NSW STATE EMERGENCY SERVICE

Bogan Shire

Local Flood Emergency Sub Plan

FloodSafe

BOGAN SHIRE
FLOOD EMERGENCY
SUB PLAN

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

Volume 1 of the Bogan Shire Flood Emergency Sub Plan

Endorsed by the Bogan Shire Local Emergency Management Committee

17 June 2024
Version 3.0

AUTHORISATION

The Bogan Shire Flood Emergency Sub Plan is a sub plan of the Bogan 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: Michael Cubillo.

NSW SES Local/Unit Commander

Print Name: Michael Cubillo

Date: 23/06/2024.

Endorsed

Signature:

Chair, Local Emergency Management Committee

Print Name: GRAEME BOURKE

Date: 17/06/2024

VERSION HISTORY

Version Number	Description	Date
1.0	Bogan Shire Local Flood Plan	1992
2.0	Bogan Shire Local Flood Plan	March 2014

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

Manager Emergency Planning
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Amendments in the list below have been entered in this plan.

Amendment Number	Description	Updated by	Date

DISTRIBUTION LIST

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

CONTENTS

1 OUTLINE AND SCOPE

1.1 PURPOSE

1.1.1 The purpose of this plan is to set out the multi-agency arrangements for the emergency management of flooding in the Bogan 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 Bogan Shire Local Emergency Management Plan (EMPLAN) and is endorsed by the Bogan Shire 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 Bogan 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 Bogan Shire LGA. The Bogan 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 Western Zone and for emergency management purposes, is part of the Far West Emergency Management Region.

1.4.3 The plan sets out the Bogan Shire level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Bogan 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 Bogan Shire are detailed within this plan, Appendix B and Appendix C.

1.7.3 Any agency with agreed responsibilities in this plan which 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 and/or the NSW SES Western Zone Office (for regional level responsibilities outside of response operations).

1.8 PLAN MAINTENANCE AND REVIEW

1.8.1 The 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 The NSW SES maintains information on the nature of flooding and effects of flooding on the community in the Bogan Shire LGA.

2.1.2 Declared dams in or upstream of the Bogan shire Local Government Area.

Dam Name	Owner	High Risk Dam
Nyngan Evaporation Pond	EMC Metals Australia Pty Ltd	No
Nyngan Tailings Storage Facility	EMC Metals Australia Pty Ltd	No
Tritton Tailings	Aeris Resources – Tritton Operations	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. The 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. The 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. The 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. The 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.

b. The NSW SES will provide advice, support, technical resources and training for NSW SES representatives to contribute effectively on Local Floodplain Risk 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 (CMGs) 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 Plans if agreed to by the NSW SES.

4.3 FLOOD INTELLIGENCE SYSTEMS

4.3.1 **Strategy**: The 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. The NSW SES maintains a list of the requirements for flood warnings for flood gauges in NSW (including flood classifications, warning times required and key statistics) and can be found in the supplementary document to the NSW State Flood Plan (see Section 1.9).

c. The 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. The 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 the NSW SES.

4.5 BRIEFING, TRAINING AND EXERCISING

4.5.1 **Strategy**: Ensure the 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. The NSW SES will consult stakeholders throughout the development of plans.

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

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

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

e. The 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**: The 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**: The 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. The 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. The 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. The NSW SES will operate Incident Control Centre(s) as required.

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

- Control resources from the NSW SES and coordinate resources of supporting emergency services and Functional Areas.
- Manage incident 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 the NSW SES and supporting agencies or Functional Areas in accordance with the 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. The NSW SES will provide Liaison Officer(s) to Emergency Operations Centres as required.

c. Where possible Emergency Operation Centres are 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. The 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 the 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 the 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. The 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 the NSW SES. This may occur post impact and continue into the recovery phase.

e. NSW SES may request the Engineering Services Functional Area to assist with the gathering of flood intelligence including (not limited to) maximum flood extents, peak flood heights, recording major flood damage at key high velocity locations and preparation of the after-flood report.

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

Action: the 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. The 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. The NSW SES liaises with the Bureau to discuss the development of flood warnings as required.

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

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

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

i. The Disaster Welfare Assistance Line will be established by the Disaster Welfare Services Functional Area 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: The 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. Bogan 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. The NSW Police Force may close and re-open roads but will normally only do so (if the Bogan Shire Council or Transport for NSW have not already acted and if public safety requires such action.

d. The 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 EMPLANs 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 Bogan Shire will keep the NSW SES informed of the status of utilities and infrastructure.

