NSW STATE EMERGENCY SERVICE

Bourke Shire LGA

Local Flood Emergency Sub Plan

FloodSafe

BOURKE SHIRE COUNCIL

NSW STATE EMERGENCY SERVICE

BOURKE SHIRE FLOOD EMERGENCY SUB PLAN

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

Volume 1 of the Bourke Shire Flood Emergency Sub Plan

Endorsed by the Emergency Management Committee

09 August 2023
Version 3.0

AUTHORISATION

The Bourke Shire Flood Emergency Sub Plan is a sub plan of the Bourke 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 Unit Commander

Print Name: KAREN KEUNING

Date: 10/8/23

Endorsed

Signature: Leonie Brown

Chair, Local Emergency Management Committee

Print Name: LEONIE BROWN

Date: 9 August 2023.

VERSION HISTORY

Version Number	Description	Date
1.0	Bourke Shire Local Flood Plan	April 2008
2.0	Bourke Shire local Flood Plan	February 2013

AMENDMENT LIST

Suggestions for amendments to this plan should be forwarded to:

Manager Emergency Planning
NSW State Emergency Service
PO Box 6126, Wollongong NSW 2500
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

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 Bourke 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 Bourke 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 Bourke 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 Bourke Shire LGA. The Bourke Shire LGA and its principal towns, villages, rivers and creeks are shown in Appendix A.

1.4.2 The council area is within 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 Bourke Shire level emergency management arrangements for prevention, preparation, response and initial recovery for flooding in the Bourke 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 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 the Bourke 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 are 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 NSW SES maintains information on the nature of flooding and the effects of flooding on communities in the Bourke Shire LGA.

2.1.2 There are no storage dams located within or upstream of the Bourke Shire LGA. However there are a number of dams on rural properties particularly around Bourke and Brewarrina, some of which are very large and anecdotally can have some influence on flooding.

3 PREVENTION/ MITIGATION

3.1 INTRODUCTION

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

3.2 LAND USE PLANNING

3.2.1 **Strategy:** Effective land use planning is a key focus for minimising the impacts of flooding. 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 created 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 created 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 or coastal inundation.

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**: The 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 they may be utilised in place of Local Flood Emergency Sub Plan 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. The NSW SES maintains a dedicated dam failure hotline and procedures to ensure priority dissemination of dam failure warnings.

f. The 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.

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

b. 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 of warnings for flash flood; or

d. On receipt of a dam failure alert; or

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

5.2 INCIDENT MANAGEMENT ARRANGEMENTS

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

Actions:

a. 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 (ICCs). 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 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 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 (EOCs) as required.

b. 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. The NSW SES may request Engineering Services Functional Area to assist with the gathering of flood intelligence including (not limited to) maximum flood extents, peak flood heights, recording major flood damage at key high velocity locations and the preparation of an 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. NSW SES Incident Controllers will issue the following NSW SES Flood Warnings aligning to the Australian Warning System:

- Advice
- Watch and Act
- Emergency Warning

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

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

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

f. 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 or 'Transport InfoLine': 131 500. VMS messaging on roadways may also be used to advise motorists.

g. 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.

h. 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. Bourke 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 Bourke 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 Council 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 Officers 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. 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 Welfare Services.

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

d. Disaster Victim Registration (DVR) will be controlled and coordinated by the NSW Police Force with the assistance of the 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 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 the SEOCON in consultation with members of the State Emergency Management Committee.

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

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

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

Actions:

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

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

5.10 FLOOD RESCUE

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

Actions:

a. 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 may 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, Welfare Services Functional Area and Bourke Shire Council representatives.

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

c. The 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 State Emergency Recovery Controller (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 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 the Bourke 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 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 State Emergency Operations Controller (SEOCON) and the State Emergency Recovery Controller (SERCON).

7 ABBREVIATIONS

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

8 GLOSSARY

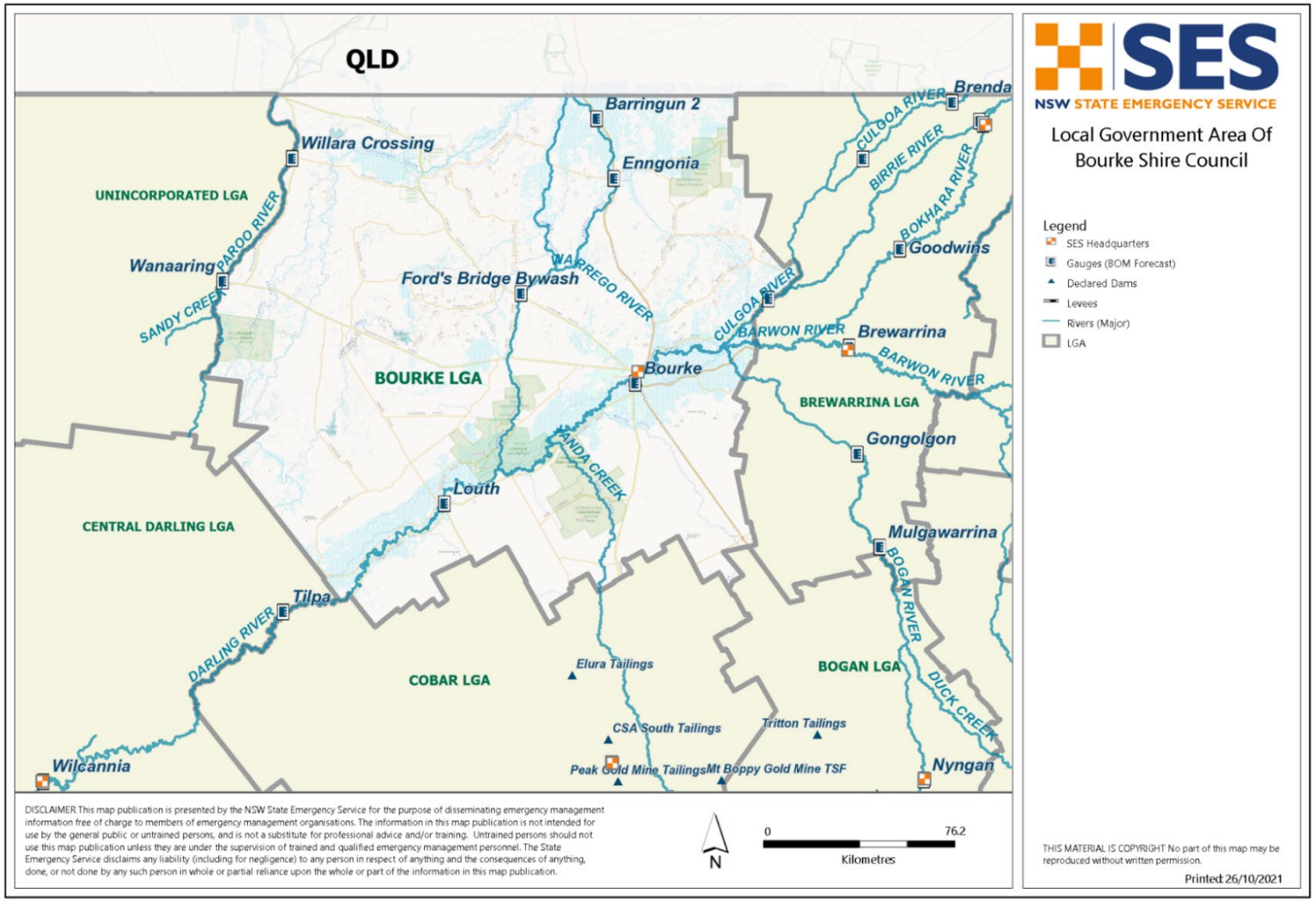
Common emergency service terminology can be found within the Australian Disaster Resilience Glossary.

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 Bourke 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 tsunamis and controls response operations. The NSW SES' roles and responsibilities in relation to floods are outlined in the NSW State Flood Plan.

AGENCY	RESPONSIBILITIES
Agriculture and Animal Services Functional Area	The roles and responsibilities for the Agriculture and Animal Services Functional Area are outlined in the Agriculture and Animal Services Supporting Plan and the NSW State Flood Plan.
Australian Government Bureau of Meteorology	The roles and responsibilities for the Australian Government Bureau of Meteorology (the Bureau) are outlined in the NSW State Flood Plan.
Bourke Shire Council	**Preparedness** • Establish and maintain floodplain and coastal risk management committees and ensure that key agencies are represented. • Develop and implement floodplain risk management plans in accordance with the NSW Government's Flood Prone Land Policy and the Floodplain Development Manual. • Provide levee studies, flood studies and floodplain management studies to the NSW SES. • Maintain council-owned flood warning networks and flood mitigation works. • Participate in the 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 local government 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.

AGENCY	RESPONSIBILITIES
	– Provision of back-up radio communications. – Resupply of isolated properties. – Technical advice on the impacts of flooding. – Close and reopen council roads (and other roads nominated by agreement with Transport for NSW) and advise the NSW SES, the 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 the 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.

AGENCY	RESPONSIBILITIES
	– Leave any movable dwelling in a condition allowing it to be relocated in an emergency (i.e.: should ensure that the wheels, axles and draw bar of the caravans are not removed and are maintained in proper working order). • Ensure that occupiers are informed of flood information. At this time, occupiers should be advised to: – Ensure that they have spare batteries for their radios. – Listen to a local radio station for updated flood information. – Prepare for evacuation and movable dwelling (cabins) relocation. • Ensure that owners and occupiers of caravans are aware of what they must do to facilitate evacuation and movable dwelling relocation when flooding occurs. • Coordinate the evacuation of people and the relocation of movable dwellings when floods are rising and their return when flood waters have subsided. Movable dwellings will be relocated back to the caravan park(s) by owners or by vehicles and drivers arranged by the park managers. • Secure any movable dwellings that are not able to be relocated to prevent floatation. • Inform 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 Energy and Utilities Services are outlined in the Energy and Utility Services Supporting Plan (EUSPLAN). Roles and responsibilities in addition to the Supporting Plan are: • Assist NSW SES with identification of infrastructure at risk of flood damage where resources are available.

