Holiday Park
- River Haven Tourist Park

2.14.10 Other Considerations

a. No other considerations.

2.15 MOGO

2.15.1 Community Overview

a. Mogo is located on the Princes Highway 287km south of Sydney (Map 13). The population of Mogo was 497 with 179 residences in 2011 (15).

b. Mogo is located within the Tomaga River catchment. It is situated on the Mogo, Cabbage Tree and Old Mogo Creeks, which feed into the Tomaga River.

c. The information in this plan is based on a study from 1987 – 1988 which only considered flooding to a 1% AEP (19). Eurobodalla Council are currently undertaking a new flood study for the Mogo area.

2.15.2 Characteristics of Flooding

a. Mogo is affected by riverine flooding (1). Areas downstream of Tomakin Road, including Mogo Zoo are potentially affected by tidal levels (18).

2.15.3 Flood Behaviour

a. Unknown.

2.15.4 Classification of Floodplain

a. In the 1% AEP, properties in Mogo have Rising Road Access (1). A gauge height for this event is unknown.

2.15.5 Inundation

a. Properties adjacent or near to Cabbage Tree Creek and Mogo Creeks, on parts of the Princes Highway, Vetich Street, Short Street, Tomakin Road, Church Street, John Street and Mogo Street may become inundated in a 1% AEP event (1).

2.15.6 Isolation

a. During a 1% AEP event no known properties become isolated (1).

2.15.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Mogo.

2.15.8 Dams

a. There are no dams located upstream of Mogo.

2.15.9 At Risk Facilities

a. **Mogo Public School** is located on the Princes Highway to the south of Mogo Township and backs onto Mogo Creek. Part of the school grounds are flooded in the 1% AEP, with unknown affects during larger flood events (19).

b. **Mogo Aboriginal Preschool** is located on Annett Street not far from Cabbage Tree Creek. Based on the old flood study this facility is located just on the edge of the 1% AEP extent (19).

2.15.10 Other Considerations

a. The Mogo Zoo is located alongside the Tomago River and is subject to tidal influences (18).

2.16 SOUTH DURRAS

2.16.1 Community Overview

a. South Durras is located at the northern edge of the Eurobodalla Shire Local Government Area (Map 14). In 2011 Durras had a population of 563 and contained 206 residences (15).

2.16.2 Characteristics of Flooding

a. South Durras is affected by overland flooding caused by the overflow of Durras Lake and the local unnamed creek (1).

2.16.3 Flood Behaviour

a. Unknown

2.16.4 Classification of Floodplain

a. Unknown

2.16.5 Inundation

a. Properties at risk of inundation are located on Lakeside Drive, Benandra Road, Mill Close and Ellen Close (1).

2.16.6 Isolation

a. Unknown

2.16.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Durras.

2.16.8 Dams

a. There are no dams located upstream of Durras.

2.16.9 At Risk Facilities

a. At risk facilities in Durras are unknown however the following facilities should be reviewed for their flood risk:

- Big 4 South Durras Holiday Park
- Murramarang Resort
- Lakesea Park
- Innes Cabins

b. There are no schools located in Durras.

2.16.10 Other Considerations

a. In the summer months the population swells with tourists.

2.17 NELLIGEN

2.17.1 Community Overview

a. Nelligen is located 8km west of Batemans Bay and is situated on the Clyde River (Map 15). The Kings Highway runs through Nelligen. The population in 2011 was 563 with 215 residences (15).

2.17.2 Characteristics of Flooding

a. Nelligen is affected by riverine flooding from the Clyde River which can be exacerbated by high tides (14).

2.17.3 Flood History

a. Floods have occurred regularly in Nelligen with a devastating flood reported in February 1860 when the Clyde River ran 3m above the high tide mark. A flood in 1898 threatened low lying buildings and their stock in Nelligen including ISN Co's store, Shellharbour Co's store, Steampacket Hotel and Shoebridge's general store. Major floods also occurred in 1925 and 1934. During a flood in 1964 the "Mechanics Institute Hall" was flooded over floor level (20).

2.17.4 Classification of Floodplain

a. During the 1% AEP Nelligen has Rising Road Access (1).

2.17.5 Inundation

a. Properties located on Wharf Street, Braidwood Street, Clyde Blvd, Thule Road and Sproxton Lane are affected by flooding in the 1% AEP (1).

2.17.6 Isolation

a. Nelligen itself does not become isolated.

b. Historically, properties located upstream of Nelligen, on River Road and the Kings Highway can become isolated for periods up to a few days due to road closures. It is unknown during what event this occurs (1).

2.17.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Nelligen.

2.17.8 Dams

a. There are no dams located upstream of Nelligen.

2.17.9 At Risk Facilities

a. The Big 4 Nelligen Holiday Park located off the Kings Highway is completely inundated in the 1% AEP (1).

b. There are no schools located in Nelligen.

2.17.10 Other Considerations

a. No other considerations.

2.18 LONG BEACH / MALONEYS BEACH

2.18.1 Community Overview

a. Long Beach and Maloneys Beach are located to the north of Batemans Bay (Maps 16 and 17).

b. In 2011 the population of Long Beach was 765 with 291 residences (15).

2.18.2 Characteristics of Flooding

a. Long Beach and Maloneys Beach are both affected by overland flooding resulting from overflow from the creek adjacent to Maloneys Drive and the wetlands to the north of Long Beach (1).

2.18.3 Flood Behaviour

a. Unknown.

2.18.4 Classification of Floodplain

a. Properties located in Maloney Beach and Long Beach have rising road access during the 1% AEP (1).

2.18.5 Inundation

a. 65 properties in Sandy Place and Bay Road in Long Beach can potentially be affected by flooding. It is unknown at what event this occurs (16).

b. 5 properties in Pendula Place in Maloneys Beach can potentially be affected by flooding. It is unknown at what event this occurs (16).

2.18.6 Isolation

a. Maloneys Beach area may become isolated in events above the 1% AEP when Northcove Beach Road becomes inundated (1).

2.18.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in this area.

2.18.8 Dams

a. There are no dams located upstream of this area.

2.18.9 At Risk Facilities

a. There are no schools located in this area.

2.18.10 Other Considerations

a. No other considerations.

2.19 NORTH BATEMANS BAY / SURFSIDE

2.19.1 Community Overview

a. North Batemans Bay and Surfside are located on the northern side of the Batemans Bay Bridge, at the entrance of the Clyde River (Map 18).

b. The population of North Batemans Bay and Surfside is included in the Batemans Bay statistics in section 2.20.

2.19.2 Characteristics of Flooding

a. North Batemans Bay and Surfside are affected by riverine flooding from the Clyde River as well as overland flooding (1). Surfside is also at risk from coastal inundation (8).

2.19.3 Flood Behaviour

a. Unknown.

2.19.4 Classification of Floodplain

a. This area has Rising Road Access for all events up to the 1% AEP (1).

2.19.5 Inundation

a. Up to 180 properties in this area are potentially affected by flooding. It is unknown at what event this occurs (16).

b. Properties located in Karoola Crescent, Landara Road, Wallarah Street, Myamba Parade, Timbara Crescent, Wallaringa Street, The Vista, Foam Street and Bayview Street in Surfside are all inundated during the 1% AEP event (1).

c. Properties located in McLeod Street, Wharf Road ad Wray Street in North Batemans Bay are inundated in the 1% AEP (1).

2.19.6 Isolation

a. Unknown.

2.19.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in this area.

2.19.8 Dams

a. There are no dams located upstream of this area.

2.19.9 At Risk Facilities

a. Batemans Bay Public School is affected in the 1% AEP (1).

b. Easts Riverside Holiday Park is affected in the 1% AEP (1).

c. Rio Rita Caravan Park is affected in the 1% AEP (1).

2.19.10 Other Considerations

a. In addition to coastal inundation, Surfside Beach is also at risk from coastal erosion (8). Houses at the eastern end of the beach are low-lying and very close to the dune where erosion scarps have previously occurred. A stormwater pipe has also previously been damaged in this location (8).

2.20 BATEMANS BAY CBD

2.20.1 Community Overview

a. Batemans Bay is located 280km south of Sydney, at the entrance to the Clyde River (Map 19). In 2011 the population of Batemans Bay was 13,035 with 5,074 residences (15).

2.20.2 Characteristics of Flooding

a. Batemans Bay is affected by riverine flooding from the Clyde River and overland flooding from Joes, McLeods and Hanging Rock Creeks (1). Batemans Bay is also susceptible to coastal inundation from astronomical high tides and storm surge (11) (8).

2.20.3 Flood Behaviour

a. Unknown.

2.20.4 Classification of Floodplain

a. Batemans Bay has Rising Road Access for events up to the 1% AEP (1).

2.20.5 Inundation

a. More than 200 properties may be affected by flooding the Batemans Bay CBD. The exact level this occurs is unknown (16). Specific areas of concern include Beach Road, Golf Links Drive, the “Watergardens”, Orient Street, Clyde Street and Vesper Street. There are also many drainage lines where the threat of overland flows has not been adequately identified (16).

b. Residential properties located on Catlin Avenue, Avalon Street, Tuna Street, Dolphin Avenue, Marlin Avenue, Beach Road, Golf Links Drive, Bavarde Avenue, Miller Street, Heradale Parade and Herade Street are affected by flooding in the 1% AEP event (1).

c. Commercial properties located on Beach Road, Clyde Street, North Street, Orient Street, Perry Street, Flora Crescent and the Princes Highway are all affected by flooding in the 1% AEP event (1).

2.20.6 Isolation

a. There are no known isolations in the Batemans Bay CBD.

2.20.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Batemans Bay.

2.20.8 Dams

a. There are no dams located upstream of Batemans Bay that impact the area.

2.20.9 At Risk Facilities

a. Cooinda Retirement Village is located in the Batemans Bay CBD. It is affected by floodwaters in the 1% AEP event (1).

b. Coastal inundation affects the Batemans Bay boardwalk (14).

2.20.10 Other Considerations

a. No other considerations.

2.21 BATEHAVEN

2.21.1 Community Overview

a. Batehaven is located 4km south of Batemans Bay (Map 20). In 2006 the population of Batehaven was 1,792 (15).

b. There are no flood gauges located within the area.

2.21.2 Characteristics of Flooding

a. Batehaven is affected by overland flooding from overtopping of Short Beach Creek and Joes Creek (16).

2.21.3 Flood Behaviour

a. Unknown.

2.21.4 Classification of Floodplain

a. In the 1% AEP event Batehaven has Rising Road Access (1).

2.21.5 Inundation

a. Up to 100 properties may be affected by flooding in the Batehaven area (16).

b. Properties affected in a 1% AEP event are located on Beach Road, Lisa Place, Matthew Parade, George Bass Drive, Edward Road, Clare Crescent, Melaleuca Crescent and Calga Crescent (1).

2.21.6 Isolation

a. There are no known isolations in Batehaven.

2.21.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Batehaven.

2.21.8 Dams

a. There are no dams located upstream of Batehaven.

2.21.9 At Risk Facilities

a. Sunshine Bay Public School is affected in the 1% AEP (1).

b. SDN Batemans Bay Preschool is located in a low lying area and is potentially affected by flooding of Joes Creek (14).

c. Caseys Beach Holiday Park is affected in the 1% AEP (1).

d. Batemans Bay Fishing Caravan Park is affected in the 1% AEP (1).

e. St Bernards School grounds may be affected, however the school itself is on relatively high ground (1) (14).

f. Clyde View Holiday Park is affected in the 1% AEP (1).

g. Big 4 Batemans Bay Beach Resort is affected in the 1% AEP (1).

h. Batemans Bay High School is affected in the 1% AEP (1).

i. The Manor – Batemans Bay Retirement Village is affected in the 1% AEP (1).

j. Birdland Animal Park is affected in the 1% AEP (1).

k. Further details of these at risk facilities are provided in Annex 2.

2.21.10 Other Considerations

a. No other considerations.

2.22 SURF BEACH

2.22.1 Community Overview

a. Surf Beach is a locality located south of Batemans Bay (Map 21). It is situated on George Bass Drive.

2.22.2 Characteristics of Flooding

a. Surf Beach is affected by overland flooding cause by overflows from Short Beach and Wimbie Creeks (1).

2.22.3 Flood Behaviour

a. Unknown.

2.22.4 Classification of Floodplain

a. Properties located in Surf Beach have Rising Road Access for events up to the 1% AEP (1).

2.22.5 Inundation

a. Inundation of properties occurs along Beach Road, Explorers Way, Newth Place, Wimbie Street, Bay View Street and High View Avenue in the 1% AEP (1).

b. Up to 20 properties may be affected by flooding in this area (16).

2.22.6 Isolation

a. There are no isolations in Surf Beach (1).

2.22.7 Flood Mitigation Systems

a. The Surf Beach Detention Basin is located in Surf Beach adjacent to George Bass Drive.

b. 15 residences could be flooded in the event of the basin wall failure (1).

2.22.8 Dams

a. Failure of the Surf Beach Detention Basin wall would result in the inundation of downstream properties (7).

2.22.9 At Risk Facilities

a. None known.

2.22.10 Sewage Treatment works are located near Wimbie Beach Other Considerations

a. There is some long term risk of coastal erosion at Surf Beach, with 2-3 properties and sewer lines at risk (8).

2.23 MALUA BAY

2.23.1 Community Overview

a. Malua Bay is located 13km south of Batemans Bay (Map 22). The population of Malua Bay was 2,055 with 805 residences in 2011 (15).

2.23.2 Characteristics of Flooding

a. Malua Bay is affected by overland flooding resulting from the overtopping of Reedy Creek (21).

2.23.3 Flood Behaviour

a. Flooding in the main channel of Reedy Creek can be high velocity and is classed as a floodway for all events up to the 1% AEP (21).

b. The wetlands area acts as flood storage and flood affected properties on Sylvan Street and George Bass Drive are in flood fringe for all events up to the 1% AEP (21).

2.23.4 Classification of Floodplain

a. Malua Bay has Rising Road Access in all events (21).

b. Evacuation is considered most difficult from the northern end of the access road off George Bass Drive due to potential flood depths (21).

2.23.5 Inundation

a. George Bass Drive becomes inundated in a PMF event with depths of 0.6m above road height (21). Sylvan Street and the access road running parallel to George Bass Drive are also flood prone.

b. The PMF extent is estimated to be approximately 0.9m higher than the 1% AEP event (21).

c. 4 properties, 3 on the access road off George Bass Drive and 1 on the northern side of Sylvan Street are prone to inundation above floor level from the 1% AEP event (21).

d. An additional 19 properties on the George Bass Drive access road and Sylvan Street are prone to inundation of their grounds in the 1% AEP event (21).

e. Six properties on the access road off George Bass Drive are considered to be particularly high risk as the northern end of the road can be inundated by depths of up to 0.8m during a 1% AEP making evacuation difficult (21).

f. In comparison the potentially flood affected properties on Sylvan Street are considered to be more readily able to evacuate by road during a 1% AEP (21).

g. The main CBD of Malua Bay located on Kuppa Avenue near the corner of Sylvan Street and George Bass Drive may be flood affected during a 1% AEP (21).

h. A new subdivision off Banksia Grove and adjacent to Reedy Creek may also have some flood affects which require further investigation (14).

2.23.6 Isolation

a. No known properties are isolated in Malua Bay, however the new subdivision off Banksia Grove should be assessed further for its isolation potential (21).

2.23.7 Flood Mitigation Systems

a. There are no flood mitigation systems located in Malua Bay.

2.23.8 Dams

a. There are no dams located upstream of Malua Bay.

2.23.9 At Risk Facilities

a. Parts of the Malua Bay CBD off George Bass Drive and Kuppa Avenue are potentially flood affected (21)

2.23.10 Other Considerations

a. The main CBD of Malua Bay is located on Kuppa Avenue near the corner of Sylvan Street and George Bass Drive which may also be flood affected during a 1% AEP (21).

ROAD CLOSURES AND ISOLATED COMMUNITIES

2.24 ROAD CLOSURES

a. Table 15 lists roads liable to flooding in the Eurobodalla Shire LGA.

Table 15: Roads liable to flooding in Eurobodalla Shire LGA.

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Princes Highway	Mogo Creek	Usually closed for less than a day		
Princes Highway	Mullenderee Flat	Road raised to 2.0m AHD in 1997. May close for a number of days.		
Princes Highway	Moruya (intersection with South Head Rd)	Road raised to 2.5m AHD in 1999. Can be affected by flooding in Racecourse Ck, or by backup flooding from Moruya River.		
Princes Highway	Trunketabella (Tuross Rd)	Closed by flooding in 1992, but raised since then. Still prone to flooding.		
Princes Highway	Dignams Creek, south of Tilpa	Can be closed for a day in a severe event; river rises very rapidly.		
Malua Bay – George Bass Drive (including access road) and Sylvan Street (21)	Near Reedy Creek	Potential evacuation difficulties from individual properties once these roads are closed.		NA
Moruya-Araluen Road	Kiora Bridge	Can remain closed for up to a week.	Alternative access by Larrys Mountain Rd if Princes Hwy still open at Mullenderee Flat.	Closes at 2.9 metres (on the Kiora Bridge).
Moruya-Moruya North Head	Malabar Weir	Raised to 2.26m AHD in 1996. North Head Rd (and access to the airport) still may be lost in major floods.	May, however, have access from the North.	

