

Kempsey Shire

Local Flood Emergency Sub Plan



KEMPSEY SHIRE FLOOD EMERGENCY SUB PLAN

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

Volume 1 of the Kempsey Shire Flood Emergency Sub Plan

Endorsed by the Local Emergency Management Committee

Endorsed Date.....

AUTHORISATION

The Kempsey Council Flood Emergency Sub Plan is a sub plan of the Kempsey 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:



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Date:

3/4/2023

Endorsed

Signature:



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Date:

3/4/2023

VERSION HISTORY

Version Number	Description	Date
	Kempsey Shire Local Flood Plan	July 2017
	Kempsey Shire Local Flood Plan	July 2012
	Kempsey Shire Local Flood Plan	May 2006

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

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

Amendment Number	Description	Updated by	Date

DISTRIBUTION LIST

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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 Kempsey 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 Kempsey Council Local Emergency Management Plan (EMPLAN) and is endorsed by the Local Emergency Management Committee (LEMC).

1.3 ACTIVATION

- 1.3.1 This plan does not require activation. The arrangements set out in this plan are always active.
- 1.3.2 The Kempsey 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 Kempsey Council LGA. The Kempsey 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 Kempsey Council level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Kempsey Council LGA.
- 1.4.4 In this plan a flood is defined as a relatively high water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.
- 1.4.5 The arrangements for dealing with episodes of coastal erosion by severe weather, are described in the NSW State Storm 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 Kempsey 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 Kempsey Council LGA.
- 2.1.2 Declared dams in or upstream of the Kempsey Shire Local Government Area.

Dam Name	Owner	High Risk Dam
Steuart McIntyre Dam	Kempsey Shire 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).
- 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:

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

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

Actions:

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

5.3 USE OF INFORMATION AND COLLECTION OF INTELLIGENCE

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

Actions:

- Information relating to the consequences of flooding, response strategies, situational awareness and operational updates will be distributed by NSW SES to supporting emergency services and functional areas listed under this Plan.
- All supporting emergency services 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 Services Functional Area 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:
 - Kempsey Shire 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. Kempsey 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 Kempsey 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 Local and Region EMPLAN's which 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 the Local EMPLAN.
- f. NSW Police Force will coordinate the provision of overall security for evacuated areas.

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

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

- d. Support to evacuation operations may be requested from other emergency services and supporting agencies using arrangements in the local EMPLAN and supporting plans.
- e. The 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 Kempsey 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 Resilience NSW 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 Kempsey 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 Resilience NSW 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 Resilience NSW.

7 ABBREVIATIONS

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

8 GLOSSARY

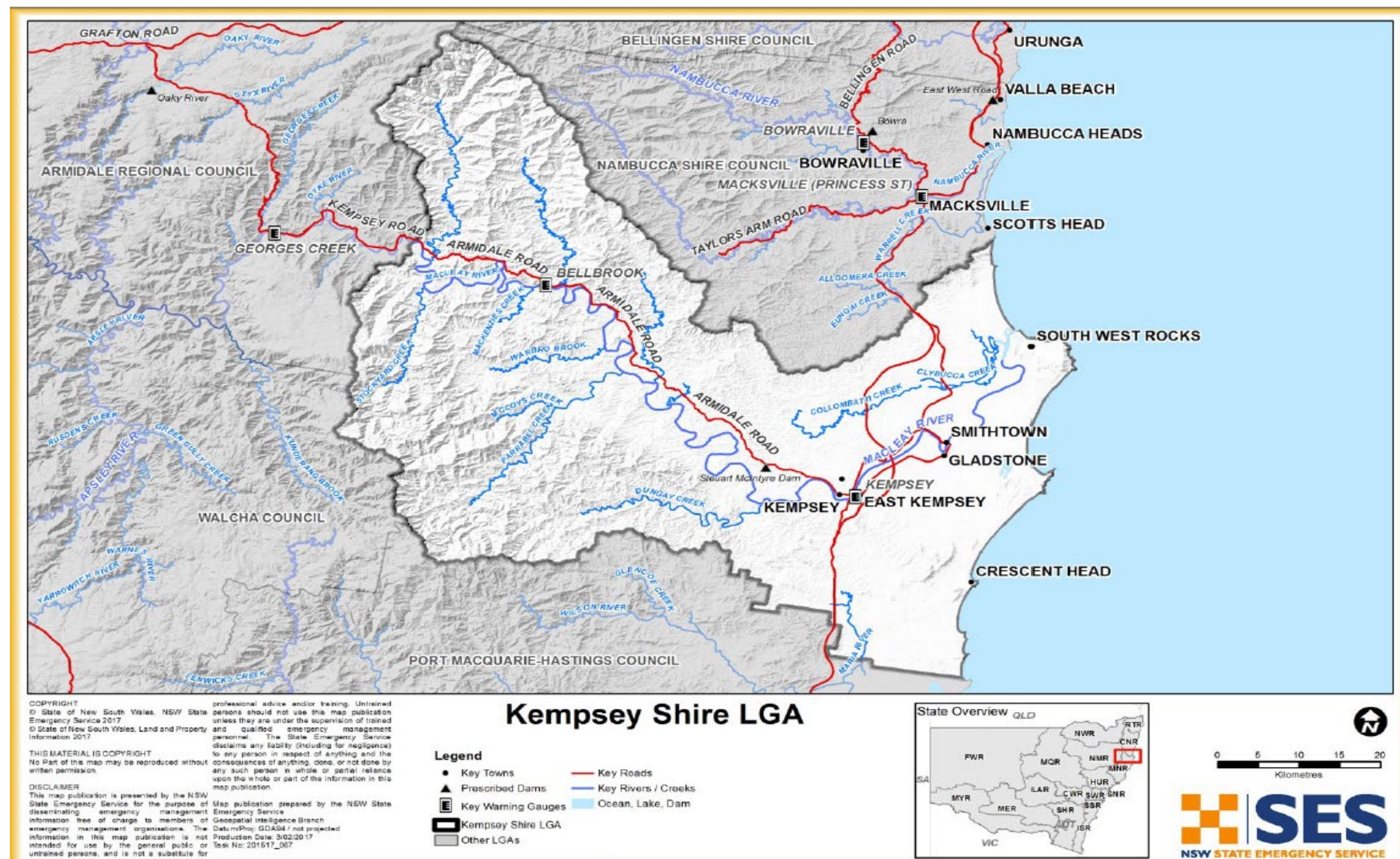
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 Kempsey Council Area



10 Appendix B – Roles and Responsibilities

AGENCY	RESPONSIBILITIES
NSW State Emergency Service	NSW SES is the designated Combat Agency for floods, storms and tsunamis 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.
Kempsey Shire Council	<p>Preparedness</p> <ul style="list-style-type: none"> 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 Stuart McIntyre 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. 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. <p>Response</p> <ul style="list-style-type: none"> Subject to the availability of council resources, assist NSW SES with flood operations including: <ul style="list-style-type: none"> Traffic management on council managed roads.

AGENCY	RESPONSIBILITIES
	<ul style="list-style-type: none"> – 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. <ul style="list-style-type: none"> • 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. <p>Recovery</p> <ul style="list-style-type: none"> • 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.

AGENCY	RESPONSIBILITIES
Caravan Park Proprietor(s)	<ul style="list-style-type: none"> • 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 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: <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> – 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	<ul style="list-style-type: none"> • When notified of possible flooding or isolation, childcare centres and preschools should. <ul style="list-style-type: none"> – 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.

AGENCY	RESPONSIBILITIES
Dams Safety NSW	The roles and responsibilities for Dams Safety NSW (formerly NSW Dam Safety Committee) are outlined in the NSW State Flood Plan.
Department of Defence	Arrangements for Defence Assistance to the Civil Community are detailed within the State EMPLAN (section 448).
Energy and Utilities Services Functional Area	<p>The roles and responsibilities for Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN).</p> <p>Roles and responsibilities in addition to the Supporting Plan are:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> – 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.

AGENCY	RESPONSIBILITIES
Local Emergency Operations Controller (LEOCON)	<ul style="list-style-type: none"> • Monitor flood operations. • If requested, coordinate support for the NSW SES Incident Controller.
Local Emergency Management Officer (LEMO)	<ul style="list-style-type: none"> • If requested by the NSW SES Incident Controller, advise appropriate agencies and officers of the start of response operations.
Manly Hydraulics Laboratory (MHL)	The roles and responsibilities for Manly Hydraulic Laboratory are outlined in the NSW State Flood Plan.
Marine Rescue NSW	The roles and responsibilities for Marine Rescue NSW are outlined in the NSW State Flood Plan.
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 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.
Resilience NSW	The roles and responsibilities for Resilience NSW are outlined in the NSW State Flood Plan.

AGENCY	RESPONSIBILITIES
SEOCON/SEOC	The roles and responsibilities for the SEOCON/SEOC are outlined in the NSW State Flood Plan.
Surf Life Saving NSW	The roles and responsibilities for Surf Life Saving NSW are outlined in the NSW State Flood Plan.
Telecommunications Services Functional Area	The roles and responsibilities for Telecommunications Services are outlined in the Telecommunications Services (TELCOPLAN) Supporting Plan.
Transport for NSW	<ul style="list-style-type: none"> • 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	<p>Preparedness</p> <ul style="list-style-type: none">• 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. <p>Recovery</p> <ul style="list-style-type: none">• Assist with community clean-up if required and able to do so.• Participate in After Action Reviews if required.
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HAZARD AND RISK IN KEMPSEY SHIRE

Volume 2 of the Kempsey Shire Local Flood Plan

Last Update: May 2017

AUTHORISATION

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

Approved

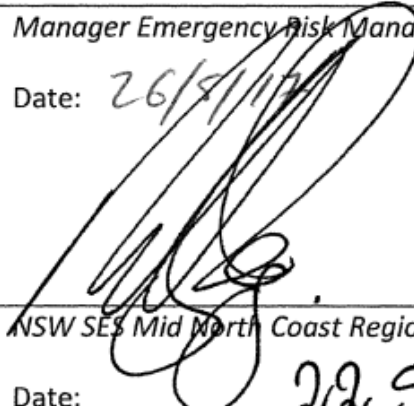


Manager Emergency Risk Management

Date:

26/8/17

Approved



NSW SES Mid North Coast Region Controller

Date:

22.5.2017

Tabled at LEMC

Date: 10 July 2017

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VERSION LIST

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

Description	Date
Kempsey Shire Local Flood Plan – Annexes A and B	July 2012
Kempsey Shire Local Flood Plan – Annexes A and B	May 2006

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Kempsey Shire Local Controller

NSW State Emergency Service

PO Box 331

KEMPSEY NSW 2440

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 LANDFORMS AND RIVER SYSTEMS

Macleay River Valley

- a. The Macleay River crosses the Kempsey Shire making its way from the New England Plateau in the Great Dividing Range to the ocean mouth at South West Rocks. Rising from the Guyra River, it joins with a range of tributaries including the Apsley, Styx, Tia, Dyke, Yarrowitch and Chandler Rivers. Originally the river exited at Grassy Heads, however, following the 1893 floods a new entrance was forged at South West Rocks (1).
- b. The Macleay River catchment covers 11,500 square kilometres with its tributaries extending for a distance of about 160 kilometres from the coast. The Macleay River valley consists of three distinct zones:
 - i. **The New England Tablelands section**, where the main tributaries, the Chandler, Muddy and Apsley Rivers, rise. This section is entirely outside Kempsey Shire (1).
 - ii. **The Gorge section**, where the rivers leave the tablelands in a series of waterfalls and join to form the Macleay River in the well-defined gorge. Here the valleys are steep-sided, stream gradients are steep and flood flow velocities are high. On this section there are several minor tributaries including the Parrabel, Hickeys, Georges and Nulla Nulla Creeks and Dykes River but no major ones. Below the Hickeys Creek confluence the topography becomes less severe as the river emerges from the gorges (1).
 - iii. **The lower valley section**, which begins at the upper limit of tidal influence about 16 kilometres upstream of Kempsey. Here there are extensive alluvial flats, occupying around 43,000 hectares, and well-defined natural levees along the river and its tributaries, the Belmore River and Christmas, Kinchela and Clybucca Creeks. Some of the levees have been raised as part of the flood mitigation effort. The ground slopes away from the levees to low-lying swamplands, the Doughboy, Cooroobongatti and Belmore Swamps and Swanpool, which act as storage areas for floods. These swampy areas are generally less than a metre above sea level. The river reaches the sea via the main entrance and during floods may do so through Korogoro Creek, Big Hill Cut, Rowes Cut, Ryans Cut, Killick Creek and South West Rocks Creek. Other breakouts through the sand dunes may also occur. Water can also flow into the Hastings Catchment via Connection Creek to the Maria River or even flow from Maria River back into the Macleay catchment (1). In the major flood of 1949,

other breakouts were reported at various points between Crescent Head and Grassy Head (2).

1.2 STORAGE DAMS

- a. Dam locations are shown on Map 1 - River Basin Map.

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

Steuart McIntyre Dam (3) (4)	
Owner / Operator	Kempsey Shire Council
Description of Dam	Steuart McIntyre Dam is an off stream water supply for the town of Kempsey. It consists of a main earthen embankment, spillway and an inlet/outlet structure. The dam has a storage capacity of 2500ML and a catchment area of about 60.5 hectares.
Location	Steuart McIntyre Dam is situated approximately 10 km west of Kempsey. It lies within the Kempsey Shire Council and Macleay River Basin.
Communities Downstream	Yarravel, Aldavilla
Monitoring System	SCADA telemetry, piezometers, seepage weir, site inspections.
Warning System	SCADA telemetry system with pre-set alert levels. There is no additional warning system to alert downstream residents.
Other	The time it takes for the initial wave front to reach the first house is within 15 minutes from the commencement of failure of the dam.

1.3 WEATHER SYSTEMS AND FLOODING

- a. The heavy rain which produces floods in the Kempsey Shire may come from the following kinds of weather systems:
- East Coast Low-Pressure Systems** that travel along the coast, usually in a southerly direction and during the cooler months, direct moist on-shore winds over the Macleay River basin. Orographic uplift of these air masses brings heavy rain over the lower valley and the gorge. The August 1949, June 1950 and May 1963 floods, the most severe in living memory, were of this origin. In 1949 the heaviest rainfall was over the lower valley, whereas in 1950 and 1963 it was over the gorge but with substantial falls also occurring over the lower valley. The 1949 system was unusual in that it originated over land in southern Queensland, moving south-eastwards very slowly over the Macleay River catchment. In 2009/11 a complex weather pattern off the north eastern NSW coast affected the area. This also included a low pressure system moving from southern Queensland and a slow moving high from the Tasman Sea (1).

- ii. **Rain Depressions** originating as tropical cyclones in the Gulf of Carpentaria or Coral Sea move southwards. The flood of January 1974 was of this type, the 'tail' of ex-tropical cyclone Wanda caused heavy falls over south-eastern Queensland and north-eastern NSW. Two months later, flooding occurred from a rain depression, which had originated as Tropical Cyclone Zoe (1).
 - iii. **Monsoonal Low-Pressure Systems** move across the Great Dividing Range from northern Australia, usually during the late summer and autumn months. These systems are indicated on weather maps as elongated low-pressure troughs stretching from the Northern Territory to the north coast of NSW. These may produce heavy rains over the Gorge zone. Flooding from this mechanism is rare in the Macleay River valley (1).
 - iv. Sequences of **frontal systems** cross the valley from west to east, usually in the winter months. The individual fronts are not usually associated with very heavy falls but the cumulative effect of a series of them over a period of some weeks may produce flooding. The flood-producing mechanism is uncommon (1).
 - v. High-intensity, short-duration, convective **thunderstorms** occur frequently over the shire, especially during the summer months. The rain from such storms may cause town drainage systems or minor creeks to surcharge, creating local flooding of low-lying areas. No rise in the Macleay River is likely from such events (1).
- b. Rains from the first three types of systems noted above could persist for some days, especially in the case of east-coast low-pressure systems which can cause heavy rain over periods of three to five days. Sometimes there may be two or more separate rain events a few days or weeks apart. In 1974, there were separate floods from these influences in January, March and April, and again in 2009 in February, March and May (1).
 - c. Most of the larger floods at Kempsey have resulted from events in which significant rain has fallen over the whole of the catchment. Lesser events may occur after rain only falling over parts of the catchment. The 1949, 1950, 1963, 2001 floods all followed general catchment-wide rainfall. The 2009 and 2011 floods had rainfall over the entire catchment area, the heaviest falls were in the lower part of the catchment (1).
 - d. North-eastern NSW experiences a distinct wet period between January and April, and about half of the recorded floods on the Macleay River have occurred between January and March. The incidence of flooding in the winter months is lower but winter floods have tended to be the most severe. The spring and early summer months are relatively dry and floods are infrequent during these times of year (1).

1.4 CHARACTERISTICS OF FLOODING

Macleay River

- a. Flooding upstream of Kempsey is confined to areas close to the river and its tributaries, though in the more severe events quite large areas can be inundated in the Temagog, Mooneba, Sherwood, Turners Flat, Dondingalong and Euroka areas (1).
- b. Downstream of Aldavilla the floodplain broadens significantly with many connecting waterways further downstream (5).
- c. At Kempsey, flow is mostly confined to a narrow area at the Kempsey Traffic Bridge, where a natural floodway cuts northward through the CBD in floods greater than 7.2 metres at the Kempsey Traffic Bridge gauge (the Kempsey gauge) (5). The peak 1% AEP flow in the Macleay River at Kempsey is approximately 15,000 cubic metres a second. At the railway crossing at Kempsey this flow is predominantly confined to a relatively narrow flow area of the main river channel and part of the left overbank area through the township of Kempsey (2).
- d. Downstream of the Kempsey Traffic Bridge the flow spreads out across the floodplain into East Kempsey wetland and Pola Creek area toward the southern Frogmore floodplain, with an extent of approximately four kilometres in the vicinity of Frederickton. Under the existing conditions, a large number of properties in Kempsey, Frederickton and the surrounding floodplain area would be inundated in events approaching 8.6 metres on the Kempsey gauge, lasting over 48 hours (2).
- e. Different rates of rise and volumes of floods with the same peak level may change the flood gradient along the levees. This impacts the sequence and location of levee overtopping. The critical rate of rise is near the levee crest heights rather than the entire rising limb. A slower rate of rise will result in the Cochrane Street levee overtopping first, whereas a faster rate of rise will result in the Eden Street levee overtopping first. This is further detailed in section 2.4.7 (5).
- f. The operation of the flood mitigation works can be generalised in the following way (2):
 - i. In small floods, around 6 metres on the Kempsey gauge, the flood mitigation works contain flood waters in the major streams and prevent flood waters spilling onto the floodplain. This minimises the frequency of inundation which is the major cause of agricultural damage and maximises the time available for moving stock during major events.
 - ii. By 7.24 metres at the Kempsey gauge, many flood gates are opened to let flood waters spill into the floodplain and wetland areas throughout the floodplain. This action helps to reduce flood levels experienced by Kempsey and small rural settlements at the expense of agricultural losses.

- iii. In larger floods, greater than 7.24 metres at the Kempsey gauge, the operation of the flood gates does not significantly change flood levels. During non-flood times the floodgates are left open to allow normal flushing.
- g. Much larger areas downstream of Kempsey in the Lower Macleay are liable to flooding (1).
- h. The lower part of the Macleay Catchment, towards Hat Head, contains a swamp referred to as Swanpool. This area has problems with drainage of flood waters as it tends to pool and act as flood storage. A flood mitigation scheme is in place in the area. This includes the Belmore River and Kinchela Creek flood control structures (2).
- i. Minor flooding can occur when the gates on flood control structures on Belmore and Kinchela Creeks are opened the flood waters flow into the Belmore and Kinchela storage areas (1).
- j. On some occasions, flooding in the area below Kinchela can be exacerbated by very high tides or by storm surge conditions. Below Jerseyville the extent of flooding may be more closely correlated with sea conditions than with upstream flood magnitude. In 1963, flood levels were higher in this area than in 1949 when the flooding was much more severe at Kempsey (1).
- k. The area of Clybucca and Collombatti to the north side of the Lower Macleay contains three water ways, Seven Oaks Drain, Collombatti Creek and Clybucca Creek. The wetlands to the north of the area act as flood storage and do not readily drain. Seven Oaks Drain connects Collombatti Creek and Clybucca Creek (and then to the Macleay) in order to provide a drainage outlet for Collombatti Creek (2).
- l. The lower valley includes Connection Creek, which may take water from Belmore Swamp to the Maria River or vice versa (see Maria River) (refer to Annex 1 – River Basin Schematic) (1).
- m. During major flood events, flood waters drain to the ocean via a number of routes in addition to the main river entrance. This includes Korogoro Creek, Ryans Cut, Killick Creek and South West Rocks Creek and breakouts have even been observed at various points between Grassy Head and Crescent Head (e.g. in 1949). Water can also flow into or from the Hastings River via Connection Creek (refer to Maria River below) (6).

Belmore River

- n. The low lying floodplains surrounding Belmore River impact significantly on the flooding of the area. As Belmore River diverts from the Macleay River the flood waters travel fast through the river and the river breaks its banks. As the flood waters travels along Belmore River the rate of rise decreases (2).

Kinchela Creek

- o. The river and creeks in the area are the main source of directly flooding of properties. Flood waters coming from the Macleay River and to some extent Kinchela Creek are fast, whereas flood waters from overland flow or from the various swamp areas are slow (2).
- p. Even with a number of drains and flood mitigation works the flood waters can last more than a week in some areas. This is due to the general drainage problem caused by swamps in the area such as Swanpool. The water hits these areas, stagnates and does not keep draining well (2).

Maria River

- q. The Maria River is the major tidal tributary and joins the Hastings River about 10 kilometres upstream from the ocean entrance. It drains the northern section of the Hastings catchment that extends along the coastal plain toward Kempsey and during periods of flood flow permits an exchange of water between the adjacent valleys via Connection Creek. The water level can be partially controlled through the operation of a weir at the Kempsey / Port Macquarie Hastings LGA boundary. It is joined by the Wilson River immediately downstream of Telegraph Point which extends west to Upper Rowland's Plains (1).
- r. The different mechanisms for flooding of the Maria River area are (2):
 - i. The Macleay River Catchment
 - ii. The Hastings River Catchment
 - iii. Local rainfall event
 - iv. Any combination of the above
- s. The interconnectivity can help the flood waters drain between the two systems, but conversely it can also increase the effect of a flood in the area if both river systems are flooded simultaneously. The rainfall events that can produce flooding in the Macleay River could also produce some flooding in the Hastings River due to their proximity (2).
- t. Isolation of the area is the main issue, with most houses built on stilts (2).

Table 2: Approximate Gauge Levels and Indicative Flow Travel Time for Georges Creek (7)

Georges Creek Height	Bellbrook	Turners Flat	Kempsey	Smithtown
4m	3.0m (+8hrs)	2.65m (+16hrs)	1.4m (+24hrs)	-
8m	7.0m (+9hrs)	5.5m (+17hrs)	4.6m (+25hrs)	-
9m	7.3m (+9hrs)	6.0m (+16hrs)	5.7m (+24hrs)	4.2m (+29hrs)
11m	10.65m (+7hrs)	9.87m (+13hrs)	6.60m (+20hrs)	4.3m (+22hrs)
13.8m	15.5m (+5hrs)	13.7m (+11hrs)	8.0m (+16hrs)	4.5m (+17hrs)
17m	17.5m (+4hrs)	18m (+10hrs)	8.7m (+14hrs)	4.75m (+15hrs)
20m	21m	20m	12.5m (+12hrs)	-

1.5 FLOOD HISTORY

- a. Flood records are available from 1838, soon after the founding of Kempsey, to 2013. Floods which are known to have exceeded 6.0 metres AHD at the Kempsey gauge are shown in Table 3, along with the heights reached in these events, where known, at Georges Creek and Bellbrook. Some of the earlier values are approximations, but those since 1945 are believed to be accurate (1).
- b. The table highlights the irregularity of serious flooding on the lower Macleay River. Several major floods may occur in a short period of time, as was the case in the periods 1863-75 and 1890-93, and 1949 and 1950 saw Kempsey's worst two floods ever within eight months of each other. Equally, there may be long periods in which few if any serious floods are experienced (for example, between 1921 and 1949 and between 1967 and 2001). The same irregularity applies for floods of lesser significance (1).

Table 3: Peak Flood Heights (mAHD) at Georges Creek, Bellbrook, Kempsey and Smithtown 1838-2013 of floods exceeding 6m at Kempsey (8). Smithtown data is from an unknown source.

Date	Georges Creek	Bellbrook	Kempsey	Smithtown
1838	-	-	7.2	-
1841	-	-	7.2	-
Aug 1848	-	-	6.3	-
Feb 1863	-	-	6.64	-
Feb 1864	-	-	7.94	-
July 1864	-	-	6.8	-
Aug 1864	-	-	7.84	-
July 1866	-	-	6.8	-

Date	Georges Creek	Bellbrook	Kempsey	Smithtown
April 1867	-	-	7.2	-
March 1870	-	-	6.8	-
March 1875	-	-	8.14	-
June 1879	-	-	6.6	-
March 1890	-	-	6.6	-
April 1892	-	8.8	6.6	-
March 1893	-	-	7.2	-
June 1893	-	17.1	8.14	-
July 1921	-	16.16	7.84	-
Feb 1928	-	-	6.14	-
Feb 1929	-	12.20	6.84	-
March 1946	-	12.73	6.10**	-
Aug 1949	14.10	17.22	8.52	-
June 1950	-	18.06	8.31	-
Aug 1952	-	13.03	6.56	-
Feb 1954	-	11.23	6.36	-
Nov 1959	-	9.75	6.43	-
April 1962	-	8.15	6.08	-
May 1963	13.50	15.54	7.68	Estimated 4.50
June 1967	-	10.24	6.56	-
Jan 1968	-	8.84	6.31	-
Jan 1974	8.63	7.70	6.10	-
March 1974	6.78	7.11	6.23	-
Feb 1976	8.64	7.56	6.05	-
May 1977	7.60	6.75	6.11	-
May 1980	7.00	7.14	6.27	-
April 1989	6.72	6.34	6.11	-
March 2001	11.90	12.80	7.44*	Estimated 4.34
May 2009	10.77	11.40	6.90*	Estimated 4.29
June 2011	11.0*	10.65*	6.70*	Estimated 4.21
Feb 2013	12.14	11.30	7.11	

* Manual gauge readings only – telemetric failed

**Height approximate

- c. A brief history of the major flood events is provided in the following paragraphs.

August 1949 Flood Event – Flood of Record

- d. Late in August 1949 an extremely intense storm resulted in heavy rain over the Macleay catchment area during the 25, 26 and 27 August 1949 (1).
- e. Headwater streams rose rapidly, and the Gara River reached its highest stage of 4.1 metres on 26 August. The Macleay River reached its peak of 17.2 metres at Bellbrook on 27 August following rises of up to 3.05 metres per an hour (1).

- f. By 7.0 metres AHD on the Kempsey gauge, water had entered Central Kempsey from near the railway bridge and was around the Post Office corner. Three metres of water flowed across Belgrave Street, flowing very fast (a velocity of 3-3.5 metres a second) and cleared a large part of the natural floodway through the CBD (5). Water also crossed River Street near Wide Street, washing away a number of houses (5) (1). The river reached a maximum height on the Traffic Bridge gauge of 8.52 metres AHD on 27 August 1949 (1).
- g. At least six people are known to have lost their lives in the August 1949 flood and very extensive damage to infrastructure and properties was caused. Contemporary reports indicate that in Kempsey alone, 35 houses were completely washed away and 300 left uninhabitable. About 2,310 people were made homeless in Kempsey. Many shops were severely damaged and stock and furniture ruined (9).
- h. In the Lower Macleay areas much of Frederickton was inundated and the villages of Smithtown, Gladstone, Kinchela and Jerseyville were totally flooded. The rural areas of Belmore River, Austral Eden, Upper Kinchela, Seven Oaks, Bellimbopinni, Rainbow Reach, Summer Island and Clybucca were all severely affected by depths up to three metres. The entire area downstream of Frederickton, from Collombatti in the west, to the coastal dunes 20 kilometres away to the east and north to Stuarts Point was flooded. Floodwaters also crossed the Crescent Head Road and combined with water from the Hastings River, flooded rural areas of Maria River towards Port Macquarie. Water remained on much of these affected areas for months after the flood (1).
- i. During the 1949 flood, flooding was experienced in the main street of Willawarrin, upstream of Kempsey, with a total of seven properties being either damaged or destroyed. Properties affected included the hall and the pub (10) (9).
- j. The flood of August 1949 was originally considered as the "1 in 100 year flood", however more recent analysis indicates that it had an average recurrence interval (ARI) of about 1 in 90 years (1).

June 1950 Flood Event

- k. 1950 was a particularly wet year throughout NSW, the wettest on record (surpassing the 1949 figure by some 700 mm) (1).
- l. There is a lack of stream data from this event, due to many gauges being washed away in the previous year and not replaced. Flood levels in some areas were comparable to or exceeded the 1949 event due to local conditions, particularly in the Lower Macleay, levels in 1950 were said to be 300—450 mm higher than in 1949. At Bellbrook the recorded level was the highest on record at 18.06 metres (some 800 mm above the previous year). The peak at Kempsey of 8.31 metres AHD) on the gauge occurred on the 25 June 1950 (1).

- m. There was less destruction in this flood due mainly to the fact that buildings and houses damaged in the 1949 event had not yet been replaced. However, the railway viaduct, which had not yet been reconstructed from the previous year, was again washed away. Several houses were destroyed in Kempsey and down river there was extensive damage to infrastructure and rural properties (1).
- n. Damage to properties was also reported in Willawarrin similar to the 1949 flood (9).
- o. Following these floods, an extensive series of flood mitigation works were constructed around the town as well as Glenrock-Tennessee, Christmas Creek and Pola Creek (5).

May 1963 Flood Event

- p. Flooding in May 1963 resulted from an intense series of low-pressure systems along the east coast from late April to early May, 1963 (1). Rainfall was concentrated in the zone from Lower Creek to Kempsey, with the highest falls in the upper Styx River and Georges Creek areas. The rainfall occurred over a five-day period and the general intensities are much less than the 1949 and 1950 storms. Hence there was more warning and less destruction (1).
- q. The peak of the flood at 7.68 metres occurred at Kempsey on 9 May. Kempsey was flooded with three to four metres of water through the central business district and several streets were evacuated. Smithtown was also evacuated. Damage was mostly to Central Kempsey and the rural lower river areas (1).
- r. Levels down-river were about 300 mm below the 1949 levels. This flood is now estimated to be a 1 in 15 year ARI event (1).
- s. There were no significant flood events in the Macleay River for a further period of 38 years, and as a result the population had become complacent. Mitigation and protection measures were largely untested (1).

March 2001 Flood Event

- a. A very intense sub-tropical low-pressure system produced heavy rainfall over the north coast of NSW between 6—11 March 2001. This resulted in major flooding occurring in several valleys including the Macleay River Valley, which was already wet from heavy rain in February. The time difference between the heaviest rain and the flood peak at Kempsey was about 21 hours (1).
- b. The highest recorded rainfall occurred in the lower half of the Macleay River Valley. This reduced the amount of lead time between heavy rain and the peak at Kempsey compared to the previous major flood of May 1963, where major flooding was also experienced in the upper catchment at places such as Armidale (1).
- c. Water slowly receded in the river and below the top of all the levee banks but was unable to drain from the town until the river receded at First Lane (1). Water began

to flow over the Eden Street levee first by around 6.65 metres AHD at the Kempsey gauge. This was the first flood to overtop this levee first since they were constructed. The Cochrane Street levee was then overtopped around 6.7 metres AHD at the Kempsey gauge. Water flowed into the Kempsey CBD basin from north and south, filling the basin over a period of 5—6 hours. Forth Street was closed to traffic around three hours after levee overtopping and Belgrave Street two hours following that. These roads were flooded for around 24 hours. The peak *ponded* level in the Kempsey CBD appears to be about 6.6 metres AHD (1). Approximately 94 businesses were flooded within the CBD. Damage to individual businesses ranged from several hundred dollars to almost half a million dollars (1).