AGENCY	RESPONSIBILITIES
	• Facilitate local utility service distribution providers (electricity, gas, water, wastewater) to: – 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 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 the 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.

AGENCY	RESPONSIBILITIES
NSW Ambulance	The roles and responsibilities for NSW Ambulance are outlined in the Health Services (HEALTHPLAN) Supporting Plan and NSW State Flood Plan.
NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission	The roles and responsibilities for NSW Department of Education, Association of Independent Schools of NSW, and National Catholic Education Commission are outlined in the NSW State Flood Plan.
NSW Department of Planning and Environment (Environment and Heritage Group)	The roles and responsibilities for NSW Department of Planning and Environment (Environment and Heritage Group) are outlined in the NSW State Flood Plan (referred to as DPIE EES).
NSW Department of Planning and Environment (Water)	The roles and responsibilities for NSW Department of Planning and Environment (Water) are outlined in the NSW State Flood Plan.
NSW Food Authority	The roles and responsibilities for 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 Areas are outlined in the Public Information Services Supporting Plan and NSW State Flood Plan**.**
SEOCON/SEOC	The roles and responsibilities for the State Emergency Operations Controller (SEOCON) / State Emergency Operations Centre (SEOC) are outlined in the NSW State Flood Plan**.**
Surf Life Saving NSW	The roles and responsibilities for Surf Life Saving NSW are outlined in the NSW State Flood Plan.
Telecommunications Services Functional Area	The roles and responsibilities for Telecommunications Services are outlined in the Telecommunications Services (TELCOPLAN) Supporting Plan.

AGENCY	RESPONSIBILITIES
Transport for NSW	• Transport for NSW coordinates information on road conditions for emergency services access. • Transport for NSW coordinates the management of the road network across all modes of transport. • Transport for NSW in conjunction will assist 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 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	**Nulla Aboriginal Lands Council** • Act as the point of contact between the NSW SES and the Alice Edwards Village community. • Inform the Bourke SES Unit Commander (NSW SES) about flood conditions and response needs. • Disseminate flood information, including flood and evacuation warnings, to the Alice Edwards Village community.

NSW STATE EMERGENCY SERVICE

HAZARD AND RISK IN BOURKE SHIRE

Volume 2 of the Bourke Shire Local Flood Plan

Last Update: August 2017

FloodSafe

AUTHORISATION

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

Approved

Manager Emergency Risk Management

Date: 2-8-17

Approved

NSW SES Far West Region Controller

Date: 2 AUGUST 2017

Tabled at LEMC Date:

CONTENTS

LIST OF TABLES

LIST OF FIGURES

VERSION LIST

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

Description	Date
Bourke Shire Local Flood Plan	April 2008
Bourke Local Flood Plan	January 2000

AMENDMENT LIST

Suggestions for amendments to this Volume should be forwarded to:

The Bourke Local Controller

NSW State Emergency Service

PO Box 179, BOURKE, NSW 2848

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

Amendment Number	Description	Updated by	Date

Document Issue: Version 3-02052016

1 THE FLOOD THREAT

1.1 OVERVIEW

a. The Bourke Local Government Area (LGA) is situated in Western New South Wales on the Darling River within the Murray Darling Basin system (Map 1). It has a population of around 2,868 people (1). Of these, around 30% are of indigenous decent (1). The major population centres at risk of flooding within the LGA include: Engonnia, Fords Bridge, Bourke, Alice Edwards Village, Wanaaring and Louth.

b. Flooding within the Bourke LGA normally originates some distance away, with adequate warning time to prepare. Flood waters are usually of low velocity, often taking months to pass a particular location. Levees have been constructed within the LGA which protect the low lying towns and many rural properties. Isolation of towns and properties for weeks or months at a time can occur as a result of flooding.

c. Localised heavy rainfall can result in minor to moderate flooding upstream of Bourke which can last 3 to 4 days and leads to isolation and overland flooding. Bourke itself can also be affected by localised heavy rainfall as water accumulates within the levee at its southern and south eastern corner.

1.2 LANDFORMS AND RIVER SYSTEMS

a. The Darling River Valley drains nearly half of inland southern Queensland and about two thirds of inland New South Wales. Its catchment includes the following river basins:

   i. Border Rivers (Basin No 416);

   ii. Moonie (Basin No 417);

   iii. Gwydir (Basin No 418);

   iv. Namoi (Basin 419);

   v. Castlereagh (Basin No 420);

   vi. Macquarie - Bogan (Basin No 421);

   vii. Condamine – Culgoa Rivers (Basin 422);

   viii. Warrego (Basin No 423);

   ix. Paroo (Basin No 424); and

   x. Darling (Basin No 425).

b. Of these, only parts of the Darling, Condamine-Culgoa, Warrego, Macquarie-Bogan and Paroo River basins are located within the Bourke LGA (Refer to MAP 1: Bourke LGA River Basins).

The Darling River Basin

c. The Darling River is the backbone of the drainage pattern of the Darling River Valley. Where it enters the valley at Mungindi it is known as the Barwon River and officially becomes the Darling River at the confluence of the Barwon and Culgoa Rivers between Bourke and Brewarrina (Refer to MAP 2: Darling River Basin).

The Condamine-Culgoa River Basin

d. The Barwon River is part of the Condamine – Culgoa River Basin (Refer to MAP 3: Condamone-Culgoa River Basin). It joins the valley at Mungindi where it has already drained a total catchment area of approximately 27,358 square kilometres. From Mungindi it flows in a south westerly direction being joined from the east by the waters of the Gwydir River system near Collarenebri. The contribution of flow from this system is usually relatively small due to the losses that occur in the extensive anabranch and effluent creek network of the lower Gwydir River.

e. The Namoi River joins the Barwon at Walgett. At its confluence with the Barwon River this stream has drained an area of about 26,715 square kilometres. However, its contribution into the Barwon River is limited because of extensive losses in the lower river effluent system.

f. Several major tributaries join the Barwon River between Walgett and Bourke. The Culgoa and Bokhara Rivers join the Barwon on the western bank after draining extensive areas of southern Queensland. Flow from these streams, although intermittent, enter the Barwon River through a defined system of meandering channels. The Narran River normally terminates in the Narran Lake, about 48 kilometres north east of Brewarrina, but in extreme floods flows can reach the Barwon River.

g. At the Culgoa River junction the Barwon River officially becomes the Darling River for the remaining 1,448 kilometres to the Murray confluence.

The Macquarie-Bogan River Basin

h. From the east, the Castlereagh, Macquarie and Bogan Rivers join the Barwon River between Walgett and Bourke. Flow contributions from these streams usually occur only during flood periods. At other times much of their runoff is lost in marshes and effluents, which characterise their lower reaches (Refer to MAP 4: Macquarie-Bogan River Basin).

Warrego River Basins

i. The Warrego River is located in the top north-west portion of the Murray–Darling Basin, directly east of the Paroo River catchment. The river has its source in the Carnarvon Range, at the northern-most point of the Murray–Darling Basin within Queensland. It flows southwards to the floodplains of north-west New South Wales,

where it meets the Darling River downstream of Bourke (Refer to MAP 5: Warrago River Basin).

j. The Warrego catchment is in an area of extremely variable rainfall. Annual average rainfall is in the range of 250 millimetres in the lower reaches to more than 650 millimetres in the more elevated sections of the Bulloo River. Over 42% of the area receives less than 400 millimetres per annum.

The Paroo River Basin

k. The Paroo catchment is located in north-western NSW, north of Wanaaring. It is bordered on the east by the Warrego catchment and to the west by the Lake Bancannia and Bulloo catchments. The Paroo River rises south of the Gowan Range in south-western Queensland and drains an area of 74,000 square kilometres. Fifty-five percent of the catchment (40,600 square kilometres) lies within NSW (Refer to MAP 6: Paroo River Basin).

l. From its origins in the Gowan Range the Paroo River flows south to south-west, crossing the NSW border at Hungerford. Here it is joined by Cuttaburra and Kulkyne Creeks (both effluents of the Warrego River) and flows into Pirie Lake. Beyond this lake the floodplain widens to encompass a complex network of channels and wetlands which are known as the Paroo Overflow.

m. The Paroo Overflow has only flowed into the Darling River on several occasions during the last century, joining the Darling between Tilpa and Wilcannia near Tribly Station. However it normally peters out onto the floodplain between Louth and White Cliffs.

1.3 STORAGE DAMS

a. There are no storage dams located within or upstream of the Bourke Shire LGA. However there are a number of dams on rural properties particularly around Bourke and Brewarrina, some of which are very large and anecdotally can have some influence on flooding.

1.4 WEATHER SYSTEMS AND FLOODING

a. Although low rainfall is a feature over much of the catchment, occasionally periods of intense rainfall occur. These events are associated with deep extra tropical depressions which move over the southern sections of the catchment or with the decay of tropical cyclones which have moved inland. Large section of the catchment also experience prolonged periods of no rainfall (2).

b. The occurrence of floods from February to April generally results from the predominantly summer rainfall that is received on the northern headwater tributaries of the Darling River which drain the southern parts of Queensland. The

consequent high flows from this region can take up to two months to reach Bourke. The frequency of floods in July and August is generally caused by high winter flows in the tributaries draining the central and northern parts of New South Wales (3).

c. The seasonal occurrence of floods in the Darling River Valley is related to the climatic characteristics of the catchments outside the valley. Floods at Bourke occur mostly in two periods, late summer to early autumn and late winter.

d. Over the past decade the majority of floods have occurred from November through to March. Most of those have been associated with ex-tropical cyclones.