5.8 EVACUATION

5.8.1 Evacuation is the NSW SES' 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. The 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. The 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. The 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 the NSW SES and the Welfare Services Functional Area.

f. School administration offices (government and private) will coordinate the evacuation of schools in consultation with the NSW SES and the Welfare Services Functional Area, 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 the 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. The 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. The 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 the NSW SES in the temporary closure of schools and will coordinate with the NSW SES, the Transport and Welfare Services Functional Areas in the management of school evacuees.

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

e. The 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 State Emergency Operations Controller (SEOCON) may establish Major Evacuation Centres or Mass Care facilities.

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

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 and assessment of animals the humane destruction and disposal of affected animals and the supply of emergency fodder and water (with aerial support where necessary).

5.10 FLOOD RESCUE

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

Actions:

a. The 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. The NSW SES may request other supporting emergency services to undertake flood rescues on behalf of the NSW SES. Agencies must be authorised/accredited to undertake flood rescue operations in accordance with State Rescue Board requirements, as prescribed by the NSW SES. Supporting emergency services must supply information regarding rescues performed to the NSW SES. Notification arrangements with the 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. The 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, the NSW SES will establish loading points where retailers can instruct suppliers to deliver goods.

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

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

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

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

5.13 END OF RESPONSE OPERATIONS

5.13.1 **Strategy**: Conclude response operations.

Actions:

a. Response operations will conclude when:

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

5.14 POST IMPACT ACTIONS

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

Actions:

a. The 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, the Welfare Services Functional Area and Bogan Shire Council representatives.

b. The 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 the NSW SES as lead agency to transition to the 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. The 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: The NSW SES works with relevant stakeholders and Bogan Shire Council on post flood data collection analysis including review of flood intelligence where necessary.

6 RECOVERY OPERATIONS

6.1 INTRODUCTION

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

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

6.2 NSW SES RECOVERY ROLE

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

6.2.2 **Actions**:

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

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

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

f. The NSW SES may coordinate immediate relief in collaboration with SEOCON and State Emergency Recovery Controller SERCON.

7 ABBREVIATIONS

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

8 GLOSSARY

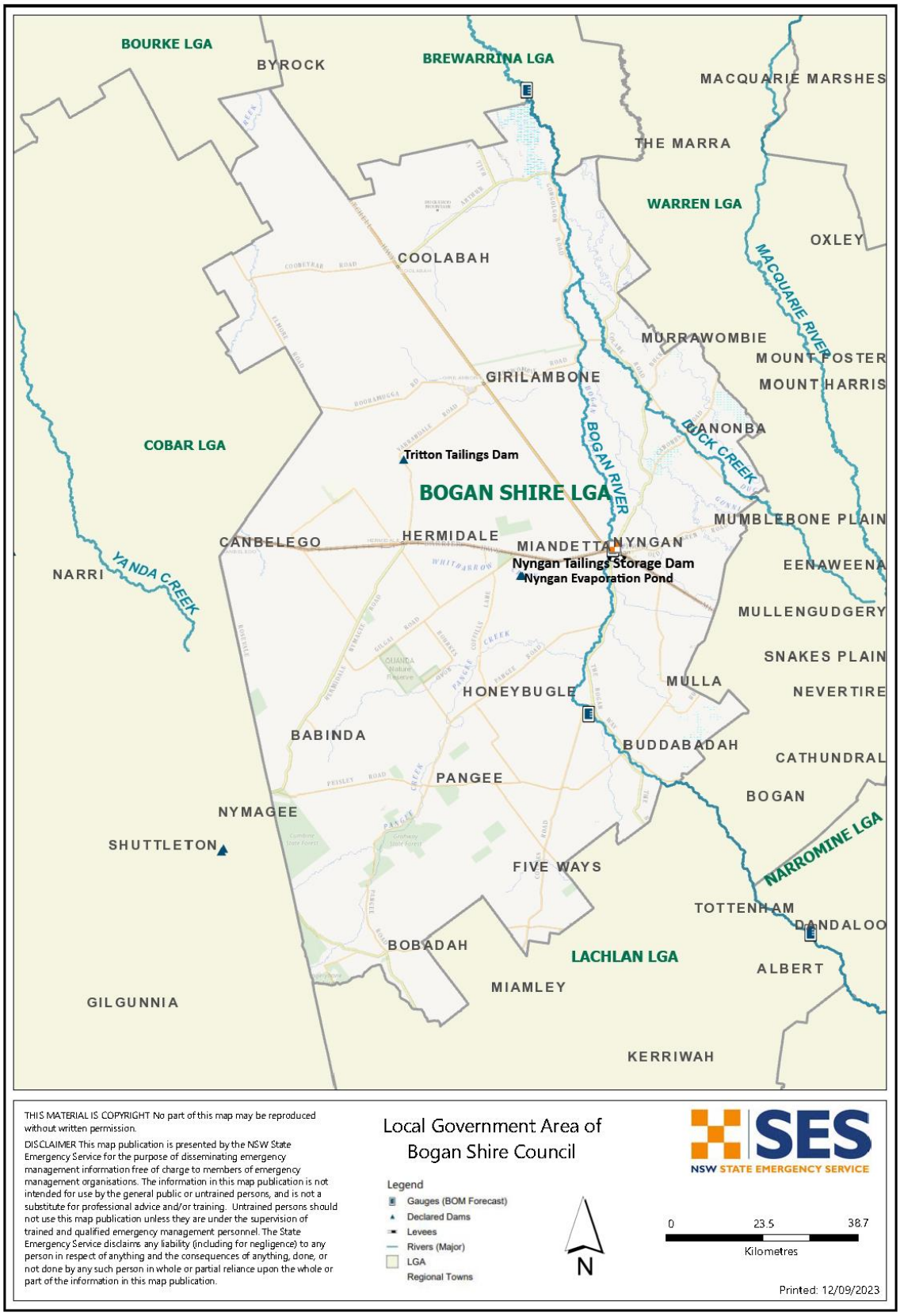
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 Bogan Shire Council Area



