NSW STATE EMERGENCY SERVICE

Mid Coast Council

(Great Lakes)

Local Flood Emergency Sub Plan

FloodSafe

MIDCOAST COUNCIL FLOOD EMERGENCY SUB PLAN

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

Volume 1 of the MidCoast Council Flood Emergency Sub Plan

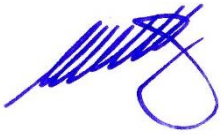
Endorsed by the MidCoast Council Local Emergency Management Committee

20 November 2023

AUTHORISATION

The MidCoast Council Flood Emergency Sub Plan is a sub plan of the MidCoast Council 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 Deputy Zone Commander

Print Name: Stephen Leahy OAM

Date: 27th November 2023

Endorsed

Signature: 

Chair, Local Emergency Management Committee

Print Name: Peter Hatton

Date: 20 November 2023

PREVIOUSLY ENDORSED VERSION PRIOR TO LGA AMALGAMATION

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

Description	Date
Gloucester Shire Flood Emergency Sub Plan	April 2015
Gloucester Shire Local Flood Plan	October 2009
Great Lakes Local Flood Plan	December 2011
Greater Taree City Flood Emergency Sub Plan	Mar 2013
Greater Taree City Local Flood Plan	December 2012
Greater Taree City Local Flood Plan	August 2007

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

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PO Box 6126, Wollongong NSW 2500
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Amendments in the list below have been entered in this plan.

Amendment Number	Description	Updated by	Date

DISTRIBUTION LIST

Available for general use and distribution on the NSW State Emergency Service website www.ses.nsw.gov.au

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1 OUTLINE AND SCOPE

1.1 PURPOSE

1.1.1 The purpose of this plan is to set out the multi-agency arrangements for the emergency management of flooding in the MidCoast Council 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 MidCoast Council Local Emergency Management Plan (EMPLAN) and is endorsed by the MidCoast Council 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 MidCoast Council 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 MidCoast Council LGA. The MidCoast Council 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 Northern Zone and for emergency management purposes, is part of the North Coast Emergency Management Region.

1.4.3 The plan sets out the MidCoast Council level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the MidCoast Council LGA. Hazard and Risk information can be found in Volume 2 of this document, and NSW SES Response Arrangements can be found in Volume 3.

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 MidCoast Council 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 at: https://www.ses.nsw.gov.au/about-us/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 MidCoast Council LGA. This is outlined in three Volume 2s – Hazard and Risk (prior to amalgamation): Greater Taree; Gloucester; Great Lakes.

2.1.2 Declared dams in or upstream of the MidCoast Council Local Government Area.

Dam Name	Owner	Above safety threshold
Duralie Coal Auxiliary Dam 1	Duralie Coal Pty Ltd	No
Duralie Coal Auxiliary Dam No 2	Duralie Coal Pty Ltd	No
Duralie Coal Mine Water Dam	Duralie Coal Pty Ltd	No
Bootawa Dam	MidCoast Council	No

3 PREVENTION/ MITIGATION

3.1 INTRODUCTION

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

3.2 LAND USE PLANNING

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

Actions:

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

b. NSW SES will provide responses to land use planning proposal referrals that have or will create significant flood risk to life and/or property due to flooding.

3.3 FLOODPLAIN RISK MANAGEMENT

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

Actions:

a. NSW SES will provide coordinated and consistent emergency management advice to councils and other agencies in relation to the management of land that is subject to flooding or coastal inundation.

b. NSW SES will provide advice, support, technical resources and training for NSW SES representatives to contribute effectively on local Floodplain Management Committees.

4 PREPARATION

4.1 INTRODUCTION

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

4.2 FLOOD EMERGENCY PLANNING

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

Actions:

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

b. Review plans as per Section 1.8.

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

4.3 FLOOD INTELLIGENCE SYSTEMS

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

Actions:

a. Gather and assess flood information for the full range of flood types and severities.

b. Collect, collate, and assess information on the characteristics of communities at risk and the potential effects of flooding on communities at risk.

c. Share flood intelligence information with supporting agencies.

4.4 DEVELOPMENT OF WARNING SYSTEMS

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

Actions:

a. All levels of government work in partnership to develop and maintain flood warning infrastructure.

b. NSW SES maintains a list of the requirements for flood warnings for flood gauges in NSW (including flood classifications, warning times required and key statistics) and can be found in the supplementary document to the NSW State Flood Plan (see Section 1.9). Gauges of relevance within the MidCoast Council LGA are also listed in the three Volume 3s of this plan (prior to amalgamation: Gloucester; Greater Taree; Great Lakes).

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

b. NSW SES will collate, assess and disseminate flood information to the community.

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

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

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

5 RESPONSE

5.1 INTRODUCTION

5.1.1 Flood response operations will begin:

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

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

c. On receipt warnings for flash flood; or

d. On receipt of a dam failure alert; or

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

5.2 INCIDENT MANAGEMENT ARRANGEMENTS

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

Actions:

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

b. All supporting emergency services and functional areas and Council will accurately record and report information relevant to their activities and any real time flood information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established.

c. 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; and
- 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:

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

h. The Public Information and Inquiry Centre will be established by 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. MidCoast 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 MidCoast 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 Arrangements for the protection of local assets are outlined in Volume 3 of this NSW SES local Flood Emergency Sub Plan. In addition, Local and Region EMPLAN's contain infrastructure inventories.

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

Actions:

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

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

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

d. The Engineering Services Functional Area is to:

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

e. The 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 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 the Welfare Services Functional Area as soon as possible. NSW SES will brief the Welfare Services Functional Area at the earliest opportunity regarding the level of assistance required.

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

c. Schools Administration (Government and Private) will manage the safety of students directly affected by flooding and will work with 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 the Health Services Functional Area.

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

Actions:

a. The 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. The 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; and

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 the 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 the Welfare Services Functional Area for assistance.

5.12 RETURN

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

Actions:

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

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

- Not suitable for access; or
- Limited access by emergency services and response agencies; or

- Limited access by residents and/or business operators; or
- Full access.

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

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

5.13 END OF RESPONSE OPERATIONS

5.13.1 **Strategy**: Conclude response operations.

Actions:

a. Response operations will conclude when:

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

5.14 POST IMPACT ACTIONS

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

Actions:

a. NSW SES will continue to engage with communities after significant floods through convening one or more community forums, workshops or other opportunities to provide communities a chance to provide feedback, address any concerns and provide input into the recovery process. These will typically include other agencies such as the Bureau, Welfare Services and MidCoast Council representatives.

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

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

- The emergency action plan in place at conclusion of the response emphasising any continuing activities including community meetings/ engagement activities.
- Resources allocated to the emergency response and associated exit strategies.
- Details of any areas or situations with potential to re-escalate the emergency.
- A recommendation for the conclusion of 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 MidCoast Council Council(s) on post flood data collection analysis including review of flood intelligence where necessary.

6 RECOVERY OPERATIONS

6.1 INTRODUCTION

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

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

6.2 NSW SES RECOVERY ROLE

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

6.2.2 **Actions**:

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

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

c. NSW SES will provide information to NSW Reconstruction Authority to support applications to Treasury for Natural Disaster Relief and Recovery Arrangements.

d. NSW SES, in conjunction with a Recovery Committee, will provide a service to support the information needs of a community immediately following a flood.

e. NSW SES and where required supporting agencies will assist with clean-up operations after floods, where possible when resources and personnel permit.

f. NSW SES may coordinate immediate relief in collaboration with NSW Reconstruction Authority

7 ABBREVIATIONS

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

8 GLOSSARY

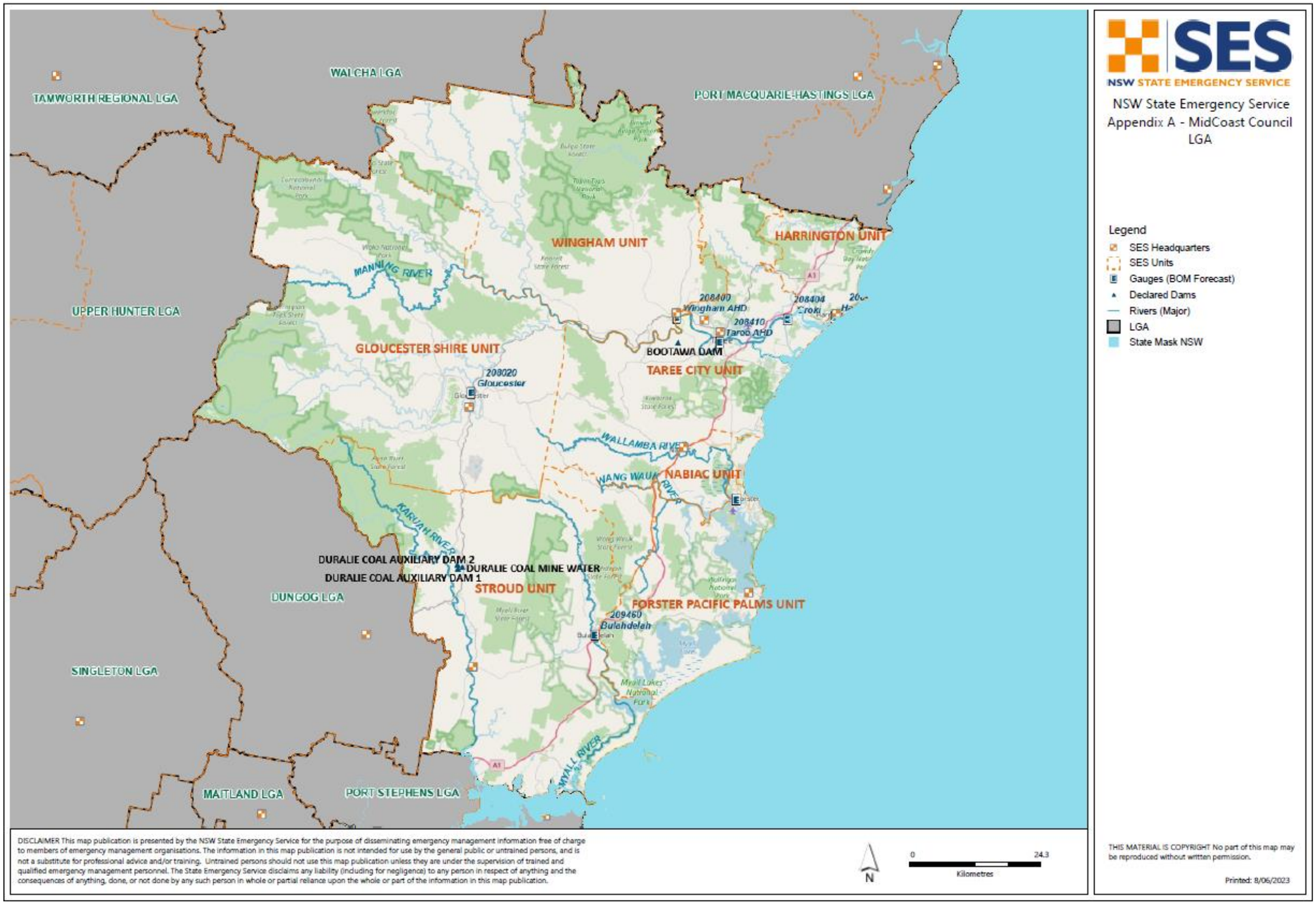
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 MidCoast Council 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 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 are outlined in the NSW State Flood Plan.
MidCoast 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 MidCoast Council Bootawa Dam and provide copies to NSW SES. • Provide information on the consequences of dam failure to NSW SES for incorporation into planning and flood intelligence. • If required by council, coordinate the development of warning services for catchments prone to flash flooding (small catchments), where appropriate. • Maintain council-owned flood warning networks and flood mitigation works. • Participate in NSW SES-led flood emergency planning meetings, to assist in the preparation of Flood Sub Plans. • Maintain a plant and equipment resource list for the council area. • Contribute to community engagement activities. **Response** • Subject to the availability of council resources, assist NSW SES with flood operations including:

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

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

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

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

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

11 Appendix C – Community Specific Roles and Responsibilities

Community Members	**Preparedness** • Understand the potential risk and impact of flooding. • Prepare homes and property to reduce the impact of flooding. • Understand warnings and other triggers for action and the safest actions to take in a flood.

	• Households, institutions and businesses develop plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours. • Have an emergency kit. • Be involved in local emergency planning processes. **Recovery** • Assist with community clean-up if required and able to do so. • Participate in After Action Reviews if required.

NSW STATE EMERGENCY SERVICE

HAZARD AND RISK IN GREAT LAKES

Volume 2 of the Mid Coast Local Flood Plan

Last Update: March 2017

FloodSafe

AUTHORISATION

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

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Mid North Coast Region Controller

Date: 2.3.17

Tabled at LEMC 14 March 2017

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VERSION LIST

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

Description	Date
Great Lakes Local Flood Plan as amended	December 2011

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

Mid North Coast Region Controller

NSW State Emergency Service

14 Arkwright Crescent, TAREE NSW 2430

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

Amendment Number	Description	Updated by	Date

Document Issue: Version 3-02052016

1 THE FLOOD AND COASTAL EROSION THREAT

1.1 OVERVIEW

Karuah River Basin Valley

a. The Great Lakes area has a complex flood problem, with flooding occurring on numerous creeks and rivers as well as on the coastal lakes. At times, flooding is worsened by heavy seas and tidal conditions and on rare occasions by the impacts of elevated ocean levels. Flash flooding occurs on the minor creeks, especially in the higher terrain, but longer warning times characterise flooding on the lower reaches of the principal rivers and on the various lakes. Severe flooding within the area has, however, been infrequent, with only low-level flooding being recorded in recent decades in most areas (1).

b. The major streams of the area are the Karuah, Myall, Wallamba, Wang Wauk, Coolongolook and Wallingat Rivers. Of these the Karuah, with a catchment of 1040 square kilometres, drains the largest area (1).

1.2 LANDFORMS AND RIVER SYSTEMS

Karuah River

a. The Karuah River, which drains the area's western portion, rises in the rugged upland country of the Chichester and Avon River State Forests. It flows in a north-west to south-east direction between the Dixies Top Ridge and Black Bulga Range to the west and the Lawlers Range and Linger and Die Ridge to the east. The main tributaries are Lawlers, Scotters, Andersons, Farleys, Mill, Lamans, Sawpit, Washpool and Deep Creeks and Mammy Johnsons and The Branch Rivers. In the lower reaches, the valley is wide and swampy and the river discharges into Port Stephens just to the south (1).

Wallis Lake

b. Wallis Lake is a broad, shallow, tidal lake commanding a catchment area of 1200 square kilometres and itself covering 80 square kilometres. Flows enter the lake from Wallamba River, Wang Wauk River, Coolongolook River and Wallingat River. It features considerable deltaic development from the streams which enter it on its northern and north-western edges. The lake has a narrow outlet to the sea via a permanent entrance channel between Forster and Tuncurry (1).

Myall River

c. The Myall River, which has a catchment area of 780 square kilometres, rises at elevations of about 460 metres in the Kyle, Meyers and Koolonock Ranges and the Craven, Myall River and parts of Myall Lakes National Park. In its upper reaches the

river is deeply incised within steep gorges and much of the catchment is timbered. The main tributary, the Crawford River, enters near Bulahdelah, but Bourkes and Black Camp Creeks are also significant tributaries. Frys Creek's confluence with the Myall River is approximately three kilometeres upstream of the Pacific Highway Bridge at Bulahdelah, and has a catchment area of approximately 18 square kilometres. From about Bulahdelah the floodplain is broad and marshy to the point at which it discharges to The Broadwater. The river flows in a meandering course from The Broadwater through flat, low-lying land to Port Stephens at Hawks Nest-Tea Gardens (1).

Myall Lakes and Smiths Lake

d. The Myall Lakes system is made up of Myall and Boolambayte Lakes and The (Bombah) Broadwater, which are linked by narrow necks of water. The only outlet is the Myall River to Port Stephens. The tidal limit is Tamboy, where the river leaves The Broadwater (1).

e. Minor creeks drain to Smiths Lake, the Myall Lakes system and to the Port Stephens estuary between the Karuah and Myall Rivers. Most of these drain flat or undulating and largely forested land. Boolambayte Creek flows to Boolambayte Lake, and Split Yard Creek to The Broadwater. Yallimbah, Bulga, Bundabah and Kore Kore Creeks drain the low hills to the north of Port Stephens (1).

f. Smiths Lake is approximately 25 kilometres south of Forster. The catchment is small, 34 square kilometres including the lake, and is relatively undeveloped land in Myall Lakes National Park and State Forest. The catchment is drained by several small creeks including Wamwarra Creek, Bramble's Creek and Tarbuck Creek. The ocean entrance is a wide sandy beach (Sandbar Beach). The entrance is normally closed, but may be opened by Council when the lake level reaches around 2.1 metres AHD, or every 1.25 years (2) (1).

Port Stephens

g. Port Stephens is a large tidal estuary with a total catchment of 2900 square kilometres. The northern side is part of the Great Lakes area and the southern side part of the Port Stephens Council Area. It has a surface area of 140 square kilometres and is fed by the Karuah River (1500 square kilometres), the Myall River (780 square kilometres) and other smaller creeks including the Yallimbah, Bulga, Bundabah and Kore Kore creeks which drain the low hills to the north of Port Stephens (1).

Wallamba River

h. The Wallamba River drains an area of around 500 square kilometres extending west to the Great Dividing Range. Most of the catchment in the north is steep and forested, but the river's gradient is low and the floodplain is wide and low-lying as it moves toward the coast. Nabiac, Failford and Minimbah are located in the Wallamba

River catchment. The river is tidal to a causeway just upstream of Nabiac. Below Failford, where the river turns south before discharging to Wallis Lake, flow is through swampy country and the channel includes a number of midstream islands (1).

i. Town Creek flows through the Nabiac township, where there are a number of crossings including a road bridge, a foot bridge, and a pipe culvert crossing near the industrial area. The creek then enters private rural land, where it eventually joins with the Wallamba River (1).

j. Woosters Creek originates north of the Pacific Highway with a larger catchment area than Town Creek and crosses Clarkson Street at the opposite end from Town Creek. Woosters Creek flows through crown reserve bushland, roughly parallel with Hoskins Street and Donaldson Street. In the lower lying areas, the waterway becomes swampy and marshy. Woosters Creek joins the Wallamba River near the end of Wharf Street. Pipeclay Creek flows through the eastern portion, originating upstream of the Pacific Highway. Pipeclay Creek has the largest catchment area of all three creeks. It meanders through private rural lands, before joining with the Wallamba River in the south. A number of smaller unnamed tributaries exist within the study area, which connect up with the three major tributaries of Town Creek, Woosters Creek and Pipeclay Creek. These tributaries were also included in the analysis (3) (1).

1.3 STORAGE DAMS

a. Dam locations are shown on the Karuah River Basin map.

Duralie Coal Mine Water (1)

Table 1: Prescribed Dams in Great Lakes area; summary of information about each storage.

Duralie Coal Dams (three)	
Owner / Operator	Duralie Coal Pty Ltd
Description of Dam	The Main Water Dam was constructed in 2003. The dam is earthfill, 18m in height, and has a capacity of 1100 ML. The spillway has a design flood capacity of 47.8 cubic metres per second, a full supply level of RL 73.0 m and crest level at RL 74.6 m AHD (1). Duralie Coal Auxiliary Dam No. 1 was constructed in 2009. The dam is earthfill, 20 m in height, and has a capacity of 500 ML. It has a design flood capacity of 20.7 cubic metres per second, a full supply level of RL 99.5 m AHD and crest level of RL 100.5 m AHD (1). Duralie Coal Auxiliary Dam No. 2. The dam is earthfill, 30m in height, and has a capacity of 2700 ML. It has a design flood capacity of 16.0 cubic metres per second, a full supply level of RL 98.5 m AHD and crest level of RL 100.0 m AHD (1). The purpose is to provide water supply storage and storm runoff management for ongoing mining operations.
Location	They are located upstream (north) of Stroud Road between Karuah River and Mammy Johnsons River, on an unnamed tributary within the lower catchment of Coal Shaft Creek, which flows into Mammy Johnsons River.
Communities Downstream	Stroud Road
Monitoring System	Duralie Mine maintains several automatic water monitoring stations.
Warning System	White, Amber and Red alerts are issued for this dam in accordance with the Dam Safety Emergency Plan
Other	No further details are currently available

1.4 WEATHER SYSTEMS AND FLOODING

a. Flooding in the Great Lakes area can occur at any time of year, but more floods have been recorded in the January-June months than between July and December. Rain along the coastal fringe is distributed more regularly across the seasons than is the case in the upland areas where the summer-autumn concentration is slightly more clear. The highest annual rainfalls occur over the higher (western) areas, demonstrating the orographic triggering effect of the upland country (1).

b. Two flood-producing weather mechanisms are responsible for most of the serious flooding which can occur within the area. These are:

i. East coast low-pressure systems: When these depressions are deep and stationary, a cool, moist, south-easterly airstream produces heavy rain over the coast and orographic enhancement causes even heavier rain over the hilly country. This mechanism is especially prevalent in the autumn and winter months. A recent example was in March, 1995, when some low-level flooding occurred in the area. East coast low-pressure systems frequently migrate in a northerly direction parallel to the coast (1).

ii. Ex-tropical cyclonic systems originating in the Coral Sea during the summer and early autumn months and moving southwards. Occasionally, such systems move far enough south to bring heavy rain to the Great Lakes area as occurred in February, 1990 with ex-tropical cyclone Nancy (1).

c. During summer, high-intensity but short-duration convective thunderstorms cause intense rain for very short periods over limited areas. `Flash' flooding can result on minor creeks or from the surcharging of artificial drainage systems in built-up areas. Such storms do not last long enough or cover sufficiently large areas to cause significant rises on the major rivers or on the coastal lakes, however (1).

d. Systems of both types can cause heavy seas or elevated ocean levels and heavy rain over the area at the same time. Riverine flooding often occurs, therefore, when the passage of water to the ocean is retarded and this exacerbates flooding on those lakes which have outlets to the sea. Neither of these types of weather system occurs frequently, however, and years can pass without severe floods occurring within the area (1).

1.5 CHARACTERISTICS OF FLOODING

a. The Great Lakes has a variety of flooding characteristics. Broadly they can be divided into upper catchment characteristics and lower catchment and lakes characteristics.

b. The upper parts of the catchments are dominated by flash flooding of creeks and streams and short duration flooding of the larger rivers. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours and no longer than 24 hours (1).

c. In the lower parts of the catchments and the lakes, oceanic processes are also important. High tide and storm surge can prevent flood waters escaping and lengthen the period of flooding. High ocean levels can also inundate coastal areas. At Tea Gardens-Hawks Nest, high water levels on Port Stephens caused by coastal processes are the dominant flooding source except in extreme events where the Myall River can increase the flood level by up to 0.5 metres. At Forster-Tuncurry flooding on the Wallis lakes caused by river runoff is dominant (1).

d. Some allowance needs to be made for the effect of wind on top of the rainfall generated water levels. No calculation of wind setup on Wallis Lake has been made, though it is likely to be small compared to the effects of wave run-up (1).

e. Waves can also run up onto land. This is more likely where shorelines are gently sloping, and where trees and other obstructions are absent (1).

f. The Wang Wauk, Coolongolook and Wallingat Rivers drain a large, mostly forested area to the west of Wallis Lake and east of the Kyle and Meyers Ranges. All are tidal in their lower reaches, which are flat and swampy and which constitute large flood storage areas experiencing frequent inundation (1).

g. Behind the coastal dunes of the area is a series of lakes, most of them subject to tidal influence. Floods on these lakes are usually slow to rise, but variations in water level of 1.0-1.5 metres can occur over a period of a few days when heavy rain occurs (1).

h. Flood behaviour on Wallis Lake (Forster/Tuncurry) is complex, being governed by both discharges into it from the rivers and by the prevailing ocean levels. The latter can by themselves cause lake levels to rise by a combination of tidal effects, storm surge and wave set-up. Wave set up is estimated to be between 2.4 metres (for 5% AEP ocean conditions) to 4.8 metres (for extreme ocean conditions) in the areas around the Sailing Club, Elim and Tiona with lesser heights (0.5-1 metre less) around Coomba, Elizabeth Beach, Tuncurry Point Road and Forster Keys (4) (1).

i. As Port Stephens is large and moderately deep (less than 10 metres), significant local wind waves can be generated to inundate the foreshore area (5) (1).

j. Smiths Lake is a much smaller lake which is landlocked by sandbar development. Rises in the lake from local creek discharges usually cause the sandbar to be breached, or is breached mechanically by council allowing flood waters to escape to the ocean (1).

k. The bulk of the inundated areas along the Karuah River (either floodway or flood storage) are classed as “high hazard”. Areas of “low” and “medium hazard” are quite small in the total inundated area (6) (1).

1.6 FLOOD HISTORY

a. The most serious floods on the **Karuah River** occurred in 1913, 1927, 1946, 1956, 1963, 1971, 1978, 1985 1990, 2001 and 2007 with peak levels at Booral between 11.78 metres AHD and 8.92 metres AHD. Detailed information on these events is lacking, however, as is the case for floods on other river systems in the area (6) (1).

b. Prior to the installation of gauges, flooding at **Forster Tuncurry** (Wallis Lake) has previously occurred in 1927, 1929, 1943, 1949, 1955, 1956, 1957, 1963, 1974, 1976, 1977 and 1983 (7). The flood of record was in 1927 and an approximate peak of 2.25 metres AHD recorded at Point Road Tuncurry. This was attributed to some form of

blockage such as a sand bar at the entrance as well as wave set up and storm surge. The highest level since automatic recorders were installed was 1.17 metres at Bells Island, and for tidal conditions 1.0 metre at Forster and 1.34 metres at Port Stephens (7) (1).

c. Flooding at **Bulahdelah** (Myall River) has come within 0.1-0.5 metres of the 1% AEP flood on 3 noted occasions in 1897, 1927 and 1947. The most severe flood recorded on the Myall River at Bulahdelah was in 1897 when more than a third of the present town area was inundated. This flood is taken as approximately the 1% AEP flood event at Bulahdelah (a level of 5.5 metres). Another serious flood occurred in 1927 (1). Minor flooding occurred on ANZAC Day in 2008, June 2007, March 2013 and April 2015, from low pressure systems off the NSW coast. The ANZAC day event saw 155 millimetres fall in one day, with a total of 218 millimetres falling over five days at Nabiac and 206 millimetres at Bulahdelah, and 189 millimetres at Tuncurry over five days. This was mainly nuisance flooding, closing roads and bridges and inundating yards. At least one business in Bulahdelah did experience over floor flooding where the flood peaked at 3.83 metres (4pm 8 June), 11.01 metres at Nabiac (1pm 8 June), 0.89 metres at Tuncurry and 0.62 metres at Tiona (2am-3am on 9 June) (1). In 2013, approximately five dwellings were flooded Alexandra Street and Jackson Street when the Myall River reach 3.71-3.75 metres at Bulahdelah (8).

d. Flooding at **Nabiac** (Wallamba River) has not occurred for a number of years. Significant local floods in records at Nabiac occurred in 1927, 1929, 1947, 1957, 1978 and 1983. The flood of 1927 on the reach from Nabiac to Failford reached levels higher than would be expected in the 1% AEP event; that is, there is a less than 1% chance each year of a flood of a severity of that of 1927 occurring there. Floods also occurred in February 2002 (with a rainfall ARI of approximately 100 years 21.6 millimetres an hour over 9 hours) (3) and in June 2007. These floods were localised floods with above floor flooding experienced due to tributaries to the Wallamba River, such as Town Creek, rather than from flooding from the Wallamba River. The influence of the Wallamba River was not significant as the flood levels in the river were lower than those in town and the peak of river flooding happened well after the peak flood levels in the township (8) (1).

e. **Mill and Lamans Creeks** have experienced several significant floods in the past century, although no regular flood records exist. Some recorded flood levels exist for Mill and/or Lamans Creek from February 1956, October 1985, June 2007, and April 2015 (7) (1). **Stroud** experienced one of its worst flash flood events on record on the 21 April 2015. With the estimated 1% AEP being around 0.9 metres at the showground, this event was rarer with a depth of 1.8 metres and potentially rare than 0.2% AEP (9). In this event, a minor flood warning was provided by the Bureau for the adjacent Myall River catchment at Bulahdelah, with 138 millimetres of rain falling in two hours at Crawford River, and anecdotal reports of 180 millimetres in six

hours around Stroud. During this event, the showground was inundated with over a metre of fast flowing floodwater resulting in a number of flood rescues and causing extensive damage to the showground's infrastructure, including the grandstand. Floodwater rose 0.3 metres in a few seconds outside one caravan on the showground. At least 13 residential properties opposite the Showground in Cowper Street (Bucketts Way) and Britton Court Road were also impacted by over floor flooding and an 1860's homestead opposite the showground where a family took refuge on the verandah roof (9), with one home requiring demolition. During the event the aged care facility known as Stroud Community Lodge (with 31 residential care units and three self care units) became isolated, and evacuated residents to higher ground as Mill Creek and neighbouring Mill Brook rose quickly. Floodwaters extend to the external grounds of the facility but did not enter the building. In the 2015 event both the Lamans Creek Bridge at Berkley Street (Bucketts Way) and Mill Creek Bridge at Cowper Street (Bucketts Way) were inundated, isolating the centre of Stroud (9).

f. Little data is available on flooding on Wang Wauk, Coolongolook and Wallingat Rivers, but the flood of record was in 1927. Recent, lower-level flooding occurred in 1978 and 1983 (1).