1.5 CHARACTERISTICS OF FLOODING

a. Flooding within the Bourke LGA has two main characteristics:

   i. Most floods originate some distance away. As a result, there is usually adequate warning time to prepare communities and to check the adequacy of both structural and non-structural mitigation measures in advance.

   ii. Flood waters usually flow through the valley at low velocities, often taking over a month to pass a particular location. Although this causes little structural damage, it means that protective levees are required around towns and many rural properties. It also results in these properties being isolated for weeks or months at a time.

The Barwon River

b. Major floods on the Barwon River generally originate from the:

   i. Darling Downs in Queensland;

   ii. Gwydir River (to the east); and/or

   iii. Namoi River (to the south east).

c. Flood conditions at Walgett provide a crucial indicator of what can be expected in the Bourke area and further downstream towards Louth (Table 1). However the Culgoa, Bogan and Warrego Rivers can also provide significant inputs further downstream.

d. The Barwon River becomes known as the Darling River mid-way between Brewarrina and Bourke at Beemery Station.

e. It usually takes around 4 to 7 days for flood water to travel between Brewarrina and Bourke (Refer to Table 1 and Annex 1B).

Table 1: Indicative Flow Travel Time for the Barwon / Darling River

Locations	Travel Time
Walgett - Brewarrina	7-14 Days
Brewarrina – Bourke	4-7 Days

The Darling River

f. The Darling River begins at the confluence of the Culgoa and Barwon rivers.

g. As floodwaters move downstream of Bourke they initially break out into a series of creeks and billabongs (including Dead Horse and Talyawalka Creeks and the Ross, Marra, Talowla and Acres Billabongs) and then cross extensive flood plains on both sides of the river.

h. It usually takes 6 to 7 days for floodwater to travel between Bourke and Louth (Refer to Table 2 and Annex 1A).

Table 2: Indicative Flow Travel Time for the Darling River

Locations	Travel Time
Brewarrina – Bourke	4 - 7 Days
Bourke – Louth	6 – 7 Days

i. Although flooding in the area around Bourke is mainly caused by over-bank flows from the Darling River, high levels in the Darling River can also cause the Bogan River to backup.

j. During extreme floods, waters from the Culgoa River can also move across country and approach Bourke from the north of the Darling River.

The Culgoa River

k. The Culgoa River, which is fed by the Boundary, Maranoa and Balonne River systems in Queensland, flood an extensive area down the eastern side of the Bourke Shire before joining the Barwon River. Inundation can vary and can last for up to four months. The extent of flooding can be influenced by sand ridges located in the upper reaches of the Culgoa catchment.

l. It usually takes 8-13 days for flood waters to travel between Weilmoringle to the Darling River (Refer to Table 3 and Annex 1B).

Table 3: Indicative Flow Travel Time for the Culgoa River

Locations	Travel Time
Weilmoringle - Kenebree	5-9 days
Kenebree – Darling River	3-4 days

Warrego River

m. Just upstream of Louth, the Darling River is joined by the Warrego River, which drains a large catchment in south western Queensland. Flooding on the Warrego River can cause isolation for extended periods. Some floodwaters from this system can move west through the Cuttaburra Creek and join the Paroo River system.

n. It usually takes around 6 to 10 days for floodwater to travel between Enngonia and Fords Bridge, and an additional 14 days between Fords Bridge and the Darling River (Refer to Table 4 and Annex 1D).

Table 4: Indicative Flow Travel Time for the Warrego River

Locations	Travel Time
Barringun (Qld) - Enngonia	3-4 days
Enngonia – Fords Bridge	6 -10 days
Fords Bridge – Darling River	14 days

Bogan

o. When in flood the Bogan River can cause rural inundation of properties along its length downstream of Bourke.

p. High flood levels in the Darling River can also cause the Bogan River to backup. This causes floodwaters to approach Bourke from the east along the Dry Bogan and the Little Bogan systems as well as from low ground to the south of this system. The timing and extent of this flooding is highly dependent on the amount of vegetation growth within the catchment.

q. Gongolgon village is located south of Bourke outside of the Bourke LGA. It normally takes around 4-6 days for flood water to travel between Gongolgon and the Darling River (Refer Table 5 and Annex 1E).

Table 5: Indicative Flow Travel Time for the Bogan River

Locations	Travel Time
Gongolgon – Darling River	4-6 days

Paroo River

r. Flooding of the northern section of the Paroo River mainly affects the village of Wanaaring and surrounding rural properties. The major impacts of flooding is the isolation of mainly rural properties located on the eastern side of the river.

s. During very large floods water from the Paroo River can join the Darling River between Tilpa and Wilcannia near Trilby Station. Water travels through a complex

network of channels billabongs, creeks, anabranches, lakes and clay pans and wetlands known as the Paroo Overflow.

t. Because of the arid nature of the country and high evaporation rates, floodwaters normally terminate in Pirie Lake, or else are normally absorbed within this system. Floodwaters have only moved through the Paroo River Overflow and then the Paroo River Channel to reach the Darling River (upstream of Wilcannia) on several occasions since European settlement.

u. When the Paroo Overflow does meet with the Darling River it can cause widespread inundation of rural land and contributes additional flow to the Darling River.

v. It normally takes around 21-28 days for flood water to travel between Pirie Lake and the Darling River (Refer Table 6 and Annex 1E).

Table 6: Indicative Flow Travel Time for the Paroo River

Locations	Travel Time
Hungerford (Qld) – Willara Crossing	2-3 days
Willara Crossing – Wanaaring	3-4 days
Wanaaring – Pirie Lake	10 days
Pirie Lake – Darling River	21-28 days

1.6 FLOOD HISTORY

a. Within the Bourke LGA the most notable historical floods have affected the townships and villages of: Bourke, Engonnia, Fords Bridge, Wanaaring and Louth as well as widespread rural areas.

Bourke Flood History

b. Historically, the highest flood occurred at Bourke in 1864, with a flood level of 14.52m (to assumed gauge datum). Other notable flood events occurred in 1890, 1950, 1974, 1976, 1998 (2) and, most recently in 2010 and 2012 where flood waters reached 13.79m and 13.81m respectively at the Bourke Gauge (425003) (Figure 1).

c. The largest of the more recent flooding events occurred in 1974 and 1976 reaching 14.1 and 14.2m respectively on the Bourke Gauge (425003)(Figure 1). These are considered to have been just below the 1% AEP (1 in 100 year ARI) flood level of 14.5m (2).

d. The 1974 flood occurred during a locally dry period when there had been no significant rainfall or stream flows. Anecdotal reports describe that there was little or no vegetation on the floodplain in and around Bourke. In contrast, anecdotal evidence concerning the 1976 flood is that there was a lot of vegetation on the floodplain (2).

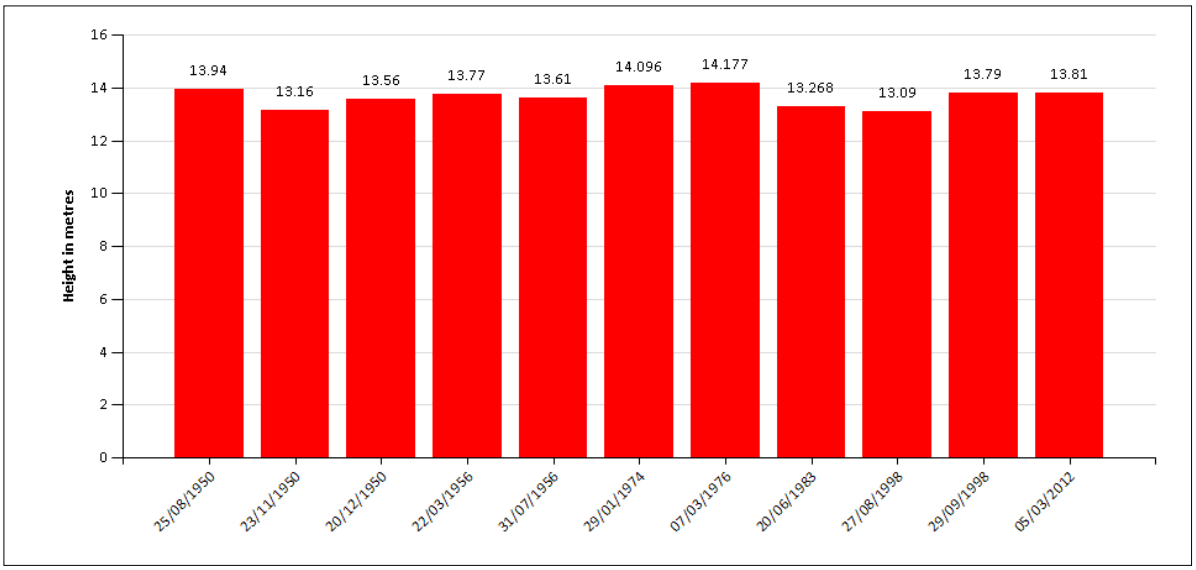


Figure 1: Flood History - Floods Above Major Classification (12.70m) 1864-2012: BOURKE (425003)

*Disclaimer: Showing the top 11 out of 13 Major Floods (based on height)

Wanaaring Flood History

e. The largest flood on record for Wanaaring reached 4.88m at the Wanaaring gauge (424001) in 1990 (Refer to Figure 2). During recent history, Wanaaring Village itself does not tend to flood, however it and rural properties in the area have historically been isolated by flooding from the Paroo River and associated Cuttaburra Creek.

f. During the 2010 flood event early predictions were for an expected record flood height of 5.3m. Consequently a temporary levee was constructed to protect properties in Wanaaring (4). However, floodwaters only ended up reaching 4.8m at the Wanaaring gauge and the town was isolated but not flooded.