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Moruya-Congo Rd	Congo Creek	Raised in late 1990s, but still prone to flooding in relatively low-level events for short periods.	Alternative access possible via Bergalia.	
Mogo-Tomakin Rd		Can be closed short-term to all traffic. Planned to be upgraded in 2006.	Access to Tomakin may be available by coast road to Batemans, but there are many low points on this route.	
Nerragundah Mtn Rd	Low level bridges	Prone to flooding from frequent low-level events, for up to a week.		
Eurobodalla Rd (Bodalla-Nerragundah-Belowra)	Multiple locations	Many low-level crossings of Tuross R and tributaries.		

2.25 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

a. Table 16 lists communities liable to isolation and potential periods of isolation.

b. Because of the short term nature of most road closures, resupply will not be necessary in many areas. The three areas that will need resupply are as follows:

- Deua River from Kiora Bridge to National Park
- Tuross River valley from Nerrigundah Mountain Road to Belowra; including Nerrigundah
- Clyde River Valley upstream of Nelligen, plus Currawan Creek valley.

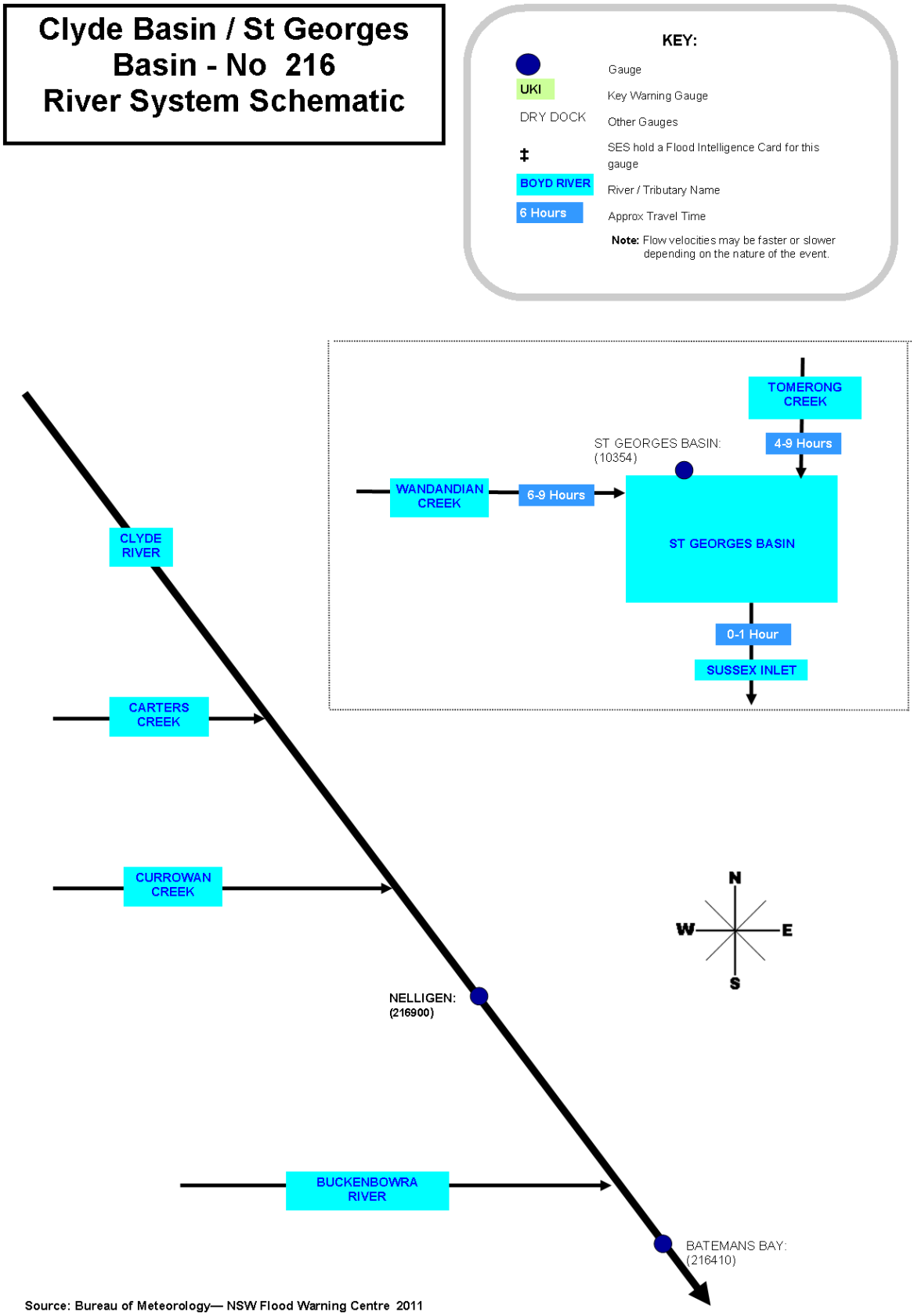
Table 16: Potential Periods of Isolation for communities in the Eurobodalla Shire LGA based on historical events.

Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	Days								NOTES
				1	2	3	4	5	6	7	8	
Bendethera (Moruya)	Camping ground		1 – 7 days									In January 2016 floods Bendethera Campground was isolated by multiple creeks. Isolation was for 8 days with a significant resupply and rescue operations undertaken.
North Moruya (Moruya)	24 dwellings	High flood island	1 – 2 days									Motel and Caravan Park in Nth Moruya
Gundary (Moruya)	1 property	Low flood island	1 – 2 days									Bowling club. Occurs between Moruya gauge height of 3.4 & 4.2m
Moruya CBD (Moruya)		Rising Road Access	1 – 2 days									Commercial properties
Mynora (Moruya)			1 – 2 days									Satellite community can be accessed across farmland if needed.
Mullenderee Flats (Moruya)			1 - 5 days									
Kiora (Moruya)	8 properties		1 - 3 days									Properties on Kiora Road. Isolation occurs when crossing closes at Moruya gauge height of 1.0m
Wamban Rd (Moruya)	5 properties		1 – 3 days									
Eastern Boundary Rd (Moruya)	4 properties		1 – 3 days									
Glendeuart Estate (Moruya)	60 properties		1 – 3 days									Isolation occurs at Moruya gauge height of 2.6m

Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	Days								NOTES
				1	2	3	4	5	6	7	8	
North Head Rd (Moruya)	Rural properties		1 – 2 days									Isolation occurs at Moruya gauge height of 2.6m
South Head Rd (Moruya)	Rural properties		1 – 2 days									Isolation occurs at Moruya gauge height of 4.2m
Cadgee Area (Tuross)	Rural properties		1-5 days									River can stay up for 5 days, however can be isolated for several weeks if repairs are required to roads (eg Nerrigundah Mountain Road)
Tuross Head (Tuross)	1169 dwellings											
Upstream Nelligen (Clyde)			1 – 3 days									Properties located on River Road and the Kings Hwy upstream of Nelligen
Maloneys Beach (Clyde)												Isolation occurs with Northcove Rd closure

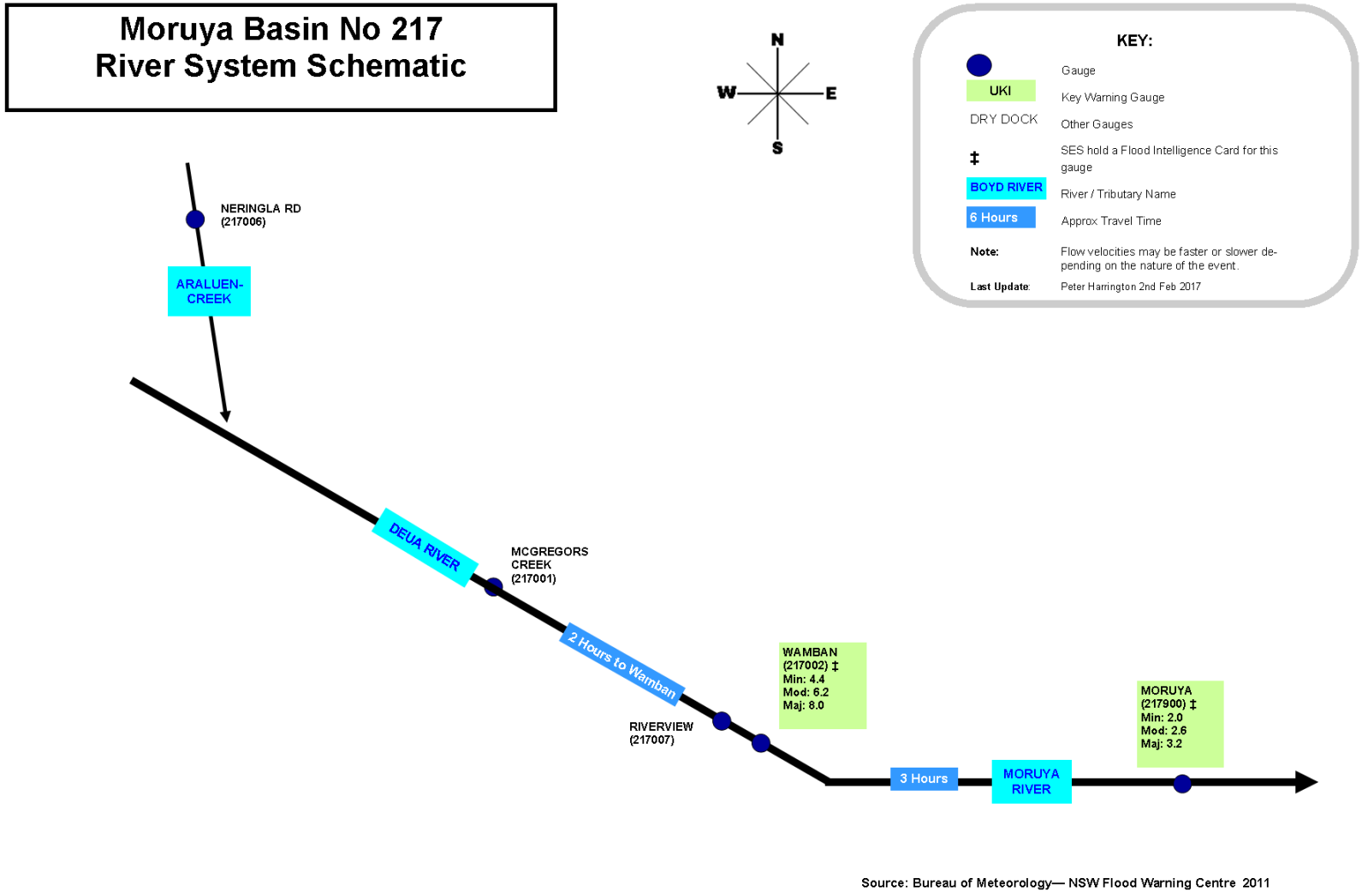
Note: Periods of isolation are a guide only. Liaison with the Local Controller and communities/residents involved is essential during periods of potential and actual isolation.

ANNEX 1A: CLYDE RIVER BASIN SCHEMATIC



Source: Bureau of Meteorology— NSW Flood Warning Centre 2011

ANNEX 1B: MORUYA RIVER BASIN SCHEMATIC



Source: Bureau of Meteorology— NSW Flood Warning Centre 2011

Note: There is no river basin schematic available for the Tuross River Basin which does not have any key warning gauges.

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

Moruya River Basin

Facility Name	Street	Suburb	Comment
Schools			
Moruya High School	Albert Street	Moruya	Ovals become inundated above 5.1m at the Moruya Gauge
St Marys Primary School	Queens Street	Moruya	Ovals become inundated above 5.1m at the Moruya Gauge
Child Care Centres			
Moruya Preschool	Campbell Street	Gundary	Becomes isolated above the Moruya Gauge height of 4.2m
Moruya Kindergarten and Day Care Centre	Princes Highway	Moruya	Is affected by floodwaters above 5.1m at the Moruya Gauge
Northside Early Learning Centre	Princes Highway	Moruya	
Eurobodalla Family Day Care	Vulcan Street	Moruya	
Facilities for the aged and/or infirm			
Moruya District Hospital	River Street	Gundary	Hospital becomes isolated around a flood level of 4.2m Car parking areas and low lying buildings may be affected before 4.2m
IRT Moruya	River Street	Gundary	Is affected by floodwaters at 4.2m at the Moruya Gauge
Moruya Medical Centre	Queens Street	Moruya CBD	Is inundated prior to the Moruya Gauge height of 4.2m

Facility Name	Street	Suburb	Comment
Utilities and infrastructure			
Moruya Veterinary Hospital	Queens Street	Moruya CBD	Is inundated prior to the Moruya Gauge height of 4.2m
Moruya Sewage Treatment Plant	Queens Street	Moruya	
Moruya Airport	North Head Drive	Moruya (North Head)	May be isolated from Moruya, inundation unknown
Camping Ground / Caravan Parks			
Riverbreeze Tourist Park	Princes Highway	North Moruya	Inundation begins at moderate flood level of 2.6m
Moruya Waterfront Hotel	Princes Highway	North Moruya	Inundation begins between 2.75-3.4m (exact value unknown)
Moruya Motel	Princes Highway	Mullenderee Flats	Height first impacted unknown but at 4.2m on the Moruya gauge definitely
Big 4 Moruya Heads Easts Dolphin Beach Holiday Park	Pedro Point Road	Moruya Heads	Unknown but isolated from Moruya when South Head Road is closed at 4.2m on the Moruya gauge.
Bendethera Camping Area	Bendethera Fire Trail	Within the Deua National Park	Can be isolated when access road is cut during rain events in the upper catchment.

Clyde River Basin

Facility Name	Street	Suburb	Comment
Schools			
Batemans Bay Public School	Mundarra Way	Surfside	Affected by flood waters in the 1% AEP- heights unknown
Sunshine Bay Public School	Beach Road	Batehaven	Affected by flood waters in the 1% AEP- heights unknown
St Bernards Primary School	David Avenue	Batehaven	Affected by flood waters in the 1% AEP- heights unknown
Mogo Public School	Princes Highway	Mogo	School grounds affected in the 1% AEP – heights unknown
Batemans Bay High School	George Bass Drive	Batehaven	Affected by flood waters in the 1% AEP- heights unknown
Child Care Centres			
SDN Batemans Bay Preschool	1 Melaleuca Crescent	Batemans Bay	Potentially effected by flooding from Joes Creek (14)
Mogo Aboriginal Preschool	3 Arnett Street	Mogo	Located just outside 1% AEP flood extent. Other impacts unknown (19)
Facilities for the aged and/or infirm			
Cooinda Retirement Village	Clyde Street	Batemans Bay	Affected by flood waters in the 1% AEP- heights unknown
Utilities and infrastructure			
Birdland Animal park	Beach Road	Batemans Bay	Affected by flood waters in the 1% AEP- heights unknown
Mogo Zoo	Tomakin Road	Mogo	Unknown flood affects but within rivers tidal zone.
Camping Ground / Caravan Parks			
Big 4 Nelligen Holiday Park	Kings Highway	Nelligen	Affected by flood waters in the 1% AEP- heights unknown
Easts Riverside Holiday Park	Wharf Road	North Batemans Bay	Affected by flood waters in the 1% AEP- heights unknown

Facility Name	Street	Suburb	Comment
Rio Rita Caravan Park	Wharf Road	North Batemans Bay	Affected by flood waters in the 1% AEP- heights unknown
Caseys Beach Holiday Park	Beach Road	Sunshine Bay	Affected by flood waters in the 1% AEP- heights unknown
Batemans Bay Fishing Holiday Park	Beach Road	Sunshine Bay	Affected by flood waters in the 1% AEP- heights unknown
Clyde View Holiday Park	Beach Road	Batehaven	Affected by flood waters in the 1% AEP- heights unknown
Big 4 Batemans Bay Beach Resort	Beach Road	Batehaven	Affected by flood waters in the 1% AEP- heights unknown

Tuross River Basin

Facility Name	Street	Suburb	Comment
Camping Ground / Caravan			
Tuross Lakeside Tourist Park		Tuross Head	Flood Risk unknown, but some potential for inundation
Tuross Beach Holiday Park		Tuross Head	Flood Risk unknown, but some potential for inundation
Other			
Dalmeny RFS Building	Mort Avenue	Dalmeny	Has required sandbagging in previous floods