10 Appendix B – Roles and Responsibilities

AGENCY	RESPONSIBILITIES
NSW State Emergency Service	The NSW SES is the designated Combat Agency for floods, storms and tsunami and controls response operations. The NSW SES roles and responsibilities in relation to floods are outlined in the NSW State Flood Emergency Sub Plan.

AGENCY	RESPONSIBILITIES
Agriculture and Animal Services Functional Area	The roles and responsibilities for the Agriculture and Animal Services are outlined in the Agriculture and Animal Services Supporting Plan and NSW State Flood Plan.
Australian Government Bureau of Meteorology	The roles and responsibilities for the Australian Government Bureau of Meteorology (Bureau) are outlined in the NSW State Flood Plan.
Bogan Shire Council	**Preparedness** • Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented. • Develop and implement floodplain risk management plans in accordance with the NSW Government's Flood Prone Land Policy and the Floodplain Risk Management Manual. • Provide levee studies, flood studies and floodplain management studies to the NSW SES. • Maintain council-owned flood warning networks and flood mitigation works. • Participate in NSW SES-led flood emergency planning meetings, to assist in the preparation of Flood Sub Plans. • Maintain a plant and equipment resource list for the council area. • Contribute to community engagement activities. **Response** • Subject to the availability of council resources, assist the NSW SES with flood operations including: – Traffic management on council managed roads. – Provision of assistance to the NSW SES (plant, equipment and personnel where able and requested). – Property protection tasks including sandbagging. – Assist with the removal of caravans from caravan parks. – Warning and/or evacuation of residents and other people in flood liable areas. – Provision of back-up radio communications. – Resupply of isolated properties.

AGENCY	RESPONSIBILITIES
	– Technical advice on the impacts of flooding. – Close and reopen council roads (and other roads nominated by agreement with Transport for NSW) and advise the NSW SES, NSW Police Force and people who contact the council for road information. – Assist the NSW SES to provide filled sandbags and filling facilities to residents and business in areas which flooding is expected. • Assist with making facilities available for domestic pets and companion animals of evacuees during evacuations. • Operate flood mitigation works including critical structures such as detention basins and levees and advise the NSW SES regarding their operation. • Manage and protect council-owned infrastructure facilities during floods. • Provide advice to the NSW SES and the Health Services Functional Area during floods about key council managed infrastructure such as sewerage treatment and water supply. • Advise the Environmental Protection Authority of any sewerage overflow caused by flooding. • Work with the NSW SES and NSW Department of Planning and Environment to collect flood related data during and after flood events. **Recovery** • Provide for the management of health hazards associated with flooding including removing debris and waste. • Ensure premises are fit and safe for reoccupation and assess any need for demolition. • Provide services, assistance and advice to State Government in accordance with the State Recovery Plan.
Caravan Park Proprietor(s)	• Prepare a flood emergency plan for the caravan park. • Ensure that owners and occupiers of movable dwellings are aware that the caravan park is flood liable by providing a written notice to occupiers taking up residence and displaying this notice and emergency management arrangement within the park. • Ensure that owners and occupiers of movable dwellings are aware that if they are expecting to be absent for extended periods, they should: – Provide the manager of the caravan park with a contact address and telephone number in case of an emergency. – Leave any movable dwelling in a condition allowing it to be relocated in an emergency (i.e.: should ensure that the wheels, axles and draw