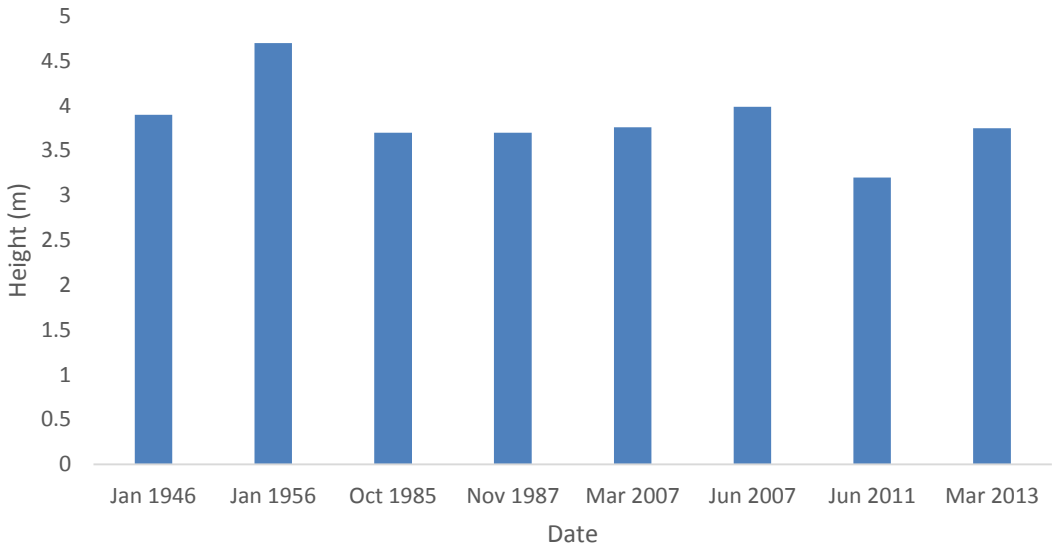


Figure 1: Flood History of floods above minor level (3.0m) at Bulahdelah (AWRC#209460) (1)

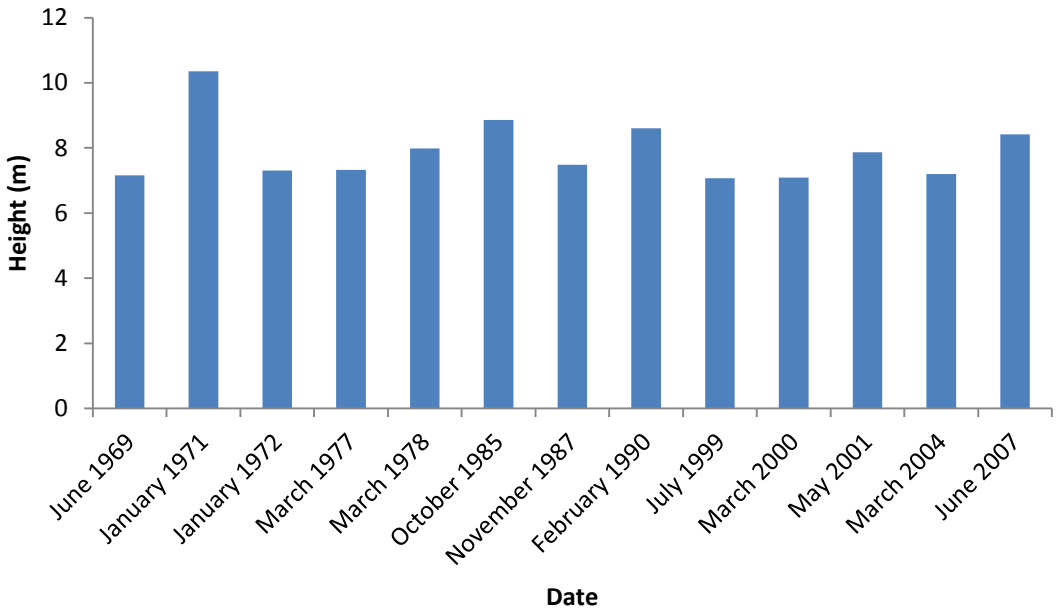


Figure 2: Flood History of floods above 7.0m at Booral (Karuah River) AWRC#209003

1.7 FLOOD MITIGATION SYSTEMS

a. No flood mitigation systems have been identified.

1.8 EXTREME FLOODING

a. While the Great Lakes area has experienced some flooding in recent years, it is a long time since genuinely severe flooding occurred. The worst floods recorded in living memory should not be regarded as the most severe which can occur. Worse floods than have been seen by present residents are possible (1).

b. Such floods will be rare, but they may reach considerably greater heights than have previously been experienced. In addition, they are likely to be both faster to rise and more dangerous in terms of depth and velocity than previous events (1).

c. Floods in Wallis Lake may occur from 168 millimetres in 24 hours (for a 20% AEP flood around 1.5 metres), with 277 millimetres in 24 hours equivalent to a 1% AEP flood (2.17 metres) (1).

d. The design flood levels for locations in the catchment are summarised in Table 3 (1).

Table 2: Estimated design heights at various Gauges (10), (11), (8), (12), (6) (1) (14)

Location	Minor	Moderate	Major	5% AEP	1% AEP	Extreme
Tea Gardens (209480)*	-	-	-	1.34-1.43 m AHD	1.40-1.53 m AHD	2.24 m AHD
Hawks Nest*	-	-	-	1.5 m AHD	1.7 m AHD	2.0 m AHD
Mallabula Gauge*	-	-	-	1.70 m AHD	1.80 m AHD	1.83 m AHD
Bombah Point (209475)	-	-	-	1.95 m	2.38 m	4.85 m
Tuncurry (209401)	0.9 m	1.5 m	1.9 m	1.4 m	2.0 m	4.4 m
Wallis Lake Coast‡	-	-	-	2.2 m	2.6 m	2.6 m
Wallis Lake‡ (209906)	-	-	-	1.54 m	1.96 m	4.36 m
Nabiac Street Woosters Creek	2.8 m	4.2 m	5.6 m	-	5.6 m	-
Nabiac Town Creek	3.5 m	5.5 m	3.5 m	-	7.5 m	-
Wallamba River (209404)	6.5 m	9.5 m	12.5 m	-	-	-
Lee Street Myall River	-	-	-	5.2 m	6.1 m	7.9 m
Bulahdelah Bridge Gauge Myall River (209460)	3.0 m	-	-	4.8 m	5.5 m	6.8 m
Tarbuck Bay (Smiths Lake)	-	-	-	2.3 m (rainfall induced)	2.6 m (ocean induced)	3.5 m AHD (rainfall induced)
Booral Karuah River (209003)	-	-	-	10.45 m AHD	11.48 m AHD	18.08 m AHD
Stroud Road (209008)	-	-	-	39.78 m AHD	41.01 m AHD	45.25 m AHD
Stroud (Mill Creek confluence)	-	-	-	24.61 m AHD	25.67 m AHD	32.05 m AHD
Allworth	-	-	-	3.7 m AHD	4.59 m AHD	9.59 m AHD
Karuah	-	-	-	1.76 m AHD	1.91 m AHD	1.98 m AHD
Washpool RTA Bridge	-	-	-	37.29 m AHD	38.26 m AHD	42.46 m AHD

***From elevated ocean levels noting that readings on the Mallabula Gauge are given as m AHD +0.9m, so the 5% AEP level as read on the gauge would be 2.6m. ‡ plus 0.1 m for wind and wave activity on the lake.**

1.9 COASTAL EROSION

a. The following locations have property at risk of coastal erosion.

   i. Winda Woppa - Jimmys Beach is identified by OEH as one of 15 coastal erosion hot spots in NSW (13) (1), shown on Map 1 The risk is expanded upon in section 2.9.

   ii. Blueys and Boomerang Beaches are located 18 kilometres south of Forster extending from Sugarloaf Point in the south to Cape Hawke in the north. Up to 10 dwellings along the seaward side of Boomerang Drive south of Carramatta Close may be at risk of coastal erosion and shoreline recession. As many as 16 properties at Blueys Beach could potentially be inundated due to wave action, with the likely duration of less than 2 hours (14).

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

Table ?: Census of Housing and Population data (2011) (15)

Census Description	Great Lakes (A)	Bulahdelah	Coomba Park	Forster-Tuncurry	Green Point	Hawks Nest
Total Persons	**34,430**	**1,519**	**915**	**19,233**	**598**	**1,211**
Aged 0-4 yrs	1,620	68	46	829	43	63
Aged 5-14 yrs	3,673	184	101	1,878	66	93
Aged 65 + yrs	10,547	348	236	6,684	126	436
Of Indigenous Origin	1,325	30	25	751	15	49
Who do not speak English well	53	3	0	15	0	3
Have a need for assistance (profound/severe disability)	2,633	116	78	1,605	41	94
Living alone (Total)	4,345	166	106	2,786	50	184
Living alone (Aged 65+)	2,420	80	41	1,679	19	85
Residing in caravans, cabins or houseboats or improvised dwellings	581	24	6	415	6	21
Occupied Private Dwellings (Households)	**14,306**	**589**	**377**	**8,308**	**225**	**542**
No Motor Vehicle	1,010	34	14	781	4	44
Caravan, cabin, houseboat or improvised dwelling	367	13	0	264	0	10
Rented via State or Housing Authority	225	3	0	205	0	0
Rented via Housing Co-Op or Community Church Group	127	6	0	101	0	0
No Internet Connection	4,434	193	94	2,857	47	179
Unoccupied Private Dwellings	**5,674**	**65**	**235**	**2,300**	**58**	**965**
Average persons per occup dwelling	**2.2**	**2.3**	**2.1**	**2.0**	**1.3**	**1.6**
Average vehicles per occup dwelling	**1.5**	**1.7**	**1.7**	**1.4**	**1.7**	**1.5**

Census Description	Nabiac	North Arm Cove	Pacific Palms-Blueys Beach	Pindimar	Smiths Lake	Stroud	Tea Gardens
Total Persons	**1,513**	**713**	**665**	**230**	**1,534**	**1,022**	**2,345**
Aged 0-4 yrs	99	33	27	4	105	66	86
Aged 5-14 yrs	244	110	86	19	200	143	203
Aged 65 + yrs	273	208	139	73	289	222	982
Of Indigenous Origin	87	22	14	3	55	34	80
Who do not speak English well	0	3	0	0	6	0	0
Have a need for assistance (profound/severe disability)	87	41	39	16	81	93	156
Living alone (Total)	108	66	70	39	169	90	246
Living alone (Aged 65+)	56	27	23	16	65	52	153
Residing in caravans, cabins or houseboats or improvised dwellings	27	5	6	0	9	0	3
Occupied Private Dwellings (Households)	**544**	**277**	**250**	**104**	**597**	**376**	**1,016**
No Motor Vehicle	24	15	14	9	19	10	44
Caravan, cabin, houseboat or improvised dwelling	9	4	3	0	10	0	4
Rented via State or Housing Authority	3	0	0	0	0	0	3
Rented via Housing Co-Op or Community Church Group	0	3	0	0	0	0	8
No Internet Connection	129	62	54	35	130	108	239
Unoccupied Private Dwellings	**79**	**157**	**599**	**67**	**436**	**87**	**284**
Average persons per occup dwelling	**2.7**	**2.2**	**2.3**	**2.1**	**2.4**	**2.5**	**2.2**
Average vehicles per occup dwelling	**1.9**	**1.7**	**1.5**	**1.7**	**1.6**	**2.0**	**1.5**

SPECIFIC RISK AREAS - FLOOD

Karuah River Valley

a. Flooding can affect large parts of the Great Lakes area, disrupting farming, closing roads and, especially in severe events, inundating parts of villages and towns. Farmers in various parts of the area have lost pumps, other machinery and livestock, and machinery at the gravel quarries near Allworth has been damaged by flood waters. Evacuations have not been required from rural areas in recent times, and resupply has also not been necessary though both may be required in severe events. Some farm dwellings in lower-lying areas may be isolated for short periods when flood waters which have backed up from the lakes or Port Stephens are slow to drain (1).

b. In the upland and forested areas, there is little developed land in flood prone areas and the effects of flooding there are limited. Urban areas are generally little affected until severe flooding occurs. Several caravan parks within the area can be affected during flood periods with vans and tents needing to be moved from low to high ground. Warning time for these tasks is usually sufficient and the relocation usually occurs within individual caravan parks (1).

2.2 BULAHDELAH

2.2.1 Community Overview

a. The township of Bulahdelah is approximately 70 kilometres north of Newcastle where the Pacific Highway crosses the Myall River at its confluence with the Crawford River (1).

b. It has a population of 1519, with 348 persons aged over 65. There is an average of 2.3 persons and 1.7 vehicles per dwelling (15).

c. There are approximately 30 persons of indigenous origin. There are approximately three persons who do not speak English well (15).

2.2.2 Characteristics of flooding

a. Bulahdelah is susceptible to flooding from the Myall River and from the open drain running through town.

b. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

2.2.3 Flood Behaviour

a. The Myall River and the Crawford River have its confluence at Bulahdelah.

b. In an extreme flood some low points could be inundated by up to 5 metres of fast flowing water making these areas extremely dangerous (1).

2.2.4 Classification of Floodplain

a. Rising Road Access (1).

2.2.5 Inundation

a. Bulahdelah utilises the Bulahdelah gauge (209460) (1).

b. Even in relatively minor floods (3.5 metres) some low points in the town can experience flooding and buildings can be inundated. These low points would be flooded first and include (1):

   i. Park land adjacent to the bridge, which often hosts campers;

   ii. Stroud Street between Jackson and Meade Streets;

   iii. Jackson Street between Prince and Alexander Streets; and

   iv. Stuart Street between Prince and Alexander Streets.

c. Many of the streets in Bulahdelah are flooded as a consequence of the open drain and therefore, the heights on the gauge varies.

d. Streets in Bulahdelah that have properties in them that could be flooded above floor level include as measured at the Bulahdelah Bridge Gauge (1).

   i. By a flood level of 3.71 metres approximately six houses located on Jackson, Short and Alexandra Streets flooded above floor (18).

   ii. By a flood level of 4.8 metres: 21 properties in Blanch, Prince (south of Stuart Street), Alexandria (south of Richmond Street) and Jackson Streets as well as Crawford and Stroud Streets between Jackson and Meade Streets (1).

   iii. By a flood level of 5.2 metres: A total of 31 properties as above plus River Street (1).

   iv. By a flood level of 5.5 metres (1% AEP and 1897 flood): A total of 52 buildings (45 residences and 7 non-residential buildings) as above plus Crawford and Stroud Streets between Meade and Stuart Streets. Prince Street (south of Richmond Street) (16) (1).

   v. By the extreme flood at a level of 6.8 metres, a total of 109 houses and 11 non residential buildings as above plus Myall, Edgar, Prince and Alexandria Streets south of Lee Street (1).

Table 3: Estimated number of properties inundated above floor level and over ground in Bulahdelah related to the Bulahdelah gauge (16)

Bulahdelah Gauge Height (m)	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
4.8m (5% AEP)	n/a	21 residential	n/a
5.2m (2% AEP)	n/a	31 residential	n/a
5.5m (1% AEP)	n/a	45 residential 7 non-residential	n/a
6.8m	n/a	109 residential 11 non-residential	n/a

2.2.6 Isolation

a. The difficulties posed by water in these low points during an evacuation should be slight as alternative routes to the evacuation centre exist (1).

b. Two raised houses on Stroud Street can be surrounded by floods around 3.7 metres, and up to the verandah (19).

c. The following intersections flood in relatively small events (around 3.5 metres on the Bulahdelah gauge):

   i. Alexandra and Jackson Streets

   ii. Blanch and Stroud Streets

2.2.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified (1).

2.2.8 Dams

a. No consequences from dam failure have been identified (1).

2.2.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.2.10 Other Considerations

a. There are two peak seasons with potential for a 10% population increase associated with tourism:

   i. Christmas holidays December –January.

   ii. Easter long weekend (1).

2.3 FORSTER-TUNCURRY

2.3.1 Community Overview

a. Forster and Tuncurry (combined population 19,233), situated on either side of the entrance to Wallis Lake, are rapidly-growing towns which have experienced flooding. High proportions of the populations of these towns are elderly (6684) or have need for assistance (1605). There is an average of 2 persons and 1.4 vehicles per dwelling. A significant proportion (2857) does not have access to internet, and 781 do not have access to a motor vehicle (15; 1).

b. There are approximately 750 persons of indigenous origin. There are approximately 15 persons who do not speak English well (15) (1).

2.3.2 Characteristics of Flooding

a. This area is susceptible to flash flooding, high lake levels and storm surge.

b. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

c. Rates of rise are estimated to be up to 0.2m/h for a PMF (20).

2.3.3 Flood Behaviour

a. In most areas the depth of inundation would be relatively shallow. Some areas could experience deep fast flowing water. They include (1):

   i. Low lying areas near Beach Street and Wharf Street, Tuncurry.

   ii. Low lying areas across the Point Road Peninsula, Tuncurry

b. The normal water level in Wallis Lake is around 0.1 metres AHD.

c. Oceanic processes are also important. High tide and storm surge can prevent flood waters escaping and lengthen the period of flooding. High ocean levels and waves can also inundate coastal areas. This is more likely where shorelines are gently sloping, and where trees and other obstructions are absent. At **Forster-Tuncurry** flooding on the Wallis lakes caused by river runoff is dominant (1). Some allowance needs to be made for the effect of wind on top of the rainfall generated water levels (1).

d. Wave set up is estimated to be between 2.4 metres (for 5% AEP ocean conditions) to 4.8 metres (for extreme ocean conditions) in the areas around the Sailing Club, Elim and Tiona with lesser heights (0.5-1 metre less) around Coomba, Elizabeth Beach, Tuncurry Point Road and Forster Keys (4) (1).

e. High hazard flood areas are the lower areas of Beach Street and Wharf Street, and Point Road and Bay Street Tuncurry. Velocities are in the order of 2.28-2.34 metres a

second at the Foster Tuncurry Bridge around floods in the order of 5.5 metres (11) (1).

2.3.4 Classification of Floodplain

a. Rising road access (1).

b. Forster Keys and Point Road are Low Flood Islands, becoming isolated between 0.68 and 1.5 metres.

2.3.5 Inundation

a. This area uses the Tuncurry gauge for predictions.

b. Residential and other property in low-lying areas adjacent to the lake and Cape Hawke Harbour can be threatened by high lake and sea levels (between 0.92 metres-0.96 metres), though these are not common occurrences (around Bay Street, Point Road, Recreation Lane, Taree Street and Big4). Very occasionally, the aerodrome on Wallis Island could become unusable because of flooding (1).

c. A large number of dwellings would be inundated from 1.4 metres flood including Coomba Park, Charlotte Bay, Whoota, Yarric, Tiona, Pacific Palms, Elizabeth Beach, Elim, Wallis Island, Booti Booti, Green Point, Forster, and to a greater extent Forster Keys, Point Road Tuncurry and Tuncurry (Table 4) (11) (1). The numbers are even larger when considering sea level rise. Just over half of the properties affected in the 1% AEP flood are high hazard. The Wallis Lake Floodplain Risk Management Study and Plan spatially identifies individual propertie affected in each design event (figure 6a-6c) (17).

Table 4: Estimated number of properties inundated above floor level and over ground in Forster-Tuncurry related to a design flood at the Tuncurry gauge (17)

Tuncurry Gauge design height (AEP)	Total No. buildings with over floor flooding								Total No. properties with over-ground flooding
	Caravan Parks	Coomba Park – Booti Booti	Forster	Forster Keys	Green Point	Tuncurry	Point Road Tuncurry	Total	
20% (1.4m)	1	1	0	7	0	9	26	44	346
10% (1.5m)	11	2	0	11	0	19	32	75	436
5% (1.5m)	15	3	0	14	0	29	33	94	452
2% (1.8m)	17	5	3	37	4	128	43	237	998
1% AEP (2.0 m)	30	11	8	86	4	224	54	417	1400
0.5%	42	17	14	270	10	329	76	758	1712
PMF	135	76	742	734	28	1202	80	2997	3021

d. Areas likely to be flooded within 2 metres include (11) (1):

   i. In Tuncurry: Chapmans Road (west end), the rear of properties on Tulloch Road, Bahama Place, Montego Place, Mayers Road (west of Parkway Drive), Parkway Village, Eden Place, South Street (west end), the Twin Dolphin Caravan Park, Mirage Drive, Wallamba Close, Bonveti Close, Lachlan Avenue, Huntley Close, Bramble Parade, Bent Street, Peel Street, Manning Lane, Parkes Street, Wharf Street, Little Street, Lake Street, Beach Street, Milliken Street, Wallis Street (at Avery's Lane), Rockpool Road, Point Road, Coral Avenue, Palm Street, Recreation Lane, Taree Street, the TAFE, Rebecca Jane Close, Annette Place, Susella Crescent, Anne Marie Place, Regency Circuit, Windsor Place, Rest Point Parade, Sunset Place, Hibiscus Place, Jonnel Place, Harbour View Place, Mount View Parade, Guy Place, Palmway Crescent, Bay Street and Baird Street.

   ii. In Forster: Areas on the lake side of Little Street, Townsend Street, Helen Street, Middle Street, Smugglers Cove Caravan Park, The Lakes Way, Goldens Road, Hind Avenue, Aurum Place, The Southern Parkway, parts of the Golden Palms Retirement Village and the Forster High School. All areas west of a line drawn along The Lakes Way, Pindari Avenue and Pipers Bay Road, including Forster Keys are within flooding reaching 2 metres at the Tuncurry gauge (1).

2.3.6 Isolation

a. Both Forster Tuncurry may become isolated due to flash flooding causing road closures. The northern side of the Lakes Way remained closed for some 5 hours during the 2013 flood event where the Southern end was closed for a short period due to overland flooding of low lying roads at Cape Hawke (1).

b. Point Road, Tuncurry may begin to become flooded from 0.68 metres (as occurred in 2013) (1).

c. Evacuations may also be difficult from areas off Taree Street, due to flood extent, distance to flood free land and the single access point for this area.

d. Forster Keys becomes isolated when King George Parade cuts between a minor and moderate flood (0.9 and 1.5 metres), flooding dwellings in a 2.2 metre flood (12).

2.3.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified (1).

2.3.8 Dams

a. No consequences from dam failure have been identified (1).

2.3.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.3.10 Other Considerations

a. There are two peak seasons with potential for a 10% population increase associated with tourism:

   i. Christmas holidays December –January.

   ii. Easter long weekend.

b. In addition to this, Lakeside Festival is usually held in October-November, which brings an additional transient population (1).

c. This area is susceptible to coastal inundation.

2.4 HAWKS NEST, TEA GARDENS AND PINDIMAR

2.4.1 Community Overview

a. Hawks Nest, Tea Gardens and Pindimar are located on Port Stephens (1).

b. Hawks Nest has a population of 1123, with a significant aged population (38%) (15).

c. Tea Gardens has a population of 2,345, with over 40% being over 65 (15).

d. Pindimar has a population of 230, with over 29% being over 65 (15).

e. Hawks Nest has an indigenous population of 44, Tea Gardens has 86 and Pindimar has zero (15).

2.4.2 Characteristics of Flooding

a. Some parts of Tea Gardens, in particular the low point on Marine Parade and the Public Reserve at Budgeree Street are susceptible to flash flooding, which occurred during June 2007 (1).

b. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

c. Upstream of Monkey Jacket is rainfall dominant, downstream is ocean flooding dominant, including Tea Gardens, Hawks Nest and Pindimar (19).

d. Elevated water levels occur in Port Stephens mainly as a result of ocean influences - tides and storm surges, wind and wave activity within the estuary, rainfall from the local catchment – Karuah River and Myall Lakes (this factor provides the least influence on levels). The most significant factor affecting the peak water levels within the estuary is the direction of the local wind setup. This factor can increase water levels by up to 0.3 metres (5).

2.4.3 Flood Behaviour

a. Oceanic processes are also important. High tide and storm surge can prevent flood waters escaping and lengthen the period of flooding. High ocean levels and waves can also inundate coastal areas. This is more likely where shorelines are gently sloping, and where trees and other obstructions are absent. At **Tea Gardens-Hawks Nest**, high water levels on Port Stephens caused by coastal processes are the dominant flooding source except in extreme events where the Myall River can increase the flood level by up to 0.5 metres. At Forster-Tuncurry flooding on the Wallis lakes caused by river runoff is dominant (1).

b. Velocities in Tilligerry Creek are between 0.4 and 1.5 metres a second from smaller floods to the PMF (17).

2.4.4 Classification of Floodplain

a. Tea Gardens has rising road access.

b. Hawks Nest becomes a low flood island when access is cut along The Anchorage (in a severe event) (1).

2.4.5 Inundation

a. This areas uses the Hawks Nest gauge.

b. Waves have been known to break across the sand dune at Winda Woppa and this could cause water to enter houses (1).

c. Hawks Nest and Tea Gardens, on the lower Myall River, could have numerous residential blocks at risk in a severe flood associated with elevated ocean levels. Again, many of the residents are elderly. Large parts of both towns are below 2 metres AHD, but their sites are undulating and there are areas of greater elevation. Many buildings are on mounds or are of two or three storeys (2).

d. Other areas to the south are also at risk of flooding. A breakdown of properties inundated in various flood events for the Northern shore of Port Stephens is provided in Table 9 (1).

Table 5: A breakdown of properties inundated in various flood events for the Northern shore of Port Stephens. Figures given are for over floor flooding with figures in brackets (*) are for yard flooding (10) (1).

Location	5% AEP (1.5m at Hawks Nest)		1% AEP (1.7m at Hawks Nest)		Extreme (2.0m at Hawks Nest)	
	Stillwater	Wave Run-up	Stillwater	Wave Run-up	Stillwater	Wave Run-up
Carrington	0	0(4)	0	3(6)	0	3(6)
Baromee Point	0	1(2)	0	1(2)	0	1(2)
Baromee Hill	1	6(9)	2	7(9)	2	7(10)
Bundabah	2	2(2)	2	2(2)	2	2(2)
Lower Pindimar	1	20(33)	3	22(33)	3	31(33)
Pindimar	4	9(18)	4	9(18)	4	13(24)
Limestone	1	1(2)	1	1(4)	1	1(4)
Tea Gardens	7	7(30)	18	18(39)	36	39(51)
Hawks Nest	0	0(8)	1	2(8)	8	8(9)
Jimmy's Beach West	3	3(16)	7	7(23)	16	16(36)
TOTAL	**19**	**49(124)**	**38**	**78(144)**	**72**	**121(177)**

2.4.6 Isolation

a. Access between the towns could be cut in a very severe event, with Tea Gardens isolated when The Anchorage is cut in an extreme event (10). Pindimar can become isolated due to Pindimar Road and Myall Way flooding from overland and flash flooding.

2.4.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified (1).

2.4.8 Dams

a. No consequences from dam failure have been identified (1).

2.4.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.4.10 Other Considerations

a. There are two peak seasons with potential for a 10% population increase associated with tourism:

   i. Christmas holidays December –January.

   ii. Easter long weekend.

b. In addition to this, Myall River Festival is usually held in October, which brings an additional transient population (1).

c. This area is subject to coastal erosion and inundation. Refer to section 2.10 on details of coastal erosion and 2.9 for further details on coastal inundation.

2.5 NABIAC

2.5.1 Community Overview

a. Nabiac is located on the northern bank of Nabiac River where the Pacific Highway crosses the River (1).

b. It has a population of 1508, with approximately 18% of the population aged 65 or older (15) and an indigenous population of 90 (15).

2.5.2 Characteristics of Flooding

a. Nabiac can be flooded from overland, backwater and mainstream flooding from the Wallamba River and local flooding from Town Creek, which runs through the town and joins the Wallamba River, Pipeclay Creek and Woosters Creek (1). No gauges exist on the smaller creeks.

b. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

c. There is typically 5 hours for Nabiac and 6 hours for Failford and Minimbah between the occurrence of the maximum rainfall intensity in the upstream catchment and the peak flood level at Nabiac due to catchment runoff. However shorter times can occur due to shorter storms producing water levels of a similar magnitude, more severe storm intensities will result in water levels approaching critical levels (8).

2.5.3 Flood Behaviour

a. Pipeclay Creek conveys a significant volume of the flow, with a peak discharge of 575 cubic metres a second in 5.8 metre flood. The flooding associated with this flow is contained within rural properties, and does not affect any of the houses in this area. There are a number of locations where the flows of Pipeclay Creek combine with those of Woosters Creek and its tributaries (3).

b. Local flooding on the tributaries can occur without rises on the main river. Nabiac is known to have experienced substantial inundation in 1927, 1929 and 1947 (8).

c. Flood depths may exceed 1 metre in properties and roads adjacent to the creek, even from the 5% AEP flood (5.0 metres) and up to 2.5 metres in an extreme flood in the channel. Velocities are generally 0.05-0.99 metres a second in properties, but exceed 2.0 metres a second in a PMF (3).

d. The highest risk areas, in terms of risk to property and risk to life, are focused around Clarkson Street, around the crossings of Town Creek and Woosters Creek. Town Creek tends to be controlled by a set of pipe culverts near the Industrial area, which can cause a backwater to form along Nabiac Street and Clarkson Street (3).

e. The areas around Hoskins Street generally experience issues with ponding (1).

f. Additional flooding of Clarkson Street, between Town Creek and Woosters Creek, is caused by flows from a relatively small catchment near the Motorcycle Museum. This overland flow path causes flooding of Clarkson Street, as well as the properties which are located adjacent to this overland flow path (3).

g. Woosters Creek does not generally create a risk to property, although there is some inundation of properties near Clarkson Street. Woosters Creek does, however, overtop Clarkson Street in a flood around 7.18 metres at the town creek gauge by with depths of around 0.15 metres and approximately 0.40 metres in a 1% AEP event (5.8 metres). This creates a potential hazard, and cuts off access for residents between Town Creek and Clarkson Street (3).

