

**Berrigan Shire**

# Local Flood Emergency Sub Plan



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# **BERRIGAN SHIRE FLOOD EMERGENCY SUB PLAN**

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

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

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

**8 November 2023  
Version 3.0**

# AUTHORISATION

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

## Authorised

Signature:



\_\_\_\_\_  
*NSW SES Local/Unit Commander*

Print Name:

Shane Hargrave  
\_\_\_\_\_

Date:

08/11/2023  
\_\_\_\_\_

## Endorsed

Signature:



\_\_\_\_\_  
*Chair, Local Emergency Management Committee*

Print Name:

Michelle Koopman  
\_\_\_\_\_

Date:

08/11/2023  
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## VERSION HISTORY

Version Number	Description	Date
1.0	Berrigan Shire Local Flood Plan	June 2009
2.0	Berrigan Shire Flood Emergency Sub Plan	March 2017

## AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

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

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

Amendment Number	Description	Updated by	Date

## DISTRIBUTION LIST

Available for general use and distribution on the NSW State Emergency Service website  
[www.ses.nsw.gov.au](http://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 Berrigan Shire Local Government Area (LGA).

## 1.2 AUTHORITY

- 1.2.1 This plan is written and issued under the authority of the [State Emergency and Rescue Management Act 1989 \(NSW\)](#) ('SERM Act'), the [State Emergency Service Act 1989 \(NSW\)](#) ('SES Act') and the NSW State Emergency Management Plan (EMPLAN).
- 1.2.2 This plan is a sub plan to the Berrigan Shire Local Emergency Management Plan (EMPLAN) and is endorsed by the Local Emergency Management Committee (LEMC).

## 1.3 ACTIVATION

- 1.3.1 This plan does not require activation. The arrangements set out in this plan are always active.
- 1.3.2 The Berrigan Shire Emergency Management Plan (EMPLAN) is active at all times in anticipation of the need to coordinate support and resources requested by combat agencies, including the NSW State Emergency Service (NSW SES).

## 1.4 SCOPE

- 1.4.1 The area covered by this plan is the Berrigan Shire LGA. The Berrigan Shire LGA and its principal towns, villages, rivers and creeks are shown in Appendix A.
- 1.4.2 The Council area is in the NSW SES Southern Zone and for emergency management purposes, is part of the Riverina Murray Emergency Management Region.
- 1.4.3 The plan sets out the Berrigan Shire level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Berrigan Shire LGA.
- 1.4.4 In this plan a flood is defined as a relatively high-water level which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves (including tsunami) overtopping coastline defences.
- 1.4.5 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 Berrigan Shire are detailed within this plan, Appendix B and Appendix C.

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

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

## **1.8 PLAN MAINTENANCE AND REVIEW**

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

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



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

## 1.9 SUPPLEMENTARY DOCUMENTS

- 1.9.1 Supplementary and supporting material of the Local Flood Emergency Sub Plan is maintained on the NSW SES website 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 Berrigan Shire LGA.
- 2.1.2 Declared dams in or upstream of the «LGA\_Name» Local Government Area.

Dam Name	Owner	High Risk Dam
Hume Dam	Water NSW – Murray Darling Basin Authority	No

## 3 PREVENTION/ MITIGATION

### 3.1 INTRODUCTION

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

### 3.2 LAND USE PLANNING

- 3.2.1 **Strategy:** Effective land use planning is a key focus for minimising the impacts of flooding. NSW SES will work with land use planning and consent authorities to

inform and influence the consideration of the risks arising from flood, storm and tsunami, to prevent the creation of intolerable impacts of these hazards on the community.

**Actions:**

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

### **3.3 FLOODPLAIN RISK MANAGEMENT**

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

**Actions:**

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

## **4 PREPARATION**

### **4.1 INTRODUCTION**

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

### **4.2 FLOOD EMERGENCY PLANNING**

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

**Actions:**

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

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

### **4.3 FLOOD INTELLIGENCE SYSTEMS**

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

**Actions:**

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

#### 4.4 DEVELOPMENT OF WARNING SYSTEMS

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

**Actions:**

- a. All levels of government work in partnership to develop and maintain flood warning infrastructure.
- b. NSW SES maintains a list of the requirements for flood warnings for flood gauges in NSW (including flood classifications, warning times required and key statistics) and can be found in the supplementary document to the NSW State Flood Plan (see Section 1.9). Gauges of relevance within the Berrigan Shire LGA are also listed in Volume 3 of this plan.
- c. NSW SES will recommend new warning services and changes to warning alert levels for gauges to the NSW and ACT Flood Warning Consultative Committee.
- d. The State Government, in partnership with Local Government, is responsible for developing and maintaining flash flood warning systems for local catchments where required.
- e. Dam Owners will provide Dam Emergency Plans (where required) and consult with NSW SES on alert levels and messaging. Alert level definitions are listed in Dam Emergency Plans.
- f. NSW SES maintains a dedicated dam failure hotline and procedures to ensure priority dissemination of dam failure warnings.
- g. NSW SES develops and maintains warning and flood information products by:
  - Utilising flood intelligence data.
  - Developing warning and flood information products.
  - Continuously reviewing warning and flood information products.
  - Consulting with affected communities, key stakeholders, Dam Safety NSW and the NSW and ACT Flood Warning Consultative Committee and maintains Operational Readiness.
  - Participating in the development of public information and warning systems.
- h. Gauge owners adequately maintain flood warning gauges and systems, including those identified in the 'Service Level Specification' maintained by the

Bureau of Meteorology (Bureau) and those identified in the 'Provision and Requirements for Flood Warning in New South Wales' maintained by NSW SES.

## **4.5 BRIEFING, TRAINING AND EXERCISING**

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

**Actions:**

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

## **4.6 COMMUNITY RESILIENCE TO FLOODING**

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

**Actions:**

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

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

**Actions:**

- a. Partners with and engage communities to understand and manage the risks associated with floods, including providing business continuity guidance (NSW SES Business FloodSafe), family preparedness (NSW SES Home FloodSafe) and other engagement strategies.
- b. NSW SES will collate, assess and disseminate flood information to the community.
- c. Collaborate with individuals, businesses, government agencies and communities when developing flood intelligence, preparedness and response information.
- d. Plan for floods collaboratively with communities through community and stakeholder participation and engagement.
- e. Collaborate with community sector and recognise the needs of individuals within communities who have an increased susceptibility during floods.

## 5 RESPONSE

### 5.1 INTRODUCTION

5.1.1 Flood response operations will begin:

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

### 5.2 INCIDENT MANAGEMENT ARRANGEMENTS

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

**Actions:**

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

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

**Actions:**

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

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

**Actions:**

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

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

**Actions:**

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

### 5.3 USE OF INFORMATION AND COLLECTION OF INTELLIGENCE

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

**Actions:**

- a. Information relating to the consequences of flooding, response strategies, situational awareness and operational updates will be distributed by NSW SES to supporting emergency services and functional areas listed under this Plan.
- b. All supporting emergency services and functional areas and Council will accurately record and report information relevant to their activities and any real time flood information (including road closure information) to the NSW SES Incident Controller. This may be in the form of a combined Emergency Operations Centre (EOC) report, or direct from agencies where an EOC has not been established.
- c. NSW SES may establish and operate a Joint Intelligence Unit to coordinate the collection, collation, interpretation, mapping, actioning and dissemination of information.
- d. Reconnaissance, mapping, damage assessments, intelligence validation and post flood evaluation will be coordinated by NSW SES. This may occur post impact and continue into the recovery phase.
- e. NSW SES may request Engineering to assist with the gathering of flood intelligence including (not limited to) maximum flood extents, peak flood

heights, recording major flood damage at key high velocity locations and preparation of After-Flood Report.

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

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

## 5.4 PROVISION OF INFORMATION AND WARNINGS TO THE COMMUNITY

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

### **Actions:**

- a. The Bureau issues public weather and flood warning products before and during a flood. These may include:
  - Severe Thunderstorm Warnings – Detailed - issued for all capital cities and surrounding areas when individual severe thunderstorms are within range of the capital city radars.
  - Severe Thunderstorm Warnings - Broad-based - issued for the entire Australian State or territories affected highlighting broad areas where severe storms may occur within the next 3 hours.
  - Severe Weather Warnings with reference to heavy rainfall and/or storm surge.
  - Flood Watches.
  - Flood Warnings.
- b. Dam Owners will utilise the Dam Emergency Plan to provide warnings and information to NSW SES and communities (where appropriate).
- c. NSW SES Incident Controllers will issue the following NSW SES Flood Warnings aligning to the Australian Warning System:
  - Advice
  - Watch and Act
  - Emergency Warning
- d. NSW SES liaises with the Bureau to discuss the development of flood warnings as required.
- e. NSW SES provides alerts and deliver flood information to affected communities using a combination of public information.
- f. NSW SES may request supporting agencies redistribute NSW SES alerts and information, including through the provision of doorknocking teams.
- g. Road closure information will be provided to the community through the following agencies/methods:
  - Local Government Council websites.

- Transport for NSW 'Live Traffic' website: [www.livetraffic.com](http://www.livetraffic.com) or 'Transport Info Line': 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. Berrigan Shire Council will coordinate the closure and reopening of council managed roads once inspections have been carried out by the relevant authority.
- b. Transport for NSW will coordinate the closure and reopening of the state road network.
- c. NSW Police Force may close and re-open roads but will normally only do so (if the Berrigan Shire Council or Transport for NSW have not already acted and if public safety requires such action).
- d. NSW SES will assist with erecting road closure signs and barriers when time and resources permit.

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

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



## 5.7 PROTECTION OF ESSENTIAL SERVICES

5.7.1 Local and Region EMPLAN's contain infrastructure inventories.

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

### **Actions:**

- a. 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 SEOCAN 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 SEOCAN 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.
- 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 exists.
  - There is no further likelihood of rescuing people.

- Resupply is no longer required (resupply operations may occur concurrently with the recovery phase).
- Response to fire and hazardous material incidents have concluded (not including subsequent clean-up of contaminated sites).
- All affected areas have had an 'All Clear' 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 Berrigan Shire Council representatives.
- b. NSW SES will conduct After Action Reviews, at the conclusion of response operations, which will involve all stakeholders. Findings will be shared and incorporated into improved disaster resilience planning.
- c. NSW SES will provide information and data throughout the emergency response to inform community recovery. A report will be developed at the request of the SERCON at the conclusion of the response within an area. Should a response summary report be required it will include the following:
  - The emergency action plan in place at conclusion of the response emphasising any continuing activities including community meetings/ engagement activities.
  - Resources allocated to the emergency response and associated exit strategies.
  - Details of any areas or situations with potential to re-escalate the emergency.
  - A recommendation for the conclusion of NSW SES as lead agency to transition to NSW Reconstruction Authority as the lead agency for Recovery.
  - Any actions that are incomplete or outstanding.
  - Damage Assessment Data and Information obtained throughout the response phase which will further support the long-term recovery of communities.
- d. NSW SES will undertake/coordinate a comprehensive review of intelligence and plans following significant flood events.

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

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

## 6 RECOVERY OPERATIONS

### 6.1 INTRODUCTION

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

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

### 6.2 NSW SES RECOVERY ROLE

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

6.2.2 **Actions:**

- a. NSW SES will provide representation to Recovery Committees as required and may have an ongoing role in the Recovery phase.
- b. NSW SES roles on Recovery Committees may include providing information about any continuing response, guidance on mitigation strategies and general advice and assistance to the committee as a subject matter specialist and or expert.
- c. NSW SES will provide information to NSW Reconstruction Authority to support applications to Treasury for Natural Disaster Relief and Recovery Arrangements.
- d. NSW SES, in conjunction with a Recovery Committee, will provide a service to support the information needs of a community immediately following a flood.
- e. NSW SES and where required supporting agencies will assist with clean-up operations after floods, where possible when resources and personnel permit.
- f. NSW SES may coordinate immediate relief in collaboration with SEOCAN and SERCON.

## 7 ABBREVIATIONS

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

## 8 GLOSSARY

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

Readers should refer to EMPLAN Annex 9 – Definitions.

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

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



# 9 Appendix A – Map of Berrigan Shire 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 tsunami and controls response operations. NSW SES roles and responsibilities in relation to floods are outlined in the <a href="#">NSW State Flood Plan</a> .