AGENCY	RESPONSIBILITIES
	bar of the caravans are not removed and are maintained in proper working order). • Ensure that occupiers are informed of Flood Information. At this time, occupiers should be advised to: – Ensure that they have spare batteries for their radios. – Listen to a local radio station for updated flood information. – Prepare for evacuation and movable dwelling (cabins) relocation. • Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs. • Coordinate the evacuation of people and the relocation of movable dwellings when floods are rising and their return when flood waters have subsided. Movable dwellings will be relocated back to the caravan park(s) by owners or by vehicles and drivers arranged by the park managers. • Secure any movable dwellings that are not able to be relocated to prevent floatation. • Inform the NSW SES of the progress of evacuation and/or movable dwellings relocation operations and of any need for assistance in the conduct of these tasks.
Childcare Centres and Preschools	• When notified of possible flooding or isolation, childcare centres and preschools should: – Liaise with the NSW SES and arrange for the early release of children whose travel arrangements are likely to be disrupted by flooding and/or road closures. – Assist with coordinating the evacuation of preschools and childcare centres.
Dams Safety NSW	The roles and responsibilities for Dams Safety NSW (formerly NSW Dam Safety Committee) are outlined in the NSW State Flood Plan.
Department of Defence	Arrangements for Defence Assistance to the Civil Community are detailed within the State EMPLAN (section 448).
Energy and Utilities Services Functional Area	The roles and responsibilities for the Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN). Roles and responsibilities in addition to the supporting plan are: • Assist the NSW SES with identification of infrastructure at risk of flood damage where resources are available. • Facilitate local utility service distribution providers (electricity, gas, water, wastewater) to:

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

AGENCY	RESPONSIBILITIES
NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission	The roles and responsibilities for NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission are outlined in the NSW State Flood Plan.
NSW Department of Planning and Environment (Environment and Heritage Group)	The roles and responsibilities for NSW Department of Planning and Environment (Environment and Heritage Group) are outlined in the NSW State Flood Plan (referred to as DPIE EES).
NSW Department of Planning and Environment (Water)	The roles and responsibilities for NSW Department of Planning and Environment (Water) are outlined in the NSW State Flood Plan.
NSW Food Authority	The roles and responsibilities for the NSW Food Authority are outlined in the Food Safety Emergency Sub Plan.
NSW National Parks and Wildlife Services	The roles and responsibilities for NSW National Parks and Wildlife Services are outlined in the NSW State Flood Plan.
NSW Police Force	The roles and responsibilities for the NSW Police Force are outlined in the NSW State Flood Plan.
NSW Reconstruction Authority	The roles and responsibilities for the NSW Reconstruction Authority are outlined in the NSW State Flood Plan.
NSW Rural Fire Service	The roles and responsibilities for the NSW Rural Fire Service are outlined in the NSW State Flood Plan.
Owners of Declared Dams within or upstream of the LGA	The roles and responsibilities for owners of declared dams are outlined in the NSW State Flood Plan.
Public Information Services Functional Area	The roles and responsibilities for the Public Information Services Functional Area are outlined in the Public Information Services Supporting Plan and NSW State Flood. Plan**.**
State Emergency Operations Controller (SEOCON)	The roles and responsibilities for the SEOCON/SEOC are outlined in the NSW State Flood Plan**.**
Surf Life Saving NSW	The roles and responsibilities for Surf Life Saving NSW are outlined in the NSW State Flood Plan.
Telecommunications Services Functional Area	The roles and responsibilities for the Telecommunications Services Functional Area are outlined in the Telecommunications Services (TELCOPLAN) Supporting Plan.
Transport for NSW	• Transport for NSW coordinates information on road conditions for emergency services access. • Transport for NSW coordinates the management of the road network across all modes of transport.