MAP 1: CLYDE RIVER BASIN

MAP 2: MORUYA RIVER BASIN

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MAP 3: TUROSS RIVER BASIN

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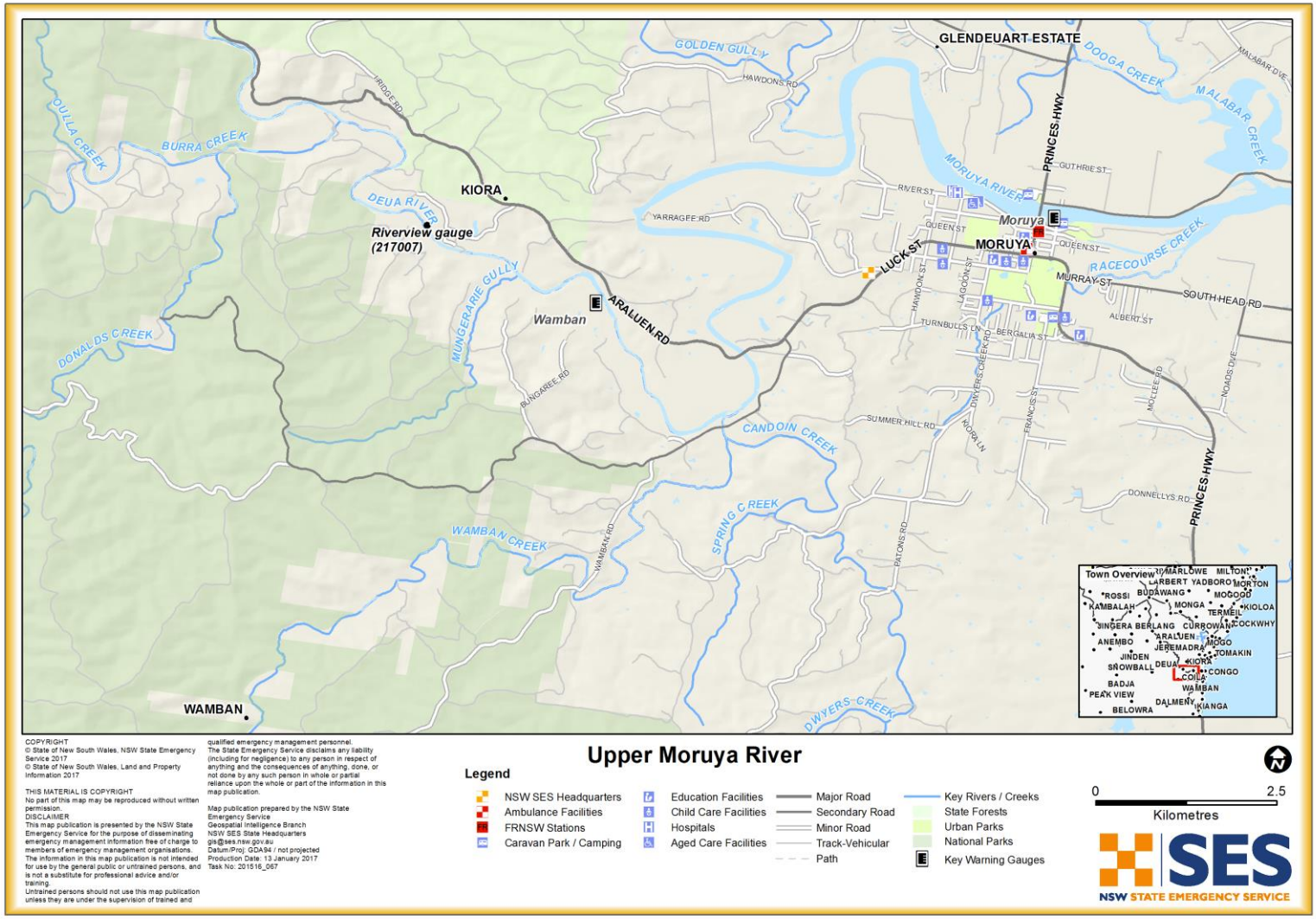
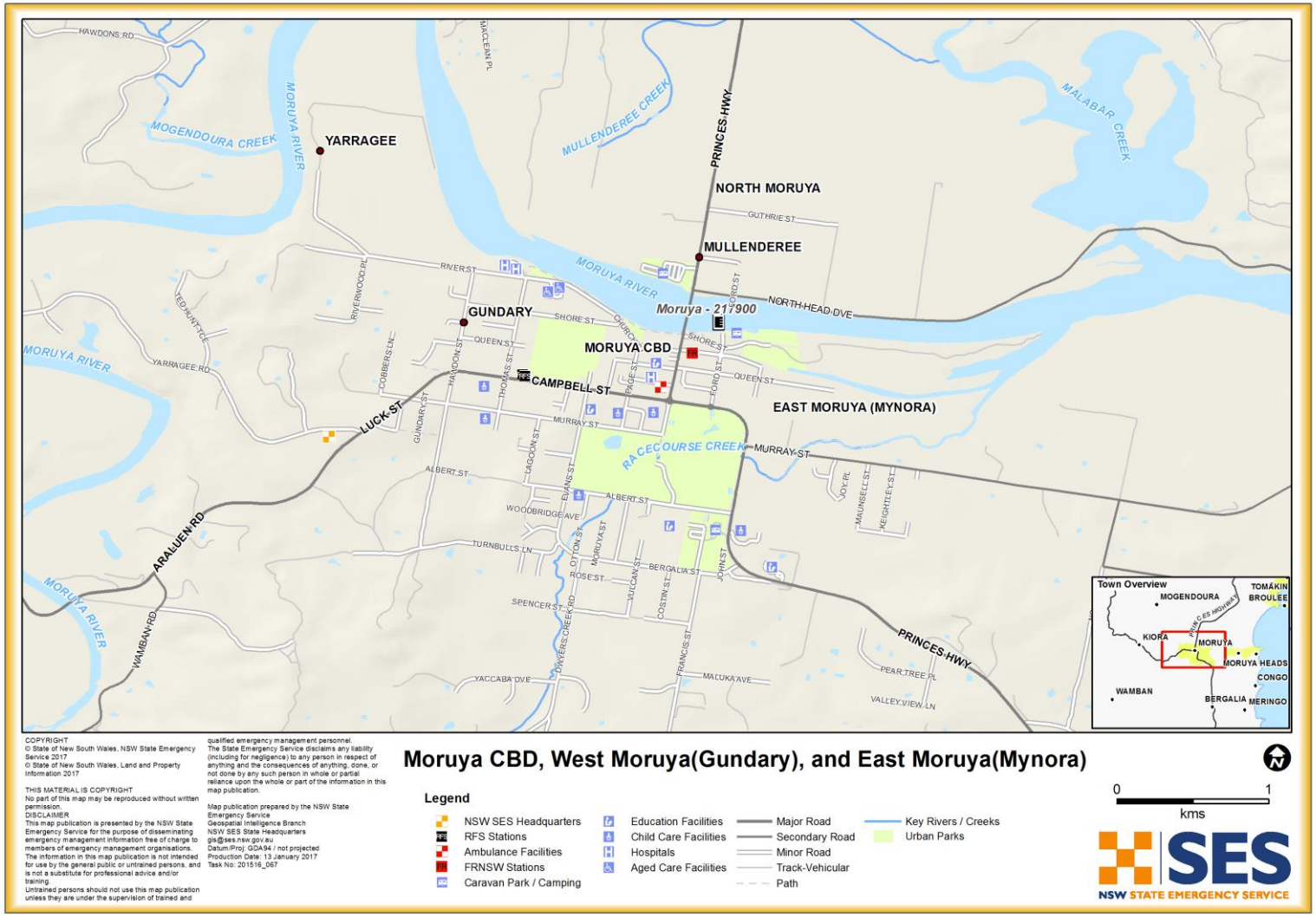
MAP 4: UPPER MORUYA RIVER TOWN MAP



MAP 5: MORUYA CBD, WEST MORUYA (GUNDARY) AND EAST MORUYA (MYNORA) TOWN MAP



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MAP 6: NORTH MORUYA AND MULLENDENDEREE FLATS TOWN MAP

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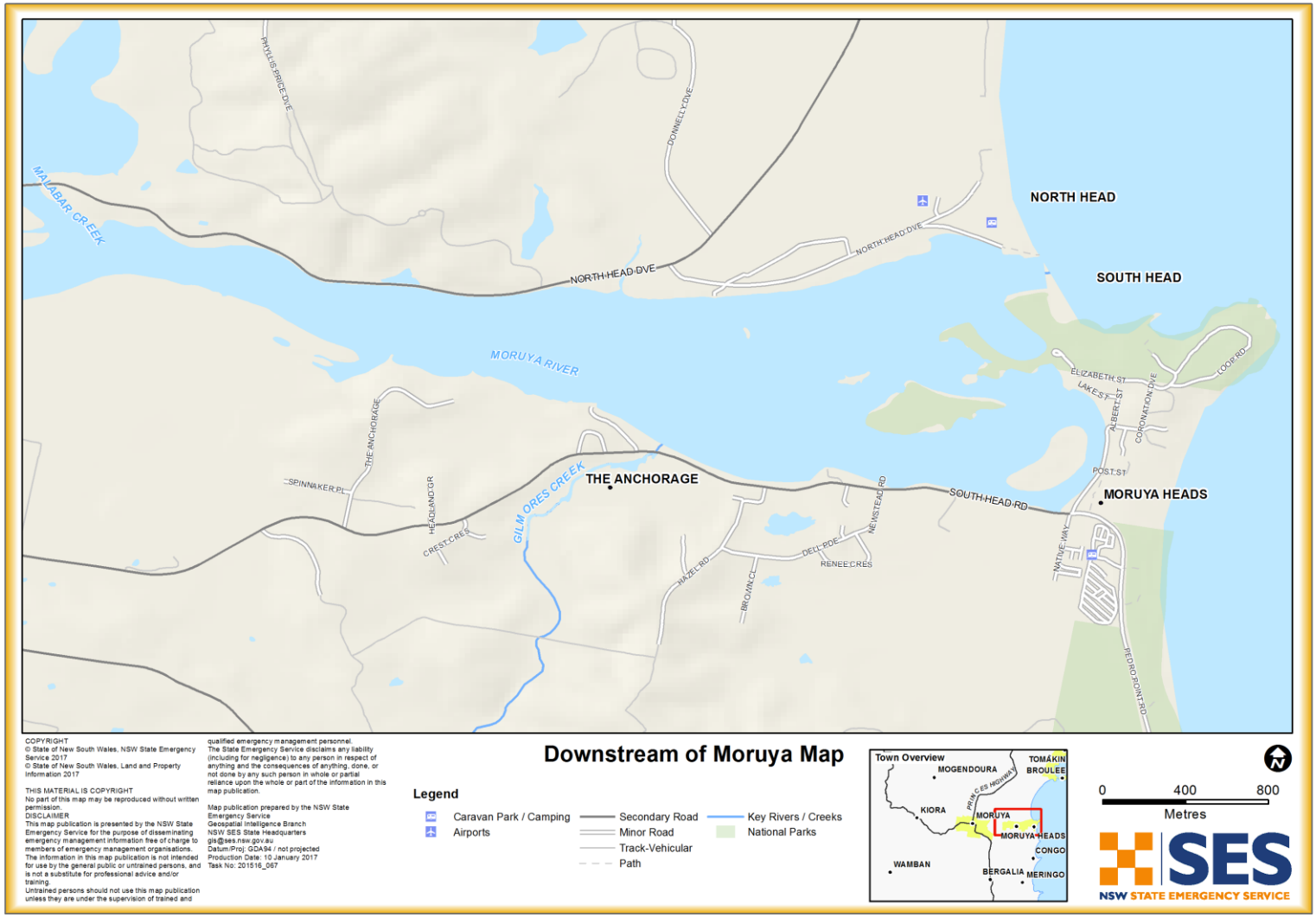
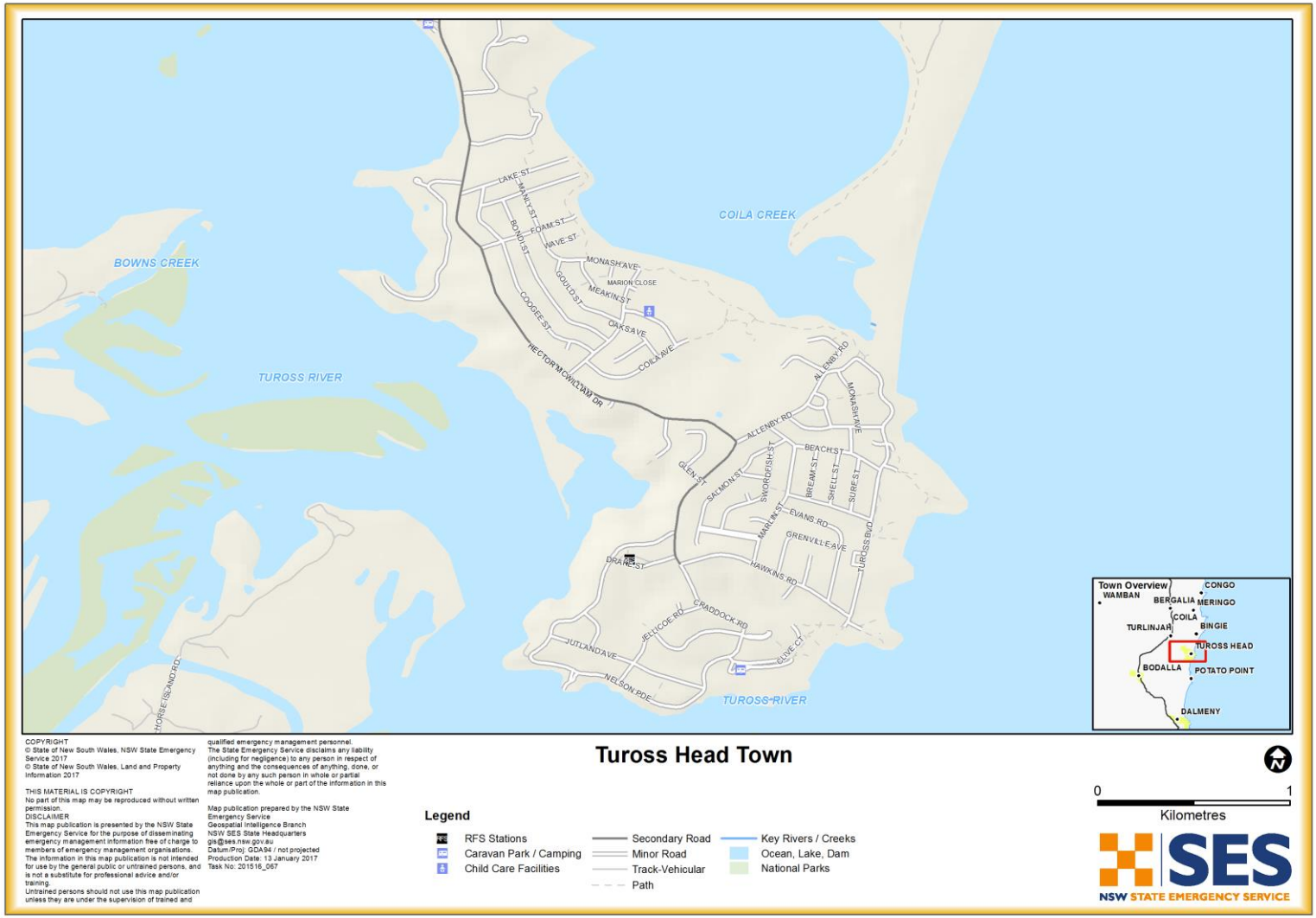
MAP 7: DOWNSTREAM OF MORUYA TOWN MAP