2.5.4 Classification of Floodplain

a. A small area in town, including Hoskins Street, Farnell Street, Farnell Lane, Cowper Street and Stuart Street as well as the south east of the town adjacent to Wallamba River become a low flood islands in an extreme flood, with access cut as early as a 5% AEP (1; 18).

b. The Clarkson Street and west of Nabiac Street area become a high trapped perimeter areas (18).

c. The areas aong the Pacific Highway to the east of Woosters Creek and to the west of Town Creek have rising road access up to and including the PMF (18).

2.5.5 Inundation

a. The Nabiac gauge on the Wallamba River is available on the Bureau website (BoM 560048 or AWRC 209404), and has historically been referred to as the “Nabiac Bakery” gauge. There are also gauges in Nabiac on Town Creek and Woosters Creek, although the levels are not visible publically. The flood studies generally refer to levels at the town gauges rather than the Wallamba River gauge.

b. Houses in Wharf, Byron, Donaldson, Martin and Stuart Streets and at the intersection of Nabiac and Clarkson Streets can be affected in floods below the 1% AEP (8).

c. Of particular concern is the Donaldson Street area which can be isolated prior to being flooded (1).

d. In extreme floods much of the town west of Parkes Street and south of Cowper Street can be inundated in Nabiac (77 buildings) (3).

e. The numbers of properties are inundated over flood level in various design events are summarised in Table 12. Additional properties will be affected, with over 110 cadastral lots affected in a PMF (3).

f. The Nabiac Showground on Nabiac Street and the area north of Clarkson Street and west of Hoskins Street remain flood free up to and including a PMF (18).

Table 6: Estimated number of properties inundated above floor level and over ground in Nabiac related to the Nabiac gauge (3).

Nabiac Gauge Height (m)	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
20% AEP (7.18m at Town Creek gauge)	n/a	1 residential 2 non-residential	12 residential 4 non-residential
10% AEP	n/a	2 residential 2 non-residential	20 residential 4 non-residential
2% AEP	0-1	5 residential 2 non-residential	29 residential 4 non-residential
1% AEP (7.65m at Town Creek gauge)	n/a	5 residential 2 non-residential	210 cadastral blocks (90 in high hazard)
0.2% AEP	n/a	6 residential 2 non-residential	34 residential 5 non-residential
Extreme	n/a	69 residential 9 non-residential	106 residential 9 non-residential

2.5.6 Isolation

a. In floods approximating the magnitude of the 0.2% AEP a floodwaters can cross Nabiac Street and flow towards the Town Creek cutting the town in two (1).

b. The town's main evacuation centre, the showground is a high flood island being isolated in an extreme flood (1).

2.5.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified (1).

2.5.8 Dams

a. No consequences from dam failure have been identified (1).

2.5.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.5.10 Other Considerations

a. No other considerations have been noted.

2.6 SMITHS LAKE

2.6.1 Community Overview

a. Smiths Lake is Located on the northern bank of Smiths Lake, close to the entrance. It has a population of around 1076, with an average of 2.4 people per household and 1.6 motor vehicles per dwelling. 22% of the population is aged 65 or older (15).

b. Pacific Palms - Blueys Beach area and Sandbar-Bungwahl-Seal Rocks are located near-by, with respective populations of 665 and 254. There is an average of 2.4 and 2.2 people per household and 1.6 and 1.7 motor vehicles per dwelling respectively. 22% of the population is aged 65 or older (15)

c. Smiths Lake has a total indigenous population of 33 and Bungwahl has eight. There are six persons who do not speak English well in Smiths Lake (15).

2.6.2 Characteristics of Flooding

a. Smiths Lake has a relatively minor flood problem, provided that it is artificially opened. Council will normally do this when the lake level reaches 2.1 metres.

b. Floods on the lakes are usually slow to rise, but variations in water level of 1.0-1.5 metres can occur over a period of a few days when heavy rain occurs (1).

c. Rates of rise in the most extreme case were estimated to be around 0.3 metres an hour (23).

2.6.3 Flood Behaviour

a. As Smiths Lake is an intermittently closed and open lagoon (ICOLL), rises in the lake from local creek discharges usually cause the sandbar to be breached, or is breached mechanically by council allowing flood waters to escape to the ocean (1).

b. Up to the 0.2% AEP event water levels should not exceed 2.2 metres if Council opens the berm according to its policy (1). However if the berm is left to open naturally water levels can be higher. The PMF is 3.5 metres, even if artificial opening of the berm is undertaken due to the high inflow rates (2).

2.6.4 Classification of Floodplain

a. Some areas close to the lake become low flood islands following the closure of The Lakes Way and Sandbar Road. The remaining is a high flood island with limited public facilities (2).

2.6.5 Inundation

a. This area uses the Smiths Lake gauge.

b. There are 30 commercial and industrial buildings that are at the level of 2.2 metres (1)(2) (20). This increases to one residential and 82 commercial or industrial in a PMF (3.5 metres) (Table 7).

c. Smiths Lake has two caravan parks (the Sandbar and Bushland caravan parks) which can also be threatened by high lake levels. Vans and tents have had to be moved in the past (1). There is also UNSW Smiths Lake Field Study Centre that is at risk of floodin, which is a 56 bed dormitory.

Table 7: Estimated number of properties inundated above floor level and over ground in Smiths Lake related to the Smiths Lake (Tarbuck Bay) gauge (20)

Smiths Lake Gauge Height (m)	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
2.2-3m	n/a	1 residential 2 non-residential	n/a
3.5m	n/a	1 residential 33 non-residential	n/a

2.6.6 Isolation

a. Roads in low lying areas around the lake could also be inundated, isolating the community. The lowest road levels from Tarbuck to Smiths Lake along The Lakes Way is 2.5-3 metres AHD, with the majority above 3 metres AHD (2).

b. Sandbar Road may get cut toward the southern distal end, as well as near The Lakes Way (2), and Dogwood Road near Horse Point. These closures result in access and egress being cur for residents and visitors to the Sandbar, Bushland Holiday Park, Golfcourse and residents of Dogwood Road near Horse Point.

2.6.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified.

2.6.8 Dams

a. No consequences from dam failure have been identified, however it is possible that Pacific Palms Dam has local consequences on Boomerang Road (Charlotte Bay) to the North (1).

2.6.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.6.10 Other Considerations

a. There are two peak seasons with potential for a 10% population increase associated with tourism:

i. Christmas holidays December –January.

ii. Easter long weekend (1).

2.7 STROUD AND STROUD ROAD

2.7.1 Community Overview

a. Stroud is located at the confluence of Mill Creek and Lamans Creek before flowing into Karuah River one kilometre further downstream. Bucketts Way is the main thoroughfare through town, crossing Mill Creek to the north and Lamans Creek to the south (1).

b. Stroud has a population of approximately 1022 (15) and has undergone moderate growth over the last 10 years. Continued growth may result in expansion of existing urban areas and development of previously un-developed or rural land, some of which is likely to be on the fringes of the floodplain (12). The average people per household is 2.5, the average vehicles per dwelling is 2.0. 21% of the population is aged 65 or older, and 93 persons requiring assistance (15).

c. Stroud Road is located on Bucketts Way upstream from Stroud just above the confluence of Karuah River and Mammy Johnsons River (1).

d. Stroud Road has a population of 280, with an average number of 2.4 persons per dwelling. 18% of the population is aged 65 or older (15).

e. Stroud and Stroud Road have approximately 32 and 9 Aboriginal and Torres Strait Islander people respectively (15).

2.7.2 Characteristics of Flooding

a. Stroud can be flooded from Mill Creek and Lamans Creek (1).

b. Much of the flooding which takes place in Stroud occurs as flash flooding (1).

c. Flooding generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

2.7.3 Flood Behaviour

a. The bulk of the inundated areas along the Karuah River (either floodway or flood storage) are classed as “high hazard”. Areas of “low” and “medium hazard” are quite small in the total inundated area (6) (1).

b. A flood runner (Mill Brook) breaks out of Mill Creek approximately 500 metres upstream of Bucketts Way and flows around the southern part of the town Recreation Centre, also crossing Bucketts Way via a large culvert, before rejoining Mill Creek (12).

c. Downstream of Stroud the bed slope of Mill Creek and Lamans Creek is relatively flat, and flood levels in the low-lying south-western areas downstream of the Mill and Lamans Creek confluence are primarily driven by backwater effects from the

Karuah River in large flood events. In Lamans Creek, the backwater flood mechanism from the Karuah River plays a more significant role than for Mill Creek. The Karuah River has a major influence on Lamans Creek flood levels for the reach from Bucketts Way to the Mill Creek confluence, even in relatively small events (12).

2.7.4 Classification of Floodplain

a. Rising Road Access (1), with Stroud becoming a high flood island in major floods, for example in 2015.

b. The Showground and Stroud Community Lodge can become low flood islands in extreme events.

2.7.5 Inundation

a. No predictive gauge exists for this area.

b. The Showground and Caravan Park, next to Mill Creek are at risk of flooding, with depths of around 1.8 metres in 2016 (9).

c. Three properties west of the main road on Lamans Creek are at risk of flooding (1).

d. At least 13 properties opposite the showground in Britton Court Road, Cowper Street (Bucketts Way), Millbrook Road, Avon Street and Maytom Street is at risk of over floor flooding, as occurred in 2015 when anecdotally 180 millimetres of rain fell over six hours.

e. The Stroud Community Lodge in Bucketts Way is at risk of flooding, adjacent to Mill Creek (1).

f. Laman Street is also prone to flooding (1).

Table 8: Estimated number of properties inundated above floor level and over ground in Stroud related to design floods (18)

Design Flood	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding	No. Properties with Over-ground Flooding
20% AEP	n/a	0	2
10% AEP	n/a	0	6
2% AEP	n/a	2	18
1% AEP	n/a	2	23
0.2% AEP	n/a	9	30
Extreme	n/a	27	55

2.7.6 Isolation

a. In the 2015 event both the Lamans Creek Bridge at Berkley Street (Bucketts Way) and Mill Creek Bridge at Cowper Street (Bucketts Way) were inundated, isolating the centre of Stroud (8).

b. Flash flooding can also see the Stroud Community Lodge (with 31 residential care units and three self care units), located opposite the Showground become isolated and become a shrinking island (9).

2.7.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified.

2.7.8 Dams

a. Duralie Coal Dams (x3) may have flooding impacts on the area (1).

2.7.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.7.10 Other Considerations

a. There are two peak seasons with potential for a 10% population increase associated with tourism and camping:

   i. Christmas holidays December –January.

   ii. Easter long weekend.

b. In addition to this, the Stroud Show is held in April, the Brick Throwing Festival in July and the Stroud Rodeo in September (1).

2.8 RURAL AREAS

2.8.1 Community Overview

a. Nerong is built largely on low-lying land south of Bulahdelah on Split Yard Creek, a tributary to The Broadwater. It has a population of 349, with 144 occupied dwellings (15).

b. Coolongolook is located to the west of Forster on either side of the Pacific Highway adjacent to the Coolongolook River. It has a population of 417, with 146 occupied dwellings (15).

c. Bungwahl is located to the east of Buladelah bound by Myall Lake to the south, Wattley Hill Road to the west, Wallingat River and Wallingat National Park to the north and Wamwarra Bay (Smiths Lake) to the east. It has a population of 254, with 105 occupied dwellings (15).

d. Minimbah is located to the west of Tuncurry, bound by the Coolongolook River to the south, Wang Wauk River to the west and the Pacific Highway to the north-west.

e. Failford is located to the north-east of Nabiac on the northern bank of the Wallamba River, to the east of the Pacific Highway. It has a population of 495, with 200 occupied dwellings (15).

2.8.2 Characteristics of Flooding

a. The extent of flooding on the south side of the Wallamba River is largely unknown but it may cover large areas in extreme events (1).

b. Flooding on the creeks and rivers generally occurs with little warning and rapidly peaks and falls. Depending on the catchment and rainfall received flooding lasts generally for a few hours to 24 hours.

c. Floods on the lakes are usually slow to rise, but variations in water level of 1.0-1.5 metres can occur over a period of a few days when heavy rain occurs (1).

2.8.3 Flood Behaviour

a. The Wang Wauk, Coolongolook and Wallingat Rivers drain a large, mostly forested area to the west of Wallis Lake and east of the Kyle and Meyers Ranges. All are tidal in their lower reaches, which are flat and swampy and which constitute large flood storage areas experiencing frequent inundation (1).

b. This area is largely ungauged, and can experience fast flowing water.

2.8.4 Classification of Floodplain

a. Rising Road Access.

b. Some areas may become high flood islands (with refuges only) (1).

2.8.5 Inundation

a. No detailed study of rural areas exists and there is little historical information on flood effects in rural areas (1).

b. Inundation and/or isolation of several properties in Nerong is possible as a result of rising levels on the Broadwater (1).

c. Most areas between Failford Road and the Wallamba River are flood liable up to the 1% AEP (5.8 metres at Nabiac). The extent of extreme flooding in the area is unknown (1).

d. The number of properties that could be inundated over floor level in the Failford and Minimbah areas during various design events are summarised in Table 17 (8).These occur in Elliotts Road, Point Road, Failford Road, The Lakes Way, and Drut Road (1).

Table 9: Estimated number of properties inundated above floor level and over ground in Failford and Minimbah related to the Nabiac gauge (8)

Nabiac Gauge Height (m)	Range of Over Floor Depths (m)	No. Properties with Over floor Flooding in Failford	No. Properties with Over floor Flooding in Minimbah
5% AEP (5m)	n/a	2 residential	2 residential 1 non-residential
2% AEP	n/a	5 residential	3 residential 1 non-residential
1% AEP (5.8m)	n/a	6 residential	5 residential 1 non-residential
0.2% AEP	n/a	17 residential	9 residential 2 non-residential
Extreme (7.6m)	n/a	59 residential; 2 non-residential	16 residential 2 non-residential

e. In addition, three properties to the west of Bulahdelah on Emu Creek Road have been known to flood above floor by over a metre (in 2015 and 2016). One is no longer occupied.

2.8.6 Isolation

a. In the June 2007 flood affected rural areas included Darawak, areas near Failford and the Booral, Cromarty and Washpool Creeks. Some roads were closed for up to 24 hours (1).

b. Failford Road is cut west of Bullocky Way and at Bungwahl Creek and the Lakes Way is cut for a large distance south of the Failford Road intersection.

c. Bullocky Way has several low points which may be affected by local drainage, however, this access to the highway is generally high and would appear viable (8).

d. Minimbah may be cut off from flooding from the Wallamba River in a number of places. Significant depths of floodwater would overtop sections of Glen Ora Road and Elliotts Road. In addition this area would be cut off from Nabiac when the Pacific Highway cuts. Therefore evacuation from Minimbah would need to be early in a flood event due to inundation of the access roads and could be either to the north to Nabiac or Taree, dependant upon flooding of the Pacific Highway or to the south to Wang Wauk or Coolongolook (8). Alternative routes may be available via farm tracks, but these could be impassable even using four wheel drives due to the volume of rainfall (1).

e. To the west of Bulahdelah, Emu Creek can become isolated for several hours to days due to overland and flash flooding of Booral Road in several locations, isolating several residents on Emu Creek Road, as occurred in 2015.

2.8.7 Flood Mitigation Systems

a. No flood mitigation systems have been identified.

2.8.8 Dams

a. No consequences from dam failure have been identified.

2.8.9 At Risk Facilities

a. The facilities that are at risk of flooding and/or isolation within the Great Lakes area including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2.

2.8.10 Other Considerations

a. There is very little detail available on the consequences in these rural communites and should be monitored.

2.9 SPECIFIC RISK AREAS – COASTAL EROSION

Mid North Coast Forecast District

2.9.1 Jimmys Beach

a. Jimmys Beach is located on the northern shoreline of Port Stephens, Winda Woppa.

b. Jimmys Beach has been identified by OEH (previously DECCW) as one of 15 coastal erosion hot spots in NSW, as shown in Map 1 (11).

c. Property managed by Council is directly affected by the potential effects of storm erosion. Community infrastructure (road allotment), and approximately 25 private allotments are adjacent to the property directly affected and so are also potentially at risk from coastal erosion (1). These are located between Kurrurma Crescent and Gemalla Street.

d. Waves have been known to break across the sand dune at Winda Woppa and this could cause water to enter houses (1).

e. It is a narrow reflective estuarine beach (19). Erosion problems have been occurring along Jimmys Beach for many years, the erosion has increased over the last 30 years due to a sediment budget imbalance. Historically, sand renourishment of the beach has been used as a means to protect the public infrastructure during severe storm events (20).

f. Trigger points for emergency action initiate when sand is within 10 metres and 5 metres from the road edge (20).

2.10 ROAD CLOSURES

a. Numerous roads within the area can be cut by flooding, though usually only for a few hours except on the lower reaches of the major streams and in severe events. Many minor roads can be cut even in relatively low-level floods. The following table lists the more important roads liable to flooding in the Great Lakes area.

Table 10: Roads liable to flooding in Great Lakes area (1).

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Laman Street, Stroud	Causeway over Mill Creek at western edge of town	Restricts access to and from Stroud from the west	Briton Court Road	n/a
Gortons Crossing, Stroud	Britton Court Road, 2 km west of Stroud at bridge over Karuah River	Restricts access between Stroud and Booral-Washpool Road residents	Via Booral or Stroud Road	n/a
Mill Creek Road (Stroud - Maybush), Stroud Road	At bridge over Mill Creek, at northern edge of Stroud	Restricts resident access/egress along Mill Creek Road, isolating residents	no	n/a
Mill Creek Road, Stroud Road	Saggers Crossing, Mill Creek	Restricts resident access/egress along Mill Creek Road, isolating residents	no	n/a
Gap Hill Road (Stroud Road - Mill Creek Road), Stroud Road	At bridge over Mill Creek	Restricts resident access/egress along Mill Creek Road, isolating residents	no	n/a
Stroud Road-Dungog (Dungog Road or Stroud Hill Road), Stroud Road	At bridge over Karuah River, at edge of Stroud Road; at bridge over Barnes Creek (Washpool vicinity); at bridge over Ramstation Creek.	Restricts access/egress between Dungog and Stroud	Via Clarence Town	n/a
Bucketts Way, Weismantels	At Groom Creek, between Stroud Road and Monkerai turnoff (major route between Stroud and Gloucester) and at corner of Bucketts Way and Forest Glenn Road.	Restricts access/egress between Gloucester (to the north) and Stroud	Via Bulahdelah	n/a
Monkerai Road (MR101),	Andersons Creek bridge, 2km west of Bucketts Way	Restricts access between Mokerai and Gloucester or Stroud	Via Stroud Hill	n/a

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Monkerai				
Booral Road, Booral	Booral Creek Bridge	Restricts access between Booral and the Branch or Crawford River/Bulahdelah	Via Karuah	n/a
Booral - Washpool Road, Booral	Washpool Creek Bridge	Restricts access for Booral-Washpool Road residents	Via The Bucketts Way	n/a
Failford Road (Pacific Hwy-The Lakes Way), Failford	Bungwahl Creek	Restricts access between Tuncurry and the Pacific Highway	Via The Lakes Way to the north or south	n/a
Failford Road (Pacific Hwy-The Lakes Way), Failford	At the 3 culverts west of Bullocky Way	Restricts access between Tuncurry and the Pacific Highway	Via The Lakes Way to the north or south	n/a
Willow Point Road, Failford	At the culvert	Restricts access to the south of Failford for residents along Willow Point Road, isolates Willow Point Road		n/a
Glen Ora Road, Nabiac	A number of low points on the road are cut in minor floods and very early in major floods.	Restricts access/egress for Glen Ora Road residents, isolates Minimbah		n/a
The Lakes Way, Darawank	Darawank (adjacent to Wallamba River, severe events only)	Restricts access to and from Tuncurry from the north	Via Forster	n/a
Coomba Road (The Lakes Way - Coomba Park), Charlotte Bay	Duck Creek	Restricts access for Coomba Road residents, isolates Coomba Park if forest roads also cut	To the north or south	n/a
Violet Hill Road (Boolambayte to Violet Hill), Violet Hill	100m off The Lakes Way, at low causeway	Isolates Violet Hill and Myall Lakes National Park, isolates several rural dwellings and Violet Hill camping area	Potentially via Mayers Range Trail for 4WD	n/a
Bombah Point Road (Bombah Point - Bulahdelah Road), Bombah Point	2km NW of Bombah Point	Isolates Bombah Point	no	n/a
Viney Creek	300 m south-east of	Restricts access to	Via Myall Way	n/a

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Road (Pacific Highway to Tea Gardens Road), Nerong	Pacific Highway	Viney Creek Road residents		
Myall Road (Pacific Highway to Tea Gardens Road), Tea Gardens	At Kore Kore Creek	Isolates Tea Gardens	no	n/a
Hawks Nest - Tea Gardens Bridge, Tea Gardens	In severe events only.	Restricts access between Tea Gardens and Hawks Nest, isolates Hawks Nest	no	n/a
Markwell Road (Bulahdelah-Gloucester Road), Upper Myall	Dorneys Bridge (Myall River, Upper Myall	Restricts access between Gloucester and Bulahdelah	Via Nabiac	n/a

2.11 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

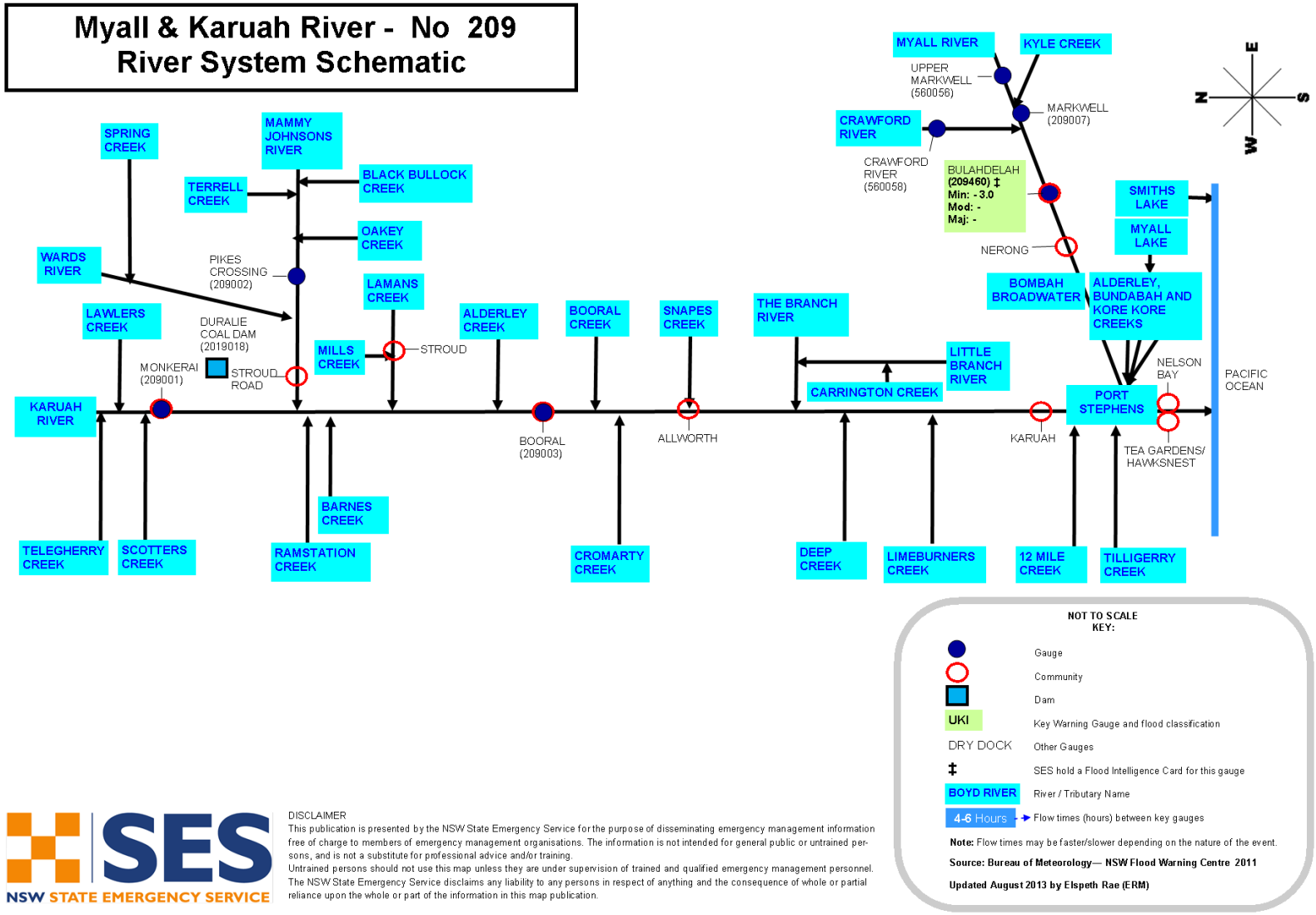
a. Table 11 lists communities liable to isolation and potential periods of isolation. Information presented here is based on historical and design events and does not reflect the duration of isolation expected in larger and extreme events.

Table 11: Potential Periods of Isolation for communities in the Great Lakes area during a Major flood.