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

11 Appendix C – Community Specific Roles and Responsibilities

Community Members	**Preparedness** • Understand the potential risk and impact of flooding. • Prepare homes and property to reduce the impact of flooding. • Understand warnings and other triggers for action and the safest actions to take in a flood. • Households, institutions and businesses develop plans to manage flood risks, sharing and practicing this with family, friends, employees and neighbours. • Have an emergency kit. • Be involved in local emergency planning processes. **Recovery** • Assist with community clean-up if required and able to do so. • Participate in After Action Reviews if required.
Aboriginal Organisations or Groups	**Nyngan Local Aboriginal Land Council**. • Act as the point of contact between NSW SES and the local Aboriginal communities in Bogan Shire. • Inform the NSW SES Incident Controller about flood conditions and response needs. • Disseminate flood information, including flood and evacuation warnings, to local Aboriginal communities in the Bogan Shire.

NSW STATE EMERGENCY SERVICE

HAZARD AND RISK IN BOGAN SHIRE

Volume 2 of the Bogan Shire Local Flood Plan

Last Update: October 1992

FloodSafe

THE FLOOD PROBLEM

GENERAL

The whole of the Bogan Shire (Figure 1) is drained by the river of the same name. The shire has a long history of floods, and most of its territory can be said to be liable to flooding from the Bogan River or from one or other of its tributaries. In addition, flash flooding can occur anywhere in the shire, even in areas remote from rivers or creeks, as a result of severe thunderstorms.

The only substantial town, Nyngan, has been affected by flooding on numerous occasions in the 110 years of its existence. Nyngan achieved national prominence in April 1990 when, in the most severe flood ever experienced there since European settlement, its levee banks were overtopped causing devastating flooding and necessitating the evacuation of virtually the entire population. Huge areas of farmland outside Nyngan were also inundated in this flood.

While this was an extreme event, flooding is a normal and natural occurrence in the shire and to mitigate its effects a wide range of activities is necessary. In the more severe events these include evacuating people, moving and feeding large numbers of farm animals, sandbagging dwellings and installations, raising levees and ensuring that utilities and services remain operational.

FLOODS IN THE BOGAN RIVER VALLEY

The Bogan River rises in the Herveys and Curumbenya Ranges, east and south of the small town of Peak Hill about 200 kilometres to the south-east of Nyngan (Figure 3). The headwaters are hilly, but downstream of Peak Hill the river enters very flat country. Together with its tributaries, the Bogan River traverses such country for several hundred kilometres through the Parkes, Narromine, Lachlan, Warren, Bogan, Brewarrina and Bourke Shires to its confluence with the Darling River upstream of the town of Bourke. Above Nyngan, the Bogan River system drains an area of 18,000 square kilometres.

The Bogan's main tributaries upstream of Nyngan are the Bullock, Bulbodney and Pangee creeks which drain the gently undulating country to the south-east and south-west of the town. Lesser tributaries include the Ten Mile, Burrill, Tomingley, Back and Whitbarrow creeks and the Bradys and Mulla cowals. Below Nyngan the Bogan is joined by Turners Creek and other small watercourses draining the slightly higher land to the west, and by the Boggy Cowal and numerous effluent streams (including the Beleringar, Gunningbar and Duck creeks and Bugwah Cowal) from the Macquarie River to the east.

The Bogan River enters the Bogan Shire upstream of Callubri. By this point it is meandering across a very wide plain which is subject to shallow inundation over several kilometres width during floods. The watershed marking the eastern extremity of the catchment is very low and poorly defined and in extreme floods on the neighbouring, much larger Macquarie River water has flowed over into the Bogan at various locations. Now that Burrendong Dam mitigates most flooding on the Macquarie, though, this will be a rare occurrence. It did not occur upstream of Nyngan in 1990 according to the report produced by the Department of Water Resources on that flood event.

When floods occur on the Bogan River, large overbank flows of water fill natural depressions, swamps and shallow channels which together carry much greater flows than does the main channel. Especially in areas downstream of Nyngan, small increases in flow volumes lead to substantial increases in the size of the area inundated. The larger tributaries can individually, when in flood, cause major flooding on the Bogan as well as aggravating existing flooding from the main river by increasing the height and duration of flooding.

The various tributaries do, of course, contribute to differing degrees in particular flood events. In the extreme flood of 1990 the Mulla Cowal system made a major contribution, but inflows from it to the Bogan were relatively small during the flood of 1992. Equally, floods on individual tributaries may be greatly attenuated as they move downstream and their contributions to flooding on the Bogan reduced accordingly. In 1992 the upper reaches of the Pangee and Whitbarrow creeks were in flood to a degree never previously seen by long-term residents but, because of the drought conditions of the time, the flood waters had little impact by the time they reached the Bogan. Whitbarrow Creek did, however, make a major contribution to the 1955 flood on the Bogan River, while the Duck and Gunningbar Creeks caused flooding on the Lower Bogan to Monkey Bridge in 1989 probably equal to the worst ever flood on that part of the river.