- d. The Kempsey gauge malfunctioned from about midday Saturday, causing much higher predictions by the Bureau and Council than the actual levels. It appears the flood peaked at 7.44 metres AHD on 10 March.
- e. Gladstone, Smithtown, South West Rocks, Hat Head, Crescent Head and many upstream and downstream rural areas were isolated. Many food drops or evacuation for medical reasons were organised. The sewerage treatment system at Smithtown / Gladstone was overloaded by floodwaters and discharging occurred. Council staff were unable to bring the system back on line until late 13 March (a few days). Some residents of both villages voluntarily evacuated until the sewer was fully functional. Apart from short periods during power failures at Bellbrook and Stuarts Point, there were no problems with or disruptions to water supply in any area (1).
- f. This flood now appears to be about a 1 in 12 year event, and the highest to occur since 1963 (which reached 7.68 metres AHD on the Kempsey Gauge) (1).

May 2009 Flood Event

- g. Following severe weather from a low pressure system and high rainfall, a flood watch on 21 May 2009 prompted Council to activate its flood procedures and close the Kinchela and Belmore Floodgate structures (1). The catchment was already wet due to smaller flooding events in March and a wet season (1).
- h. This event peaked at 6.9 metres AHD on 24 May 2009.
- i. The river broke its banks at the Riverside Park Boat ramp causing Eden Street to backfill approximately 100 metres south to a depth of 300 mm. Road levels at John and Verge Streets contained the breach, however the water breached through erosion gutters on either side of the road at the intersection of Eden and Sydney Streets. At the southern end, the water flowed into a stormwater pit and at the northern end it flowed down the gutter on Sydney Street, into a car park and overtopping the kerb onto the playing field in Verge Street (1).
- j. Soon after, the river broke through the sandbagging of the Pacific Highway abutting the Cochrane Street levee causing it to slowly over top. Some overtopping of the

levee systems did occur, however water levels subsequently dropped and the CBD was not inundated (1).

- k. Major disruption was caused to the smaller surrounding communities outside Kempsey as the rural levee systems in the Lower Macleay overtopped. There was significant flood damage to the rural farming land of Jerseyville, Gladstone and Smithtown. The damage sustained was to livestock and equipment with only a small number of properties with over-floor flooding. The coastal townships of Hat Head, South West Rocks and Crescent Head were isolated for a few days (1).

June 2011 Flood Event

- l. This event was similar to the 2009 event, and did not overtop the levee system. There was some flooding in the CBD, but did not enter the Coles car park. Flood water was within 100 mm of the levee crest at Eden Street at the flood peak of 6.72 metres AHD. Flooding was reported in 16 dwellings, one of which was in Maria River, four in Bellimbopinni, Clybucca and Collombatti, five in Gladstone, Smithtown, Seven Oaks, Kinchela and Belmore River, one in Hat Head and five in South West Rocks and Jerseyville. Over 177 yards also experienced flooding and around 68 secondary buildings mostly in Gladstone, Smithtown, Seven Oaks, Kinchela and Belmore River, South West Rocks and Jerseyville, Kempsey, Bellimbopinni, Clybucca and Collombatti and Maria River (2). People (total of 54) from Belgrave Street, parts of Smith Street and Clyde Street were evacuated (5) and many people reported disruption to access (2).
- m. The event was regarded as relatively small on the Macleay, but relatively large on Collombatti Creek. This caused the peak to occur over several days between 14 June at Collombatti Creek (3.49 mAHD), 15 June at Kempsey (6.72 mAHD), 16 June at Smithtown (4.23 mAHD) and 17 June at Clybucca flood gates (2.25 mAHD) (2).
- n. All warning gauges failed in this event and manual readings had to be undertaken by the NSW SES members and phoned to the Bureau of Meteorology for warning predictions (1).

February 2013 Flood Event

- o. In January 2013, ex-Tropical Cyclone Oswald impacted the Mid North Coast, resulting in the Macleay River peaking below minor at 4.45 metres AHD at Kempsey on 29 January 2013. In the following two weeks two low pressure systems impacted the Mid North Coast in quick succession. These two systems brought gale force winds, heavy rain, damaging surf and flooding to the Macleay River as well as the adjacent Hastings River, Camden Haven River and Manning River.
- p. The highest recorded rainfall occurred in the lower half of the Macleay River Valley (415 mm at Yarras). This reduced the amount of lead time between heavy rain and

the peak at Kempsey compared to the previous major flood of May 2011, where major flooding was also experienced in the upper catchment.

- q. The largest of the peaks was 7.11 metres AHD on 24 February at Kempsey, which was followed by a smaller peak above the moderate level of 5.95 metres AHD on 4 March. Overtopping of the Cochrane Street levee and partial inundation of the Kempsey CBD occurred as the basin filled over a number of hours, making Belgrave Street impassable. Floodwaters entered the lower part of Eden Street near Clyde Street intersection via the boat ramp access. North of 117 Smith Street was worse hit with water remaining impassable for about 72 hours. The Eden Street levee did not overtop, reaching 50 mm from the crest. Water slowly receded in the river and below the top of all the levee banks but was unable to drain from the town until the river receded at Cochrane Street/First Lane (5).
- r. The flood on 24 February was estimated to be about a 1 in 11 year event. It was also the highest to occur since May 2009, which reached approximately 6.9 metres. The 2001 flood reached a level of 7.40 metres AHD on the Kempsey gauge, and is estimated to be an event that occurs on average once every 12 years.
- s. The following tables and figure summarise the flood history for the Bellbrook, Georges Creek and Kempsey gauges. Intelligence gathering started in 2013 for the Smithtown gauge, and to date there have been no floods above the 4.2 major flood level.

Table 4: Flood History from the Bellbrook Gauge 206019 – Floods above major 13.5m

Date	Peak Height (m)
01/01/1893	19.20
27/08/1949	17.22
24/06/1950	18.06
08/05/1963	15.54

Table 5: Flood History from the Georges Creek Gauge 206024 – Floods above major 10.0m

Date	Peak Height (m)
26/08/1949	14.10
24/06/1950	14.35
08/05/1963	13.50
16/02/1997	10.36
10/03/2001	11.90
23/05/2009	10.77
15/06/2011	11.00
23/02/2013	12.14

Table 6: Flood History from the Kempsey Gauge 206402 – Floods above major 6.6m

Date	Peak Height (mAHD)
February 1863	6.64
February 1864	7.94
August 1864	7.84
March 1875	8.14
June 1893	8.14
July 1921	7.84
February 1929	6.84
27/08/1949	8.52
25/6/1950	8.31
09/05/1963	7.68
10/03/2001	7.44
23/05/2009	6.90
15/06/2011	6.70
24/02/2013	7.11

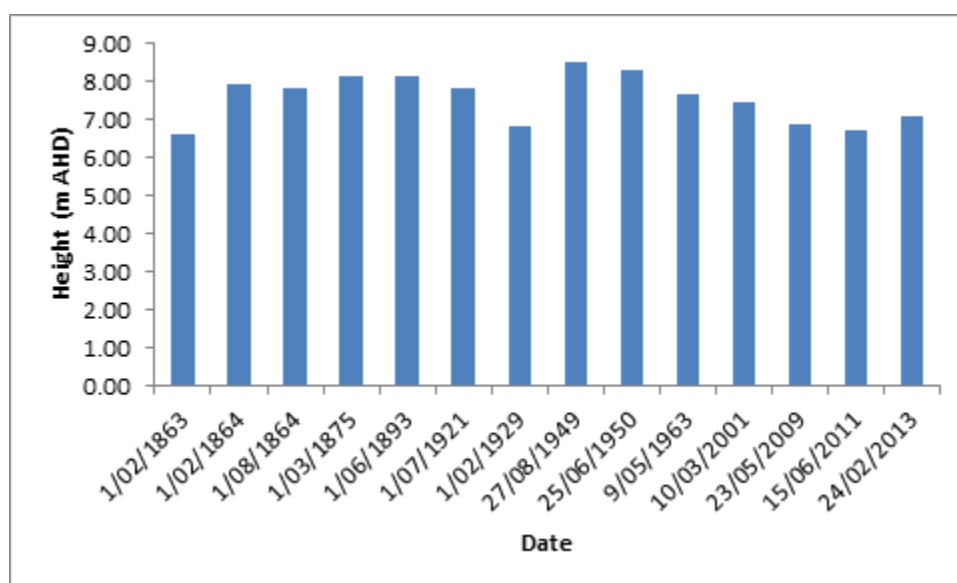


Figure 1: Major flood history for Kempsey between 1863 - 2013

1.6 FLOOD MITIGATION SYSTEMS

- a. Extensive rural flood mitigation works have been completed since the 1950s on the floodplain of the lower Macleay River. These comprise levees, barrages, drains, floodgates, floodway's, training walls, ocean cuts and river bank stabilisation works. They are designed to reduce the frequency and real extent of flooding in small events and to facilitate drainage after inundation (1).
- b. Common levee terminology includes (11):

- i. **Design Height:** The height for which a levee was designed to provide protection. This will always be lower than the crest height.
 - ii. **Freeboard:** The amount of additional height added to the top of the structure of a levee to ensure that the crest is high enough to meet the design needs of the levee.
 - iii. **Crest Height:** The crest height of a levee is the top of the physical structure and is equal to the design height plus freeboard.
 - iv. **Surveyed Low Point (Imminent Failure Level):** A level surveyed lower than the crest height of the levee, and possibly lower than the design height, at which there is a potential for failure of the levee.
- c. Failure of a levee, such as a breach, could occur prior to overtopping. This situation could be made worse as a levee may have given a false sense of security to the local community. In Kempsey, floodwaters flow down the CBD when the Eden Street levee overtops. In the event of levee failure, properties impacted are likely to have short to no warning time of the failure with high velocities and high inundation depths. A large number of houses are not built to withstand the pressure following failure of the levee and ponding of floodwater. Overtopping of a levee is not considered failure of the levee, as many levees have been designed to overtop in some events. (5).
- d. There are 15 levee systems within the Kempsey Shire LGA, with the majority designed to minimise residential and agricultural damages during small floods:
- i. Short Street/Wide Street/Cooks Lane Levee located between Short Street and Cooks Lane.
 - ii. Cochrane Street Levee located north of First Lane, runs between the railway embankment at Broughton Street and the high bank of the Macleay River.
 - iii. Eden Street Levee located along the northern side of Eden Street between the railway embankment and the high ground in the CBD.
 - iv. RSL Levee located along the river bank opposite the RSL tying in to the high ground at the northern end and free standing at the southern end.
 - v. Frederickton Interchange Levee located along the bank of the Macleay River at Lawson Street and the Pacific Highway.
 - vi. Kempsey to Frederickton Levee system located on the left bank of the Macleay River between Kempsey and Frederickton.
 - vii. Smithtown Levee begins at the southern end of Belmore Street in Smithtown and extends around the left bank of the Macleay River to the Smithtown boat ramp.

- viii. East Kempsey to Gladstone Levee system located on the right hand bank of the Macleay River (looking downstream) and is made up of 3.3 kilometres of constructed levees.
- ix. Hat Head Levee System: The Control Levee located approximately 2 kilometres upstream of the Korogoro Creek Bridge, Village Levee located along the northern bank of Korogoro Creek and South West Levee is the embankment for Gap Road.
- x. Christmas Creek Levee system on the left and right banks of Christmas Creek.
- xi. Frederickton to Smithtown Levee located on the left bank of the Macleay River stretching between the northern embankment of the Kempsey Bypass Bridge at Frederickton and Smithtown.
- xii. Belmore River Levee system located on the left and right banks of Belmore River commencing at the Macleay River junction and terminating at the Belmore River head works structure.
- xiii. Kinchela Creek Levee system located on the left and right banks of Kinchela Creek commencing at the Macleay River junction and terminates at the Kinchela head works structure.
- xiv. Rainbow Reach Levee located on the left bank of the Macleay River at Rainbow Reach.
- xv. Smithtown to Jerseyville Levee system extends 31.2 kilometres along the left and right banks of the Macleay River.
- e. Information of key levees is summarised in Table 7. These are further expanded in Part 2 - Specific Risk Areas and shown on the town maps attached.
- f. There are approximately 177 floodgates within the Kempsey Shire, including at Kinchela and Belmore which are further described below and in 2.11. While some operate automatically, others require manual opening. Council consider operating the floodgates at around 5.1 metres on the Kempsey gauge, but is dependent on daylight to ensure the farmers have maximum time to evacuate. Once the gates open, water spills out into the floodplain and wetlands to reduce flood levels in Kempsey and small rural settlements. In larger floods, the floodgates do not significantly change the flood levels (2) (12).
- g. Flood structures of note are (6):
 - i. **Ryans Cut** – a channel cut directly through the sand dunes on Killick Beach. A floodgate on Loftus Road controls the use of the cut. Ryans Cut traverses a back swamp area between the flood gate and the ocean. After flood waters are released from the Belmore River into Belmore Swamp, Ryans Cut is then used to drain the remainder of flood waters into the ocean.

- ii. **Big Hill Cut Floodgates** – consist of an excavated channel adjacent to Big Hill Headland, with a flood gate at the ocean entrance on the southern side of Delicate Nobby Beach. The floodgates are used in events great than 10% AEP after other flood mitigation works have been used. The gates relieve flooding to around 30-40 properties and roads including Maria River Road. Sand build up on the floodgate must be excavated prior to operating the gate (13).
 - iii. **Killick Creek Floodgates** – which are used to reduce flooding on the Belmore River, including when Connection Creek joins the Belmore River (Connection Creek connects the Macleay and the Hastings River catchments in large floods).
 - iv. **Korogoro Creek Floodgates** – located on Hat Head Road, the flood gates are manually wound down and are used to slow flood water down to minimise damage to the levees on either side of the river protecting the village of Hat Head as it outlets to the ocean (13). A two kilometre control levee is also in place upstream of Hat Head Road bridge, referred to as ‘the choke’ (14).
 - v. **Rowes Cut** – a swale cut from Korogoro Creek through Hat Head dunes to the ocean. The swale is between Korogoro Creek Floodgates and ‘the choke’. Rowes Cut has not been used in a very long time and it is uncertain if the channel would be usable at the present time (13).
 - vi. **Frederickton Floodgates** – automatic floodgates under the Pacific Highway.
 - vii. **Kinchela and Belmore Floodgates** – manual floodgates in Belmore and Kinchela. They have little benefit in floods greater than 7.24 metres at the Kempsey gauge.
 - viii. **Willow Drain** – consists of six 1.8 by 1.8 metres high culverts that allow water to drain from the CBD post event in the vicinity of the Cochrane Street levee.
- h. There are no prescribed detention basins within the Kempsey Shire LGA.

Table 7: Key levee heights summary (6)

Levee Name	Related Gauge Height of Levee Overtopping	Design Height (mAHD – not relative to the gauge, unless specified)	Surveyed Low Point Height (mAHD – not relative to the gauge)	Low Spots requiring sandbagging	Consequence of overtopping
Short Street/Wide Street/Cook s Lane	8.3m	10.90m	-	-	Inundation of small number of houses. Water flows across River Street between Marsh Street and

Levee Name	Related Gauge Height of Levee Overtopping	Design Height (mAHD – not relative to the gauge, unless specified)	Surveyed Low Point Height (mAHD – not relative to the gauge)	Low Spots requiring sandbagging	Consequence of overtopping
					Wide Streets. Elbow Street becomes a flood island. Police Station, Fire Station and Council would be cut off.
Cochrane Street (Glenrock Drain)*	6.6 - 7.43m Kempsey gauge	5.90m	5.86m	Pacific Highway	Inundation of CBD
Eden Street	6.68 - 6.9m Kempsey gauge	7.50m	7.3 - 7.7m	Eden St near Sydney St Intersection	Inundation of CBD
RSL Levee	7.12m Kempsey gauge	7.26m	7.10 - 7.15m	-	Inundation of CBD
Frederickton Interchange	9.05m Kempsey gauge	8.55m at Kempsey gauge	6.7 – 7.3m Crest Height	-	Inundation of 27 properties
Kempsey to Frederickton	-	-	Several Low points	-	Inundation of agricultural land and small number of dwellings
Smithtown	-	Ranges from 4.3m – 4.43m	200mm below original design height	-	Inundation of Smithtown
East Kempsey to Gladstone	-	Ranges from 3.0m – 7.1m	Numerous low points	-	Inundation of agricultural land and some dwellings
Hat Head	-	Ranges from 2.26m - 4.03, with 400mm freeboard	Numerous low points	-	Isolation Inundation
Christmas Creek	-	4.95m	250mm above design height	-	Inundation of agricultural land

Levee Name	Related Gauge Height of Levee Overtopping	Design Height (mAHD – not relative to the gauge, unless specified)	Surveyed Low Point Height (mAHD – not relative to the gauge)	Low Spots requiring sandbagging	Consequence of overtopping
Frederickton to Smithtown	-	Ranges from 4.46 to 5.2m	Numerous low points	-	Inundation of agricultural land
Belmore River	-	3.7m	-	-	Inundation of agricultural land
Kinchela Creek	-	3.05m	100mm – 200mm below design height	-	Inundation of agricultural land
Rainbow Reach	-	1.34m – 1.46 m	50% of levee 200m below design crest level	-	Inundation of agricultural land
Smithtown to Jerseyville	-	No formal record	300mm	-	Inundation of agricultural land

1.7 EXTREME FLOODING

- a. Worse floods than have been seen in the Kempsey Shire must be regarded as inevitable. They will occur when particularly severe weather conditions of the sorts described above are experienced. Recent floods have been relatively minor when compared to rarer events such as the 1% AEP and greater. During floods of this magnitude, the current levee system offers little mitigation (5).
- b. An estimate of the Probable Maximum Flood (PMF) at Kempsey is that it would reach a height of 13.89 metres AHD at the Kempsey gauge (5). This flood, the worst possible on the Macleay River, would peak more than five metres higher than the level reached in 1949. Floods considerably smaller than this but bigger than the event of 1949 are more likely to occur and would have devastating consequences for the whole of the lower valley, with depths likely to exceed 10-15 metres, and velocities unsafe for vehicles and people (1).
- c. All of the Lower Macleay communities such as Smithtown, Gladstone, Kinchela and Jerseyville would have flood waters over roof levels and would require evacuation early due to the early loss of evacuation routes (1). Note in larger events the travel time between locations will decrease and therefore the amount of time available for evacuation will decrease (2).

- d. The below table shows the design heights of various floods, including extreme floods (1).

Table 8: Flood heights at Kempsey gauge for various design floods (6)

AEP	Kempsey traffic bridge (mAHD) (5)
PMF	13.89
0.2%	9.87m
0.5%	9.26m
1%	8.55m
5%	7.70m
10%	7.24m
20%	6.64m
50%	5.97m

- e. The percentage value corresponds with the ARI (Average Recurrence Interval), which is the average length of time, which is estimated to elapse between floods of a given magnitude. A 2% AEP flood, for example, is expected to be experienced **on average** once in a 50-year period. In a particular 50-year period it could occur on several occasions or not at all. An illustration of this unevenness of occurrence is that Kempsey's two worst floods, both of them higher than the 2% AEP event, happened within nine months of each other (1).

1.8 COASTAL EROSION

- a. Kempsey Shire has a low risk of coastal erosion, however the following five locations are at risk of coastal erosion threat. This is expanded in sections 2.17 to 2.21 (15);
- i. Crescent Head
 - ii. Hat Head Beach
 - iii. South West Rocks and Trial Bay
 - iv. Grassy Head – Coastal Inundation
 - v. Stuarts Point – Coastal Inundation

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

Table 9: Census of Housing and Population data (2011) (16)

Census Description	LGA	Upper Macleay Bellbrook Willawarrin	Kempsey	Smithtown Gladstone	Crescent Head	Hat Head	SWR
Total Persons	28,134	660	389	992	1,592	644	5,235
Aged 0-4 yrs	1,750	27	28	66	78	25	281
Aged 5-14 yrs	3,726	98	32	140	197	66	542
Aged 65 + yrs	5,578	112	94	207	239	145	1,497
Of Indigenous Origin	3,114	116	22	55	97	27	280
Who do not speak English well	34	0	0	0	5	0	6
Have a need for assistance (profound/severe disability)	2,342	59	27	53	69	49	493
Living alone (Total)	2,992	63	77	98	194	72	686
Living alone (Aged 65+)	1,312	21	34	56	76	27	362
Residing in caravans, cabins or houseboats or improvised dwellings	278	5	39	3	40	3	26
Occupied Private Dwellings (Households)	10,615	233	182	384	636	257	2,200
No Motor Vehicle	902	16	37	27	34	16	143
Caravan, cabin, houseboat or improvised dwell	154	4	24	3	22	3	13
Rented via State or Housing Authority	394	0	0	0	10	0	17
Rented via Housing Co-Op or Community Church Group	153	23	0	0	3	4	14
No Internet Connection	3,513	75	89	144	177	84	671
Unoccupied Private Dwellings	2,031	86	17	31	263	156	638
Average persons per occup dwelling	2.4	6	2.1	5.2	2.3	2.2	2.0
Average vehicles per occup dwelling	1.6	3.2	1.0	3	1.7	1.8	1.5

SPECIFIC RISK AREAS - FLOOD

Upper Macleay Valley – Sector 1

Overview of Area

- a. The Upper Macleay area has about 800 properties. The area reaches from Georges Creek high in the catchment making its way down to Bellbrook, Toorooka, Willawarrin, Temagog and Turners Flat, Mooneba and Skillion Flat in the east (1).
- b. In moderate to major flooding the area is cut off by road closures due to washouts and low levels bridges causing properties to become isolated. Depending on the severity of road damage isolation can be from five days in smaller event up to 30 days in extreme events (1).
- c. The main populated communities are Bellbrook and Willawarrin with the other areas being mainly rural farming (1).

2.2 BELLBROOK COMMUNITY

2.2.1 Community Overview

- a. Bellbrook is 54 kilometres west of Kempsey in the Upper Macleay Valley. The village of Bellbrook itself (population less than 200) is flood free but a small number of farm houses in lower areas outside the village could be affected by severe floods, however this remains unknown. The community has a hotel, shop and community hall (1). A summary of the community is below.

Table 10: Bellbrook community statistics (16)

Bellbrook	Total
Total Persons	356
Total Dwellings	213
Persons aged 65 years and over	112
Persons aged below 15 years	60
Median Age	46

2.2.2 Characteristics of Flooding

- a. As the valley is steep, with any given amount of rainfall a high amount of runoff will quickly make its way into the river. This results in flooding occurring very quickly.

2.2.3 Flood Behaviour

- a. Flooding in the Bellbrook area is confined to those areas close to the river and its tributaries, though in more severe events quite large areas can be inundated (5).

- b. A number of small tributaries join with the Macleay River immediately upstream and downstream of Bellbrook contributing to flooding, including Mackenzies Creek, Gap Creek and Nulla Nulla Creek.

2.2.4 Classification of Floodplain

- a. Bellbrook is a High Flood Island that is cut off and becomes isolated due to road closures (1).

2.2.5 Inundation

- a. No known dwellings at risk of flooding.
- b. Substantial amounts of farmland are at risk of flooding in all floods up to the PMF.

2.2.6 Isolation

- a. The Bellbrook Bridge closes when the Bellbrook gauge reaches 2.80 metres (1). This results in the isolation of at least 18 properties in Elsinore and McKenzie Creek/ Scrubby Creek areas (2).
- b. Turners Flat Bridge, Toorooka Bridge, Temagog Bridge and Sherwood Bridge close progressively between 3.2 and 4.5 metres at Bellbrook, restricting access to Kempsey from the upper Macleay area. Access to Kempsey from the south side of the river is then only available via South Kempsey (17).
- c. Thungutti community may become isolated when Nulla Creek Bridge on Armidale Road closes at around 9.5 to 10.5 metres at Bellbrook (17).
- d. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.2.7 Flood Mitigation Systems

- a. There are no known flood mitigation systems in Bellbrook.

2.2.8 Dams

- a. No known consequences of dam failure.

2.2.9 At Risk Facilities

- a. The facilities that are at risk of flooding and/or isolation within the Kempsey Shire LGA including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2. This includes:
 - i. Bellbrook Public School – Main Street Bellbrook

2.2.10 Other Considerations

- a. No other considerations have been identified.

2.3 WILLAWARRIN COMMUNITY

2.3.1 Community Overview

- a. A rural village 35kms west of Kempsey on the Armidale Road. Willawarrin is surrounded by grazing land and forests and is close to the Macleay River and is predominantly flood free. A summary of the community is below.

Table 11: Willawarrin community statistics (16)

Willawarrin	Total
Total Persons	304
Total Dwellings	134
Persons aged 65 years and over	56
Persons aged below 15 years	65
Median Age	44

2.3.2 Characteristics of Flooding

- a. The steepness and rockiness is such that flooding occurs rapidly.

2.3.3 Flood Behaviour

- a. Flooding is usually confined to areas close to the river and its tributaries though in more severe events quite large areas can be inundated including sections within the village of Willawarrin. The major tributary of the Macleay River in the vicinity of Willawarrin is Hickeys Creek, which runs to the north and east of the town to join with the Macleay River to the south.

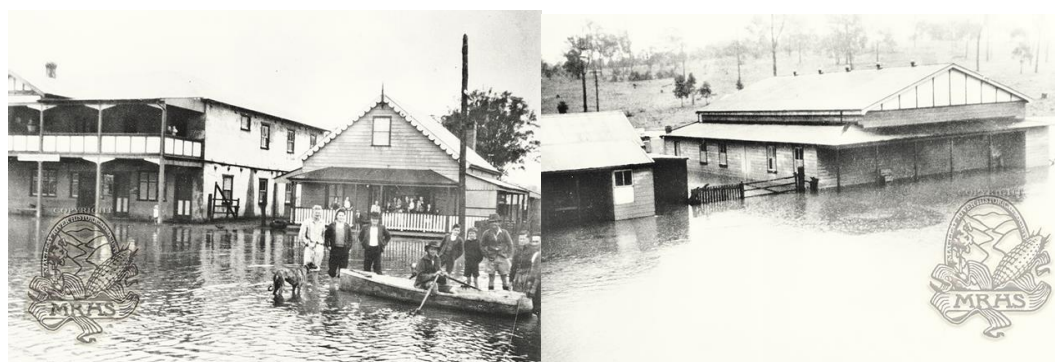


Figure 2: Willawarrin Hotel and Community Hall – 1949 (18)

2.3.4 Classification of Floodplain

- a. Willawarrin is a High Flood Island that is cut off and becomes isolated due to road closures (1). The areas inundated have rising road access into flood free areas, however this only describes historical floods and does not encompass the full range of flooding up to a PMF.

2.3.5 Inundation

- a. There is no appropriate flood warning gauge for this area.
- b. Historical records indicate that seven buildings were damaged/destroyed in both the 1949 and 1950 floods and photographic evidence confirms that both the Community Hall and the local pub experienced inundation (10) (9). The 1949 flood (flood of record) was around a 1% AEP. The most severe of more recent floods was 8% AEP, during which no village inundation was experienced in Willawarrin.

2.3.6 Isolation

- a. The village can become isolated in severe events (1% AEP events – no relevant gauge height).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.3.7 Flood Mitigation Systems

- a. No known flood mitigation systems in Willawarrin.

2.3.8 Dams

- a. No known consequences of dam failure.

2.3.9 At Risk Facilities

- a. The facilities that are at risk of flooding and/or isolation within the Kempsey Shire LGA including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2. This includes:
 - i. Upper Macleay Pre School – 77 Main Street Willawarrin
 - ii. Willawarrin Public School – Main Street Willawarrin

2.3.10 Other Considerations

- a. The Akubra Willawarrin Campdraft is an annual major event - two full days of Campdrafting in May (1).

Central Macleay Valley – Sectors 2 - 4

Overview of Area

- b. This area is made of the following communities
 - i. Kempsey Central Business District (CBD) (Central Kempsey)
 - ii. Kempsey West, East and South
 - iii. Aldavilla
 - iv. Euroka
 - v. Frederickton
- c. Kempsey is the main centre on the Lower Macleay floodplain, and it has been flooded on several occasions, with loss of life and severe property damage in the CBD and to nearby residences. The 1949 flood, the highest seen in the town, caused six deaths, destroyed 35 dwellings, damaged 226 dwellings and 71 business premises and forced 2,310 people to evacuate. During the 1950 flood it is reported that 3954 people were evacuated (9).
- d. The number of properties affected in the Central Macleay Valley are summarised in table 11.

Table 12: Estimated number of properties inundated above floor level and over ground in Kempsey and surrounding areas, based on design floods (6).

Gauge Height (mAHD) (5)	No. residential properties over ground flooding	No. residential properties with over-floor flooding	No. commercial properties with over ground flooding	No. of commercial properties with over-floor flooding
5.97 m	4	2	0	0
6.64 m	18	2	3	0
7.24 m	113	33	79	51
7.7 m	200	58	121	74
8.55 m (1% AEP)	308	171	159	127
9.26 m	390	284	184	168
9.87 m	431	354	197	181
13.89 m (PMF)	509	497	202	202

- e. Around 36% of the population of Kempsey have moved there within the last 5 years. Although many of these residents would have experienced the most recent floods, it is unlikely that they have an understanding of larger floods, as these floods were only relatively small. There is also a high rental rate (36 to 44%), where they are less likely to be aware of potential flooding issues due to a higher rate of turn over (6).

Cultural and Linguistic Diversity

- f. The Macleay Valley today has one of the largest concentrations of Aboriginal people in NSW. The community is dispersed throughout the shire, and most of the local people consider themselves to be descendants of the Macleay Valley Dunghutti people or Gumbaynggir people, the group to the north. The former government reserves of Bellbrook, Burnt Bridge, Greenhill and Kinchela, all located in the shire of Kempsey are now indigenous land and form the nucleus of indigenous residential communities (1).
- g. To date there are some 246 Aboriginal sites recorded in an area of 190 square kilometres centred on Kempsey – Eungai. Sites include scarred trees, burials, shell middens, stone arrangements, artefacts scatters, isolated finds, rock shelters with deposits and natural sites of culture significance. Thirty six sites are within this area (1).

2.4 KEMPSEY CBD (CENTRAL KEMPSEY)

2.4.1 Community Overview

- a. The boundary of Kempsey CBD is from the Macleay River on the east to the railway line in the west (1). The area is mostly commercial development. A summary of the community is below.

Table 13: Kempsey community statistics (16)

Kempsey CBD	Total
Total Persons	389
Total Dwellings	205
Persons aged 65 years and over	86
Persons aged below 15 years	63
Median Age	47

2.4.2 Characteristics of Flooding

- a. At Kempsey, flow is mostly confined to a relatively narrow area at the Kempsey Railway Bridge. The town is protected in small events by a levee system. In larger floods, a large natural floodway cuts northward through the CBD from the Macleay River at Eden Street to First Lane, and is bounded by Memorial Avenue in the west and contains the CBD area. This separates the CBD from West Kempsey in floods greater than 7.24 metres at the Kempsey gauge (6). Consequently, a significant portion of the existing CBD area is currently zoned as high hazard floodway and flood fringe, with significant velocities and depths unsafe for people and vehicles (1).

- b. The duration of flooding increases with the magnitude of the event. Inundation is longer (generally 2-3 days but more in larger flood) if the levees overtop and the CBD area needs to drain (5).
- c. Flooding can also result from ponding behind the levees (particularly the RSL levee) (6).

2.4.3 Flood Behaviour

- a. At a level of 2.5 metres, flooding is generally confined to the low lying areas adjacent south of First Lane and around the Gladstone Street underpass. Most existing development is generally located above 4.5 metres AHD (6).
- b. From around 5.97 metres, the Coles car park starts to flood, and then flows across the footpath in Lower Belgrave Street to a drainage pit in Belgrave Street and pools behind the RSL levee. A permanent barrier is planned to prevent this flooding in small events and build up behind the RSL levee (6).
- c. Greater than 10 metres depth can be experienced in floods reaching 7.7 metres at the Kempsey gauge (the gauge), with these depths being confined to the main channel. Depths can also exceed 10 metres in parts of the CBD and West Kempsey in a PMF, with the majority of the area covered in flood water greater than 6-8 metres (5).
- d. Velocities in the developed area of the CBD and West Kempsey can exceed 3.5 metres a second in floods above 7.7 metres at the gauge, in the vicinity of Belgrave Street, Eden Street Levee and the main river channel (5). A number of residential and commercial properties are located in this floodway and are subject to regular flooding (6).
- e. In a PMF, a large proportion of West Kempsey and the CBD have flood velocities exceeding 4 metres a second. Even in floods in the order of 7.7 metres at the gauge, velocities in the main river channel exceed 4 metres a second (5).
- f. Once the Macleay River breaches its banks and overtops the Eden Street and Cochrane Street Levees, flood waters flow back towards Belgrave Street, causing a basin effect within the floodway (5).