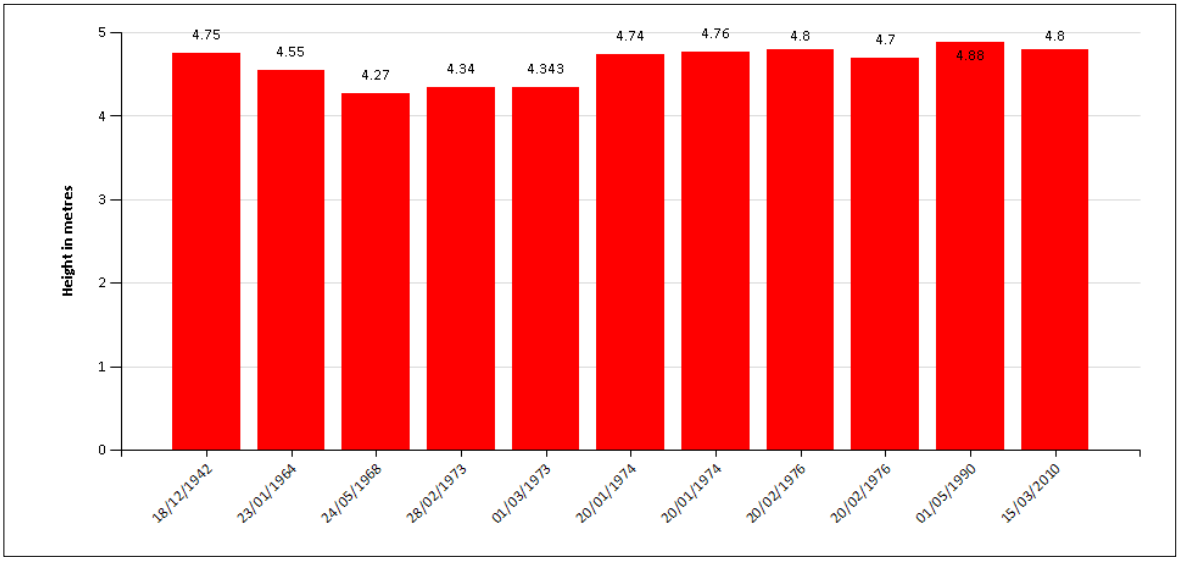


Figure 2: Flood History – Floods Above Major Classification (4.00m) 1926-2012: WANAARING (424001)

*Disclaimer: Showing the top 11 out of 21 Major Floods (based on height)

Louth

g. The highest recorded flood in Louth reached 13.94m at the Louth Gauge. Most recently 13.25m was reached during the March 2012 flood (See Figure 3). This resulted in the isolation of rural properties within the area. Louth itself was still accessible via the road to Cobar.

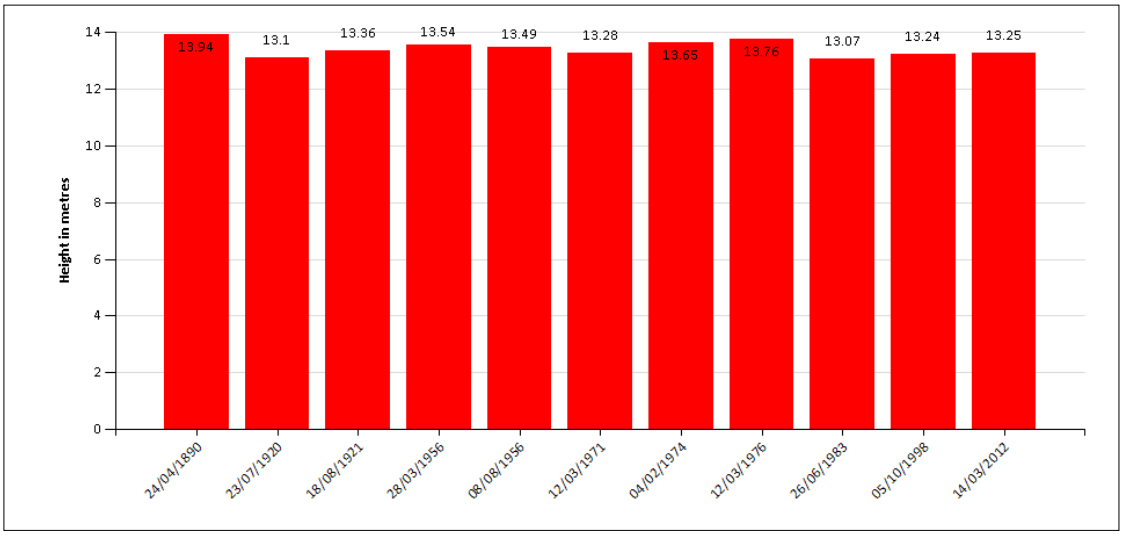
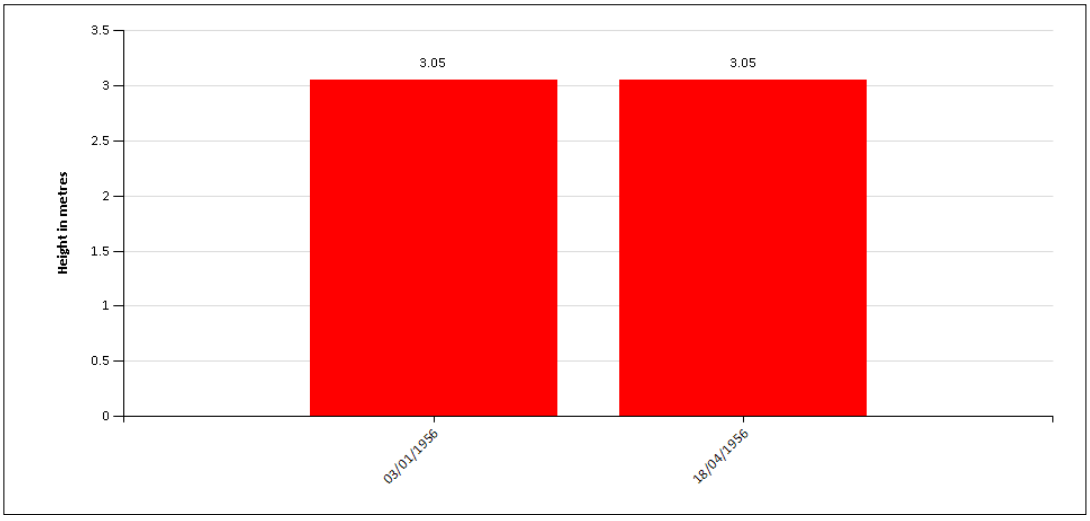


Figure 3: Flood History –Floods Above Major Classification (12.00m) 1890-2012: LOUTH (425004)

*Disclaimer: Showing the top 11 out of 21 Major Floods (based on height)

Enngonia

h. The highest recorded flood in Enngonia reached 3.05m at the Enngonia Gauge twice in 1956 during January and April (See Figure 4). These are the only recorded floods above major level in Enngonia. During minor to moderate floods historically rural properties surrounding Enngonia have been isolated.



*Disclaimer: Showing the top 2 out of 2 Major Floods (based on height)

Figure 4:Flood History –Floods Above Major Classification (3.00m) 1956-2012: ENNGONIA (423903)

1.7 FLOOD MITIGATION SYSTEMS

a. There are four main levees within the Bourke Shire LGA:

   i. Bourke Levee which protects the main township of Bourke;

   ii. Alice Edwards Village levee which protects this Indigenous community located to the west of Bourke;

   iii. Louth levee which protects the township of Louth; and

   iv. Wanaaring levee which is an informal levee built to protect the town of Wanaaring.

b. There are also numerous private levees that are built around individual properties, residential houses and businesses.

c. Each of the main levees are further described within Part 2 - Specific Risk Areas. Levee locations are shown on Maps 7, 8 and 9.

d. There are no prescribed detention basins within the Bourke Shire LGA.

1.8 EXTREME FLOODING

a. The 1976 Darling River flood reached 14.18m on the Bourke Gauge (425003). This was just below the design height of the Bourke town levee (14.5m at the gauge) which was built to protect the town during a 1% AEP event (1 in 100 year ARI) (5). In comparison, the highest flood of record in 1864 reached a flood level of 14.52m.

b. There have been no flood studies done to date which have investigated floods larger than the 1% AEP up to the Probable Maximum Flood (PMF) within the Bourke LGA. Whilst it is to be expected that floods larger than those previously recorded could occur in the future, extreme flood depths are not anticipated due to the relatively flat nature of the landscape.

c. Aerial photographs of at risk areas provide some indication of the historical extent of flooding due to the grey coloration of the soil within the floodplain compared with the surrounding red sands (Refer to Maps 7 to 12).

d. The potential overtopping or failure of levees poses the largest risk during extreme flood events within the Bourke LGA.

2 EFFECTS ON THE COMMUNITY

2.1 COMMUNITY PROFILE

Table 7: Census of Housing and Population data (2016)

Census Description	Bourke LGA 2011	Bourke LGA 2016	Bourke Urban 2016	North Bourke Urban 2016	Waanaring 2016	Louth 2016	Enngonia 2016	Fords Bridge 2016
Total Persons	**2,868**	**2,634**	**1,909**	**287**	**140**	**43**	**148**	**54**
Aged 0-4 yrs	269	222	156	20	10	0	17	3
Aged 5-14 yrs	456	395	290	46	27	3	24	8
Aged 65 + yrs	340	359	230	58	20	12	16	13
Of Indigenous Origin	867	829	704	32	17	3	66	4
Who do not speak English well	0	6	4	0	0	0	0	0
Have a need for assistance (profound/severe disability)	97	97	82	6	0	0	0	0
Living alone (Total)	285	266	196	26	11	4	12	10
Living alone (Aged 65+)	95	95	69	12	3	3	3	3
Pers in Vans, cabins, houseboats or improvised dwells	22	34	5	19	0	0	0	0
Occupied Private Dwellings (Households)	**938**	**831**	**614**	**94**	**35**	**13**	**41**	**22**
No Motor Vehicle	127	**100**	**85**	**0**	**0**	**0**	**8**	**0**
Caravan, cabin, houseboat or improvised dwell	12	19	4	9	0	0	0	0
Rented via State or Housing Authority	67	73	73	0	3	0	0	0
Rented via Housing Co-Op or Community Church Gp	41	34	18	0	0	0	19	0
No Internet Connection	318	264	196	21	4	6	15	9
Unoccupied Private Dwellings	**222**	**214**	**137**	**32**	**31**	**10**	**14**	**0**
Average persons per occup dwelling	**2.6**	**2.5**	**2.5**	**2.5**	**2.6**	**2.0**	**2.3**	**1.4**
Average vehicles per occup dwelling	**1.6**	**1.6**	**1.4**	**2.0**	**2.1**	**2.8**	**1.8**	**1.9**

Note: In the 2016 Census, Town and Locality counts are based on Mesh Block Data. Populations will be more precise for small localities than in previous Census. Hence some counts may increase and others may decrease.