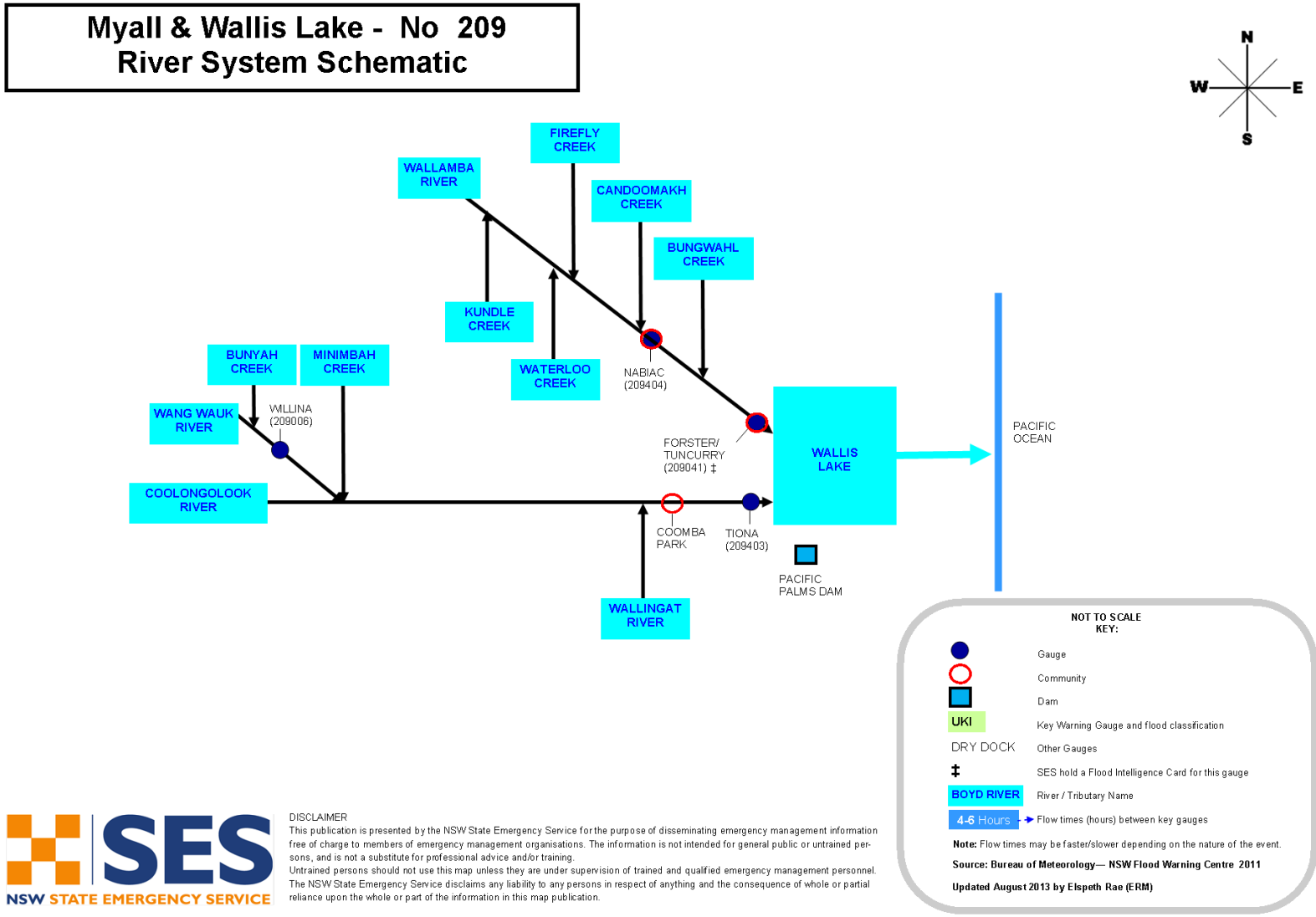
Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	Days								NOTES
				1	2	3	4	5	6	7	8	
Failford	200 dwellings	High flood island	1 – 5 days									
Forster and Tuncurry	8308 dwellings	Low flood island	Several hours									Resupply unlikely. Flash flooding.
Smiths Lake	597 properties	Low flood island	Several hours									Resupply unlikely. Flash flooding.
Tea Gardens	1016 properties	Low flood island	Several hours									Resupply unlikely. Flash flooding.
Nabiac	544 properties	High flood island	1 – 5 days									

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: MYALL AND KARUAH RIVER BASIN SCHEMATIC



ANNEX 1B: MYALL AND WALLIS LAKE SCHEMATIC



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

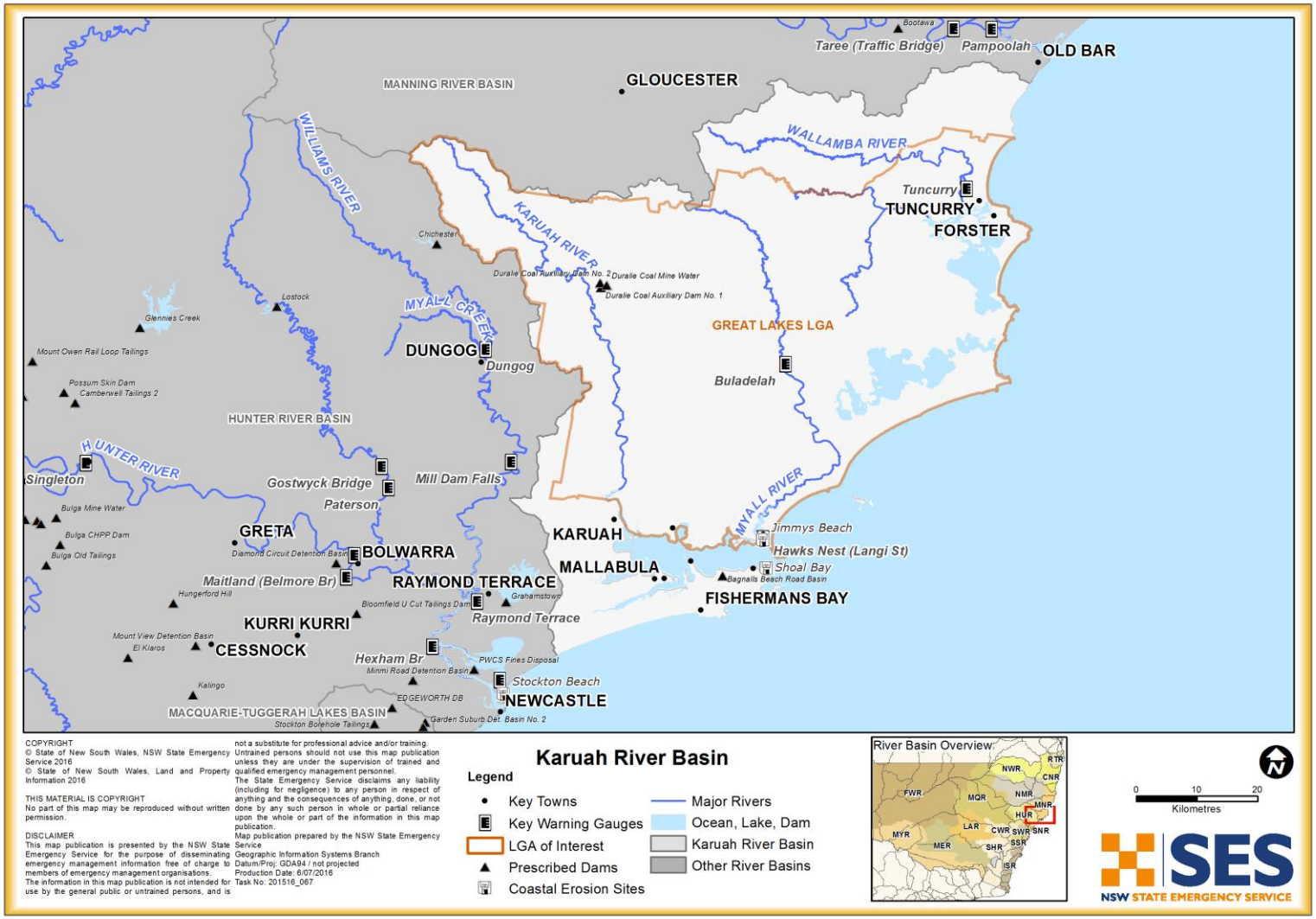
Karuah River Basin Valley (1)

Facility Name	Street	Suburb	Comment
Schools			
Forster High School	Head Street		Parts of the school are flood liable in the 1% AEP, though it is not likely to be significantly affected except in an extreme event
Holy Name Primary School	41 Lake Street	Forster	
Great Lakes College/TAFE	Cape Hawke Drive	Forster and Northern Parkway, Tuncurry	(risk unknown)
Tuncurry Primary School	Tuncurry Street	Tuncurry	(risk unknown)
Tea Gardens Public School	Witt Street	Tea Gardens	(risk unknown)
Nabiac Public School	Clarkson Street		(in an extreme event)
Pacific Palms Public School	Boomerand Drive	Boomerang Beach	(risk unknown)
Stroud Road Public School	Bucketts Way	Stroud Road	(risk unknown)
Stroud Public School	Erin Street	Stroud	(risk unknown)
Coolongolook Public School	Pacific Highway	Coolongolook	(risk unknown)
Bungwahl Public School	Seal Rocks Road	Bungwahl	(risk unknown)
Child Care Centres			
Bulahdelah Preschool			5.6 metres (Bulahdelah)
Dolphins Child Care Centre, Tuncurry.		Tuncurry	
King of the Castle Child Care Centre, Forster.		Forster	
Pokey Possum Preschool	47 Godwin Street	Forster	(risk unknown)
Manning & Great Lakes Early	Chapel Street		(risk unknown)

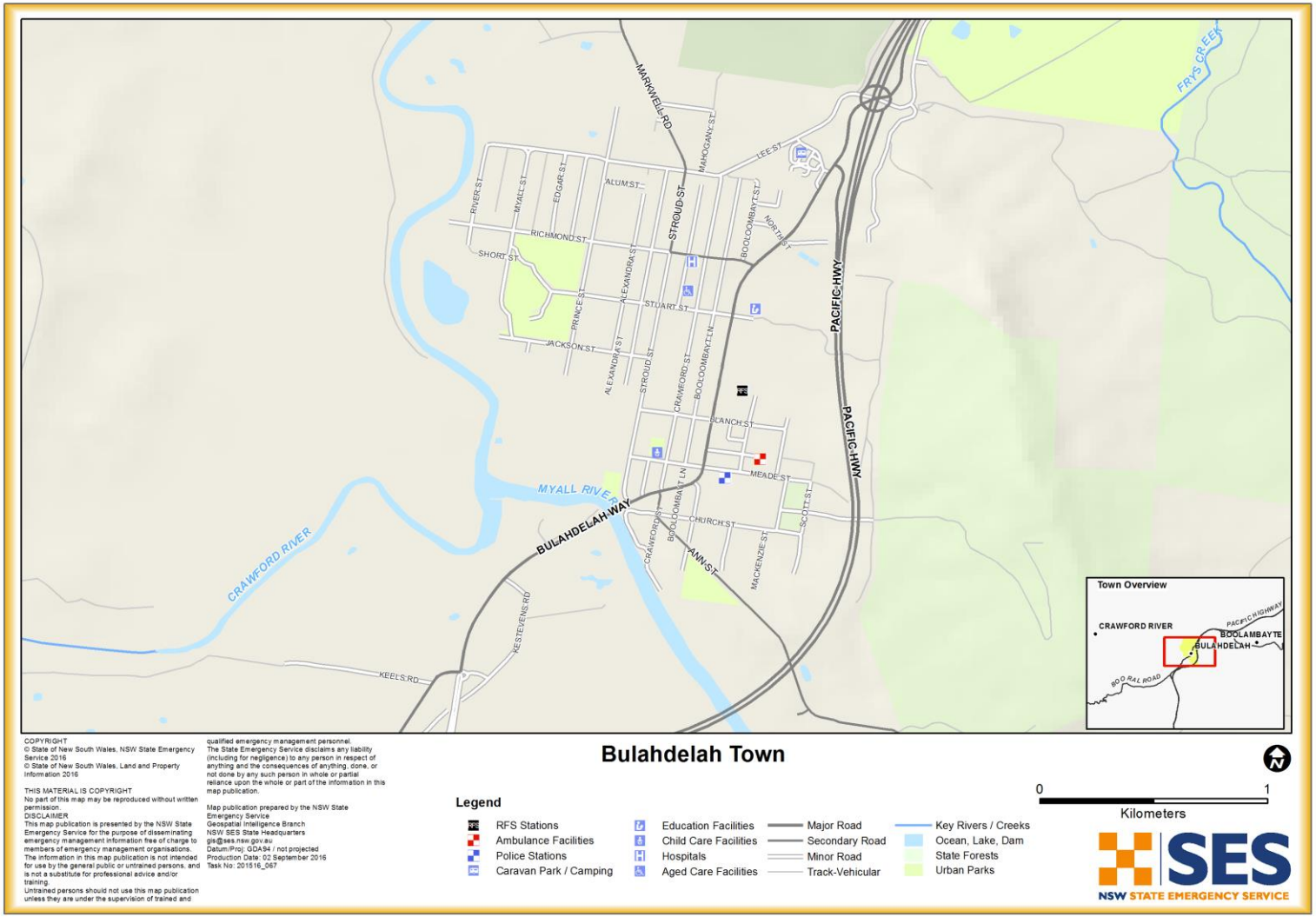
Facility Name	Street	Suburb	Comment
Intervention (Outreach Forster)			
Giggles Child Care Centre	Water Street	Forster	(risk unknown)
Blossoms	33 Chapmans Road	Tuncurry	(risk unknown)
Little Beaver Pre School	2 Cross Street	Forster	(risk unknown)
Brighter Beginnings Early Learning Centre	44 Coupland Avenue		(risk unknown)
Nabiac Pre-school	12 Martin Street		(in an extreme event)
Jitterbugs Pre-school			(in an extreme event)
Annabeles Long Day Care	13 Coomba Road	Pacific Palms	(risk unknown)
Seashells Child Care Centre	Paradise Drive	Smiths Lake	(risk unknown)
Stroud Pre-school	8 Berkeley Street	Stroud	
Facilities for the aged and/or infirm			
Kularoo Centre For Aged Care	Cnr Kularoo Drive & Boundary St	Forster	(risk unknown)
Beaumont Terrace	4 Bonventti Close	Tuncurry	(risk unknown)
Glaica House	22 Flora Parade	Tuncurry	
Myall Lodge Hostel	2 Mirreen Street		(risk unknown)
Stroud Community Lodge	Bucketts Way	Stroud	(risk unknown)
Utilities and infrastructure			
Nabiac SES			(in an extreme event)
Nabiac-Great Lakes RFS			(in an extreme event) thought the Nabiac-Taree station should not be flood affected.
Nabiac Police Station			(in an extreme event)
Buladelah substations		Buladelah	5.5 metres (Buladelah)
Camping Ground / Caravan			

Facility Name	Street	Suburb	Comment
Parks			
Wallamba River Holiday Park		Failford	
River Inn Caravan Park		Failford	
Great Lakes Caravan Park		Tuncurry	
Great Lakes Holiday Park		Tuncurry	
Shangri La Caravan Park		Tuncurry	
Tuncurry Beach Caravan Park		Tuncurry	
Twin Dolphin Caravan Park		Tuncurry	
Forster Waters Caravan PArk		Forster	
Lani's Holiday Park		Forster	
Smugglers Cover Holiday Village		Forster	
Stroud Showground Caravan Park		Stroud	

MAP 1: KARUAH RIVERBASIN



MAP 2: BULAHDELAH TOWN MAP



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NSW SES State Headquarters
gis@ses.nsw.gov.au
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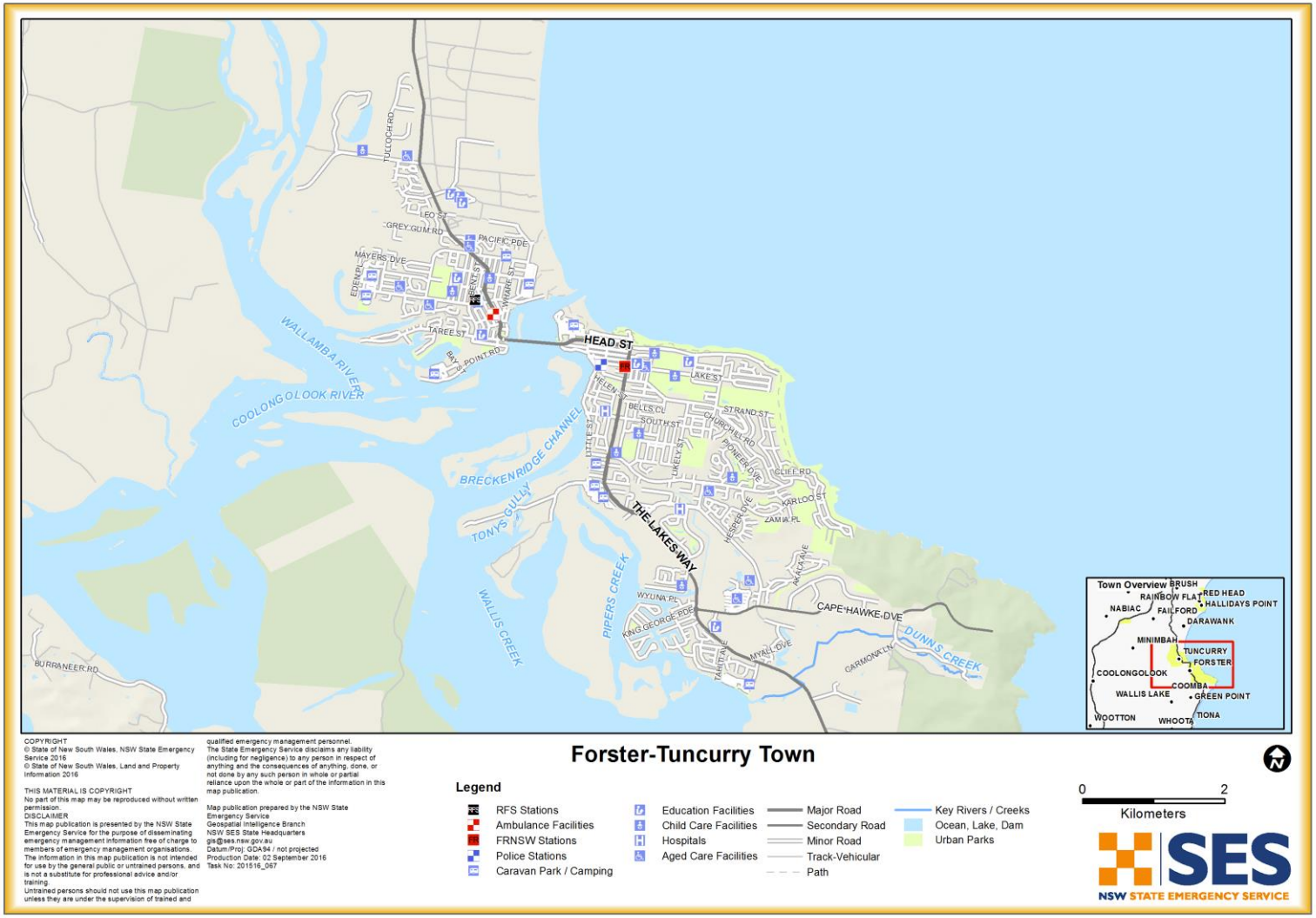
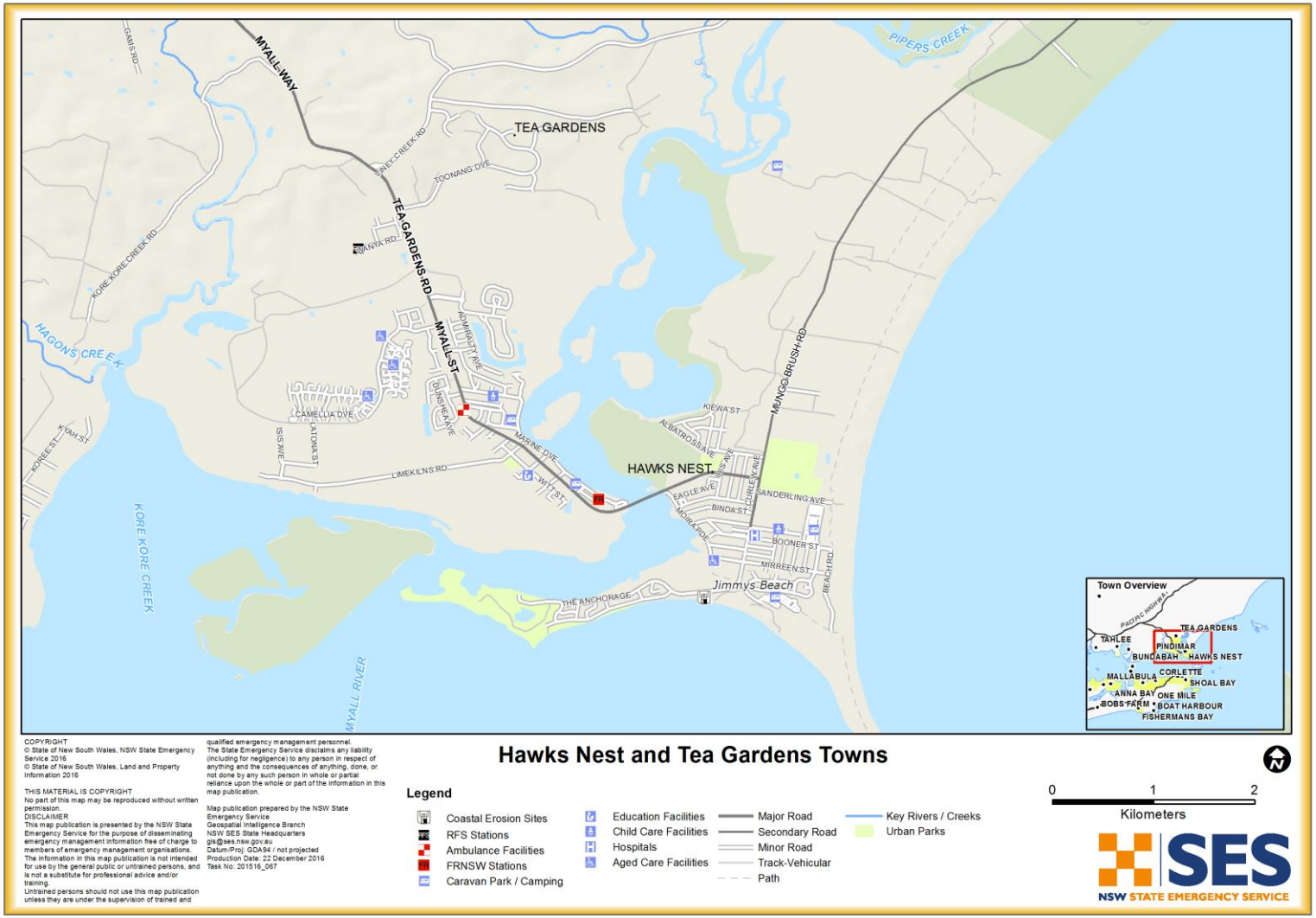
Task No: 201516_067

MAP 3: FORSTER TUNCURRY TOWN MAP



MAP 4: HAWKS NEST TOWN MAP



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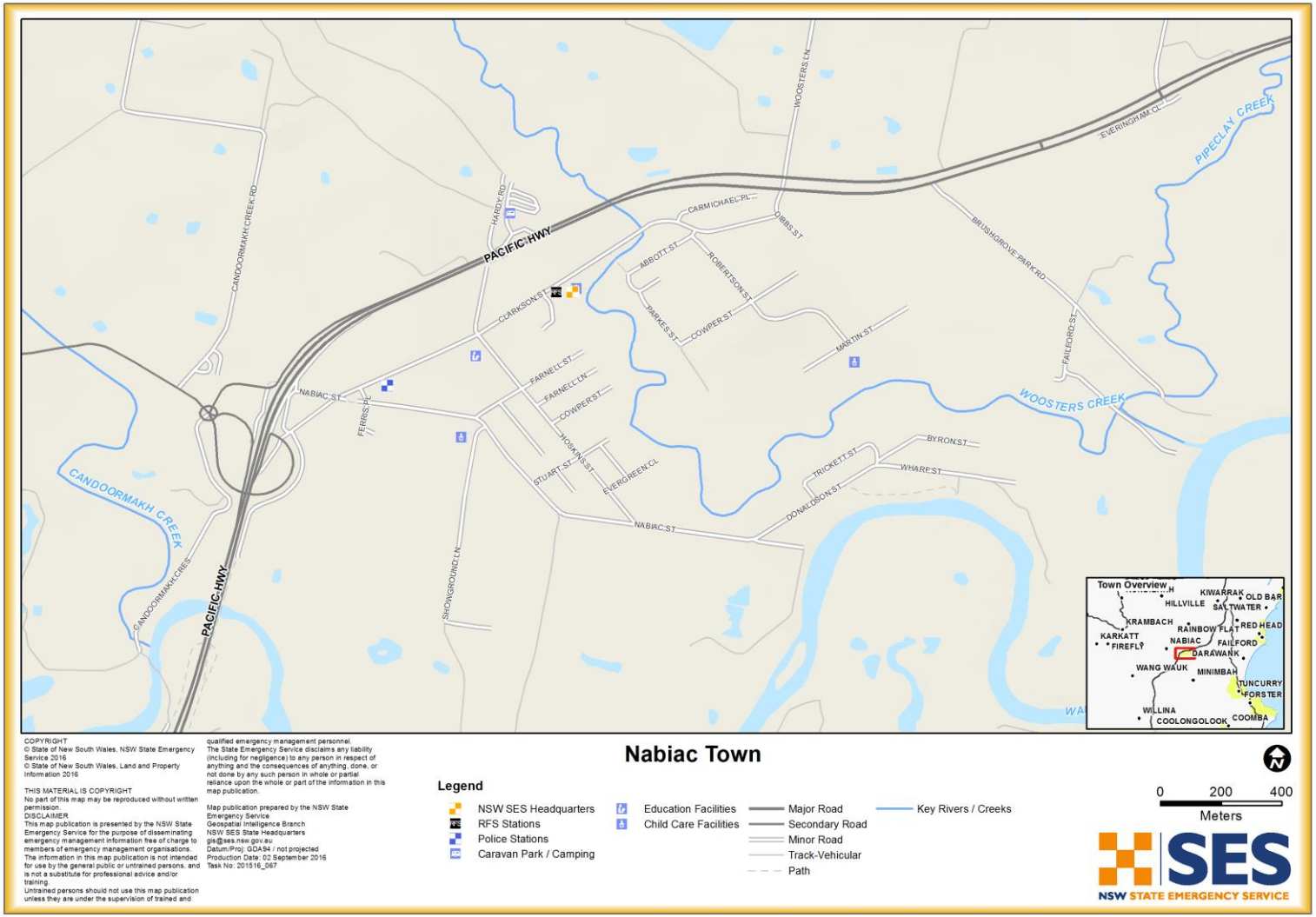
MAP 5: NABIAC TOWN MAP



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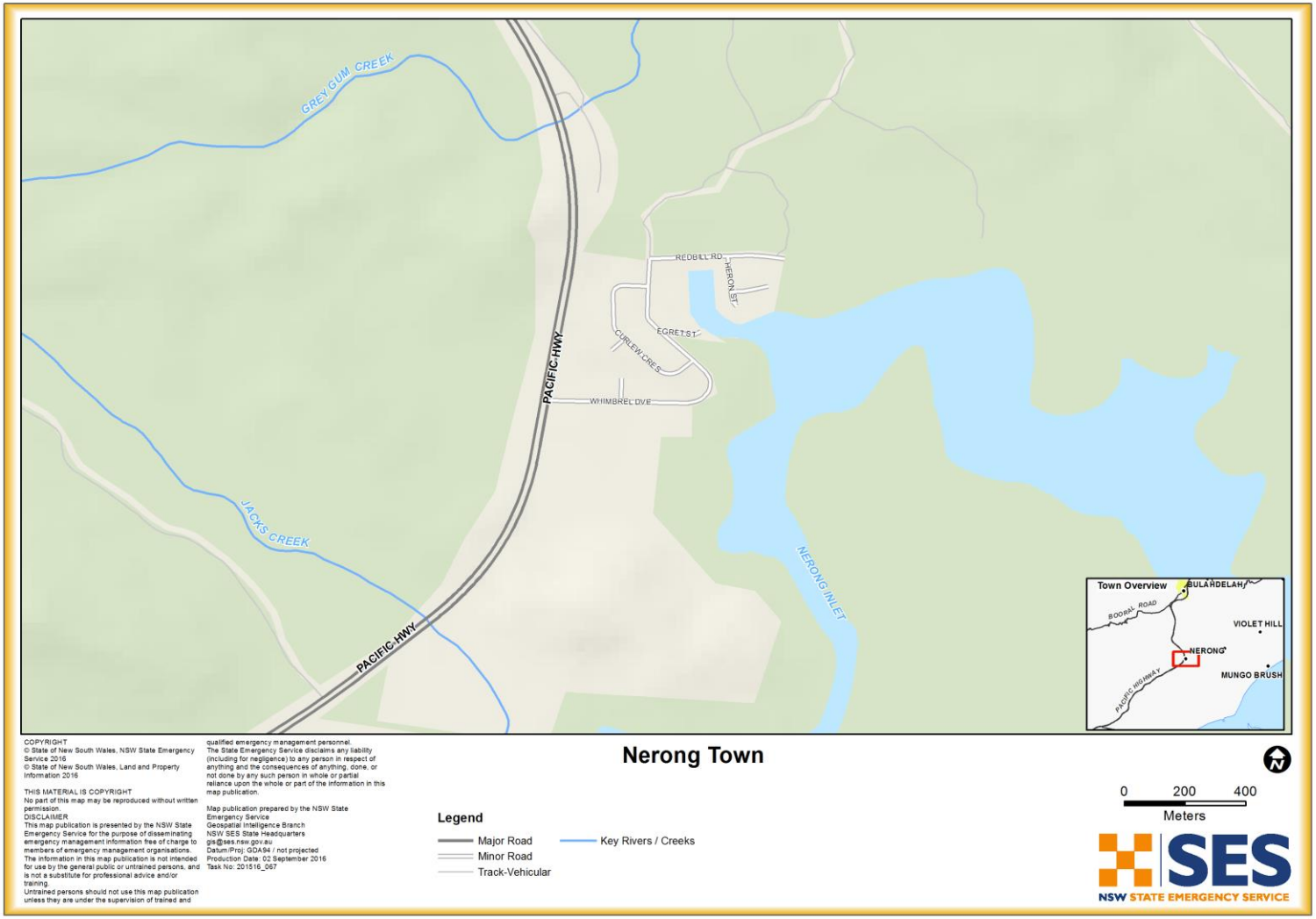
MAP 6: NERONG TOWN MAP