2.4.4 Classification of Floodplain

- a. Kempsey CBD is a Low Flood Island.

2.4.5 Inundation

- a. This area uses the Kempsey gauge.
- b. The following areas are at risk of inundation from around 6.70 metres AHD, with property inundation occurring shortly thereafter (6) (grid references relate to Kempsey map, 9435-1-N) (1):

- i. Area behind Elrington's Car Park (GR 848611)
- ii. Forth Street, from Hopetoun Street to Clyde Street (GR 841616 -GR 849615)
- iii. Lower end of Regent, Yaelwood and Hopetoun Streets (GR 845618 – GR 841619)
- iv. Verge Street, Eden Street and Austral Street (GR 846611 – GR848612)
- c. Approximately 40 residential properties and additional number of Commercial properties are located in a high hazard 'voluntary purchase zone', including a respite centre that was flooded in 2001 (7.44 metres AHD). These are located in Regent Street, Yaelwood Street, Hopetoun Street, Forth Street and Belgrave Street (6).
- d. By around 8.61 metres on the Kempsey gauge, Kempsey would see 144 commercial and 255 residential properties flooded (17).
- e. For property inundation information for the Central Macleay Valley refer to Table 12.

2.4.6 Isolation

- a. All roads within Central Kempsey would be cut in a levee-overtopping flood, this begins from 5.9 metres (1).
- b. Flood depths on roads in the CBD in an 8.55 metre flood could reach between 2 and 3.5 metres (5).
- c. Belgrave Street and access would be cut to West Kempsey when the levee overtops. Access to East Kempsey via the Traffic Bridge is still available from some areas in the area (2).
- d. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.4.7 Flood Mitigation Systems

- a. Kempsey is protected by a series of Levees. Refer to table below.
- b. Flood protection for the CBD is currently provided by a series of interconnected levees that have progressively been constructed since 1958. The flood of March 2001 is the first event during which this levee system overtopped. Although it came close in 2009 and 2011 it was not overtopped again until 2013 when the Cochrane Street Levee overtopped (5).
- c. Levee overtopping can be expected to occur when the predicted peak water level at the Kempsey Traffic Bridge falls between a range of 6.6 and 7.43 metres AHD (6). Which levee overtops depends on the flood gradient. Fast rising floods will cause Eden Street to overtop first, whereas if the water level rise is slower (less than 0.1 metre an hour between 6.7 and 6.9 metres at the gauge) the Cochrane Street levee will overtop first. It is also possible that the Eden Street levee will still overtop first,

but the time difference between the two overtopping will be less than that during fast rising floods (2).

- d. When the Eden Street levee is overtopped, the basin to its immediate north could fill within 90 minutes to a depth of 3—4 metres (1) resulting in CBD inundation.
- e. Warning time for levee overtopping is generally 12 to 24 hours depending on the event (6).

Post drainage of CBD area

- f. Following inundation, as flood levels in the CBD area fall below the crest levels of the various flood protection levees, drainage of the CBD area is provided by a series of flood gates located underneath the Cochrane Street levee. The floodgates consist of six (6) 1.8 metres wide by (at least) 1.8 metres high culverts that are designed to allow water to only flow out from inside the levee (1).
- g. Following cessation of flow across the Cochrane Street levee, it is estimated that it would take approximately 26 hours for the CBD area to drain to a level of 4.5 metres AHD (1).
- h. The flood levels inside the levees reach a level of 2.5 metres AHD about three (3) days after Cochrane Street has ceased flowing. Below this level, flooding is generally confined to the Low-lying areas adjacent south of First Lane and in and around the Gladstone Street railway underpass (1).

Table 14: Levees in Kempsey CBD; summary of information

	Cochrane Street Levee (1)	Eden Street Levee (1)	RSL Levee (1)
Location	North of First Lane, runs between the railway embankment at Broughton Street and high bank of the Macleay River.	Eden Street Levee located along the northern side of Eden Street between the railway embankment and the high ground in the CBD	RSL Levee located along the river bank opposite the RSL tying in to the high ground at the northern end and free standing at the southern end
Type of Levee (ring etc.)	Flood protection for the CBD is currently provided by a series of interconnected levees that have progressively been constructed since 1958.	Flood protection for the CBD is currently provided by a series of interconnected levees that have progressively been constructed since 1958.	Flood protection for the CBD is currently provided by a series of interconnected levees that have progressively been constructed since 1958.
Owner	Kempsey Shire Council	Kempsey Shire Council	Kempsey Shire Council
Design Height	5.9 mAH	7.5 mAH	7.26 mAH
Overtopping Height	Between a range of 6.68 mAH and 7.43 mAH (1) Kempsey Gauge. Fast rising floods will typically cause the Eden Street Levee to overtop before the Cochrane Street levee. When the rate of water level rise is slower (less than approximately 0.1 m/hr.), the Cochrane Street Levee may begin to overtop first.	Levee overtopping of Eden Street can be expected to occur when the predicted peak water level at the Kempsey traffic bridge falls between a range of 6.68mAH and 6.9mAH. Fast rising floods will typically cause the Eden Street Levee to overtop before the Cochrane Street Levee. When the rate of water level rise is slower (less than approximately 0.1 m/hr.), the Cochrane Street Levee may begin to overtop first.	7.12mAH Kempsey Gauge. Ponding occurs behind the levee prior to overtopping.
No. of properties protected	450 Businesses 210 houses		
Known low points	A few locations along the levee with the lowest being at Smith Street where the top of the levee is at 5.86 mAH.	7.3mAH	7.10-7.15mAH

	Cochrane Street Levee (1)	Eden Street Levee (1)	RSL Levee (1)
Location and sequence of inundation	Flooding first begins to enter the urban section of Kempsey at 5.5 metres AHD, flooding the Eden St car park. With further rises yards of houses in Austral, Verge and Eden Streets begin to flood. These properties require evacuation if a height of 6.2 metres AHD is predicted.	Flooding first begins to enter the urban section of Kempsey at 5.5 metres AHD, flooding the Eden Street car park. With further rises yards of houses in Austral, Verge and Eden Streets begin to flood. These properties require evacuation if a height of 6.2 metres AHD is predicted.	Flooding first begins to enter the urban section of Kempsey at 5.5 metres AHD, flooding the Eden Street car park. With further rises yards of houses in Austral, Verge and Eden Streets begin to flood. These properties require evacuation if a height of 6.2 metres AHD is predicted.
Consequences of levee overtopping or failure	Central Kempsey is the worst affected area, and up to 450 people would have to be evacuated from it in a short time if the Eden Street and/or First Lane levees were likely to be overtopped.	Central Kempsey is the worst affected area, and up to 450 people would have to be evacuated from it in a short time if the Eden Street and/or First Lane levees were likely to be overtopped.	Central Kempsey is the worst affected area, and up to 450 people would have to be evacuated from it in a short time if the Eden Street and/or First Lane levees were likely to be overtopped.

2.4.8 Dams

- a. No known consequences of dam failure.

2.4.9 At Risk Facilities

- a. The facilities that are at risk of flooding and/or isolation within the Kempsey Shire LGA including schools, child care centres, hospitals, aged and infirm, infrastructure and caravan parks are shown in Annex 2. This includes Central and Sundowner Caravan Park, flooded around 6.7 metres AHD at Kempsey gauge.

2.4.10 Other Considerations

- a. As many business owners live outside of Kempsey, warnings should be issued as early as possible to allow business owners to evacuate during daylight hours and prior to evacuation routes closing.

2.5 WEST KEMPSEY COMMUNITY

2.5.1 Community Overview

- a. West Kempsey comprises of a commercial hub, schools and residential properties. Also located within this sector are the Police and Fire stations. A summary of the community is below.

Table 15: West Kempsey community statistics (16)

West Kempsey	Total
Total Persons	4791
Total Dwellings	2085
Persons aged 65 years and over	872
Persons aged below 15 years	1097
Median Age	40

2.5.2 Characteristics of Flooding

- a. Flooding in West Kempsey is generally from the Macleay River, and is influenced by the Willow Drain Backwater, Dangar Street Backwater and the Wide Street/Cooks Lane Levee overtopping flow-path. The area is predominantly backwater area, with some small high hazard areas unsafe for people and vehicles (6).

2.5.3 Flood Behaviour

- a. The Macleay River breaks its banks through Fig Tree Park located at the end of Tozer Street/Eden Street (6).
- b. The majority of West Kempsey is located on high land with many of the critical infrastructure located in this area. Flooding of Low-lying areas (Willow Drain Backwater, Dangar Street Backwater) occurs via underpasses and bridges under the railway line (6).
- c. In events greater than 8.55 mAHD on the Kempsey gauge the Wide Street/Cooks Lane Levee overtopping flow path develops. Overtopping of River Street occurs in several locations in floods greater than 9.26 mAHD on the Kempsey gauge (6).

2.5.4 Classification of Floodplain

- a. This is mostly rising road access to a high flood island, with areas to the north areas with overland escape route up to and including a PMF (1).

2.5.5 Inundation

- a. This area uses the Kempsey gauge.
- b. The following areas are at risk of inundation from 7.25 mAHD (1):
 - i. Low-lying areas in Sea Street (GR 830632) and Tozer Street (GR 827631)

- ii. Lower end of Tabrett and Polwood Streets (GR 839631 – GR837632).
 - iii. Other streets affected: Dangar, Short, Wide, Marsh, Cochrane, Cameron and Becke Streets; Cooks, Perrins and Hudsons Lanes and Colin Tait Avenue.
 - iv. Low-lying areas.
- c. By around 8.61 metres on the Kempsey gauge, West Kempsey would see 112 houses flooded in Sea, Tozer, Dangar, Short, River, Wide, Marsh, Cochrane, Cameron and Becke Streets; Cooks, Perrins and Hudson Lanes; and Colin Tate Avenue (17).

2.5.6 Isolation

- a. West Kempsey would be isolated from the CBD with Eden or Cochrane Street levee overtopping and Belgrave Street floods. The Council Depot would be partly flooded (not store or workshop) the top gate would still be available for access (1).
- b. In floods above 8.3 metres, the Fire and Police Stations would be isolated as the Wide Street/Cooks Lane levee overtops and water flows over River Street into the Dangar Street backwater area (6).
- c. The Gladstone Street Railway underpass is one of the first locations to flood (6).
- d. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.5.7 Flood Mitigation Systems

Table 16: Levees in West Kempsey summary of information

Wide Street/Cooks Lane	
Location	Short Street/Wide St/Cooks Lane Levee located on Wide Street and Cooks Lane
Type of Levee (ring etc.)	Short Street section is an earthen embankment. Section between Wide Street and Cooks Lane is a concrete wall.
Owner	Kempsey Shire Council
Design Height and freeboard	10.90 mAHD
Overtopping Height	8.3 metres at Kempsey gauge (6)
No. of properties protected	Small number of houses
Known low points	Nil
Location and sequence of inundation	Unknown
Consequences of levee overtopping or failure	Development of the Wide Street/Cooks Lane flow path
Deficiencies	Unknown

2.5.8 Dams

- a. No known consequences of dam failure.

2.5.9 At Risk Facilities

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

2.5.10 Other Considerations

- a. Emergency Service agencies are all located within this sector.

2.6 EAST KEMPSEY COMMUNITY

2.6.1 Community Overview

- a. The majority of properties in East Kempsey are located largely on high land on the eastern side of the Macleay River over the traffic bridge from the CBD. East Kempsey also includes some Low-lying land such as East Kempsey Wetland and Pola Creek. A summary of the community is below.

Table 17: East Kempsey community statistics (16)

East Kempsey	Total
Total Persons	1320
Total Dwellings	615
Persons aged 65 years and over	207
Persons aged below 15 years	290
Median Age	38

2.6.2 Characteristics of Flooding

- a. Flooding in East Kempsey is generally riverine flooding from the Macleay River, and is influenced by the East Kempsey Wetland and Pola Creek. The area is flood storage, backwater area and minor floodway with small high hazard areas unsafe for people and vehicles (6). Flood velocities on South West Rocks Road near Red Hill Lane are significant and are dangerous to pedestrians and vehicles (5).

2.6.3 Flood Behaviour

- a. The catchment of East Kempsey Wetland is small in comparison to the Macleay. Flood levels in the vicinity are dominated by Macleay River flooding. Pola Creek connects East Kempsey Wetland to the Macleay River with floodwaters backing up Pola Creek in flood events. A floodgate exists on Pola Creek between Rudder Street and Washington Street however it has not been operational in recent floods. The majority of properties are largely located on high ground, but also includes low lying areas of the East Kempsey Wetland and Pola Creek (6).
- b. Glenrock-Pola Creek Floodway covers Pola Creek and Frogmore areas to the east of the river and Glenrock Drain to the west (6).

2.6.4 Classification of Floodplain

- a. This area is mostly rising road access. The area around Pola Creek and Old Pola Creek is classified as having an overland escape route to a high flood island.

2.6.5 Inundation

- a. This area uses the Kempsey gauge.
- b. The following areas are at risk of inundation from 7.24 metres AHD (1):

- i. Rudder Street, between Bissett and Sullivan Streets (GR 854614 – GR856617).
- ii. Lower end of Stanley Street (GR 856613).
- c. Other streets affected include Little Rudder, Ferry, William and Ernest Larkin Streets.
- d. By around 8.61 metres on the Kempsey gauge, East Kempsey would see 52 houses flooded on Rudder, Bissett, Sullivan, Little Rudder, Ferry, William and Ernest Larkin Streets (17).

2.6.6 Isolation

- a. Access to South Kempsey from East Kempsey is cut off from around 8.55 metres on the gauge (2). East Kempsey can access the Pacific Highway to the south via Macleay Valley Way.
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.6.7 Flood Mitigation Systems

- a. The East Kempsey to Gladstone Levee System consists of: Pola Creek Levee, Old Pola Creek Levee, Austral Eden Levee system (7 levees) and the Right Bank Macleay Levee (19).
- b. The Kempsey to Gladstone Levee bank system is situated on the right hand bank of the Macleay River (facing downstream) and is made up of approximately 3.3 kilometres of constructed earth bank levees (19).
- c. Specifically, the aim of the East Kempsey to Gladstone system is to decrease the flooding frequency of the adjacent agricultural land in order to increase agricultural production (19).
- d. Old Pola Creek Levee is at the northern end of Old Pola Creek. It was placed there to keep floodwaters from backing up into Old Pola Creek. The corresponding level at the Kempsey Traffic Bridge for overtopping of the levee is 3.5 metres AHD (1).

2.6.8 Dams

- a. No known consequences of dam failure in East Kempsey.

2.6.9 At Risk Facilities

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

2.6.10 Other Considerations

- a. No other considerations have been identified.

2.7 SOUTH KEMPSEY COMMUNITY

2.7.1 Community Overview

- a. This is south of the CBD on the southern side of the Macleay River along the highway north to the river including the area of Euroka (1). A summary of the community is below.

Table 18: South Kempsey community statistics (16)

South Kempsey	Total
Total Persons	2466
Total Dwellings	1008
Persons aged 65 years and over	348
Persons aged below 15 years	638
Median Age	37

2.7.2 Characteristics of Flooding

- a. Flooding is caused by backwatering of Gills Bridge Creek, Boat Harbour Creek and Gills Drain, an open drain near Bloomfield Street. The Euroka area is also flooded from Euroka Creek. The area is comprised of flood storage and backwater with small high hazard areas unsafe for people and vehicles (6).

2.7.3 Flood Behaviour

- a. The majority of residential properties in South Kempsey are located on high ground. Bloomfield Street may become inundated in events as small as 6.6 metres at Kempsey gauge, although no properties are subject to significant flood damage from mainstream flooding (6).
- b. A flood runner, Chapmans Creek, cuts through the Euroka area as early as 5.97 metres at the Kempsey gauge. Settlement in this area is scattered and largely flood free (6).

2.7.4 Classification of Floodplain

- a. This is mostly rising road access to a high flood Island (1).

2.7.5 Inundation

- a. The following areas are at risk of dwelling inundation from around 6.64 mAHD (6):
 - i. Bloomfield Street (GR 830605).
 - ii. Green Wattle Creek, Gill Creek and Rudder's Lagoon areas (GR 855604).
 - iii. Area near the greyhound track (GR 849594), with a floor level of 4.32 metres and inundated between 7.24 and 7.7 metres (2).

- b. By around 8.61 metres on the Kempsey gauge, South Kempsey would see 74 houses flooded in Bloomfield, Hill, Jersey, Druitt, Carri, Nicholson, Yarravel, Middleton, Macquarie and Goonbi Streets (17).
- c. In major floods a few properties can experience floodwaters in secondary buildings (not dwellings). Two people were evacuated in 2011 (11 metres at Georges Creek) on Old Green Hills Ferry Road and Gowing Hill Road (2).

2.7.6 Isolation

- a. Access and egress remains via the Macleay Valley Way, south to the Pacific Highway, however individual residents of Euroka may become isolated (6).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.7.7 Flood Mitigation Systems

- a. There are no known flood mitigations systems in South Kempsey.

2.7.8 Dams

- a. No known consequences of dam failure.

2.7.9 At Risk Facilities

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

2.7.10 Other Considerations

- a. No other considerations have been identified.

2.8 ALDAVILLA COMMUNITY

2.8.1 Community Overview

- a. Aldavilla is located approximately 10 kilometres from the Kempsey CBD and is situated on the eastern side of the Macleay River. It is comprised of rural and semi-rural properties. The Kempsey Airport is located in Aldavilla. A summary of the community is below.

Table 19: Aldavilla community statistics (16)

Aldavilla	Total
Total Persons	1154
Total Dwellings	268
Persons aged 65 years and over	136
Persons aged below 15 years	133
Median Age	37

2.8.2 Characteristics of Flooding

- a. Complex interactions between the river and the floodplain affect the characteristics of flooding. Upstream of Kempsey at Belgrave Falls the river is well defined and floodwaters are mainly constrained to the river channel and a relatively narrow floodplain. The area is a combination of flood storage, floodway and minor backwater with a large proportion of high hazard areas unsafe for people and vehicles (6).
- b. Local inundation results firstly from direct flow over banks, however areas along the river can be subject to fast flowing waters carrying debris and there are a number of intermittent channels that are fed from both the river and localized rainfall (9).

2.8.3 Flood Behaviour

- a. Flooding in the Aldavilla area is generally confined to those areas close to the river however there are a number of intermittent channels from which water can flow into Low-lying areas. In recent floods up to and including 2001 localized flooding only has been experienced. However in the 1949 flood which is considered to have an ARI of 1 in 90 years, the airport and surrounding land was inundated (20).

2.8.4 Classification of Floodplain

- a. Depending on the severity of the event properties along the river may vary from High Flood Islands to Low Flood Islands or areas with overland escape routes.

2.8.5 Inundation

- a. Comprehensive inundation records are not available. Photographic evidence shows significant over-floor inundation of the Airport House on Old Aerodrome Road.

Anecdotal evidence suggests a number of houses along Nelsons Wharf Road were both High and Low Flood Islands (20).

2.8.6 Isolation

- a. Properties can become isolated during events.
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.8.7 Flood Mitigation Systems

- a. No known flood mitigation systems in Aldavilla.

2.8.8 Dams

- a. Steuart McIntyre Dam is located on Fattorini Creek, Link Road Yarravel. Approximately 50 properties in the Aldavilla area would be affected in the event of a dam failure. Detailed information of properties at risk is contained in the Dam Safety Emergency Plan (DSEP).

2.8.9 At Risk Facilities

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

2.8.10 Other Considerations

- a. The river in the Aldavilla area is subject to tidal influences.

2.9 FREDERICKTON COMMUNITY

2.9.1 Community Overview

- a. A small township which is just north of Kempsey. A summary of the community is below.

Table 20: Frederickton community statistics (16)

Frederickton	Total
Total Persons	1277
Total Dwellings	459
Persons aged 65 years and over	247
Persons aged below 15 years	292
Median Age	39

2.9.2 Characteristics of Flooding

- a. Frederickton experiences flooding from the Macleay River. Downstream of Kempsey, the floodplain is comprised of floodway and flood storage, with small high hazard areas unsafe for people and vehicles (6).

2.9.3 Flood Behaviour

- a. In extreme events when the levee is overtopped there will no longer be a continuous flow path through the area behind the levee. Therefore the velocity and magnitude of the flow passing through that area will be significantly reduced (21).

2.9.4 Classification of Floodplain

- a. This is mostly rising road access to a high flood Island, becoming isolated in floods above 8.55 metres on the Kempsey gauge.

2.9.5 Inundation

- a. Most of Frederickton is on relatively high ground with some low-lying houses in the southern portion which were previously affected by floods below 5.97 metres at the gauge. The properties (around 10) in Lawson Street would be at risk of becoming flooded above their floor levels in floods exceeding 8.55 metres at the gauge, with a further seven properties experiencing over the ground inundation (1). An additional 16 or so properties in low-lying part of Macleay Street, Remembrance Way, Chapman Street, Edgar Street and Creek Street are also at risk of flooding above 8.55 metres at the Kempsey gauge (depths and velocities unknown) (21).
- b. As a result of the levee, built along the edge of Lawson Street in 2012 to mitigate the increased risk of flood impacts from the bypass, flood protection has now been increased in low-lying areas to 8.55 metres on the Kempsey gauge (plus 0.5 m

freeboard), protecting 5-6 properties in Lawson Street that would have previously flooded by 7.7 metres at the Kempsey gauge (21).

2.9.6 Isolation

- a. The bypass and levee protection now permits access and egress to floods exceeding 8.55 metres, thereafter becoming isolated (1).
- b. A cattle laneway has been built next to the highway interchange to allow for farmers to move their stock to higher ground in Frederickton (2).
- c. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.9.7 Flood Mitigation Systems

Table 21: Levees in Frederickton summary of information

Frederickton Levee	
Location	Frederickton Interchange Levee located along the bank of the Macleay River at Lawson Street and the Pacific Highway. It extends from the rear of the Macleay River Hotel to the Pacific Highway for 960 metres, and with a height of 1.5 to 2 metres.
Type of Levee (ring etc.)	Earthen embankment with a small section of sheet pile behind the Frederickton Butter Factory
Owner	Kempsey Shire Council
Design Height and freeboard	8.55m (1% AEP) plus 0.5m freeboard
Overtopping Height	6.7 to 7.3m AHD (9.03 m AHD at the Kempsey gauge)
No. of properties protected	27
Known low points	Nil
Location and sequence of inundation	Unknown
Consequences of levee overtopping or failure	The houses and Butter Factory behind the levee in Lawson Street will be flooded, as well as the road access and egress in Frederickton (2).

2.9.8 Dams

- a. No known consequences of dam failure.

2.9.9 At Risk Facilities

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

2.9.10 Other Considerations

- a. No other considerations have been identified.

Lower Macleay – Smithtown, Gladstone, Crescent Head and surrounding areas – Sectors 5 - 9

Overview of Area

- b. The Lower Macleay area has about 9000 people living there. The area covers these main communities such as; Smithtown, Gladstone, South West Rocks, Crescent Head, Bellimbopinni, Hat Head, Jerseyville, Kinchela and Stuarts Point/Grassy Head. The area also has extensive rural farming land which includes Austral Eden, Old Station, Verges Creek, Belmore River, Maria River, Seven Oaks, Summer Island, Clybucca and Rainbow Reach (1).
- c. Large areas of the Lower Macleay are liable to flooding, roads and bridges can close early, areas then can be isolated and farming operations disrupted even in relatively frequent and low-level events. The problems are many and the effects in the more severe events can be devastating (1).
- d. In the more severe floods there is a potential for massive stock losses on farms, great damage to infrastructure and private property and large-scale evacuations from the town of Smithtown, Gladstone, Kinchela, Jerseyville and the rural areas of the lower floodplain will be required (1).
- e. All road access are cut at around 6 metres on the Kempsey gauge, isolating the lower Macleay communities resulting in access issues for evacuations (1).
- f. The area contains some farmers that won't leave during floods. The number affected is unclear however, there could be a significant number isolated but they are largely self-sufficient in smaller events (2). The area also has a number of "stock mounds" used as a last resort for reducing stock losses during a flood (6).

2.10 BELLIMBOPINNI/CLYBUCCA COMMUNITY

2.10.1 Community Overview

- a. The Bellimbopinni/Clybucca area consists mainly of fertile rural agricultural lands. Most properties use the Macleay Valley Way for access, however residents in the south-west have access to Chain 'O' Ponds Road and Collombatti Road.
- b. A summary of the community is below.

Table 22: Bellimbopinni/Clybucca community statistics (16)

Bellimbopinni/Clybucca	Total
Total Persons	466
Total Dwellings	201
Persons aged 65 years and over	71
Persons aged below 15 years	101
Median Age	41

2.10.2 Characteristics of Flooding

- a. Bellimbopinni and Clybucca are situated in the Macleay Valley floodplain. Although the Macleay River is the dominant watercourse on the floodplain, the Clybucca Creek, Seven Oaks Drain and Collombatti Creek also impact flooding in the area. Seven Oaks Drain connects Collombatti Creek and Clybucca Creek (and then to the Macleay) to provide drainage for Collombatti Creek (2) (5).

2.10.3 Flood Behaviour

- a. Flooding in this area varies dependent upon the proximity to the Macleay River. It has been observed to be very fast in this area as well as almost static (2).
- b. Flood waters can be slow to rise and it can take more than a week for flood waters to recede. The wetlands to the north act as flood storage and do not drain easily (2).

2.10.4 Classification of Floodplain

- a. Bellimbopinni/Clybucca is a Low Flood Island.

2.10.5 Inundation

- a. These communities use the Kempsey gauge, however intelligence collection and correlation has commenced for the Smithtown gauge.
- b. The majority of houses in the area are raised however four houses were flooded above floor, less than a metre, in 2011 (on the Pacific Highway, Bellimbopinni, and Croads Lane and Plummers Lane Clybucca) and there is potential for further inundation in extreme events. There is also a large amount of yard flooding even in smaller events (2).

2.10.6 Isolation

- a. The properties in the area become completely isolated and remain isolated for a number of days with the closure of Plummers Lane, Spooners Avenue, Menacobrinni Road, Cooks Lane, Quarry Road, and Collombatti Road, (2).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.10.7 Flood Mitigation Systems

- a. There are a number of flood drains in this area, which convey the flow of water. The floodgates contain flooding in very small events, but once they are opened they spill water onto the rural floodplain (2).

2.10.8 Dams

- a. No known consequences of dam failure.

2.10.9 At Risk Facilities

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

2.10.10 Other Considerations

- a. No other considerations have been identified.

2.11 GLADSTONE AND SMITHTOWN COMMUNITY

2.11.1 Community Overview

- a. Gladstone and Smithtown are twin towns separated by the Macleay River. A summary of the communities is below.

Table 23: Gladstone and Smithtown community statistics (16)

	Gladstone Total	Smithtown Total
Total Persons	387	605
Total Dwellings	168	262
Persons aged 65 years and over	81	216
Persons aged below 15 years	77	129
Median Age	45	41

2.11.2 Characteristics of Flooding

- a. In Gladstone flood waters come directly from either the Macleay or the Belmore River as it breaks its banks, as it is located just to the north of the Belmore River entrance on the Macleay (2).
- b. Smithtown is surrounded on three sides by the Macleay River which is the main source of flooding (2).

2.11.3 Flood Behaviour

- a. Flooding can be slow to rise and often takes days to weeks to recede (2).
- b. Floodwater in this location tends to inundate the area starting upstream, then as the flood progresses from all of its banks. The low-lying areas act as small floodways if the flood is high enough (2).
- c. Generally water close to the Macleay River recedes first while it can take many days for water further inland to eventually drain into the Macleay or other outlet (2).
- d. Water can encroach on the Nestle Factory in Smithtown from drainage systems from around 4.5 metres AHD on the Kempsey gauge (3.65 metres on the Smithtown gauge) (17).
- e. Although a large percentage of houses in Smithtown are elevated the whole town is flood prone (1).
- f. Austral Eden is also flood-prone, with all properties experiencing flooding below 4.2 metres at the Smithtown gauge. Gladstone is located mainly on the natural river levee. Some parts are affected by backwater inundation in minor floods and major flooding inundates large portions of the town (1).

2.11.4 Classification of Floodplain

- a. Gladstone and Smithtown are classified as a low flood islands.

2.11.5 Inundation

- a. These communities use the both the Kempsey and Smithtown gauges. In the past there has little correlation between the two gauges, however intelligence collection and correlation between the two gauges has commence.
- b. Smithtown has levee protection by natural and artificial levees but only to about 4.29 metres at the Smithtown gauge. The corresponding level at the Kempsey gauge for overtopping of the levee is estimated to be 5.7 metres AHD (1).
- c. Most of the dwellings in these areas are elevated. Inundation of blocks on which dwellings are located within Smithtown and Gladstone begins in floods reaching about 6.0 metres at the Kempsey gauge, or by around 4 metres at Smithtown gauge.
- d. By 6.5 metres AHD at Kempsey (or 4.23 metres on the Smithtown gauge), one main building in Gladstone and three in Smithtown experience over-floor flooding (2). These are located in Barnard Street, Gladstone (commercial), and Main Street and Belmore Street, Smithtown (2). By 4.8 metres, the entire community would be inundated (257 properties in Smithtown and 155 in Gladstone) (1).
- e. Both towns are completely inundated by 8.6 metres AHD at Kempsey (or 4.78 metres at Smithtown gauge), with 261 Smithtown dwellings and 164 dwellings in Gladstone being flooded above their floor levels. A total of 430 properties would experience over-ground inundation in such a flood (1).

2.11.6 Isolation

- a. Smithtown and Gladstone becomes isolated prior to any inundation due to road closures from around 5.7m AHD at the Kempsey gauge (17).
- b. Gladstone can be isolated by 4.3 metres on the Smithtown gauge, with the flooding of Smithtown Road. Gladstone was isolated in March 2001, May 2009, June 2011 and February 2013 (17).
- c. Smithtown becomes isolated around 4.05 metres on the Smithtown gauge, when Smithtown Road floods (17).
- d. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.11.7 Flood Mitigation Systems

- a. Smithtown is protected in small events by a levee but only to about 4.00 metres at Smithtown (22). The corresponding level at the Kempsey Traffic Bridge for overtopping of the levee is 5.7 metres AHD (1).

Table 24: Levees in Smithtown; summary of information

Smithtown Levee (22)	
Location	Begins at southern end of Belmore Street in Smithtown and extends around the left bank of the Macleay River to the Smithtown boat ramp.
Type of Levee (ring etc.)	Earthen Embankment
Owner	Kempsey Shire Council
Design Height	Ranges from 4.3m to 4.43m
Overtopping Height	5.7m AHD Kempsey Traffic Bridge 4.0m AHD Smithtown Gauge The levee is consistently approximately 200mm below original design height
No. of properties protected	262
Known low points	Various
Location and sequence of inundation	Entire length of levee
Consequences of levee overtopping or failure	Inundation of Smithtown with the potential for 262 properties to be affected.
Deficiencies	Typically 10% AEP flood

2.11.8 Dams

- a. No known consequences of dam failure.

2.11.9 At Risk Facilities

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

2.11.10 Other Considerations

- a. In recent floods the majority of residents of Smithtown and Gladstone have not evacuated. This will be a major issue in events greater than 4.78 metres at Smithtown.

2.12 KINCHELA/BELMORE RIVER COMMUNITY

2.12.1 Community Overview

- a. The Kinchela area covers both the township of Kinchela and also the houses surrounding Kinchela Creek. The majority of the properties in the area experience flooding and consist of valuable agricultural lands.
- b. The Belmore River area consists of properties along the river and surrounding swamp areas. Low-lying floodplains surround Belmore River and impact significantly on flooding in the area. The area consists of valuable agricultural lands.
- c. A summary of the communities is below.