AGENCY	RESPONSIBILITIES
Agriculture and Animal Services Functional Area	The roles and responsibilities for Agriculture and Animal Services are outlined in the Agriculture and Animal Services Supporting Plan and NSW State Flood Plan.
Australian Government Bureau of Meteorology	The roles and responsibilities for the Australian Government Bureau of Meteorology are outlined in the NSW State Flood Plan.
Berrigan Shire Council	<p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>• Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented.</li> <li>• Develop and implement floodplain risk management plans in accordance with the NSW Government’s Flood Prone Land Policy and the Floodplain Risk Management Manual.</li> <li>• Provide levee studies, flood studies and floodplain management studies to NSW SES.</li> <li>• Maintain council-owned flood warning networks and flood mitigation works.</li> <li>• Participate in NSW SES-led flood emergency planning meetings, to assist in the preparation of Flood Sub Plans.</li> <li>• Maintain a plant and equipment resource list for the council area.</li> <li>• Contribute to community engagement activities.</li> </ul> <p><b>Response</b></p> <ul style="list-style-type: none"> <li>• Subject to the availability of council resources, assist NSW SES with flood operations including: <ul style="list-style-type: none"> <li>– Traffic management on council managed roads.</li> <li>– Provision of assistance to NSW SES (plant, equipment and personnel where able and requested).</li> <li>– Property protection tasks including sandbagging.</li> <li>– Assist with the removal of caravans from caravan parks.</li> <li>– Warning and/or evacuation of residents and other people in flood liable areas.</li> <li>– Provision of back-up radio communications.</li> </ul> </li> </ul>

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

AGENCY	RESPONSIBILITIES
	<p>bar of the caravans are not removed and are maintained in proper working order).</p> <ul style="list-style-type: none"> <li>• Ensure that occupiers are informed of Flood Information. At this time, occupiers should be advised to: <ul style="list-style-type: none"> <li>– Ensure that they have spare batteries for their radios.</li> <li>– Listen to a local radio station for updated flood information.</li> <li>– Prepare for evacuation and movable dwelling (cabins) relocation.</li> </ul> </li> <li>• Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs.</li> <li>• Coordinate the evacuation of people and the relocation of movable dwellings when floods are rising and their return when flood waters have subsided. Movable dwellings will be relocated back to the caravan park(s) by owners or by vehicles and drivers arranged by the park managers.</li> <li>• Secure any movable dwellings that are not able to be relocated to prevent floatation.</li> <li>• Inform NSW SES of the progress of evacuation and/or movable dwellings relocation operations and of any need for assistance in the conduct of these tasks.</li> </ul>
<b>Childcare Centres and Preschools</b>	<ul style="list-style-type: none"> <li>• When notified of possible flooding or isolation, childcare centres and preschools should. <ul style="list-style-type: none"> <li>– Liaise with NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures.</li> <li>– Assist with coordinating the evacuation of preschools and childcare centres.</li> </ul> </li> </ul>
<b>Dams Safety NSW</b>	The roles and responsibilities for Dams Safety NSW (formerly NSW Dam Safety Committee) are outlined in the NSW State Flood Plan.
<b>Department of Defence</b>	Arrangements for Defence Assistance to the Civil Community are detailed within the State EMPLAN (section 448).
<b>Energy and Utilities Services Functional Area</b>	<p>The roles and responsibilities for Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN).</p> <p>Roles and responsibilities in addition to the Supporting Plan are:</p> <ul style="list-style-type: none"> <li>• Assist NSW SES with identification of infrastructure at risk of flood damage where resources are available.</li> <li>• Facilitate local utility service distribution providers (electricity, gas, water, wastewater) to:</li> </ul>

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

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

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

## 11 Appendix C – Community Specific Roles and Responsibilities

<b>Community Members</b>	<p><b>Preparedness</b></p> <ul style="list-style-type: none"> <li>• Understand the potential risk and impact of flooding.</li> <li>• Prepare homes and property to reduce the impact of flooding.</li> <li>• Understand warnings and other triggers for action and the safest actions to take in a flood.</li> <li>• Households, institutions and businesses develop plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours.</li> <li>• Have an emergency kit.</li> <li>• Be involved in local emergency planning processes.</li> </ul> <p><b>Recovery</b></p> <ul style="list-style-type: none"> <li>• Assist with community clean-up if required and able to do so.</li> <li>• Participate in After Action Reviews if required.</li> </ul>
<b>Private Companies or other Organisations</b>	<ul style="list-style-type: none"> <li>• Assist with the provision of;             <ul style="list-style-type: none"> <li>- Front end loader. Ag Trade Machinery Finley, Lot 129 Tocumwal Road Newell Highway, Finley 2713 NSW. Ph: (03) 5883 4560.</li> </ul> </li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• Tocumwal NSW SES Facebook Page.</li> </ul>
<b>Cross-border Assistance Arrangement</b>	<ul style="list-style-type: none"> <li>• A local cross-border mutual assistance arrangement exists in which the NSW SES Berrigan Shire and the Victorian State Emergency Service (VIC SES) will deploy resources to support each other.</li> <li>• Legislative responsibility for emergency management of floods in Victoria lies with the local council. Flood response arrangements for Victorian towns (Barmah, Cobram and Yarrawonga) and properties on the Murray River, adjacent to the Berrigan Shire, are outlined in the Moira Shire Municipal Emergency Management Plan.</li> <li>• Any request for out of area assistance by either State response agency will be made in accordance with New South Wales and Victorian emergency management arrangements and legislation.</li> <li>• Tocumwal NSW SES Unit works hand in hand with Cobram Unit VIC SES.</li> </ul>



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# HAZARD AND RISK IN BERRIGAN SHIRE

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

Last Update: June 2009

## ANNEX A - THE FLOOD THREAT

### Landforms and River Systems

27. The Murray River rises in the Australian Alps and extends across New South Wales, forming the State border with Victoria. It flows into South Australia, entering the ocean at Goolwa. The Murray River is affected by significant flows from the Mitta Mitta, Kiewa, Goulburn, Ovens and King Rivers originating in Victoria, and in the lower reaches by the Murrumbidgee, Lachlan and Darling Rivers. The length and complexities of the river are such that floods of record will vary along its 2,500km course.
28. The Murray River has been highly regulated to create a reliable source of water for irrigation, agricultural, industrial and domestic needs. To regulate the river system, River Murray Water operates four major storages, sixteen weirs, five barrages and numerous other smaller structures. While these control measures for irrigation have a capacity to mitigate some flood waters, the complex inter-relationships of the drainage basin are such that the possibility of major flood remains relevant, particularly when very large storm systems develop over south-eastern Australia.

### Characteristics of Flooding

29. The flooding on the river within Berrigan Shire is best defined within two reaches:
30. **Yarrawonga to Tocumwal** - Along this reach, inundation of the flat land adjacent to the river is not uncommon although floodwaters are usually confined to a few kilometres in width, causing only localised nuisance flooding for several days during major events. Floodwaters along the first 30 kilometres are naturally confined. From about Barooga downstream they are confined by a combination of high ground (often localised sandhills) and levees, the biggest of which is the Barooga levee. Near Barooga, an old section of river bed (known as Barooga Cowl) may be affected by local runoff flooding. It is possible that during higher level flooding for this to also develop as a flood runner. The township of Tocumwal is protected by a levee which, in common with others maintained by the Berrigan Council, is constructed to a height of 1.2 metres above the 1975 flood level. Confinement of floodwaters along this reach has increased their velocity and probably accounts for scouring of banks in the area.
31. **Downstream of Tocumwal** Levees on both sides of the river have resulted in considerable changes to natural flood patterns by confining flood flows, raising flood stages and increasing flood flows in this reach. On the NSW side, major floods are contained by a series of sandhills and levees until floodwaters leave the river through offtakes leading to the Native Dog and Bullatale Creeks. Floodwaters on the Native Dog, Bullatale and Tuppal Creek floodplains are again confined by levee systems but still cover extensive areas to shallow depths.

32. Average travel times of flood peaks from Albury:
  - a. Albury to Yarrawonga is 2.7 days (historically ranging from 1 to 8 days);
  - b. Albury to Tocumwal is 4.5 days (historically ranging from 1 to 10 days);
  - c. Albury to Echuca is 11.1 days (historically ranging from 7 to 20 days).
33. It must be noted that the above travel times are indicative only and can vary significantly, particularly during extreme flood events.

### **Storage Dams**

34. The Hume Dam and Yarrawonga Weir are part of a comprehensive control system on the Murray River and are operated by the Murray-Darling Basin Commission (MDBC). They were designed and built to regulate irrigation downstream and provide only limited flood mitigation.
35. **Yarrawonga Weir** is upstream of Tocumwal and located near the towns of Yarrawonga in Victoria, and Mulwala in New South Wales. The Weir is located 538 km from the source of the River Murray, and 1992 km from the mouth. It is used to hold and divert water to irrigation districts in NSW and Victoria.
36. The Weir, built in 1939 is comprised of two groups of gates: 8 on a southern structure and 2 on a northern structure. The 8 gates on the southern side are used for all flows. The 2 on the northern side are only used during floods larger than 60 000 ML/day to stop flows along the downstream side of the weir embankment that could cause scour. The lake formed by Yarrawonga Weir, Lake Mulwala, has an FSL of 124.90m AHD and a capacity of 118,000 megalitres.
37. **Hume Dam** is on the Murray River downstream of the junction of the Murray and Mitta Mitta Rivers approximately 16 kilometres east of Albury in the Albury City Council area. The dam's primary purpose is for irrigation in the Murray Valley but it is also used for industrial and town water supplies, stock and domestic supplies, hydro-power generation, riparian uses and to sustain the riverine environment. Hume is drawn down in the summer and autumn of every year.
38. Hume Dam consists of a concrete gravity section in the main river channel extended by a short embankment section on the northern side and a long embankment section (No. 1 Bank) on the southern side. The concrete gravity section includes 29 vertical lift spillway gates, four irrigation outlets and a hydro-electrical power station. There are two embankment saddle dams to the south of the main embankment, known as the No. 2 Bank and No. 3 Bank.

39. The capacity of the Hume Reservoir<sup>1</sup> is 3,038,000 megalitres at an FSL of 192m AHD and a surface area of almost 202 square kilometres. The total catchment area of the dam is 15,540 square kilometres.
40. Hume Dam is a prescribed dam under the NSW Dams Safety Act, and is currently ranked as a high risk dam.
41. **Dartmouth Dam**, an earth and rockfill dam on the Mitta Mitta River in Victoria, is located about 110km upstream of Hume Dam, and is primarily used as reserve storage to supplement Hume Dam in dry years. Dartmouth has a less regular annual cycle of operation than Hume, and its levels tend to reflect longer cycles of wet and dry climate.
42. The capacity of the Dartmouth Storage<sup>2</sup> is 4,000,000 megalitres at FSL. It has a 700m wide, 180m high dam wall and a reservoir surface area of almost 6400 hectares. The total catchment area of the dam is 3560 square kilometres.
43. A sunny day failure or flood-induced failure of Dartmouth Dam would consequently cause failure of the Hume Dam.

## Weather Systems and Flooding

44. The annual median rainfall over the Murray River Valley generally shows an east to west gradation closely related to the overall westward decrease in elevation. In the east, upstream of Tocumwal, the median values decrease from more than 1600mm to 446 mm per year at Tocumwal. Rainfall, in general, is greater over the more elevated boundaries of the valley while areas of relatively low rainfall are found in the vicinity of the main watercourse.
45. Over 60 percent of the annual rainfall over the valley occurs in the months from May to October inclusive. On average June is the wettest month with a mean rainfall of 44.0mm (as measured at Tocumwal Airport<sup>3</sup>).
46. Flooding in Berrigan Shire usually results from one of the following three weather mechanisms:
  - **Well developed low-pressure troughs.** The most usual set of meteorological conditions causing flooding is a series of well-developed inland troughs associated with southern depressions crossing the council areas from west to east. These can be associated with thunderstorms and very heavy rain. Sequences of such troughs can produce high rainfall totals over a period of weeks, usually in the winter months.

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<sup>1</sup> MDBC (2006) River Murray Water: Hume Dam ([http://www.mdbc.gov.au/rmw/river\\_murray\\_system/hume\\_reservoir](http://www.mdbc.gov.au/rmw/river_murray_system/hume_reservoir)) Updated 02/02/2006. Accessed 23/05/06.