SPECIFIC RISK AREAS - FLOOD

2.2 SUMMARY OF THE SPECIFIC RISK AREAS WITHIN THE BOURKE LGA

a. Communities can be affected by flooding either directly, or indirectly. Depending on their location in the landscape and the roads and services available to them during a flood, these communities can have differing needs for assistance such as evacuation, resupply and/or rescue. Flood classifications are applied to communities according to the impact that flooding has on them and the potential assistance they may require.

b. The classifications defined for the specific flood risk areas within the Bourke LGA are outlined in Table 8 below:

Table 8: Flood Classifications of Towns within the Bourke LGA

Town	Flood Classification	Relevant Gauge	Description
Bourke	Low Flood Island	Bourke (425003)	Bourke is protected by Levee to a 1% AEP (14.5m at the gauge). It becomes isolated at 13.80m due to road closures. If the levee overtops the Bourke township would be flooded.
Alice Edwards Village	Low Flood Island	Bourke (425003)	Alice Edwards Village is protected by a Levee to 14.50m (there is a unconfirmed low point in the North West Corner at 13.75m). It becomes isolated at 13.20m due to road closure. If the levee overtops the village would be flooded.
Wanaaring	High Flood Island	Wanaaring (424001)	An informal Levee protects the township to a crest height of 6.0m. The Community is normally able to evacuate via the Wanaaring/White Cliffs Road to the South West. However during major floods this route can also be cut isolating the village.
Louth	High Trapped Perimeter	Louth (425004)	Louth is protected by a levee to 14.00m (however there is a reported low point on the levee of 13.40m). Road access is available to the east via the Louth/Cobar Road to a river gauge height of 14.20m. Beyond this Louth would be isolated (Note: this has not occurred to date)
Enngonia	Rising Road Access	Enngonia (423903)	Enngonia is not protected by a levee but is located on high ground between two runners of the Warrego River. Whilst many roads around Enngonia close the Enngonia to Bourke road (Mitchell Highway) remains open.
Fords Bridge	High Trapped Perimeter	Fords Bridge (423002)	Fords Bridge is isolated from Bourke its major supply centre at 3.10m. It remains flood free to the north west, however no services are readily available for a considerable distance (4 hrs drive).

Note: Flood classifications are based on known flood history. PMF flood classifications are unknown due to lack of flood studies for these areas.

Darling River Basin

2.3 BOURKE

2.3.1 Community Overview

a. Bourke (population 2,634) is situated on the Darling River 150 kilometres north of Cobar (MAP 7: Bourke Town Map). Bourke Township has a large aboriginal population consisting of 829 people (31.5 %) of people of indigenous origin (See also Section 2.4 Alice Edwards Village).

b. Five kilometres north of the Bourke CBD is the small community of North Bourke situated on the western side of the Darling River. This is largely unaffected by flooding. The road between North Bourke and the Bourke CBD used to cut due to flooding, however this road has now been upgraded and flooding no longer occurs.

c. The Bourke township itself is protected by a levee designed to protect the town during a 1% AEP flood event (14.5m at the Bourke gauge) (5). This levee has a crest height of between 15 and 15.5m in relation to the gauge (Refer Section 2.3.7).

d. There are around 6 properties between Bourke and North Bourke that lie outside of the main levee which are subject to flooding, however many of these have their own private levees.

2.3.2 Characteristics of flooding

a. Flash, riverine, overland flood runners. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water). Bourke flooding can be one or more.

2.3.3 Flood Behaviour

a. During minor flood events flood waters flow out of the Darling River approximately 10km to the North of Bourke and then southwards through Polygonum Swamp crossing under the Bourke to North Bourke Road (SH7 Mitchell Highway). Floodwater re-joins the Darling River around 3km North of Bourke.

b. During larger flood events, floodwaters from the Darling River can inundate the areas to the west and south of Bourke.

c. Overland flooding from the Bogan River can contribute to flooding of Bourke from the east.

2.3.4 Classification of Floodplain

a. During most flood events Bourke has Rising Road Access out of town available until the last evacuation route is cut at 13.8m during major flooding.

b. From 13.8m Bourke is considered to be a High Flood Island (i.e. isolated but not flooded) up to 14.5m (1% AEP) as it is protected by a ring levee to a 1% AEP design height.

c. However during an extreme flood event, where the levee may potentially overtop or fail, Bourke is considered to be a Low Flood Island (i.e. isolated and flooded).

2.3.5 Inundation

a. Over-floor flooding in Bourke is rare. Most urban properties are protected by the Bourke levee, or are located on higher ground. Rural properties are built up above the normal flood level, or else are protected by private levees. However during extreme events these properties are at risk of flooding if the levees were to overtop or fail.

b. **Minor Floods:** Minor levels (9.5m to 11.4m at the Bourke gauge):

   i. A number of properties are isolated and may require resupply during minor flooding on both the east banks of the Darling River to the North of Bourke.

   ii. There are also a number of road closures.

c. **Moderate Floods**: Moderate levels of flooding (11.4m to 12.7m at the Bourke gauge):

   i. Most roads (other than the Mitchell Highway) are closed resulting in the isolation of rural properties.

   ii. Six properties west of Alice Edwards Village become totally isolated from Bourke.

d. **Major Floods :** Major levels (12.7 metres and above at the Bourke gauge):

   i. Can result in most roads in the Bourke area being cut.

   ii. Homesteads along the river can be isolated for six to eight weeks.

   iii. Bourke is isolated from 13.8m at the Bourke gauge.

   iv. The Bourke levee is designed to protect the town to 14.5m, with a crest height of between 15 and 15.5m.

e. **Storm Events:** During 2009 heavy rainfall over Bourke resulted in approximately 60 properties including the golf course being flooded. These properties are located inside of the levee in it's in the south eastern corner. Water affected the streets and properties to depths of approximately 0.25m, but no over-floor flooding was observed. Council has since purchased pumps that can be used to pump water out of this area if this happens again in the future.

2.3.6 Isolation

a. Bourke can become isolated at around 13.8m on the Bourke gauge when the last road out, the Mitchell Highway, is cut south of Bourke (Refer Section 2.11, 2.12 and Annex 3). This height and timing may vary depending on the influence of the Bogan River and the amount of vegetation within the catchment.

b. Alice Edwards Village is isolated from Bourke during major floods (Refer to Section 2.3 for details).

c. Bourke Township can become isolated for periods up to 4 weeks (Refer to Table 8 and Table 14).

2.3.7 Flood Mitigation Systems

Table 9: Bourke Levee; Summary of Information

Bourke Levee	
Location	This levee protects the Bourke Township from flooding which primarily originates from the Darling River within the Darling River Basin.
Type of Levee (ring etc.)	Ring Levee with a total distance of 10.5km. It has been constructed of Black clay gypsum stabilised with a gravel top.
Owner	Bourke Shire Council
Design Height and freeboard	Design height is 14.5m (RL 106.4m) equivalent to a 1% AEP **Invalid source specified.**. The design freeboard is around 1m, however a survey in 2015 found this freeboard to range between 0.5m to 1m (RL106.90 to RL107.40, or 15.0m to 15.5m) disregarding the known low point at the old wharf.
Overtopping Height	The low point at the old wharf is at 13.07m (RL104.92) would currently be the first place that the levee would overtop **Invalid source specified.**.
No. of properties protected	2000 people (Approximately 800 Dwellings)
Known low points	There is a known low point of 13.07m at the tourist wharf (Chainage 8400m or Location: S30.05.15 – E 145.56.08) **Invalid source specified.**. This low point extends approximately 100 to 150m in length. Council has a plan in place to instate flood barriers at this location when required (6).
Actions required in a flood event	Flood gates need to be closed. Council will need to enact their plan to place flood barriers at the low-point near the Old Wharf.
Location and sequence of inundation	It is assumed inundation would commence at the low point unless Council implements their plan to place flood barriers at this location prior to flooding. There is no spillway.
Consequences of levee overtopping or failure	There is no high point behind the levee should it over top. The nearest high ground is approximately 5km to the south east towards Cobar. However given that all road access is closed at 13.8m should this height be predicted, resupply plans and a review of evacuation would be required.
Deficiencies	The levee is generally well maintained by council. There are no specific known deficiencies, however the low point near the old wharf means that it does not currently protect the town of Bourke to its design height (14.5m) 1%AEP **Invalid source specified.**.

2.3.8 Dams

a. There are no prescribed dams within the Bourke LGA.

2.3.9 At Risk Facilities

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

b. These facilities are normally only affected if Bourke becomes isolated at 13.8m. During an extreme flood event they could potentially be impacted if the Bourke levee was to overtop or fail.

2.3.10 Other Considerations

a. No other known considerations.