MAP 8: TUROSS HEAD TOWN MAP



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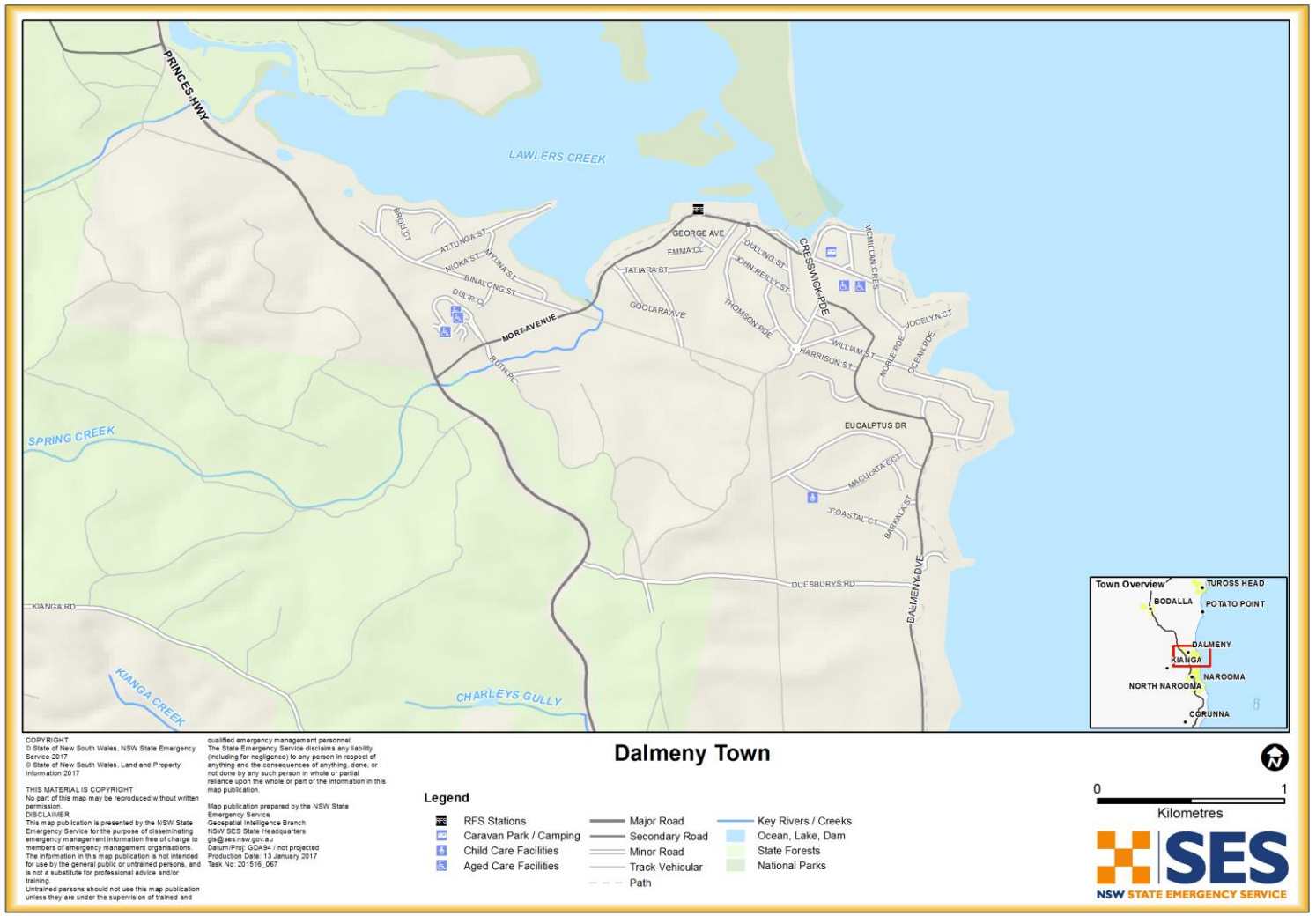
MAP 9: DALMENY TOWN MAP



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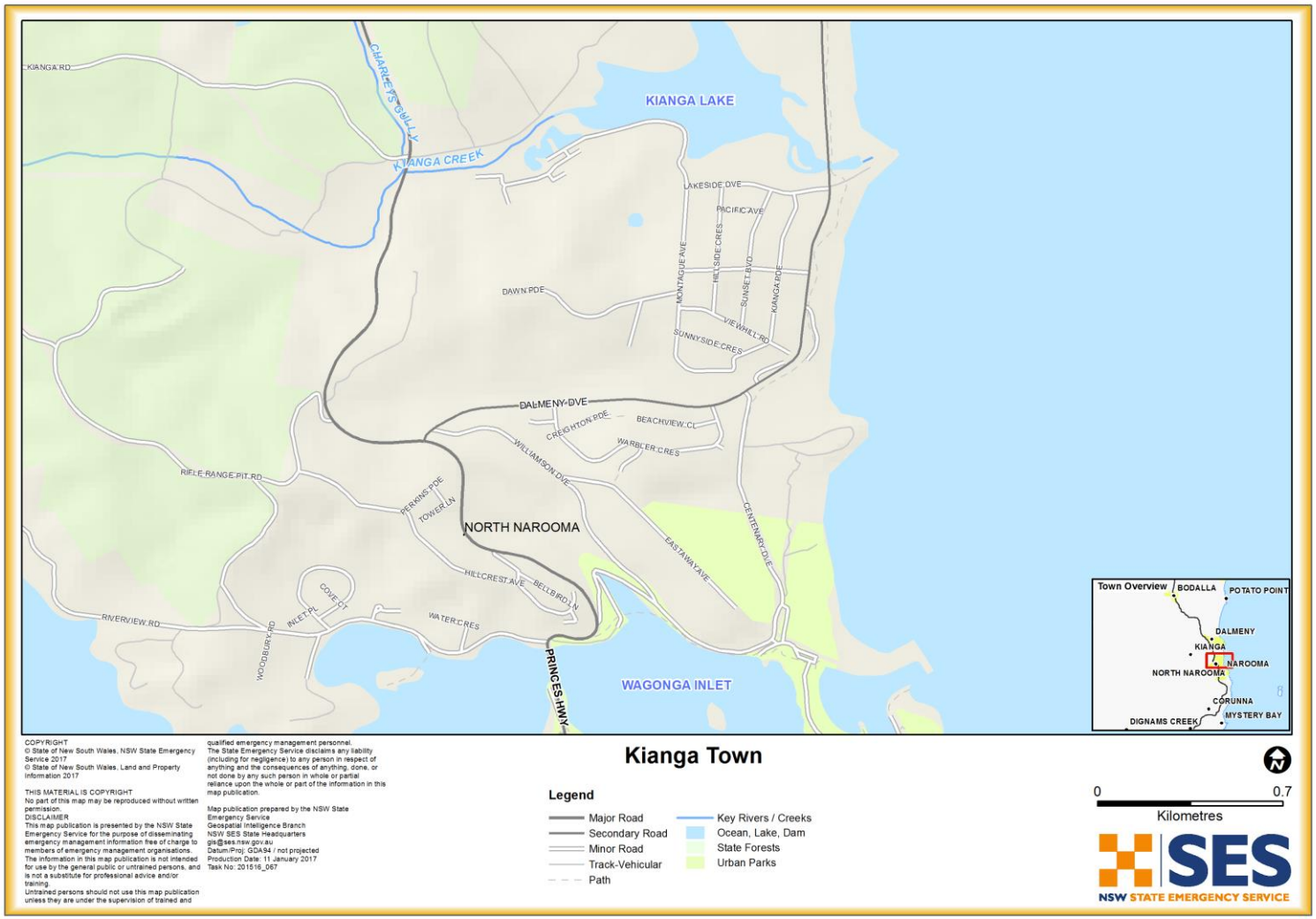
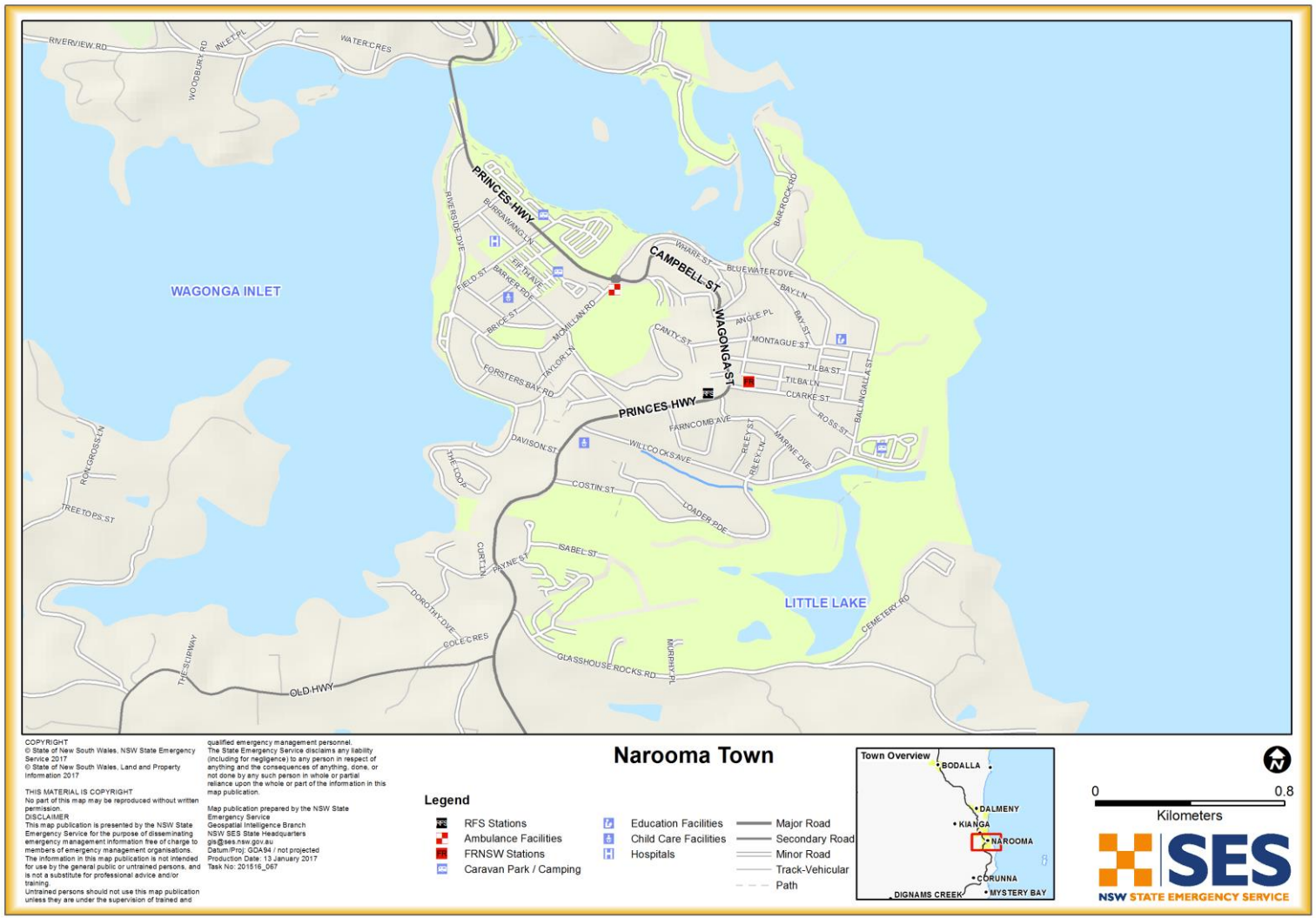
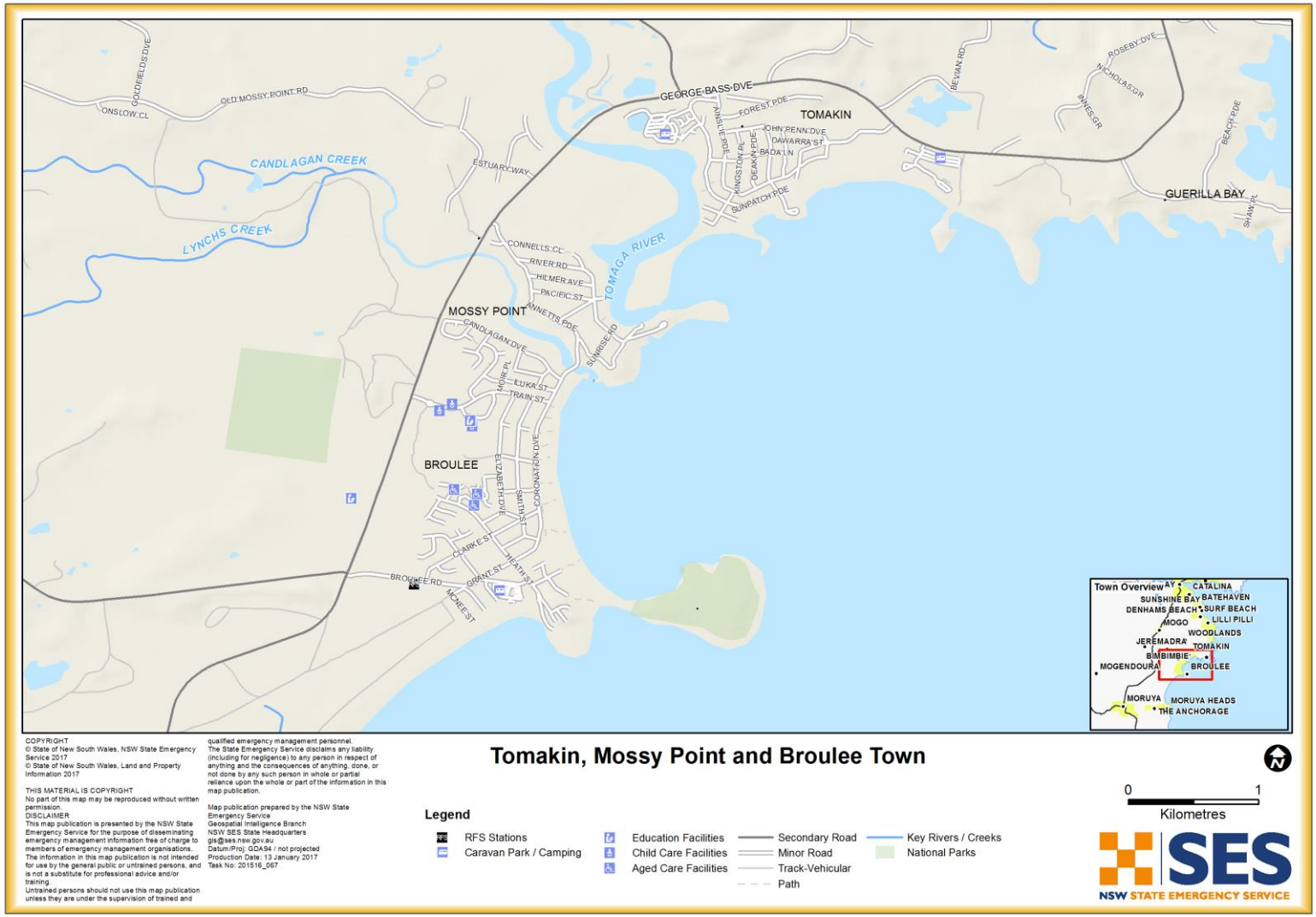
MAP 10: KIANGA TOWN MAP