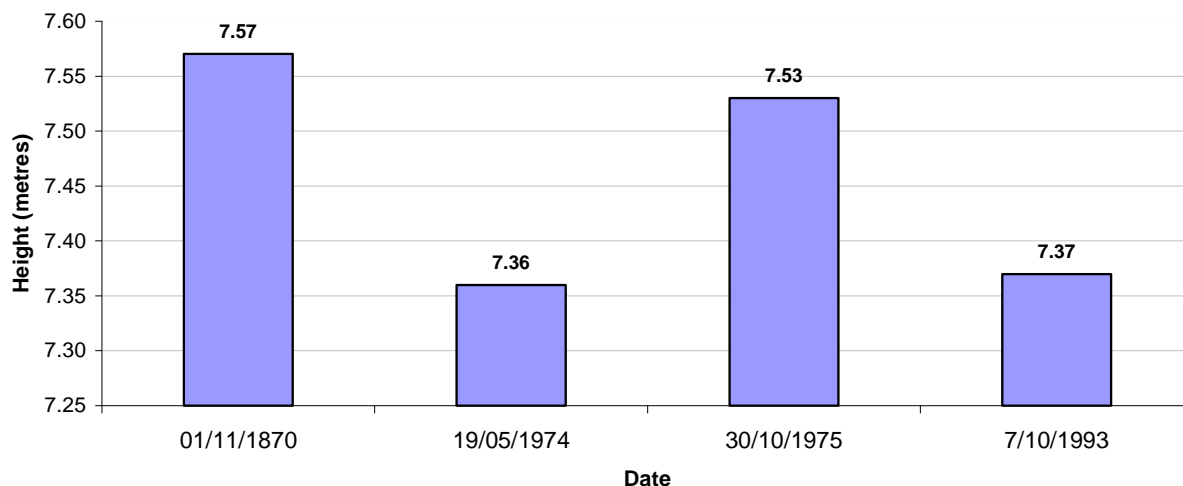
<sup>2</sup> MDBC (2006) River Murray Water: Hume Dam ([http://www.mdbc.gov.au/rmw/river\\_murray\\_system/hume\\_reservoir](http://www.mdbc.gov.au/rmw/river_murray_system/hume_reservoir)) Updated 02/02/2006. Accessed 23/05/06.

<sup>3</sup> Australian Government Bureau of Meteorology (2008) Climate Averages ([www.bom.gov.au](http://www.bom.gov.au)) Updated 20/11/2008. Accessed 19/11/2008.

- **East coast low-pressure systems.** These systems develop off the coast of NSW and Victoria, usually during the cooler months of the year. They direct moist winds onto the coast and across the Great Dividing Range, often producing very heavy rain. Usually, but not exclusively, they move in a generally southerly direction and can generate floods in the upper reaches of westward flowing streams. East coast lows off the Victorian coast can produce substantial flooding in a number of the tributaries of the Murray River, exacerbating flood conditions on the NSW side of the border.
  - **Sequences of cold fronts.** Fronts crossing the State from west to east can produce flooding in the Murray River catchment during 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 a few weeks may result in flooding. The major floods on the Murray River in 1870, 1917, and 1975 resulted from such systems. On occasion, these fronts may also be associated with low pressure systems at the tail end of the frontal system.
47. Major floods usually arise from large rain depressions originating over the Southern Ocean and moving into the Murray Valley from the south-west. Heavy rainfall over a period of a few days may occur over a major portion of the Murray River Valley from time to time. These falls are frequently associated with deep active depressions which, after developing over the eastern end of the Great Australian Bight, move eastward over the valley. These troughs rarely produce high daily rainfalls but can bring substantial falls over longer periods. It is usually the sequence of fronts rather than individual ones that cause the flooding.
48. The Murray River within this reach can be categorised as having a warm temperate climate. Rainfall in this region has a predominant winter/spring pattern and as a result, under natural conditions, the Murray River demonstrates distinct seasonal pulses in the amount of water it carries.

## **Flood History**

49. Since records commence in 1870, only four major floods (7.3m or greater) have been recorded on the Tocumwal gauge. These are shown in Figure A-1:



**Figure A-1: Floods above the major flood level (7.30 metres) at the Tocumwal gauge (409202)**

50. Some past major floods along the Murray River are briefly described in Table A-1 below:

DATE	CONSEQUENCES
1867	Little data exists on this flood, but it ranks the fourth highest (in terms of level) on record at Albury and the second highest at Echuca.
1870	This is the highest flood on record throughout the Murray River and the significant modifications carried out to the floodplain this century would result in considerably higher levels were a flood equal to the 1870 event to occur again today. This flood reached a peak of 9.56 metres at the Yarrawonga (downstream) gauge, slightly less than the estimated 1% AEP event at this gauge (9.83 metres). The peak height at the Tocumwal gauge was only 7.55 metres which is the flood of record at this location but is less than even the estimated 2% AEP flood level (7.66 metres) and much less than the calculated 1% AEP flood at Tocumwal (8.05 metres).
1916	The highest flood on record on the Goulburn and Campaspe rivers resulted in the third highest at Echuca and sixth highest at Swan Hill. No significant flooding resulted in the Murray outside this reach.
1917	The level reached at the Albury gauge was within 30mm of the 1870 reading and this is the second highest flood of record down to and including Tocumwal. The levee extending from Cobram to Barmah breached and was subsequently repaired. If this flood was to occur again today

DATE	CONSEQUENCES
	<p>without a break of the levee, a much higher flood level at, say, Tocumwal would result. This flood reached 9.0 metres on the Yarrawonga (downstream) gauge, slightly higher than the estimated 2% AEP flood at this gauge (8.96 metres).</p> <p>NOTE: The relatively low flood peak during this event resulted from breaches to the levees on the Victorian side of the river and does not truly indicate the magnitude of this flood.</p>
1931	This was the sixth highest flood at Albury and the fourth highest at Euston and Mildura.
1956	This was the fifth highest flood at Yarrawonga, Tocumwal and Echuca.
1974	The two floods in this year (May and October) generally ranked between fourth and sixth along the Murray River.
1975	This was the third highest flood between Albury and Tocumwal.

**Table A-1: Historical Floods on the Murray River**

### Indicative Flood Travel Times

51. Table A-2 below provides an indication of flood travel times along the Murray River based on historical flood events:

**Table A-2: Indicative Flood Travel Times on the Murray River**

FROM	TO	TIME TAKEN (HOURS)	CUMULATIVE TIME (HOURS)
Hume Dam	Albury	6	6
Albury	Corowa	24	30
Corowa	Yarrawonga	48	78
Yarrawonga	Tocumwal	48	126
Cobram	Tocumwal	13	n/a

52. It must be stressed that the above travel times are indicative only and can vary significantly, particularly during extreme flood events.

## Flood Mitigation Systems

53. The **Tocumwal Town Levee** runs along the Foreshore Reserve and consists of an earth bank approximately 2m high. After a short section of concrete levee wall, the earthen bank continues to the Tocumwal Recreation Reserve and Pony Club. The levee height corresponds to a freeboard of 1200mm on 1975 flood levels. The design height of the levee corresponds to 8.14m on the Tocumwal gauge and the crest height (RL 112.51m) is approximately 8.7m on the Tocumwal gauge, bearing in mind that the gauge has 8m as the highest reading possible.
54. The **Barooga Station Levee** is the largest levee in the Berrigan Shire (up to 4m in height)

## Extreme Flooding

55. The worst floods recorded at the Tocumwal gauge since European settlement should not be considered to be the most serious that will ever occur. The 1%AEP (or one chance in 100 years event) at Tocumwal is estimated to be 8.14 metres (RL 111.89m). The flood of record in 1870 (7.55m), peaked at 0.5m below the estimated 1%AEP flood height and 0.11 metres below the 2% AEP (one chance in 50 years event), estimated to be 7.66m. The most recent major flood recorded on the Tocumwal gauge on 7 October 1993 reached a peak of only 7.37 metres, well short of even the 2%AEP (7.66m).
56. When genuinely severe floods occur in the Berrigan Shire, they are likely to reach much greater heights than was true of previous recorded floods. Moreover, they are generally faster to rise, slower to recede and more dangerous in terms of both depth and velocity of flood water than any previously known events. It must be realised that should a Probable Maximum Flood (PMF) or Hume Dam failure situation occur, the extent of the area of inundation would be much greater than that occurring in historical floods.



## ANNEX B - EFFECTS OF FLOODING ON THE COMMUNITY

### Community Profile

Census Description	Berrigan LGA	Barooga	Berrigan	Finley	Tocumwal
Total Persons	7994	1453	898	2053	1861
Total Dwellings	3133	532	386	824	800
Total persons aged 65 years and over	1739	275	240	472	562
Total persons aged below 15 years	1556	316	158	415	233
Total persons with a need for assistance (profound / severe disability)	405	42	57	160	118
Total persons of indigenous origin	103	14	18	49	15
Total persons using Internet	1543	294	146	353	359
Single parent families	270	45	26	91	73
Persons living alone	851	115	144	266	233
Total persons who do not speak English well	13	0	0	0	5
Total persons who lived at a different address 5 years ago	2926	601	295	734	808
Households without vehicles	190	30	37	65	56
Total persons residing in caravans, cabins or houseboats	110	17	3	3	66
Mean household size	2	2	2	2	2

**Table B-1: Census of Housing and Population data (2006)**

### General

27. Berrigan Shire is located on the NSW side of the Murray River downstream of the Yarrawonga Weir and upstream of the junction of the Murray River with the Edward River. The Berrigan Shire encompasses an area of 2067 square kilometres

and has a population of approximately 8,000 with a distribution that is mostly in urban centres.

28. It is significant that 21.7 percent of the population is aged above 65 years. Elderly people are often frail and unable to respond quickly without assistance. Some of them may also be socially isolated, resulting in them being unaware of evacuation warnings or unable to decide on a course of action. Areas with particularly high proportions of elderly residents should be targeted for doorknocking and the provision of transport.

29. A large proportion of the floodplain in the Shire is protected to varying degrees by levees (including many privately constructed levees). The potential consequences of levee breach are significant with large areas of unprotected land vulnerable to flooding. Such breaches have occurred in the past.

30. Levee construction, upgrading, maintenance, repair and surveillance are therefore important facets of flood response operations throughout the Berrigan Shire.

31. A large number of rural properties throughout the Shire are at threat of flooding. Although generally protected by private levee systems, many may become isolated for long periods of time. This could result in a significant number of medical evacuations or resupply operations (food/medical supplies) by flood boat or high clearance vehicles.

### **Specific Risk Areas**

#### **Tocumwal (2006 pop: 1861)**

32. A large proportion of the floodplain is protected to varying degrees of levees (including many privately constructed levees). The potential consequences of levee breach are significant with large areas of unprotected land and Tocumwal vulnerable to flooding. Such breaches have occurred in the past. Levee construction, upgrading, maintenance, repair and surveillance are therefore important facets of flood response operations throughout the Berrigan Shire.

#### **Finley (2006 pop: 2053)**

33. Detailed flood information is not available for Finley. There is the occasional issue with local drainage that results in inconvenience but no property damage.

#### **Barooga (2006 pop: 1453)**

34. Detailed flood information is not available for Barooga. The town is located on the high side of the Murray River on a sand hill area. There is the occasional issue with local drainage that results in inconvenience.

#### **Berrigan (2006 pop: 898)**

35. Detailed flood information is not available for Berrigan. There is the occasional issue with local drainage that results largely in inconvenience.

## **Camping Reserves**

36. Campers at the Forest Camping Area and Murray River beaches must be evacuated before water reaches 5.36m on the Tocumwal gauge.

## **Effects of flooding in rural areas**

### **Rural Areas**

1. Land ownership within the area is such that most properties occupy significant areas of flood-free land operated in conjunction with flood liable land. However, the land adjacent to the river is often the richest and most productive. For this reason, the effects of flooding on rural properties in the Berrigan Shire can be significant.

During minor flooding (6.4 metres on the Tocumwal gauge) the main problems in the Berrigan Shire are minor road closures and loss of access and inundation of low lying paddocks. Once major flood levels are reached (7.3 metres on the Tocumwal gauge), inundation of significant areas of land occurs on properties on the NSW side of the river.

2. In general, flooding can have the following detrimental effects on farms along the Murray River:
  - a. Damage to crops
  - b. Death or retardation of pasture growth - particularly for floods with a duration of more than eight days
  - c. Livestock deaths of small or young animals such as sheep and calves
  - d. Loss of access to grazing and cropping areas due to in-stream flows through anabranches and lagoons
  - e. Intrusion of noxious weeds
  - f. Deposition of debris
  - g. Damage to infrastructure such as fences, sheds, bridging, etc
  - h. Disruption to livestock grazing and productivity - particularly to intensive operations
  - i. Erosion hazard - particularly for cultivated land
  - j. Extreme difficulty in improving pastures by conventional cultivation and seeding techniques.
  - k. Damage to hay either pre- or post-cutting
1. The impact of inundation for farmers along the Murray River is dependent on a number of factors which include:

- i. The duration of inundation
  - ii. The type of pastures inundated (improved versus natural)
  - iii. The time of year (impacts increase progressively as the season matures)
  - iv. Frequency and timing of previous inundation events
3. The effect on grazing/feed loss depends on the time of year in which the flood occurs. The estimated number of weeks of grazing/feed loss by month of flood occurrence for an inundation period of 20 days (as occurred in the 1975 flood) is tabulated in Table B-2:

**Table B-2: Estimated grazing and feed loss by month.**

Month of Flood Occurrence	Estimated Weeks Grazing/Feed Loss
July	8
August	10
September	15
October	22
November	18

4. A large number of rural properties throughout the Shire are at threat of flooding. Although generally protected by private levee systems, many may become isolated for long periods of time. This could result in a significant number of medical evacuations or resupply operations (food/medical supplies) by flood boat, high clearance vehicles or helicopter.