Table 25: Kinchela and Belmore community statistics (16)

	Kinchela Total	Belmore Total
Total Persons	318	391
Total Dwellings	140	159
Persons aged 65 years and over	70	66
Persons aged below 15 years	54	94
Median Age	47	47

2.12.2 Characteristics of Flooding

- a. In general the main source of flooding is the Macleay River overtopping its banks (2).
- b. In Kinchela, properties along the Macleay River experience different flood behaviour to the properties adjacent to the Kinchela Creek. The river and creeks in the area are the main source of directly flooding of properties (2).
- c. In Belmore, the Low-lying floodplains surrounding Belmore River impact significantly on the flooding of the area (2).

2.12.3 Flood Behaviour

- a. These areas have problems with drainage of flood waters and it tends to pool and act as flood storage (2).
- b. Flooding can be slow to rise and slow to recede. In the 2011 event it took more than four (4) days for waters to recede (2).
- c. Generally water close to the Macleay River recedes first while it can take many days for water further inland to eventually drain into the Macleay or other outlet (2).
- d. Kinchela – Flood waters coming from the Macleay River and to some extent Kinchela Creek can be fast, whereas waters from overland flow or from the various swamps in the area are slow (2).

- e. Belmore – As Belmore River diverts from the Macleay River the flood waters travel fast through the river and the river breaks its banks. As the flood waters travel along Belmore River the rate of rise decreases (2).

2.12.4 Classification of Floodplain

- a. This is a low flood Island (1).

2.12.5 Inundation

- a. Kinchela uses both the Kempsey and Smithtown gauges, with no appropriate warning gauge in Belmore. In the past there has little correlation between the two gauges, however intelligence collection and correlation between the two gauges has commence.
- b. Kinchela and Belmore River are located on a natural levee protecting them in smaller floods and most houses are raised, but over-levee flooding would inundate most properties in larger events (from 8.6 metres AHD at Kempsey or 4.78 metres at Smithtown) (1).

2.12.6 Isolation

- a. The area becomes isolated early (well before inundation of dwellings) due to road closures and many properties can remain isolated for four (4) days or more.
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.12.7 Flood Mitigation Systems

Flood gates – Belmore and Kinchela

- a. The Belmore River flood gates are approximately six and a half kilometres upstream of the entrance (2).
- b. When a flood warning is received predicting heights greater than 5.0 metres AHD at the Kempsey gauge, a preliminary notice will be issued by Kempsey Shire Council that the Flood Control Structures at Belmore and Kinchela may need to be opened (1). Council are responsible for opening the floodgates (2).
- c. The control gates are gradually opened in several stages as required or until full outflow is reached (1).
- d. The floodway's were originally designed to assist in achieving uniformity of protection along the river for a designated bank full flood. By opening the floodway's at appropriate times flood protection was improved in most of the lower valley adjoining the main river. Flood protection from more frequent floods was also improved for Belmore and Kinchela by installing the headwork's structures (1).

- e. As soon as possible after the flood has receded off the low roads and the level has dropped below 5.0 metres AHD at Kempsey, the gates will be progressively closed (1).
- f. The table below summarises the information on the levees in Kinchela and Belmore.

Table 26: Levees in Kinchela and Belmore; summary of information

	Kinchela Creek Levee (23)	Belmore River Levee (24)
Location	Located on the left and right banks of Kinchela Creek	Located on the left and right banks of Belmore River
Type of Levee (ring etc.)	Earthen	Earthen
Owner	Kempsey Shire Council	Kempsey Shire Council
Design Height and freeboard	3.05mAHD	3.7mAHD
Overtopping Height	4.9mAHD	5.18mAHD
No. of properties protected	Due to there only being flood modelling for the 1% AEP flood level it is not possible to accurately estimate the level of flood immunity provided by the levee.	Due to the lack of information on the Belmore River system it is difficult to determine the direct flood immunity level of the levee system. The design crest is typically 600mm below the 1% AEP year flood level and the upstream end and approximately 70mm below the 1% AEP flood level as it approaches the Macleay River junction.
Known low points	Several low points approximately 100 -200mm below design height.	Three low points approximately 120-300mm below design height.
Location and sequence of inundation	The aim of the levee system, as part of the overall Flood mitigation system, is to contain floodwaters within the creek channel.	The aim of the levee system, as part of the overall Flood mitigation system, is to protect important urban and rural agricultural land from the effects of minor flood events.
Consequences of levee overtopping or failure	Inundation of agricultural land and isolation 140 properties.	Inundation of agricultural land and isolation 159 properties.

2.12.8 Dams

- a. No known consequences of dam failure.

2.12.9 At Risk Facilities

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

2.12.10 Other Considerations

- a. The timing of the opening and closing of the floodgates will need to take into consideration the early closure of local roads.

2.13 CRESCENT HEAD COMMUNITY

2.13.1 Community Overview

- a. Crescent Head is a coastal town on the headland between Hat Head and above Port Macquarie. It has two main access routes, Crescent Head Road and Loftus Road. A summary of the communities is below.

Table 27: Crescent Head community statistics (16)

Crescent Head	Total
Total Persons	1586
Total Dwellings	1003
Persons aged 65 years and over	232
Persons aged below 15 years	274
Median Age	47

2.13.2 Characteristics of Flooding

- a. Generally any severe flooding of the Crescent Head township would be as a result of storm surge/coastal inundation and erosion caused by severe weather events (refer to section 2.23).
- b. Killick Creek runs underneath Loftus Road to the north of the township of Crescent Head and discharges into the ocean just north of the town. Killick Creek provides an outlet for the water stored in the Belmore swamp areas (2).

2.13.3 Flood Behaviour

- a. There was only minor flooding at Crescent Head in the June 2011 flood event. Three people reported being impacted by flooding. And only one of these reported flooding in their yard and an outlying building. It is believed that the cause of the flooding was most likely as a result of the hydraulics of the property rather than the flood itself (2).
- b. Low-lying properties along Killick Creek, Willow Street and the caravan park could be affected by storm surge/coastal inundation (25).
- c. Flood water is slow to recede (5).

2.13.4 Classification of Floodplain

- a. This is mostly a high flood island.

2.13.5 Inundation

- a. No appropriate warning gauge exists for Crescent Head.
- b. Generally there is no problems of dwelling inundation at Crescent Head.

2.13.6 Isolation

- a. Access to Kempsey can be cut at the Connection Creek causeway on Crescent Head Road. This can occur due to flooding on the Hastings River and the Maria River backing up or major flooding on the Macleay and could last for at least a week in severe cases (1).
- b. During the 2011 event, the town was isolated from Kempsey for at least 4 days, when Loftus Road, Belmore River Road, Maria River Road and Crescent Head Road were flooded relatively early in the flood (2).
- c. There is generally 4WD beach access to Port Macquarie as long as there is no storm surge or the Hastings River is not in Flood (1).
- d. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.13.7 Flood Mitigation Systems

- a. No known flood mitigation systems in Crescent Head.

2.13.8 Dams

- a. No known consequences of dam failure.

2.13.9 At Risk Facilities

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

2.13.10 Other Considerations

- a. Crescent Head is considered to be a hot spot of international surfing. It is home to the Malibu Classic which is held every May.
- b. There are two peak seasons, leading to more than 10% increase in population:
 - i. Christmas school holidays
 - ii. Easter school holidays.

2.14 HAT HEAD COMMUNITY

2.14.1 Community Overview

- a. Hat Head is a coastal town with access via only one road. It is located at the mouth of the Korogoro Creek, 32 kilometres east of Kempsey. A summary of the communities is below.

Table 28: Hat Head community statistics (16)

Hat Head	Total
Total Persons	326
Total Dwellings	309
Persons aged 65 years and over	76
Persons aged below 15 years	37
Median Age	49

2.14.2 Characteristics of Flooding

- a. Korogoro Creek runs through the town, from the Swanpool to the west of the town, and discharges flood waters in to the ocean. This is part of the flood mitigation and drainage system of the Belmore/Kinchela River area of the Macleay floodplain (2).
- b. Hat Head experiences minimal flooding in the town, however is easily isolated in flooding event from Macleay River floods and local rainfall.
- c. Hat Head has the potential for flooding caused by storm surge/coastal inundation and erosion as a result of severe weather events (refer to section 2.22).

2.14.3 Flood Behaviour

- a. During the June 2011 flood event, flood water was described as “slow” or “not moving”. Water did not flow from the river but rather from neighbouring land and stormwater systems.
- b. Flood water is slow to recede as it has problems with drainage, acting as flood storage (2).
- c. Rows Cut (a constructed channel outlet through the sand dunes) ocean breakout spillway was designed to allow floodwaters to breakout through the sand dunes and discharge into the ocean.

2.14.4 Classification of Floodplain

- a. This is a high flood Island with rising road access.

2.14.5 Inundation

- a. There is no appropriate warning gauge for Hat Head.

- b. There is no serious problem of inundation within the town, however, in 2011 there was one report of over-floor flooding in a dwelling in Hutchison Street and several reports of yard flooding (6).
- c. Because of Rows Cut, severe oceanic conditions could erode the sand dunes and allow seawater entry (1).

2.14.6 Isolation

- a. Hat Head can be isolated for considerable periods by flooding over Hat Head Road and Smith Road (1).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.14.7 Flood Mitigation Systems

Table 29: Levees in Hat Head; summary of information

	Hat Head Levee System (26)
Location	<p>The Hat Head levees are designed for large flood events to direct water through the Korogoro Creek, this forms part of the flood mitigation and drainage system for the Belmore-Kinchela area of the lower Macleay, and this system deflects water through the sand dunes upstream of Hat head.</p> <p>The Hat Head Levee system consists of:</p> <ul style="list-style-type: none"> • Control Levee across Korogoro Creek. • Village Levee along Korogoro Creek protecting Hat Head township, running from the Hat Head Bridge to high ground at the Caravan Park. • South West Levee protecting the southern side of Hat Head, extends around 1.8 kilometres downstream from the Hat Head Bridge and is an embankment for Gap Road. • Rows Cut breakout, 300 metres upstream of the control levee. • An excavated channel through sand dunes between Swanpool and Korogoro Creek. • Floodgates three kilometres upstream of Hat Head. <p>The South Western Levee extends some 1.8 kilometres downstream from the Korogoro Creek Bridge. It is effectively the embankment for Gap Road.</p>
Type of Levee (ring etc.)	<p>The levee is an earthen levee with a box culvert designed to limit the amount of flood water flowing through Korogoro Creek to the ocean outlet.</p> <p>The Village and South West Levees are comprised of compacted beach sands with an internal plastic membrane to reduce seepage.</p>
Owner	Kempsey Shire Council
Design Height and freeboard	<p>Control – Approximately 3.5 metres AHD</p> <p>Village – 2.1 metres AHD</p> <p>South-western – 2.1 metres AHD</p>

	Hat Head Levee System (26)
	400mm freeboard has been adopted by Council
Overtopping Height	The Hat Head levee System provides protection to about the level of the 1% AEP flood (no relevant gauge height). Control - 3.63 metres AHD (with a crest height of 3,9 metres AHD) Village – crest height is 2.4 metres AHD South West – crest height is 2.4 metres AHD
No. of properties protected	-
Known low points	In events of 1% AEP or greater, there is potential for inundation if the Rows Cut ocean spillway is not functional. The existing levels are below the Design levels in various sections for a total length of approximately 290m. However the existing levels are above the 1% AEP flood level for the total length.
Location and sequence of inundation	Entire length of levee
Consequences of levee overtopping or failure	Not known If the South West Levee overtops, flooding of Gap Road isolates the properties in Hat Head on the southern side of Korogoro Creek.
Deficiencies	Not known

2.14.8 Dams

- a. No known consequences of dam failure.

2.14.9 At Risk Facilities

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

2.14.10 Other Considerations

- a. The Hat Head sewage system is not connected to the main town sewage system. The system works on a vacuum pump. When this becomes filled with water from excessive rains this can cause the system to stop working. Prolonged failure of the sewage system may require the evacuation of Hat Head (2).
- b. Rows Cut is often overgrown by vegetation and the ocean plug may need to be removed by Council during a flood event.
- c. All flood modelling conducted has assumed that the ocean breakout spillway (Rows Cut) is functional. If in a large flood event the ocean spillway was not opened, the protection of Hat Head against the 1% AEP flood level could not be guaranteed (26).

- d. Korogoro Creek is subject to tidal influences.
- e. There are two peak seasons, leading to more than 10% increase in population:
 - i. Christmas school holidays
 - ii. Easter school holidays.

2.15 MARIA RIVER COMMUNITY

2.15.1 Community Overview

- a. The Maria River area is predominately State Forest and National Park lands and rural lands. It is located to the south of Kempsey. The Maria River and a number of tributaries traverse this sector.
- b. No census data is available specifically for this area.
- c. The approximate population is 100 (55 properties) (1), and mostly comprised of farm properties.

2.15.2 Characteristics of Flooding

- a. The Maria River is connected to both the Macleay and Hastings Rivers and as such event timings and responses are varied. Flooding that occurs in Maria River is due to the river breaking its banks and is susceptible to flash flooding (2).

2.15.3 Flood Behaviour

- a. Flooding of the Maria River is largely influenced by the flood levels within the Hastings River. The floodwater gradient is typically very flat, with floodwaters “backing-up” along the Maria River from the Hastings River confluence. The flat water surface gradient can also be attributed to the substantial storage afforded by the coastal floodplain of the Maria River which extends from the Pacific Highway to the coast (1).
- b. The interconnectivity between the two river systems can assist in flood water drainage, however it can also increase the effect of flooding if both systems are flooded.
- c. The flood in February 2009 originated in the Hastings and Wilson River areas due to backing up of the Hastings River. The river began to flow back towards Connection Creek and the Lower Macleay catchment. This flood put approximately 1.22 meters of water in 8 houses on the eastern side of Maria River (1).

2.15.4 Classification of Floodplain

- a. Low Flood Island.

2.15.5 Inundation

- a. This community uses the Maria River gauge.
- b. During the major flood on the Macleay in March 2001 several property owners had approximately 60 centimetres of water in their homes, however many other homes are raised above the planning level. This flooding originated in the Macleay River.

- c. Inundation of the entire area is expected to occur at 3.00 metres on the Maria River gauge, with one dwelling on Maria River Road flooded over-floor (by 1.2 metres) and several secondary buildings and yards flooded in 2011 (where Maria River gauge reached 2.03 metres) (2).

2.15.6 Isolation

- a. Dependent upon the size of the event, properties can be isolated for between 5-7 days in a minor event and for in excess of 20 days in a major event (1).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.15.7 Flood Mitigation Systems

- a. There are no known flood mitigation systems in the Maria River area.

2.15.8 Dams

- a. No known consequences of dam failure.

2.15.9 At Risk Facilities

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

2.15.10 Other considerations

- a. No other considerations have been identified.

2.16 SOUTH WEST ROCKS COMMUNITY

2.16.1 Community Overview

- a. South West Rocks township is located near the mouth of the Macleay River. A summary of the communities is below.

Table 30: South West Rocks community statistics (16)

South West Rocks	Total
Total Persons	4304
Total Dwellings	2656
Persons aged 65 years and over	1330
Persons aged below 15 years	670
Median Age	53

2.16.2 Characteristics of Flooding

- a. The lower parts of South West Rocks could be liable to flooding from the Macleay River flowing into Back Creek, and coinciding with high tides or storm surge activity (1).
- b. Flooding is rare in South West Rocks as it is located on high ground. Flooding results from Macleay River floods, as well as flooding of South West Rocks Creek and Spencers Creek with local rainfall. The community is also at risk of coastal inundation and erosion (refer to section 2.22).

2.16.3 Flood Behaviour

- a. Flooding in the South West Rocks area would be confined to those areas close to the river and its tributaries.

2.16.4 Classification of Floodplain

- a. High flood island.

2.16.5 Inundation

- a. This community uses the Kempsey gauge.
- b. In 2011, three houses suffered from over-floor flooding. These were located in Gregory Street, Rudder Street and Entrance Street (2).
- c. The Macleay Valley Holiday Centre caravan park would be flooded under such circumstances. Local flooding of low areas east and west of Gregory Street and adjacent to Saltwater Creek can also occur (1).

2.16.6 Isolation

- a. South West Rocks and nearby Arakoon can both be cut off from Kempsey (1).

- b. South West Rocks isolation is not as significant as other areas as it is a large town with resources that can cope with small periods of isolation.
- c. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.16.7 Flood Mitigation Systems

- a. No known flood mitigation systems in South West Rocks.

2.16.8 Dams

- a. No known consequences of dam failure.

2.16.9 At Risk Facilities

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

2.16.10 Other Considerations

- a. South West Rocks is subject to tidal influences.
- b. There are two peak seasons, leading to more than 10% increase in population:
 - i. Christmas school holidays
 - ii. Easter school holidays.

2.17 JERSEYVILLE COMMUNITY

2.17.1 Community Overview

- a. Jerseyville is a village 33 kilometres north east of Kempsey situated on South West Rocks Road and is home to the Macleay River's fishing and prawning fleet. A summary of the communities is below.

Table 31: Jerseyville community statistics (16)

Jerseyville	Total
Total Persons	135
Total Dwellings	62
Persons aged 65 years and over	22
Persons aged below 15 years	24
Median Age	42

2.17.2 Characteristics of Flooding

- a. No specific flood studies have been undertaken of the area.
- b. The source of flooding in this area is predominantly from the Macleay River though some overland flow is experienced (2).
- c. Jerseyville is subject to flooding as it is on the bank of the Macleay River and has a number of low-lying properties (2).

2.17.3 Flood Behaviour

- a. Floodwaters in this area flow slowly and are subject to tidal influences (2).
- b. During 1949 floodwaters in the village were up to a metre deep and stayed near that level for a day or so. The 1963 flood was more severe, however, because of oceanic influences (2).

2.17.4 Classification of Floodplain

- a. This is mostly rising road access to a high flood island (1).

2.17.5 Inundation

- a. This community uses the Kempsey gauge.
- b. Nearly all the dwellings in Jerseyville are elevated, but 4 would have over-floor flooding around 4.23 metres on the Smithtown gauge and 13 would have over-floor flooding around 4.78 metres on the Smithtown gauge (1). The first houses to flood are located in Main Street and South West Rocks Road (2).
- c. By around 8.61 metres on the Kempsey gauge or 4.78 metres on the Smithtown gauge, Jerseyville would see 24 houses flooded (17).

- d. During the 1949 Flood (8.52 metres AHD at Kempsey gauge), 11 dwellings and 4 businesses were damaged/destroyed (9).

2.17.6 Isolation

- a. The village of Jerseyville is isolated during major floods for a number of days and access/egress can be a major problem, with Plummerville Lane, Suez Road, Rainbow Road, Fig Tree Lane, Gregory Street and Spencers Creek Road subject to flooding in relatively small flood events (2) (1).
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.17.7 Flood Mitigation Systems

Table 32: Levees in Jerseyville; summary of information

Smithtown to Jerseyville Levee (27)	
Location	The Smithtown to Jerseyville levee extends for 31.2km on both sides of the Macleay River.
Type of Levee (ring etc.)	Earthen Bank
Owner	Kempsey Shire Council
Design Height and freeboard	The design flood immunity level of the levee is unknown.
Overtopping Height	The levee crest was found to be approximately 200mm below the 10% AEP flood event.
No. of properties protected	The levee forms an integral part of the overall Lower Macleay Flood Mitigation System and is designed to protect important urban and rural agricultural land.
Known low points	There are a number of low spots, generally limited to 300mm
Location and sequence of inundation	Entire length of levee
Consequences of levee overtopping or failure	Inundation of urban and rural agricultural land.

2.17.8 Dams

- a. No known consequences of dam failure.

2.17.9 At Risk Facilities

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

2.17.10 Other Considerations

- a. No other considerations have been identified.

2.18 STUARTS POINT/GRASSY HEAD COMMUNITY

2.18.1 Community Overview

- a. Stuarts Point is a riverside village situated on the arm of the Macleay River.
- b. Grassy Head is approximately 9 kilometres north of Stuarts Point.

Stuarts Point/Grassy Head	Total
Total Persons	958
Total Dwellings	593
Persons aged 65 years and over	217
Persons aged below 15 years	148
Median Age	52

2.18.2 Characteristics of Flooding

- a. Flooding is generated from backwater flooding of the Macleay up the Macleay Arm, or from local rainfall. It is also at risk to coastal inundation (refer to section 2.19 and 2.20).

2.18.3 Flood Behaviour

- a. Until the flood of 1893 the Macleay River reached the sea at Grassy Head approximately 3 kilometres north of Stuarts Point. In the major flood of 1893 the river breached the sand barrier just north of South West Rocks (28).
- b. The old estuary channel between South West Rocks and Grassy Head is now an extensive backwater known as the Macleay Arm, which is the source of flooding in the area (28).
- c. Flood waters drain into the ocean at South West Rocks.

2.18.4 Classification of Floodplain

- a. High flood island.

2.18.5 Inundation

- a. No appropriate warning gauge exists for Stuarts Point and Grassy Head.
- b. The village of Stuarts Point is essentially flood-free, however a combination of floodwaters and high seas could cause Stuarts Point Holiday Park to be inundated (1).
- c. The Grassy Head Holiday Park and the Seventh Day Adventist Convention Centre could be flood prone in severe events (1).

2.18.6 Isolation

- a. Stuarts Point and Grassy Head may become isolated in extreme events due to back up water from the Macleay River.
- b. Section 2.24 expands on roads and bridges liable to flooding and associated gauge heights.

2.18.7 Flood Mitigation Systems

- a. No known flood mitigation systems in Stuarts Point and Grassy Head.

2.18.8 Dams

- a. No known consequences of dam failure.

2.18.9 At Risk Facilities

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

2.18.10 Other Considerations

- a. The Stuarts Point Convention Centre hosts an annual convention for the Seventh-day Adventist Church. The convention is usually held around April of each year but is subject to change.
- b. The convention centre hosts a number of events throughout the year and can accommodate up to 3500 people at any one time.
- c. There are two peak seasons, leading to more than 10% increase in population:
 - i. Christmas school holidays
 - ii. Easter school holidays.

SPECIFIC RISK AREAS – COASTAL EROSION/INUNDATION (25)

Coffs Coastal Waters

2.19 GRASSY HEAD

- a. At Grassy Head, coastal inundation is possible for the caravan park office (high risk), the water supply line (extreme risk) servicing the caravan park, and small sections of Reserve Road (high risk) approaching the caravan park and used for public access (25).

2.20 STUARTS POINT

- a. At Stuarts Point, coastal inundation is possible for water infrastructure including water supply and sewerage mains (extreme risk) and stormwater (high risk). There are six cabins and a laundry building at Stuarts Point Holiday Park (medium risk) and Stuarts Point village including 20 houses at Fishermans Reach (high risk) that are potentially affected by inundation. Sections of Marine Parade, Ocean Avenue, Fishermans Reach Road and New Entrance Road are also vulnerable (high risk) as well as the community hall, BBQ shelter and amenities block (medium risk) (25).

Macquarie Coastal Waters

2.21 SOUTH WEST ROCKS AND TRIAL BAY

- a. In South West Rocks, assets at risk from coastal erosion include the water supply network and the sewerage dune disposal field (extreme risk).
- b. The coastal inundation risks in and around South West Rocks are substantial. In particular the wastewater infrastructure (extreme risk), water line (extreme risk), Gregory Street and South West Rocks Road (extreme risk), residential, town centre and business centre of South West Rocks (high risk), Cooper Street, Fig Tree Lane, Buchanan Drive, Lindsay Noonan Drive, Philip Drive, Marlin Drive, New Entrance Road and Mayta Moran Close (high risk), stormwater infrastructure (high risk). The water tanks (medium risk), and Arakoon Road and Spencers Creek Road (medium risk) are also susceptible to coastal erosion.

2.22 HAT HEAD

- a. In Hat Head, some water infrastructure is at high risk from coastal erosion. The consequence of erosion impacts for rising mains are considerable as the weight of overlying material on pressure pipes maintains their integrity. The consequences for pump stations are also significant as thrust restraints on pipes surrounding the pump

station would be prone to failure due to erosion. The surf club is at medium risk of coastal erosion.

- b. Coastal inundation poses a threat to the sewer line (extreme risk), water line (extreme risk), Hat Head Road isolating Hat Head (extreme risk), stormwater line (high risk). town reservoir (high risk), Myrtle Street, Perry Street, Ward Street, Gap Road, Creek Street and Dodd Street (high risk), Gladstone Street, Hutcheson Street, Ledge Street, Les Dunford Road, Marlin Court, Mason Street, Bay Street, Boronia Street, Bream Street, Eversons Lane, Fern Street, Oak Street, Schnapper Close, Straight Street and Vine Street (medium risk), and community buildings (medium risk).

2.23 CRESCENT HEAD

- a. In Crescent Head, coastal erosion poses a threat to the Crescent Head Holiday Park (high risk), Crescent Head Golf Club (high risk), Reserve Road, Back Beach Road and Point Plomer Road (medium risk), sewer and water lines (medium risk), surf lifesaving club (medium risk), and BBQ shelter (medium risk). The existing rock wall protection would in part form a control to this erosion risk.
- b. Coastal inundation is a risk to the sewer line, sewer put stations, water line, Crescent Head Road and Pacific Street (all extreme risk), water treatment works, stormwater line, Birralelee Hall, residential areas associated with Killick Creek and also privately owned rural landscape areas including Belmore Street, Lake Street, Lee Street, Point Plomer Road, Willow Street, Loftus Road, Maria River Road, Beranghi Road, Nevertire Road, Paperbark Road, Richardson Crossing and Robinsons Access (all high risk), sewer treatment works, Crescent Head Golf Club, Crescent Head Holiday Park, Crescent Head amenities/block/sheds and the BBQ Shelter (all medium risk).

ROAD CLOSURES AND ISOLATED COMMUNITIES

2.24 ROAD CLOSURES

- a. Table 33 lists roads liable to flooding in the Kempsey Shire LGA. Historically, a number of rescues associated with medical conditions have occurred during major floods due to road closures.

Table 33: Roads liable to flooding in Kempsey Shire LGA (1).

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Macleay Valley Way – Kempsey to Frederickton	Glenrock Drain Kempsey: 9435 -1-N GR 56639 Second Lane Kempsey: 9435 -1-N GR 858639 Christmas Creek Kempsey: 9435 -1-N GR 859657 Easter Creek Kempsey: 9435 -1-N GR 862660	Access to Kempsey cut from the north	Kempsey Bypass Bridge	Approx. 5.60m AHD Kempsey Gauge
Macleay Valley Way – Frederickton to Clybucca	Dangar Lane: 9435 -1-N GR 907685 Sutherland Lane: 9435 -1-N GR 14700 Seven Oaks Turnoff: 9435 -1-N GR 930702 Clybucca Flat : 9435 -1-N GR 951751	Potential for Frederickton to be isolated in events greater than 1% AEP Isolation of Clybucca	No	Approx. 8.55m AHD Kempsey Gauge
Crescent Head Rd	Rudders Lagoon: 9435-1-N GR 845589 The Corduroy: 9435-1-N GR 969495	Crescent Head Isolated	Possible via Belmore River Rd	Not gauged
Loftus Road	Kempsey: 9435-1-N GR 984581			
Kempsey - Armidale Road	Closes in very severe floods at various locations in the Bellbrook and Willawarrin areas.	Isolates the Upper Macleay	No	Not gauged and often due to landslides
Belmore River to Crescent Creek Road	Seale Road: 9435-1-N GR 955579	Isolation to properties in Belmore river area	No	Approx. 5.70m AHD Kempsey Gauge
South West Rocks Road MR 198	Red Hill: 9435-1-N GR 876640 Austral Eden: 9435-1-N GR 916697 Gladstone Drain: 9435-1-N GR 970696	Isolates Rd to Gladstone and SWR Evacuation route to East Kempsey	No	Approx. 5.70m AHD Kempsey gauge 3.76 m AHD

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
	Kinchela: 9435-1-N GR 988715 Mannix Corner SWR: 9536-3-S GR 038777			Smithtown gauge
Smithtown Road	Various locations - Inundation to road	Evacuation route for Smithtown and lower Macleay	No	Approx. 5.70mAHD Kempsey gauge 3.63 mAHD Smithtown gauge
Plummer's Lane	Various locations - Inundation to road	Evacuation route for SWR, Jerseyville and Summer Island	No	Approx. 5.70mAHD Kempsey gauge 3.63 mAHD Smithtown gauge
Hat Head Road	Various locations - Inundation to road	Isolation to Hat Head	No	Approx. 5.70mAHD Kempsey gauge
Kinchela Creek Road	Various locations - Inundation to road	Isolation to rural properties	No	Approx. 5.70mAHD Kempsey gauge
Belmore River Road	Various locations - Inundation to road	Alternative route to Crescent head now closed	No	Approx. 5.70mAHD Kempsey gauge 1.86 mAHD Smithtown gauge
Old Station Road	Various locations - Inundation to road	Isolates properties around Old Station area for a few days	No	Approx. 5.70-6.74mAHD Kempsey gauge 3.76 mAHD Smithtown gauge
Inner and Outer Roads Austral Eden	Kempsey 9435-1-N GR 916679	Yes	No	Approx. 5.70mAHD Kempsey gauge
Old Pola Creek Road	Kempsey 9435-1-N GR 861615	Evacuation route closes to East Kempsey	No	Approx. 5.70mAHD Kempsey gauge

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
East Frederickton Lane	Kempsey 9435-1-N GR 895655	-	No	Approx. 5.70mAHD Kempsey gauge
Two Hills Lane	North of Smithtown Rd at Seven Oaks Kempsey 9435-1-N GR 702930	Isolation to Summer Island area	No	Approx. 5.70mAHD Kempsey gauge
Summer Island Road	At McCabe's Drain 9436-2-S GR 979746	Isolates properties along river bank	No	Approx. 5.70mAHD Kempsey gauge
Cochrane Street	West Kempsey	Restricts access between Kempsey and West Kempsey	Sea Street	Approx. 6.70mAHD Kempsey gauge
Eden Street	Kempsey and West Kempsey	Flooded for couple of days	n/a	Approx. 6.70mAHD – 6.74mAHD Kempsey gauge
Crescent Head Road	Rudders Lagoon	Isolates properties and communities including Crescent Head (and potentially North Shore in Port Macquarie) for a few days	No	Not linked to gauge height
Euroka Road	Euroka	Isolates Euroka for several days to a week when Marys Bay Road is also flooded		Approx. 6.74mAHD Kempsey gauge
Forth Street	Kempsey	Restricts access between Kempsey CBD and West Kempsey	Belgrave Street	Approx. 6.74mAHD Kempsey gauge
Gladstone Street	West Kempsey	Restricts access between West Kempsey and Kempsey CBD, and isolates the northern area of the CBD including the Coles Express and Motor Inns	No	Approx. 6.74mAHD Kempsey gauge
Kemp Street	West Kempsey	Restricts access between West Kempsey and Kempsey CBD	n/a	Approx. 6.74mAHD Kempsey gauge
Second Lane	Kempsey	Isolates West Kempsey	No	Approx. 6.74mAHD Kempsey gauge

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Smith Street	Kempsey	Isolates CBD area if the bridge approaches are also flooded	Lord Street	Approx. 6.74m AHD Kempsey gauge
Spooners Avenue	Collombatti	Restricts alternate access between West Kempsey and Frederickton	Pacific Highway	Approx. 5.98m AHD Kempsey gauge
Verge Street	Kempsey	Restricts local traffic around CBD area	n/a	Approx. 6.70m AHD Kempsey gauge
Verges Creek Road	Kempsey	Old Station isolated for a few days	No	Approx. 5.98m AHD Kempsey gauge
Wide Street	West Kempsey	Restricts traffic between Kempsey CBD and West Kempsey	Marsh Street	Approx. 6.74m AHD Kempsey gauge
Dungay Creek Road	Several locations	Isolates rural properties to the west of Willawarrin	No	Approx. 10.25 m AHD Toorooka Gauge
Gowings Hill Road	Several locations	Isolates rural properties to the west of South Kempsey	No	Approx. 10.25 m AHD Toorooka Gauge
Marys Bay Road	Euroka	Isolates Euroka when Euroka Road is also flooded	No	Approx. 10.04 m AHD Toorooka Gauge
Moparrabah Road	Several locations	Isolates rural properties to the west of Willawarrin	No	Approx. 10.25 m AHD Toorooka Gauge
Willi Willi Road	Several locations	Isolates rural properties to the west of Willawarrin	No	Approx. 10.25 m AHD Toorooka Gauge

Table 34: Bridges liable to flooding in Kempsey Shire (1)

Bridge	Closure Location	Consequence of closure	Alternate Route	Indicative Gauge Height
Sherwood Bridge	Sherwood: 9435-4-N: GR 743636	Road Closed	Yes	3.6m AHD Turners Flat Gauge
Turners Flat Bridge	Sherwood: 9435-4-N: GR 724691	Road Closed	Yes	3.0m AHD Turners Flat Gauge
Toorooka Bridge	Willawarrin: 9436-3-N: GR 600791	Road Closed	Yes	3.5m AHD Toorooka Gauge
Temagog Bridge	Willawarrin: 9436-3-N: GR 600729	Road Closed	Yes	3.9m AHD Toorooka Bridge Gauge
Bellbrook Bridge	Willawarrin: 9436-3-N: GR 526901	Road Closed	No	2.8m AHD Bellbrook gauge
Dungay Creek/Wittittrin Causeway	Sherwood: 9435-4-N: GR 679589	Road Closed	No	Ungauged.
Nulla Creek Bridge	Armidale Rd	Road Closed	No	9.5 to 10.5 mAHD Bellbrook Gauge

2.25 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

- a. The following tables (Tables 35 – 37) list 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.