Just as water can in major events break out of the Macquarie River system and flow overland to reach the Bogan, so too can water flow out of the Bogan River. In particular this happens upstream of Callubri where a slight constriction of the valley causes water to flow across country to the Mulla Cowal system which joins the Bogan about 15 kilometres above Nyngan. When breakouts occur, large volumes of water bypass the stream gauges and lead to problems in estimating the size of the flood at Nyngan itself. There are various points of re-entry, both above and below the town.

One of the major characteristics of flooding on the Bogan River is the slowness with which floods travel. Flood waters in very minor events can take as long as two weeks to travel from Peak Hill to Nyngan and associated with the slow travel is the great length of time over which flood waters can remain in the shire's territory. It must be noted, though, that travel times are very variable and that in genuinely severe events like that of 1990 they are invariably faster than in lower-level floods. In 1990, the main flood peak took little more than three days to travel from Peak Hill to Nyngan as compared with an average of six to eight days in previous major floods and even longer in floods of minor significance. The unusual speed of travel in 1990 was related to rain persisting over a saturated catchment with a major flood already in existence. Especially in the Mulla Cowal system, unusually high velocities of flow were noted.

Flood events in the Bogan Shire are complex and take many forms. While the fact that flooding will occur can normally be predicted well in advance, it is not easy to predict the form and level of flooding and therefore the precise nature of its likely impact at particular locations. In general the more severe events like that of 1990 are the quickest to rise and both for this reason and because they are outside the community's experience they are likely to catch people unawares. Equally, it is usually the larger floods in which the water levels remain high for long periods and therefore create problems in relation to **duration** of inundation as well as extent of flooding.

WEATHER SYSTEMS AND FLOODING

The Bogan River valley has a relatively dry climate, with average annual rainfall varying from only about 600 mm in the headwaters to less than 350 mm in the lower reaches. This rainfall is fairly uniformly distributed across the year, with only slight tendencies toward higher falls between June and August and between December and February. Severe floods can occur at any time, as is shown by the fact that the 1990 event took place outside these times of year.

Two main types of weather regime produce floods within the shire. In summer, deep depressions bringing moist airstreams from the north of Australia can produce flooding as a result of very high daily precipitation totals. Flooding in the cooler months occurs when a series of troughs associated with southern depressions moves over the catchment. These troughs rarely produce high daily falls but can produce very high falls over a period of weeks.

Most of the severe floods recorded in the catchment have occurred because of **sequences** of rain events rather than single ones. The early events wet the catchment, and the later ones generate the flooding. The 1990 flood, in fact, was the result of three separate rain events spread over a period of about three weeks. Given the slow response time of the catchment, floods tend to be superimposed one upon another when these rain events are as close together as they were on that occasion.

Floods can, depending on the nature of the weather systems that cause them, occur as a result of sudden high influxes from the upper catchment or as slowly-building events with large discharge volumes coming through at lower rates. The differences relate to differences in antecedent catchment conditions as well as to differences between rainfall events as far as intensity and location are concerned. The worst floods have been the result of multiple rainfall events in which individual reporting stations have recorded the equivalent of an average year's rainfall within less than a month, usually with very high daily falls occurring at some stages.

THE IMPACTS OF FLOODING

Minor flooding does negligible damage to farming activities within the Shire and may produce greater dollar benefits than costs by promoting pasture development and increasing carrying capacity. Major flooding, however, can cause considerable damage to fences as well as substantial losses of stock. Surviving animals may lose condition given the slow drainage which is the norm in the area. Some properties are flooded in their entirety in major events and farmers must move all their stock to public roads or to stock routes for the duration of the flood. Most farm houses and other farm buildings are, however, located above the flood level or are protected by individual levees. Even so they may be isolated for very long periods, both upstream and downstream of Nyngan, and in genuinely severe floods like that of 1990 some dozens of people from the rural areas need to evacuate.

Some problems of flooding in or near small villages have been experienced. Hermidale, Coolabah and Girilambone are not prone to creek flooding themselves, but access to them can be cut during flood events.