### **Effects of flooding on transport and infrastructure**

5. Murray River flooding is usually of sufficient duration and extent to affect a wide range of transport and communications systems including road, rail, air and water traffic as well as telecommunications services. Of those, road transport is the most vulnerable to interruption by flooding.

#### **Road Transport**

6. A number of roads within the Council area are affected by flooding as follows:
- a. Roads closed by high rainfall and local flooding:
    - Lower River Road (Tocumwal to Mathoura).
  - b. Roads affected by the Murray River:
    - Lower River Road to Mathoura.

- Taylors Road.
  - Goulburn Valley Highway (Tocumwal-Shepparton Road)
  - Cobram to Barooga Road between the Murray River and Barooga.
- c. Roads affected by the Tuppal Creek:
- The Tocumwal to Deniliquin Road.

### **Bridges**

7. The following bridges are designed to be trafficable up to a 1% AEP flood.
- Bullanginya Bridge over the Bullanginya Lagoon at Barooga
  - Peoples Bridge over the floodway at Barooga
  - Barooga Bridge over the Murray
  - Hillson Bridge over the Murray at Tocumwal

### **Air Transport**

8. Access to the Tocumwal aerodrome remains in a 1:100 year event. Tocumwal Aerodrome is capable of handling planes to 5,700kg without concessions.

### **Telecommunications**

9. There is uncertainty as to the height at which telecommunication services will be lost to Tocumwal and Cobram.

### **Electricity**

10. Barooga is supplied from Mulwala Zone substation via a 22,000 Volt distribution line. This line has a relatively good reliability history. An alternate 22,000 volt supply is also available from Tocumwal or Berrigan.

Tocumwal is supplied from Finley Zone substation via a 22,000 Volt distribution line. This line has a relatively good reliability history. An alternate 22,000 volt supply is also available from Mulwala or Berrigan.

There is uncertainty as to the height at which electricity services would be lost to Barooga or Tocumwal; however it is most unlikely there would be any significant widespread outages even with a major flood of the Murray River. (Pers. Comm. Country Energy Manager Planning & Customer Connections-South Western 2009)

### **Water Supply**

11. Water supply is not expected to be interrupted in flooding up to a 1% AEP due to the protection of the town levee system and its elevated position in both Tocumwal and Barooga. The storages contain sufficient for 24 hours at peak demand or 4-5 days at restricted supply.

### **Sewerage**

12. Sewage services throughout town are assured due to protection by the town levee. There are smaller independent systems that lie outside the levee and these can be shut down as inundation occurs and the areas will likely be evacuated.

### **Health**

13. Tocumwal Hospital is located within the area protected by the town levee and will not be affected unless the levee fails or is overtopped. In this case, essential services to the whole area will likely be severely damaged or destroyed. Restoration of essential services may take several weeks or longer.

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# **SES RESPONSE ARRANGEMENTS FOR BERRIGAN SHIRE**

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

Last Update: June 2009

## ANNEX C - GAUGES MONITORED BY THE BERRIGAN SES LOCAL HEADQUARTERS

Gauge Name	Type	AWRC No	Stream	Flood Classification			Reading Arrangements
				Min	Mod	Maj	
Jingellic*‡	Telemeter	401201 A	Upper Murray	4.0	5.5	7.0	Warnings issued in conjunction with BoM Victoria Office.
Hume Weir	Manual	401027	Murray	-	-	-	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Doctor's Point (South Albury)	Telemeter	409017	Murray	-	-	-	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Albury*‡	Telemeter	409001	Murray	4.3	4.9	5.5	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Corowa*‡	Telemeter	409002	Murray	3.8	5.9	8.6	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Yarrowonga Weir downstream (Mulwala)* ‡	Manual	409025	Murray	6.4	6.7	7.8	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Tocumwal*‡	Telemeter	409202 A	Murray	6.4	6.7	7.3	03 5874 2006
Edward River Offtake		574026	Murray				02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Echuca*‡	Telemeter	409200	Murray	93.5	93.9	94.4	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Goulburn River at Shepparton*	Automatic Telemeter	081044	Goulburn River	9.5	10.7	11.0	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)
Goulburn River at McCoys Bridge*	Automatic Telemeter	580000	Goulburn River	9	10	10.20	02 9296 1587 or 02 9296 1548 (BoM Flood Desk)

### Notes:

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



## ANNEX D - DISSEMINATION OF SES FLOOD BULLETINS

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

### Television Stations:

Station	Location	Phone Number
Prime	Shepparton	(03) 5831 3677
WINTV	Shepparton Offices	(03) 5823 3699
Southern Cross Broadcasting	Melbourne	(03) 9243 2100
ABCTV	Melbourne	13 9994

### Radio Stations:

Station	Location	Phone Number	Frequency	Modulation
ABC Goulburn Murray	Shepparton	(03) 5820 4011 Shepparton (02) 6049 2011 Wodonga	97.7	FM
3SR	Shepparton	(03) 5821 1260	95.3	FM
Sun FM	Shepparton	(03) 5831 3969	96.9	FM
ABC Regional	Shepparton	(03) 5820 4011	97.7	FM
ABC Riverina	Wagga Wagga	(02) 6923 4811	675	AM
2QN	Deniliquin	(03) 5881 1811	1521	AM

### Newspapers:

Name	Phone Numbers	Location
Border Mail	(02) 6024 0555	Albury
Pastoral Times	(03) 5881 2322	Deniliquin
Southern Riverina News	(03) 5883 1033	Finley
Cobram Courier	(03) 5872 1144	Cobram
Herald Sun	(03) 9292 2000	Melbourne

### Other Agencies:

DWE Regional Offices: <ul style="list-style-type: none"> <li>• Albury</li> <li>• Deniliquin</li> </ul> NSW RTA Offices: <ul style="list-style-type: none"> <li>▪ Wagga Wagga</li> </ul> VicRoads Office at Benalla	Victoria SES: <ul style="list-style-type: none"> <li>• North East Regional Office - Benalla</li> <li>• North West Regional Office - Swan Hill</li> </ul> Berrigan Shire Council offices at Berrigan.
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State Water – Hume Dam Goulburn Murray Water	NRMA, Albury Office
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## ANNEX E - TEMPLATE EVACUATION WARNING MESSAGE FOR [ENTER NAME OF AREA]

**Evacuation Warning for** [ ]

**Date/Time of Issue:** [ ]

**Authorised By:** [ ]

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

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

To prepare for evacuation, you should:

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

If evacuation is necessary:

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

## **ANNEX F - EVACUATION ARRANGEMENTS FOR THE BERRIGAN SHIRE AREA**

### **BACKGROUND**

1. Floods of a magnitude of up to and including the 1% AEP flood event (8.14 m at the Tocumwal gauge) will necessitate evacuations of Tocumwal as the levee protecting the town will be overtopped. The levee height corresponds to a freeboard of 1200mm on 1975 flood levels. The design height of the levee corresponds to 8.14m on the Tocumwal gauge and the crest height is approximately 8.7m on the Tocumwal gauge. Evacuees in these events will be accommodated within the Berrigan Shire at the designated evacuation centre or through personal arrangements with family and friends.
2. During extreme floods, evacuations will involve moderate numbers of people having to move or be moved to safety in relatively short periods of time.
3. This Annex provides a summary of the flood evacuation plan for the Berrigan Shire Council area.

### **ARRANGEMENTS**

#### **Control**

1. Evacuations will be controlled by the Berrigan SES Local Controller.
2. Should the evacuation operation escalate beyond the capabilities of local resources, control will be handed over to the Murray SES Region Controller.

#### **Operational Sectors**

3. For the purpose of managing evacuations during severe floods, the Berrigan Shire Council area may be divided into three operational sectors.
  - a. Tocumwal
  - b. Barooga
  - c. Rural Areas

## Decision to Evacuate

4. The responsibility for issuing any general evacuation order during flooding rests with the Berrigan SES Local Controller who exercises his/her authority in accordance with Section 22(1) of The State Emergency Service Act 1989. However, the decision to evacuate will usually be made after consultation with the Local Emergency Operations Controller and the Murray SES Region Controller.
5. Refer to Part 1.5 for agency responsibilities.

## Decision Making Parameters

6. Evacuations will be required if any of the following are likely:

**Failure of Essential Services.** The failure of public utilities such as sewerage, power, telephones and water pose a significant health risk to residents on the floodplain or in flood affected areas. In the event of any or all of these systems failing or potentially failing, the need for evacuations will be discussed with the members of the LEMC.

**Flooding affecting properties.** Evacuations will be conducted when it is likely properties will be flooded.

**Isolation of properties.** People who are not prepared for isolation, or unsuited due to medical conditions etc, should be encouraged to evacuate.

**Dam Failure.** A Dam Failure Warning will require the evacuation of all people at risk.

7. For each sector where flood evacuations are required, there are four critical parameters that have to be considered in the decision making process. These parameters are tabulated within each Sector Annex and are based on:
  - The time required to mobilise for a response operation
  - The time required to ensure all residents are warned of the need to evacuate
  - The time required to move all vehicles out of the area
  - The minimum time likely to be available before flood water closes road evacuation routes

## Conduct

8. Evacuations will be conducted by SES, NSW Police, NSW Fire Brigade, Ambulance Service of NSW, VRA, NSW Rural Fire Service and sporting / service club personnel in four phases:
  - a. Phase 1 – Warning.

- b. Phase 2 – Withdrawal.
- c. Phase 3 – Shelter.
- d. Phase 4 – Return.

## **Phase 1 – Warning**

- 9. Evacuation warnings.** On the receipt of flood warnings predicting peak heights of **5.36 metres** and above at the Tocumwal Gauge; the Berrigan SES Local Controller will consult as necessary to determine the level of the threat and the need to consider evacuations. As soon as possible after the decision to evacuate is made, the Berrigan SES Local Controller will issue evacuation warnings to the ‘at risk’ residents, indicating what people should do before evacuating and when actually doing so.

### **10. Evacuation triggers.**

The first evacuation warnings issued in the Berrigan Shire Council are when the Tocumwal gauge is expected to reach the following heights:

- 5.36m on the Tocumwal gauge - Campers at the Forest Camping Area and Murray River beaches must be evacuated.
- 6.4m on the Tocumwal gauge – Bushlands on the Murray
- 8.7m on the Tocumwal gauge – Crest height of town levee

- 11. Content of Evacuation Warnings.** A template guide to the content of evacuation warning messages is at Annexes E and F. The Murray SES Region Headquarters also maintains prewritten flood bulletin messages. These are disseminated via:

- a. The radio and TV stations listed in Annex D.
- b. Door-knocks by emergency service personnel.
- c. Public address systems from emergency service vehicles.
- d. Telephone.
- e. Two-way radio.
- f. SES Flood Bulletins.

### **12. Time**

The table below details the amount of time required to evacuate the entire at-risk population of Tocumwal depending upon doorknocking resources available.

<b>Number of Doorknocking Teams</b>	<b>Total Evacuation Time (hours)</b>
1	71.83
5	16.50
10	11.59
15	8.56
20	7.30
25	6.54
30	5.53
35	5.17
40	4.90
50	4.52

**Table F-1 Time required to complete evacuation of Tocumwal. Assumes 800 properties to be evacuated, 0.98 vehicles per house, 6 hours to decide and mobilise, 12 hours available for evacuation, warning acceptance factor (WAF) equal to 1 hour, warning lag factor (WLF) equal to 1 hour and a maximum movement of 600 vehicles per hour.**

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

## **Phase 2 – Withdrawal**

14. **Introduction.** Withdrawal involves the actual removal of the community/individuals from dangerous or potentially dangerous areas to safer areas.
15. **Transport.** Evacuees are to be encouraged to move using their own transport where possible. The Berrigan SES Local Controller will arrange transport for those people without their own vehicles
16. **Traffic Control.** When large scale evacuations are likely, evacuation routes are to be secured by the NSW Police and kept clear by the following means:
- g. Denying access to all traffic except for emergency vehicles (including buses and private vehicles being used for the purposes of evacuation).
  - h. Keeping one lane clear at all times for use by emergency vehicles.