Upper Macleay

Table 35: Potential Periods of Isolation for communities in the Kempsey Shire LGA – Upper Macleay Division during flooding.

Town / Area	Sector	Population/ Dwellings	Flood Affect Classification	Approximate period isolation			Main Supply Routes	NOTES
				Minor	Moderate	Major		
Georges Creek	1	50 (22)	High Flood Island	1-5 days	6-9 days	>9 days	Armidale Rd	Resupply likely to be required after 5 days by air
Bellbrook and surrounding area	1	544 (271)	High Flood Island	1-10 days	10-16 days	>20 days	Armidale Rd	Resupply likely to be required after 5 days by air
Willawarrin	1	335 (153)	High Flood Island	5-7 days	10-14 days	>20 days	Armidale Rd	Resupply likely to be required after 5 days by air

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.

Central Macleay

Table 36: Potential Periods of Isolation for communities in the Kempsey Shire LGA – Central Macleay Division (Kempsey Bridge Gauge) during flooding.

Town / Area	Sector	Population/ Dwellings	Flood Affect Classification	10%	5%	2%	1%	Main Supply Routes	NOTES
				7.24m	7.70m	8.24m	8.55m		
Kempsey CBD	2	1000 (450)	Low Flood Island/Levee	2-5 days	5-7 days	>10 days	>15 days	Pacific Hwy	Resupply generally not required - Inundated
Kempsey West	2	4740 (2054)	High Flood Island	2-5 days	5-7 days	>10 days	>15 days	Pacific Hwy	Resupply likely to be required after 5 days by air
Kempsey East	2	1117 (518)	High Flood Island	2-5 days	5-7 days	>10 days	>15 days	Pacific Hwy	Resupply generally not required
Kempsey South	2	2467 (1020)	High Flood Island	2-5 days	5-7 days	>10 days	>15 days	Pacific Hwy	Resupply generally not required
Frederickton	3	1248 (483)	High Flood Island	-	-	-	>15 days	Pacific Hwy/Bypass	Resupply likely to be required after 5 days by air for rural areas
Aldavilla	2	1055 (231)	High Flood Island	2-5 days	5-7 days	>10 days	>15 days	Pacific Hwy	Resupply generally not required

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.

Lower Macleay

Table 37: Potential Periods of Isolation for communities in the Kempsey Shire LGA – Lower Macleay Division (Smithtown Gauge) during flooding.

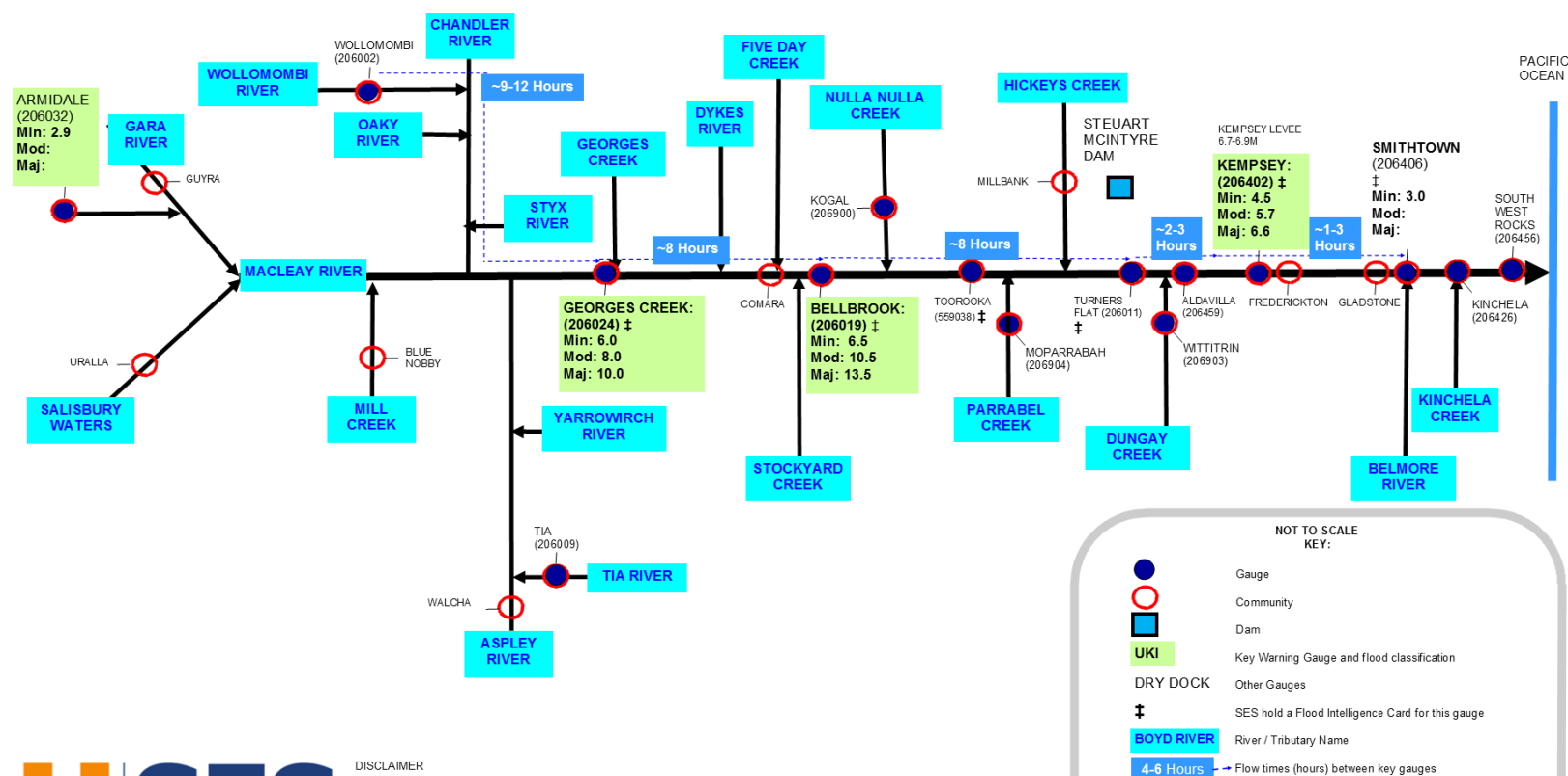
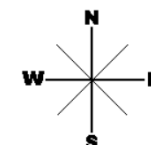
Town / Area	Sector	Population/ Dwellings	Flood Affect Classification	10%	5%	2%	1%	Main Supply Routes	NOTES
				4.34m	4.50m	4.66m	4.76m		
Bellimbopinni, Clybucca	4	100	Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days	Pacific Hwy, Plummer's lane	Resupply likely to be required after 5 days to Summer Island Area
Smithtown	5	591 (261)	Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days	South West Rocks Rd	Resupply likely to be required after 5 days
Gladstone	5	364 (164)							
Kinchela	5	525 (237)	Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days	South West Rocks Rd	Resupply likely to be required after 5 day
Jerseyville	8		Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days	South West Rocks Rd	Resupply likely to be required after 5 day
Austral Eden, Belmore River	5		Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days		Resupply generally not required
Hat Head	9	299 (285)	High Flood Island	5-7 days	7-10 days	10-15 days	>20 days	South. West Rocks Rd Hat Head Rd	Resupply generally not required
Crescent Head	6	1966 (1100)	High Flood Island	5-7 days	7-10 days	10-15 days	>20 days	Crescent Head Rd	Resupply Local store
South West Rocks	8	4612 (2892)	High Flood Island	5-7 days	7-10 days	10-15 days	>20 days	South West Rocks Rd Plummer's Lane to Gregory Street	Resupply to supermarket

Maria River	7	100 (55)	Low Flood Island	5-7 days	7-10 days	10-15 days	>20 days	Maria river Rd	Resupply generally not required
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Note: Periods of isolation are a guide only. Liaison with the Local Controller and communities/residents involved is essential during periods of potential and actual isolation.

ANNEX 1: MACLEAY RIVER BASIN SCHEMATIC

Macleay Basin No 206 River System Schematic



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

Upper Macleay Valley

Facility Name	Street	Suburb	Comment
Schools			
Bellbrook Public School	Main Street	Bellbrook	
Willawarrin Public School	Main Street	Willawarrin	
Child Care Centres			
Upper Macleay Pre School	Main Street	Willawarrin	
Facilities for the aged and/or infirm	n/a		
Utilities and infrastructure	n/a		
Community bore water/rain water pumps		Bellbrook	The communities utilise bore water or rain water tanks for drinking, in flooding events properties along the river may lose power to their pumps.
Bellbrook Septic System		Bellbrook	Bellbrook community Septic systems will continue to be monitored under Council's On-site Sewage Management Strategy.
Communication Systems		Bellbrook	Communications systems have in previous events failed such as land lines and mobile service; however the community uses satellites internet connections so information can be distributed through this means to agencies.
Camping Ground / Caravan Parks	n/a		

Central Macleay Valley

Facility Name	Street	Suburb	Comment
Schools			
Kempsey Preschool and Nursery School	Verge Street	Kempsey	Located within the levee
Kempsey Community Child Care	Austral Street	Kempsey	Located within the levee
Kempsey High	Broughton Street	West Kempsey	
Kempsey West Public	Marsh Street	West Kempsey	
St Joseph's Primary	Kemp Street	West Kempsey	
St Paul's High School	Sea Street	West Kempsey	
Kempsey Adventist School	Crescent Head Road		
Kempsey East Public School	Innes Street		
Kempsey South Public	Queen Street	South Kempsey	
Macleay Vocational College	Reginald Street	South Kempsey	
Melville High	Nicholson Street	South Kempsey	
Bellimbopinni Public	Pacific Highway	Bellimbopinni	
Frederick Public	Great North Road	Frederickton	
Child Care Centres			
Dalaigur Pre-School	Nancy Ellis Street	West Kempsey	
Kempsey Kindy	Short Street	West Kempsey	
Kempsey Kindy	River Street	West Kempsey	
ABC Child Care	Kemps Street	West Kempsey	
The Cubbyhouse Child Care Centre	Polwood Street	West Kempsey	
The Kindergarten	North Street	West Kempsey	
Kempsey Family Day Care	Macleay Street		

Facility Name	Street	Suburb	Comment
South Kempsey Preschool	Nicholson Street	South Kempsey	
Goodstart Early Learning West Kempsey	14-16 Kemp Street	Kempsey	
Kempsey Family Day Care	11 Austral Street	Kempsey	
Kempsey PCYC Kidzcare	42-44 Bloomfield Street	Kempsey South	
Kempsey Preschool Long Day Care Centre	9-11 Verge Street	Kempsey	
N and P Cooper's Home Based Child Care Service	23 Cochrane Street	Kempsey	
Saint Joseph's After School and Vacation Care	36 Kemp Street	West Kempsey	
Scribbly Gum Dalai	32 Nicholson Street	Kempsey	
Facilities for the aged and/or infirm			
Taking Care of the Lives in Our Hands	Cochrane Street	West Kempsey	
Cedar Place Aged Care Facility	Cochrane Street	West Kempsey	
Booroongen Djugan Aboriginal Facility	River Street	West Kempsey	
Vincent Court	Leith Street	West Kempsey	
Macleay Valley House	Macleay Street	Frederickton	In floods exceeding 8.55 metres on the Kempsey gauge
Utilities and infrastructure			
The two Kempsey Sewage Treatment Works		West Kempsey	The Kempsey sewerage treatment works are built above the 20 year (1:5) flood level. There may be some pump wells and effluent ponds flooded in smaller event.
Frederickton Sewage Treatment Works	Yarrabandini Road	Bellimbopinni	

Facility Name	Street	Suburb	Comment
Water Supply		West Kempsey	Water supply should not be affected, although this is subject to electricity supply.
South Kempsey Sewage Treatment Works	Nance Road	South Kempsey	
West Kempsey Sewage Treatment Works	North Street	West Kempsey	
Frederickton Telephone Exchange	37 Edgar Street	Frederickton	
Kempsey Telephone Exchange	25 Elbow Street	West Kempsey	
Camping Ground / Caravan Parks			
Kempsey Tourist Village	325 Macleay Valley Way	South Kempsey	
Central Caravan Park	63 Belgrave Street	Kempsey	
Sundowner Caravan Park	161 Pacific Highway (Macleay Valley Way)	Kempsey	
Tall Timbers Caravan Park	425 Macleay Valley Way	South Kempsey	

Lower Macleay Valley

Facility Name	Street	Suburb	Comment
Schools			
Gladstone Public	Kinchela Street	Gladstone	
Smithtown Public	Cannane Street	Smithtown	
Crescent Head Public	Main Street	Crescent Head	
South West Rocks Public	Gregory Street	South West Rocks	
Kinchela Public School	5 Right Bank Rd	Kinchela	

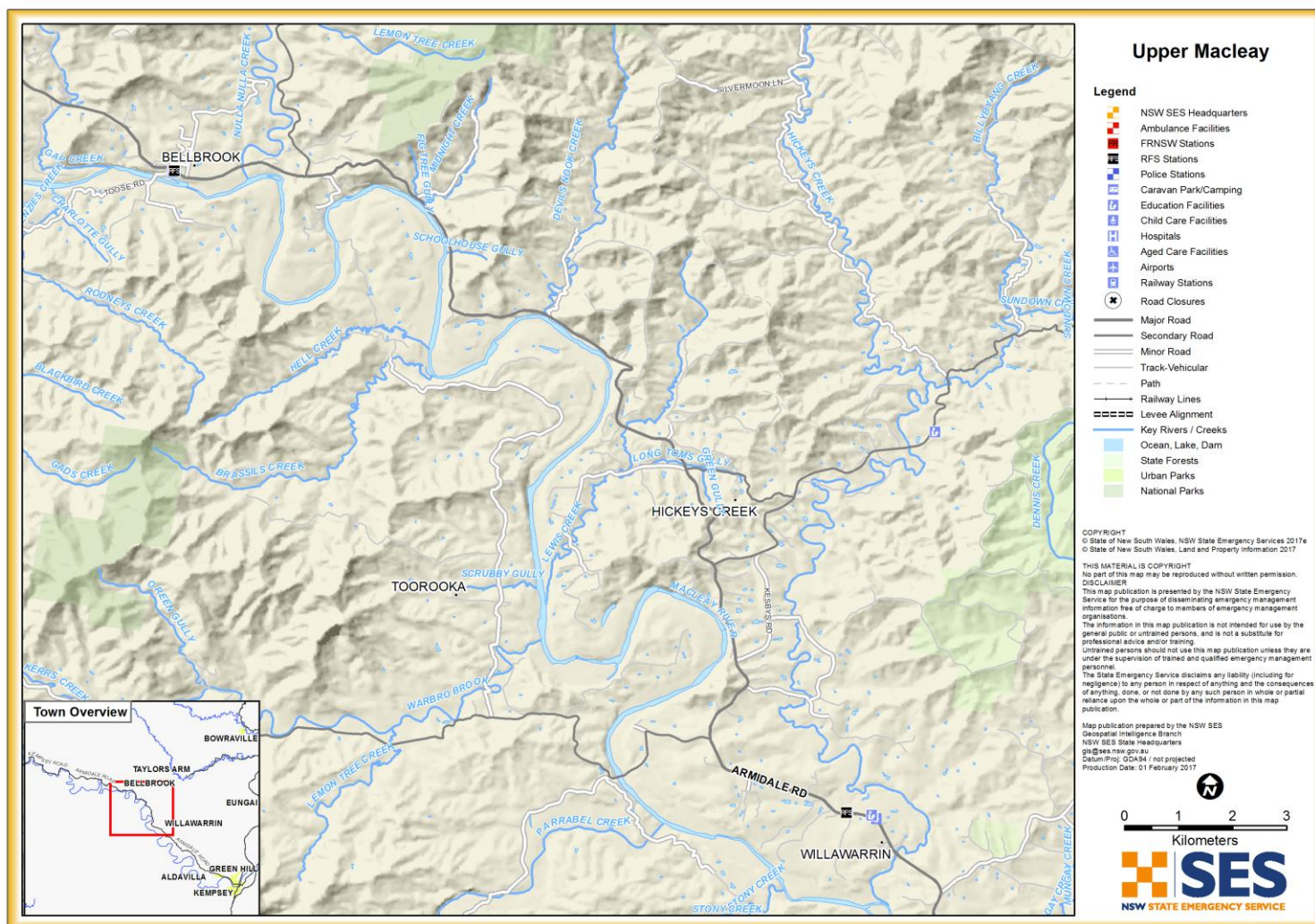
Facility Name	Street	Suburb	Comment
Child Care Centres			
Lower Macleay Preschool	Belmore Street	Smithtown	
Crescent Head Community Preschool	Killuke Crescent	Crescent Head	
South West Rocks Preschool	Trial Street	South West Rocks	
Early Learning Centre	Wilfred Partridge Street	South West Rocks	
Community Preschool	Fourth Avenue	Stuarts Point	
South West Rocks OOSH / Vacation Care	South West Rocks Public School, 62-82 Gregory Street	South West Rocks	
Facilities for the aged and/or infirm			
South West Rocks Nursing Facility		South West Rocks	
Utilities and infrastructure			
Sewage Treatment Works			The Sewerage treatment works is generally not affected in small flooding events. However in 2001 the system was overloaded by floodwaters and surcharging occurred.
Hat Head Sewage Treatment System			Hat head Sewage treatment system works on a Vacuum pump. When this becomes filled with water from excessive rains this can cause the system to stop working.
Smithtown Telephone Exchange	96 Kinchela Street	Gladstone	
Stuarts Point Telephone Exchange		Stuarts Point	
Camping Ground / Caravan Parks			
Macleay Valley Holiday Centre			

Facility Name	Street	Suburb	Comment
Caravan Park			
Grassy Head Caravan Park		Grassy Head	
Delicate Nobby Caravan. Park		Crescent Head	
Lagoon View Beach Caravan. Park		South West Rocks	
Other			
Seventh Day Adventist Convention Centre			

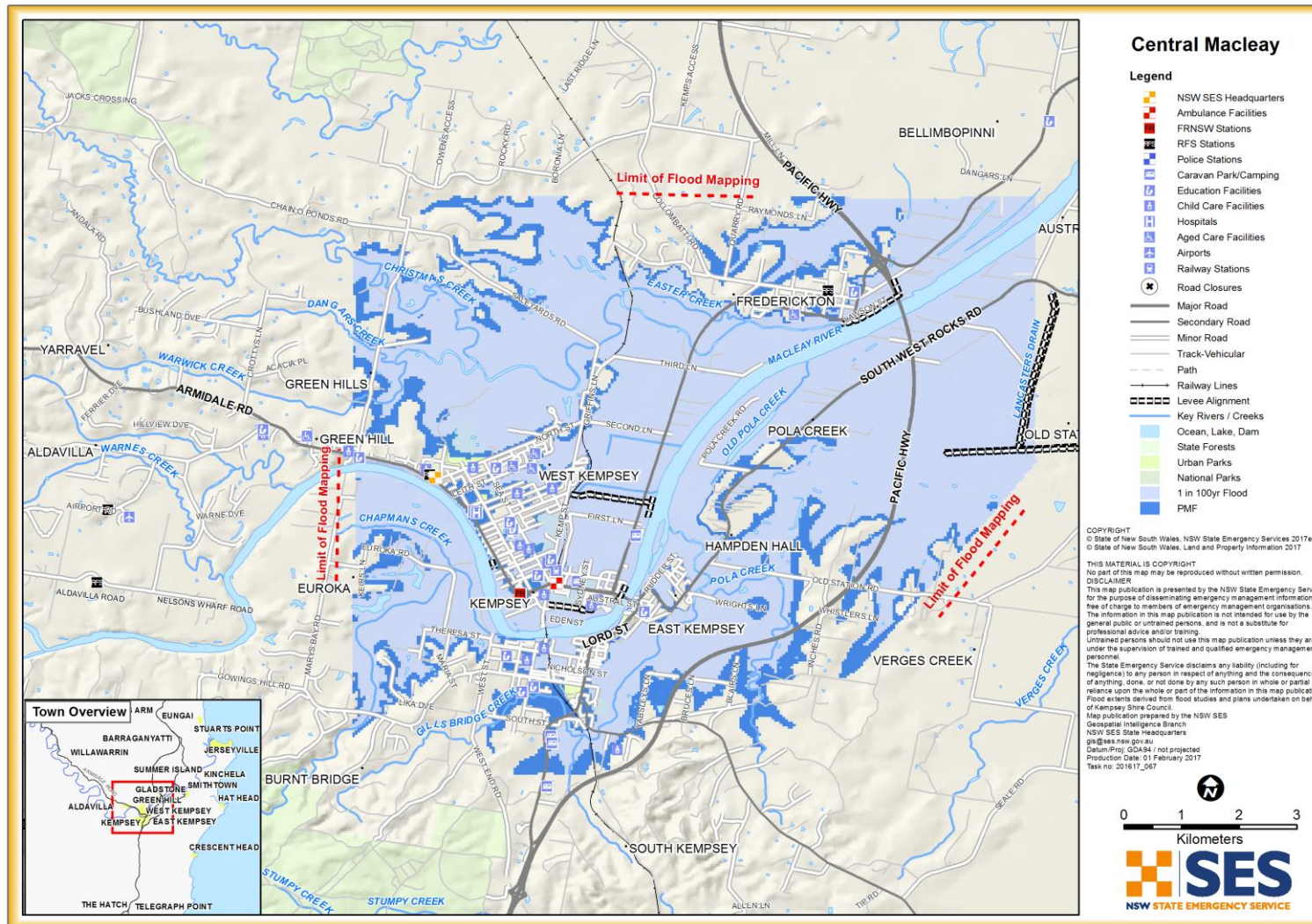
MAP 1: MACLEAY RIVER BASIN



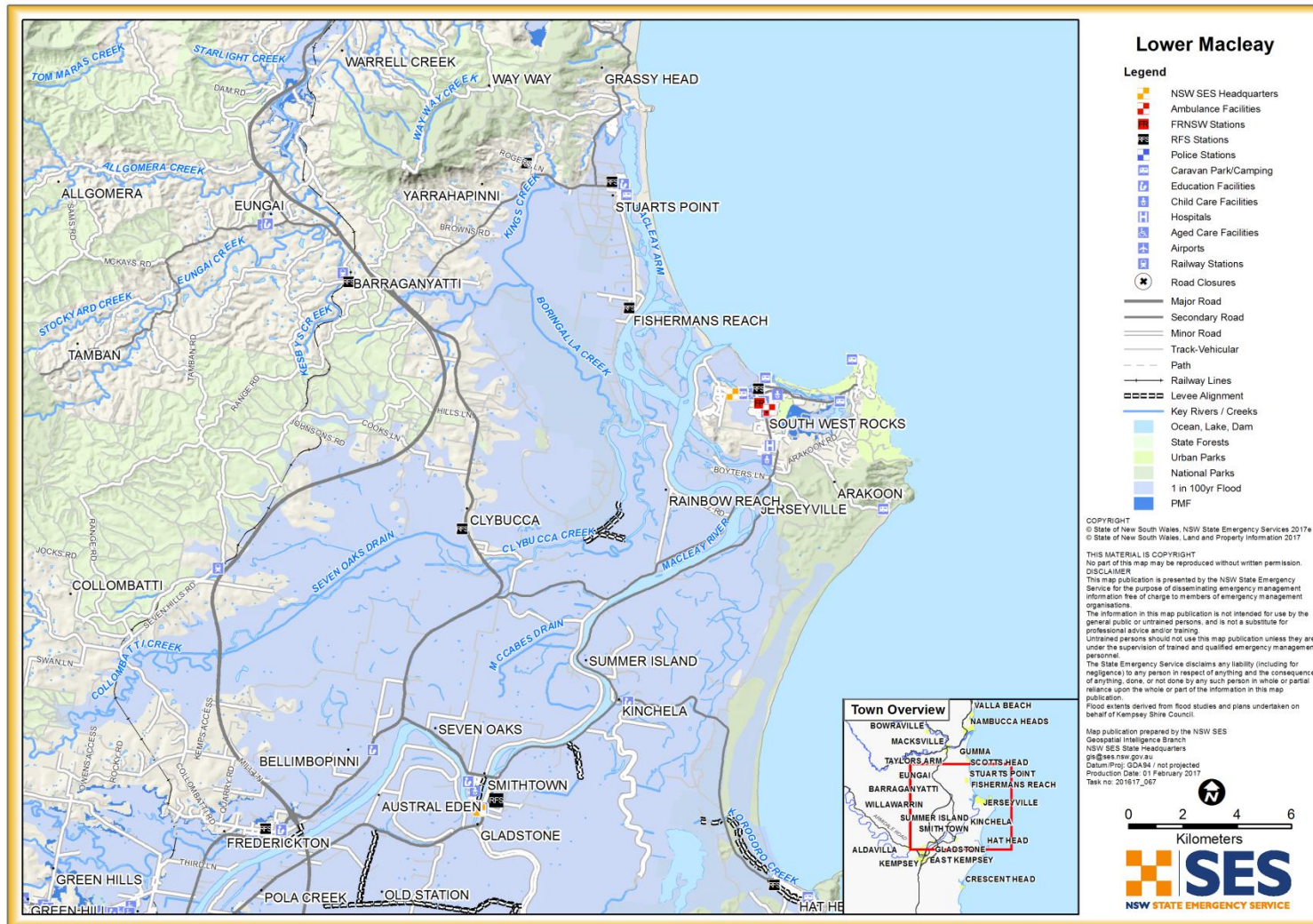
MAP 2: UPPER MACLEAY TOWN MAP



MAP 3: CENTRAL MACLEAY TOWN MAP



MAP 4: LOWER MACLEAY TOWN MAP



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SES RESPONSE ARRANGEMENTS FOR KEMPSEY SHIRE

Volume 3 of the Kempsey Shire 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
Kempsey Shire Local Flood Plan	July 2012
Kempsey Shire Local Flood Plan	May 2006

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Kempsey Shire Local Controller

NSW State Emergency Service

PO Box 331

KEMPSEY NSW 2440

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

[illegible]

KEMPSEY SHIRE: FLOOD WARNING SYSTEMS AND ARRANGEMENTS


**Chapter 1 of Volume 3 (NSW SES Response Arrangements for Kempsey
Shire) of the Kempsey Shire Local Flood Plan**

Last Update: May 2017

AUTHORISATION

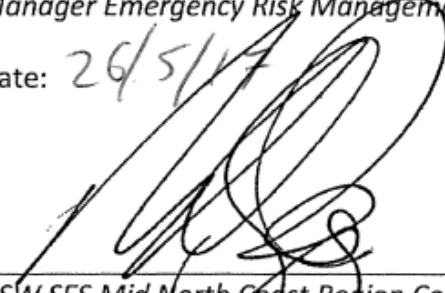
Kempsey Shire: Flood Warning Systems and Arrangements has been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved



Manager Emergency Risk Management
Date: 26/5/17

Approved



NSW SES Mid North Coast Region Controller
Date: 22.5.2017

Tabled at LEMC

Date: 10 July 2017

Document Issue: 3.1-07042014

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1. GAUGES MONITORED BY THE NSW SES KEMPSEY SHIRE LOCAL HEADQUARTERS

Table 1: Gauges monitored by the NSW SES Kempsey Shire Local Headquarters

Gauge Name	Type	AWRC No.	Bureau Gauge No.	Stream	Flood level classification in metres			Special Reading Arrangements	Owner
					MIN	MOD	MAJ		
D/S Dumaresq Dam	T	-	556022	Dumaresq Ck				BOM	NOW
Wollomombi	M	206002	057079	Wollomombi River				BOM-MHL	NOW
Georges Creek*†‡	T	206024	557001	Macleay River	6.0	8.0	10.0	BOM-MHL	NOW
Bellbrook*†‡	T	206019	059122	Macleay River	6.5	10.5	13.5	BOM-MHL	BOM
Kogal	T	206900	059036	Nulla Nulla Creek				BOM	BOM
Toorooka	T	-	559038	Macleay River				BOM-MHL	KSC
Moparrabah	T	206904	059128	Parrabel Creek				BOM-MHL	BOM
Turners Flat‡	T	206011	559002	Macleay River				NOW-MHL	NOW
Wittitrin	T	206903	059125	Dungay Creek				BOM-MHL	BOM
Aldavilla D/S	T	206431	559151	Macleay River				BOM-MHL	OEH
Kempsey*†‡	T	206403	059127	Macleay River	4.5	5.7	6.6	BOM-MHL	OEH
Seven Oaks†	T	-	559034	Macleay River				KSC	KSC
Smithtown/Belmore River Entrance	T	206406	559003	Macleay River				MHL	OEH
Smithtown	T	-	559040	Belmore River	3.4	4.0	4.2	MHL	OEH
Kinchela Creek	T	206427	559031	Macleay River				MHL	OEH
Plummer's Lane	T	-	559035	Macleay River				KSC	KSC
Jerseyville	T	206409	553019	Macleay River				BOM	KSC

Gauge Name	Type	AWRC No.	Bureau Gauge No.	Stream	Flood level classification in metres			Special Reading Arrangements	Owner
					MIN	MOD	MAJ		
Killick Gates	T	-	559033	Killick CK				BOM-MHL	KSC
South West Rocks	T	-	559041	Macleay River				MHL	OEH
Maria River	T	-	560003	Maria River				BOM	OEH

NOW = NSW Office of Water BOM = Bureau of Metrology MHL = Manly Hydraulics KSC = Kempsey Shire Council OEH=Office of Environment & Heritage

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 (§).

Table 2: Rain Gauges monitored by NSW SES Kempsey Shire Local Headquarters through Enviromon

Gauge Name	AWRC No.*	Reading Arrangement
Guyra		Bureau of Meteorology
Wollomombi		Bureau of Meteorology
Blue Nobby	206002	Bureau of Meteorology
Walcha		Bureau of Meteorology
Tia		Bureau of Meteorology
Point Lookout		Bureau of Meteorology
Bellbrook	206019	Bureau of Meteorology
Moparrabah	206904	Bureau of Meteorology
Boonanghi		Bureau of Meteorology
Turners Flat		Bureau of Meteorology
Millbank		Bureau of Meteorology
Wittittrin	206903	Bureau of Meteorology
Aldavilla		Bureau of Meteorology
Collombatti		Bureau of Meteorology
Seven Oaks		Bureau of Meteorology

Table 3: Other Rain gauges monitored remotely by NSW SES Kempsey Shire Local Headquarters

Gauge Name	Gauge Name
Newholme	Tiverton
Dumaresq Dam	Jeogla
Willow Glen	Mt Seaview
Armidale Airport	
Yarrowitch	

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

The NSW SES Mid North Coast Region Headquarters distributes NSW SES Flood Bulletins, NSW SES Evacuation Warnings and NSW SES Evacuation Orders to the following regional media outlets and agencies:

Television Stations:

Station	Location
Prime TV	Port Macquarie
Southern Cross Ten	Taree
NBN 9 TV	Port Macquarie
ABC TV	Port Macquarie

Radio Stations:

Station	Location	Frequency	Modulation
TANK FM	Kempsey	103.1	FM
ABC North Coast	Coffs Harbour	92.3	FM
ABC North Coast	Coffs Harbour	684	AM
ABC Mid North Coast	Port Macquarie	95.5	FM
ABC Mid North Coast	Port Macquarie	756	AM
TRIPLE M	Port Macquarie	106.7	FM
HIT	Port Macquarie	105.1	FM
EASY LISTENING 531	Port Macquarie	531	AM

Newspapers:

Name	Location
MACLEAY ARGUS	KEMPSEY
MID COAST OBSERVER	KEMPSEY

Other Agencies:

- All Agencies as outlined in Part 1 of this plan, including:
 - LEOCON
 - LEMO
 - NSW Ambulance

- Caravan Park Proprietors
- Childcare Centres and Preschools
- Corrective Services NSW
- Fire and Rescue NSW
- NSW Police Force
- NSW Rural Fire Service
- Dam Owners
- School Administration Offices
- Surf Life Saving Australia
- Transport Services Functional Area
- Welfare Services Functional Area
- Dunghutti and Thungutti Nation Aboriginal Communities
- Lower Macleay Flood Reference Group

Emergency Alert:

- Emergency Alert may be used for the Kempsey sector, with defined polygons developed.