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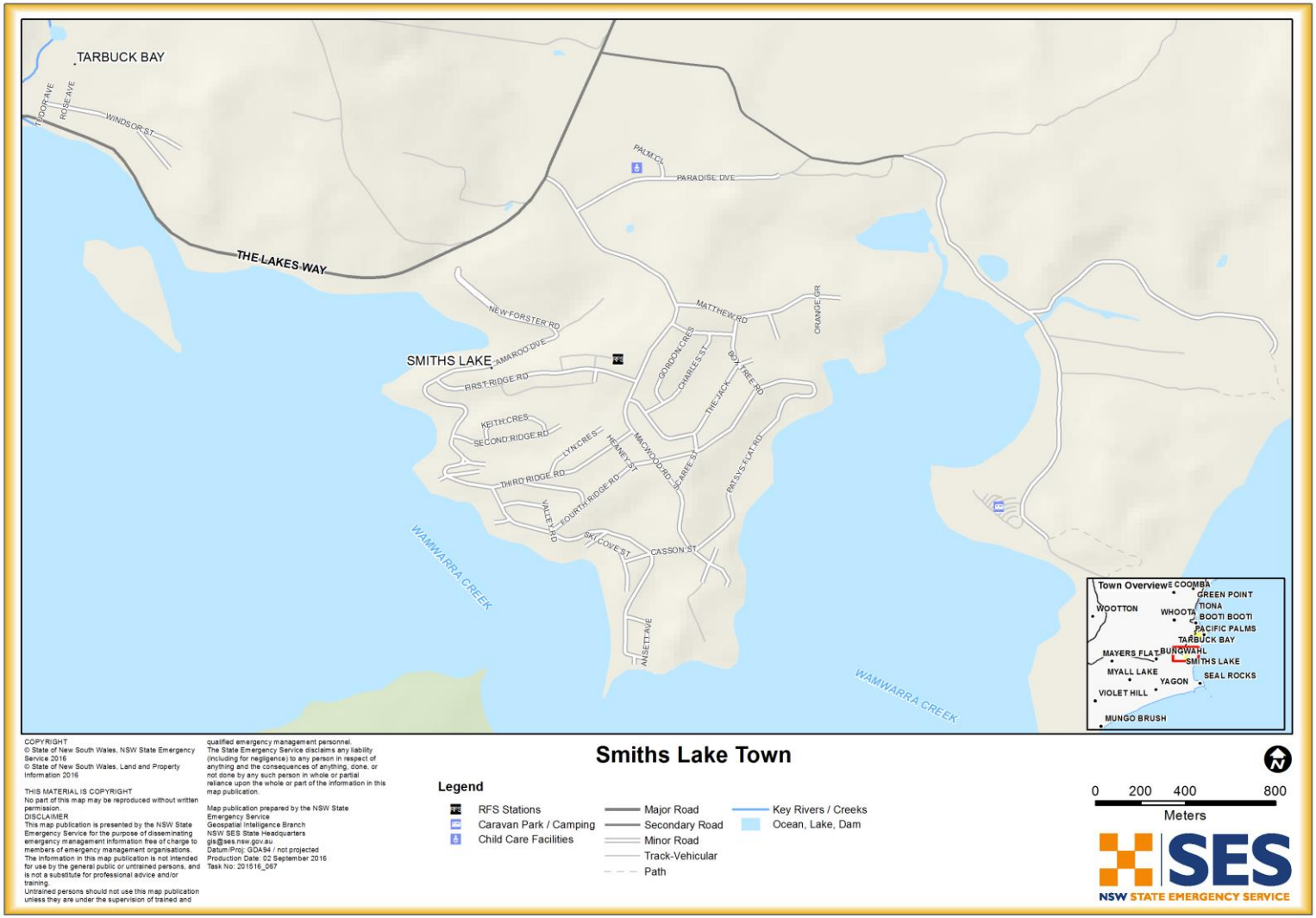
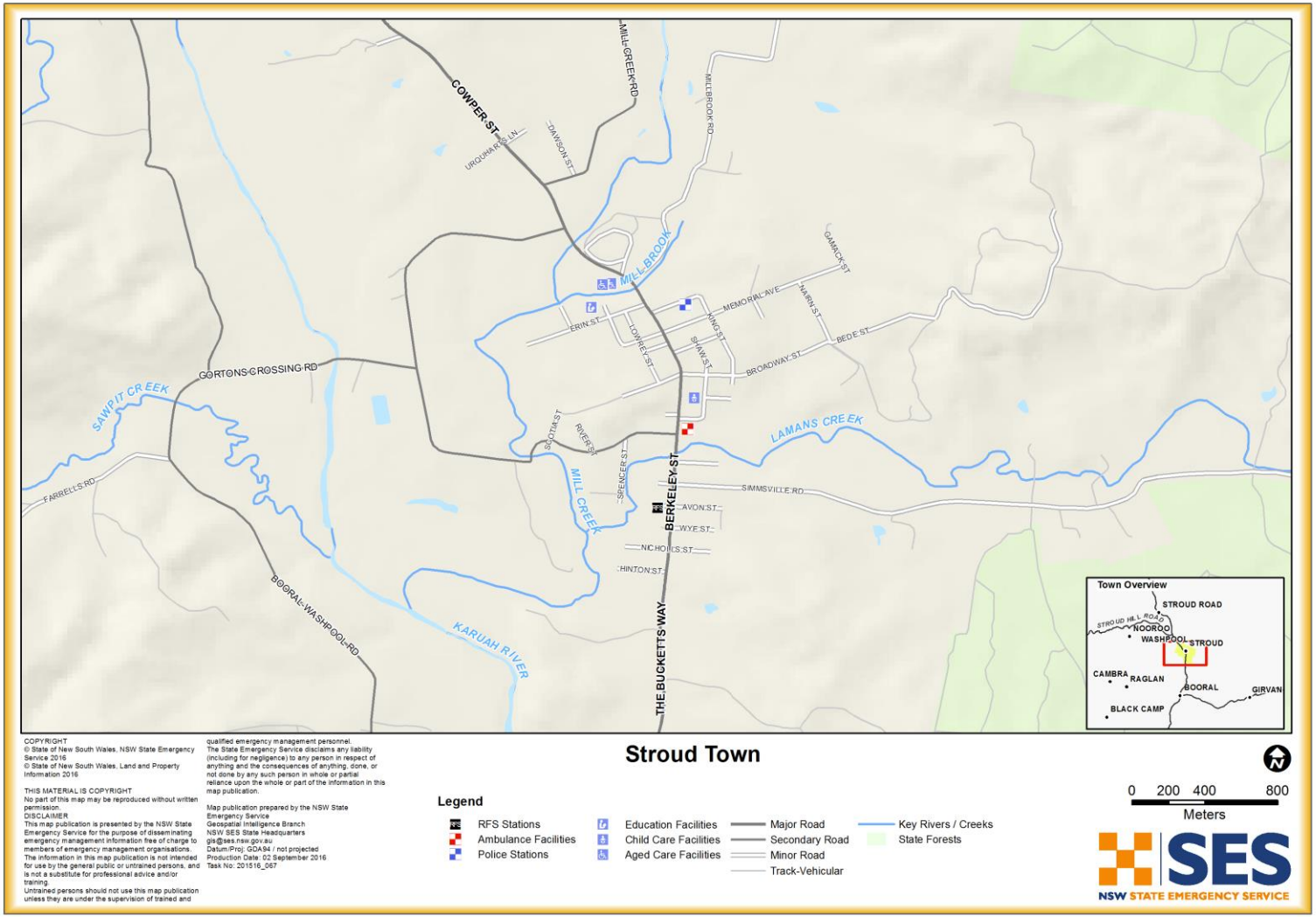
MAP 7: SMITHS LAKE TOWN MAP



MAP 8: STROUD TOWN MAP



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SES RESPONSE ARRANGEMENTS FOR GREAT LAKES

Volume 3 of the Mid Coast Local Flood Plan

CONTENTS

Chapter 1: Flood Warning Systems and Arrangements

- *Dissemination options for NSW SES flood information and warning products.*
- *Gauges monitored by the NSW SES within the LGA.*

Chapter 2: SES Locality Response Arrangements

- *NSW SES flood response arrangements by individual sector within the LGA.*

Chapter 3: SES Dam Failure Arrangements

- *Not Applicable*

Chapter 4: SES Caravan Park Arrangements

- *Arrangements for the Evacuation of flood liable Caravan Parks within the LGA.*
- *Specific arrangements for individual parks likely to be affected by flooding.*

VERSION LIST

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

Description	Date
Great Lakes Local Flood Plan as amended	December 2011

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Mid North Coast Region Controller

NSW State Emergency Service

14 Arkwright Crescent, TAREE NSW 2430

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

Amendment Number	Description	Updated by	Date

GREAT LAKES FLOOD WARNING SYSTEMS AND ARRANGEMENTS

Chapter 1 of Volume 3 (NSW SES Response Arrangements for Great Lakes) of the Mid Coast Local Flood Plan

Last Update: March 2017

AUTHORISATION

Great Lakes: Flood Warning Systems and Arrangements has been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Mid North Coast Region Controller

Date: 2.3.17

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1. GAUGES MONITORED BY THE NSW SES GREAT LAKES LOCAL HEADQUARTERS

Table 1: Gauges monitored by the NSW SES Great Lakes Local Headquarters

Wallis Lake Catchment									
Gauge name	**Type**	**AWRC No**	**Bureau/DPI Gauge No.**	**Stream**	**MIN**	**MOD**	**MAJ**	**Special Reading Arrangements**	**Owner**
Wallamba River at Nabiac	Tele	209404	560048	Wallamba River downstream of Nabiac	n/a	n/a	n/a	None	PWS
Wang Wauk at Willna	Tele		560049	Wang Wauk River (infow to Wallis Lake)	n/a	n/a	n/a	None	
Coolongolook at Coomba Park	Tele		560059	Coolongolook River (infow to Wallis Lake)	n/a	n/a	n/a	None	
Wallis Lake at Tuncurry	Tele	209401	560053	Wallamba River (infow to Wallis Lake)	n/a	n/a	n/a	None	
Wallis Lake at Tuncurry (Point Road) * ‡	Tele		560057	Wallis Lake	0.9	1.5	1.9	NSW SES	Council
Wallis Lake at Tiona	Tele	209403	560055	Wallis Lake	n/a	n/a	n/a	None	PWS
Wallis Lake at Forster	Tele		560044	Wallis Lake	n/a	n/a	n/a	None	PWS
Tarbuck Bay	Tele		209465	Smiths Lake	n/a	n/a	n/a	None	MHL

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

Myall Catchment									
Gauge name	**Type**	**AWRC No**	**Bureau/DPI Gauge No.**	**Stream**	**MIN**	**MOD**	**MAJ**	**Special Reading Arrangements**	**Owner**
Mayll River at Upper Markell	Tele		560056	Myall River	n/a	n/a	n/a	None	
Myall River at Markwell	Tele	209007	561104	Myall River	n/a	n/a	n/a	None	DWR
Crawford River at Bulahdelah	Tele		560058	Crawford River (inflow to Myall)	n/a	n/a	n/a	None	MHL
Myall River at Bulahdelah * ‡	Tele	209460	560040	Myall River	3.0m			NSW SES	PWS
Myall River at Bombah Point	Tele		209475	Bombah Broadwater	n/a	n/a	n/a	None	MHL
Myall River at Tea Gardens	Tele		209480	Water level at enterance of Myall River	n/a	n/a	n/a	NSW SES	MHL
Shoal Bay	Tele		561153	Water level southern shore of Port Stephens	n/a	n/a	n/a	None	

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

Karuah River Catchment									
Gauge name	**Type**	**AWRC No**	**Bureau/DPI Gauge No.**	**Stream**	**MIN**	**MOD**	**MAJ**	**Special Reading Arrangements**	**Owner**
Mammy JR @ Pikes Crossing	Tele		209002	Mammy Johnsons River	n/a	n/a	n/a	None	DPI
Karuah River at Dam Site	Tele		561106	Karuah River (upstream of Stroud)	n/a	n/a	n/a	None	
Karuah River at Booral	Tele		561040	Karuah River (downstream of Stroud)	n/a	n/a	n/a	None	

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

.

2. DISSEMINATION OPTIONS FOR NSW SES FLOOD INFORMATION AND WARNING PRODUCTS

The NSW SES Mid North Coast Region Headquarters will distribute NSW SES Flood Bulletins, General Media Releases, Flood Advice, Evacuation Warnings and Evacuation Orders via Social Media and through the following regional media outlets and agencies:

Television Stations:

Station	Location
Southern Cross Ten	Coffs Harbour
Prime	Newcastle
NBN	Newcastle
ABC	Sydney

Radio Stations:

Station	Location	Frequency	Modulation
2RE	Taree	100.3	FM
Great Lakes FM	Forster	105.1	FM
ABC Newcastle	Newcastle West	1233	AM
ABC Mid North Coast	Port Macquarie	95.5	FM
2HD	Sandgate	1143	AM
NEW FM	Sandgate	105.3	FM
KO-FM	Charlestown	102.9	FM
NX-FM	Charlestown	106.9	FM
2NUR-FM	Callaghan	103.7	FM

Newspapers:

Name	Location
Manning River Times	Taree
Great Lakes Advocvate	Forster
Port Stephens Examiner	Raymond Terrace
Myall Coast Messenger	Tea Gardens
Stroud Community Web	Stroud

Other Agencies:

Flood bulletins will be issued by the Region Headquaters to the following;

- Region Emeregency Management Officer (REMO)
- Local Emergency Operations Controller (LEOCON)
- Local Emergency Management Office (LEMO)
- Community Service NSW – District Manager (CS)
- NSW Ambulance – Operation Centre Newcastle (for distribution to own stations)
- NSW Police Force – Operations Centre Newcastle (for distribution to own stations)
- Fire and Rescue NSW – Operations Centre Newcastle (for distribution to own stations)
- Essential Energy
- NSW Rural Fire Service
- Hunter New England Health
- NSW Police Force – Gloucester
- Department of Primary Industries
- Transport for NSW

Emergency Alert (EA):

Predefined areas for utilising EA have been developed for Great Lakes

GREAT LAKES: NSW SES LOCALITY RESPONSE ARRANGEMENTS

Chapter 2 of Volume 3 (NSW SES Response Arrangements for the former Great Lakes LGA) of the Mid Coast Local Flood Plan

Last Update: March 2017

AUTHORISATION

NSW SES Locality Response Arrangements in the former Great Lakes LGA has been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Mid North Coast Region Controller

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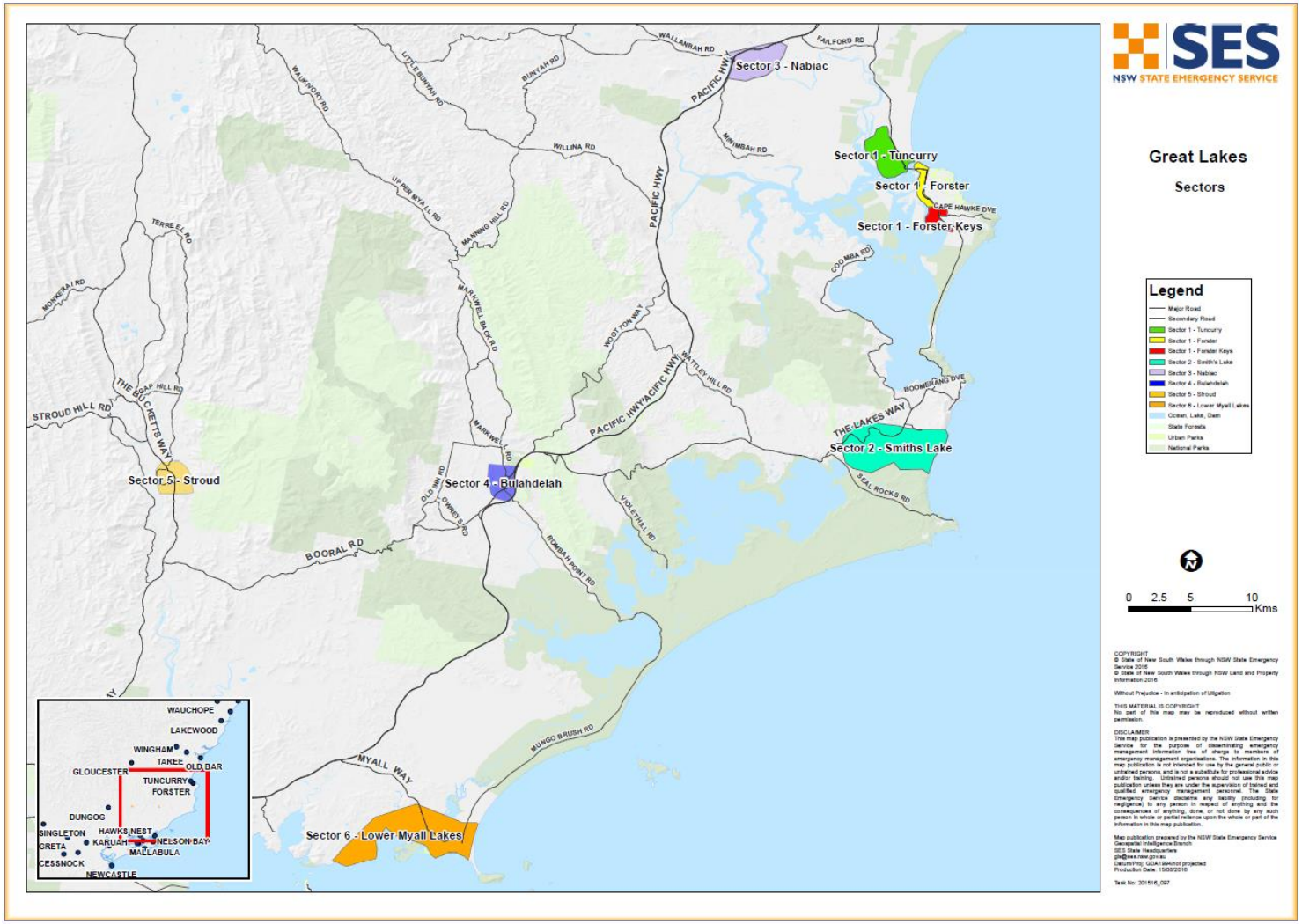
SECTOR OVERVIEW

Table 1: Overview of Sectors in the former Great Lakes LGA. These Sectors provide further detail of the planned response strategies within Communities in the former Great Lakes LGA. The sectors are based on geographic communities.

Sector Name	Key triggers	Warning strategy	High risk areas	Flood risk	Total properties (1)	Properties potentially at risk (extreme)
Tuncurry, Forster	Wallis Lake at Point Road gauge predicted to reach or exceed 1.3 m –first stage of evacuations completed by this height. Second stage of evacuations completed by 1.5 m.	Pre-emptive evacuation warnings and orders based on riverine triggers.	Point Road – Tuncurry Taree, Beach and Wharf Street areas – Tuncurry Forster Keys	Ocean/Storm Surge (tides/swells) Riverine (Wallamba, Wang Wauk, Wallingat and Coolongolook Rivers).	8308	3021
Smith's Lake	Smith's Lake water levels at Tarbuck Bay Gauge reach or exceed 1.9 m and failure to mechanically open the entrance.	Isolation advice for holiday parks, UNSW Field centre and Dogwood Road residents	Bushland and Sandbar Holiday Parks UNSW Field Study Centre Dogwood Road residents	Ocean/Storm Surge (tides/swells) Failure to mechanically open entrance of lake to ocean.	597	34
Nabiac	Observed rises in local creeks plus rises in the Wallamba River (Wallamba River at Nabiac gauge reach or exceed 6.0 m). Evacuations completed under these circumstances.	Evacuation of low lying properties in Nabiac	Clarkson and Nabiac Streets	Town, Wooster's and Pipeclay Creeks Wallamba River in large events.	544	115
Bulahdelah	Myall River at Bulahdelah gauge predicted to reach or exceed 3.5 m, first stage of evacuations completed by this height. Second stage of evacuations completed by 4.8 m.	Pre-emptive evacuation warnings and orders based on riverine triggers	Western side of the town	Riverine from Myall and Crawford Rivers. Flash flooding.	589	120
Stroud	Flood Watches for Myall and or Karuah River	Inclusion in Flood Watches as reminder for Stroud	Showground Cowper Street (Bucketts	Mill and Lamans Creeks and Karuah River in large	376	27

	catchments. Severe weather warning(s) for heavy rain.	residents about the areas flash floods risk as per the April 2015 event.	Way between Stroud Lodge and Mill Creek Road). North east section of Briton Court Road.	events. Flash flooding.		
Tea Gardens, Hawks Nest, Pindimar	Consideration of storm surge, high tides, current/ predicted rainfall and rates of rise – together with: Bombah Broadwater at Bombah Point by 3.0m and Myall River at Tea Gardens by 1.4m - evacuations completed by these heights.	Pre-emptive evacuation warnings and orders based on triggers.	Tea Gardens Peninsular (Marine Parade), Low foreshore areas of Hawks Nest and South (Lower) Pindimar.	Ocean/storm surge, riverine effects very low south of Monkey Jacket.	1662	121

1.1. SECTOR OVERVIEW MAP



2. BULAHDELAH SECTOR

2.1. BULAHDELAH RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in former Great Lakes LGA for more information about this Community.

Sector Description	Bulahdelah is situated 235 kilometres (km) north of Sydney along the eastern and northern banks of the Myall River, approximately 480 metres (m) east of the confluence of the Myall and Crawford rivers. The eastern sector of the township is built on the foot of the Alum Mountain. Even in minor floods low lying parts of the town are susceptible inundation and warning times for rises in the Myall can be quite limited (April 2015 event). The Myall River has a catchment area of 365 km^2 at the Pacific Highway. The Crawford River, its major tributary, has a catchment area of 125 km^2 (2).					
Hazard	Bulahdelah is situated near the confluence of the Myall and the Crawford Rivers meaning that floodwater generated from either catchment has the potential to cause flooding. The town is affected by flooding from both the Myall River and drainage paths transferring water from the eastern of the urban area and the urban area itself to the Myall River on the west as well as flash flooding (2). Flooding at Bulahdelah has come within 0.1-0.5m of the 1% AEP flood on 3 noted occasions in 1897 (5.5m), 1927 (5.1m) and 1947 (4.7m) (3). The most severe flood recorded on the Myall River at Bulahdelah was in 1897 when more than a third of the present town area was inundated. Recently there has been minor to moderate flooding in 2015 and 2016. Major floods can have a reasonable impact on the town resulting in significant damage and the need for a number of dwellings to be evacuated (2).					
Flood Affect Classification	Rising Road Access					
At risk properties	120	**Total number of properties within Sector/Community**		589		
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** NSW SES will conduct storm and flood operations in the sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS). An Incident Control Facility will be established at the NSW SES Nabiac Unit, Clarkson Street, Nabiac. For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the Local Controller Nabiac Unit Controller becoming a Division Commander. In large scale events the Mid Coast Council Emergency Operations Centre Facility (Tuncurry) may provide facilities for incident control separate to a supporting Emergency Operations Centre.					
Key Warning Gauge Name	**Name**	**Watercourse**	**AWRC No.**	**Min (m)**	**Mod (m)**	**Maj (m)**
	Myall River at Upper Markwell	Myall River	560056	n/a	n/a	n/a
	Myall River at Markwell	Myall River	561104	n/a	n/a	n/a
	Myall River at Bulahdelah	Myall River	560040	3.0m	n/a	4.5m

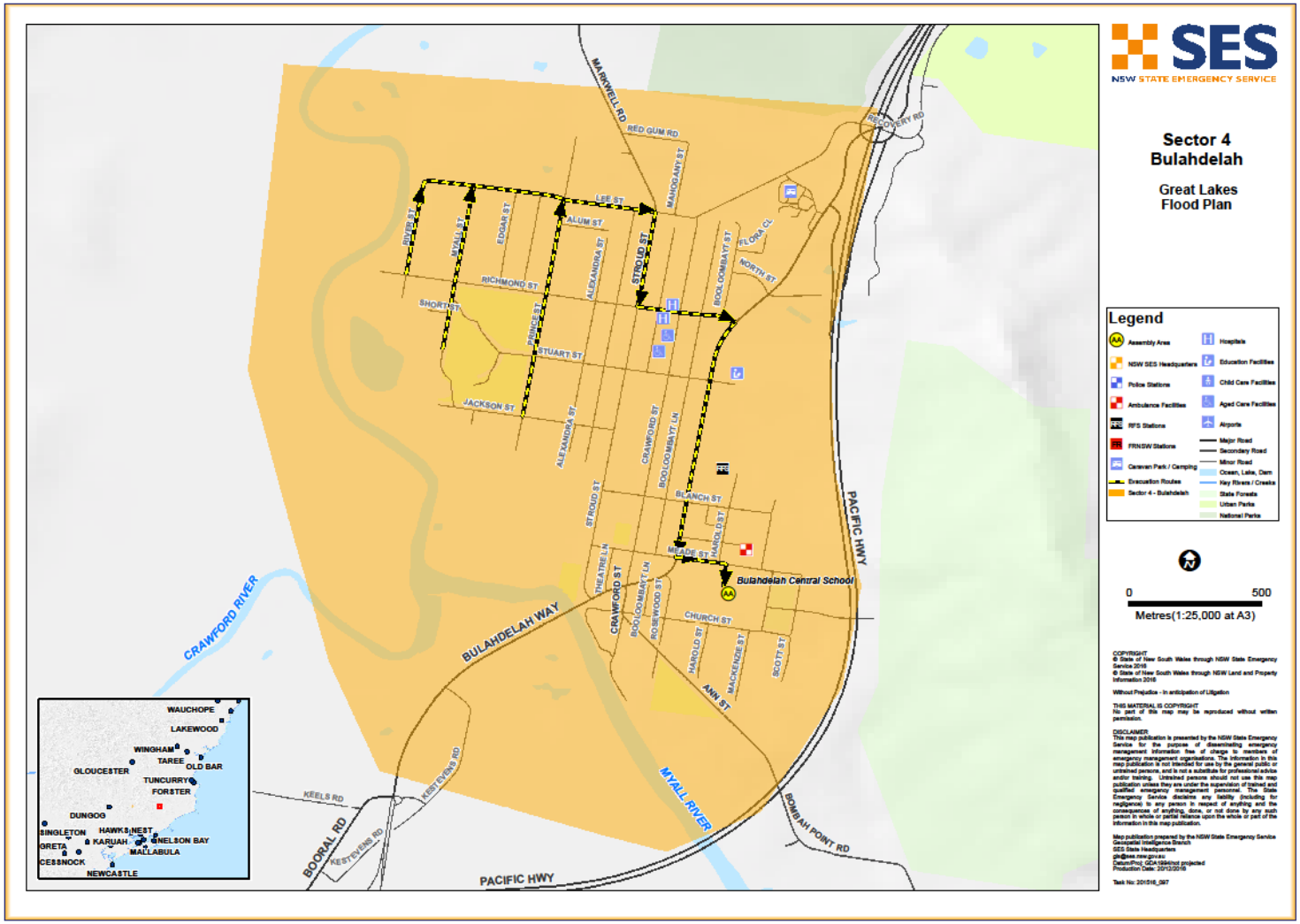
	Crawford River at Bulahdelah	Crawford River	560058	n/a	n/a	n/a
Key Rain Gauges	Crawford (Station Number - 560048)					
	Markwell (Station number – 561104)					
	Bulahdelah (Station number – 560040)					
	Cabbage Tree Mountain (Station number – 60099)					
General Strategy	**Property protection measures** ▪ Based on requests for assistance from 132 500 **Evacuation of at risk population:** ▪ At risk residents will be door knocked by NSW SES, RFS and other emergency personnel and advised on the evacuation details. ▪ Primarily self-evacuation by private transport to family and friends outside the flood affected area. ▪ Primarily self-evacuation by private transport to nominated assembly areas. **Establishment of an Assembly Area at:** ▪ Bulahdelah Central School, 8 Meade Street, Bulahdelah *Where a major PMF occurs evacuees will either remain at the assembly area or an established evacuation centre until the threat has past.* **Rescue**					
Key Risks / Consequences	**Inundation** Potential threats to people's safety and property from riverine flooding from the Myall River and overland flows from drainage causing inundation. Inundation of Bulahdelah occurs in the western part of the town that is located near the Myall River. Early and possible rapid inundation of the Lions Park Camping ground on the western bank of the Myall River poses threats to user's safety. Flooding from the Myall River around 5.5 m will inundate around 45 houses and 7 non-residential properties (2). **Isolation** Land in Bulahdelah township to the east of the old Pacific Highway and north of the bridge over the Myall will not be affected by flooding from the Myall in all river events, including an extreme flood events (2). Those areas on the western side of the town that are subject to inundation do have rising road access. The difficulties posed by flood waters in these low western areas of the town during an evacuation should be slight as alternative routes to the evacuation centre exist (3). **Interruption to electricity supply** In recent minor to moderate flood events in April 2015 and January 2016 power supply to some sections of the town was disputed for a number of hours.					
Information and Warnings	**The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:** ▪ Flood Watch ▪ Flood Bulletins ▪ Evacuation Warning ▪ Evacuation Order					

	▪ Sequenced door knocking of evacuation sectors ▪ Media announcements ▪ Social Media use ▪ Emergency Alert (SMS, Landlines) ▪ SEWS
Property Protection	***Specific property protection measures:*** ▪ Monitoring rising flood waters. ▪ Relocation of livestock. ▪ Relocation of farm machinery and valuable goods ▪ Control of surface water through sandbagging measures. ▪ Assist in the lifting of furniture to residents in need. ▪ Monitoring integrity of dwellings surrounded by flood waters. Property protection measures are limited due to the nature of flooding (i.e. flash flood /fast rising / depths of flooding).
	Protection of essential infrastructure: Bulahdelah substations may require protection in floods equal to or greater than 5.5 metres at Bulahdelah.
Evacuation and/or Isolation Triggers	The key evacuation triggers based on Bureau of Meteorology flood height predictions at the **Myall River at Bulahdelah Gauge** (560040): **1. Flood watch or minor flood warning for the Myall River or severe weather warning for flash flood risk in the area** Targeted evacuation of Lions Park on the western bank of Myall River **2. Prediction to reach and/or exceed 3.5m.** Targeted evacuation of low lying properties in and around the following streets must be complete by this height: ▪ Myall Street ▪ Richmond Street (West of Alexandra Street) ▪ Stuart Street (West of Alexandra Street) ▪ Stroud Street (South of Stuart Street) ▪ Blanch Street (West of Crawford Street) ▪ Prince Street (South of Richmond Street) ▪ Jackson Street ▪ Alexandra Street (South of Stuart Street) ▪ Bulahdelah Showground Route: Residents in affected areas to travel east using Lee, Richmond, Stuart, Jackson and Blanch Streets to Assembly Area at Bulahdelah Central School (8 Meade Street). **3. Prediction to reach and/or exceed 4.80m.** Targeted evacuation of low lying properties in and around the following streets must be completed by this height: ▪ Prince Street (South of Alum Street) ▪ Alexandria Street ▪ Crawford and Stroud Streets between Jackson and Meade Streets Route: Residents in affected areas to travel east using Lee, Stuart and Blanch Streets to Assembly Area at Bulahdelah Central School (8 Meade Street)

	An event of a 5.5 m is likely to result in approximately 52 properties experiencing over floor inundation.
Sequencing of evacuation	Evacuation sequencing will be based on the above triggers for evacuation. The aged care facility, schools and community health campus/small hospital are located outside of the predicted of the 5.5 m and Possible Maximum Flood extents (6.8m).
Evacuation Routes	General strategy will be for affected residents and visitors to use roads traveling east to access higher ground and evacuation/assembly areas on the eastern side of the town.
Evacuation Route Closure	The western area of Bulahdelah is the area affected by flood waters. Inundation of low lowing sections of these streets can begin at 2.0 metres at Myall River at Bulahdelah gauge. Majority of these streets are undulating in nature with high and low points that provide rising road access.
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures ▪ Evacuation/Relocation information to residents disseminated via broadcast media, social media and via doorknock (depending on available resources)
Evacuation Centre/Assembly Point	**People should be encouraged to stay with friends/relatives outside the flood affected areas of Bulahdelah.** Where this is not possible the nominated Assembly Area/Evacuation Centres is: ▪ Bulahdelah Central School, 8 Meade St, Bulahdelah
Large scale evacuations	When large-scale evacuations are likely, NSW SES Mid Coast Local Controller Local Controller will liaise with the Local Emergency Management Committee and request the deployment of additional transportation resources into Bulahdelah.
Rescue	Accredited flood rescue technicians from NSW SES and other agencies will undertake Flood Rescue operations as per the Flood Rescue Operations Policy and Incident Action Plan for the event. **There is no NSW SES Unit in Bulahdelah. In the event of predictions for severe weather and riverine flooding for Bulahdelah, it is possible that NSW SES Mid North Coast Region will seek to deploy out of area flood rescue resources into Bulahdelah**.
Resupply	**Resupply will be provided by the NSW SES through the 132500 call out system.** The town of Bulahdelah has rising road access so protracted resupply operations in the sector are unlikely.
	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1
Aircraft Management	***Helicopter Landing Points:*** Suitable landing points are located at: ▪ Sports oval at Bulahdelah Central School, 8 Meade St, Bulahdelah (-32.413, 152.210) ▪ Sport oval at St Joseph's Primary School, Bulahdelah Way, Bulahdelah (-32.406, 152.213) Note – Bulahdelah Showground is located on the western side of the town in flood prone land next to Myall River.
	Airports: ▪ No airport exists at Bulahdelah ▪ In the event that aviation resources are required to support flood operations,

	it is likely that aircraft would operate out of the Taree Airport . ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43 m.
Other	**Special considerations relating to the evacuation:** ▪ Closure of Schools –the NSW SES will coordinate closures through the school principals on each affected school. ▪ Evacuation of residential institutions, nursing homes and aged care facilities will occur where these are threatened by predicted flood waters. ▪ Security. Police patrols to be established to maintain law and order after evacuation has occurred. ▪ Bulahdelah has 2 peak seasons with potential for in population increases: (1) School Holidays – December/ January (2) Easter Holidays – March /April (3) Bulahdelah Rock, Rattle and Roll Festival – first weekend in November These arrangements will stay in place until the ALL CLEAR is provided by the NSW SES to residents to return to their premises.