- i. Positioning a tow truck or similar vehicle at appropriate entry points, road blocks and exit points along the evacuation routes.
17. **Large-scale evacuations.** When large scale evacuations are likely, the Berrigan SES Local Controller will liaise with the Murray SES Region Headquarters and request the deployment of helicopters and trains.
18. **Management of Evacuees' Pets.** Evacuees with their own pets will be encouraged to take their companion animals with them as they evacuate. Animals must be appropriately contained in a pet carry cage or on a leash. Companion animals will be collected from their owners at evacuation centres and taken to facilities to be arranged by NSW Department of Primary Industries. Due to safety restrictions, it may not be possible to allow companion animals to accompany their owners when transported via aircraft or flood boats. In these cases provision will be made for animals to be picked up as people are evacuated. Arrangements will also be made to pick-up animals that are left behind. Assistance animals (guide dogs etc.) will remain in the care of their owners throughout the evacuation. This includes the transport and access into evacuation centres.
19. **Doorknocking.** Field teams conducting doorknocks will record and report back the following information back to the Operations Centre:
- j. Addresses and locations of houses doorknocked and/or evacuated.
  - k. The number of occupants.
  - l. Details of support required (such as transport, medical evacuation, assistance to secure house and/or property and raise or move belongings).
  - m. Details of residents who refuse to comply with the evacuation order.
20. Key steps in planning for a doorknock are:
- n. Define the flood-affected areas that require doorknocking.
  - o. Using a map of the affected area define street segments of 10-15 houses and assign a doorknocking team to each segment. Teams can be assigned one or more street segments.
  - p. Assume that it will take a doorknocking team of two people up to five minutes per property to doorknock. Rural properties will take a longer period of time.
  - q. In each flood-affected area, generally plan to doorknock the lowest lying areas first and then work up to higher areas.
  - r. Typed warning messages should be given to each doorknocking team for distribution to property occupants.



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

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

23. **Collection centres (Safe Havens).**

1. For Tocumwal the following centres have been identified as suitable collection points for evacuees:

- Barooga Sports Club
- Tocumwal Aerodrome
- Tocumwal State School.
- Sacred Heart Catholic School

24. **Helicopter Landing Points.** Suitable landing points are located at:

- Tocumwal Recreation Reserve
- Tocumwal Aerodrome
- Barooga Recreation Reserve

### **Phase 3 – Shelter**

25. **Evacuation Centres.** Evacuation centres provide people affected by disaster with immediate basic needs such as food, clothing, blankets, accommodation and personal support, as well as financial and other immediate assistance. Evacuees will be advised to go to or be taken to the nearest accessible evacuation centre, which may initially be established at the direction of the Berrigan SES Local Controller but managed as soon as possible by the Department of Community Services. Any or all of the following sites might be used:

- Barooga Sports Club
- Tocumwal Aerodrome
- Tocumwal State School.
- Sacred Heart Catholic School

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

- Registered;
- Medically checked, if necessary; and

- Provided with their immediate welfare needs.

#### 27. **Registration.**

- The NSW Police will ensure that all evacuees are registered on arrival at the designated evacuation centres and details of the registrations are to be sent to the NSW Police Deniliquin Local Area Command Headquarters by the quickest means available.
- The Red Cross will assist the NSW Police by providing Disaster Victim Registration (DVR) Teams at evacuation centres.

28. **Transport and storage.** Transport and storage of furniture from flood-threatened properties will be arranged as time and resources permit, but may not be possible on a large scale in severe floods. People will be encouraged to store belongings in elevated areas within the buildings and take any essential/important belongings with them when evacuating. In the event of an imminent dam failure, people should not waste time raising belongings if they have not already done so.

### **Phase 4 – Return**

29. Once it is considered safe to do so, the Berrigan SES Local Controller will authorise the return of evacuees to their normal or alternative place of residence. This decision will be made in consultation with appropriate officers in regard to matters such as the electrical safety of buildings.
30. The return will be controlled by the Berrigan SES Local Controller and may be conducted, at his/her request, by DoCS.

### **Administration and Logistics**

31. **Transport and storage.** People will be encouraged to store belongings in elevated areas within buildings and take any essential/important belongings with them when evacuating. In the event of an imminent dam failure, people should not waste time raising belongings if they have not already done so.
32. **Support provided at evacuation centres.** The expected duration of the evacuation will dictate the need for and level of facilities and support at the evacuation centres. If evacuations are expected to be of a short duration, evacuees may be provided with short-term accommodation at the centres. However, if they are expected to last for longer than 24 hours, evacuees will be encouraged to go to alternative accommodation or stay with friends where possible. Alternatively, accommodation will be arranged for them in hotels, motels or by billeting.
33. **Animal shelter compounds.** Animal shelter compounds will be set up for the domestic pets and companion animals of evacuees. These facilities will be operated by NSW Department of Primary Industries (Agriculture).

## **Control Arrangements**

34. **Control.** Small-scale evacuations will be controlled by the Berrigan SES Local Controller. Should the evacuations operations escalate beyond the capabilities of local resources control may be handed over to the Murray SES Region Controller.

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

### General

27. The caravan parks listed in the table below are flood liable:

Name and Address	Total Sites	Inundation begins at	Peak Occupancy	Time required to evacuate	Description of consequences
Bushlands on the Murray Holiday Park; Barooga Rd, Tocumwal	64 sites	7.0m at Tocumwal gauge	200 people		Access is cut at 6.4m

Note: Summer/Autumn is the busiest time of year for Caravan Parks in the Berrigan Shire.

### Advising Procedures

28. Caravan Park proprietors will ensure that the owners and occupiers of caravans are:

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

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

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

- Provide the Manager with a key; in a sealed envelope; to the van.
- Provide a contact address and telephone number.
- Inform the Manager if a vehicle will be required to relocate the van during flood time.
- Leave any mobile van in a condition allowing it to be towed in an emergency (i.e.: tyres inflated, jacks wound up, personal effects secured and annexes and lines for water, sewer, electricity and gas readily detachable).

- c. Informed when a flood is rising. At this time, occupiers will be advised to:
- Ensure that they have spare batteries for their radios.
  - Listen to a local radio station for updated flood information.
  - Prepare for evacuation and van relocation.

29. The Berrigan SES Local Controller will ensure that the Managers of caravan parks are advised of flood warnings and the details of any evacuation order.

### **Evacuation of Occupants and Relocation of Vans**

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

31. When an evacuation order is given:

- a. Occupiers of non-movable vans should:

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

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

- Tocumwal Pony Club grounds (Crown Land)

32. Caravan Park Managers will:

- a. Ensure that their caravan park is capable of being evacuated within **24 hours**.

- b. Advise the Berrigan SES Local Controller of:

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

- c. Check that no people remain in non-removable vans that are likely to be inundated.
- d. Inform the Berrigan SES Local Controller when the evacuation of the caravan park has been completed.
- e. Provide the Berrigan SES Local Controller with a register of people that have been evacuated.

### **Return of Occupants and Vans**

- 33. The Berrigan SES Local Controller, using Council resources as necessary, will advise when it is safe for the caravan parks to be re-occupied.
- 34. Vans will be towed back to the caravan park(s) by van owners or by vehicles and drivers arranged by the park Managers. Again, Council and SES personnel will assist if available.

# ANNEX H - DETAILS OF THE DAM-FAILURE WARNING AND EVACUATION SYSTEM FOR HUME DAM

## Background

27. Hume Dam is located on the Murray River, downstream of its junction with the Mitta Mitta River, approximately 16 kilometres east of Albury. It is operated by State Water (NSW) and River Murray Water (Victoria) on behalf of the Murray Darling Basin Commission (MDBC). For information on specifications of the dam refer to Annex A of this plan and the Hume Dam Safety Emergency Plan (DSEP).
28. Dartmouth Dam is located upstream of Hume Dam and impounds the waters of the Mitta Mitta River about 24 km from the township of Mitta Mitta in north eastern Victoria. It is operated by River Murray Water on behalf of the MDBC. It is the largest capacity dam in Victoria and the highest structure of its kind in Australia. When full, the dam stores 4,000,000 megalitres of high quality water from the surrounding alpine areas of Victoria.
29. There are three major possible causes of Hume Dam failure;
  - a. Failure due to extreme flood levels overtopping the embankments.
  - b. Flood failure consequent to the failure of Dartmouth Dam.
  - c. Failure due to a rapidly deteriorating structural deficiency such as may be induced by internal erosion or by an extreme earthquake. (This is the so-called “Sunny Day” failure, i.e. not induced by an inflow flood).
30. Although the dam is currently in good condition, it is recognised that an unsafe or emergency condition could occur at any time due to extreme natural events.
31. Recent and progressive upgrades that have been undertaken by State Water and the Murray Darling Basin Commission mean that Hume Dam can now safely pass a Dam Crest Flood (previously known as the Imminent Failure Flood)<sup>4</sup>. Prior to these upgrades, Hume Dam was capable of passing as little as 60% of the PMF or as much as 80% of the PMF<sup>5</sup>.

## Aim

32. This Annex describes the arrangements for the failure of Hume Dam and should be read in conjunction with Annexes E to G.

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<sup>4</sup> URS (2008) Draft Floodplain Risk Management Study Corowa Shire.

<sup>5</sup> DWR (1992) Hume Dam Dambreak Flood Analysis. NSW Department of Water Resources.

## Consequences of Failure

33. A cascade failure would result in catastrophic flooding downstream of Hume Dam – in such an event the entire Murray River Floodplain will require evacuation.
34. Approximately 3000 people are at risk in the Berrigan Shire in a Hume Dam failure scenario (not associated with a cascade failure). Approximately 532 dwellings in the village of Barooga and 800 dwellings in the town of Tocumwal could be inundated by a failure of Hume Dam as well as hundreds of businesses and commercial premises. Rural properties located along the Murray River between these urban areas will also be inundated.
35. It should be noted that a failure of Hume Dam resulting from extreme rainfall would be preceded by flooding many times more destructive than the 1870 flood of record. Consequently vast areas downstream of Hume Dam would already have been inundated and residents evacuated.
36. Severe flooding would also likely damage power supply facilities in the area resulting in loss of power, put telephone facilities out of action, and cut off evacuation routes.
37. In all failure scenarios, extreme velocities and depths are likely to be experienced resulting in the destruction of private property and public infrastructure.
38. Flow times between failure and the impact upon urban areas along the Murray River is short. It is estimated that travel times from the start of the breach at the dam to the arrival of the peak of the dam-break flood would be approximately 2 hours and 40 minutes to Albury Airport and 6 hours and 50 minutes to the Howlong Road Bridge. It would take significantly less time (30 minutes to Albury Airport and three hours to Howlong Road Bridge) for the start of the dam-break flood wave to reach these locations. The following table details the approximate dam break flood travel times:

**Table H-1: Dam Failure Flood Travel Times**

<b>LOCATION</b>	<b>START OF DAM BREAK FLOOD WAVE</b>	<b>PEAK OF DAM BREAK FLOOD WAVE</b>
Albury Airport	30 minutes	2 hours, 40 minutes
Doctors Point	50 minutes	3 hours, 10 minutes
Albury Railway Bridge	1 hour	3 hours, 20 minutes
Lincoln Causeway	1 hour	3 hours, 20 minutes
Howlong Road Bridge	3 hours	6 hours, 50 minutes
Corowa Road Bridge	4 hours, 40 minutes	15 hours, 30 minutes
Yarrowonga (Mulwala) Weir	Unknown	Unknown
Tocumwal Railway Bridge	Unknown	Unknown



39. Note that these travel times are only one component of the lead-up time (and therefore the warning time) before flooding commences. Other components include:
  - a. Rainfall duration, flood travel times upstream of the dam and time to fill the storage (for flooding cases).
  - b. Dartmouth Dam failure time and travel time from Dartmouth Dam to Hume Dam (approximately 3.5 hours) for the case of 'cascade failure' of both dams.
  - c. Lag time between the occurrence of an earthquake and the start of a consequential dam failure.
40. For all modes of failure, actual breach development times longer than one hour may give a greater time between 'start of dam-break flood wave' and 'peak of dam-break flood wave' and a correspondingly lesser rate of rise of flood waters.

### **Dam Break Flood Levels**

41. The downstream effects of a Hume Dam failure event may vary considerably. Levels and extent of inundation, rates of rise and flood wave travel times will depend on a number of factors including:
  - a. Pre-existing flood conditions.
  - b. Dam storage levels.
  - c. The cause of failure (e.g. flood or earthquake).
  - d. The actual mode of failure.
  - e. Actions taken at the dam to control releases and to contain damage.
42. The worst case scenario considered is the failure of Dartmouth Dam on the Mitta Mitta River followed by failure of Hume Dam located downstream of the junction of the Mitta Mitta and Murray rivers. The flood wave could take about three and a half hours to travel from Dartmouth Dam to the upstream reaches of Lake Hume.
43. It may become necessary during an emergency or an extreme flood for Hume Dam operators to lower the storage level to decrease seepage and/or loading on the structure or to minimise the impact of any failure. The maximum discharge from the dam at Full Supply Level (FSL) through the spillway is 590,000 megalitres per day. (Note: releases of 220,000 megalitres per day would result in peak heights of approximately 5.8 metres at the Albury gauge and may overtop the Albury levee). For further detailed information refer to the Hume Dam Safety Emergency Plan 2003 (DSEP).