KEMPSEY SHIRE: NSW SES LOCALITY RESPONSE ARRANGEMENTS


**Chapter 2 of Volume 3 (NSW SES Response Arrangements for Kempsey
Shire) of the Kempsey Shire Local Flood Plan**

Last Update: May 2017

AUTHORISATION

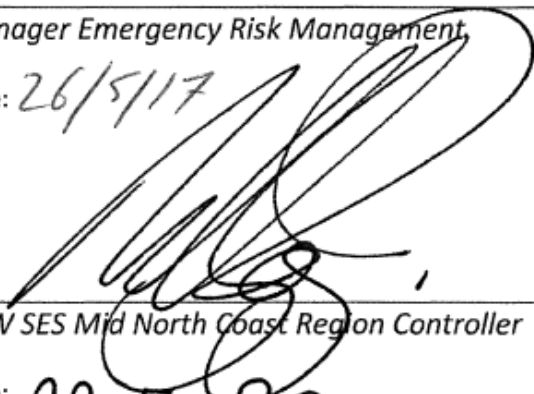
NSW SES Locality Response Arrangements in Kempsey Shire has been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved



Manager Emergency Risk Management
Date: 26/5/17

Approved



NSW SES Mid North Coast Region Controller
Date: 22.5.2017

Tabled at LEMC

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SECTOR OVERVIEW

Table 1: Overview of Sectors in the Kempsey Shire LGA.

Sector Name	Community	Sector Basis	Total properties	Properties potentially at risk
Sector 1	Bellbrook Willawarrin Turners Flat Skillion Flat	High Flood Island	213 134 182 126	Low-Lying farmland and residences at risk of inundation Approximately 800 at risk of isolation
Sector 2	Kempsey CBD	Low Flood Island	655	450 Businesses 205 Houses
Subsectors				
Kempsey CBD	East Kempsey (including Pola Creek and Hampden Hall)	High Flood Island and Low Flood Islands	754	52 Houses
East Kempsey	West Kempsey		2085	112 Houses
West Kempsey	South Kempsey		1008	74 Houses
South Kempsey	Aldavilla (including Euroka)	High and Low Flood Islands	268 115	Low-lying farmland and residences
Aldavilla				
Sector 3	Frederickton	High Flood Island	459	33 houses Rural farming land between Kempsey and Frederickton on both sides of the Macleay River (Christmas and Easter Creek, Glenrock and Frogmore).
Sector 4	Bellimbopinni and Clybucca	Low Flood Island	201	Rural farming land 160 Houses
Sector 5	Gladstone Smithtown Kinchela Belmore River Austral Eden and Seven Oaks	Low Flood Island	168 262 140 159 201	168 Gladstone 262 Smithtown Low-lying farmland
Sector 6	Crescent Head	High Flood Island	1003	1003 at risk of isolation Low-lying properties along Killick Creek in Willow Street at risk of coastal inundation.
Sector 7	Maria River	Low Flood Island	55	Approximately 55 houses
Sector 8	South West Rocks Stuart Point and	High flood Island	2656 593	Around 100 low-lying properties at risk of

Sector Name	Community	Sector Basis	Total properties	Properties potentially at risk
	Grassy Head			inundation 3429 at risk of isolation
	Rainbow Reach – Jerseyville	Low Flood Island	62	62 at risk of isolation. Approximately 24 Low-lying properties at risk of inundation
Sector 9	Hat Head	High Flood Island	309	309 properties at risk of isolation At least one dwellings and several yards at risk of inundation

1. UPPER MACLEAY - SECTOR 1

1.1. GEORGES CREEK/BELLBROOK/WILLAWARRIN RESPONSE ARRANGEMENTS

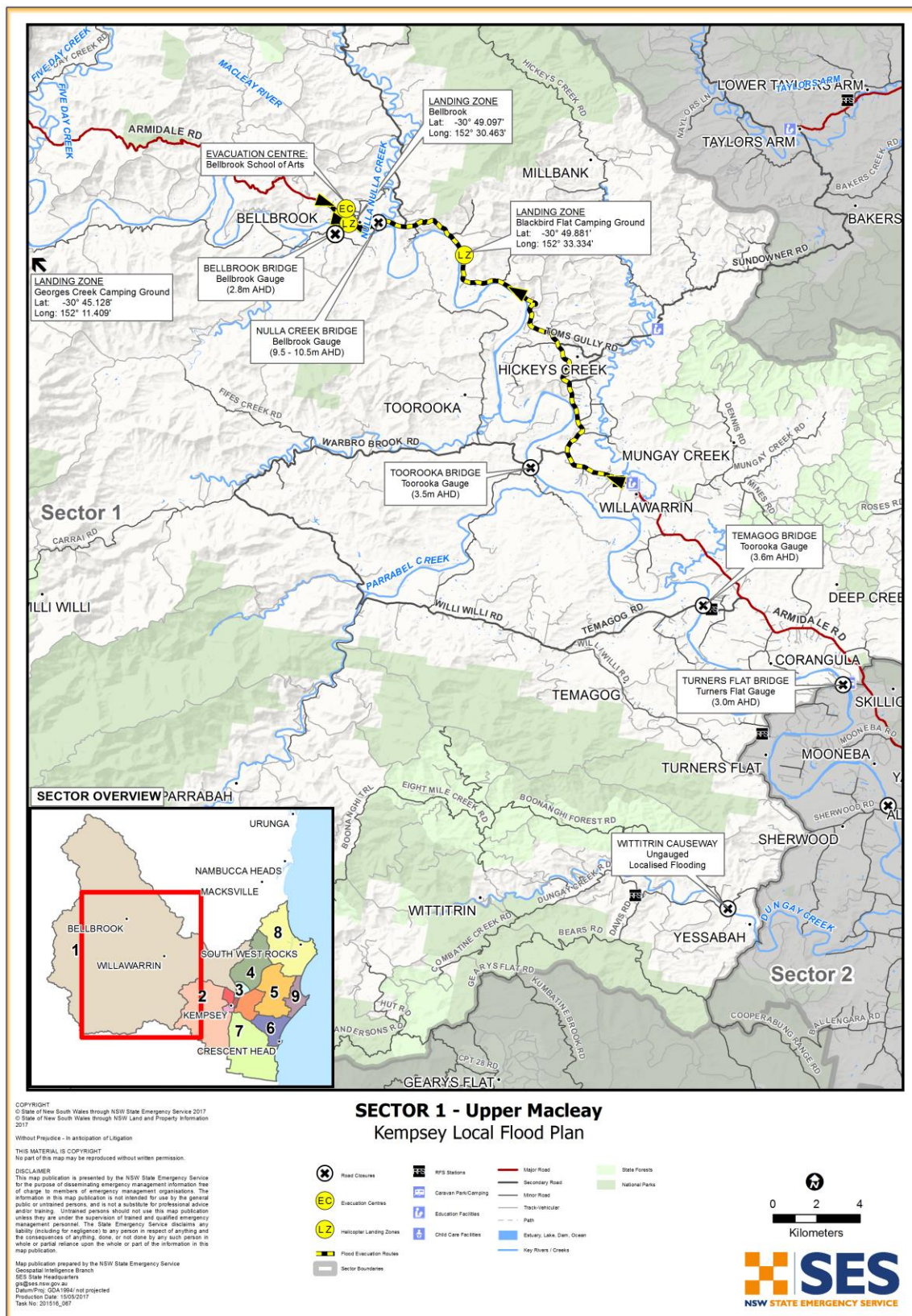
Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

Sector Description	This sector covers the western part of the Kempsey Shire covering the communities of Bellbrook, Toorooka, Wittitrin, Willawarrin, Temagog, Corangula, Turners Flat and Skillion Flat. The sector extends from the Dumaresq Shire boundary in the west heading east to Turners Flat/Armidale Road turn off, then to the: <ul style="list-style-type: none">Southern shire boundary along Turners Flat Road, Sherwood Road, Dungay Creek Road and Old Rollands Plains Road.Northern shire boundary along Jacks Crossing Road, Chain O Ponds Road, Saleyards Road and the North Coast Railway.				
Hazard	Isolation Inundation in parts of Willawarrin in extreme events.				
Flood Affect Classification	High Flood Islands				
At risk properties	800 at risk of isolation Several Willawarrin properties at risk of inundation	Total number of properties within Sector/Community			Approx. 655
Sector Control	Control- The NSW SES Incident Controller will control operations in this sector. In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc. Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation. Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the Emergency Operations Centre (EOC) where established. Operations command can assist in supporting and coordinating incident management teams as required.				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge	206024	6.00	8.00	10.00
	Bellbrook Gauge	206019	6.50	10.50	13.50
General Strategy	<ul style="list-style-type: none">Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.Issue of early warning of flood level impacts and potential isolation.Pre-deployment of sandbags to Willawarrin to assist with property protection.				

	<ul style="list-style-type: none"> Evacuation of at risk population: <ul style="list-style-type: none"> Self-Evacuation to friends/family outside the impact area. Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator. Medical evacuation may force an earlier response. Establish resupply operations where isolation has continued for over 5 days. Flood rescue where evacuation has failed, or where people have driven into floodwater.
Key Risks / Consequences	<p>The major risk for this sector is isolation with flooding usually confined to the areas close to the river and its tributaries.</p> <p>Isolation Georges Creek, Bellbrook, Willawarrin and surrounding areas can become isolated during minor floods with the closure of low level bridges.</p> <p>Inundation Low-lying areas of Willawarrin may become inundated in events of 1% AEP or greater, similar to 1949 flood of record, where the Community Hall and Pub were inundated.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> NSW SES Bulletins <ul style="list-style-type: none"> Flood Watch Flood Warning Equipment, Livestock and Aquaculture Warnings Media Release such as– Isolation Warnings Evacuation Warning Evacuation Order All Clear Standard Emergency Warning Signal (SEWS) Sequenced door knocking Media briefing Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Notifications are sent out via Commercial radio. Information is also posted on the Kempsey Shire Council website, however access to the internet is poor in this area.</p> <p>NSW SES Kempsey Unit operates a phone tree network system.</p> <p>Considerations:</p> <ul style="list-style-type: none"> Bellbrook Public School – Notify School Upper Macleay Pre School Willawarrin – Notify School
Property Protection	<p><i>Specific property protection measures:</i></p> <ul style="list-style-type: none"> Property protection is not required due to residential floor heights and valley structure. Low-lying farmland properties will need to move livestock and equipment. Pre-deployment of sand and sand bags to Main Street, Willawarrin. <p><i>Protection of essential infrastructure:</i> Nil required.</p>
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions/observations at the Georges Creek Gauge (206024), unless specified otherwise.</p> <p>1. If heights reach and or exceed 5.0m</p>

	<p>Inundation of Bass Lodge camping ground (at Georges Creek Junction) commences and requires warning.</p> <p>2. If heights reach/and or exceed 13m</p> <p>Kempsey Road (Armidale Road) is flooded at Bass Lodge. This restricts access (if not already restricted from landslides or localised flooding) between the Upper Macleay and Armidale.</p> <p>The key heights based on observations at the Bellbrook Gauge (206019) unless specified otherwise.</p> <p>1. If heights reach and/or exceed 2.89m (or predictions to reach and/or exceed 3.7m at Georges Creek gauge)</p> <p>Bellbrook Bridge, on Toose Road, floods isolating residents in the rural area. It generally floods 8 hours after Georges Creek reaches 3.7m. Residents are generally self-sufficient but may require resupply in large or prolonged events.</p> <p>2. If heights reach and/or exceed 4.0 – 4.5m</p> <p>Sherwood Bridge floods approximately 10 hours later. This is the last bridge upstream of Kempsey to flood. The only access to Kempsey is via South Kempsey.</p> <p>3. If heights reach and/or exceed 9.5m</p> <p>Nulla Creek Bridge (on Armidale Road) deck height. The bridge is flooded at this height with no alternate route. Thungutti aboriginal community potentially isolated. Approximately 90 people. Residents are generally self-sufficient but may require resupply in large or prolonged events.</p> <p>The key heights based on observations at the Toorooka Bridge Gauge (559038) unless specified otherwise.</p> <p>1. If heights reach and/or exceed 3.5m (or predictions to reach and/or exceed 2.4m at Georges Creek)</p> <p>Toorooka Bridge on Moparrabah Road floods at this height, isolating 45 families. It generally floods 12 hours after Georges Creek reaches 2.4m and around 3-4 hours after Bellbrook gauge reaches 3.3-3.5m. Residents are generally self-sufficient but may require resupply in large or prolonged events.</p> <p>Camping grounds at Kookaburra and Daisy Plains may also be cut off. School buses do not operate south of the river after the bridge floods.</p> <p>2. If heights reach and/or exceed 3.9m (or 3.5-3.9 at Bellbrook)</p> <p>Deck height of Temagog Bridge (for which there is no gauge) approximately 13km downstream of Toorooka Bridge. The bridge floods at this height isolating rural communities. Residents are generally self-sufficient but may require resupply in large or prolonged events.</p> <p>The key heights based on observations at the Turners Flat Gauge (206011) unless specified otherwise.</p> <p>1. If heights reach and/or exceed 3.0m (or 3.2-3.7m at Bellbrook gauge)</p> <p>Turners Flat Bridge Deck height, with the bridge flooded at this height and access to Kempsey is only available from the west side of the river via Dondingalong/South Kempsey. School buses do not operate to the south of the river after the bridge floods.</p> <p>Turners Flat Bridge floods approximately 8-9 hours after reaching 3.2-3.7m.</p>
Sequencing of evacuation	Generally evacuation is only required for medical emergencies and will require aviation support.
Evacuation Routes	Armidale Road

Evacuation Route Closure	Armidale Road can flood in small and local flood events.
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Generally evacuation is required for medical treatment only.
Evacuation Centre/Assembly Point	Bellbrook School of Arts - 52 Main Street, Bellbrook
Large scale evacuations	<p>Generally evacuations are only required for people with medical conditions.</p> <p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>The NSW SES Kempsey Unit will manage flood rescue operations in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>Flood Rescue Risks:</p> <ul style="list-style-type: none"> • No areas in general, Georges Creek Camping Ground and Blackbird Flat known possible campers. • Medical evacuations or attempted crossings of flooded creeks are considered to be the only scenarios. • Addressed by dedicated Flood Rescue personnel using air resources.
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days. • This will be carried out by aviation support to the local store in Bellbrook or direct to properties. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire 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	<p>Helicopter Landing Points:</p> <p>Suitable landing points are located at:</p> <ul style="list-style-type: none"> • Georges Creek camping ground – S30°.45.128' E 152 ° 11.409 (Carrai map 9336-3-N: GR 225 975) • Bellbrook – S30 ° 49.097' E152 ° 30.463' • Blackbird Flat camping ground – S30 ° 49.881 E 152 ° 33.334 • Other potential landing sites are identified in the NSW SES MNR Region Homestead report, listing homestead names and locations across the area.
Other	<p>Georges Creek camping ground and Blackbird Flat camping ground are to be considered.</p> <p>The Akubra Willawarrin Campdraft is held in May each year.</p>



2. KEMPSEY - SECTOR 2

2.1. KEMPSEY RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

Sector Description	<p>This sector covers the Kempsey area, including the subsectors of West Kempsey, East Kempsey, South Kempsey and Aldavilla. It is bounded by sector 1 to the west, the shire boundary in the south, Pacific Highway, Seale Road, Station Road and Rocks Road to the east, and the Macleay River, Glenrock Drain and Saleyards Road in the north.</p> <p><u>West Kempsey sub-sector</u> This sub sector includes West Kempsey urban area and parts of Greenhill. It is bounded by the North Coast Railway line from the Railway Bridge (at Fig Tree Park) to Saleyards Road, Spooners Avenue and the Macleay River.</p> <p><u>East Kempsey (including Pola Creek and Hampden Hall) sub-sector</u> This sub sector includes East Kempsey urban area as well as Hampden Hall, Frogmore, Verges Creek and Pola Creek semi-rural and rural areas. It is bounded by the Kempsey Bridge, Lord Street, Lachlan Street and the Macleay River in the east, Angus McNeil Crescent and Crescent Head Road to the south, Seal Road and Verges Creek Road Old Station Road to the east, and South West Rocks Road in the north.</p> <p><u>South Kempsey sub-sector</u> This sub sector includes south Kempsey urban area and the adjacent rural and semi-rural areas. It is bounded by the Macleay River in the north, Euroka Creek in the west, and Gowings Hill Road to South Street in the south and Macleay Valley Way to the east.</p> <p><u>Aldavilla sub-sector</u> This sub sector includes the semi-rural and rural areas of Aldavilla, Euroka, Dondingalong and surrounding areas. It is bounded by sector 1, South Kempsey and West Kempsey to the north and west, the shire boundary to the south, and the Pacific Highway and Macleay Valley Way in the east.</p>		
Hazard	Riverine flooding		
Flood Affect Classification	<p>Kempsey CBD is a Low Flood Island.</p> <p>Kempsey East, West and South are High Flood Islands.</p> <p>Aldavilla, Euroka and Pola Creek are High Flood Islands to Low Flood Islands.</p>		
At risk properties	<p>Central CBD: Businesses – 450; Houses – 210 West Kempsey – 112, South Kempsey – 74, East Kempsey - 52</p>	Total number of properties within Sector/Community	4880
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources.</p>		

	<p>Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge (Flow time 15-23 hrs)	206024	6.00	8.00	10.00
	Bellbrook Gauge (Flow time 9-15 hrs)	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<ul style="list-style-type: none"> • Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions. • Issue of early warning of flood level impacts and potential isolation. • Assistance with property protection where time and resources permit. • Evacuation of at risk population: <ul style="list-style-type: none"> • Self-evacuation to friends/family outside the impact area. • Establishment of an Assembly Area/Evacuation Centre in consultation with the Welfare Services Functional Area Coordinator • Flood rescue where evacuation has failed, or where people have driven into floodwater. 				
Key Risks / Consequences	<p>Inundation</p> <p>The Kempsey CBD is located within a large natural floodway that conveys significant flows during large events and separates Kempsey CBD from South, West and East Kempsey.</p> <p>Overtopping of the levee system can result in significant inundation within the CBD and surrounding areas with some 450 businesses and 210 residences at risk.</p> <p>Levee overtopping can commence when the height at the Kempsey Traffic Bridge falls between a range of 6.6mAHD and 7.43mAHD. However, the sequence of levee overtopping is dependent on peak height and rate of rise. Fast rising floods (greater than 0.2m/hour between 4.0 and 6.9mAHD) will typically cause Eden Street Levee to overtop before the Cochrane Street Levee. When the rate of rise is slower (less than approximately 0.2m/hour between 4.0 and 6.9mAHD), either the Eden or Cochrane Street Levee may begin to overtop first. Most streets in both the Kempsey CBD and West Kempsey would be flooded in a PMF event with depths of 5-10m.</p> <p>Low-lying areas within West Kempsey, East Kempsey, South Kempsey, Aldavilla, Euroka and Pola Creek are at risk of inundation.</p> <p>Isolation</p> <p>There is potential for several days' isolation in areas such as Aldavilla, Euroka and Pola Creek areas.</p>				
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings 				

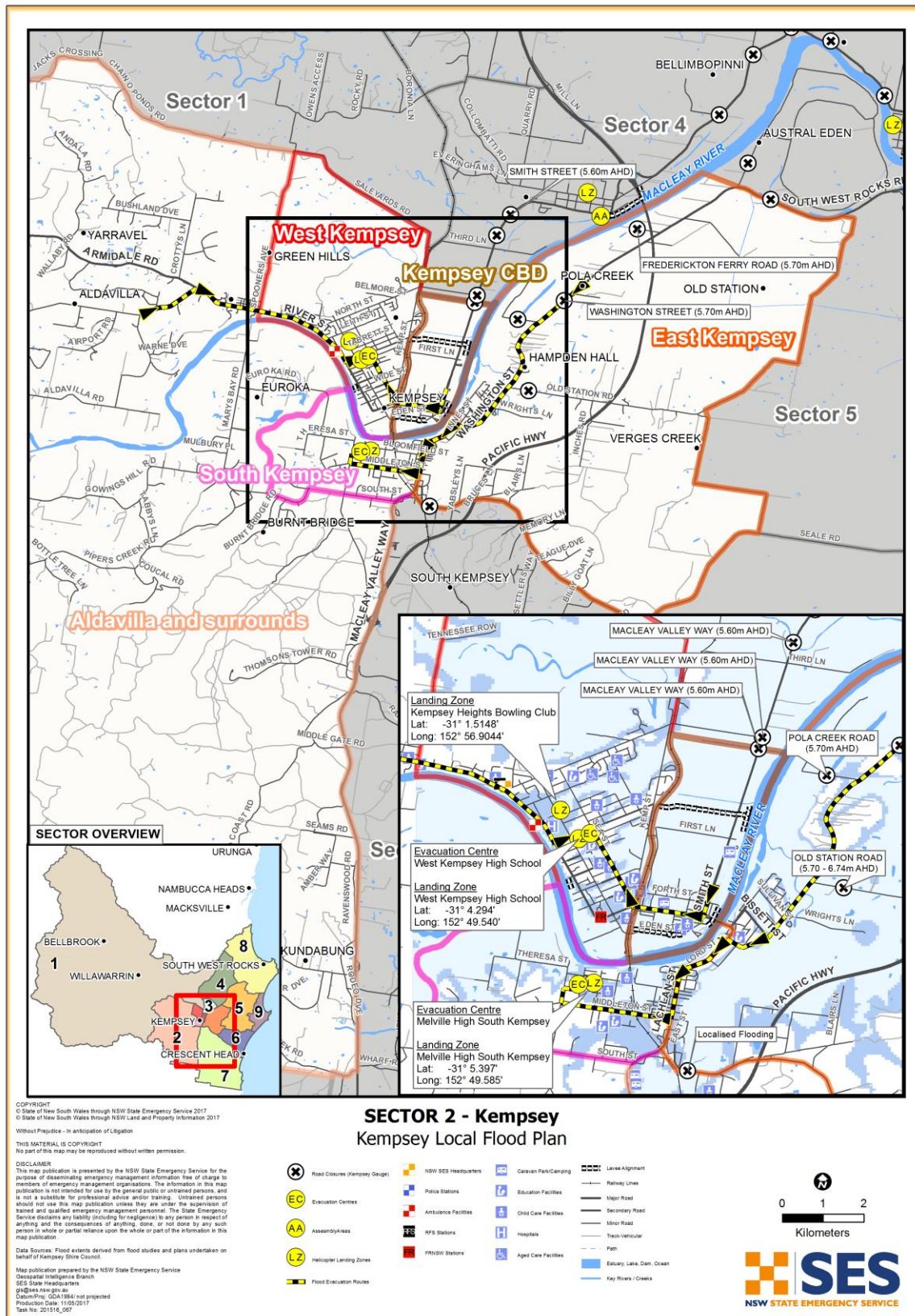
	<ul style="list-style-type: none"> • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert – a predefined warning area has been developed for Kempsey CBD • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warnings include:</p> <ul style="list-style-type: none"> • Door knocking CBD with issue of moderate warning (5.70m) • CBD Evacuation Order at 6.40m If height yet to be determined by the Bureau • NSW SES Kempsey Unit to notify Cavanagh's and Busways of potential inundation.
Property Protection	<p><i>Specific property protection measures:</i></p> <ul style="list-style-type: none"> • Property protection is limited within the CBD. • Other property protection based on request for assistance 132 500 • CBD Business owners need to be advised at 5.70m AHD
	<p><i>Assistance with property protection:</i></p> <p>Pre-deployment of Sand/Sandbags:</p> <ul style="list-style-type: none"> • Clyde St Mall • East Kempsey memorial • South Kempsey Information Centre
	<p><i>Protection of essential infrastructure:</i></p> <ul style="list-style-type: none"> • West Kempsey Sewerage treatment ponds
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 6.65 – 6.96.7m</p> <p>The CBD Sector must be evacuated by this height, including 450 Businesses and 210 residences in:</p> <ul style="list-style-type: none"> • Smith Street • Belgrave Street • Eden Street • John Street • Austral Street • Sydney Street • Verge Street • Holman Street • Stuart Street • Clyde Street • Regent Street • Yaelwood Street • Hopeton Street • Memorial Avenue • Central Caravan Park (Belgrave Street) • Sundowner Caravan Park (Smith Street)

	<p>Levee overtopping can be expected to have commenced.</p> <p>Historically an isolation warning and pre-emptive doorknocking has occurred by 6.1 metres, the evacuation warning by 6.2 metres, evacuation order by 6.4 metres.</p> <p>2. If height predicted to reach and/or exceed 6.68 – 6.9mm</p> <p>Water can be expected to enter the yards of properties in Rudder, Bissett and Innes Streets, East Kempsey.</p> <p>Vehicle access from West Kempsey to Central, East and South Kempsey can be expected to be cut.</p> <p>3. If height predicted to reach and/or exceed 7.1m</p> <p>Access to and from Kempsey Airport Aldavilla lost (however access may be lost prior to this height dependent upon local rainfall).</p> <p>4. If height predicted to reach and/or exceed 8.61m</p> <p>Over ground inundation of residential properties in the following streets (number of properties in brackets; some have water in houses at this level), evacuation is required to be complete by this height:</p> <ul style="list-style-type: none"> • West Kempsey: Sea, Tozer, Dangar, Short, River, Wide, Marsh, Cochrane, Cameron and Becke Streets; Cooks, Perrins and Hudson Lanes and Colin Tait Avenue (112). • South Kempsey: Bloomfield, Hill, Jersey, Druitt, Carri, Nicholson, Yarravel, Middleton, Macquarie and Goonbi Streets (74). • East Kempsey: Rudder, Bissett, Sullivan, Little Rudder, Ferry, William and Ernest Larkin Streets (52). • Kempsey CBD: Approximately 144 commercial and 255 residential properties flooded above floor level. <p>5. If height predicted to reach and/or exceed 8.80m</p> <p>Cooks Lane Levee can be expected to overtop. Water would flow across River Street between Marsh and Wide Streets. Elbow Street (containing Police Station, Council and Fire Station) would become isolated, impacting on service delivery.</p>
Sequencing of evacuation	<p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the CBD area first, with evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Staged evacuation based on assessment of frontal or rear levee overtopping. Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>

Evacuation Routes	<p>Kempsey CBD to West Kempsey: Belgrave Street to Kempsey High School.</p> <p>Pola Creek to East Kempsey: South West Rocks Road to Melville High School (if open).</p> <p>Aldavilla to West Kempsey: Sherwood Road to River Street to Kempsey High School.</p> <p>Euroka: Gowings Hill Road to Melville High School (if open)</p> <p>South Kempsey: Middleton Street to Melville High School (if open)</p>
Evacuation Route Closure	<p>Kempsey CBD: Belgrave St (dependant on levee overtopping, can commence from 6.68m Water starts to cross Macleay Valley Way (at Cochrane Street Levy) at 5.6m</p> <p>Pola Creek to East Kempsey: 5.2m</p>
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1) Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends. • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Assisted evacuation may be required for medical treatment.
Evacuation Centres	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. Potential locations identified are:</p> <ul style="list-style-type: none"> • Kempsey High School – Broughton Street, Kempsey • Melville High School – Nicholson Street, Kempsey
Large scale evacuations	<ul style="list-style-type: none"> • In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area. • NSW Police will be responsible for security of evacuated areas.
Rescue	<p>The NSW SES Kempsey Unit will manage flood rescue operations in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and Flood Rescue Policy.</p> <p>Flood Rescue Risks:</p> <ul style="list-style-type: none"> • Area within the levee system due to rising water • Polo Creek area in East Kempsey
Resupply	<ul style="list-style-type: none"> • Generally not required within Kempsey Sector unless extreme event. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire 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	<p>Helicopter Landing Points:</p> <p>Suitable landing points are located at:</p> <ul style="list-style-type: none"> • Kempsey Airport - Access is lost by road at approx. 7.1m (this could be earlier dependant on localised rain). • West Kempsey High School- S 31° 4.294' E 152° 49.540' • Melville High South Kempsey – S31° 5.397' E 152° 49.585'

	<ul style="list-style-type: none"> Kempsey Heights Bowling Club car park - S -31 ° 065855' E 152 ° 821798' <p><i>Airports:</i></p> <ul style="list-style-type: none"> Kempsey Airport – Aerodrome Rd, Aldavilla Access is lost by road at approx. 7.1m (this could be earlier dependant on local rain).
Other	<ul style="list-style-type: none"> Levee overtopping can be expected to occur when the height at the Kempsey Traffic Bridge falls between the range for 6.6mAHD and 7.43mAHD. Sequence of overtopping is dependent upon if the water is fast or slow rising. Fast rising floods will typically cause the Eden Street levee to overtop before the Cochrane Street Levee. When the rate of water level rise is slower (less than approximately 0.2m/hr), the Cochrane Street Levee may begin to overtop first.