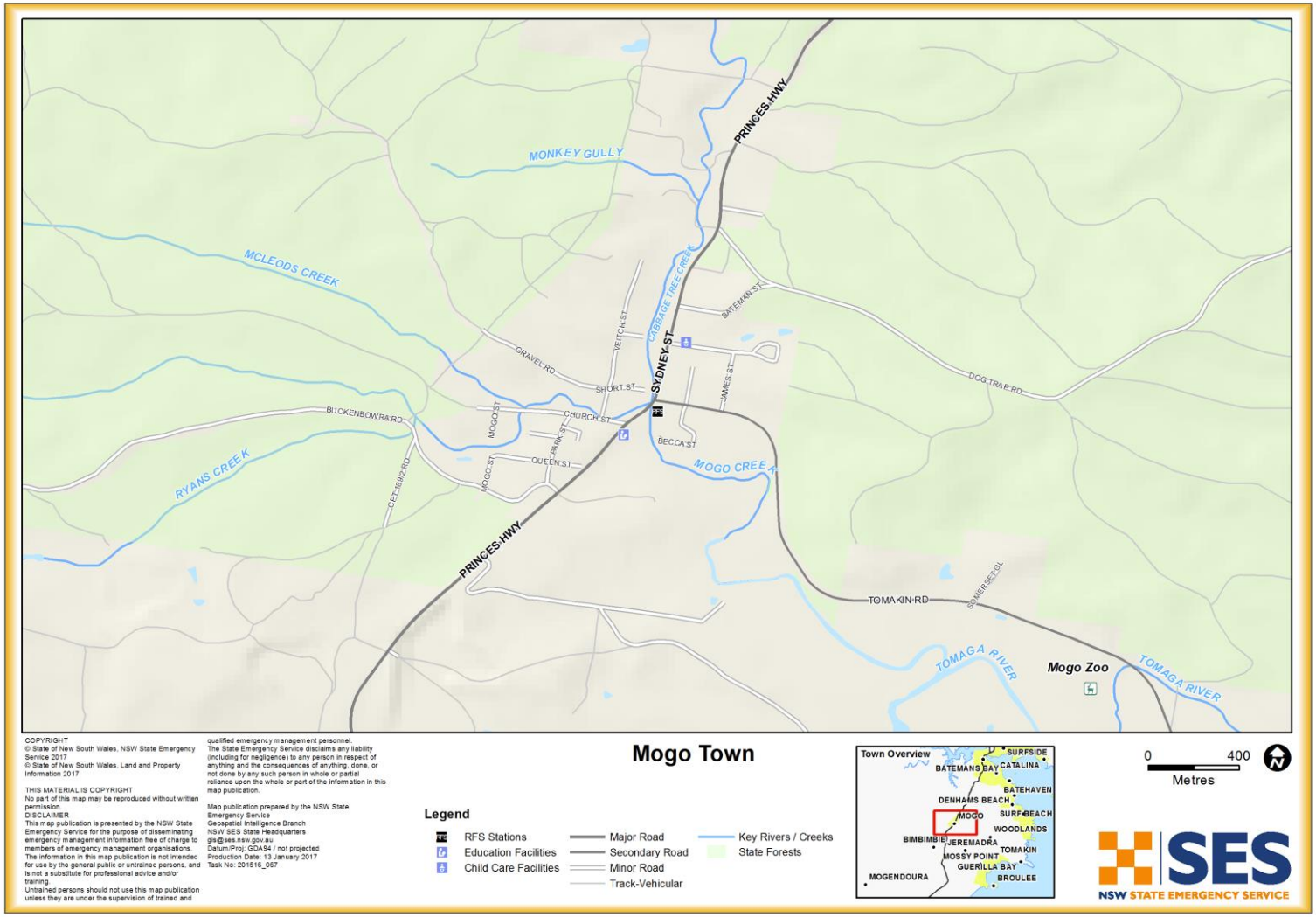
MAP 11: NAROOMA TOWN MAP



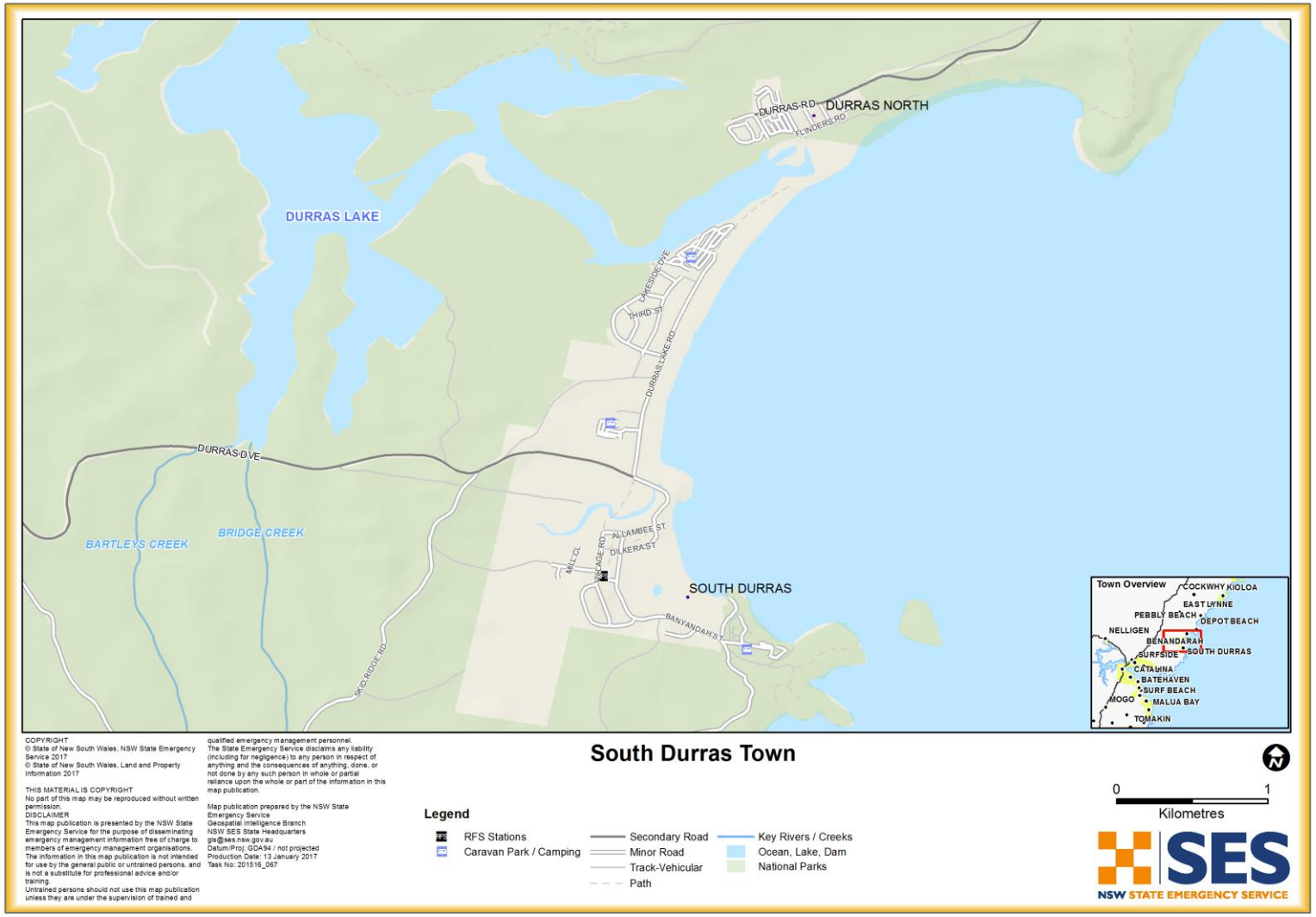
MAP 12: TOMAKIN, MOSSY POINT AND BROULEE TOWN MAP



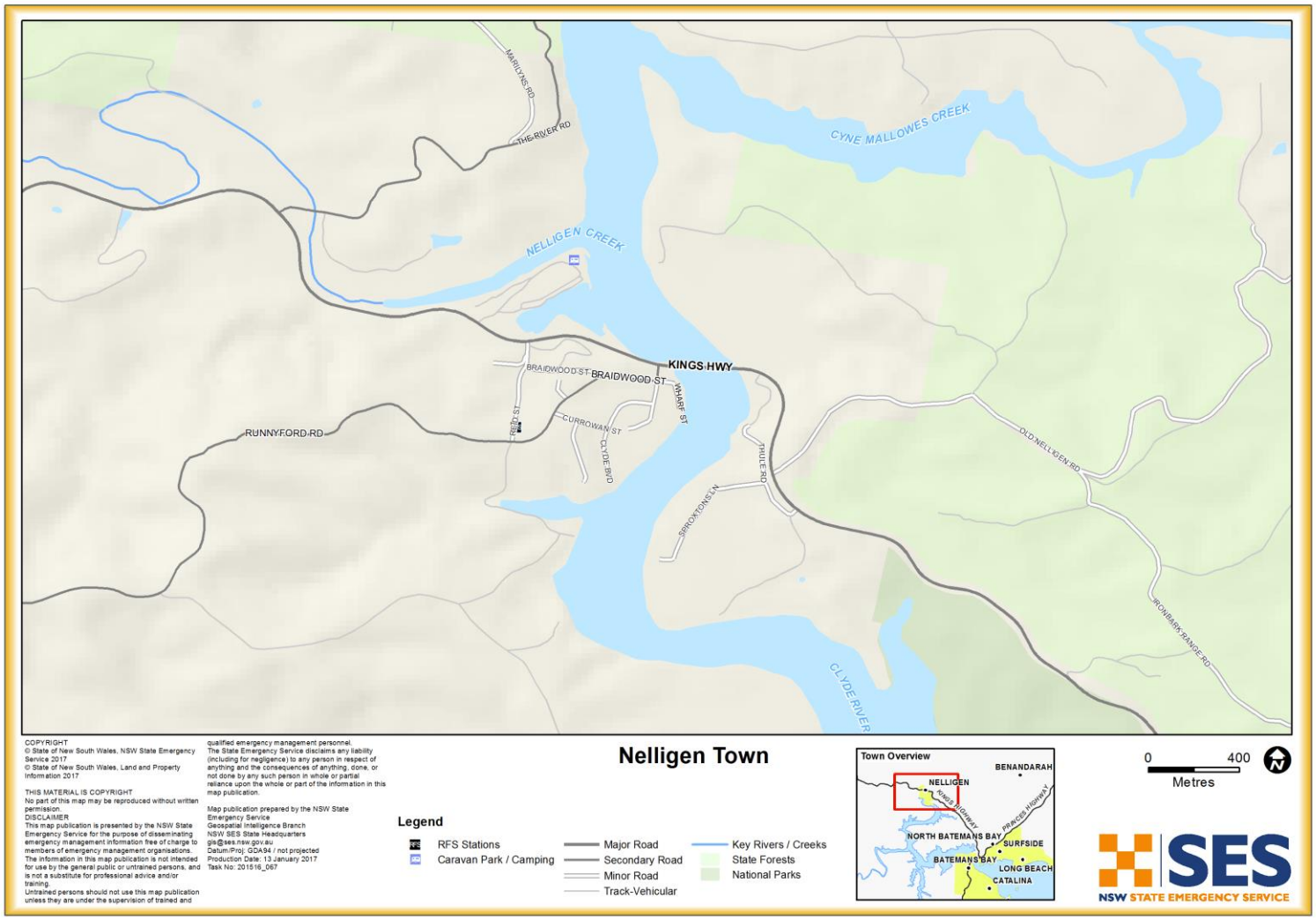
MAP 13: MOGO TOWN MAP



MAP 14: SOUTH DURRAS TOWN MAP



MAP 15: NELLIGEN TOWN MAP



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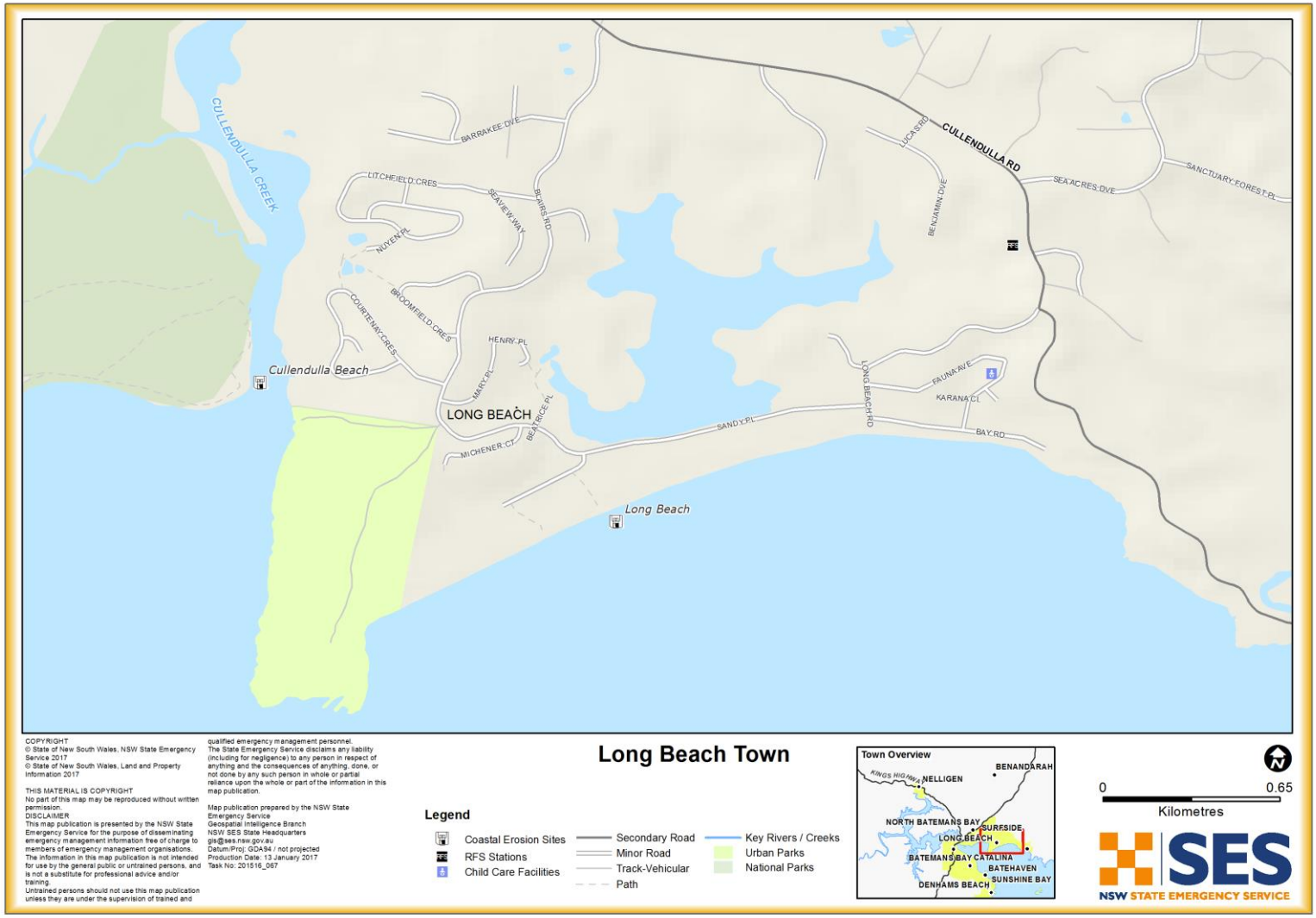
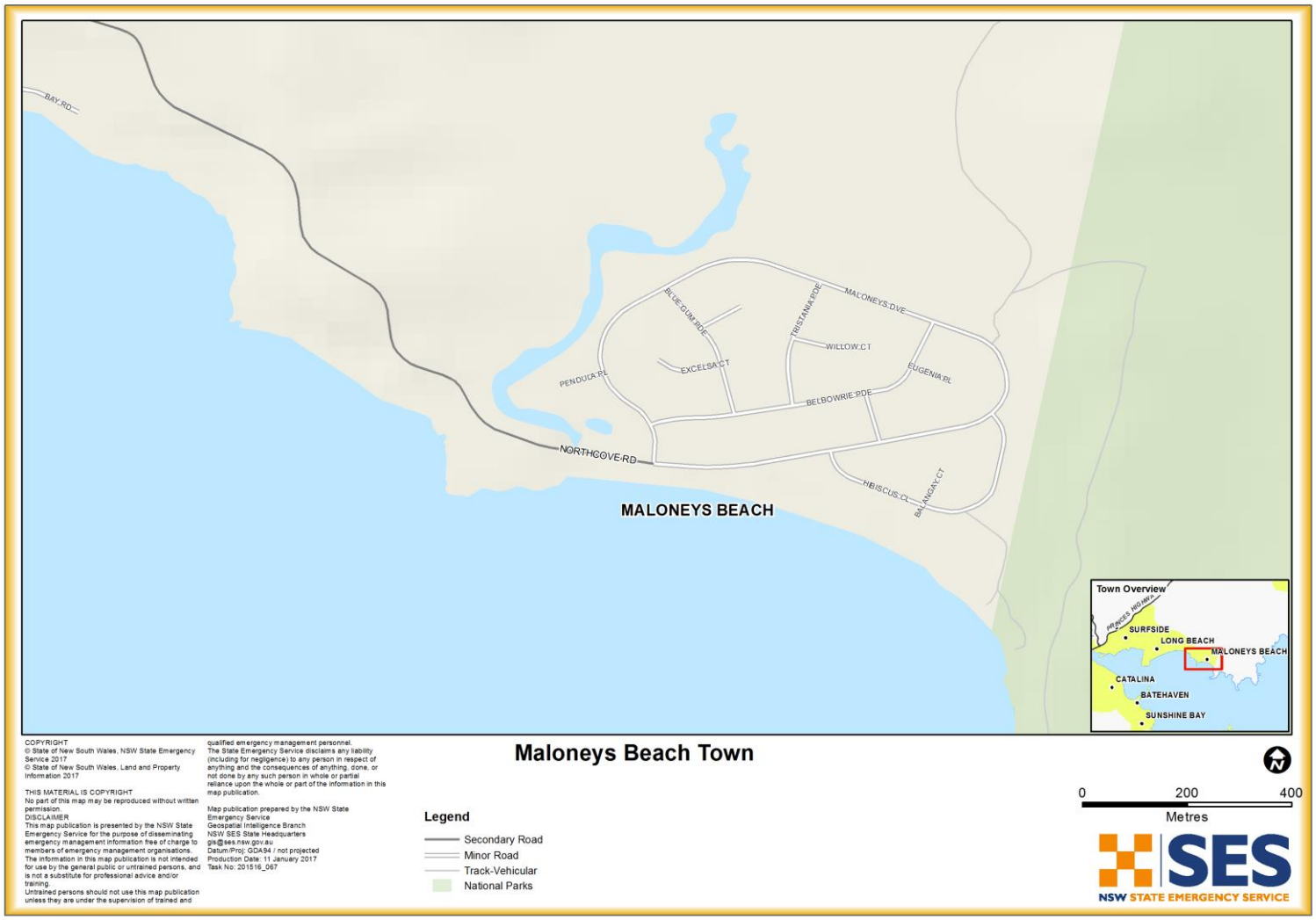
MAP 16: LONG BEACH TOWN MAP