## Operation and Procedures

44. **Flood Operation**<sup>6</sup> – The operation of the storage is controlled from the River Murray Water office in Canberra. During flooding events, the dam will be continuously manned. The RMW Duty Officer in Canberra and the Duty Officer at Hume Dam are in regular contact with each other.
45. **Monitoring procedures** – Dam levels are monitored by River Murray Water in Canberra and State Water at the dam by:
- Rainfall gauges upstream of the Hume Dam are monitored on a daily basis and more frequently as required during flood events. River Murray Water will use this data in hydrological models to predict expected dam level rises.
  - The principal storage level indicator is a recorder and data logger located on a pier of Bethanga Bridge. The data logger is interrogated by telephone. The storage water level is also recorded continuously on an automatic recorder in the dam office. If the storage behaviour on the recorder looks suspect, the storage level reading should be visually checked on the dam wall gauge.
  - Manual readings of the gauge boards at the dam will be taken for dam levels above FSL.
46. **Notification Procedures** - The primary contact for dam failure warning notification is the NSW SES State Headquarters Duty Officer. This officer will subsequently notify the Murray Region Headquarters duty officer who will contact the Berrigan SES Local Controller. An alternate NSW Police contact is available if this notification procedure was to fail.
47. The Duty officer, Hume Dam will keep the SES State Headquarters Duty Officer informed of the anticipated river heights in all Murray River towns (including Tocumwal and Barooga) whenever a significant change in release from Hume Dam is made. In particular, the alerts outlined in Table H-3 will be sent to the SES in NSW (and Victoria):
48. Alert classifications have been used in Table H-3 to organise response actions. The levels of green, white, amber and red have been selected. Consequences and responses escalate as the alert level migrates from green to red. The conditions that define each of the alert levels are listed in Table H-3. The meaning of each alert level is as follows:
- a. **Green:** Situation normal.
  - b. **White:** Preliminary alert to assist the SES in its preparation. This is not a public alert.

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<sup>6</sup> State Water (2003) Dam Safety Emergency Plan for Hume Dam. Murray Darling Basin Commission (River Murray Water).

- c. **Amber:** Alert level necessitating the warning of the community at risk and advising the community to prepare for evacuation.
- d. **Red:** Alert level requiring the immediate evacuation of the community at risk.

49. Actions indicated as occurring at particular alert levels may be brought forward if the development of the flood event warrants.

Alert Trigger	Alert	Alert classification
Storage Water Level Storage up to FSL 192.0 m AHD	Flood releases through the spillway are about to begin	White
Hume Dam discharge plus Kiewa River flow will equal or exceed 43 000 ML/day	Murray River at Albury is expected to reach MINOR FLOOD LEVEL (4.3m)	White
Hume Dam discharge plus Kiewa River flow will equal or exceed 81 000 ML/day	Murray River at Albury is expected to reach MODERATE FLOOD LEVEL (4.9m)	White
Hume Dam discharge plus Kiewa River flow will equal or exceed 173 000 ML/day	Murray River at Albury is expected to reach MAJOR FLOOD LEVEL (5.5m)	White
Hume Dam discharge plus Kiewa River flow will equal or exceed 220 000 ML/day	The Albury Levee may be overtopped in the near future.	Amber
All spillway gates fully open spillway discharge will be 589,850ML/day	Hume dam is no longer able to regulate releases	Amber
RL 193.9	Storage at crest of main embankment, some outflanking of Embankment No.3	Amber
RL 194.3 (Spillway discharge 1,075,000)	Storage at critical safety level at top of core wall	Red
RL 195.3 (Spillway Discharge 1,189,000)	Storage at top of parapet wall and at crest of Embankments No.2 and No.3	Red

**Table H-2: Alerts will be sent by Hume Dam to NSW and VIC SES**

- 50. The SES is to be informed by State Water / RMW of any decreases in flow at all times. In particular the SES should be informed of instances where the anticipated combined flow (Kiewa and Murray Rivers) at Albury falls below the above mentioned levels.
- 51. In the event of a complete loss of communications between the dam and River Murray Water in Canberra, Hume Dam staff would operate the storage in accordance with standard flood operational procedures as detailed in the DSEP.

## **Monitoring**

52. Dam owners/operators (State Water and River Murray Water) will undertake monitoring and inspections of their respective dams to ensure any situations, which may lead to potential dam failure, are identified.
53. If a situation is identified which may lead to potential dam failure, the dam owner will notify the SES.
54. State Water must ensure that appropriate agencies are made aware of any threat to the dam to maximise the time available for mobilising necessary resources.

## **Warning**

55. Once an amber alert level is reached dam failure warnings will be disseminated.
56. The SES will disseminate dam failure warnings with assistance from NSW Police, NSW Fire Brigades, NSW Rural Fire Service, VRA, Service Clubs, State Water and Snowy Hydro Ltd.
57. Dam Failure Warnings will be disseminated by the following means:
  - a. Doorknocking of at-risk dwellings.
  - b. Telephone call being made to at-risk dwellings.
  - c. Mobile public address systems fitted to emergency service vehicles.
  - d. Sirens fitted to emergency service vehicles.
  - e. Broadcasts over radio and television stations.
  - f. By two-way radio.
58. Broadcast dam failure warning messages will describe the situation; say what is happening currently: what is expected to happen: when it will occur and indicate how people should act. If evacuation is required the message will be preceded by the playing of the Standard Emergency Warning Signal (SEWS) and will detail:
  - a. Instructions to evacuate.
  - b. The location of assembly areas for transport to evacuation centres.
  - c. The location of evacuation centres for those using private transport
  - d. Authorised or recommended evacuation routes.
  - e. Arrangements for children in schools and pre-schools.
  - f. Arrangements for elderly or infirm residents unable to self-evacuate.

## **Evacuation**

59. If necessary, evacuations will be undertaken. Refer to Annex E to G of this plan for detailed evacuation arrangements.

Table H-3: Notification, Warning and Evacuation Arrangements for Potential Failure of Hume Dam

ALERT LEVEL	DEFINING CONDITIONS	APPROX. ELAPSED TIMES IN WORST CASE	FLOOD EFFECTS	NOTIFICATION ARRANGEMENTS AND ACTIONS			
				STATE WATER	MURRAY SES REGION HQ	BERRIGAN SES LOCAL HQ	PEOPLE AT THREAT
<b>WHITE:</b> (emergency services notification level and evacuation of areas inundated by levee overtopping flood in Albury).	<ul style="list-style-type: none"> <li>Storage level = 192.0 m AHD</li> <li>Hume Dam discharge plus Kiewa River flows may exceed 220,000 ML/day</li> </ul>	To Be Confirmed (TBC)	<ul style="list-style-type: none"> <li>Major flooding will already be occurring downstream.</li> <li>Flood heights may reach up to 5.8 metres on the Albury gauge.</li> <li>The Albury levee is likely to be overtopped.</li> </ul>	<ul style="list-style-type: none"> <li>Staff at dam informed of any Defining Conditions being reached.</li> <li>Monitor dam.</li> <li>Advise Murray SES Region Headquarters of White Alert Level being reached and provide regular updates on the situation at the dam.</li> </ul>	<ul style="list-style-type: none"> <li>Informed by staff at the dam of any Defining Conditions being reached.</li> <li>Notify SES State HQ.</li> <li>Advise Berrigan SES Local Headquarters and other SES units downstream of the dam.</li> <li>Advise the Murray District Emergency Management Officer (DEMO).</li> <li>Provides SES Flood Bulletins and evacuation warnings to the media organisations listed in Annex D.</li> <li>Organise out of area assistance for warning and evacuation operations.</li> </ul>	<ul style="list-style-type: none"> <li>Activate Local Flood Plan.</li> <li>Advise NSW Police (Deniliquin Local Area Command Headquarters), Berrigan Local Emergency Operations Controller (LEOCON), Berrigan Fire Control Officer, the Department of Community Services (DoCS), VICSES and other agencies that the White Alert Level has been reached.</li> <li>Ensure that evacuation centres are ready to receive evacuees.</li> <li>Coordinate warning and evacuation of residents by doorknock and public address systems from emergency service</li> </ul>	<ul style="list-style-type: none"> <li>Residents and business owners in Berrigan to prepare homes for inundation pack mementos and pets and move to evacuation centres.</li> <li>Notify SES doorknockers if transport to evacuation centres is required.</li> </ul>

ALERT LEVEL	DEFINING CONDITIONS	APPROX. ELAPSED TIMES IN WORST CASE	FLOOD EFFECTS	NOTIFICATION ARRANGEMENTS AND ACTIONS			
				STATE WATER	MURRAY SES REGION HQ	BERRIGAN SES LOCAL HQ	PEOPLE AT THREAT
						vehicles.	
<b>AMBER:</b> (all at-risk households warned)	<ul style="list-style-type: none"> <li>Storage up to Full Supply Level (RL 192.0 metres AHD).</li> <li>Flood passing over spillway.</li> <li>All spillway gates fully opened.</li> <li>Staff at Hume Dam are no longer able to regulate releases.</li> </ul>	From AMBER alert stage to RED alert stage = TBC	<ul style="list-style-type: none"> <li>Extreme flooding downstream, Albury levee overtopped.</li> <li>Many downstream residents will already have been evacuated before this action level is reached.</li> </ul>	<ul style="list-style-type: none"> <li>Staff at dam informed of Amber Alert Level being reached.</li> <li>Continue monitoring the dam.</li> <li>Advise Murray SES Region Headquarters of Amber Alert Level being reached and provide regular updates on the situation at the dam.</li> <li>Contact residents immediately downstream of dam and advise them to prepare to evacuate.</li> </ul>	<ul style="list-style-type: none"> <li>Informed by staff at the dam that the Amber Alert Level has been reached.</li> <li>Notify SES State HQ.</li> <li>Advise Berrigan SES Local Headquarters and other SES units downstream of the dam.</li> <li>Advise the Murray DEMO.</li> <li>Provides SES Flood Bulletins and evacuation warnings to the media organisations listed in Annex D.</li> <li>Coordinate provision of out of area assistance for warning and evacuation operations.</li> </ul>	<ul style="list-style-type: none"> <li>Advise NSW Police (Deniliquin Local Area Command Headquarters), Berrigan LEOCON, Albury Fire Control Officer, DoCS, VICSES and other agencies that Amber Alert Level has been reached.</li> <li>Ensure that evacuation centres are made ready.</li> <li>Conduct warning of downstream residents by doorknock and public address systems from emergency service vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>Prepare homes for inundation, pack valuables, mementos and pets and prepare to evacuate.</li> <li>Notify SES doorknockers if transport to evacuation centres will be required.</li> </ul>
<b>RED:</b> <b>(EVACUATIO</b>	<ul style="list-style-type: none"> <li>Storage at critical safety</li> </ul>	From issue of RED alert stage	<ul style="list-style-type: none"> <li>Extreme flooding</li> </ul>	<ul style="list-style-type: none"> <li>Staff at dam informed of Red Alert</li> </ul>	<ul style="list-style-type: none"> <li>Informed by staff at the dam that the Red</li> </ul>	<ul style="list-style-type: none"> <li>Advise NSW Police (Deniliquin Local</li> </ul>	<ul style="list-style-type: none"> <li>Evacuate to nearest evacuation centre.</li> </ul>

ALERT LEVEL	DEFINING CONDITIONS	APPROX. ELAPSED TIMES IN WORST CASE	FLOOD EFFECTS	NOTIFICATION ARRANGEMENTS AND ACTIONS			
				STATE WATER	MURRAY SES REGION HQ	BERRIGAN SES LOCAL HQ	PEOPLE AT THREAT
<b>N LEVEL FOR ALL REMAINING SECTORS).</b>	level at top of core wall (RL 194.3 metres AHD).	to failure of dam wall = TBC	already occurring downstream and large parts of Albury evacuated.	<p>Level being reached.</p> <ul style="list-style-type: none"> <li>• Continue monitoring the dam.</li> <li>• Advise Murray SES Region Headquarters of Red Alert Level being reached and provide regular updates on the situation at the dam.</li> <li>• Contact residents immediately downstream of dam and advise them to evacuate.</li> </ul>	<p>Alert Level has been reached.</p> <ul style="list-style-type: none"> <li>• Advise Berrigan SES Local Headquarters and other SES units downstream of the dam.</li> <li>• Advise the Murray DEMO.</li> <li>• Confirm that residents immediately downstream of the dam have been notified of Red Alert Level being reached.</li> <li>• Activate the Standard Emergency Warning Signal (SEWS) and ensure that evacuation warnings are broadcast over the radio stations listed in Annex D.</li> <li>• Coordinate provision of out of area assistance for evacuation operations.</li> </ul>	<p>Area Command Headquarters), Berrigan LEOCON, Berrigan Fire Control Officer, the Department of Community Services (DoCS), VICSES and other agencies that Red Alert Level has been reached.</p> <ul style="list-style-type: none"> <li>• Ensure that evacuation centres are ready to receive evacuees.</li> <li>• Conduct warning and evacuation of downstream residents by doorknock and public address systems from emergency service vehicles.</li> <li>• Coordinate transport of evacuees without their own vehicles.</li> </ul>	