2.2. KEMPSEY - SECTOR 2 MAP



3. FREDERICKTON AREA - SECTOR 3

3.1. FREDERICKTON AREA RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

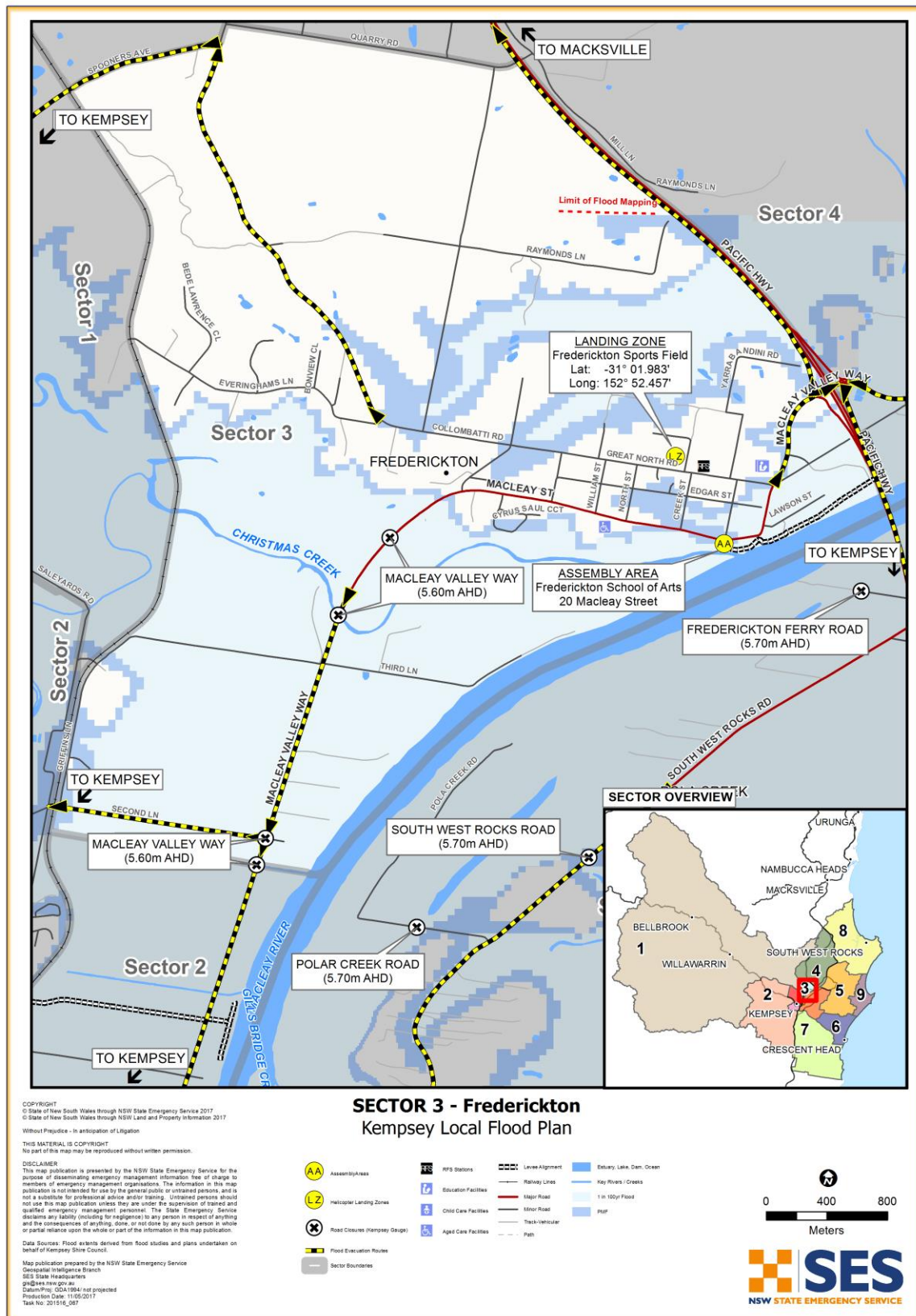
Sector Description	This sector covers the Frederickton urban and surrounding semi-rural areas, extending from Glenrock Drain in the north to the North Coast Railway Line and Spooners Avenue, Quarry Road to Sheppards Road to the Pacific Highway interchange to the Macleay River.				
Hazard	Riverine flooding and isolation				
Flood Affect Classification	Levee – High Flood island				
At risk properties	33 houses Rural farmland	Total number of properties within Sector/Community	459		
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge (Flow time 15-23 hrs)	206024	6.00	8.00	10.00
	Bellbrook Gauge (Flow time 9-15 hrs)	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Assistance with property protection where times and resources permit, including pre-deployment of sand to Frederickton School of Arts.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-Evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.○ Medical evacuation may force an earlier response.• Establishment of a helicopter landing zone at Frederickton Sports Field• Establish resupply operations where isolation has continued for over 5 days.				

	<ul style="list-style-type: none"> Flood rescue where evacuation has failed, or where people have driven into floodwater.
Key Risks / Consequences	<p>Inundation</p> <p>With the completion of the Frederickton Levee built along the edge of Lawson Street, Frederickton now has protection from inundation during floods up to 1% AEP (8.55m AHD Kempsey gauge).</p> <p>In extreme events when the levee is overtopped, properties behind the levee will be inundated.</p> <p>Isolation</p> <p>In the past isolation was a significant hazard. The completion of the bypass now gives residents evacuation routes to the south (Port Macquarie) and to the north (Frederickton to Eungai) in events up to 1% AEP.</p> <p>The level of flood protection in Frederickton has not been tested (2) since the opening of the Kempsey bypass in 2013.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> NSW SES Bulletins <ul style="list-style-type: none"> Flood Watch Flood Warning Equipment, Livestock and Aquaculture Warnings Media Release such as– Isolation Warnings Evacuation Warning Evacuation Order All Clear Emergency Alert Standard Emergency Warning Signal (SEWS) Sequenced door knocking Media briefing Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warnings arrangements include:</p> <ul style="list-style-type: none"> Doorknocking Assistance with other Emergency Services in delivering warning and advice
Property Protection	<p><i>Specific property protection measures:</i></p> <ul style="list-style-type: none"> Sandbagging of lower lying houses followed by evacuation to higher ground at the evacuation centre. Pre-deployment of sand to Frederickton School of Arts. <p><i>Assistance with property protection:</i></p> <ul style="list-style-type: none"> Assistance with property protection where time and resources permit.
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 5.7m</p> <p>Macleay Valley Way (Frederickton to Kempsey) floods, Frederickton access and egress is still available via the Bypass.</p> <p>2. If height predicted to reach and/or exceed 6.0m</p> <p>Spooners Avenue (Between West Kempsey and Frederickton) floods, alternative access/egress to Kempsey is still available via the bypass.</p> <p>3. If height predicted to reach and/or exceed 8.55m</p> <p>33 properties at risk of inundation if levee overtops, located behind the levee.</p>

	<p>Evacuation should be complete by this height for properties in Lawson and Macleay Streets. The levee is expected to overtop at 9.05m. Frederickton also becomes isolated and may require resupply in extreme or prolonged events above this level.</p> <p><i>As the level of flood immunity in Frederickton has not been tested beyond 7-year ARI (2) since the opening of the Kempsey bypass in 2013, there is considerable uncertainty from this point forward.</i></p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children (including the Macleay Valley House) in floods predicted to exceed 8.55m at the Kempsey gauge. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	<p>Frederickton to Kempsey:</p> <ul style="list-style-type: none"> • Pacific Highway to South Kempsey (Kempsey Bypass) • Pacific Highway to the north (towards Macksville) • Macleay Valley Way to Kempsey • An alternative unsealed route, Spooner's Avenue to West Kempsey
Evacuation Route Closure	<p>Closure of evacuations routes:</p> <ul style="list-style-type: none"> • Macleay Valley Way can become inundated at 5.2m on Kempsey Traffic Bridge Gauge. • Unsealed Spooners Avenue route can become inundated at 5.7m on the Kempsey Traffic Bridge gauge. • Flooding of the Kempsey Bypass and Pacific Highway has not been tested beyond 7-year ARI (2) since the opening of bypass in 2013, therefore there is considerable uncertainty from this point forward.
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre.
Evacuation Centres/ Assembly Area	<p>Evacuation Centre will be determined by the Welfare Services Functional Area Coordinator. Potential locations identified are:</p> <ul style="list-style-type: none"> • Kempsey High School – Broughton St, Kempsey

	<ul style="list-style-type: none"> Frederickton School of Arts will be an Assembly Area once Evacuation routes flood. If Macksville is used as for an evacuation centre, liaison through the LEMC (Welfare Serviced Functional area) should occur.
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>The NSW SES Kempsey Unit will manage flood rescue operations in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and Flood Rescue Policy. The following local arrangements have been implemented:</p> <ul style="list-style-type: none"> Rescue on the eastern side of the bypass will be responded to by Gladstone NSW SES Unit. Rescued on the western side of the bypass will be responded to from Kempsey NSW SES Unit.
Resupply	<ul style="list-style-type: none"> Resupply operations are normally not required until isolation has continued for over 5 days and these will be carried out by aviation support the local store. Medical evacuations may force an earlier response. Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire 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	<p><i>Helicopter Landing Points:</i></p> <p>Suitable landing points are located at:</p> <ul style="list-style-type: none"> Frederickton Sports Field (S-31° 01.983', E 152° 52.457').
Other	<p>Macleay Valley House aged care facility is located at 80-114 Macleay Street, Frederickton. The facility has a 150 bed capacity.</p>

3.2. FREDERICKTON - SECTOR 3 MAP



4. BELLIMBOPINNI/CLYBUCCA AREA - SECTOR 4

4.1. BELLIMBOPINNI/CLYBUCCA AREA RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

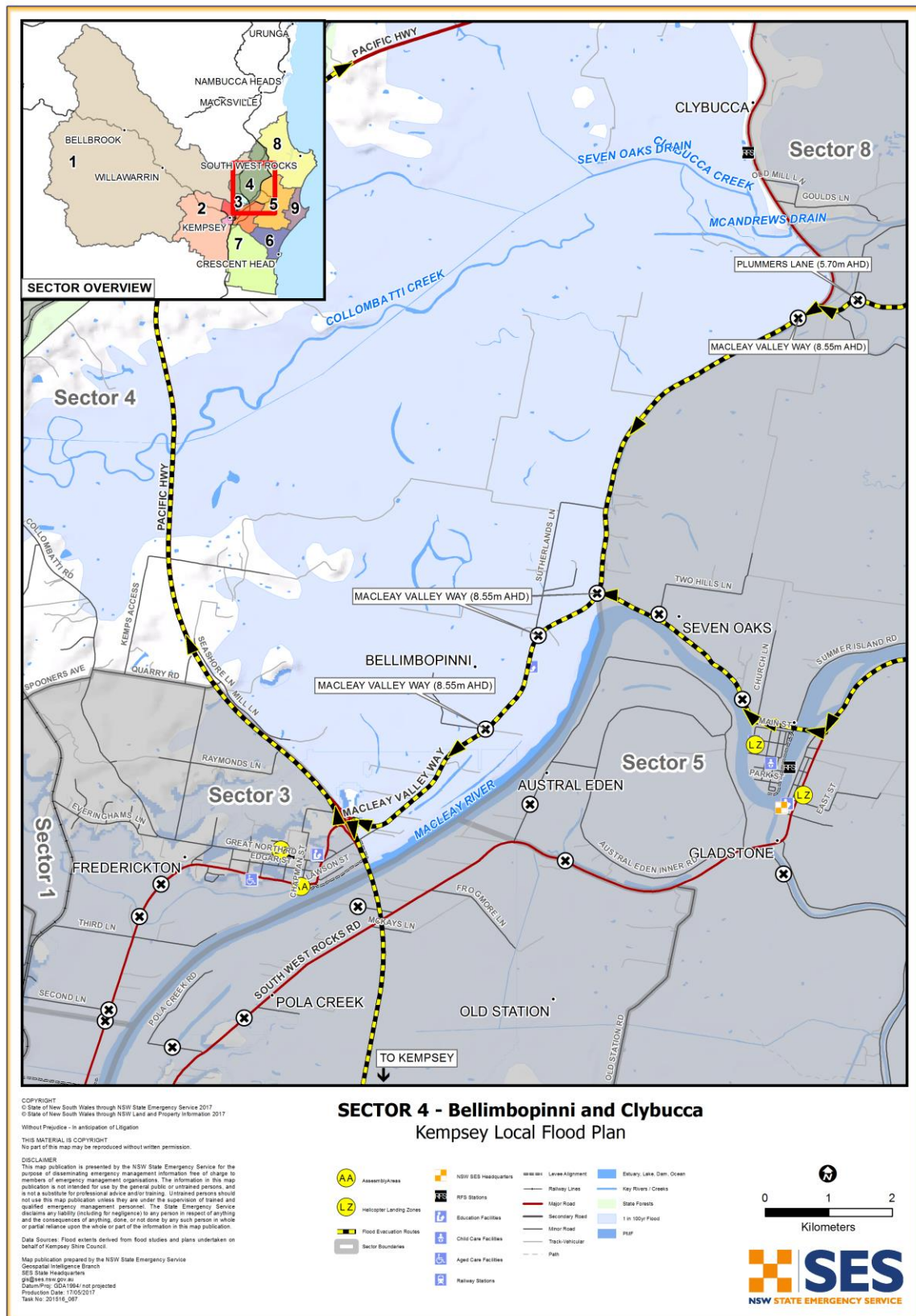
Sector Description	This sector covers the Bellimbopinni/Clybucca semi-rural and rural area, from the northern end of Sector 3-Frederickton and eastern side of sector 1-Upper Macleay and along Macleay Valley Way on the eastern side to the shire boundary.				
Hazard	Riverine and creek flooding.				
Flood Affect Classification	Low Flood Island				
At risk properties	160 houses Rural farming land	Total number of properties within Sector/Community	201		
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge	206024	6.00	8.00	10.00
	Bellbrook Gauge	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<p>Warnings and Evacuations</p> <ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.○ Medical evacuations may force an earlier response.• Establish resupply operations where isolation has continued for over 5 days.• Flood rescue where evacuation has failed, or where people have driven into floodwater				

Key Risks / Consequences	<p>Inundation The majority of houses in the area are raised however there is potential for inundation in extreme events.</p> <p>Isolation Early road closure in smaller events will cause properties to be isolated and will remain isolated for a number of days. As the houses are raised, they are also prone to isolation.</p> <p>These will require evacuation in events >6.80m (Kempsey Gauge), which generally occurs through self-evacuation.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include advice to property owners on isolation and livestock movements at 5.20m if unable to give predictions of expected river heights</p>
Property Protection	<p><i>Specific property protection measures:</i> Bellimbopinni to Clybucca Property protection options are very limited due to the large number of properties that can be affected and the depth of floodwaters.</p> <p><i>Protection of essential infrastructure:</i> Nil required.</p>
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 3.5m Low lying farmland may start to inundate and equipment and livestock warning must be issued by this height.</p> <p>2. If height predicted to reach and/or exceed 5.7m All roads in the Lower Macleay begin to become inundated and may flood, restricting access and egress to the lower Macleay floodplain.</p> <p>3. If height predicted to reach and/or exceed 6.7m Parts of Bellimbopinni will be inundated and must be evacuated by 6.0m when the last evacuation route is cut.</p> <p>4. If height predicted to reach and/or exceed 8.55m All properties downstream of Kempsey assumed to be inundated (approximately 100) and must be evacuated prior to 5.7m, otherwise they are isolated. This generally occurs through self-evacuation.</p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and</p>

	<p>properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	<p>To Kempsey Macleay Valley Way, Smithtown Road, Plummers Lane and Summer Island Road</p> <p>To Macksville Pacific Highway, Macleay Valley Way</p> <p>To South West Rocks Country Club Macleay Valley Way, Plummers Lane and Gregory Street to South West Rocks</p>
Evacuation Route Closure	<p>Local roads commence to flood around 5.70m (Kempsey Gauge)</p> <p>Macleay Valley Way will flood south of Clybucca at approximately 6.0m (Kempsey Traffic Bridge Gauge).</p>
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre.
Evacuation Centres	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • Kempsey High School – Broughton Street, Kempsey • Melville High School – Nicholson Street, Kempsey • South West Rocks Country Club – 2 Sportsmans Way, South West Rocks <p>Generally in past events evacuations centres have not been opened in South West Rocks.</p>
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>The NSW SES Kempsey Unit will manage flood rescue operations in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>Due to early road closures in major events rescue may be required around Summer</p>

	<p>Island.</p> <p>Rescue would be by means of Flood Boat or Aviation asset.</p>
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days and these will be carried out by aviation support the local store. • Medical evacuations may force an earlier response. • Approximately 201 houses are at risk of isolation. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire 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	<p><i>Helicopter Landing Points:</i></p> <p>Suitable landing points will be dependent on flooding.</p>
	<p><i>Airports:</i></p> <p>No airports available for this sector.</p>
Other	No other considerations.

4.2. BELLIMBOPINNI/CLYBUCCA SECTOR 4 MAP



5. GLADSTONE/SMITHTOWN/SEVEN OAKS/KINCHELA AREA - SECTOR 5

5.1. GLADSTONE/SMITHTOWN/SEVEN OAKS/KINCHELA AREA RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

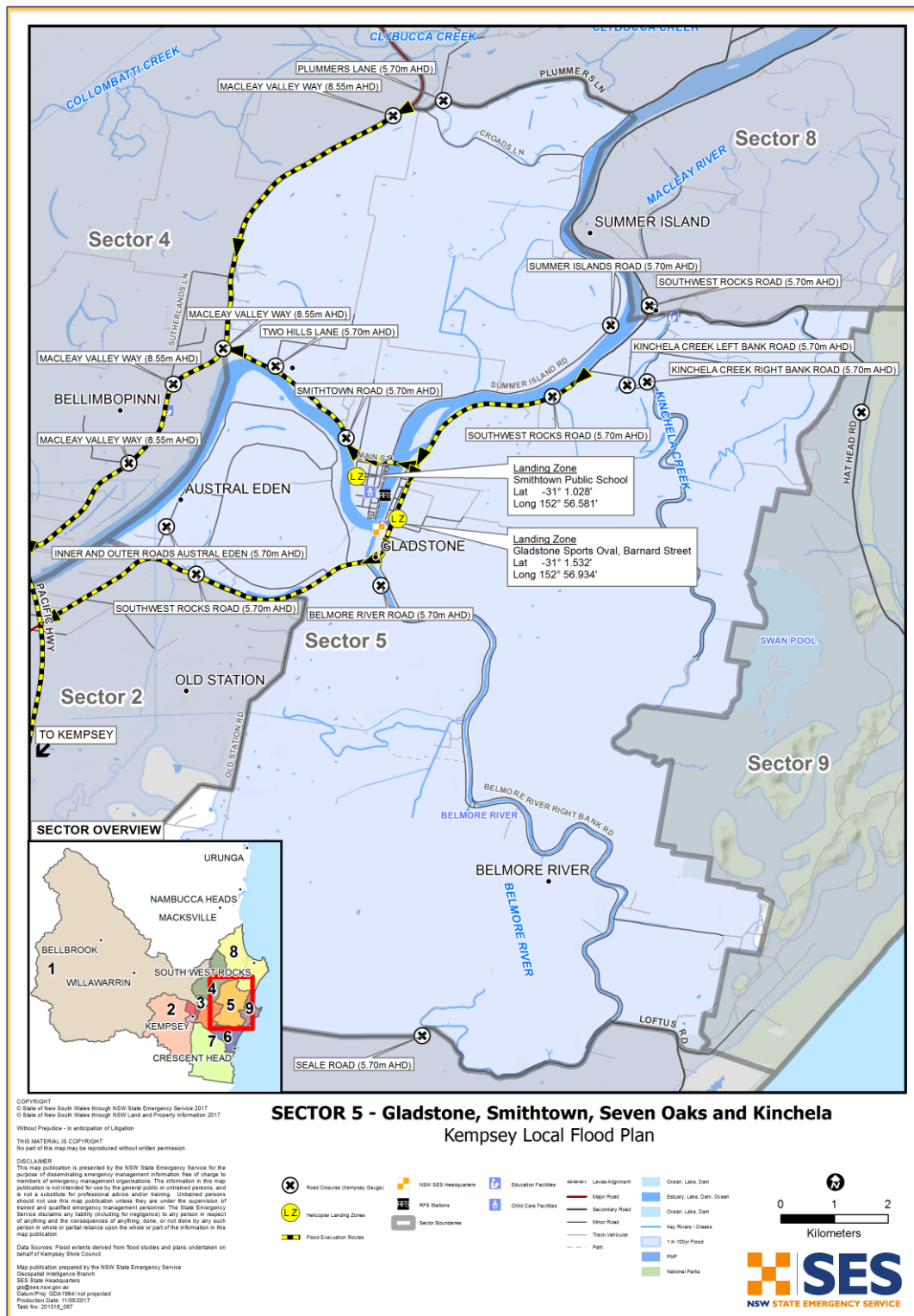
Sector Description	This sector covers Smithtown, Gladstone, Seven Oaks and Kinchela urban and rural areas, including a number of swaps on the lower floodplain. It is bounded by Seale Road, Belmore River Road and Loftus Road in the south, Hat Head National Park in the east, the northern side of Kinchela and Macleay River to Plummers Lane in the north, and Macleay Valley Way, Macleay River, South West Rocks Road, Old Station Road and Verges Creek Road in the west.				
Hazard	Riverine and creek flooding.				
Flood Affect Classification	Low Flood Island				
At risk properties	570 houses (Gladstone 168, Smithtown 262, Kinchela 140) Low lying farmland	Total number of properties within Sector/Community	930		
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge Flow Time to Kempsey 15-23hrs	206024	6.00	8.00	10.00
	Bellbrook Gauge Flow Time to Kempsey 9-15hrs	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge Flow Time to Smithtown 1-4hrs	206402	4.50	5.70	6.60
	Smithtown gauge	206406	3.50	4.00	4.20
General Strategy	<p>Warnings and Evacuations</p> <ul style="list-style-type: none">Manage operations in response to predicted heights indicating likely				

	<p>consequences that pre-empt appropriate actions.</p> <ul style="list-style-type: none"> • Issue of early warning of flood level impacts and potential isolation. • Evacuation of at risk population: <ul style="list-style-type: none"> ○ Self-Evacuation to friends/family outside the impact area. ○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator. ○ Medical evacuations may force an earlier response. • Establish resupply operations where isolation has continued for over 5 days. • Flood rescue where evacuation has failed, or where people have driven into floodwater.
Key Risks / Consequences	<p>Inundation Many dwellings would not experience over floor inundation in a 1% ARI, however could become inundated if higher levels were reached.</p> <p>Inundation of blocks on which dwellings are located within Smithtown/Gladstone, Upper and Lower Kinchela begins about 6.0m at the Kempsey Traffic Bridge gauge.</p> <p>The land area of Smithtown and Gladstone must be regarded as being covered in floods reaching about 7.5m. (Kempsey Traffic Bridge Gauge). At this level the entire community would require total evacuation.</p> <p>Isolation Early road closure in smaller events will cause properties to be isolated and remain isolated for a number of days.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include:</p> <ul style="list-style-type: none"> • Doorknock Smithtown then Gladstone with warning at 4.90m. • Lower Macleay Flood Reference Group to assist.
Property Protection	<p><i>Specific property protection measures:</i></p> <p>Property protection options are very limited due to the large number of properties that can be affected and the depth of floodwaters</p> <p><i>Assistance with property protection:</i></p> <p>Pre-deployment of sand/sandbags to:</p> <p>RFS Kinchela Street - Gladstone</p>

	<p>Boat Ramp Main St - Smithtown</p> <p>South West Rocks Road - Kinchela</p> <p><i>Protection of essential infrastructure:</i></p> <p>Nil</p>
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge gauge (206402) and Smithtown gauge (206406) where specified</p> <p>1. If height predicted to reach and/or exceed 4.5m (3.65m Smithtown gauge)</p> <p>Water flows back up the drain at Nestle factory in Smithtown. Drain needs to be blocked by this height, which is assisted by NSW SES.</p> <p>2. If height predicted to reach and/or exceed 5.7m (3.97m Smithtown gauge) - 6.2m (4.10m Smithtown gauge)</p> <p>Sector becomes isolated, with evacuation routes closing at this height.</p> <p>Rural levees begin to overtop and Macleay Valley Way floods at Smithtown Road, Seven Oaks. Water over South West Rocks Road in places between Kinchela and Gladstone.</p> <p>Isolation warning has historically been issued by 5.0m (3.8m Smithtown gauge), Gladstone and Smithtown doorknocked by 5.0m (3.80m Smithtown gauge), with all teams out of the area by 5.5m.</p> <p>Inundation of residential land in Smithtown, Gladstone and Kinchela is believed to commence around 6.50m (4.18m Smithtown gauge).</p> <p>Potential for forced evacuations and major aviation and flood boat resource capability to facilitate rescue for failed evacuations.</p> <p><i>Decisions to trigger evacuations must take into account the separate influence of the Belmore River, Connection Creek, Kinchela Creek and the tides and ocean.</i></p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	<p>Smithtown Road and South West Rocks Road to Pacific Highway and Kempsey.</p> <p>South West Rocks Road and Summer Island Road to South West Rocks</p>

Evacuation Route Closure	All evacuation routes flood at 5.70m on Kempsey Bridge Gauge.
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Assisted evacuation may be required for medical treatment
Evacuation Centres	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • Kempsey High School – Broughton Street, Kempsey • Melville High School – Nicholson Street, Kempsey • South West Rocks Country Club – 2 Sportsmans Way, South West Rocks <p><i>Generally in past events evacuation centres have not been opened in South West Rocks. Opening will need to be confirmed with Welfare Services.</i></p>
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>Flood rescue operations will be conducted in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>Additional Flood Rescue resources (Flood boat/operators) are to be located in Gladstone from NSW SES Kempsey Unit.</p> <p>After the closure of evacuation routes at 5.7m, aviation will be the primary source of transport for failed evacuations.</p>
Resupply	<ul style="list-style-type: none"> • In Moderate events resupply operations are normally not required until isolation has continued for over 5 days and these will be carried out by air to support the local stores in the communities. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire Council 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	<p>Helicopter Landing Points:</p> <p>Suitable landing points are located at:</p> <p>Gladstone - Sports Oval - Bernard Street (S-31° 1.532', E152° 56.934').</p> <p>Smithtown – Smithtown Public School (S-31° 1.028', E152° 56.581').</p> <p>Airports:</p> <p>No airports available for this sector.</p>
Other	<p>Campdrafting events are held at the Gladstone Rodeo Grounds, several times per year. Large events can attract in excess of 200 competitors and spectators as well as significant numbers of livestock (cattle and horses).</p> <p>The majority of residents in Smithtown and Gladstone do not evacuate and there is potential that forced evacuations will be required in events exceeding 8.3m at the Kempsey Traffic Bridge.</p>

5.2. GLADSTONE/SMITHTOWN/SEVEN OAKS/ KINCHELA AREA – SECTOR 5 MAP



6. CRESCENT HEAD - SECTOR 6

6.1. CRESCENT HEAD RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

Sector Description	This sector covers the Crescent Head urban and surrounding semi-rural area. It extends along the coastline from McGuires Crossing in the north-east along Seale Road and Crescent Head Road and Maria River Road to the southern boundary of Goolawah National Park.				
Hazard	Isolation, creek flooding, coastal inundation and coastal erosion.				
Flood Affect Classification	High Flood Island				
At risk properties	1003 at risk of isolation Some properties at risk of coastal inundation	Total number of properties within Sector/Community	1003		
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Telegraph Point Gauge		-	-	-
	Maria River Gauge		-	-	-
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<p>Warnings and Evacuations</p> <ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-Evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.○ Medical evacuations may force an earlier response.• Establish resupply operations where isolation has continued for over 5 days.• Flood rescue where evacuation has failed, or where people have driven into floodwater.				

Key Risks / Consequences	<p>Inundation</p> <p>Generally any severe flooding of Crescent Head would be as a result of storm surge/coastal inundation.</p> <p>During the 2011 flood there was only minor flooding which was believed to have been caused as a result of the hydraulics of the property rather than the flood itself.</p> <p>Coastal inundation poses a risk to some infrastructure in this sector including Sewer line, water line, water treatment works a number of roads and other community infrastructure.</p> <p>Low-lying properties along Killick Creek in Willow Street are particularly at risk.</p> <p>Isolation</p> <p>Isolation can occur due to flooding on the Hastings River and the Maria River backing up, or major flooding on the Macleay, and can last for at least a week in severe events. However if there is no storm surge and the Hastings River is not in flood, there is generally 4WD beach access to Port Macquarie.</p> <p>Coastal erosion</p> <p>The Crescent Head Holiday Park and the Crescent Head Golf Club, sewer and water lines, some roads and other infrastructure are at risk of coastal erosion.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include:</p> <ul style="list-style-type: none"> • The NSW SES Kempsey Unit will contact the local supermarket when a Flood Warning is issued on the Macleay River or when the Maria River may indicate flooding. • Assistance from Crescent Head RFS is usually sought.
Property Protection	<p><i>Specific property protection measures:</i></p> <p>Property Protection generally not required.</p> <p><i>Assistance with property protection:</i></p> <p>Assistance with property protection where time and resources permit.</p> <p><i>Protection of essential infrastructure:</i></p> <p>Nil required</p>

Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 5.7m</p> <p>Crescent Head may become isolated. 1 x Property Protection team to be deployed to Crescent Head by this height.</p> <p>Triggers for road closures are not related to gauge heights.</p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	Crescent Head Road and Loftus Road to Crescent Head Public School
Evacuation Route Closure	Evacuation route closures are not linked to gauge heights.
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends. • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Generally evacuation is not required. • Assisted evacuation may be required for medical treatment.
Evacuation Centre	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • Crescent Head Public School- 44 Pacific Street, Crescent Head
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>The NSW SES Kempsey Unit will manage flood rescue operations in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>The major rescue hotspot is on Crescent Head Road when access is cut at the</p>

	Corduroy.
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days and these will be carried out by air to support the local stores in the communities. • Generally people have 4wd beach access to Port Macquarie if the Hastings is not in Flood. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire Council 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	<p><i>Helicopter Landing Points:</i></p> <p>Crescent Head Country Club (S-31° 11.361' E152° 58.745')</p> <p>Safety arrangement will need to be put in place with Club prior.</p>
	<p><i>Airports:</i></p> <p>No Airport available for this sector.</p>
Other	<p>Crescent Head is a popular holiday location the two peak seasons being Christmas and Easter School holidays where the population can increase by more than 10%.</p> <p>Crescent Head hosts the Malibu Surf Classic every May.</p> <p>Punt deployed by tilt tray to the Corduroy provided there is sufficient water to launch.</p> <p>The only hazard is along Crescent Head Road when access is cut at the Corduroy.</p> <p>NSW SES Liaison Officer is deployed upon indication that Crescent Head could become isolated.</p>

7. MARIA RIVER - SECTOR 7

7.1. MARIA RIVER RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

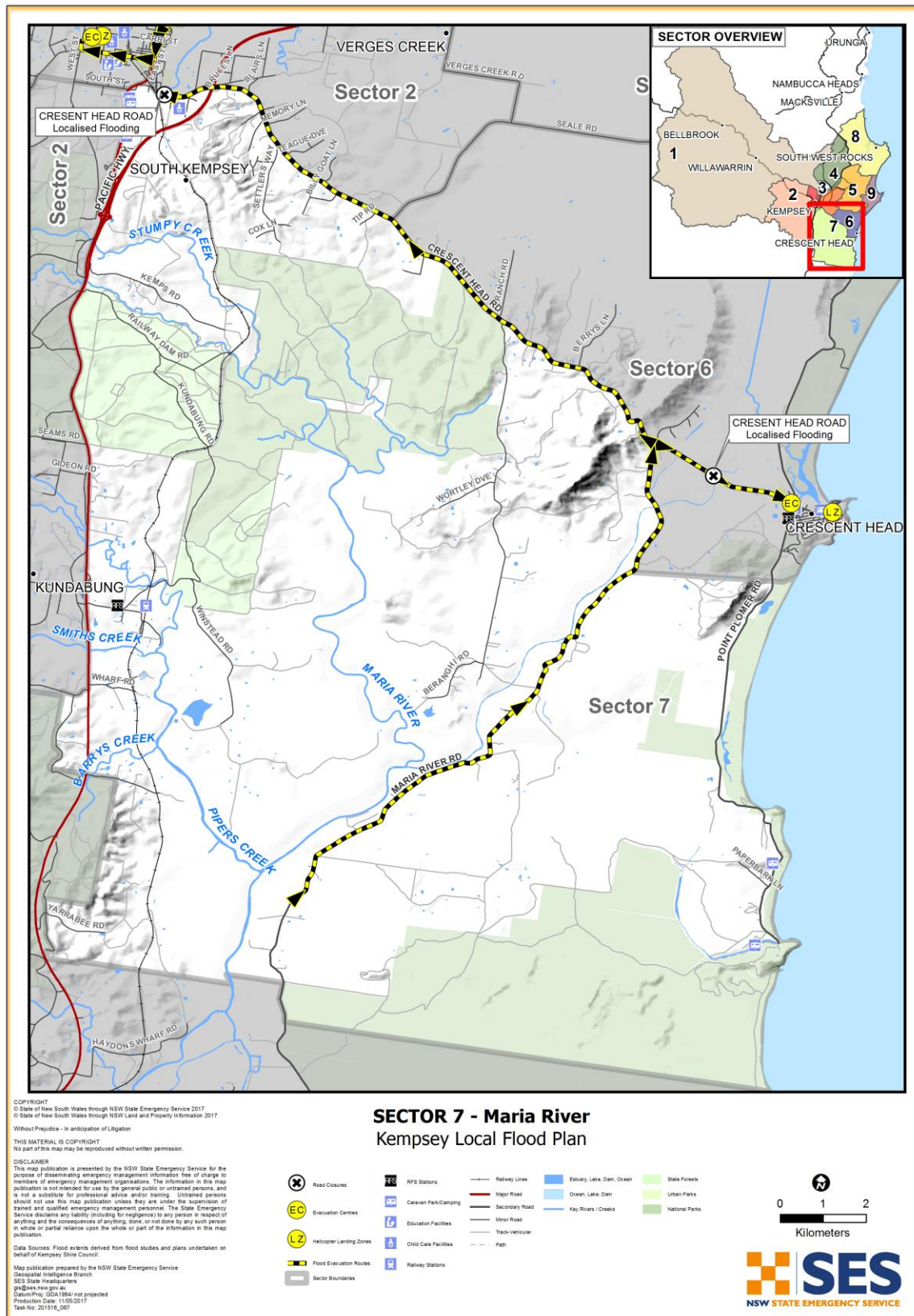
Sector Description	This sector covers the Maria River rural area. It is bounded by the southern side of Angus McNeil Crescent and Crescent Head Road in the north, the ocean in the east (excluding Crescent Head covered by sector 6), the Shire Boundary in the south and the Macleay Valley Way in the west.				
Hazard	Isolation and inundation				
Flood Affect Classification	Low Flood Island				
At risk properties	55	Total number of properties within Sector/Community			55
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Telegraph Point Gauge		-	-	-
	Maria River Gauge		-	-	-
General Strategy	<ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-Evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.○ Medical evacuation may force an earlier response.• Establish resupply operations where isolation has continued for over 5 days.• Flood rescue where evacuation has failed, or where people have driven into floodwater.				