MAP 17: MALONEYS BEACH TOWN MAP



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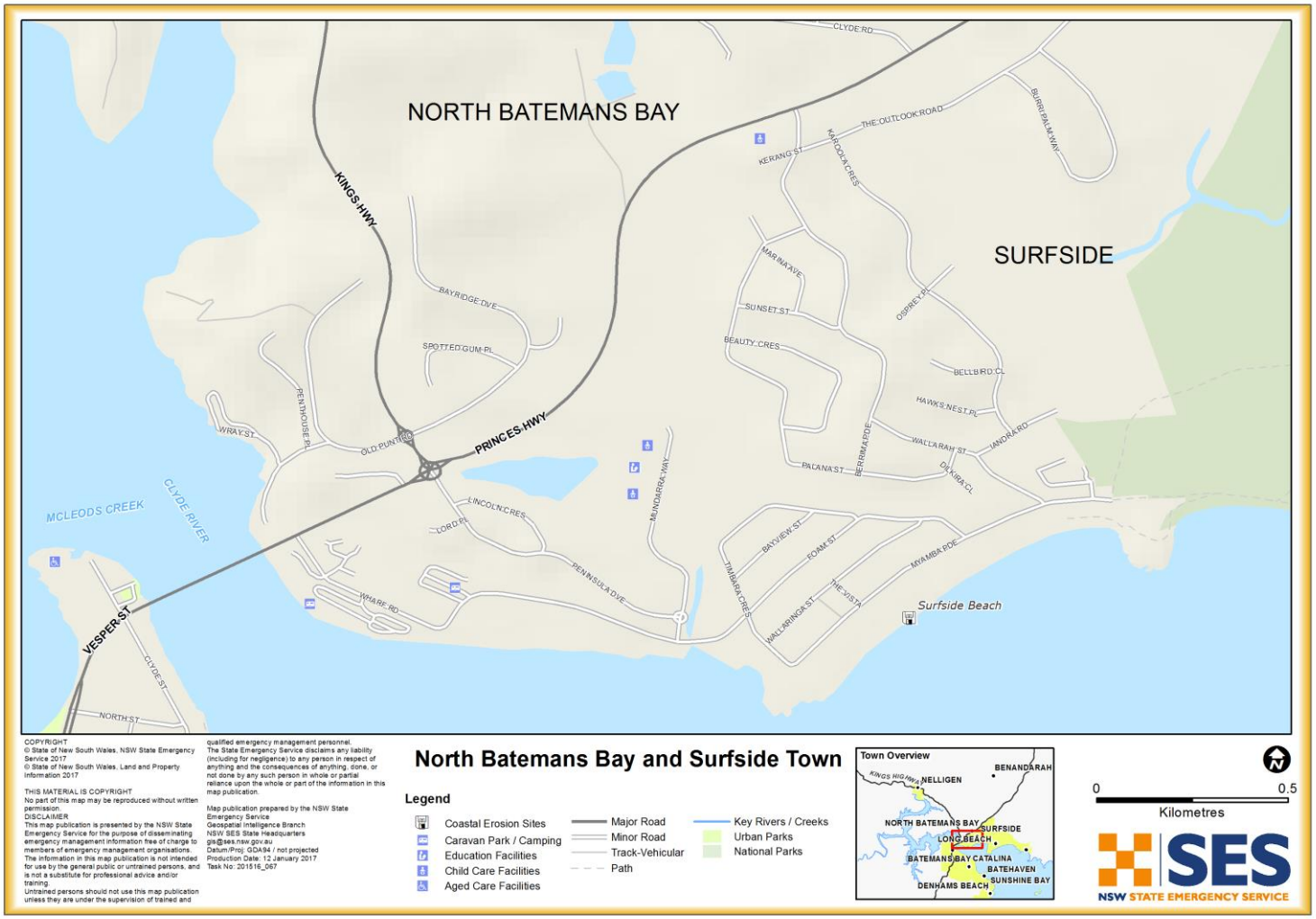
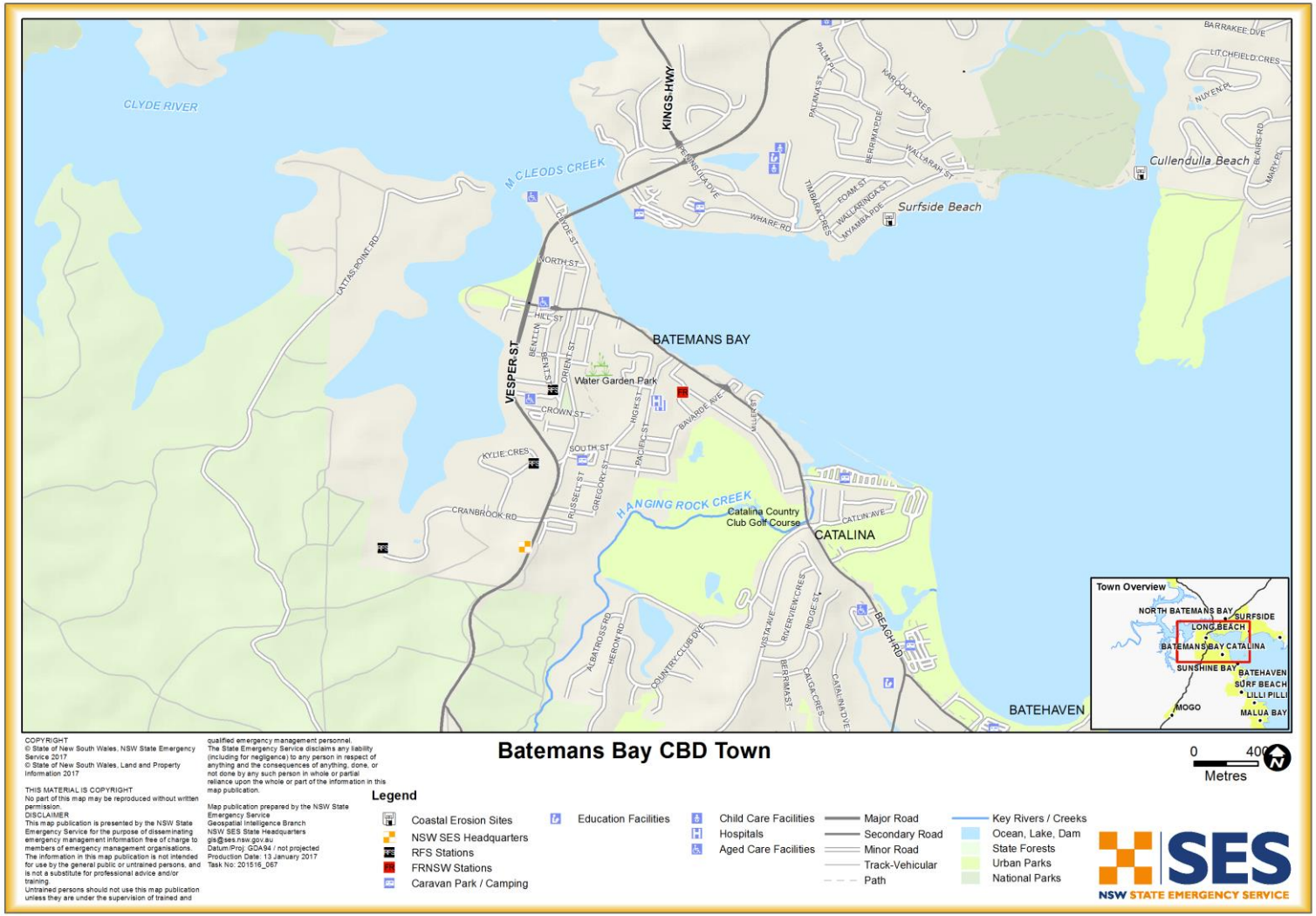
MAP 18: NORTH BATEMANS BAY AND SURFSIDE TOWN MAP



MAP 19: BATEMANS BAY CBD TOWN MAP



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MAP 20: BATEHAVEN TOWN MAP

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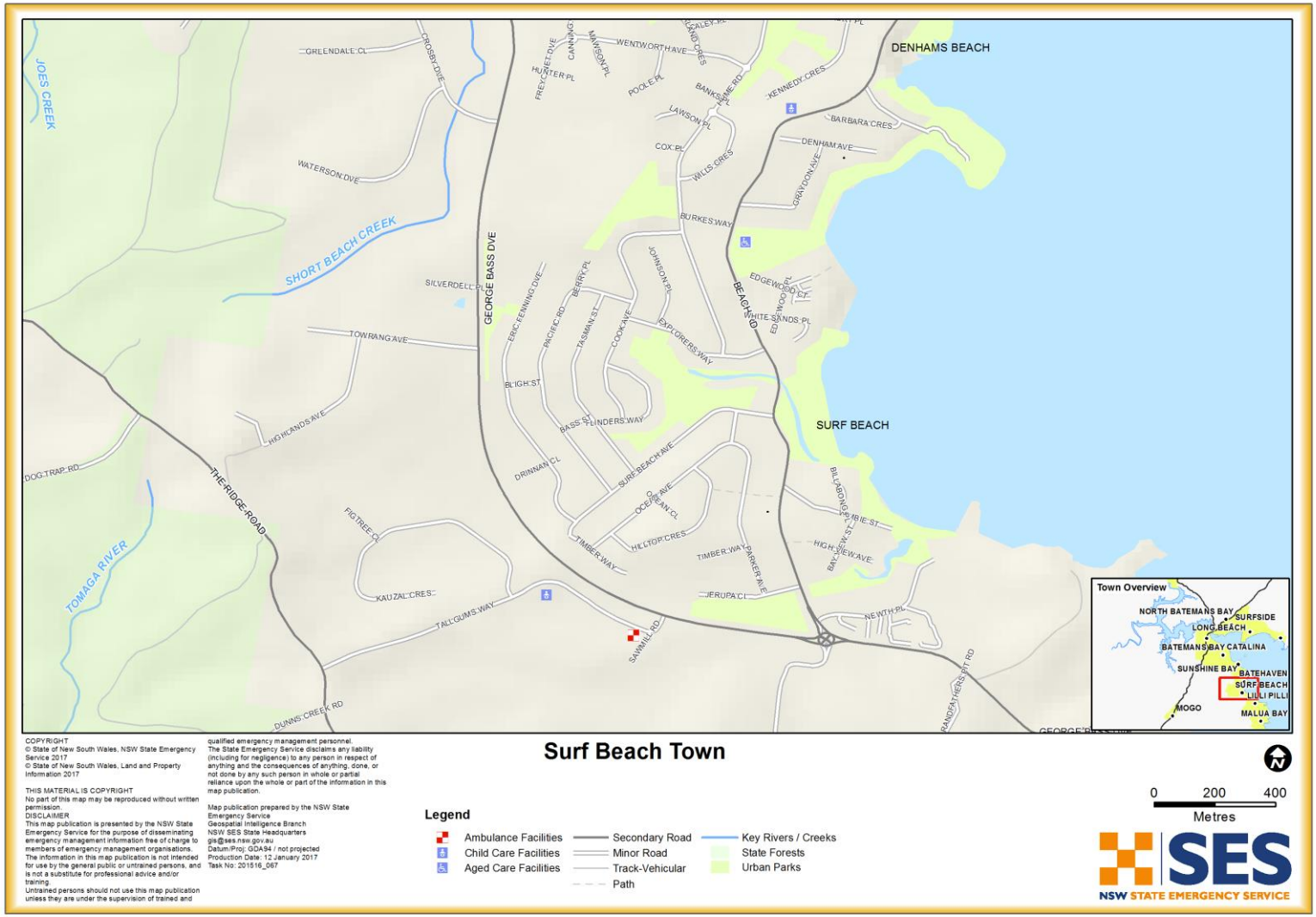
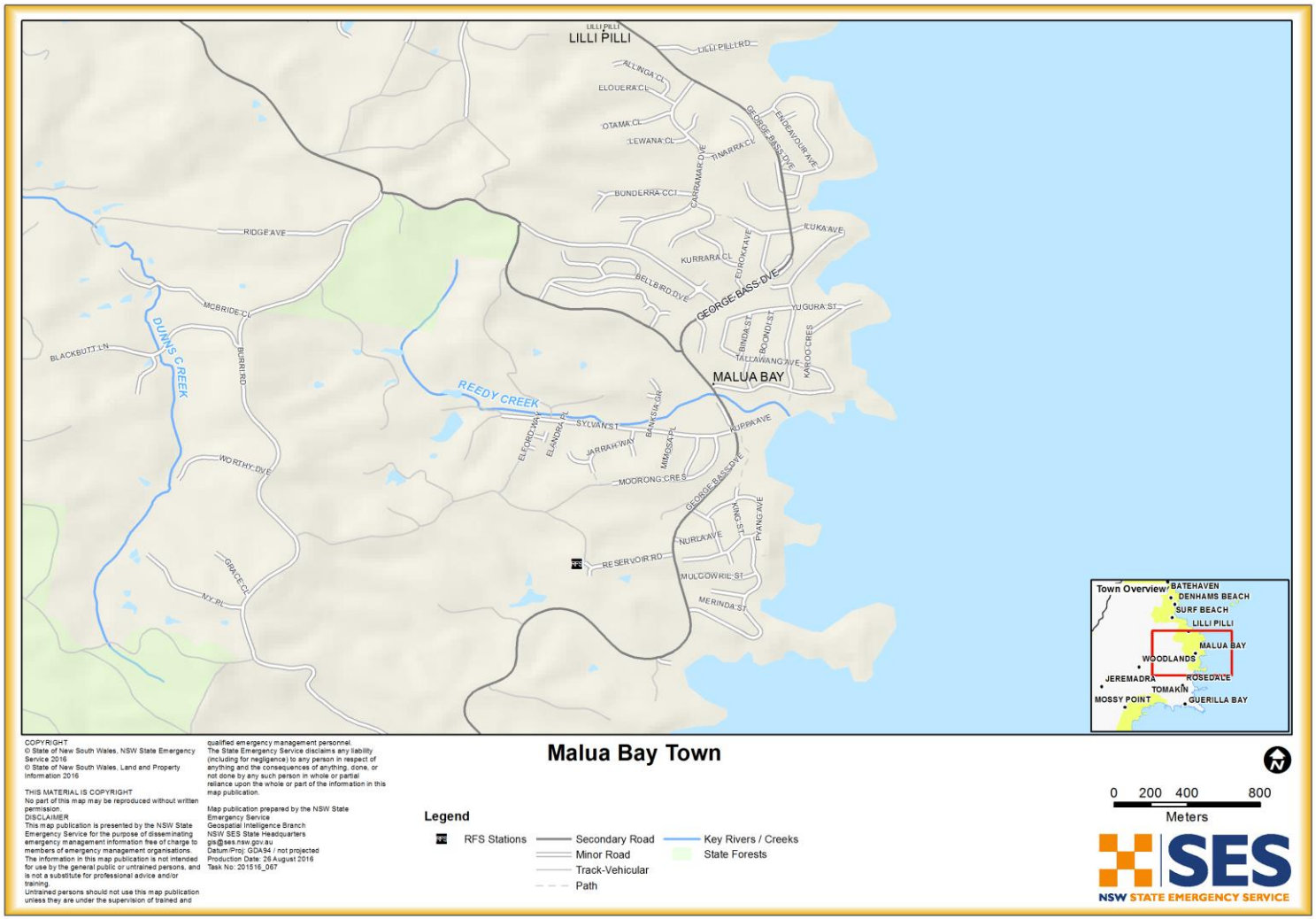
MAP 21: SURF BEACH TOWN MAP



MAP 22: MALUA BAY TOWN MAP



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LIST OF REFERENCES

1. **NSW State Emergency Service.** *Eurobodalla Flood Plan.* 2006.

2. **Eurobodalla Shire Council Water and Waste Department.** *Deep Creek Dam - Dam Safety Emergency Plan.* Sep 2006.

3. **Patterson Britton & Partners Pty Ltd.** Moruya River Floodplain Management Study. s.l. : Patterson Britton & Partners Pty Ltd, 1995.

4. **Department of Public Works.** *Moruya River Flood History 1841-1978.* 1978.

5. **NSW SES.** *Peak Heights Listing - Moruya Gauge (217900).* 2016.

6. **Public Works Department.** *Moruya River 1925 Flood.* s.l. : Public Works Department, 1992.

7. **Eurobodalla Shire Council.** *Surf Beach Detention Basin Operators Manual.* s.l. : Eurobodalla Shire Council, 2010.

8. **SMEC.** *Eurobodalla Shire Coastal Hazards Scoping Study.* s.l. : Eurobodalla Shire Council, October 2010. 3001805.

9. **Office of Environment and Heritage.** Coastal erosion 'hot spots'. *Office of Environment and Heritage.* [Online] February 26, 2011. [Cited: August 23, 2016.] http://www.environment.nsw.gov.au/coasts/coasthotspots.htm.

10. **Eurobodalla Shire Council.** *Draft Coastal Zone Management Plan: Wharf Road North Batemans Bay.* s.l. : Eurobodalla Shire Council, April 2016.

11. **Webb, McKeown & Associates Pty Ltd.** *Draft Batemans Bay Coastline Hazard Management Plan - Draft for Public Exhibition.* s.l. : Eurobodalla Shire Council, November 2001.

12. **Bureau of Meterology.** Daily Rainfall Moruya (Plumwood). *www.bom.gov.au.* [Online] Australian Bureau of Meterology, January 04, 2017. [Cited: January 04, 2017.] http://www.bom.gov.au/jsp/ncc/cdio/weatherData.

13. **The NSW State Emergency Service.** Flood Intelligence Card - Moruya Gauge. s.l. : The NSW State Emergency Service, 2011.

14. **NSW SES Batemans Bay Unit.** Advice provided by Batemans Bay unit members. *Emailed feedback to ISR Region Controller and ERM Planner and Face to Face Meeting.* 2016.

15. **Australian Bureau of Statistics.** 2011 Census of Population and Housing. 2012.

16. **URS Australia Pty Ltd.** *Flood Risk Assessment Report - Eurobodalla.* s.l. : URS Australia Pty Ltd, 2006.

17. **Unit, NSW SES Eden and Bermagui.** *Advice recieved from NSW SES Eden unit members.* December 1, 2016.