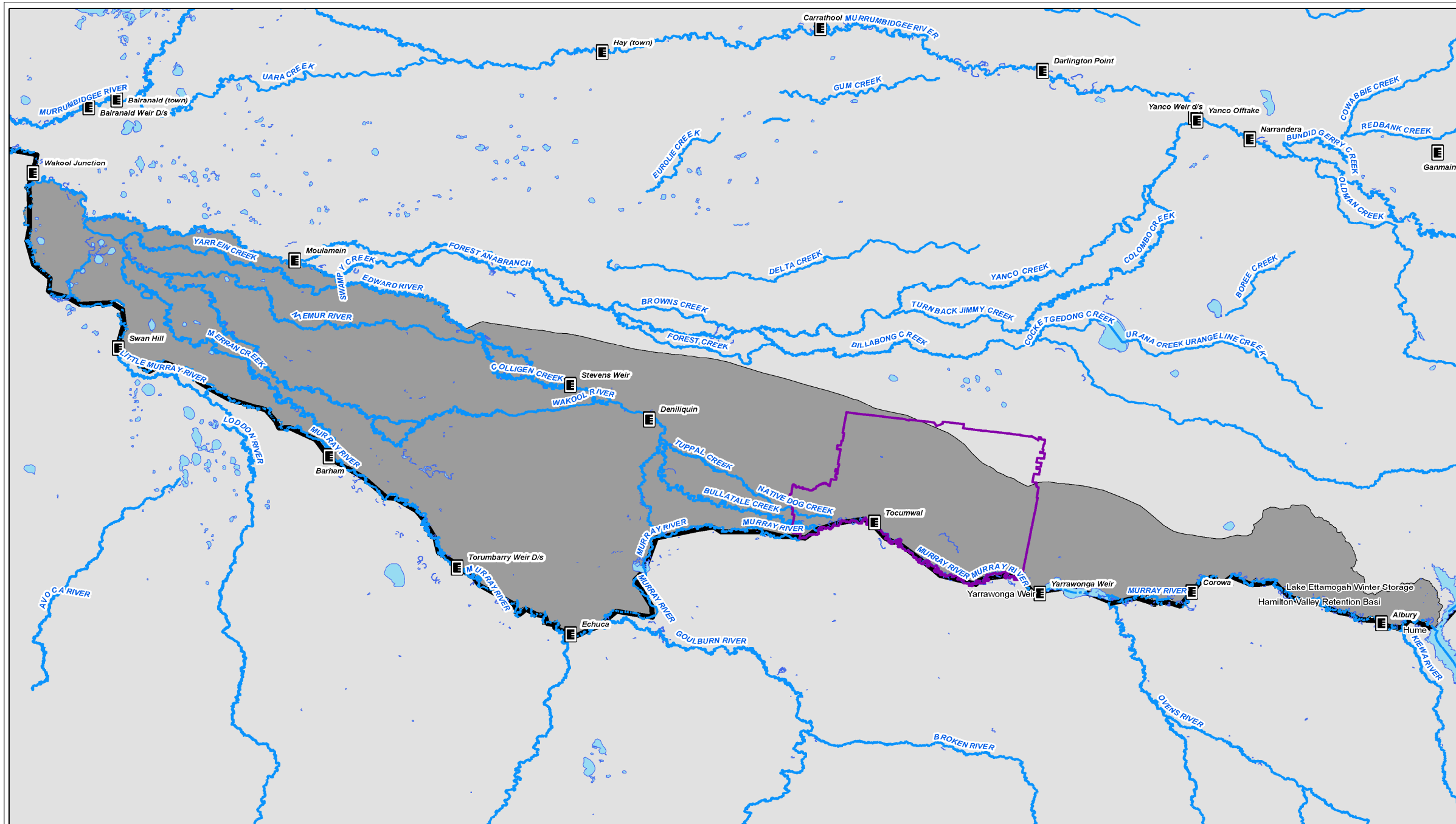
ALERT LEVEL	DEFINING CONDITIONS	APPROX. ELAPSED TIMES IN WORST CASE	FLOOD EFFECTS	NOTIFICATION ARRANGEMENTS AND ACTIONS			
				STATE WATER	MURRAY SES REGION HQ	BERRIGAN SES LOCAL HQ	PEOPLE AT THREAT
<b>THEORETICAL FAILURE LEVEL/IMMINENT FAILURE LEVEL</b>	<ul style="list-style-type: none"> <li>Storage at top of parapet wall and at crest of Embankments No. 2 and No. 3 (RL 195.3 metres AHD).</li> </ul>			<ul style="list-style-type: none"> <li>Continue to monitor the dam and advise Murray SES Region Headquarters.</li> </ul>	As above.	As above.	As above.
<b>ALL CLEAR</b> (Danger at the dam is assessed as being over. NOTE: This could occur at any time after the White Alert Level is reached).	<ul style="list-style-type: none"> <li>Danger assessed as being over.</li> </ul>	N/A	N/A	<ul style="list-style-type: none"> <li>Advise Murray SES Region Headquarters that danger assessed as being over.</li> </ul>	<ul style="list-style-type: none"> <li>Informed by staff at the dam that danger is assessed as being over.</li> <li>Issue 'All Clear' message to Berrigan SES Local HQ and SES State HQ</li> <li>Advise the Murray DEMO that 'All Clear' has been issued.</li> <li>Issue 'All Clear' message over radio stations listed in Annex D.</li> <li>Coordinate issue of 'All Clear' message at evacuation centres or by phone/doorknock.</li> </ul>	<ul style="list-style-type: none"> <li>Deliver 'All Clear' message to other agencies as necessary.</li> <li>Coordinate issue of 'All Clear' message at evacuation centres or by phone/doorknock.</li> </ul>	<ul style="list-style-type: none"> <li>Stay home, return home or await further advice.</li> </ul>

**Notes to Table 4:**

Actions indicated as occurring at particular Alert Levels may be brought forward if the development of a flood event warrants.

The 'Approximate Elapsed Times' are estimates of the worst possible case based upon PMF hydrographs. In real events which threaten to cause the Hume Dam to fail, it is likely that much more time would elapse between defined levels than is indicated in the table. Assessments of the speed of onset of developing events would be made at the time and advice given to residents would reflect these assessments.

# MAP 1 - RIVER BASIN



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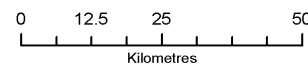
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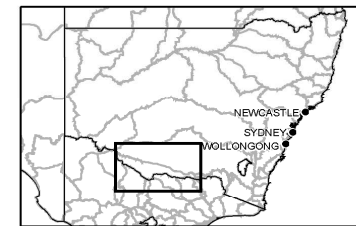
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## Murray Riverina Basin



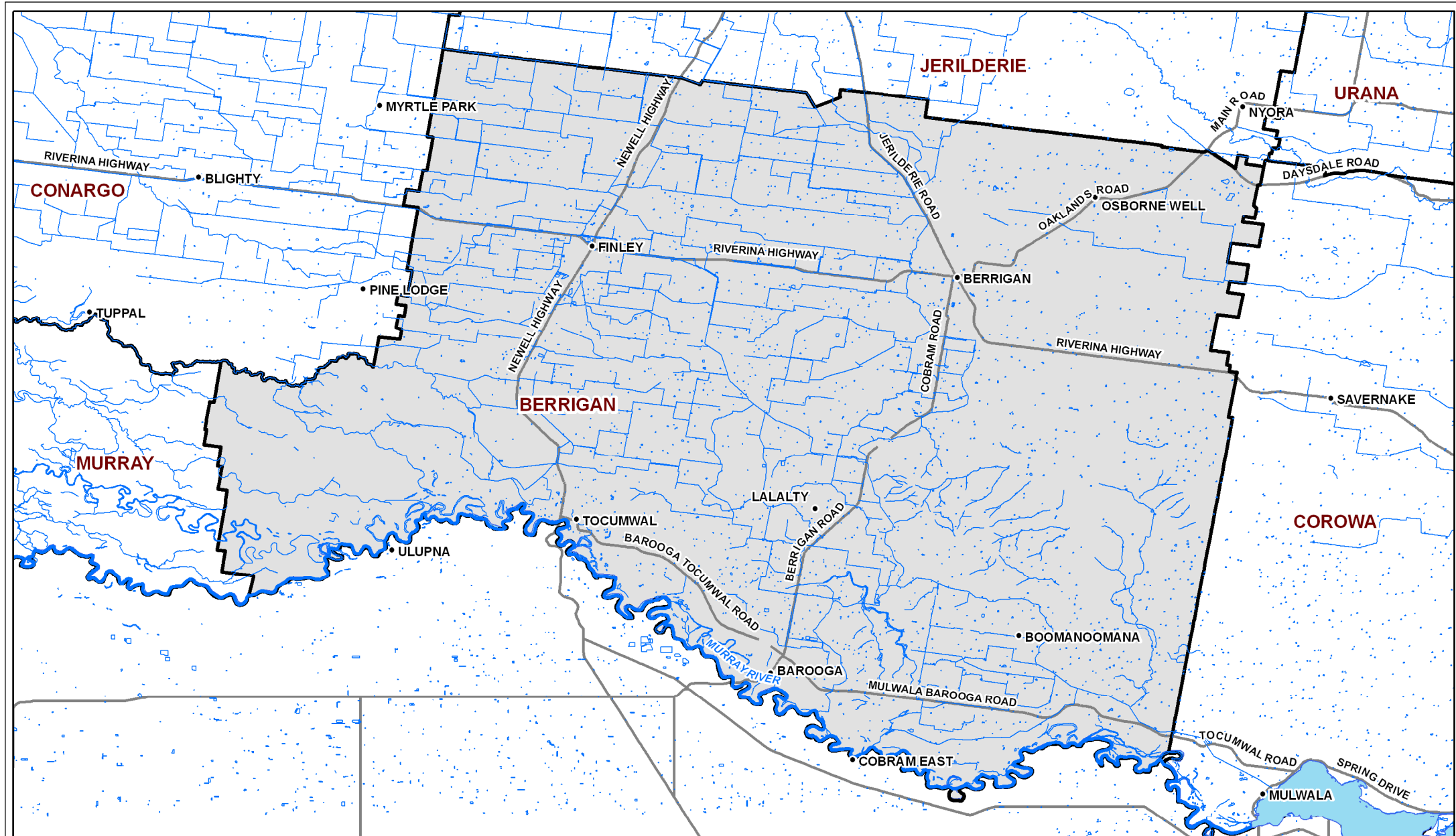
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### Legend

- Warning Gauges
- Dams
- Major Rivers
- Murray Riverina Basin
- Berrigan LGA

# MAP 2 - COUNCIL AREA



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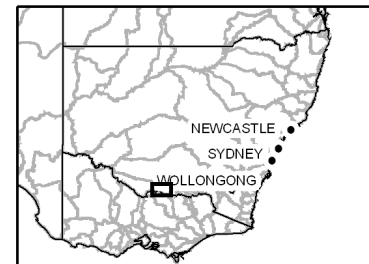
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**Berrigan Shire Council**