2.2. BULAHDELAH SECTOR MAP



3. NABIAC SECTOR

3.1. NABIAC RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Mid Coast for more information about this Community.

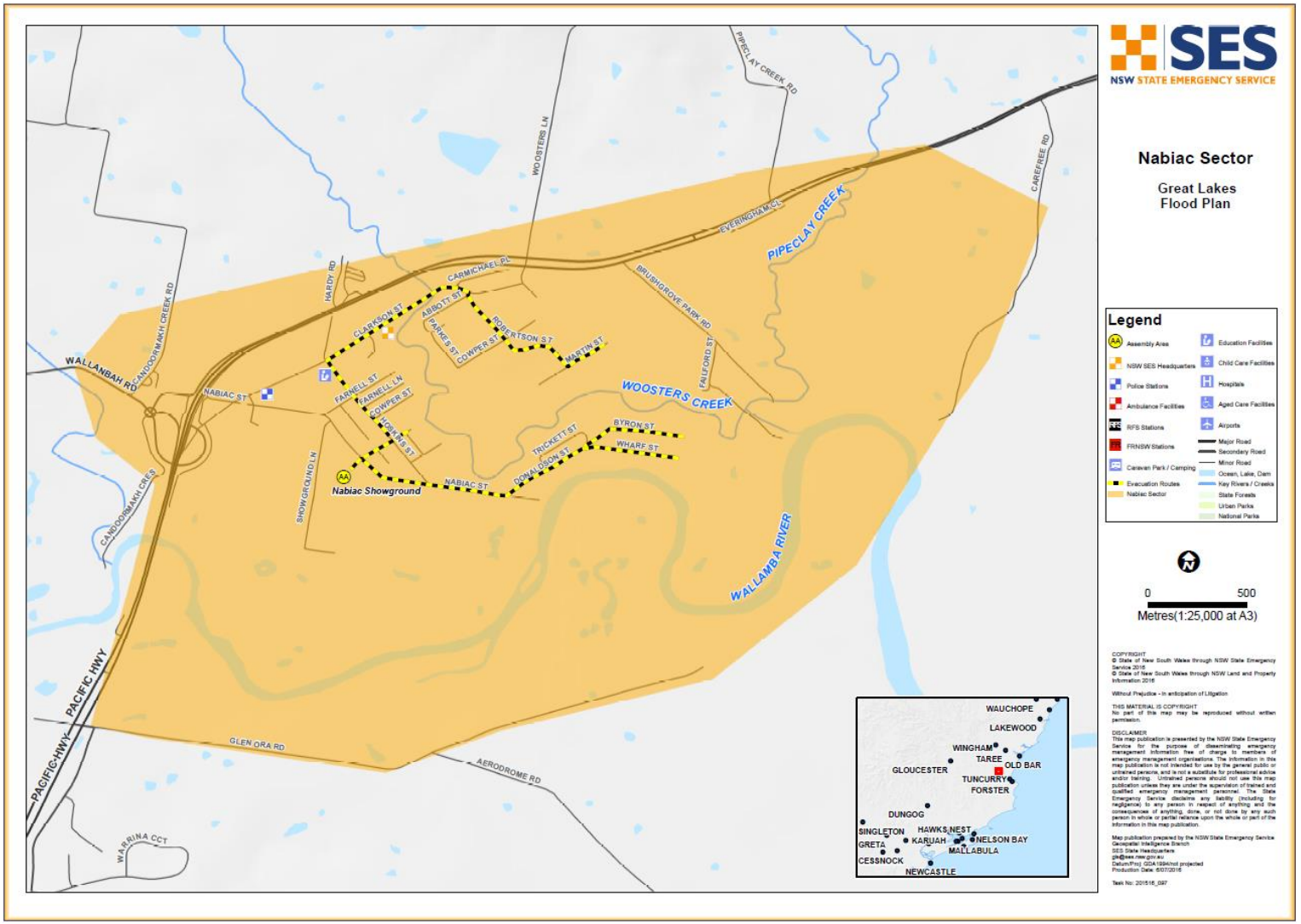
Sector Description	Nabiac is a small town situated 29 km south of Taree. The village is located within the Mid Coast Council local government area and is approximately 281 km north of Sydney and is situated near the Wallamba River. Land use within the village comprises mainly low density residential development with commercial buildings in the north-west part of the town. The Wallamba River flows in an eastwards direction passing approximately 1 km to the south of Nabiac, with a contributing upstream catchment area of approximately 325 km^2, out of a total area of 495 km^2 including the southern section to Wallis Lake.		
Hazard	Three creeks (Town, Wooster's and Pipeclay) flow from a northerly direction southwards through the town and into the Wallamba River. The highest risk areas, in terms of risks to property and life, are focused around Clarkson Street, around the crossings of Town Creek and Wooster's Creek (4). Town Creek tends to be controlled by a set of pipe culverts near the Industrial area, which can cause a backwater to form along Nabiac Street and Clarkson Street. Flooding at Nabiac (Wallamba River) has not occurred for a number of years. However significant local floods at Nabiac occurred in 1927, 1929, 1947, 1957, 1978, 1983, 2002 and 2007 (4). The flood of 1927 on the reach from Nabiac to Failford peaked at levels higher than would be expected in the 1% AEP event; that is, there is a less than 1% chance each year of a flood of a severity of that of 1927 occurring there. The most severe flooding in recent times occurred in February 2002, as a result of intense (with a rainfall ARI of approximately 100 years 21.6mm/hr over 9 hours) local rainfall and elevated Wallamba River levels (5). There are several historical recorded floods on the Wallamba River that resulted in flood heights at Nabiac Bridge above 7 mAHD, high enough to cause backwater flow up Town Creek as far as Clarkson Street (5).		
Flood Affect Classification	In an event that features flooding from the Wallamba River plus local catchment run off, sections of Nabiac have the following flood affect\classifications (5): ▪ Southern section of Nabiac – Low Flood Island ▪ Northern section of Nabiac – Rising Road Access ▪ Western section of Nabiac – Overland Refuge on High Flood Island or High Trapped permitter area. ▪ Clarkson Street Area – High Trapped Perimeter All of Nabiac becomes a Low Flood Island in an extreme flood, including major rises on the Wallamba River (4).		
At risk properties in an extreme flood	115	**Total number of properties within Sector/Community**	544
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** NSW SES will conduct storm and flood operations in the sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS). An Incident Control Facility will be established at the NSW SES Nabiac Unit, Clarkson Street, Nabiac. For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the		

<table>
<tr><td></td><td>Local Controller Nabiac Unit Controller becoming a Division Commander.
In large scale events the Mid Coast Council Emergency Operations Centre Facility (Tuncurry) may provide facilities for incident control separate to a supporting Emergency Operations Centre.</td></tr>
<tr><td>Key Warning Gauge Name</td><td>
<table>
<tr><th>Name</th><th>Watercourse</th><th>AWRC No.</th><th>Min (m)</th><th>Mod (m)</th><th>Maj (m)</th></tr>
<tr><td>Wallamba River at Nabiac</td><td>Wallamba River</td><td>209404</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
</table>
The Bureau of Meteorology monitors the Wallamaba River catchment via an ALERT rainfall gauge and two river height gauges near Nabiac, primarily using this information for flood warning at Wallis Lake rather than to provide detailed flood warnings for Nabiac (5).
There is no warning system currently in place for the three local creek catchments with current weather forecast technology not being sufficient to accurate provide lead times for responding to such floods.</td></tr>
<tr><td>Key Rain Gauge</td><td>Nabiac (Station number - 560048)</td></tr>
<tr><td>General Strategy</td><td>Property protection measures.
Based on requests for assistance from 132 500
Evacuation of at risk population:
At risk residents may be door knocked by NSW SES, RFS and other emergency personnel and advised on the evacuation details.
Primarily self-evacuation by private transport to family and friends outside the flood affected area.
Establishment of an Assembly Area at:
Nabiac Showground, Showground Lane, Nabiac
Rescue</td></tr>
<tr><td>Key Risks / Consequences</td><td>Inundation
Properties in Wharf, Byron, Donaldson, Martin and Stuart Street and at the intersection of Nabiac and Clarkson Streets can be affected in floods below t5.8m at the Nabiac Street gauge on Town Creek (4).
Of particular concern is the Donaldson Street area which can be isolated prior to being flooded.
In 5.8m flood at Nabiac Street gauge, 7 houses, and 2 non-residential buildings may be flooded above floor.
In extreme floods (7.6 m at Nabiac Street gauge) much of the town west of Parkes Street and south of Cowper Street can be inundated in Nabiac (77 buildings).
Isolation
In floods approximating the magnitude of 6.5m at Nabiac Street gauge a floodwaters can cross Nabiac Street and flow towards the Town Creek cutting the town in two.
The town’s main evacuation centre, the showground is a high flood island being isolated around 6.5m at Nabiac Street gauge (4).</td></tr>
<tr><td>Information and Warnings</td><td>The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:
Flood Watches for Wallamba River and Wallis Lake
Flood Bulletins for Wallamba River
Provision of flood advice about evacuation of residents in large flood events to an Assembly Area at the Nabiac Showground
Sequenced door knocking of low lying properties in Nabiac that may need to evacuate during large events</td></tr>
</table>

	▪ Media announcements ▪ Social media ▪ Possible use of Emergency Alert System ▪ Liaison between key community stakeholders and the NSW SES Nabiac Unit
Property Protection	***Specific property protection measures:*** ▪ Monitoring rising flood waters. ▪ Relocation of livestock. ▪ Relocation of farm machinery and valuable goods ▪ Control of surface water through sandbagging measures. ▪ Assist in the lifting of furniture to residents in need. ▪ Monitoring integrity of dwellings surrounded by flood waters. Proactive property protection measures are limited due to the flash flood nature of the local creek systems, lack *of* local warning systems and scarcity of emergency service resources.
	Protection of essential infrastructure: Emergency Services in located in Clarkson Street Nabiac such as RFS, NSW SES and Police buildings are at risk of flooding in an extreme event. The Telstra phone exchange, sewerage pump station and a number of electricity substations are threatened with inundation in 1% AEP (5.8 m at Nabiac Street gauge) and Probable Maximum Flood (PMF) events.
Evacuation and/or Isolation Triggers	The key evacuation triggers for Nabiac sector include: ▪ Heavy rainfall in the local catchment leading to rises in Town, Wooster's and Pipeclay Creeks causing flash flooding. ▪ Rises in the Wallamba River causing riverine/backwater flooding. **Evacuations** Although there is a river level gauge on the Wallamba River it should be noted that no warnings are available for Wallamba River at Nabiac and there are no warning systems on local creeks (5). For large floods on the Wallamba River it may be necessary to evacuate residents, with low flood islands as priority areas (5). **Should the Wallamba River at Nabiac Gauge reach or exceed the estimated moderate height of 9.5 metres, combined with elevated local creek levels - NSW SES would issue a Flood Advice – suggesting that residents in the low lying properties in the following streets may choose to self-evacuate to the Nabiac Showground where an Assembly Point has been established:** Wharf, Byron, Donaldson, Trickett, Martin, Stuart Street, Farnell, Hoskins Street, Nabiac and Clarkson Streets
Sequencing of evacuation	Southern end of Nabiac as a low flood Island would be a priority area in terms of initiating evacuations. Evacuation of the Nabiac Public School, Nabiac Kids Shack, and Nabiac Pre School would also be prioritised.
Evacuation Routes	General strategy will be for affected residents and visitors to use Nabiac Street and Showground Lane to access higher ground and evacuation/assembly area at the Nabiac Showground.
Evacuation Route Closure	Evacuation routes may become inundated in the event of combined flash flooding from local creeks plus large scale riverine flooding from the Wallamba River.
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures ▪ Evacuation/relocation information to residents disseminated via broadcast

	media, social media and via doorknock (depending on available resources)
Evacuation Centre/Assembly Point	**People should be encouraged to stay with friends/relatives outside the flood affected areas of Nabiac.** Where this is not possible the nominated Assembly Area is: ▪ Nabiac Showground, Showground Lane, Nabiac
Large scale evacuations	If *large-scale evacuations are* required, NSW SES Mid Coast Local Controller can *liaise with the Local Emergency Management Committee and request the deployment of additional resources* into *Nabiac.*
Rescue	**The NSW SES Nabiac Unit will undertake Flood Rescue operations as per the Flood Rescue Operations Policy and Incident Action Plans for the event.** Large scale rescues are considered unlikely in this sector due to the characteristics of flooding in the area. i.e. Incremental/low velocity/lack of over floor residential property inundation.
Resupply	**Pre-positioning of flood rescue resources** ▪ NSW SES level 3 flood rescue resources are limited in the Nabiac area ▪ On receiving a severe weather warning for heavy rain and a flood watch for Wallamba River/Wallis Lake, and/or the Myall catchment, that consideration be given to requesting OOAA flood rescue resources. **Nabiac Unit assisting Stroud Unit in Flood operations at Bulahdelah** ▪ As there is no NSW SES Unit at Bulahdelah, NSW SES Nabiac Unit can be called upon to support storm and flood field operations in the Bulahdelah sector. **Resupply will be provided by the NSW SES through the 132 500 request for emergency assistance system.** ▪ Large scale prolonged resupply operations are considered unlikely in this sector. ▪ Requests for resupply in the sector would be more likely to come from nearby rural properties isolated by flash flood waters/rises in the Wallamba River.
	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1
Aircraft Management	***Helicopter Landing Points:*** Suitable landing points are located at: ▪ Nabiac Showground, Showground Lane, Nabiac (-32.102, 152.383) Due to the limited Airport facilities in the sector, aviation management would be coordinated from Taree Airport.
	Airports: ▪ No airport exists at Nabiac ▪ In the event that aviation resources are required to support flood operations, it is likely that aircraft would operate out of the Taree Airport. ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43m.
Other	Nabiac is a stopover point for people travelling along the Pacific Highway, which can result in an increase in the number of people in Nabiac. No other considerations have been noted.

3.2. NABIAC SECTOR MAP



4. SMITHS LAKE SECTOR

4.1. SMITHS LAKE RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Mid Coast for more information about this Community.

Sector Description	Smith's Lake is a small village in the Mid North Coast region, located within the Mid Coast Council local government area, approximately 274 km north of Sydney. The township of Smiths Lake is located on the northern side of the Smiths Lake itself. A number of other villages boarder the lake including Tarbuck Bay and parts of Bungwahl. Within the sector there are also two caravan parks (Sandbar and Bushland) and a University research centre at Horse Point. Drawing its catchment from within Wallingat National Park and the Wamwarra and Tarbuck creeks, Smiths Lake has a relatively small catchment area of 34 km^2 and a surface area of 12 km^2. The Lake is classified as an Intermittently Open and Closed Lake or Lagoon (ICOLL).		
Hazard	Flooding can occur along the foreshore areas of Smiths Lake and on the eastern edge of Symes Bay due to catchment rainfall and elevated ocean levels. An example of the type of weather system that can cause both elevated river/lake and ocean levels was the June 2016 East Coast Low. Most of the time the lakes entrance is closed to the ocean. Periodically the lakes entrance is opened mechanically by Council in accordance with floodplain management protocols. The current trigger for opening Smiths Lake is set at 2.1 mAHD, however the entrance can be opened any time from 1.9 mAHD.		
Flood Affect Classification	**Sandbar and Bushland Holiday Parks and Golf Course (low trapped perimeter area)** The residents and visitors to the Sandbar and Bushland holiday parks and golf course have been identified in the Smiths Lake Flood Risk Management Study as being vulnerable to isolation during major flood events due to the inundation of access roadways prior to floodwaters reaching permanent and temporary structures/buildings (6). Therefore the area in the holiday parks could be considered as a **low trapped perimeter area** as it is likely that the holiday parks (particularly Bushland Holiday Park) do not have enough land above the limit of flooding to cope with the number of people in the area (6). **Residents Dogwood Road (rising road access)** Residents of Dogwood Road (south western side of the Lake) are likely to experience inundation of access routes during minor flood events and when levels in Smiths Lake are high. However people in the area still have **rising road access** (6).		
At risk properties in an extreme flood	34	**Total number of properties within Sector/Community**	597
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** NSW SES will conduct storm and flood operations in the sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS). An Incident Control Facility will be established at the NSW SES Forster Pacific Palms Unit, Charlotte Bay Road, Charlotte Bay. For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the Local Controller Forster/Pacific Palms Unit Controller becoming a Division Commander. In large scale events the Mid Coast Council Emergency Operations Centre Facility		

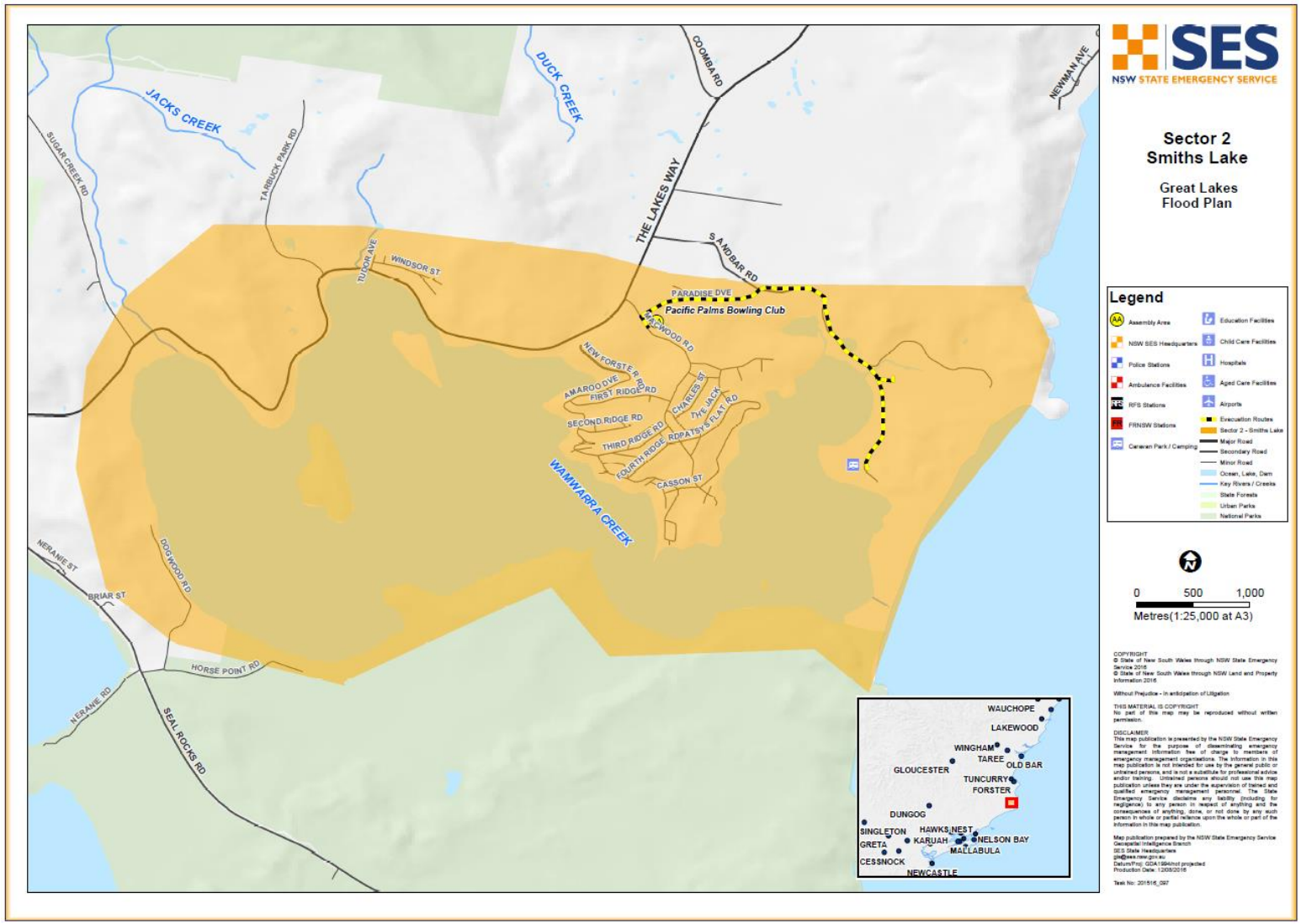
	(Tuncurry) may provide facilities for incident control separate to a supporting Emergency Operations Centre.
Key Warning Gauge	There are no river based warning gauges for this sector. The tributaries to the lake include Wamwarra and Tarbuck creeks. The creeks originate in the elevated areas of the Wallingat National Park. Water levels in Smiths Lake have been measured at the Manly Hydraulics gauge located at Tarbuck Bay (station number 209465).
Key Rain Gauges	Forster (Station number - 60013)
	Bungwahl (Station number – 60095)
General Strategy	**Property protection measures**: ▪ Based on requests for assistance from 132 500 **Warning of risk areas about potential isolation:** ▪ According to the Smiths Lake Flood Risk Management Study there are no residential properties inundated due to flooding in all events except for the PMF (3.5 mAHD) (6). ▪ It is not envisaged that large scale flood evacuations are required. ▪ Residents in Dogwood Road, UNSW Field Centre and Sandbar/Bushland Holiday parks will be encouraged to prepare for isolation which may also include self-evacuation. **Rescue**
Key Risks / Consequences	**Tarbuck Bay and Smith Lake** Results of flood modelling from the Smith Lake Floodplain Risk Management Study indicate that flood hazards in the villages of Smith Lake and Tarbuck Bay are relatively minor as most dwellings lie outside of the extent of the probable maximum flood (PMF) (6). Furthermore those properties that are affected in the PMF will still have rising road access allowing evacuation. The exception being the Frothy Coffee Boatshed at Smiths Lake. **Sandbar and Bushland Holiday Parks** The Symes Bay/eastern area of Smiths Lake is where the majority of floodplain inundation occurs (6). Within this area the Flood Risk Study has identified residents and visitors to the Sandbar and Bushland Holiday Park and Golf Course as being at risk of isolation due to inundated roads that would prevent evacuations. The Study suggest that in 2.6 mAHD floods the key access route (un sealed Sandbar Road) for the Sandbar and Bushland holiday parks is inundated at its lowest point approximately 2.5 hours after the commencement of rainfall in the catchment (6). During peak holiday season it is estimated that the combined capacity of the two caravan (Sandbar and Bushland) parks is approximately 800 people, utilising 200 camping/caravan sites. **Residents of Dogwood Road** Eight (8) properties along Dogwood Road on the south western foreshore of the Lake are likely to experience inundation of access routes (Dogwood Road) during minor flood events and when levels in Smiths Lake are high (6). **University of NSW Smiths Lake Field Study Centre** The field centre is located on Horse Point Road at the southern end of Smiths Lake. The one hectare property contains a number of buildings including a 56 bed dormitory facility and has been identified in the Smiths Lake Flood Risk Management Study as being potentially at risk from flooding. However it is envisaged that staff and visitors at the Centre would have rising road access to evacuation along Uni Road (6).

	The above risks are likely to be increased in the event of a failure to mechanically open the entrance of the Smiths Lake to the ocean.
Information and Warnings	**The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:** ▪ Flood Watches for Myall Lake ▪ Media announcements ▪ Social media ▪ Possible use of Emergency Alert System ▪ Liaison between key community stakeholders and the NSW SES Forster Pacific Palms Unit
Property Protection	***Specific property protection measures:*** ▪ Monitoring rising flood waters. ▪ Relocation of livestock. ▪ Relocation of farm machinery and valuable goods ▪ Control of surface water through sandbagging measures. ▪ Assist in the lifting of furniture to residents in need. ▪ Monitoring integrity of dwellings surrounded by flood waters. Proactive property protection measures are limited due to the gradual and low velocity nature of ocean derived flood events in the area and the scarcity of emergency service resources.
	Protection of essential infrastructure: No known infrastructure at risk
Evacuation and/or Isolation Triggers	**The key isolation triggers are based on:** ▪ Manly Hydraulics Tarbuck Bay water level gauge (station number 209465). ▪ Predictions for above average astronomical tides high tides ▪ Predictions for damaging surf above 2 metres ▪ Severe weather warnings for heavy rainfall **Triggers for issuing isolation advice:** NSW SES may issue flood isolation advice for the following areas/facilities: ▪ Sandbar and Bushland Holiday Parks ▪ Residents of Dogwood Road – Smiths Lake ▪ The UNSW Field Study Centre – Horse Point This local flood advice will be in the form of a media release that will advise residents/visitors to these facilities about the potential for isolation. The issuing of this advice will be carried out by NSW SES Mid North Coast Region in consultation with the Mid Coast Local Controller, Mid Coast Council and community stakeholders. The advice can be issued when: ▪ Water levels in Smith Lake at the Tarbuck Bay gauge reach 1.9 mAHD (trigger for mechanical opening of the lake). ▪ Predictions for above average astronomical tides ▪ Predictions for damaging surf above 2 metres ▪ Severe weather warnings for heavy rainfall ▪ A failure to open the lake entrance
Sequencing of	Evacuations in this sector are considered unlikely.

evacuation	However in the event of a failure to mechanically open Smiths Lake combined with continued heavy rain, storm surge and abnormally high tides, it maybe become necessary to evacuate the Sandbar and Bushland Holiday Parks.
Evacuation Routes	Evacuation route for Sandbar and Bushland Holiday Parks is via Sandbar Road, Paradise Drive and then Macwood Road to Pacific Palms Bowling Club.
Evacuation Route Closure	During a 2.6 mAHD the key access route (un sealed Sandbar Road) for the Sandbar and Bushland holiday parks is inundated at its lowest point approximately 2.5 hours after the commencement of rainfall in the catchment (6).
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures. ▪ Evacuation/relocation information to residents of the affected areas will be disseminated via broadcast media, social media, direct liaison with holiday park management and through doorknocks (depending on available resources).
Evacuation Centre/Assembly Point	**Assembly Area:** ▪ Pacific Palms Bowling Club - Lot 58 Macwood Road, Smiths Lake
Large scale evacuations	Large scale evacuations of this sector are considered unlikely. If large-scale evacuations are required of the Holiday Parks during peak season, NSW SES Mid Coast Local Controller can liaise with the Local Emergency Management Committee and request the deployment of additional resources into Smiths Lake.
Rescue	**Pre-positioning of flood rescue resources** ▪ NSW SES level 3 flood rescue resources are limited in the Forster/Tuncurry area. ▪ On receiving a severe weather warning for heavy rain and a flood watch for Wallamba River/Wallis Lake, and/or the Myall catchment, that consideration be given to requesting OOAA flood rescue resources. ▪ These resources would be deployed at the Forster/Pacific Palms Unit for tasking. **The Forster/Pacific Palms NSW SES Unit will undertake Flood Rescue operations as per the Flood Rescue Operations Policy.** Large scale rescues would be unlikely in this sector due to the characteristics of flooding in the area. i.e. Incremental/low velocity/lack of over floor residential property inundation.
Resupply	**Resupply will be provided by the NSW SES through the 132500 request for emergency assistance system.** ▪ Large scale prolonged resupply operations are considered unlikely in this sector. ▪ Villages of Smith Lake and Tarbuck Bay retain rising road access during 1% AEP events. ▪ Requests for resupply in the sector would be more likely to come from nearby rural properties isolated by flash flood waters or from the isolated Sandbar and Bushland Holiday Parks.
	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1
Aircraft Management	***Helicopter Landing Points:*** Due to the limited Airport facilities in the sector, aviation management would be coordinated from Taree Airport.