18. **WMA Water.** *Draft Tomakin / Mossy Point / Broulee / Mogo Flood Study for Public Exhibition.* s.l. : Eurobodalla Shire Council, 14 April 2016.

19. **Willing & Partners Pty Ltd.** *Mogo Floodplain Management Study.* s.l. : Willing & Partners Pty Ltd, 1987.

20. **Pip Ciovanelli Heritage and Conservation.** Nelligen Main Street Study. s.l. : Prepared for Eurobodalla Shire Council, June 2011.

21. **Peter Spurway & Associates Pty Ltd.** *Reedy Creek, Malua Bay Floodplain Risk Management Study and Plan.* 2005.

22. **NSW SES Bega Unit.** Advise provided by Local Bega NSW SES Unit Members. November 2016.

NSW STATE EMERGENCY SERVICE

SES RESPONSE ARRANGEMENTS FOR EUROBODALLA SHIRE

Volume 3 of the Eurobodalla Shire Local Flood Plan

Last Update: July 2006

FloodSafe

ANNEX C - GAUGES MONITORED BY THE SES

Gauge Name	Type	AWRC No	Stream	Flood Classification			Reading Arrangements
				Min	Mod	Maj	
Moruya	Telemeter		Moruya River	2.0	2.6	3.2	BoM Flood Warnings
Wamban	Telemeter		Moruya River	4.4	6.2	8.0	BoM Flood Warnings
Kiora Bridge	Manual		Moruya River				Council
Tuross	Manual		Tuross River				BoM Flood Warnings
Nelligen	Manual		Clyde River				Manly Hydraulics web site
Princess Jetty			Batemans Bay				Manly Hydraulics web site
Narooma Public Wharf			Wagonga Inlet				Manly Hydraulics web site

Notes:

1. The Bureau of Meteorology provides flood warnings for the Moruya and Wamban gauges.
2. The SES holds a Flood Intelligence Card for the Moruya gauge.

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ANNEX D - DISSEMINATION OF SES FLOOD BULLETINS

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

Radio Stations:

Station	Location	Frequency (FM)
2EC	Bega	105.9
Power FM	Nowra	104.3
2BA	Bega	103.5
2ABCFM	Batemans Bay/Moruya	101.9
2 EAR	Moruya	107.5

Television Stations:

Station	Location
WIN TV	Wollongong
Southern Cross 10	Warrawong
Prime	Wollongong

Newspapers:

Name	Location
Bay Post/Moruya Examiner	Batemans Bay
Narooma News	Narooma

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

Evacuation Warning for [ ]

Date/Time of Issue: [ ]

Authorised By: [ ]

The Bureau of Meteorology has predicted a flood level of [ ] metres at [ ] ***(place)*** at [ ] ***(time).*** This means that the following area(s) may be inundated **[ ]**.

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

To prepare for evacuation, you should:

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

If evacuation is necessary:

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

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ANNEX F - EVACUATION ARRANGEMENTS FOR THE EUROBODALLA SHIRE COUNCIL AREA

Situation

1. Evacuations will be necessary, because of riverine flooding, from the following areas: Nelligen Mullenderee Flat and Moruya CBD and surrounding residential area Mogo (business district)

2. Evacuations will be necessary, because of oceanic flooding, from the following areas: Long Beach, Surfside, North Batemans Bay, Batemans Bay CBD, Catalina (Hanging Rock) Narooma Flats

3. Evacuations may be necessary because of stormwater flooding from Surf Beach (downhill from retention basin).

Mission

4. The SES is to arrange and control the evacuation of areas at risk of flooding in order to ensure the safety of residents

Execution

5. **Control.** During floods evacuations will be controlled by the NSW SES.

6. **Conduct.** Evacuations will be controlled by the Eurobodalla SES Local Controller and conducted by SES, RFS, NSWFB and VRA personnel in four phases:

   a. Phase 1 - Warning.

   b. Phase 2 – Withdrawal.

   c. Phase 3 – Shelter.

   d. Phase 4 – Return.

7. **Coordinating Instructions.**

   a. **The decision to evacuate.** The responsibility for issuing any general evacuation order during flooding rests with the Eurobodalla 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 Illawarra South Coast SES Region Controller.

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

c. **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.

d. **Evacuation triggers.** The triggers for evacuation are summarised in the table below.

8. **Phase 1 – Warning**

a. **Evacuation warnings.** On the receipt of flood warnings or other BoM warning products indicating the possibility of flooding, the Eurobodalla 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 Eurobodalla SES Local Controller will issue evacuation warnings to the 'at risk' residents, indicating what people should do before evacuating and when actually doing so.

b. **Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at Annex 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.

9. **Phase 2 – Withdrawal**

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

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

c. **Evacuation routes.** Evacuation routes are summarised in the table below.

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

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

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

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

g. **Security.** The NSW Police will provide security for evacuated premises.

10. **Phase 3 – Shelter**

a. **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 Eurobodalla SES Local Controller but managed as soon as possible by the Department of Community Services. The nominated evacuation centres are shown in the table below.

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

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

c. **Registration.** The NSW Police will ensure that:

- evacuees and other displaced persons are registered in accordance with the standard Disaster Victim Registration procedures.
- Assistance with registration will be provided by persons who have the appropriate training/oversight and capabilities as determined by NSW Police.

11. **Phase 4 – Return**

    a. Once it is considered safe to do so, the Eurobodalla 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.

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

Administration and Logistics

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

13. **Support provided at evacuation centres.** The expected duration of the evacuation will dictate the need for and level of facilities and support at the evacuation centres. If evacuations are expected to be of a short duration, evacuees may be provided with short-term accommodation at the centres. However, if they are expected to last for longer than 24 hours, evacuees will be encouraged to go to alternative accommodation or stay with friends where possible. Alternatively, accommodation will be arranged for them in hotels, motels or by billeting.

14. **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 the Dept of Primary Industries (DPI).

Control Arrangements

15. **Control.** Small-scale evacuations will be controlled by the Eurobodalla SES Local Controller. Should the evacuations operations escalate beyond the capabilities of local resources control may be handed over to the Illawarra South Coast SES Region Controller.

ANNEX G - EVACUATION ROUTES

Location	Evacuation trigger	Evacuation route	Evacuate to
Nelligen (approx 20 dwellings)	Inundation of Wharf St, and further rises expected	Local roads	Local billeting
Surfside (approx 200 dwellings)	Expectation of major storm surge, with swell from SE	Only route available is Berrima Rd from flats to high ground. Overland evacuations up steep slope possible for able bodied. NB: low level local roads will flood early.	Anglican School Surfside
North Batemans Bay (approx 40 dwellings, and two caravan parks)	Expectation of major storm surge, with swell from SE	Only route available is Wharf Rd to Princes Hwy (Peninsula Dr likely to flood early). Overland evacuations may be possible near East end of McLeod St, but not generally possible elsewhere because of cliff backing.	Lincoln Downs Motel, Princes Hwy
Batemans Bay CBD	Expectation of major storm surge, especially in conjunction with Clyde River flooding	Local roads	Billeting, plus local commercial operations such as Sunseeker Motel Princes Hwy, South Batemans Bay; Fitness Centre, Museum Place.

Location	Evacuation trigger	Evacuation route	Evacuate to
Catalina - Hanging Rock (approx 200 dwellings, plus 3 holiday/residential parks)	Expectation of major storm surge	Local roads to high ground in Batemans Bay, overland routes. NB: evacuation only possible if initiated before flooding occurs.	Billeting in Catalina only
Surf Beach – detention basin (approx 15 dwellings)	Overflow of detention basin (see detail in Surf Beach Detention Basin Operations and Maintenance Manual)	Local Roads	Billeting
Moruya – north of River (caravan park, and approx 10-20 dwellings)	Prediction of flooding above 2.80m on the Moruya gauge	Princes Hwy to Moruya	Golf Club, High School, Primary School
Moruya – flood storage NE edge of town, N of Queen St (approx 250 properties in a 1%AEP flood)	Prediction of flooding above 3.2 m on the Moruya gauge	Local roads to high ground	Golf Club, High School, Primary School
Narooma Flats (approx 150 dwellings and two holiday parks)	Expectation of major storm surge, swell from East	Princes Hwy to South (and North if necessary), plus Forsters Bay Rd to the South	A number of hotels, motels and schools on Sth ridge.

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

General

1. The following caravan parks are flood liable:

Caravan Park	Flood Threat
Barlings Beach Caravan Park 1939 George Bass Dr, Tomakin Ph: 4471 7313	Ocean Inundation
Beachcomber Caravan Park Blackfellow Point Rd, Potato Point Ph: 4473 5312	Local catchment
Broulee Beach Van Park 6 Lyttle St, Broulee Ph: 4471 6247	Local catchment
Clydeview Caravan Park 107 Beach Rd, Batehaven Ph: 4472 4224	Ocean inundation
Coachhoues Marina Resort 49 Beach Rd, Batemens Bay Ph: 4472 4392	Ocean inundation
Coila Lake Service Station and Caravan Park 3926 Princes Hwy, Turlinjah Ph: 4473 8171	Local catchment
Congo Camping Ground Congo C/- Eurobodalla Shire Council	Ocean inundation
Easts Riverside Caravan Park 2-24 Wharf Rd, Batemans Bay Ph: 4474 4048	Ocean inundation
Easts Van Village 48-58 Princes Hwy, Narooma Ph: 4476 2046	Ocean inundation
Glenhaven Caravan Park 51 Beach Rd, Batemans Bay Ph: 4472 4541	Ocean inundation
Island View Beach Resort 7323 Princes Hwy, Narooma Ph: 4476 4600	Local catchment
Narooma Shores Holiday Park 41 Princes Hwy, Narooma Ph: 4476 2046	Ocean inundation

Nelligan Park 970 Kings Hwy, Nelligen Ph: 4478 1076	Riverine flooding
Pacific View Van Park 414 Beach Rd, Batehaven Ph: 4472 4226	Ocean inundation Local catchment
Pleasurelea Tourist Park 438 Beach Rd, Batehaven Ph: 4472 4226	Ocean inundation
Rio Rita Caravan Park 29 Wharf Rd, Batemans Bay Ph: 4472 5741	Ocean inundation Local catchment
River Breeze Caravan Park 9 Princes Hwy, Moruya Ph: 1800 001 543	Riverine flooding
Shady Willows Holiday Park 49 Old Princes Hwy, Batemans Bay Ph: 4472 4972	Local catchment
Taldumande 109 Beach Rd, Batehaven Ph: 4472 4855	Ocean inundation
Tomaga River Tourist Park 55 Sunpatch Pde, Tomakin Ph: 4471 7235	Ocean inundation Riverine flooding
Tuross Lakeside Tourist Park 211 Hector McWilliam Dr, Tuross Head Ph: 4473 8181	Lake floodplain

Advising Procedures

2. Caravan Park proprietors should ensure that the owners and occupiers of caravans are:

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

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

      - Displaying this notice prominently in each van.

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

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

      - Provide a contact address and telephone number.

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

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

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

- Ensure that they have spare batteries for their radios.

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

- Prepare for evacuation and van relocation.

d. The Eurobodalla 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

3. Caravan park proprietors will install flood depth indicators and road alignment markers within their caravan parks.

4. 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 if they have their own transport, or move to the caravan office to await transport.

5. 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 possible and may be able to provide additional vehicles.

6. Occupants of vans that are being relocated should go to a designated evacuation centre if they have their own transport. Those without their own transport are to report to the caravan park office.

7. Caravan park managers will:

   a. Ensure that their caravan park is capable of being evacuated within 6 hours.

   b. Advise the Eurobodalla 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 Eurobodalla SES Local Controller when the evacuation of the caravan park has been completed.

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

Return of Occupants and Vans

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

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

ANNEX I - RESUPPLY REQUIREMENTS AND OPERATIONS

Background

1. Because of the short term nature of most road closures, resupply will not be necessary in many areas. The three areas that may need resupply are as follows:

Community	Main Supply Routes	Likely Point of Closure of Supply Routes	Likely Duration of Isolation
Deua River from Kiora Bridge to National Park	Araluen Rd	Multiple points	Up to a week
Tuross River valley from Nerrigundah Mtn Rd to Belowra; incl Nerrigundah	Nerrigundah Mtn Rd	Multiple points	Up to a week
Clyde R valley upstream of Nelligen, plus Currawan Ck valley	Kings Hwy, River Rd	Multiple points	A few days

2. Aerial reconnaissance and (if necessary) resupply, will commence as soon as conditions allow.

3. The coordinates for aerial reconnaissance runs are as follows:

Location	Latitude	Longitude	Latitude	Longitude
	(degress minutes seconds)		(decimal degrees)	
Clyde River Valley				
Nelligen	150d 08' 18" W	35d 38' 55" S	150.1383 W	35.6486 S
Currowan	150d 10' 02" W	35d 34' 30" S	150.1672 W	35.5750 S
Brooman	150d 14' 12" W	35d 28' 25" S	150.2367 W	35.4736 S
Tuross River Valley				
Bodalla	150d 03' 00" W	36d 05' 31" S	150.0500 W	36.0919 S
Eurobodalla	149d 57' 54" W	36d 10' 28" S	149.9650 W	36.1744 S
Cadgee	149d 55' 06" W	36d 08' 45" S	149.9183 W	36.1458 S

Location	Latitude	Longitude	Latitude	Longitude
	(degress minutes seconds)		(decimal degrees)	
Tinpot	149d 52' 48" W	36d 12' 54" S	149.8800 W	36.2150 S
Barren Jumbo	149d 42' 42" W	36d 11' 50" S	149.7117 W	36.1972 S
Belowra	149d 41' 45" W	36d 07' 08" S	149.6958 W	36.1189 S
Cadgee	149d 55' 06" W	36d 08' 45" S	149.9183 W	36.1458 S
Nerrigundah	149d 53' 51" W	36d 06' 46" S	149.8975 W	36.1128 S
Deua River Valley				
Kiora Bridge	150d 02' 35" W	35d 55' 32" S	150.0431 W	35.9256 S
Locality	149d 58' 51" W	35d 53' 21" S	149.9808 W	35.8892 S
Locality	149d 58' 51" W	35d 49' 49" S	149.9808 W	35.8303 S
The Lagoon	149d 56' 05" W	35d 46' 11" S	149.9347 W	35.7697 S
Araluen Lower	149d 50' 31" W	35d 41' 21" S	149.8419 W	35.6892 S
Araluen North	149d 47' 32" W	35d 37' 30" S	149.7922 W	35.6250 S

ANNEX J - DETAILS OF THE DAM-FAILURE WARNING AND EVACUATION SYSTEM FOR DEEP CREEK DAM

Purpose of System

1. The Deep Creek Dam is owned and operated by Eurobodalla Shire Council and provides the main water supply to the community of Batemans Bay and surrounding district.

2. The dam is of earth fill construction with a reservoir gross capacity of 4900 ML. The Dam is classified by the NSW Dams Safety Committee with a High (C) Flood Hazard Rating.

3. The consequences of flooding from dam failure are:

4. Inundation within the Botanic Gardens with loss of structures and need for evacuation procedures

5. Princes Highway will be inundated at the crossing of Deep Creek and the Highway

6. The Eurobodalla Pumping Station will suffer loss of functionality and the ability to supply reservoirs from Longbeach to Central Tilba.

7. Oyster Leases located in Waterfall Creek and on the Clyde River waterfront will be affected by a sudden rise in water level.

Operation and Procedures

8. When a failure or overflow occurs, the stated emergency contact procedures are to be carried out in a smooth, orderly and efficient manner in accordance with the Deep Creek Dam Safety Emergency Plan.

9. When flood level is at **0.75m** above spillway (45.15m AHD) the Dam Operator will advise the Eurobodalla Shire Council Water & Waste Manager who will activate a **PROTECTION ALERT** and issues an advice to the Botanic Gardens Supervisor and the Eurobodalla SES Local Controller. The Dam Operator will continue to monitor and advise changes to the Water & Waste Manager.

10. When Flood level is at **1.25m** above spillway (45.65m AHD) the Dam Operator will advise the Eurobodalla Shire Council Water and Waste Manager who will activate an **ORANGE ALERT** and issues an advice to the Botanic Gardens Supervisor and the Eurobodalla SES Local Controller who will then notify the NSW Police. The Dam Operator will continue to monitor and advise changes to the Water & Waste Manager.

11. When Flood level is at **1.6m** above spillway (46.0m AHD) the Dam Operator will advise the Eurobodalla Shire Council Water and Waste Manager who will activate an **RED ALERT** and issues an advice to the Botanic Gardens Supervisor and the Eurobodalla SES Local Controller who will then notify the NSW Police and the Media. The Dam Operator will continue to monitor and advise changes to the Water & Waste Manager.

12. The SES will initiate appropriate emergency action to safeguard downstream areas as appropriate to the alert status and as per the Flood Plan arrangements.

Prior Advice to People Potentially at Threat

13. The State Emergency Service will conduct educational activities to ensure that people in locations potentially threatened by associated flooding can understand the threat and its management. These activities will include:

    a. Public meetings of residents.

    b. Publicity being sought in local newspapers and over local radio stations.

    c. Provision of printed material to residents.