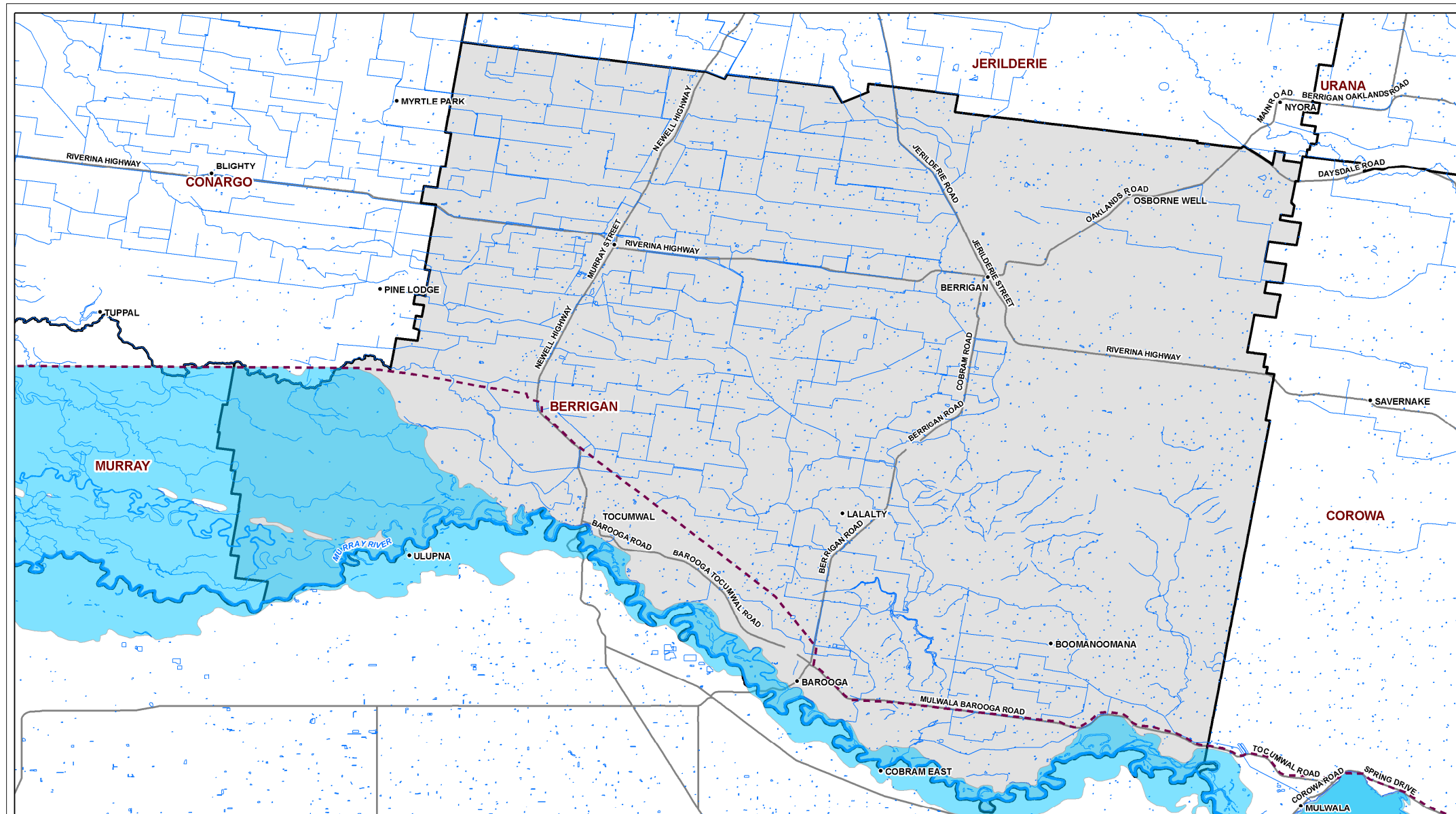
Print Date: 28 October 2008



**Legend**

- Towns
- Major Rivers
- Minor Streams
- ▭ LGA Boundary
- Major Roads

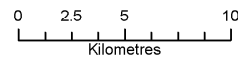
### MAP 3 - COUNCIL AREA SHOWING 1956 FLOOD EXTENT



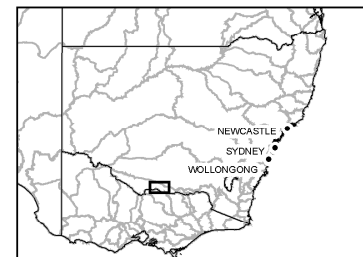
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**Berrigan Shire Council  
 1956 Flood Extent**



Print Date: 22 December 2008

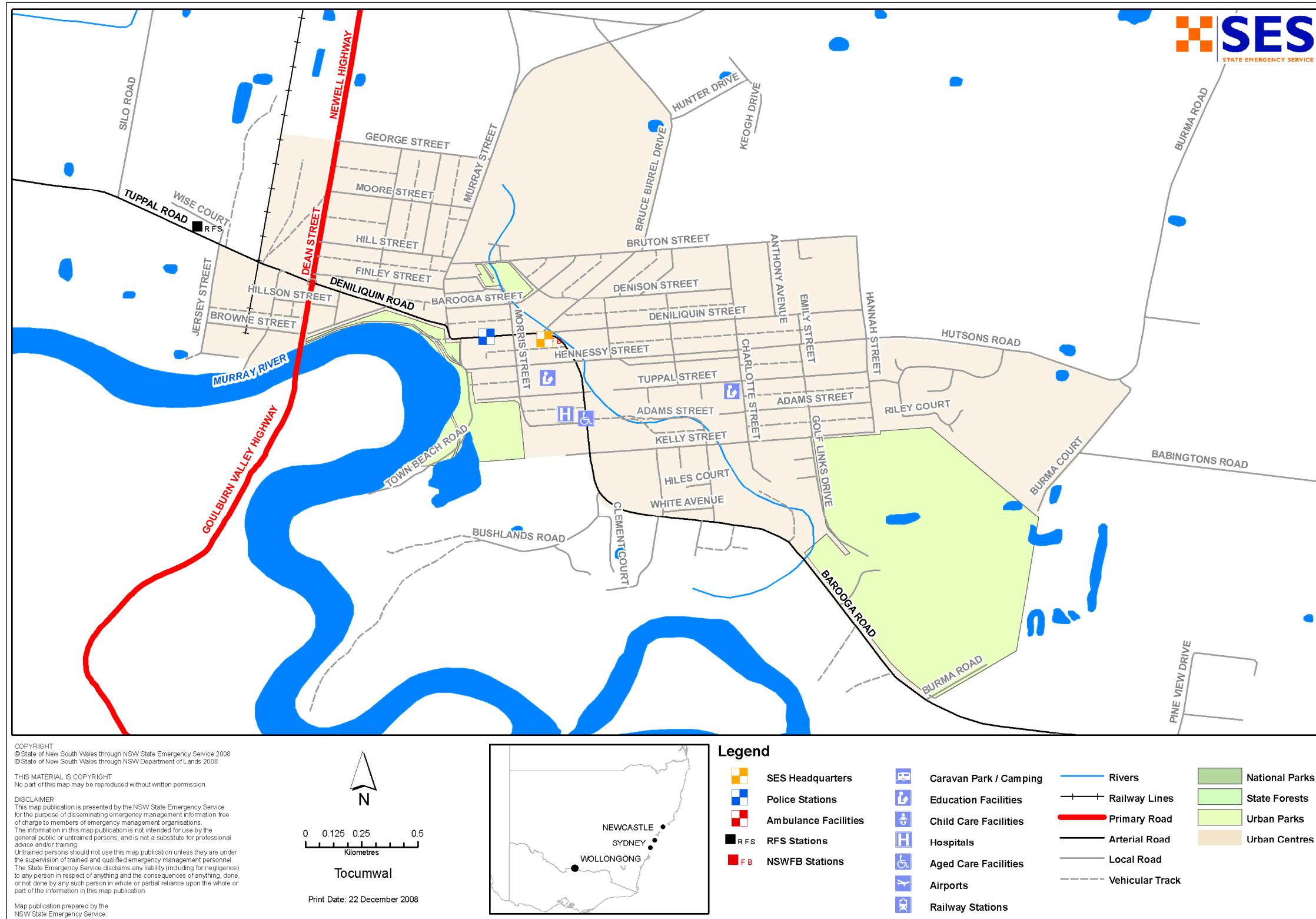


**Legend**

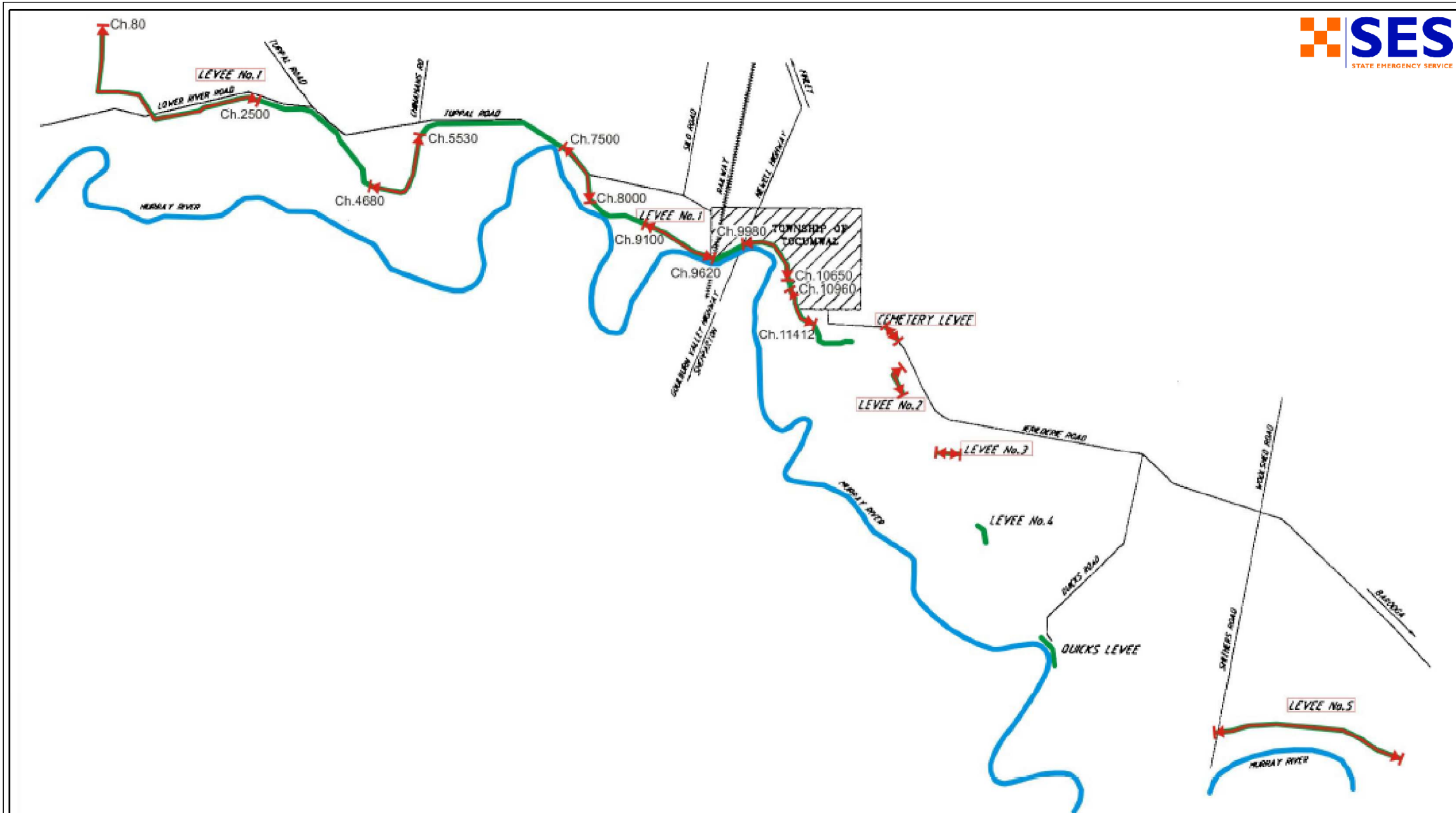
- Towns
- Major Rivers
- Minor Streams
- ▭ LGA Boundary
- Major Roads
- 1956 Flood Extent
- - - Extent of Flood Mapping



# MAP 4 - TOCUMWAL



# MAP 5 - TOCUMWAL LEVEES



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Data source: Figure 4.1: Location-Tocumwal Levees, Flood Levee Audit for Berrigan Shire Council, NSW Department of Commerce - Dams and Civil, 2004

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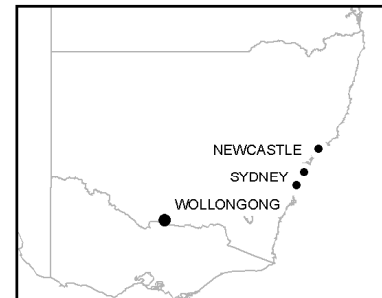
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Tocumwal Levee System

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# MAP 6 - BAROOGA

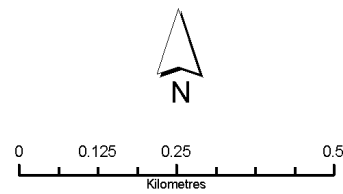


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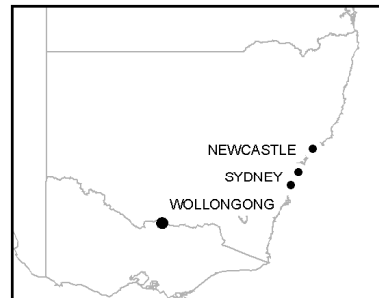
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**Legend**

- |  |                      |  |                        |  |                 |  |                |
|--|----------------------|--|------------------------|--|-----------------|--|----------------|
|  | SES Headquarters     |  | Caravan Park / Camping |  | Rivers          |  | National Parks |
|  | Police Stations      |  | Education Facilities   |  | Railway Lines   |  | State Forests  |
|  | Ambulance Facilities |  | Child Care Facilities  |  | Primary Road    |  | Urban Parks    |
|  | RFS Stations         |  | Hospitals              |  | Arterial Road   |  | Urban Centres  |
|  | NSWFB Stations       |  | Aged Care Facilities   |  | Local Road      |  |                |
|  |                      |  | Airports               |  | Vehicular Track |  |                |
|  |                      |  | Railway Stations       |  |                 |  |                |