2.4 ALICE EDWARDS VILLAGE

2.4.1 Community Overview

a. Alice Edwards Village is situated on the Darling River approximately 1.5km to the west of Bourke on Adelaide Street (MAP 8: Alice Edwards Village Map).

b. Up to 80 people live in Alice Edwards Village (an indigenous community) within 19 properties and 4 flats.

c. The village is protected by a levee to a design height of 14.5m. However the village is isolated from Bourke at 13.2m on the Bourke gauge and requires evacuation prior to this height being reached. The Evacuation Trigger for Alice Edwards Village is 12.85m on the Bourke gauge.

2.4.2 Characteristics of flooding

a. Flash, riverine, overland, flood runners. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water). Can be one or more.

2.4.3 Flood Behaviour

a. During minor and moderate flood events flood waters do not tend to affect Alice Edwards Village itself, but can cut Parkdale Road (which becomes Adelaide St) to the west of the village.

b. During high moderate to major flood events water from the Darling River inundates the areas surrounding Alice Edwards Village.

2.4.4 Classification of Floodplain

a. During small flood events Alice Edwards Village has Rising Road Access out of the village and into Bourke until Parkdale Road /Adelaide Street is cut at 13.2m.

b. From 13.2m Alice Edwards village is considered to be a High Flood Island (i.e. isolated but not flooded) up to 14.5m (1% AEP) as it is protected by a ring levee.

c. However in an extreme flood event, where the levee may potentially overtop or fail, Alice Edwards Village is considered to be a Low Flood Island (i.e. isolated and flooded).

2.4.5 Inundation

a. **Minor:** During minor flood events (9.5m to 11.3m at the Bourke gauge):

   i. Waters do not tend to affect Alice Edwards Village itself.

b. **Moderate:** During moderate flood events (11.4m to 12.6m at the Bourke gauge):

i. Parkdale Road to the west of Alice Edwards Village can be cut isolating 6 properties.

c. **Major:** During major flood events (Above 12.7m at the Bourke gauge):

i. The evacuation route from Alice Edwards Village into Bourke along Adelaide Street is cut at 13.2m on the Bourke gauge.

2.4.6 Isolation

a. Alice Edwards Village is isolated from Bourke during major floods. Road access to the village is lost from 13.2 metres on the Bourke gauge (Refer to Table 8, Table 13 and Table 14).

2.4.7 Flood Mitigation Systems

Table 10: Alice Edwards Village Levee; Summary of Information

Alice Edwards Village Levee	
Location	Alice Edwards Village indigenous community located 1.5km west of Bourke.
Type of Levee (ring etc.)	Ring levee
Owner	Nulla Aboriginal Land Council
Design Height and freeboard	Crest height of 15.26m at the Bourke gauge (7) (8). The design height is believed to be 14.5m at the Bourke gauge (unconfirmed).
Overtopping Height	The crest height of the levee was originally designed to be 15.26m at the Bourke gauge (107.20 m AHD) (7) (8).
No. of properties protected	19 properties and 4 flats (8) about 80 people.
Known low points	A low point exists at the entry road into the village which is 14.91m at the Bourke gauge (8). A low point exists in the North West corner of the levee close the river where a track crossing the levee has eroded it (possibly at 13.75m - unconfirmed).
Actions required in a flood event	Evacuation of the village is required prior to their access road being cut at 13.2m. Both electricity and sewage has to be turned off to the village when evacuating. Sandbagging of the low points of the levee.
Location and sequence of inundation	Unknown, however likely that inundation will first occur at the low point in the North West corner and the entrance road.
Consequences of levee overtopping or failure	There is no high point behind the levee should it over top. Overtopping could potentially inundate 19 properties and 4 flats affecting approximately 80 people.
Deficiencies	There were a number of deficiencies in this levee reported during an inspection in 2011 including some eroded areas and sink holes in the crest as well as some issues with the southern stormwater outlet (8).

2.4.8 Dams

a. There are no prescribed dams within the Bourke LGA.

2.4.9 At Risk Facilities

a. There are no known at risk facilities within Alice Edwards Village. All properties within the village are residential.

2.4.10 Other Considerations

a. Cultural sensitivities relating to Alice Edwards Village being an indigenous community.

2.6 LOUTH

2.6.1 Community Overview

a. Louth is located on the eastern bank of the Darling River 150kms south of Bourke (MAP 9: Louth Town Map).

b. Louth has a population of 43, with facilities such as a local hotel, primary school and a small number of local industries including a goat abattoir.

c. Louth is not considered to be at significant risk from flood inundation, however it can become largely surrounded by flooding of the Darling River and has the potential to be isolated if floodwaters reach above 14.2m on the Louth gauge. Access out of Louth to Cobar remains possible during most flood events, however rainfall can impact the condition of roads and also close them.

d. Louth has an earthen levee which has been constructed to divert water around the town and protect those properties closest to the river on the western side of town. There are two properties on the northern edge of Louth that lie outside of the main levee. These are protected by private levees of questionable standard.

e. A bitumen aircraft landing strip is located to the east of the town and is not affected by flooding.

f. The largest impacts of flooding have historically been to the many rural properties surrounding Louth which can be isolated and/or cut off from Louth.

2.6.2 Characteristics of flooding

a. Riverine flooding from the Darling River. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water).

2.6.3 Flood Behaviour

a. Water initially breaks out of the Darling River in the vicinity of "Trilbey Station" (30 kilometres south of Louth towards Tilpa) which leads to road closures on the eastern and western sides of the river.

b. Water then flows out of the Darling River to the east and south into Talyawalka Creek. Flood waters from Monday and Tuesday Creeks also join Talyawalka Creek which then travels overland resulting in further road closures.

c. Most of the road closures affecting Louth occur as a result of flooding from the Darling River much further upstream closer to Bourke.

d. Water from the Darling River to the west of Louth is diverted around the town by the levee. During the 2012 flood the levee was extended further to the south. This has

resulted in floodwaters now being diverted further to the south of town and no longer impacting on areas including the Louth Showground.

2.6.4 Classification of Floodplain

a. During previous floods road access has normally been available to the east of Louth via the Louth/Cobar Road and Louth is considered to have Rising Road Access.

b. It is expected that the Louth/Cobar Road will close due to flooding of the last road out of town around 14.2m on the Louth gauge, however to date this has not yet occurred. If this road were to close, Louth would be isolated. In these extreme events Louth would be classified as being a High Trapped Perimeter as overland escape is not possible.

2.6.5 Inundation

a. **Below minor**: Below minor floods (below 8.6m at the Louth gauge 425004):

   i. Once water has broken out of the Darling River, about 5 days later floodwaters cross the Louth to Tilpa Road at Talyawalka Crossing isolating "Tara".

   ii. About one day later again "Kalara" is isolated.

b. Both of these properties are able to access alternative routes towards White Cliffs dependant on if the Paroo is in major flood.

c. **Minor:** During minor floods (8.6 to 10m at the Louth gauge 425004):

   i. "Akuna" homestead is isolated (8.82m). This homestead has a private levee.

   ii. The Louth to Tilpa road can be cut (9.5m) dependant on weather conditions resulting in no vehicular access to Louth or Tilpa from properties on the eastern side of the Darling River. However, there are often still alternative routes available to locals through private properties.

d. **Moderate**: During moderate floods (10m to 12m at the Louth gauge 425004):

   i. From 11.2m the properties of "Newfoundland/Belgrove", "Idalia", "Minley", "Trilbey" and "Delta" are isolated by road and rely on the use of private aircraft or resupply from the NSW SES. Each of these properties has a good bush airstrip.

e. **Major:** During major floods (above 12m at the Louth gauge 424004):

   i. Water can cut the Louth to Bourke Road (also known as Louth to Toorale Road) (12.2m) near "Eldorado" property to the north west of Louth. When this closes there is no direct access to Bourke, however longer alternative routes are still normally available. The airstrips on "Idalia" and "Trilby" may close (13m) due to flooding resulting in resupply support being required.

ii. All roads on the western side of the river cut (13.1m) resulting in up to 20 properties being isolated.

iii. The airstrip on "Newfoundland/Bellsgrove" may close (13.5m unconfirmed).

iv. The crest height of the Louth levee is around 14m on the Louth gauge, with land behind the levee generally around 13m. If the levee overtops or fails all roads will be closed and there would be inundation of properties.

v. The Louth to Cobar road is expected to close around 14.2m isolating Louth, however since its upgrade flooding of this road has not yet occurred.

f. Refer to road closure details in Table 13 and Annex 3 for further details.

2.6.6 Isolation

a. Louth could potentially be isolated above 14.2m when the Louth to Cobar Road is expected to close. However historically Louth has had road access out of town available. The nearby airstrip also provides a potential means of access into and out of town.

b. During the 2012 flood event Louth was isolated for several weeks, however this was due to heavy localised rainfall closing the roads rather than due to riverine flooding.

c. Numerous rural properties surrounding Louth can be isolated by road and require resupply (Refer to 2.6.5 and Table 14). Some of these properties have their own airstrips, or else may have alternative means of travelling through private properties as detailed above.

2.6.7 Flood Mitigation Systems

Table 11: Levees in Louth; summary of information

Louth Levee (9) (10) (11)	
Location	The Louth levee is located on the eastern bank of the Darling River protecting the western side of the township of Louth
Type of Levee (ring etc.)	Partial levee system which deflects water around the town. It consists of an existing main levee and a southern extension to the south constructed prior to the 2012 flood.
Owner	Bourke Shire Council
Design Height and freeboard	The original levee was designed to a crest height of 14m. During the 2012 flood event this levee was surveyed and found its levels vary around 14m. Council have done further works on this levee since this survey was undertaken.
Overtopping Height	Varies between 13.3 (southern cut off levee) and between 13.7m and 14.57m (on main levee) on the Louth gauge. The original design of the main levee was up to 14m. Further works may have been done.
No. of properties protected	Approx 23 private dwellings plus businesses.