Nyngan, the Shire's service and administrative centre, is located entirely within the eastern floodplain of the Bogan River. For the first century of its existence the town experienced periodic serious flooding of its built-up area. These floods differed substantially in scale and in character. Some came literally out of the river and inundated the town from its western side, but others - including those of 1955 and 1990 - came overland from the south-east from the direction of the Mulla Cowal. The 1990 flood, in fact, was approximately 200 mm higher on the eastern side of Nyngan at the peak than on the west.

Before 1990, the last flood to cause widespread inundation of Nyngan occurred in 1950. Temporary levees kept out virtually all of the water from the 1955 and 1976 events and a permanent levee was constructed during the early eighties. This structure was expected to make the town safe from inundation except in floods considerably larger than those previously experienced though still subject to isolation. The 1990 event, however, was vastly larger than those of earlier years and the levee was

overtopped. When the sandbag levee placed on top of the earthen one failed, the town was inundated virtually in its entirety.

Well before this happened, all land access to Nyngan was cut. The Mitchell Highway south-east to Dubbo and north-west to Bourke was closed, as were the Barrier Highway to Cobar and all local roads leading to and from Nyngan. The railway line was also cut and, like the roads, subjected to washaways. The airport was eventually inundated as well, the water initially coming in from the north of the town.

Because Nyngan is so flat - the difference in elevation between the highest and lowest points is little more than a metre - almost all of the town was inundated. The railway embankment, acting as an internal levee, kept levels down in the northern parts of the town and saved some dwellings from the water, and the Hospital Hill area also remained above the peak levels of the flood. Nevertheless the failure of essential services and the potential for the development of a health hazard necessitated a wholesale evacuation and approximately 2,300 people were evacuated to Dubbo.

MITIGATION MEASURES

Since 1990, Nyngan's protective levees have been realigned, extended to encircle the town completely, and considerably raised. The bank is now, at all points along its 11-kilometre length, a metre higher than the reach of the water in the 1990 flood.

The road approaches have also been rebuilt. To the east, the Mitchell Highway has been designed to have only about 250 mm depth of water flowing over it in an event identical to that of 1990, which would allow light vehicular traffic to move to and from the town. Even if the 1990 flood height were to be exceeded, heavy-vehicle access should still be possible in floods significantly more severe than that of 1990. The western approach, which is less important in terms of supplying Nyngan or evacuating it than the eastern one, has also been built up. In a 1 in 100 year flood the depth of water over the road would be about 250 mm, and the 700 mm depth which would be expected in a repeat of the 1990 event would allow heavy vehicles to negotiate this stretch of road.

Immediately to the west of the river and outside the town's levee bank, several houses are protected by their own individual levees which were hurriedly constructed as the flood of February 1992 was rising. These banks are lower than those around the town proper and were built to much lower standards.

Flood warning systems have been augmented since 1990. New gauges have been installed on the Pangee and Whitbarrow creeks and on the Bogan River as well as on the Mulla Cowal. These gauges will provide a more complete picture of rising floods, particularly those approaching across country from the southeast, than has previously been available.

EXTREME EVENTS

The flood of 1990 was the all-time record since European settlement at all locations on the Bogan River proper above Nyngan and some below it. Nyngan's levee banks have been greatly improved since that event, but it is worth noting one of the main lessons of 1990: levees cannot guarantee total protection against floods. Not only can they subside under compaction and be compromised by lack of maintenance, they can be overtopped by floods higher than those they are designed to hold out. Some levees, not properly maintained, have failed before overtopping has occurred.

The Department of Water Resources has made a `conservatively high' estimate of the worst possible flood which Nyngan could experience. The estimate is that the water level could reach a height up to two metres above that recorded in 1990. Such a flood would overtop the new levees and inundate the entire town. It would also cause many buildings in rural areas, in the past thought to be above any conceivable flood level, to be inundated. A massive evacuation would be necessary both of the town and possibly of a few hundred people living outside it.

A flood of this magnitude is extremely unlikely to occur. Lesser floods which are nevertheless more serious than the event of 1990 are not inconceivable, however. It should be noted, too, that very serious events can occur in quick succession. The 1990 flood was followed in 1992 by an event which approximated in its severity the pre-1990 record floods of 1955 and 1976. Nyngan and surrounding areas thus experienced two of their worst-ever floods within less than two years. Of these the 1990 event was of a magnitude which would occur **on average** once every 200 years while a flood as serious as that of 1992 can be expected **on average** about once every fifty years.