	Suitable landing points are located at: ▪ Pacific Palms Bowling Club – Lot 58 Macwood Road, Smiths Lake (-32.372, 152.500)
	Airports: ▪ No airport exists at Smith Lake. ▪ In the event that aviation resources are required to support flood operations, it is likely that aircraft would operate out of the Taree Airport. ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43 m.
Other	**Special considerations relating to sector management:** ▪ The Smiths Lake area has 3 peak seasons with potential for in excess of 10% population increase: (1) School Holidays – December/ January (2) Easter Holidays – March /April (3) School Holidays – September/October ▪ Liaison is required between NSW SES Incident Controller/Incident Management Team and Mid Coast Council around the mechanical opening of the lake entrance to the ocean. ▪ Liaison and planning is required with the management/ownership of the Sandbar and Bushland Holiday Parks

4.2. SMITHS LAKE SECTOR MAP



5. STROUD SECTOR

5.1. STROUD RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Mid Coast for more information about this Community.

Sector Description	Stroud is located 226 km north of Sydney in the heart of the Karuah Valley. Stroud town lies near the confluence of Mill and Lamans Creeks, which join approximately 1 km downstream from the centre of the township and then flow into the Karuah River. Stroud has a population of approximately 1022 residents.		
Hazard	Stroud can be flooded from Mill Creek and Lamans Creek (4). Mill Creek has a catchment area of 120 km^2 and Lamans Creek an area of 20 km^2 (7). Much of the flooding which takes place in Stroud occurs as flash flooding. The highest risk areas are properties located in the western and southern parts of Stroud around the confluences of Mill Creek and Mill Brook and Mill Creek and Lamans Creek. Mill and Lamans Creek have experienced several significant floods in the past century, although no regular flood records exist. Some recorded flood levels exist for Mill and Lamans Creek from February 1956, October 1985, June 2007 and April 2015, with the 1956 and 2015 events being remembered as the largest on record. Local anecdotal reports indicate that the April 2015 event was larger than the 1956 event.		
Flood Affect Classification	Rising Road Access		
At risk properties in an extreme flood	>27	**Total number of properties within Sector/Community**	376
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** NSW SES will conduct storm and flood operations in the sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS). An Incident Control Centre will be established at the NSW SES Stroud Unit, Booral Road, Booral. For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the Stroud Unit becoming a Division. In large scale events the Mid Coast Council Emergency Operations Centre Facility (Tuncurry) may provide facilities for incident control separate to a supporting Emergency Operations Centre.		

Key Warning Gauge Name	**Name**	**Watercourse**	**AWRC No.**	**Min (m)**	**Mod (m)**	**Maj (m)**
	Karuah River at Dam Site	Karuah River (upstream of Stroud)	561106	n/a	n/a	n/a
	Karuah River at Booral	Karuah River (downstream of Stroud)	561040	n/a	n/a	n/a
	Mammy Johnsons River at Pikes Crossing	Mammy Johnsons River	NSW DPI gauge 209002	n/a	n/a	n/a

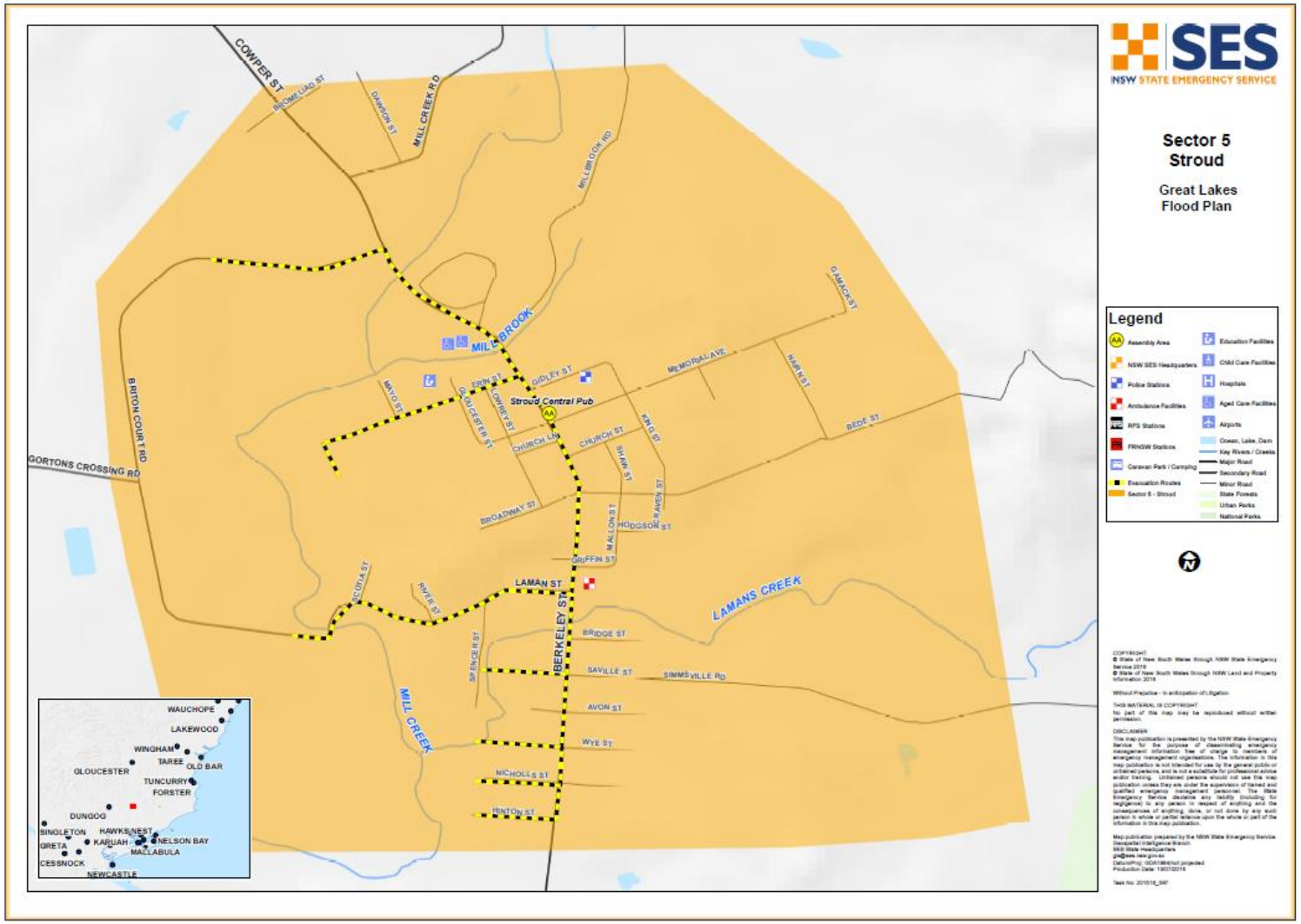
	Flooding in Stroud is primarily a function of Mill and Lamans Creek. There are no warning system(s) in place for the Mill and Lamans Creek catchments. Flooding in Stroud can be made worse by back waters from the Karuah River. However there have been no recorded floods on the Karuah River larger than the estimated 2% AEP design event (10.7 m at Booral), which is approximately the height at which significant backwater flooding at Stroud will begin to occur (7).
Key Rain Gauges	Stroud Post Office (Station Number - 61071)
	Crawford (Station Number - 560048)
	Chichester (Station Number – 61302)
	Gloucester (Station Number – 60015)
General Strategy	**Property protection measures:** ▪ Based on requests for assistance from 132 500 **Evacuation of at risk population:** ▪ At risk residents may be door knocked by NSW SES, RFS and other emergency personnel and advised on the evacuation details. ▪ Primarily self-evacuation by private transport to family and friends outside the flood affected area. **Establishment of an Assembly Area at:** ▪ Stroud and District Country Club, 164 Bucketts Way , Stroud ▪ Stroud School of Arts, 2/18 Berkeley Street (Bucketts Way), Stroud **Establishment of an evacuation/assembly area stage point at:** ▪ Stroud Central Pub, 52 Cowper Street, Stroud *Where a PMF occurs evacuees will either remain at the assembly area, an established evacuation centre or staging point until the threat has past.* **Rescue**
Key Risks / Consequences	**Inundation** The Stroud Showground is located on the Bucketts Way near Mill Creek and Mill Brook. During the April 2015 event the Showground was inundated with over a metre of fast flowing floodwater resulting in a number of flood rescues and causing extensive damage to the showground's infrastructure. At least 13 residential properties opposite the Showground in Cowper Street (Bucketts Way) and Briton Court Road were also impacted by over floor flooding, with one home requiring demolition. In the 2015 event the aged care facility know as Stroud Community Lodge prepared to evacuate residents to higher ground as Mill Creek and neighbouring Mill Brook rose quickly. Floodwaters extend to the external grounds of the facility but did not enter the building. In addition to the Showground, flood liable areas in Stroud include properties in Britton Court Road, Erin, Scotia and Mayo Streets (7). In the southern part of the town floodwaters near the confluence of Mill and Lamans Creek can cause the inundation of Lamans Creek Bridge at Berkley Street (Bucketts Way), Avon Street, Spencer Street and the western low lying sections of Hinton, Nicolas, Saville and Bridge Streets. **Isolation** In the 2015 event both the Lamans Creek Bridge at Berkley Street (Bucketts Way) and Mill Creek Bridge at Cowper Street (Bucketts Way) were inundated effectively isolating Stroud.

	These closures meant the Rural Fire Service Station and the Great Lakes Council depot were cut off from the centre of the town, and each other. The availability of rising road access and the flash flood nature of the risk in Stroud means that inundation generally causes only short term isolations with flood waters rising and falling quickly.
Information and Warnings	**The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:** ▪ Flood Watches for Karuah and Myall Valleys ▪ Flood Bulletins for Karuah River and Myall Rivers ▪ Provision of flood advice about relocation of residents in large flood events to an Assembly Area at Stroud and District Country Club or Stroud School of Arts ▪ Sequenced door knocking of low lying properties in Stroud that may need to relocate during large events ▪ Media announcements ▪ Social media ▪ Possible use of Emergency Alert System ▪ Liaison between key community stakeholders and the NSW SES Stroud Unit
Property Protection	***Specific property protection measures:*** ▪ Monitoring rising flood waters. ▪ Relocation of livestock. ▪ Relocation of farm machinery and valuable goods ▪ Control of surface water through sandbagging measures. ▪ Assist in the lifting of furniture to residents in need. ▪ Monitoring integrity of dwellings surrounded by flood waters. Proactive property protection measures are limited due to the quick flash flood nature of the Mill/Lamans Creek catchment and the scarcity of emergency service resources.
	Protection of essential infrastructure: Sewerage treatment plant on Simmsville Road and water treatment plant on southern end of Briton Court Road are located out of the predicted 1% AEP flood extent (11.48 m at Booral gauge (8)). Telstra phone exchange is located on the edge of the 1% AEP and probable maximum flood levels (was threatened by inundation in the April 2015 flash floods).
Evacuation and/or Isolation Triggers	**Evacuations** Although there are gauges on the Karuah River to the north (Dam Site) and south (Booral) of Stroud, there are no gauges on the Karuah River that provide specific warnings for Stroud. The Karuah River is only likely to have a major influence on flooding in Stroud during a 2% AEP event (9) (equivalent 10.70 m AHD at Booral). There are no warning systems in place for the primary drivers of flooding in Stroud, Mill and Lamans Creek. **Warnings** In the event of a Flood Watch for moderate to major flooding on the Karuah or Myall Rivers and the issuance of associated severe weather warnings for heavy rain, the Stroud Unit may undertake a community liaison/"heads up" doorknock of residents in the following areas to highlight the potential risk of flash flooding and need to evacuate: ▪ Stroud Showground camping areas ▪ The section of Cowper Street (Bucketts Way) from the Stroud Community

	Lodge (Aged Care facility) through to Mill Creek Road ▪ The north east section of Briton Court Road
Sequencing of evacuation	The flash flood nature of the catchments combined with no warning systems means that proactive and accurate evacuations warnings will be difficult. Priority evacuation locations/facilities include: ▪ Stroud Showground camping areas ▪ The section of Cowper Street (Bucketts Way) from the Stroud Community Lodge (Aged Care facility) through to Mill Creek Road ▪ The north east section of Briton Court Road.
Evacuation Routes	From Stroud north along Bucketts Way to the Stroud Country Club.
Evacuation Route Closure	Central Stroud can become isolated by flash flooding closing the Bucketts Way (Cowper Street) just north of Mill Creek Bridge and the Bucketts Way south of the Lamans Creek Bridge (Berkeley Street).
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures. ▪ Evacuation/relocation information to residents disseminated via broadcast media, social media and via doorknock (depending on available resources).
Evacuation Centre/Assembly Point	**Assembly Area at:** ▪ Stroud and District Country Club, 164 Bucketts Way , Stroud ▪ Stroud School of Arts, 2/18 Berkeley Street (Bucketts Way), Stroud **An additional evacuation/assembly area at:** ▪ Stroud Central Pub, 52 Cowper Street, Stroud
Large scale evacuations	Large scale evacuations of this sector are considered unlikely. If required the Stroud Country Club would be the preferred venue for an assembly/evacuation centre for large scale evacuations.
Rescue	**Pre-positioning of flood rescue resources** ▪ NSW SES flood rescue resources are limited in Stroud. ▪ Flooding in Stroud can result in the closure of the Bucketts Way at Cowper Street (Mill Creek) and Bucketts Way at Berkeley Street (Lamans Creek). ▪ The closure of Berkeley Street at Lamans Creek prevents NSW SES Stroud Unit and NSW RFS Stroud Brigade from accessing the flood affected central parts of Stroud. ▪ The Stroud Unit Headquarters is located in the village of Booral (10 km south of Stroud) and can be isolated from Stroud by flashing flooding and road closures. ▪ The Stroud Unit may consider pre-positioning a response team and flood boat in the central part of Stroud on receiving a Flood Watch for the Karuah and Myall Valleys and severe weather warning for heavy rain. **The NSW SES Stroud Unit will undertake Flood Rescue operations as per the Flood Rescue Operations Policy and Incident Action Plans for the event.** On the issuing of a Flood Watch for the Myall or Karuah catchments, NSW SES Gloucester Unit flood rescue resources can be placed on stand-by to assist operations in Stroud.
Resupply	**Resupply will be provided by the NSW SES through the 132 500 request for emergency assistance system.** ▪ Large scale prolonged resupply operations are considered unlikely in this sector. ▪ Requests for resupply in the sector would be more likely to come from nearby rural properties isolated by flash flood waters/rises in the number of local creeks along Booral Road.

	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1.
Aircraft Management	***Helicopter Landing Points:*** Due to the limited Airport facilities in the sector, aviation management would be coordinated from Taree Airport. Regular emergency helicopter landing zone is flood prone Stroud Showground Suitable landing points are located at: ▪ Gidley Street, Stroud (next to Police Station on high ground) (-32.402, 151.967) ▪ Corner of Gloucester Street and Memorial Avenue, Stroud (on high ground) (-32.405, 151.965)
	Airports: ▪ No airport exists at Stroud. ▪ In the event that aviation resources are required to support flood operations, it is likely that aircraft would operate out of the Taree Airport. ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43m.
Other	There are two peak seasons with potential for a 10% population increase associated with tourism and camping: i. Christmas holidays December –January. ii. Easter long weekend. In addition to this, the Stroud Show is held in April (1), Rodeo in September and Stroud Brick Throwing Festival in July each year increasing population by up to 1000.

5.2. STROUD SECTOR MAP



6. TEA GARDENS/HAWKS NEST/PINDIMAR SECTOR

6.1. TEA GARDENS/HAWKS NEST/PINDIMAR RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Mid Coast for more information about these Communities.

Sector Description	The towns of Tea Gardens and Hawks Nest are located on the northern shores of Port Stephens at the entrance to the Myall River. These small towns are located approximately 220 km north of Sydney in the southern portion of the Mid Coat Council Local Government Area (LGA). Tea Gardens (population 2,434) is on the western banks of the Myall River with a bridge connecting the town to Hawks Nest (population 1123) on the eastern banks of the River. The two towns are joined by the two lane Singing Bridge. Pindimar is village approximately 230 residents. It is located 5 km to the south of Tea Gardens on the northern shores of Port Stephens. The Lower Myall River catchment covers an area of 909 km^2 extending north-east from Port Stephens to cover the Myall Lakes and northwards along the Myall River 30 km to the west to Bulahdelah (10). The Lower Myall drains through the townships of Tea Gardens and Hawks Nest before discharging at Corrie Island via Corrie Creek and Paddy Marrs Inlet into Port Stephens.		
Hazard	One the key drivers of floods in the sector are oceanic processes (waves, wind, tides). High tide and storm surge can prevent flood waters escaping and lengthen the period of flooding. High ocean levels can also inundate coastal areas (4). Flood modelling conducted as part of the Lower Myall River and Myall Lakes Flood Study shows that that peak flood levels upstream of Monkey Jacket are attributed to catchment derived design flood events, while below (downstream of) Monkey Jacket (location of Tea Gardens/Hawks Nest Pindimar), ocean derived flood events are more significant (10). A number of historic floods and their associated peaks are identified in the Lower Myall River and Myall Lakes Flood Study these include; 1890s - 3.7 m AHD; 1927 - 2.7 m AHD; 1963 – 2.2 m AHD; May 1978 - 1.3m. More recent floods include April 2008 – 1.45 m AHD and June 2011 1.20 m AHD (10).		
Flood Affect Classification	Tea Gardens has rising road access in the 5% and 1% AEP floods (equivalent to 1.95 m and 2.38 m respectively at Bombah Point gauge). In the design Possible Maximum Flood (PMF) catchment event, the Tea Gardens peninsula would be classified as a Low Flood Island (10). In the design PMF catchment event Hawks Nest is classified as having Rising Road Access due to the ability to evacuate to the higher ground east of the Myall River, while Winda Woppa is classified as a High Flood Island as access along Tuloa Avenue may be lost.		
At risk properties in an extreme flood	121	**Total number of properties within Sector/Community**	1016, 542, 104
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** The NSW SES will conduct evacuations in this sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS) volunteers. An NSW Fire and Rescue brigade is located in at Marine Parade and Rural Fire Service brigade is located at Wanya Road near the Council Depot. For Level 1 events an Incident Control Facility will be established at the NSW SES Stroud Unit at Booral, alternatively the Incident Controller may wish to establish of a		

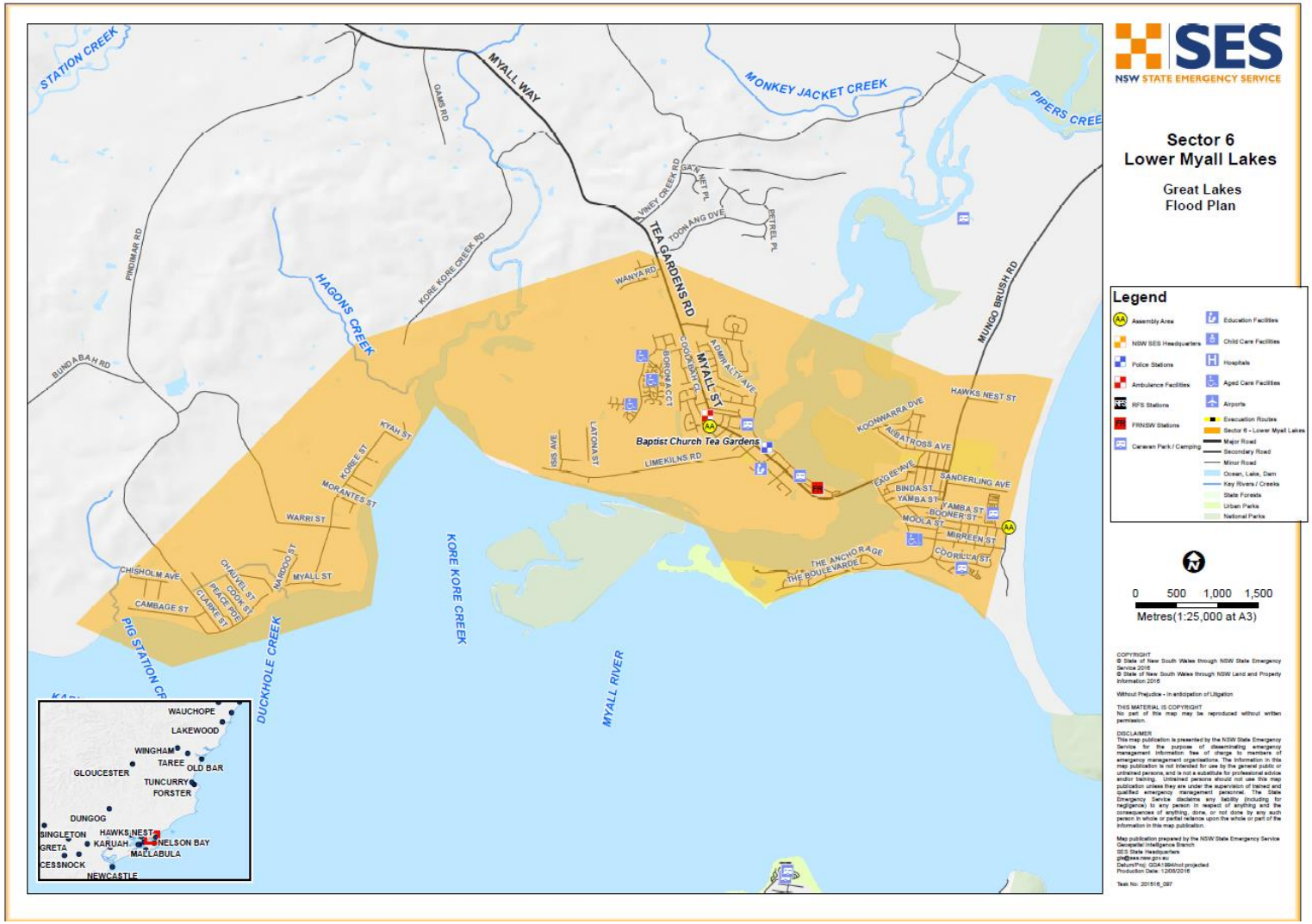
<table>
<tr><td></td><td colspan="6">Forward Command/Staging Area at Tea Gardens Rural Fire Service Station.
For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the Local Controller Stroud Unit Controller becoming a Division Commander.</td></tr>
<tr><td rowspan="6">Key Warning Gauge Name</td><td>Name</td><td>Watercourse</td><td>AWRC No.</td><td>Min (m)</td><td>Mod (m)</td><td>Maj (m)</td></tr>
<tr><td>Bulahdelah</td><td>Myall River</td><td>560040</td><td>3.0m</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Myall River at Bombah Point
MHL</td><td>Bombah Broadwater, Boolambyate and Myall Lakes</td><td>209475</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Myall River at Tea Gardens
MHL</td><td>Myall River at entrance (ocean levels)</td><td>209480</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Shoal Bay</td><td>Levels southern shores of Port Stephens</td><td>561153</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td colspan="6">Flooding in Tea Gardens, Hawks Nest and Pindimar are more likely to be caused by wind and ocean conditions rather than riverine/catchment drivers.</td></tr>
<tr><td rowspan="3">Key Rain Gauges</td><td colspan="6">Bulahdelah (Station Number - 560040)</td></tr>
<tr><td colspan="6">Bungwahl (Station Number - 60095)</td></tr>
<tr><td colspan="6">Hawks Nest Golf Club (Station Number – 61416)</td></tr>
<tr><td>General Strategy</td><td colspan="6">Property protection measures:
Based on requests for assistance from 132 500
Evacuation of at risk population:
At risk residents may be door knocked by NSW SES, RFS and other emergency personnel and advised on the evacuation details.
Primarily self-evacuation by private transport to family and friends outside the flood affected area.
Establishment of an Assembly Area at:
Hawks Nest Golf Course, Sanderling Ave, Hawks Nest
Hawks Nest Community Centre, 71-73 Booner Street, Hawks Nest
Where a major PMF occurs evacuees will either remain at the assembly area or an established evacuation centre until the threat has past.
Rescue</td></tr>
<tr><td>Key Risks / Consequences</td><td colspan="6">Some parts of Tea Gardens, in particular low lying areas on Marine Parade and the reserve at Budgeree Street are susceptible to flash flooding (June 2007) and storm surge (April 2015) (4).
Low lying properties in South Pindimar are susceptible to flash flooding from local creek run off and storm surge.
The Tea Gardens/Hawks Nest can be isolated by road closures caused by flash flooding.
In extreme events Tea Gardens can be isolated from Hawks Nest.</td></tr>
<tr><td>Information and Warnings</td><td colspan="6">The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:
Flood Watches for Myall River catchment
Flood Bulletins for Myall River
Sequenced door knocking of low lying properties in Tea Gardens, Hawks Nest and Pindimar that may need to relocate during large events
Media announcements</td></tr>
</table>

	▪ Social media ▪ Possible use of Emergency Alert System ▪ Liaison between key community stakeholders and the NSW SES Stroud Unit
Property Protection	***Specific property protection measures:*** ▪ Monitoring river, ocean, lake heights and rainfall totals ▪ Control of surface water through sandbagging measures ▪ Assist in the lifting of furniture to residents in need ▪ Monitoring integrity of dwellings surrounded by flood waters ▪ Responding to requests for assistance via Beacon Proactive property protection measures are limited due to the gradual and low velocity nature of ocean derived flood events in the area and the scarcity of emergency service resources. *Note: Jimmy's Beach at Winda Woppa is a designated Coastal Erosion "Hot Spot within this sector"* Property protection measures for the threat of coastal erosion involves the relocation of readily moveable household goods and commercial stock and equipment depending on available resources and operational priorities. *The NSW SES is not responsible for planning or conduct of emergency beach protection works or other physical mitigation works. The former Great Lakes Council is responsible for the activation of the Mid Coast Council Coastal Zone Management Plan – Emergency Action Plan.*
	Protection of essential infrastructure: *No known essential infrastructure at risk*
Evacuation and/or Isolation Triggers	**Evacuations** In the extreme event (PMF) design catchment event, flood levels up to 2.4 m AHD will flood low lying land in Tea Gardens and Hawks Nest and will necessitate evacuations to prevent the potential loss of life due to the occurrence of high risk (flood conditions i.e. deep, high velocity) (10). Evacuation of the **Tea Gardens peninsula** and low lying areas of Hawks Nest and Pindimar should be considered if: ▪ Bombah Broadwater levels is likely to reach or exceed 3 m AHD at the Myall River at Bombah Point Gauge ▪ Tea Gardens gauge level is likely to reach or exceed 1.4 m ▪ Occurrence of large astronomical tides ▪ Large seas and swell (storm surge) ▪ Continued heavy rain is predicted (10).
Sequencing of evacuation	Southern end of the Tea Gardens Peninsular area, south of Maxwell Street, would be an evacuation priority in large ocean derived floods. Consideration will need to be given to the possible evacuation of the Tea Gardens Public School, which is located just to the north of this area. Low lying areas of Hawks Nest and Pindimar should be considered in the second stage of evacuations.
Evacuation Routes	From the Tea Garden Peninsular east along Myall Street, Kingfisher Avenue, Mungo Brush onto Sanderling Drive to Hawks Nest Golf Club. Due to road closures caused by flash flooding affected residents in Pindimar would not be asked travel to Hawks Nest Club. Instead affected residents would be encouraged to assemble at the Pindimar Rural Fire station at corner of Wyree and Koree Streets, Pindimar where an evacuation staging point would be established.

	Residents requiring evacuation in Hawks Nest will travel to the evacuation/assembly area via Kingfisher then Sanderling Avenues to the Hawks Nest Golf Club
Evacuation Route Closure	Undulating nature of the local road network, flash flooding, combined with storm surge and abnormally high tides may cause the closure of roads around foreshore areas.
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures ▪ Evacuation/relocation information to residents disseminated via broadcast media, social media and via doorknock (depending on available resources)
Evacuation Centre/Assembly Point	**People should be encouraged to stay with friends/relatives outside the flood affected areas.** Where this is not possible the nominated Assembly Area(s) are: ▪ Hawks Nest Golf Course, Sanderling Ave, Hawks Nest ▪ Hawks Nest Community Centre, 71-73 Booner Street, Hawks Nest
Large scale evacuations	Large scale evacuations of this sector are considered unlikely. If large-scale evacuations are required, NSW SES Mid Coast Local Controller can liaise with the Local Emergency Management Committee and request the deployment of additional resources in the sector. If large scale evacuations are required the Hawks Nest Golf Club and Hawks Nest Surf Lifesaving Club would be the preferred venue for an assembly/evacuation centre(s).
Rescue	**The NSW SES Stroud Unit will undertake Flood Rescue operations as per the Flood Rescue Operations Policy and Incident Action Plans for the event.** Known flood rescue risk areas have been identified at Viney Creek Road and Myall Way (Tea Gardens Road) at Kore Kore Creek. Large scale flood rescues considered unlikely in this sector with parts areas having rising road access from low velocity flood waters.
Resupply	**Resupply will be provided by the NSW SES through the 132 500 request for emergency assistance system.** ▪ Large scale prolonged resupply operations are considered unlikely in this sector. ▪ Requests for resupply in the sector would be more likely to come from nearby rural properties isolated by flash flood waters/rises a number of local creeks.
	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1
Aircraft Management	***Helicopter Landing Points:*** Due to the limited Airport facilities in the sector, aviation management would be coordinated from Taree Airport. Suitable landing points are located at: ▪ Myall Park, Yamba Street, Hawks Nest (Lat: -32.671707 Long: 152.181468) ▪ Waterfront Reserve, Curlew Avenue, South Pindimar (Lat: -32.685028 Long: 152.145556
	Airports: ▪ No airport exists at Tea Gardens/Hawks Nest ▪ In the event that aviation resources are required to support flood operations, it is likely that aircraft would operate out of the Taree Airport. ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43m.