Known low points	There is a known low point on the main Louth levee where the Louth to White Cliffs Road crosses it (13.7m on the Louth gauge). The southern cut off levee has its lowest point at 13.3m however the main purpose of this levee is to deflect water away from the community. Stormwater outlet pipes through the levee need to be closed off prior to the rising flood water reaching any pipe level on the outside of the levee.
Location and sequence of inundation	Unknown
Consequences of levee overtopping or failure	There is high ground located behind and to the east of the levee should it fail or overtop.
Deficiencies	Crab holes undermining the levee along the riverbank (12). Known low-points as above.

2.6.8 Dams

a. There are no prescribed dams within the Bourke LGA.

2.6.9 At Risk Facilities

a. The Louth Public School is the only known facility at risk of flooding within Louth, however this is located behind the levee an it is only at risk should the levee fail or overtop.

b. The facilities that are at risk of flooding and/or isolation within the Bourke Shire LGA are shown in Annex 2.

2.6.10 Other Considerations

a. Roads surrounding Louth are gravel. Due to the nature of the soils within this district, when rainfall occurs these roads can become impassable and roads may be closed earlier than stated above.

b. The Louth Races are held annually during August over a weekend. During this time the population can increase by up to 5,000 people.

Paroo River Basin

2.8 WANAARING

2.8.1 Community Overview

a. Wanaaring (Population 55) is situated on the Paroo River 180km to the west of Bourke and 234km to the east of Tibooburra (MAP 10: Wanaaring Town Map).

b. The township provides services to outlying station properties and to the travellers passing through to or from the Corner Country.

c. Wanaaring is located on high ground and isn't normally directly affected by flooding but it can be isolated as a result of road closures.

d. A temporary levee was constructed during the 2010 flood event to an approximate crest height of 6m on the Wanaaring gauge in order to protect the town against the predicted 5.3m flood. However flood levels did not reach the predicted height and did not cause flooding in Wanaaring. The temporary levee was meant to be removed or upgraded following this flood event, however to date this has not occurred.

2.8.2 Characteristics of Flooding

a. Riverine flooding from the Paroo River which can be influenced by flooding of the Cutterburra Creek. Overland flooding from the Warrego River. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water).

2.8.3 Flood Behaviour

a. Primarily Wanaaring is affected by overbank flows from the Paroo River. The main Paroo River is located to the east of town, however a smaller branch of the river leaves it 3km north of town and runs around the town on its western side before re-joining the river about 2.5km downstream. During flood events Wanaaring becomes surrounded by floodwaters.

b. Cuttaburra Creek is located further to the east of town and is an overflow from the Warrego River which can contribute to Paroo River flooding.

c. The Warrego River is located further to the east again. During major floods overland flow from the Warrego River can join with floodwaters in Cuttaburra Creek and the Paroo River.

d. During the 2010 flood event all rivers in the area were in flood including the Warrego River, Cuttaburra Creek and the Paroo River.

2.8.4 Classification of Floodplain

a. During minor flood events Wanaaring is classified as having Rising Road Access. Road access out of Wanaaring is available via the Wanaaring/White Cliffs Road to the South West.

b. However during major floods floodwaters can surround Wanaaring and all roads out can cut isolating the village. Wanaaring is then considered to be a High Flood Island. Whilst a number of buildings on the outskirts of Wanaaring are at risk of flooding should the temporary levees overtop or fail, most of the village is located on high ground.

2.8.5 Inundation

a. **Minor:** During minor floods (2.4m to 3.3m at the Wanaaring gauge 424001):

   i. Farmland begins to be inundated.

   ii. Water can begin to cut the final access to town (from 3m at the Wanaaring gauge) 1.5km to the west at the Billabong. The height this cuts is dependent on if the Warrego River is in major flood and is overflowing into the Cuttaburra Basin.

b. **Moderate**: During moderate floods (3.3m to 4m at the Wanaaring gauge 424001):

   i. The final access into and out of Wanaaring (Wanaaring to Tibooburra Road (MR405)) is closed 1km west of Wanaaring by 3.8m at the gauge (but can occur earlier).

   ii. Fifteen to 20 properties in an area up to 70km to the west of Wanaaring loose road access to Wanaaring. An additional 16 properties to the east of Wanaaring may also be isolated.

c. **Major:** During major floods (Above 4.0m at the Wanaaring gauge 424001):

   i. Many additional properties outside of town will lose road access into Wanaaring due to road closures and require resupply. If the Paroo and Cuttaburrah are in flood properties may be isolated for up to 4-6 weeks.

2.8.6 Isolation

a. Wanaaring itself can become isolated when all access roads are cut. The height this occurs is dependent on which rivers are in flood, however normally all roads are closed by 3.8m on the Wanaaring gauge (Refer to Table 8, Table 13, Table 14 and Annex 3).

b. Rural properties surrounding Wanaaring can also be isolated by road due to flooding. During past flood events locals have operated a ferry service to access Wanaaring as well as to travel between properties.

c. During the 2010 flood event (which reached 4.8m on the Wanaaring gauge) one property (Gorimpa Station) located downstream of Wanaaring was isolated for 9 months.

d. A bitumen landing strip is located to the east of the township. The strip is not affected by flood water, however can become isolated from the township above 5.0m on the Wanaaring gauge.

2.8.7 Flood Mitigation Systems

a. In the 2010 flood, the flood was initially predicted to peak at 5.3 metres which would have been the flood of record. The Bourke Shire Council in consultation with the NSW SES and NSW Public Works, constructed two temporary emergency levees that encompass the entirety of the community.

b. This involved raising and extending the existing flood levee, which runs beside the Paroo River ("Main Levee") and construction of a new flood levee behind the town ("Rear Levee"). These levees were made of local materials to a height of around 6 metres (Crest Level), 0.7m above the predicted peak. They were to be removed or enhanced following the 2010 event, however these works are to date still in place and are in questionable condition (Refer to Table 12 below for further levee details).

2.8.8 Dams

a. There are no prescribed dams within the Bourke LGA.

2.8.9 At Risk Facilities

a. The Wanaaring Public School, Wanaaring Health Service and the Wanaaring Police Station are potentially at risk should the Wanaaring levees fail or overtop during major floods.

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

2.8.10 Other Considerations

a. Wanaaring is the key service centre for many surrounding rural properties.

Table 12: Levees in Wanaaring; Summary of Information

Wanaaring Levee (4) (13)	
Location	Wanaaring Levee located on the Paroo River. A Temporary levee was constructed during the 2010 flood event consisting of two parts: • Main Levee is an enhancement and extension of the existing flood levee, which runs beside the Paroo River. • "Rear levee" Construction of a new flood levee, behind the town, near the rubbish tip ("rear" levee).
Type of Levee	Partial levee tied into high ground.
Owner	Bourke Shire Council
Design Height and freeboard	The temporary levee was constructed in order to protect properties to the predicted height of 5.3m on the Wanaaring gauge with a freeboard of 0.7m.
Overtopping Height	It was built to have a crest height of 6m. However a subsequent survey of the levee in 2012 noted that actual crest heights varies but is generally around 5.8m.
No. of properties protected	50 properties consisting of residential as well as commercial properties, a police station, health service and primary school.
Known low points	Gaps are located in the levee where the roads cross it. The lowest of these is located at 4.21m, with another at 5.24m.
Location and sequence of inundation	Unknown. Either at the low points, or in areas where the levee is in poor condition due to levee failure.
Consequences of levee overtopping or failure	Most of the properties within Wanaaring are located on higher ground, however without the levee a number of properties on the edge of town, particularly those on the Bourke-Milparinka Road including residential commercial properties, a police station, health service and primary school could be flood affected.
Deficiencies	The enhancement of the existing main levee and construction of the new "rear levee" were done under emergency conditions using local materials. As such these works were considered to be a temporary measure with further enhancement works following flooding recommended at the time. The materials used in the construction, particularly within the rear levee are known to be highly erodible and the rear levee in particular is known to have poor compaction *(4)*. Survey work done following the 2010 flood identified severe erosion from 250m to 800m in the sandy bank. It is understood that to date this has not been fixed.

Warrego River Basin

2.9 ENNGONIA

2.9.1 Community Overview

a. Engonnia (Population 124) is located on the Warrego River 95km north of Bourke and 40km south of the Queensland border (MAP 11: Enngonia Town Map). It is made up of a police station, a small school, a pub with caravan facilities and 38 private dwellings. Engonnia has a high indigenous population making up 45% of the total population (14).

b. Enngonia itself is not considered to be at risk from flood inundation, however it can become largely surrounded by flooding of the Warrego effluent tributaries. Access out of Enngonia to Bourke remains possible during flood events.

c. However, many rural properties surrounding Enngonia can be isolated and/or cut off from Enngonia.

2.9.2 Characteristics of flooding

a. Riverine flooding from the Warrego River and its various tributaries. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water).

2.9.3 Flood Behaviour

a. During minor flooding water breaks out of the Warrego River and runs into Multagoona Creek. Cato Creek can also back up and flow overland cutting the Mitchell Highway near a property named “Cato” around 7km north of Enngonia.

b. As flooding increases to moderate levels floodwaters begin to surround the village of Enngonia on all sides cutting various access roads to the East, North and West. The Mitchell Highway between Enngonia and Bourke to the south of town has been upgraded and during recent flood events has remained open. It is uncertain at what height this road will now be cut.

c. The Cuttaburra, which is fed by the Warrego River, can cause significant isolations to the east of Enngonia if in flood.

d. There is little information available regarding major floods in this area as there hasn’t been a major flood since 1956.

2.9.4 Classification of Floodplain

a. Engonnia has Rising Road Access out of town during all known flood events (Table 8).