Key Risks / Consequences	<p>Isolation</p> <p>Dependent upon the size of the event, properties can be isolated for between 5-7 days in minor events and for in excess of 20 days in major events.</p> <p>Inundation</p> <p>During the major flood on the Macleay in March 2001 several property owners had approximately 60 centimetres of water in their homes. Flooding in this event originated in the Macleay River.</p> <p>Inundation of the entire area is expected to occur at 3m on the Maria River gauge, however most houses are raised.</p> <p>The floodwater gradient is typically very flat, with floodwaters “backing-up” along the Maria River from the Hastings River confluence.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include the NSW SES Kempsey Unit activating a phone tree warning network.</p>
Property Protection	<p><i>Specific property protection measures:</i></p> <p>Property protection is limited due to widespread nature of flooding.</p> <p><i>Assistance with property protection:</i></p> <p>Nil</p> <p><i>Protection of essential infrastructure:</i></p> <p>Nil</p>
Evacuation and/or Isolation Triggers	<ul style="list-style-type: none"> • Triggers are not linked to a gauge
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children.</p>

	<p>Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	<p>To Kempsey</p> <p>Maria River Road then Crescent Head Road to Kempsey.</p> <p>To Port Macquarie</p> <p>Maria River Road to Shoreline Drive then to Port Macquarie via the ferry.</p>
Evacuation Route Closure	<p>Not linked to a gauge.</p> <p>Road access is lost before any property inundation.</p> <p>Roads can flood due to back up water from either the Macleay or Hastings Rivers.</p>
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends. • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Generally evacuation is not required. • Assisted evacuation may be required for medical treatment.
Evacuation Centres	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • Crescent Head Public School – 44 Pacific Street, Crescent Head • Melville High School – Nicholson Street, Kempsey • Kempsey High School – Broughton Street, Kempsey • If Port Macquarie is to be used as an evacuation centre, liaison through the LEMC (Welfare Serviced Functional area) should occur.
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>Flood rescue will be conducted in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>Rescue is generally not required in this area. All properties will be isolated early with inundation occurring very late in any event.</p> <p>Medical emergencies will have to be managed by flood boat or aviation.</p>
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days. • Most houses are built up. • Resupply will be by flood boat preferably, aviation landing sites will be restricted. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire Council area and potential periods of isolation.

	<ul style="list-style-type: none">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 will be at individual properties if not inundated.
	Airports: No airport for this sector.
Other	The Bureau provides no flood warnings to gauges in this area.

7.2. MARIA RIVER - SECTOR 7 MAP



8. SOUTH WEST ROCKS - SECTOR 8

8.1. SOUTH WEST ROCKS RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

Sector Description	This sector covers South West Rocks urban area in the south to Stuarts Point and Grassy Head in the north. It extends along the coast from the shire boundary in the north to the southern side of Hat Head Road with the western boundary along South West Rocks Road, Plummers Lane, and Macleay Valley Way.				
Hazard	Riverine flooding, coastal inundation and coastal erosion.				
Flood Affect Classification	High Flood Island.				
At risk properties	3311 at risk of isolation (South West Rocks 2656, Jerseyville 62, Stuarts Point/Grassy Head 593) Around 100 properties are at risk of inundation	Total number of properties within Sector/Community	3311		
Sector Control	Control- The NSW SES Incident Controller will control operations in this sector. In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc. Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation. Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge	206024	6.00	8.00	10.00
	Bellbrook Gauge	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Assistance with property protection where time and resources permit, including pre-deployment of sand and sandbags.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-Evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.				

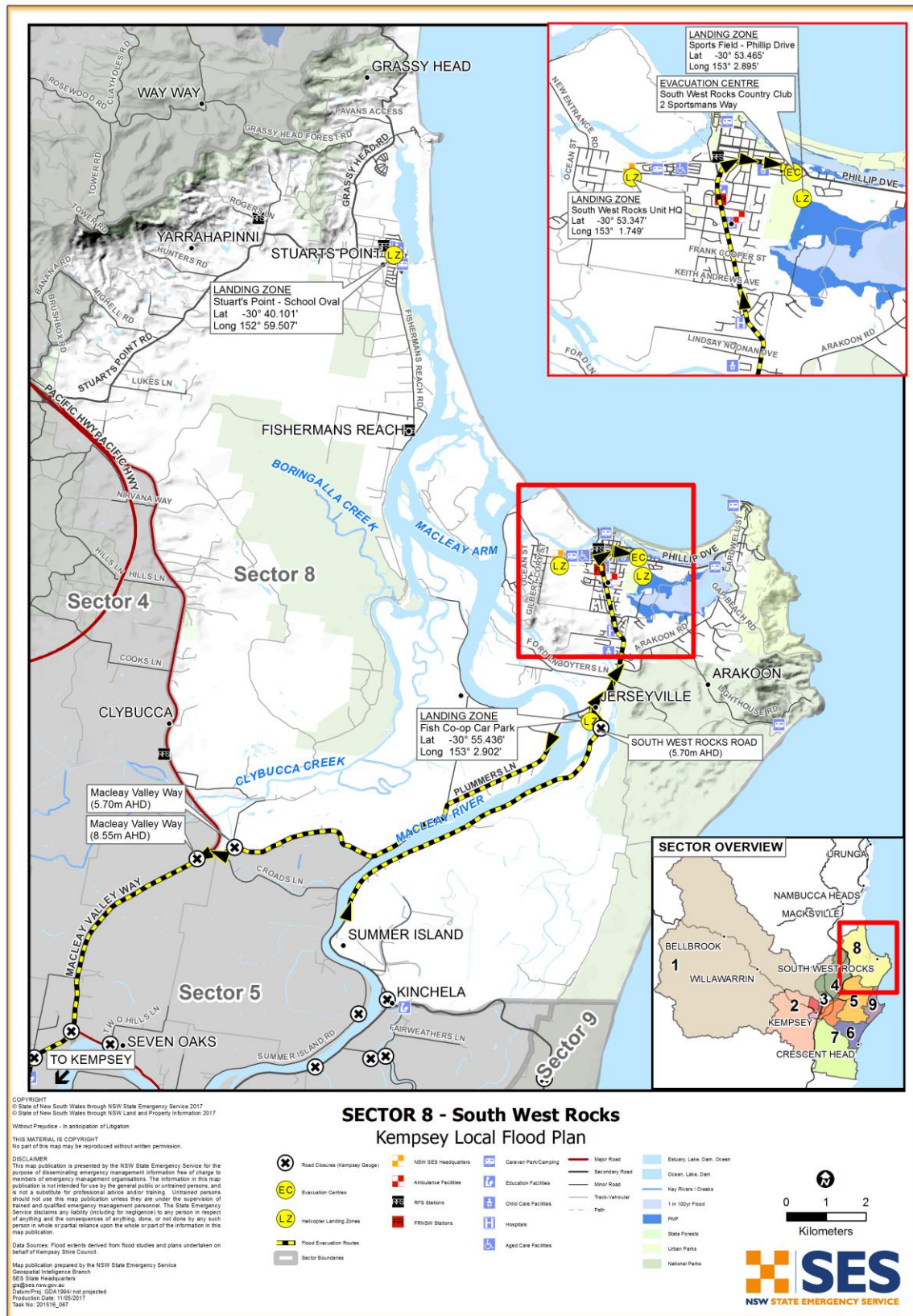
	<ul style="list-style-type: none"> ○ Medical evacuation may force an earlier response. ● Establish resupply operations where isolation has continued for over 5 days. ● Flood rescue where evacuation has failed, or where people have driven into flood water.
Key Risks / Consequences	<p>Isolation</p> <p><u>South West Rocks</u> - Isolation in this sector is not as significant as it is a large town with resources that can cope with small periods of isolation.</p> <p><u>Jerseyville</u> – is isolated during major floods and access for evacuations can be a major problem.</p> <p><u>Stuarts Point/Grassy Head</u> – May become isolated in extreme events due to back up water from the Macleay River.</p> <p>Inundation</p> <p><u>South West Rocks</u> – could be liable to flooding from the Macleay River flowing back into Back Creek, and coinciding with high tides and storm surge activity. The Macleay Valley Holiday Centre Caravan Park would be flooded under such circumstances. Local flooding of low areas east and west of Gregory Street and adjacent to Saltwater Creek can also occur. Properties in the lower area of Rainbow Reach are also at risk.</p> <p><u>Jerseyville</u> – Nearly all dwellings are elevated, but 13 would have over floor flooding around 4.78m on the Smithtown gauge.</p> <p><u>Stuarts Point/Grassy Head</u> – The village of Stuarts Point is essentially flood free, however the Grassy Head Holiday Park and the Seventh Day Adventist Convention Centre could be flood prone in severe events.</p> <p>Lower parts of South West Rocks could be liable to flooding from the Macleay River flowing into Back Creek, and coinciding with high tides or storm surge activities.</p> <p>A flood predicted to reach or exceed 7.0 metres (AHD) on the Kempsey Traffic Bridge would require evacuation of the lower parts of the South West Rock itself.</p> <p>Coastal inundation and erosion</p> <p>Risks for <u>South West Rocks</u> are substantial, in particular water and wastewater infrastructure, local streets and roads and residential and business centre. Coastal erosion risks for South West Rocks include water and wastewater infrastructure.</p> <p>Risks for <u>Grassy Head</u> include the caravan park office, water line and sections of Reserve Road.</p> <p>Risks for <u>Stuarts Point</u> include water and waste water infrastructure, Stuarts Point Holiday Park, houses at Stuarts Point and Fishermans Reach, community facilities, and several local roads.</p> <p>Further detail on coastal erosion and inundation is provided in Volume 2.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> ● NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings ● Evacuation Warning ● Evacuation Order ● All Clear ● Emergency Alert ● Standard Emergency Warning Signal (SEWS) ● Sequenced door knocking ● Media briefing ● Interagency Local Emergency Management Committee (LEMC) briefings

	<p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include advice to store owners by NSW SES South West Rocks Unit on any Flood Warnings to prepare in case of isolation.</p>
Property Protection	<p>Specific property protection measures:</p> <p>NSW SES will monitor rising flood waters and provide assistance for flood threatened properties where time and resources permit:</p> <ul style="list-style-type: none"> Property Protection generally not required in the South West Rocks sector. Sandbagging of some properties in Jerseyville may be required.
	<p>Assistance with property protection:</p> <p>Pre-deployment of Sand and Sandbags to:</p> <ul style="list-style-type: none"> South West Rocks - Landsborough Street car park Jerseyville – Fish Coop on South West Rocks Road
	<p>Protection of essential infrastructure:</p> <p>Nil required</p>
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 5.7m (3.75-3.97m at Smithtown gauge 206406)</p> <p>All roads in the Lower Macleay begin to flood isolating South West Rocks.</p> <p>Water over South West Rocks Road between Kinchela and Gladstone. Evacuations would need to be complete prior to this height.</p> <p>2. If height predicted to reach and/or exceed 8.55m (4.5m at Smithtown gauge 206406)</p> <p>Over ground inundation in all streets in Jerseyville and all rural properties in Rainbow Reach assumed to be flooded. These areas must be evacuated prior to roads being cut (5.7m).</p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties, including South West Rocks Public School and Tourist Park.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>

Evacuation Routes	Arthur Street, Mitchell Street, McIntyre Street to the Country Club Gordon Young Drive, Elizabeth Street. McIntyre Street to the Country Club. Stuarts Point Road to Pacific Highway to Kempsey or Macksville
Evacuation Route Closure	All evacuation routes flood at 5.70m Kempsey Gauge outside of South West Rocks.
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends. • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Generally evacuation is not required. • Assisted evacuation may be required for medical treatment • In major events evacuation will be into higher grounds in South West Rocks.
Evacuation Centres	<p>Evacuation Centre will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • South West Rocks Country Club - 2 Sportsmans Way, South West Rocks • Kempsey High School – Broughton Street, Kempsey • Melville High School – Nicholson Street, Kempsey • If Port Macquarie is to be used as an evacuation centre, liaison through the LEMC (Welfare Serviced Functional area) should occur.
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>Flood rescue will be conducted in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>Flood rescue resource will be deployed from South West Rocks Unit.</p>
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days. • This will be carried out by aviation drops to support the local supermarkets in South West Rocks (contact will be established by the South West Rocks Unit upon any Flood warnings). • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire Council 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	<p>Helicopter Landing Points:</p> <p>Suitable landing points are located at:</p> <ul style="list-style-type: none"> • South West Rocks Unit (S 30° 53.327' E 153° 1.749') • Sports Field Phillip Drive (S 30° 53.465' E 153° 2.902') • Jerseyville - Fish Co-op car park (S30° 55.436' E153° 2.902') <ul style="list-style-type: none"> ○ (Beware Wires on east side near road) • Stuarts Point Sporting Oval behind school (S30° 40.101' E 152° 59.507')
	<p>Airports:</p> <p>No airports available for this sector.</p>

Other	Flooding in this sector is subject to tidal influences. NSW SES Unit may become isolated in floods exceeding 1% AEP.
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8.2. SOUTH WEST ROCKS - SECTOR 8 MAP



9. HAT HEAD - SECTOR 9

9.1. HAT HEAD RESPONSE ARRANGEMENTS

Refer to Volume 2: Hazard and Risk in Kempsey Shire for more information about this Sector/Community.

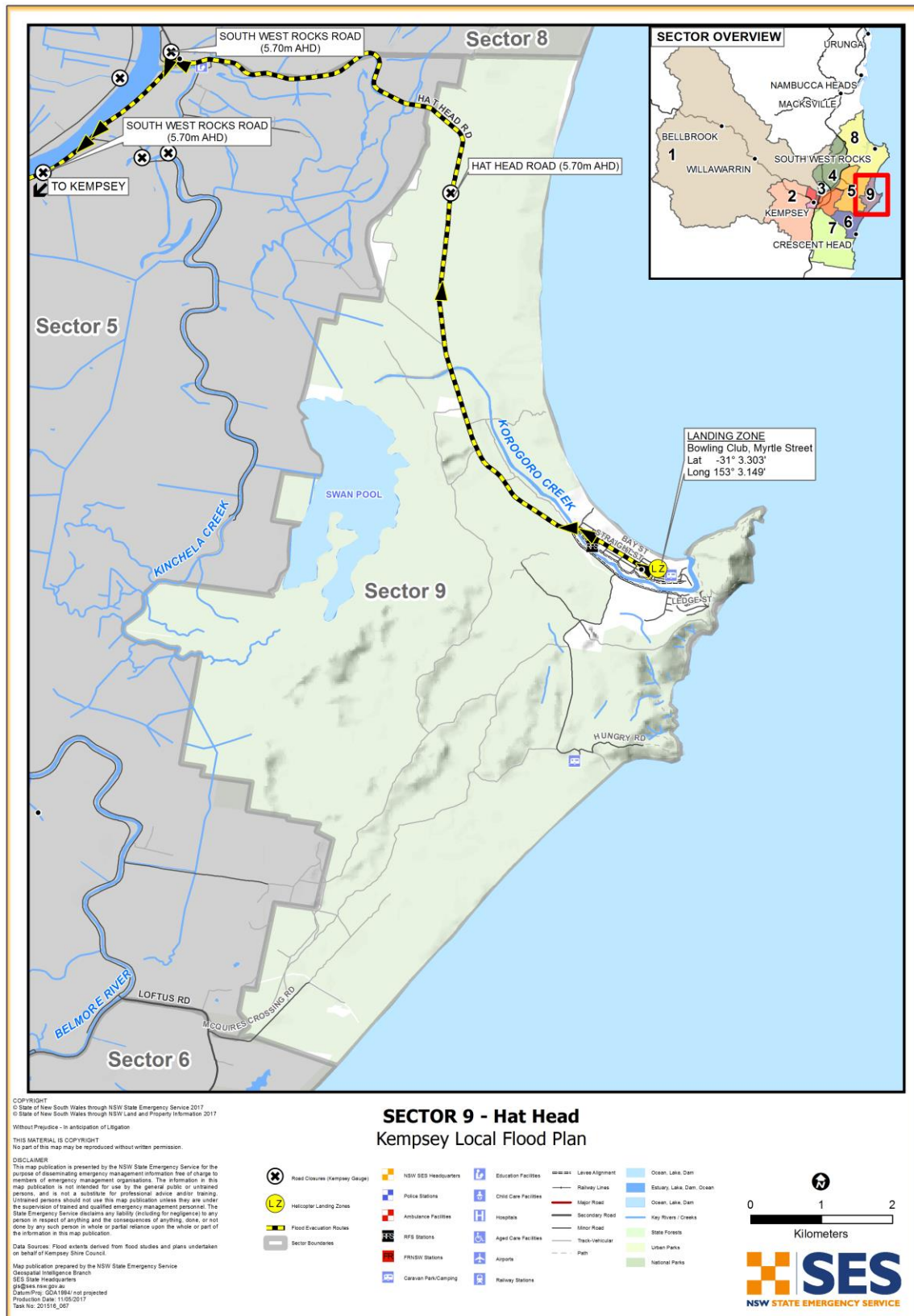
Sector Description	This sector covers the Hat Head area, including the national park. It extends along the coast, encompassing Hat Head National Park from Kinchela to McGuires Crossing.				
Hazard	Isolation, coastal inundation, and coastal erosion.				
Flood Affect Classification	High Flood Island				
At risk properties	309 (isolation) At least one at risk of inundation	Total number of properties within Sector/Community			309
Sector Control	<p>Control- The NSW SES Incident Controller will control operations in this sector.</p> <p>In larger events Incident control may be escalated, for example the NSW SES Kempsey Local Controller may become the Incident Controller and the Kempsey Unit Controller becoming a Division Commander etc.</p> <p>Command – NSW SES and other agencies remain in command of their own resources. Command operates vertically within an organisation.</p> <p>Coordination- The coordination of other organisations and resources to support an emergency management response will occur at the EOC where established. Operations command can assist in supporting and coordinating incident management teams as required.</p>				
Key Warning Gauge Name	Name	AWRC No.	Min (m)	Mod (m)	Maj (m)
	Georges Creek Gauge	206024	6.00	8.00	10.00
	Bellbrook Gauge	206019	6.50	10.50	13.50
	Kempsey Traffic Bridge Gauge	206402	4.50	5.70	6.60
General Strategy	<ul style="list-style-type: none">• Manage operations in response to predicted heights indicating likely consequences that pre-empt appropriate actions.• Issue of early warning of flood level impacts and potential isolation.• Evacuation of at risk population:<ul style="list-style-type: none">○ Self-Evacuation to friends/family outside the impact area.○ Establishment of an Assembly Area/Evacuations Centre in consultation with the Welfare Services Functional Area Coordinator.○ Medical evacuation may force an earlier response.• Establish resupply operations where isolation has continued for over 5 days.• Flood rescue where evacuation has failed, or where people have driven into floodwater.				

Key Risks / Consequences	<p>Isolation</p> <p>Hat Head can be isolated for up to several days by flooding over the road to Kinchela. There may be access to South West Rocks via 4wd along the beach if there is no storm surge.</p> <p>Inundation</p> <p>There is no serious problem of inundation within the town however severe oceanic conditions could erode the sand dunes and allow seawater entry.</p> <p>Coastal Inundation risks for Hat Head are detailed in Volume 2, but include utilities and a number of roads.</p> <p>Coastal Erosion risks for Hat Head are described in Volume 2, but include water supply and the surf club.</p>
Information and Warnings	<p>NSW SES Flood Bulletins will localise the consequences of the Bureau products on the sector. NSW SES Mid North Coast Region will issue timely, relevant and tailored information to the public in the following formats:</p> <ul style="list-style-type: none"> • NSW SES Bulletins <ul style="list-style-type: none"> ○ Flood Watch ○ Flood Warning ○ Equipment, Livestock and Aquaculture Warnings ○ Media Release such as– Isolation Warnings • Evacuation Warning • Evacuation Order • All Clear • Emergency Alert • Standard Emergency Warning Signal (SEWS) • Sequenced door knocking • Media briefing • Interagency Local Emergency Management Committee (LEMC) briefings <p>Bureau products, such as Flood Watches and Flood Warnings, will include NSW SES safety advice.</p> <p>Specific warning arrangements include:</p> <ul style="list-style-type: none"> • Contacting General Store by phone. • Door knocking with assistance from RFS
Property Protection	<p><i>Specific property protection measures:</i></p> <p>Nil required</p> <p><i>Assistance with property protection:</i></p> <p>Nil required.</p> <p><i>Protection of essential infrastructure:</i></p> <p>The Hat Head sewerage treatment works may fail in major events due to excessive water. Kempsey Shire Council will undertake pumping and may require assistance with access.</p>
Evacuation and/or Isolation Triggers	<p>The key heights based on predictions Kempsey Traffic Bridge (206402)</p> <p>1. If height predicted to reach and/or exceed 5.7m</p> <p>All roads in the Lower Macleay begin to flood, isolating Hat Head.</p> <p>Deploy property protection team to this sector prior to this height.</p> <p>2. If height predicted to reach and/or exceed 6.0m</p> <p>At this height all roads in the Lower Macleay have flooded and Hat Head is isolated, with any evacuation required to be complete by this height.</p>
Sequencing of evacuation	<p>Evacuation sequencing will be as per the triggers for identified at risk properties.</p> <p>Outside the identified sequenced evacuation areas, a number of residences and properties may need to be evacuated during periods of significant flooding. In most</p>

	<p>floods, the evacuation tasks will only involve a small number of people from impacted properties. These properties would be dealt with on a case by case basis in conjunction with NSW Police and the Welfare Services Functional Area Coordinator.</p> <p>Evacuations will be conducted incrementally as the flood height predictions become known and the impact extent established.</p> <p>Evacuations will be staged as follows.</p> <p>Stage 1:</p> <p>Evacuation of the elderly, sick and infirm as well as families with young children. Evacuation will be by way of road along higher ground to the nominated Assembly Area or Evacuation Centre.</p> <p>Stage 2:</p> <p>Evacuation of all persons not required for emergency operations. Evacuation will be by way of road along higher ground prior to roads being flooded.</p> <p>Stage 3:</p> <p>Full evacuation of the sector if required (including emergency services). Evacuation will be by way of road along higher ground.</p> <p>If access is impeded or blocked by water, flood boats and helicopters may be utilised for rescue dependent upon prevailing conditions.</p>
Evacuation Routes	Hat Head Road and South West Rocks Road to South West Rocks or Kempsey.
Evacuation Route Closure	Evacuation routes commence closing at 5.7m on the Kempsey Traffic Bridge gauge and are completely flooded by 6 metres
Method of Evacuation	<p>Evacuations should reflect the principles outlined in Evacuation Planning Handbook (1)</p> <p>Options include-</p> <ul style="list-style-type: none"> • Self-evacuation by private transport to the Evacuation Centre or family and friends. • Where resources permit, with assistance of NSW SES or emergency services to the Evacuation Centre. • Generally evacuation is not required. • Assisted evacuation may be required for medical treatment.
Evacuation Centre	<p>Evacuation Centres will be determined by the Welfare Services Functional Area Coordinator. The following facilities have been identified as suitable evacuation centres:</p> <ul style="list-style-type: none"> • Kempsey High School – Broughton Street, Kempsey • Melville High School – Nicholson Street, Kempsey • South West Rocks Country Club – 2 Sportsmans Way, South West Rocks <p><i>Generally in past events evacuations centres have not been opened in South West Rocks. Opening will need to be confirmed with Welfare Services.</i></p>
Large scale evacuations	<p>In a large or full scale evacuation evacuees will be moved to the Evacuation Centre in consultation with the Welfare Services Functional Area.</p> <p>NSW Police will be responsible for security of evacuated areas.</p>
Rescue	<p>Flood rescue resource will be deployed from Gladstone Unit and conducted in accordance with the responsibilities outlined in the Flood Emergency Sub Plan and flood rescue policy.</p> <p>In the event of isolation large scale evacuations would be required to be undertaken by air.</p>
Resupply	<ul style="list-style-type: none"> • Resupply operations are normally not required until isolation has continued for over 5 days or beach access is lost.

	<ul style="list-style-type: none"> • This will be carried out by aviation drops to support the local general Store stores in Straight Street Hat Head. • Table 2, in Volume 2 provides information about isolated communities in the Kempsey Shire Council 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	<p>Helicopter Landing Points:</p> <p>Suitable landing points are located at:</p> <p>Bowling Club Myrtle Street Hat Head (-S 31° 3.303' E 153° 3.149)</p> <p>(Safety arrangement will need to be put in place with Club prior)</p>
	<p>Airports:</p> <p>No airports available for this sector.</p>
Other	<p>All flood modelling conducted has assumed that Rowes Cut is functional. If in a large flood event the ocean spillway was not opened, the protection of Hat Head against the 1% AEP flood level.</p> <p>Rowes Cut is overgrown by vegetation and the ocean plug would need to be removed by Council during a flood event.</p> <p>The Hat Head sewage system works on a vacuum pump. When this fills with water from excessive rains the system can stop working.</p> <p>Prolonged failure of the sewage system may require the evacuation of Hat Head (326 people however this number substantially increases during holiday periods).</p>

9.2. HAT HEAD SECTOR 9 MAP



KEMPSEY SHIRE NSW SES CARAVAN PARK ARRANGEMENTS


**Chapter 4 of Volume 3 (NSW SES Response Arrangements for Kempsey
Shire) of the Kempsey Shire Local Flood Plan**

Last Update: May 2017

AUTHORISATION

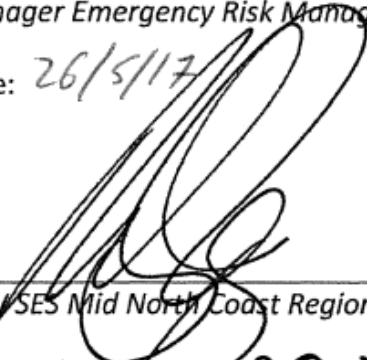
The Kempsey Shire NSW SES Caravan Park Arrangements have been prepared by the NSW State Emergency Service (NSW SES) as part of a comprehensive planning process.

Approved



Manager Emergency Risk Management
Date: 26/5/17

Approved



NSW SES Mid North Coast Region Controller
Date: 22.5.2017

Tabled at LEMC

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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. Central Caravan Park
- b. Sundowner Caravan Park
- c. Kempsey Tourist Village
- d. Tall Timbers Caravan Park
- e. Trial Bay Caravan Park
- f. Hat Head Holiday Park
- g. Horseshoe Bay Caravan Park
- h. South West Rocks Tourist Park
- i. Crescent Head Caravan Park
- j. Stuarts Point Holiday Park

1.1.2 For more information on individual caravan parks see Table 1 and Table 2 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 Kempsey Shire Local Controller will ensure that the managers of caravan parks are advised of Flood Information (described in Volume 1 of the Kempsey Shire 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. 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 three hours.
 - c. Advise the NSW SES Kempsey Shire 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 Kempsey Shire Local Controller when the evacuation of the caravan park has been completed.
- f. Provide the NSW SES Kempsey Shire 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 Kempsey Shire 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 and/or Isolation from Flooding.

Name	Address/Location description	Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Evacuation centre	Notes
Central Caravan Park	63 Belgrave Street Kempsey	2	40	Inside Levee (Low Flood Island)	Belgrave Street to West Kempsey. Kemp Street to Sea Street	Approx. 6.74mAHD Kempsey gauge	Kempsey Showground, Sea St Kempsey	Kempsey High School – Broughton St, Kempsey Melville High School – Nicholson St, Kempsey	Inundation begins 6.70m Levee overtopping
Sundowner Caravan Park	161 Smith Street Kempsey	2	30	Inside Levee (Low Flood Island)	Belgrave Street to West Kempsey. Kemp Street to Sea Street	Approx. 6.74mAHD Kempsey gauge	Kempsey Showground, Sea St Kempsey	Kempsey High School – Broughton St, Kempsey Melville High School – Nicholson St, Kempsey	Inundation begins 6.70m Levee overtopping
Kempsey Tourist Village	325 Pacific Highway South Kempsey	2	100	High Flood Island Town Isolated	-	-	-	Kempsey High School – Broughton St, Kempsey Melville High School – Nicholson St, Kempsey	Isolation occurs around 8.42 metres on the Kempsey gauge

Name	Address/Location description	Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Evacuation centre	Notes
Tall Timbers Caravan Park	425 Pacific Highway South Kempsey	2	80	High Flood Island Town Isolated	-	-	-	Kempsey High School – Broughton St, Kempsey Melville High School – Nicholson St, Kempsey	Isolation occurs around 8.42 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays
Trial Bay	Access Road Arakoon	8	116	High Flood Island Town Isolated	n/a	n/a	n/a	SWR Anglican Hall – 15 McIntyre St, South West Rocks	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays
Hat Head Holiday Park	Straight Street Hat Head	9	80	High Flood Island Town Isolated		Approx. 5.70mAHD Kempsey gauge		SWR Anglican Hall – 15 McIntyre St, South West Rocks	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays

Name	Address/Location description	Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Evacuation centre	Notes
Horseshoe Bay Caravan Park	1 Livingston Street South West Rocks	8	83	High Flood Island Town Isolated	n/a	n/a	n/a	SWR Anglican Hall – 15 McIntyre St, South West Rocks	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays
South West Rocks Tourist Park	89 Gordon Young Drive South West Rocks	8	188 with additional 42 sites over 2 weeks during Christmas	High Flood Island Town Isolated	Gordon Young Drive to Gregory Street			SWR Anglican Hall – 15 McIntyre St, South West Rocks	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays
Crescent Head Holiday Park	Pacific Street Crescent Head	6	222	High Flood Island Town Isolated		Not linked to gauge		Crescent Head Primary School	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays

Name	Address/Location description	Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwelling relocation location	Evacuation centre	Notes
Stuarts Point Holiday Park	Marine Parade Stuarts Point	8	148	High Flood Island Town Isolated				SWR Anglican Hall – 15 McIntyre St, South West Rocks	Not gauged Peak season during Christmas and Easter school holidays
Big4 Sunshine South West Rocks Holiday Park	161 Phillip Drive, South West Rocks	8	125	High Flood Island Town Isolated				SWR Anglican Hall – 15 McIntyre St, South West Rocks	Isolation occurs around 5.70 metres on the Kempsey gauge Peak season during Christmas and Easter school holidays

Table 2: Caravan Parks at risk from Coastal Erosion and/or Coastal Inundation.

Name	Address/Location description	Town/Sector	Number of sites	Risk	Evacuation route	Evacuation route closure	Moveable dwellings relocation location	Evacuation centre	Notes
Stuarts Point Holiday Park	Marine Parade Stuarts Point	8	148	Coastal inundation	-	-	-	-	Peak season during Christmas and Easter school holidays Not a “hot spot” location
Crescent Head Holiday Park	Pacific Street Crescent Head	6	222	Coastal erosion	-	-	-	-	Peak season during Christmas and Easter school holidays Not a “hot spot” location

LIST OF REFERENCES

1. **NSW Government.** *Local Government (Manufactured Home Estates, Caravan Parks, Camping Grounds and Moveable Dwellings) Regulation 2005 Part 3 Division 3 Subdivision 7 Clause 123.* 2005.