Other	**Coastal Erosion** During a significant ocean derived flood event it is possible that coastal erosion may occur at Jimmy's Beach Winda Woppa. ▪ Jimmys Beach has been identified by OEH (previously DECCW) as one of 15 coastal erosion hot spots in NSW (4). ▪ Property managed by Council is directly affected by the potential effects of storm erosion. Community infrastructure (road allotment), and approximately 25 private allotments are adjacent to the property directly affected and so are also potentially at risk from coastal erosion. These are located between Kurrurma Crescent and Gemalla Street. ▪ Waves have been known to break across the sand dune at Winda Woppa and this could cause water to enter houses. ▪ Erosion problems have been occurring along Jimmys Beach for many years, the erosion has increased over the last 30 years. ▪ Historically, sand renourishment of the beach has been used as a means to protect the public infrastructure during severe storm events. ▪ Trigger points for emergency action initiate when sand is within 5m to 10m from the road edge.

6.2. TEA GARDENS/HAWKS NEST/PINDIMAR SECTOR MAP



7. TUNCURRY/FORSTER SECTOR

7.1. TUNCURRY/FORSTER RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Mid Coast for more information about this Community.

Sector Description	The towns of Forster and Tuncurry are situated either side of the entrance to Wallis Lake, 308 km north of Sydney. Recently the area has experienced significant population growth, with the retirement and tourism industries now dominating the economy. Flooding occurs as a combination of inflows from river tributaries, wind wave action and inflows from the ocean. There should be potential for effective warnings due to the generally slow rate of lake level rises (11). Residential and other property in low-lying areas adjacent to Wallis Lake, Cape Hawke Harbour (Tuncurry and Forster CBDs) and Forster Keys and can be threatened by high lake and sea levels.		
Hazard	The sector is susceptible to flash flooding, high lake levels and storm surge Flooding within Wallis Lake is caused by: ▪ Elevated ocean levels due to storm surge and/or high astronomical tides ▪ Rainfall over the lake and river tributaries ▪ Wind action within the lake itself Wallis Lake has four main tributaries, the Wallamba, Wang Wauk, Wallingat and Coolongolook Rivers Flooding of Wallis Lake has occurred very infrequently, with the largest recorded flood being the 1927 flood that peaked at 2.27 mAHD. Since 1927 the highest water level recorded in the lake has been 1.1 mAHD in 1978, 0.94 mAHD in 2013 and 0.88 mAHD in 2016. Community awareness of flooding is low. Depth and velocity of flooding is relatively low except for Point Road Tuncurry (11).		
Flood Affect Classification	Rising road access Forster Keys and Point Road are Low Flood Islands, becoming isolated between 0.68 and 1.5 metres.		
At risk properties	3021	**Total number of properties within Sector/Community**	8308
Sector Control	**The NSW SES Mid Coast Local Controller will control evacuations in this sector.** The NSW SES will conduct evacuations in this sector with assistance from NSW Police, Fire and Rescue NSW and Rural Fire Service (RFS) volunteers. The sector is divided into the following three sub sectors: Subsector 1 – Tuncurry Subsector 2 – Forster CBD and Lake Foreshore Subsector 3 – Forster Keys For Level 1 incidents an Incident Control Facility will be established at the NSW SES Forster Pacific Palms Unit, Charlotte Bay Road, Charlotte Bay. For Level 2 and 3 events Incident Control is likely to scale up to LGA level, with the Local Controller Forster/Pacific Palms Unit Controller becoming a Division Commander. In large scale events the Mid Coast Council Emergency Operations Centre Facility (Tuncurry) may provide facilities for incident control separate to a supporting Emergency Operations Centre.		

<table>
<tr><td rowspan="8">Key Warning Gauge Name</td><td>Name</td><td>Watercourse</td><td>AWRC No.</td><td>Min (m)</td><td>Mod (m)</td><td>Maj (m)</td></tr>
<tr><td>Wallamba River at Nabiac</td><td>Wallamba River</td><td>560048</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Wang Wauk at Willina</td><td>Wang Wauk</td><td>560049</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Coolongolook at Coomba Park</td><td>Coolongolook River</td><td>560059</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Wallis Lake at Tuncurry
(Upstream of lake inflows Wallamba River)</td><td>Wallamba River /Wallis Lake</td><td>560053</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Wallis Lake at Tuncurry (Point Road)
(water level - Wallis Lake)</td><td>Wallis Lake</td><td>560057</td><td>0.9</td><td>1.5</td><td>1.9</td></tr>
<tr><td>Wallis Lake at Forster
(influenced by tides)</td><td>Wallis Lake</td><td>560044</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Wallis Lake at Tiona
(water level - Wallis Lake)</td><td>Wallis Lake</td><td>560055</td><td>n/a</td><td>n/a</td><td>n/a</td></tr>
<tr><td>Key Rain Gauges</td><td colspan="6">Nabiac (Wallamba River upstream)</td></tr>
<tr><td></td><td colspan="6">Willina (Wang Wauk River)</td></tr>
<tr><td></td><td colspan="6">Tuncurry (Wallamba downstream</td></tr>
<tr><td>General Strategy</td><td colspan="6">Property protection measures:
▪ Based on requests for assistance from 132 500
Evacuation of at risk population:
▪ At risk residents will be door knocked by NSW SES, RFS and other emergency personnel and advised on the evacuation details.
▪ Primarily self-evacuation by private transport to family and friends outside the flood affected area.
▪ Primarily self-evacuation by private transport to nominated assembly areas.
Establishment of an Assembly Area at:
▪ Great Lakes College – Tuncurry Campus – Northern Parkway, Tuncurry
▪ Great Lakes College – Forster Campus – Corner of The Lakes Way and Cape Hawke Drive, Forster
▪ Club Forster, Strand Street, Forster
Where a major PMF occurs evacuees will either remain at the assembly area or an established evacuation centre until the threat has past.
Rescue</td></tr>
<tr><td>Key Risks / Consequences</td><td colspan="6">High hazard flood areas are the lower areas of Beach Street and Wharf Street, and Point Road and Bay Street Tuncurry. Velocities are in the order of 2.28-2.34m/s at the Foster Tuncurry Bridge in a 1% AEP flood (4).
Both Forster and Tuncurry may become isolated due to flash flooding causing road closures. The northern side of the Lakes Way remained closed for some 5 hours during the 2013 flood event where the southern access to Forster was closed for a short period due to overland flooding of low lying roads at Cape Hawke (4).</td></tr>
<tr><td>Information and Warnings</td><td colspan="6">The NSW SES will undertake a variety of different actions to ensure the community are informed of potential impacts, these include:
▪ Flood Watch</td></tr>
</table>

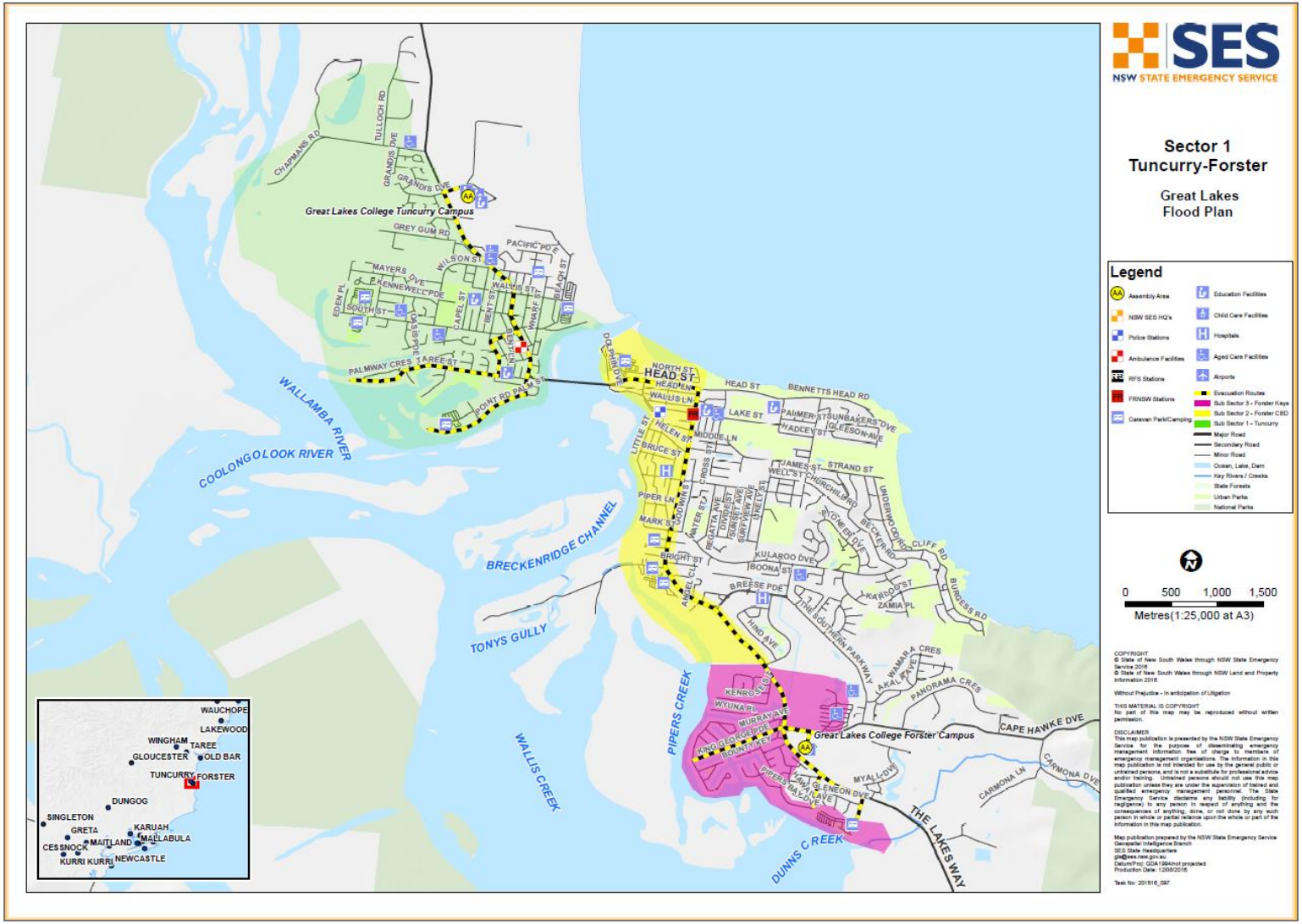
	▪ Flood Bulletins ▪ Evacuation Warning ▪ Evacuation Order ▪ Sequenced door knocking of evacuation sectors ▪ Media announcements ▪ Social Media use ▪ Emergency Alert SEWS (SMS, Landlines)
Property Protection	***Specific property protection measures:*** ▪ Monitoring rising flood waters ▪ Control of surface water through sandbagging measures ▪ Assist in the lifting of furniture to residents in need ▪ Monitoring integrity of dwellings surrounded by flood waters Proactive property protection measures are limited due the significant number of properties affected by moderate/major flooding in the area and the scarcity of emergency service resources. In past recent flood events the Point Road area of Tuncurry has been an early source of request for sandbags.
	Protection of essential infrastructure: A number of electricity substations would be under threat in the following areas: • Point Road Peninsular – Tuncurry • Taree Street Peninsular – Tuncurry • Forster Keys – Forster *In addition, the sewerage treatment plant at Sweet Pea Road Forster, could be threaten by flood waters in large scale events as it is located only 1.5 kilometres away from the Pipers Bay foreshore.*
Evacuation and/or Isolation Triggers	The key evacuation triggers are based on: ▪ Predictions for high tides and large seas/swells (storm surge) ▪ Bureau of Meteorology flood height predictions at the Wallis Lake at Tuncurry (Point Rd) Gauge (205416) **1. Prediction to reach and/or exceed 1.20m** ***Targeted Evacuation of Point Road area of Tuncurry to occur by this height*** Including Point Road, Baird, Mariners, Lakeview, Pelican, Sunlovers, Bay and Leisure Streets, Coral Lane & Recreational Lane **2. Prediction to reach and/or exceed 1.50m** ***Targeted Evacuation of Taree/Wharf/Beach Street areas of Tuncurry is to occur by this height*** Taree Street west from Bent Street, Rebecca Jane Close, Annette Place, Anne Marie Place, Susella Crescent, Windsor Place, Regency Crescent, Rest Point, Sunset Place, Mount View Place, Palmway Crescent, Mirage Ave, Wallamba Close, Lachlan Avenue and low lying parts of Wharf and Beach Streets ***Targeted Evacuation of Forster Keys area is to occur by this height, noting that road access via King George Parade is lost between the minor (0.9m) and moderate (1.5m) flood heights and that the majority of properties in the area do not experience inundation until 0.5% AEP event levels (2.2m).***

	Including Kenrose Street, Wyuna Place, Murray Avenue, King George Parade, Allen Avenue, Eloura Circuit, Cavil Avenue, Elizabeth Parade, Friendship Key, Blundell Avenue, Bounty Key, Victor Avenue, Discovery Drive, Endeavour Circuit, Royal Circuit, Pipers Bay Drive, and Caribbean Avenue.
Sequencing of evacuation	Evacuation sequencing will be based on the above triggers for evacuation. The aged care facility, schools and community health campus/small hospital are located outside of the predicted of the 1 in 100 flood prediction extent; however a number of vulnerable facilities would be affected in a Possible Maximum Flood (PMF).
Evacuation Routes	***Point Road area of Tuncurry*** Route: Manning Street to north to Great Lakes College Tuncurry Campus. ***Taree/Wharf/Beach Street areas of Forster*** Route: Manning Street to north to Great Lakes College Tuncurry Campus. ***Forster Keys area*** Route: King George Parade, The Lakes Way then Cape Hawke Drive to Great Lakes College Forster Campus
Evacuation Route Closure	**Road Closures affecting the sequenced evacuation of the sector**: ▪ Point Road at Tuncurry may begin to become inundated from 0.90 m at Wallis Lake at Tuncurry Gauge (as occurred in March 2013 event) ▪ King George Parade at Forster Keys between 1.2 and 1.5 metres. **Other roads where closure is dependent on local rainfall include:** ▪ Failford Road at Bungwahl Creek, between Pacific Highway-and The Lakes Way (North west of Tuncurry) ▪ The Lakes Way at Darrawank (north of Tuncurry) ▪ The Lakes Way south of Tea Tree Road at Dunns Creek (south of Forster)
Method of Evacuation	▪ Primarily self-evacuation by private transport before road closures ▪ Evacuation/relocation information to residents disseminated via broadcast media, social media and via doorknock (depending on available resources)
Evacuation Centre/Assembly Point	**People should be encouraged to stay with friends/relatives outside the flood affected areas of Tuncurry and Forster.** Where this is not possible the nominated Assembly Area/Evacuation Centres are: ▪ Great Lakes College – Tuncurry Campus - Northern Parkway, Tuncurry ▪ Great Lakes College – Forster Campus - Cape Hawk Drive, Forster ▪ Club Forster – Strand Street, Forster (inundated in PMF) There are a number of other buildings located in flood free areas in Forster which are available for use as Evacuation Centres. These buildings will be nominated by Department of Family & Community Services as the need arises.
Large scale evacuations	When large-scale evacuations are likely, the Mid Coast NSW SES Local Controller will liaise with the Local Emergency Management Committee and request the deployment of resources into Tuncurry/Forster. There are a significant number of older people and caravan parks in flood affected areas. Operational evacuation planning should consider peak holiday times around Easter, Christmas and long weekends.
Rescue	**Pre-positioning of flood rescue resources** ▪ NSW SES level 3 flood rescue resources are limited in the Forster/Tuncurry area ▪ On receiving a severe weather warning for heavy rain and a flood watch for Wallamba River/Wallis Lake, and/or the Myall catchment, that consideration be given to requesting OOAA flood rescue resources. ▪ These resources would be deployed at the Forster/Pacific Palms Unit for

	tasking. **The Forster/Pacific NSW SES Unit will undertake all Flood Rescue operations as per the Flood Rescue Operations Policy.** ▪ Large scale rescues would be unlikely in this sector due to the large storage capacity of Wallis Lake itself, the rate of rise of flood waters is likely to be slow and occur some hours after the rainfall event itself (11).
Resupply	**Resupply will be provided by the NSW SES through the 132 500 request for emergency assistance system.** ▪ Large scale prolonged resupply operations are considered unlikely in this sector. Requests for resupply in the sector would be more likely to come from nearby rural properties isolated by flash flood waters/rises a number of local creeks.
	Table 2, in Volume 2 provides information about isolated communities in the former Great Lakes area and potential periods of isolation. A flowchart illustrating the Resupply process is shown in Volume 1 of the Local Flood Plan, Attachment 1
Aircraft Management	***Helicopter Landing Points:*** Due to the limited Airport facilities in the sector, aviation management would be coordinated from Taree Airport. Suitable landing points are located at: ▪ North Tuncurry Regional Sports Complex, Beach Street, Tuncurry (-32.166, 152.503) ▪ Tuncurry Sports Centre, South Street Oval, Corner South Street and Stewart Parade, Tuncurry (-32.171, 152.493) ▪ Great Lakes College – Forster Campus – Corner of The Lakes Way and Cape Hawke Drive (-32.216, 152.528) ▪ Forster Aquatic Centre, Lake Street, Forster (-32.181, 152.521)
	Airports: ▪ No airport exists at Tuncurry or Forster ▪ In the event that aviation resources are required to support flood operations, it is likely that aircraft would operate out of the Taree Airport. ▪ Functionality of the Taree Airport is threatened once Manning River at the Taree Gauge reaches 5.43m.
Other	**Special considerations relating to the evacuation:** ▪ Significant numbers of older people and caravan parks will require evacuation in large scale events ▪ Closure of Schools –the NSW SES will coordinate closures through the school principals on each affected school. ▪ Evacuation of residential institutions, nursing homes and aged care facilities will occur where these are threatened by predicted flood waters. ▪ The Forster Private Hospital will only be evacuated in extenuating circumstances. ▪ Security: Police patrols to be established to maintain law and order after evacuation has occurred. ▪ The NSW SES will use flood boats and helicopters to monitor safety of individuals. ▪ Forster/Tuncurry has 3 peak seasons with potential for in excess of 10% population increase: ▪ School Holidays – December/ January

	· Easter Holidays – March /April · School Holidays – September/October · Forster Triathlon (early October)

7.2. FORSTER/TUNCURRY SECTOR MAP



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3. **NSW State Emergency Service.** *Great Lakes Local Flood Plan.* 2011 (as amended 2012).

4. —. *Draft - Hazard and Risk in Great Lakes.* 2016.

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6. **WorleyParsons.** *Smiths Lake Floodplain Risk Management Study.* Oct 2015.

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9. **WMA Water.** *Stroud Flood Study.* 2012.

10. **BMT WBM.** *Lower Myall River and Myall Lakes Flood Study.* Jun 2015.

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GREAT LAKES: NSW SES
CARAVAN PARK ARRANGEMENTS

Chapter 4 of Volume 3 (NSW SES Response Arrangements for Great Lakes) of the Mid Coast Local Flood Plan

Last Updated: March 2017

AUTHORISATION

The Great Lakes NSW SES Caravan Park Arrangements have been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved

Manager Emergency Risk Management

Date: 1/3/17

Approved

NSW SES Mid North Coast Region Controller

Date: 2.3.17

Tabled at LEMC 14 March 2017

Document Issue:

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Table 1: Caravan Parks at risk of Inundation from Flooding. **7**

1 ARRANGEMENTS FOR THE EVACUATION OF CARAVAN PARKS AND THE RELOCATION OF MOVABLE DWELLINGS

1.1 GENERAL

1.1.1 The following caravan parks are flood liable:

a. Twin Dolphins Holiday Park

b. Tuncurry Lakes Resort

c. Big 4 Great Lakes Holiday Park Tuncurry

d. North Coast Holiday Park – Foster Beach Park

e. Lanis Caravan Park

f. Smugglers Cove Holliday Village

g. Lifestyle Lakeside Foster

h. Discovery Parks - Forster

i. Riverside Holiday Park

j. Stroud Showground

k. Sandbar and Bushland Holiday Parks

1.1.2 For more information on individual caravan parks see Table 1 at the end of this Chapter.

1.2 ADVISING PROCEDURES

1.2.1 Caravan Park proprietors will ensure that the owners and occupiers of movable dwellings are:

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

- Providing a written notice to occupiers taking up residence. The notice will indicate that the caravan park is liable to flooding and designate the location of flood liable land within the park (1).
- Displaying this notice and the emergency arrangements for the Caravan Park prominently in the park.

b. Made aware that if they are expecting to be absent for extended periods, they should:

- Provide the manager of the caravan park with a contact address and telephone number in case of an emergency.
- Leave any movable dwelling in a condition allowing it to be relocated in an emergency (i.e.: should ensure that the wheels, axles and draw

bar of the caravans are not removed, and are maintained in proper working order).

c. Informed of Flood Warning Information. 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 movable dwelling relocation.

1.2.2 The NSW SES Great Lakes Local Controller will ensure that the managers of caravan parks are advised of Flood Information (described in Volume 2 of the Great Lakes Local Flood Plan).

1.3 EVACUATION OF OCCUPANTS AND RELOCATION OF MOVEABLE DWELLINGS

1.3.1 When an evacuation order is given caravan park occupants should follow the flood evacuation procedures for the park under the direction of the caravan park management. This should include advice to:

a. Isolate power to moveable dwellings.

b. Collect personal papers, medicines, a change of clothing, toiletries and bedclothes.

c. Lift the other contents in any remaining dwellings as high as possible.

d. Move to friends, relatives or a designated evacuation centre if they have their own transport, or move to the caravan office to await transport.

e. If undertaking self-managed evacuation, register their movements with the caravan park management upon leaving the park.

1.3.2 Where possible, movable dwellings that can be moved will be relocated by their owners. Park managers will arrange for the relocation of movable dwellings as required. Council and NSW SES personnel may assist if required and if resources are available. Vans are to be moved to the locations outlined in Tables 1 and 2 at the end of this Chapter.

1.3.3 Caravan park managers will:

a. Secure any movable dwellings that are not able to be relocated to prevent floatation.

b. Ensure that their caravan park is capable of being evacuated in a timely and safe manner.

c. Advise the NSW SES Great Lakes Local Controller of:

- The number of people requiring transport.

- Details of any medical evacuations required.
- Whether additional assistance is required to effect the evacuation.

d. Check that all residents and visitors are accounted for.

e. Inform the NSW SES Great Lakes Local Controller when the evacuation of the caravan park has been completed.

f. Provide the NSW SES Great Lakes Local Controller with a register of people that have been evacuated.

1.4 RETURN OF OCCUPANTS AND MOVEABLE DWELLINGS

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

1.4.2 Moveable dwellings will be returned back to the caravan park(s) by owners or by vehicles and drivers arranged by the park managers.

1.4.3 Council and NSW SES personnel may assist by request where resources are available.

Table 1: Caravan Parks at risk of Inundation from Flooding.

Name	Address/Location description	Town/Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Notes
Twin Dolphins Holiday Park	134 South street, Tuncurry 02 6554-7015 Available 24/7	Subsector 1 Tuncurry (Point Road Gauge)	Permanent sites:- 63 Short term sites:- 5	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	South Street onto Manning Street heading north to Great Lakes College Tuncurry	South Street closes at 1.5m Point Road Gauge	Vans moved to Great Lakes College Tuncurry Campus car park	Peak seasons are:- Dec – Jan 100% 50% rest of year
Crystal Waters Estate Over 50s Relocable Home Estate	133 South Street, Tuncurry 02 6554-8522 Office hours 0433226922 Private mangers number 24/7	Subsector 1 Tuncurry (Point Road Gauge)	Permanent 150 sites as of 09/08/16 Further sites being developed	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	South Street onto Manning Street heading north to Great Lakes College Tuncurry	South Street closes at 1.5m Point Road Gauge	Structures too large to easily relocate	Over 50s estate all dwellings are permanent sites
Tuncurry Lakes Resort	End of Chapmans Road, Tuncurry (02) 65545366 office hours only 0412999446 Private mangers number 24/7	Subsector 1 Tuncurry (Point Road Gauge)	All sites Short term Camp 25 Units 48	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	Champman Street south onto Manning Street then to Great Lakes College Tuncurry	Manning Street closes at 1.5m Point Road Gauge	Vans moved to Great Lakes College Tuncurry Campus car park	Peak season are:- Dec – Jan 80% 60%
Big 4 Great Lakes Holiday Park,	1 Baird Street, Tuncurry (02) 65546827	Subsector 1 Tuncurry	Short term sites:- 211 No	Trigger for evacuation Tuncurry	Point Road onto Manning Street north	Manning Street closes at 1.5m	Vans moved to Great Lakes	Peak season is:- Sep to April 80%

Name	Address/Location description	Town/Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Notes
Tuncurry	number available 24/7	(Point Road Gauge)	permanent sites	Point Road Gauge to reach or exceed 1.3m	to Great Lakes College Tuncurry Campus	Point Road Gauge	College Tuncurry Campus car park	December 95% Rest of the year 50%
North Coast Holiday Park - Foster Beach Park	1 Reserve Road, Foster (02) 6554-6269 Business hours 0401731160 managers private number: 24/7	Subsector 2 (Point Road Gauge)	Short term sites:- 246 No permanent sites	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	Head Street then south on Macintosh Street/The Lakes Way to Great Lakes College Forster	Manning Street closes at 1.5m Point Road Gauge	Vans relocated to Great Lakes College Forster Campus car park	Peak season is:- Dec – Jan 100% Oct – Nov 60% Feb – March 80%
Lanis Holiday Island	33 The Lakes Way, Foster (02) 6554-6273 Business hours 0408553225 managers private number 24/7	Subsector 2 (Point Road Gauge)	Permanent sites:- 28 Short term sites:- 176	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	The Lakes Way south to Great Lakes College Forster	Manning Street closes at 1.5m Point Road Gauge	Vans relocated to Great Lakes College Forster Campus car park	Peak season are:- Dec – jan 100% Ester 100% Sep – may 60%
Smugglers Cove Holiday Village	45 The Lakes way, Foster (02) 6554-6666 office hours	Subsector 2 (Point Road Gauge)	Permanent sites:- 30 Short term sites:-	Trigger for evacuation Tuncurry Point Road Gauge to	The Lakes Way south to Great Lakes College Forster	Lakes Way can be closed at 1.5 at Point Road Gauge	Vans relocated to Great Lakes College Forster	Peak season are:- Dec – jan 100%

Name	Address/Location description	Town/Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Notes
	0432210609 managers private number 24/7		50 cabins 115 camp sites	reach or exceed 1.3m			Campus car park	Holiday times 70% Rest of year 30%
Lifestyle Lakeside Foster	13 Tea Tree Road, Forster (02) 6555-5511 available 24/7	Subsector 2 (Point Road Gauge)	Permanent sites:- 35 Short term sites:- 55	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	Tea Tree Road north onto Lakes Way then to Cape Hawke Drive to Great Lakes College Forster Campus	Lakes Way can be closed at 1.5 at Point Road Gauge	Vans relocated to Great Lakes College Forster Campus car park	Peak season is:- Dec – Jan 100% 75% rest of year
Discovery Holiday Parks – Forster formerly "Wallamba River Holiday Park"	99 Aquatic Road, Darrawank (02) 6554 3123	15km north west from Tuncurry	300 Sites Mix of Short term and permanent sites	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	Aquatic Road onto Lakes Way – then to Black Head. Lakes Way going south likely to be closed	Lakes Way can be closed at 1.5 at Point Road Gauge	Vans relocated to Black Head Bowling Club	Possible isolation from Tuncurry with closure of The Lakes Way at Darrawank

Name	Address/location description	Sector	Number of sites	Risk	Evacuation Route	Evacuation Route closures	Moveable dwelling relocation	Notes
Riverside Holiday Park	5 Mill Rd, Failford (02) 6554 3144	15km north west from Tuncurry	289 Sites	Trigger for evacuation Tuncurry Point Road Gauge to reach or exceed 1.3m	Mill Road, onto Failford Rd, onto Lakes Way – then to Black Head. Lakes Way going south likely to be closed	Lakes Way and Failford Road at Bungwahl Creek can be closed at 1.3 at Point Road Gauge	Vans relocated to Black Head Bowling Club	Isolated earlier due to road closure at Failford Road at Bungwahl Creek -
Sandbar and Bushland Holiday Parks	3434 The Lakes Way, Smiths Lake (02) 6554 4095	Sector 2 (Tarbuck Bay gauge)	200 sites	Isolation and limited inundation of low lying areas of the parks in ocean derived flood events	Sandbar Road north onto Paradise Drive then Macwood Road to Pacific Palms Bowling Club	In a 1% AEP flood event (2.6 mAHD) the Sandbar Road is inundated at its lowest point	Vans relocated to Pacific Palms Bowling Club and near by netball courts	Flood risk reduced when Council opens the lake – opening trigger is 2.1 mAHD
Lions Park Camping Ground – Bulahdelah	Intersection of western side of Myall River and northern side of Pacific Highway/Bridge over Myall River (Nan Syron Bridge)	Sector 4 (Myall River at Bulahdelah)	Approx. 20 unregulated sites	Inundation and isolation	Pacific Highway north into higher ground at Bulahdelah	Inundation starts at 2m at the Myall River @ Bulahdelah gauge	Bulahdelah Central School	Popular with Motor Homes
Bulahdelah Showground camping area	Stuart Street, Bulahdelah (02) 6591 7222	Sector 4 (Myall River at Bulahdelah)	Approx. 40 unregulated sites	Inundation and isolation	Stewart Street heading east towards Pacific Hwy	Inundation starts at 2.5m at the Myall River @ Bulahdelah gauge	Bulahdelah Central School	Managed by Mid Coast Council

Stroud Showground camping area	52 Cowper Street, Stroud (02) 4994 5204 – Mid Coast Council Stroud Office number	Sector 5	Approx. 20 sites	Flash Flooding (April 2015)	Cowper Street north to Stroud Country Club	Flash Flooding can cut Cowper Street north of Lamens Creek.	Stroud Country Club	Managed by Mid Coast Council Stroud Office

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