It is noteworthy that extreme floods are sometimes **much** worse than previous record floods: the peak flow during the 1990 event was five times that of the flood of 1955 and the peak height was more than 0.8 metres higher on the Nyngan gauge. In this context it should be noted that the Department of Water Resources has estimated that a flood reaching 5.5 metres at Nyngan could occur, on average, once very 550 years. A flood reaching 6 metres has an estimated average return period of more than 2,000 years.

STATISTICAL INFORMATION

Some statistical details on the five most severe flood events at Nyngan during the period since World War II are as follows:

	1950	1955 (Feb)	1976 (Jan)	1990 (April)	1992 (Feb)
Peak gauge height (metres)	4.11*	4.42*	4.33	5.23	4.39
Peak discharge ('000s megalitres/day)	NA	38.9	32.2	180	NA
Flood volume ('000s megalitres)	NA	NA	275	969	NA
Days above moderate flood level (3.5 metres)	NA	NA	13	20	NA
Travel time of peak from Peak Hill to Nyngan (days)	NA	7½	6+	3+	6½
Approximate ARI (Average Recurrence Interval) of flood**	30	50	40	200	50

*Approximate only; probably not consistent with current gauge heights.

The ARI is the **average length of time which is expected to elapse between floods of a given magnitude or higher. The higher the ARI figure, the rarer and the more severe is the flood. Over a very long period of time (say 1,000 years), floods with a 100-year (or longer) ARI could be expected to occur about ten times. In any **particular** 100-year period such floods could occur more than once or not at all, since floods of particular levels do not occur regularly. An example of the irregularity is the occurrence of floods at Nyngan with high ARI values within less than two years between April 1990 and February 1992.

Source: Department of Water Resources, **Nyngan April 1990 Flood Investigation**

SPECIFIC RISK AREAS

The following are the specific risk areas which may require special arrangements or attention during times of flooding:

1.Outside the Nyngan town levee system:

a.Pumping station on the Bogan River to the south west of Nyngan.

b.ABC communications tower on Tottenham Road.

c.The caravan park on the west bank of the Bogan River immediately west of Nyngan.

d.21 houses in the Temples Lane area west of Nyngan.

e.The villages of Hermidale, Coolabah and Girilambone which can be isolated by flooding.

2.Within the Nyngan town levee system:

a.Nyngan District Hospital, Hospital Road.

b.Mick Glennie Homes, Flashman Avenue.

c.Nyngan Public School, Cathundril Street.

d.Nyngan Pre-School, Dandaloo Street.

e.St Josephs School, Terangion Street.

f.Nyngan High School.

SES RESPONSE ARRANGEMENTS FOR BOGAN SHIRE

Volume 3 of the Bogan Shire Local Flood Plan

Last Update: October 1992

RIVER-HEIGHT GAUGES MONITORED BY THE BOGAN SHIRE STATE EMERGENCY SERVICE LOCAL HEADQUARTERS

River/Creek	Location	Council Area	Flood Classification (Metres)		
			Minor	Moderate	Major
Bogan River	Peak Hill*	Parkes	2.5	4.6	6.0
	Oaks Bridge	Narromine			
	Dandaloo*	Narromine	4.1	5.2	6.0
	Waitara	Warren			
	Gwandoban	Bogan			
	Mudall*	Bogan	2.7	3.0	3.6
	Neurie Plains	Bogan			
	Summerlea	Bogan			
	Nyngan*	Bogan		3.5	4.2
Mulla Cowal	Pine View	Bogan			
	Montrose	Bogan			
	Galore	Bogan			
	Euroa	Bogan			
Pangee Creek	Clairview	Bogan			
	Wanouri	Bogan			
Whitbarrow Creek	Urunda	Bogan			
	Box Flat	Bogan			
	Woodburn	Bogan			
	Tyrone	Bogan			
	Tikkara	Bogan			

*Gauges for which the Commonwealth Bureau of Meteorology provides a flood warning service.

GUIDE TO THE CONTENT OF EVACUATION WARNING MESSAGES

1.Statement that the State Emergency Service Local Controller, Bogan Shire, advises evacuation because of the flood situation in (specify appropriate areas).

2.Information to be given to evacuees on:

a.Location of appropriate Evacuation Centre.

b.Time by which evacuation should take place.

c.Arrangements for those without their own transport.

3.Evacuees to be advised to:

a.Gather personal documents, family mementos, medications and those belongings that can be fitted within a vehicle.

b.Lift furniture and effects as high as practicable.

c.Listen to radio for confirmation of message and for further information.

4.Evacuees to be advised that Police will provide security for properties in the evacuated area.