ANNEX K - DETAILS OF THE DAM-FAILURE WARNING AND EVACUATION SYSTEM FOR SURF BEACH STORMWATER DETENTION BASIN

(UNDER DEVELOPMENT BY

EUROBODALLA SHIRE COUNCIL)

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ANNEX L - MANAGEMENT OF COASTAL EROSION / INUNDATION

The Problem and the Areas at Risk

1. The coastal erosion / inundation problem in the local government area takes two forms:

   a. Undercutting of the seashore, threatening the collapse of dwellings and other buildings.

   b. The potential breaking through of the dunes by seawater, causing flooding and isolation of property on the landward side of the dunes.

2. The most severe problems of coastal erosion / inundation occur as a result of oceanic storm conditions associated with the passage of East Coast low-pressure systems. These storms may cause temporary sea level rises with large associated waves. The worst erosion is likely when severe weather conditions occur in conjunction with unusually high tides.

3. Storm activity is sometimes accompanied by heavy rain causing flooding in the creeks behind the sand dunes. This flooding can be exacerbated by an elevated sea level preventing the escape of floodwaters to the sea.

4. The role of the SES as the combat agency for storms does not include coastal erosion and inundation caused by astronomical high tides when severe weather is not actually developing or occurring.

5. The following areas within the Eurobodalla Shire Council have been identified as areas at risk for coastal erosion:

   a. Batemans Bay - beaches along northern and southern sides.

   b. Surfside Beach - on the north side of the bay.

   c. Cullendulla Beach – western end

   d. Long Beach

Responsibilities for Mitigation

6. The SES is NOT responsible for controlling or conducting any physical mitigation works to protect properties or structures at risk from coastal erosion and inundation, either during or outside the period of storm activity. This includes, but is not limited to:

   a. The placement of rocks or other materials on beaches or foreshore areas; and

b. The construction of temporary walls made of sandbags, geotechnical tubes or other materials.

7. Planning for and construction of any physical mitigation works required for the protection of property, whether during storm events or during normal wind and wave action (including during unusually high tides) when severe weather is not forecast or occurring, is the responsibility of local government councils.

8. During, or in the lead up to a storm out at sea, councils are required to seek technical advice from the Engineering Services Functional Area Coordinator, under the provisions of the NSW State Displan, before constructing or allowing the construction of any unapproved physical mitigation works to protect coastal property or other structures.

9. The Department of Natural Resources (DNR) is responsible for providing the SES and councils with details of the risk of erosion along the New South Wales coastline.

Public Education

10. The State Emergency Service, in conjunction with the Eurobodalla Shire Council, will conduct educational activities to ensure that people in locations potentially threatened by coastal erosion and associated flooding can understand the threat and its management. These activities will include:

    a. Public meetings of residents.

    b. Publicity being sought in local newspapers and over local radio stations.

    c. Provision of printed material to residents.

Response Operations

11. Response operations will be initiated when the BoM issues a Severe Weather Warning for dangerous waves or storm tide (forecast on-shore waves of 5 metres or more, or storm surge of 0.5 metres or more) for the NSW South Coast, and when in the judgement of the SES Local Controller, severe storm activity occurs off the coast in the form of a large and intense low pressure system.

12. SES will:

    a. Advise local council and other emergency agencies of the likelihood of coastal erosion in the council area.

    b. Coordinate and conduct regular reconnaissance of areas known to be at risk of coastal erosion / inundation.

    c. Coordinate the provision of warnings, information and advice to occupiers of properties at threat regarding the likely problems and the actions they should take. Local radio stations will be used along with telephone calls to caravan parks and other properties with a known coastal erosion / inundation problem. Properties most at risk may be doorknocked.

d. Coordinate actions to protect household and commercial contents (if time and resources permit) by:

- Transporting them to community halls and mini-storages.

- Lifting household and commercial contents in situ, using casual volunteers. These actions will apply where building collapse is not likely but flooding is possible.

e. Coordinate actions to evacuate or rescue people from buildings threatened by collapse or over-floor inundation. Such people would be taken to the nearest accessible evacuation centre.

13. Senior police officers as defined under Section 60K of the State Emergency and Rescue Management Act may, if satisfied that there are reasonable grounds for doing so for the purpose of protecting persons from injury or death or protecting property, direct or authorise another police officer to direct the doing of certain things including shoring up a wall or premises [Section 61(1) of the State Emergency and Rescue Management Act]. Senior Police Officers should, however, obtain technical advice about what is reasonable in the circumstances from the Engineering Services Functional Area Coordinator.

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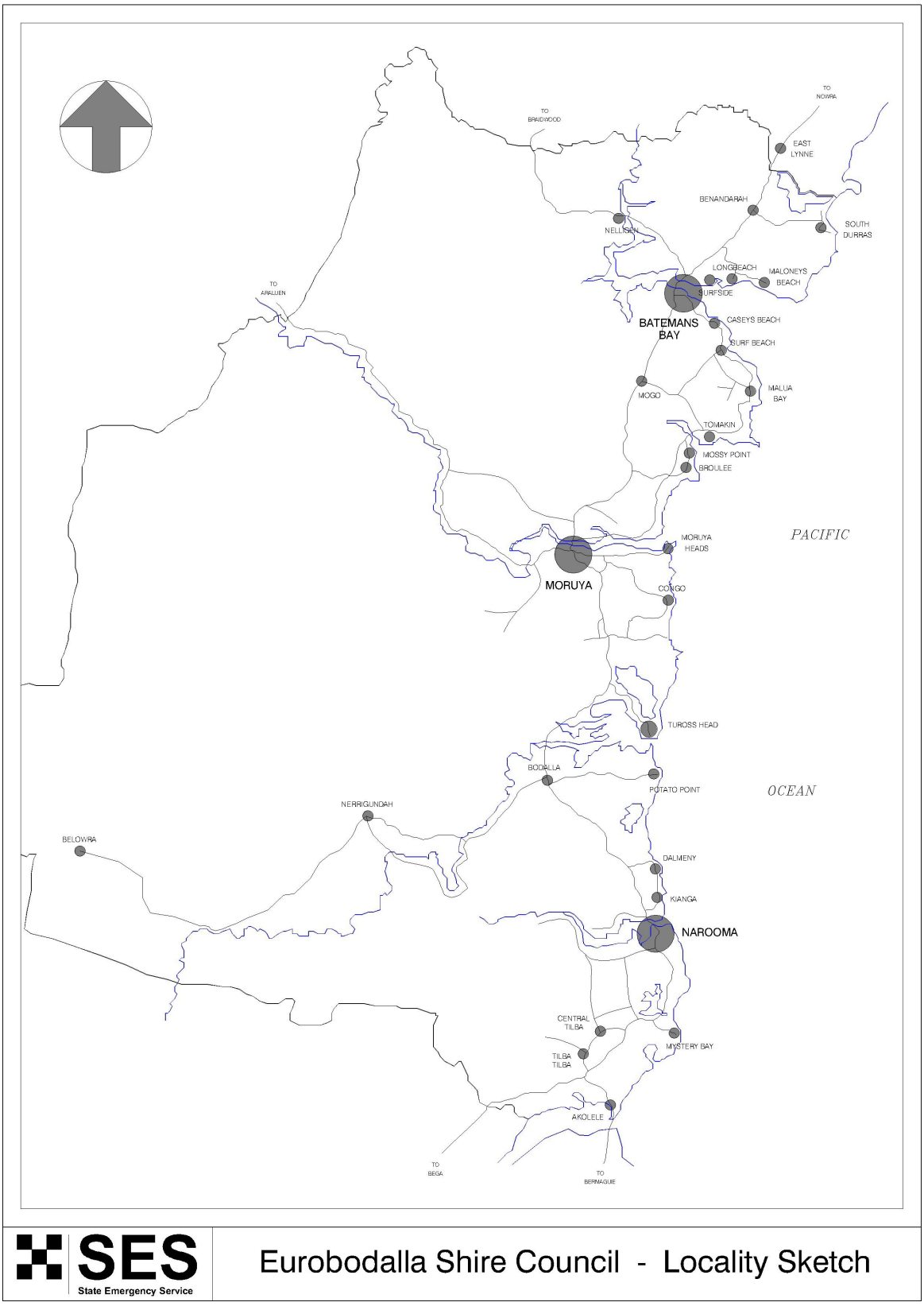
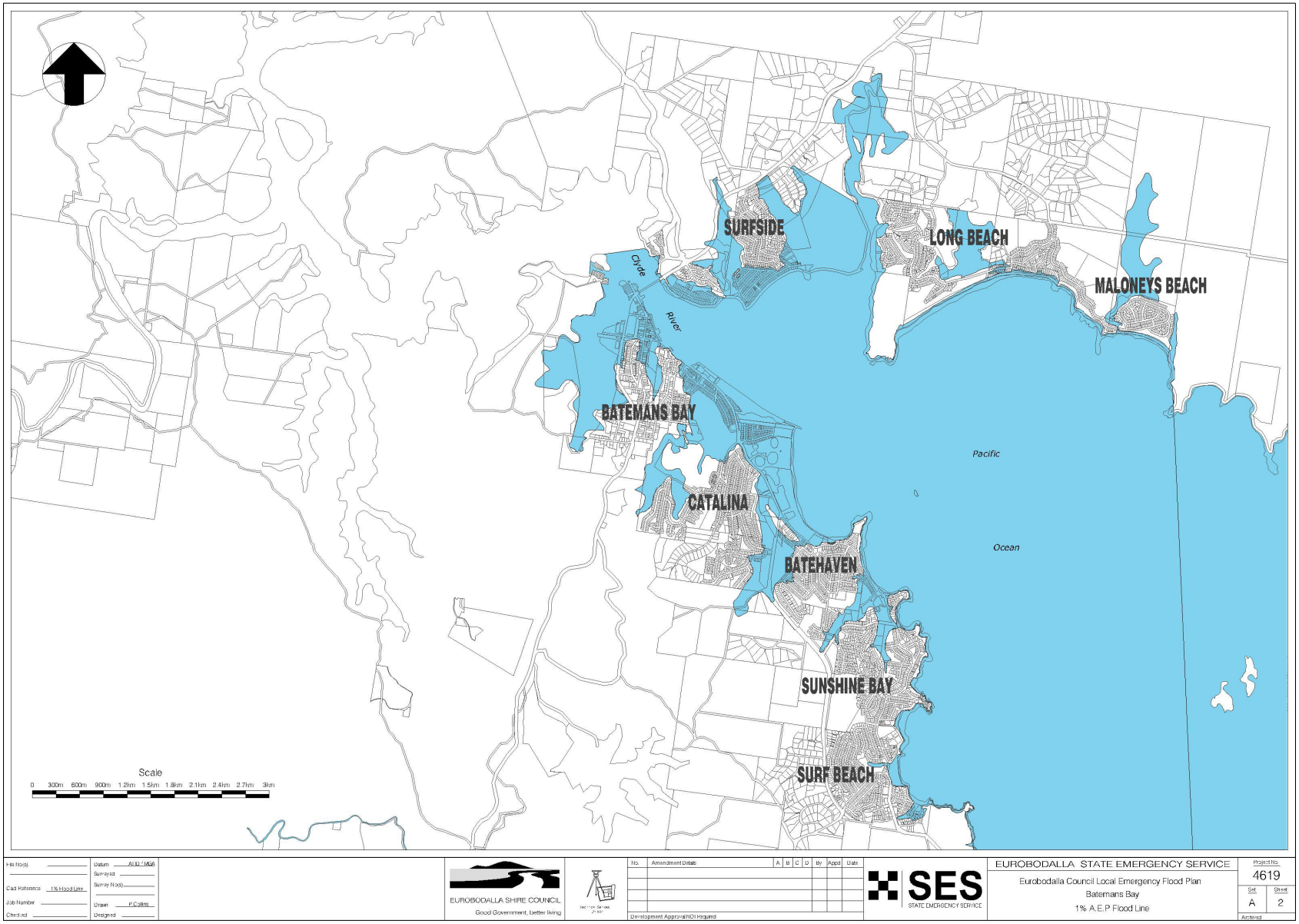
EUROBODALLA LOCALITY MAP



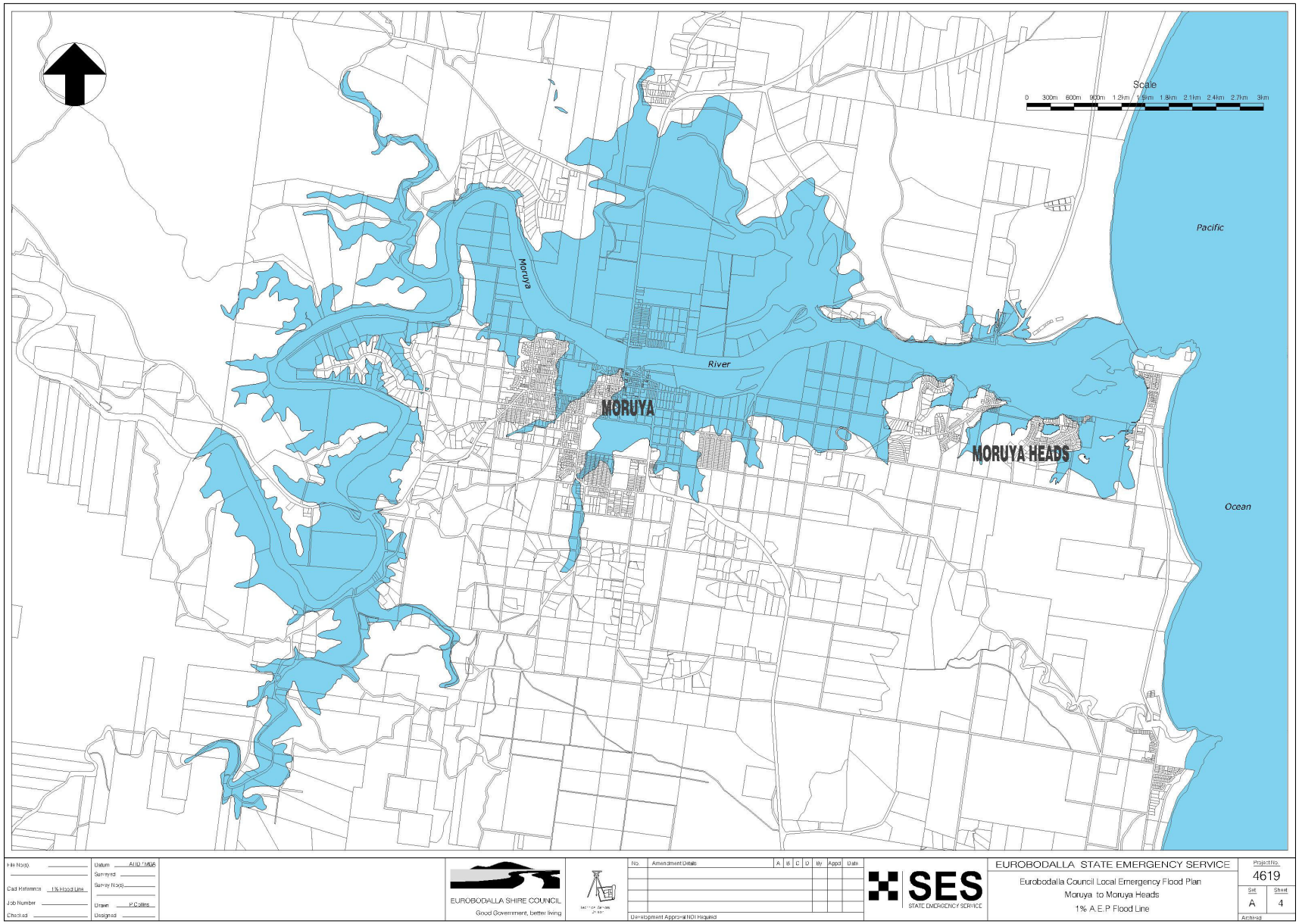
MAP 1 FLOOD LINE - NELLIGEN

MAP 2 FLOOD LINE – BATEMANS BAY



MAP 3 FLOOD LINE - MALUA BAY to BROULEE

MAP 4 FLOOD LINE– MORUYA to MORUYA HEADS



MAP 5 FLOOD LINE– TUROSS HEAD to POTATO POINT

File No(s)
Datum AUSTM55
Cad Reference 1% Flood Line
Surveyed
Survey No(s)
Job Number
Drawn P Collins
Checked
Designed

EUROBODALLA SHIRE COUNCIL
Good Government, better living

No.	Amendment Details	A	B	C	D	By	Appd	Date
	Development Approval/NOI Required							

SES STATE EMERGENCY SERVICE

EUROBODALLA STATE EMERGENCY SERVICE
Eurobodalla Council Local Emergency Flood Plan
Tuross Head to Potato Point
1% A.E.P Flood Line

Project No. 4619
Set A
Sheet 5
Archived

MAP 6 FLOOD LINE– DALMENY to NAROOMA