2.9.5 Inundation

a. Enngonia itself is not considered to be at risk of flooding, however it can become largely surrounded by floodwaters from the Warrego River resulting in the isolation of surrounding rural properties.

b. **Minor:** During minor floods (2m to 2.5m on the Engonnia gauge 423903) the:

   i. Enngonia to Yantabulla Road is cut about 5.5km west of Engonnia (2m) isolating the properties of “Congarara” and “Mulyagoona” for periods of up to two weeks.

   ii. The Mitchell Highway closes to light traffic around 7km north of Enngonia (2.35m) near “The Cato” but remains open to high clearance and heavy vehicles.

   iii. By 2.5m on the gauge all local roads apart from the Mitchell Highway South to Bourke are closed isolating approximately 20 properties.

c. **Moderate:** During moderate floods (2.5m to 2.9m on the Engonnia gauge 423903)**:**

   i. The Mitchell Highway is closed to all vehicles 7 km north of Enngonia at "The Cato" (2.7m) denying road access between Enngonia and Cunnamulla.

   ii. All roads west, north and east of Enngonia are closed (2.9m), however the Mitchell highway to Bourke remains open.

   iii. Properties can access Weilmoringle via an alternate route, however this will depend on the levels of the Culgoa River. Up to 6 properties could be isolated and require resupply (2.9m).

d. **Major:** As there has been no major flooding (above 2.9m Engonnia gauge 423903) in Engonnia since 1956 little is known of major flood impacts in Enngonia.

2.9.6 Isolation

a. Enngonia itself is not isolated, however rural properties surrounding Enngonia may be isolated due to road closures for 4 to 8 weeks depending on flood extent of the Warrego and Cuttaburra Basin (Refer to Table 8 and Table 14).

2.9.7 Flood Mitigation Systems

a. Engonnia is not protected by a levee but is located on high ground between two tributaries of the Warrego River.

2.9.8 Dams

a. There are no prescribed dams within the Bourke LGA.

2.9.9 At Risk Facilities

a. There are no known facilities at risk within Enngonia.

2.10 FORDS BRIDGE

2.10.1 Community Overview

a. Fords Bridge is located 103 kilometres north west of Bourke on the Warrego River (MAP 12: Fords Bridge Town Map). Fords Bridge consists of a pub and two residential houses. It has an estimated current population of 5.

2.10.2 Characteristics of Flooding

a. Riverine flooding from the Warrego River. Overland flooding from the Warrego and Cattaburra catchments. Localised heavy rainfall can also cause pooling of water that can take some time to evaporate (referred to as Orphan Water).

2.10.3 Flood Behaviour

a. Fords Bridge is affected by overbank flows from the Warrego River. The Warrego River is situated to the east of town.

b. The Warrego River spits into two creating what is known as the Fords Bridge Bywash as it approaches Fords Bridge.

c. During flooding both tributaries flow under bridges to the east of Fords Bridge. The road approaches between the two bridges is low and once cut by floodwaters the most direct access route between Fords Bridge and Bourke is closed.

d. To the east Fords Bridge access can be affected by the flooding of the Cuttaburra basin, an overflow the upper reaches of the Warrego River.

2.10.4 Classification of Floodplain

a. During moderate flood events Fords Bridge is classified as having Rising Road Access as road access is available via Snake Gully Rd to Wanaaring Road heading to the south of the village (Table 8).

b. During major floods floodwaters can cut access routes to Bourke, its main supply centre. Whilst Fords Bridge remains flood free to the North West, no services are readily available for a considerable distance (4 hrs drive) in this direction. The village is located on high ground so in this instance Fords Bridge is classified as being a High Trapped Perimeter (Table 8).

2.10.5 Inundation

a. **Minor:** During minor floods (1.7m to 2.3m on the Fords Bridge Bywash gauge 423002):

   i. Farmland begins to be inundated.

   ii. The Bourke - Hungerford Road is closed to low clearance and family cars. 4WD and high clearance vehicles may still have access with caution.

b. **Moderate**: During moderate floods (2.3m to 3.2m on the Fords Bridge Bywash gauge 423002):

   i. Low lying areas around town are flooded. This only affects the old Cricket Ground and does not cause any problems for the village.

   ii. The Fords Bridge - Enngonia road is closed as the result of the Warrego River/Willara Creek backing up and breaking out just north of Fords Bridge.

   iii. It is estimated that the Fords Bridge - Snake Gully - Wanaaring Road (RLR17) will be closed to all vehicles by water over the road at Warrego River Fords Bridge Bywash (3.1m). When this occurs, all crossing points over the Warrego River are lost. Properties and travellers on the western side of the Warrego River are denied access to Bourke for prolonged periods.

c. **Major:** During major floods (Above 3.2m on the Fords Bridge Bywash gauge 423002):

   i. Many additional properties outside of town will lose road access into Fords Bridge due to road closures and require resupply. Isolation and resupply may occur over a 4 to 6 week period.

2.10.6 Isolation

a. The most direct route from Fords Bridge to Bourke can become cut around 2.78m at the Fords Bridge Bywash (Fords Bridge Bywash gauge (423002)).

b. Fords Bridge becomes totally cut off from Bourke at 3.10 m when Snake Gully road closes to the south of the village RLR17. It remains flood free to the west, however no services are readily available for a considerable distance (4 hrs drive).

c. Considerable isolation of rural properties occurs during moderate to major flooding.

d. The Cuttaburra basin to the west of village will also influence the time of isolation for surrounding rural properties.

2.10.7 Flood Mitigation Systems

a. There are no known levees or flood mitigation systems surrounding Fords Bridge.

2.10.8 Dams

a. There are no known prescribed dams surrounding Fords Bridge.

2.10.9 At Risk Facilities

a. There are known at risk facilities surrounding Fords Bridge.

2.10.10 Other Considerations

a. No other considerations.

2.11 ROAD CLOSURES

Table 13: Lists roads liable to flooding in the Bourke Shire LGA, these locations are shown within Annex 3

Bourke and Alice Edwards Village

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Kamilaroi HWY SH29	55kms east of Bourke towards Brewarrina	access to Brewarrina	via the Mitchell Hwy/Arthur Hall VC Way	9.77m Bourke gauge
Dowling Track MR404	Fords Bridge Bywash	Access to Enngonia and Fords Bridge	Nil	3.10 on Warrego Gauge
Wanaaring Rd MR405	25kms west various if Warrego and Cuttaburra in Flood	Access to Wanaaring and Rural Properties	Possible via RLR 28 to RLR 44 dependant on Paroo Flooding	3.3m Wanaaring Gauge
Louth Rd MR68s	Jandra Creek	Access to Louth	Via Cobar	11.15m Bourke gauge
Parkdale Rd	1.5 and 2.0kms west of Bourke	Access to Residential Properties and Alice Edwards Village	Nil	12.80
Cobar Rd MR421	4.5kms south of Bourke	Access to Cobar	Nil	13.70m Bourke gauge
Nyngan Rd SH7	5km east of Bourke	Access to Nyngan	Nil	13.20m Bourke gauge

Fords Bridge

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Bourke Rd MR404	Fords Bridge Bywash	Direct access to Bourke	Via RLR17 to MR405 or a 6hrs trip via RLR405 – RLR44 – MR407 to Cobar	3.10m Fords Bridge Bywash gauge
Lower Lila Rd RLR25	20kms east of Fords Bridge	Major Rural Property Access	RLR 25 east via SH7 to Bourke	2.58m Fords Bridge Bywash gauge
Snake Gully Rd RLR 17	South of Fords Bridge	Final access to Bourke	via RLR 20 to MR405, dependant on Warrego and Cuttabuura flood extent	N/A

Enngonia

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Mitchell Hwy SH7	North of Enngonia	Access to Cullamulla	Possible by Qld Roads	2.70m Enngonia
Burrawantie RLR27	West of Enngonia	Access to rural Properties	Nil	2.91m Enngonia
Dunsandle Rd RLR1	East of Enngonia	Access to rural Properties	Possible via RLR2 – RLR31 to RLR3 and SH7 to Bourke	2.91m Enngonia

Wanaaring

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Willara Rd RLR23	Willara Crossing	Access to rural properties	Possible via private roads dependant on Paroo and Cuttaburra flood extent	1.86m Willara Crossing
Milparinka Rd west RLR 405	2.0km west of Wanaaring	West access (White Cliffs/Tibooburra, Rural Properties	Via White Cliffs Rd And Wilcannia Rd SR5 (CDSC)	3.3m Wanaaring
Wilcannia Rd SR5	15kms south of Wanaaring approx.	Access to southern rural properties	Nil	3.4m Wanaaring
Bourke Rd MR405	5 mile Crossing 9kms east of Wanaaring	Direct access to Bourke	Nil	4.6m Wanaaring
Bourke Rd MR405	Kulkyne Creek Crossing East of Wanaaring 76kms	Access to Wanaaring and rural properties	Nil	N/A. Influenced by flood from the Warrego river Possible indication is the Tara Gauge on the Warrego

Louth

Road	Closure location	Consequence of closure	Alternate Route	Indicative gauge height
Louth to Tilpa MR68s	Talyawalka Crossing	Direct access to Tilpa and rural properties	MR407 to Cobar or MR68s to Wilcannia	8.20m Louth
Louth to Bourke MR68s	North of Louth	Direct access to Bourke and rural properties	MR407 to Cobar	8.82m Louth
Louth to Tilpa RLR10	Near Trilby Stn	Western river access to Tilpa and rural properties	Possible via RLR 44 – RLR 13 to White Cliffs	10.14m Louth
Louth to Bourke RLR11	11kms south of Toorale	Direct access to Bourke and rural Properties	Possible via RLR44 MR405 to Bourke	12.2m Louth
RLR44 to Wanaaring	Known Bridge Deck Height	Closure of western access to rural properties	Nil	13.35m Louth
Louth to Cobar MR407	10kms east of Louth	Final access and egress route	Passage via $WD vehicle only	13.65m Louth
Louth to Cobar MR407	15kms east of Louth	Final access and egress route	NIL	14.20m Louth

2.12 SUMMARY OF ISOLATED COMMUNITIES AND PROPERTIES

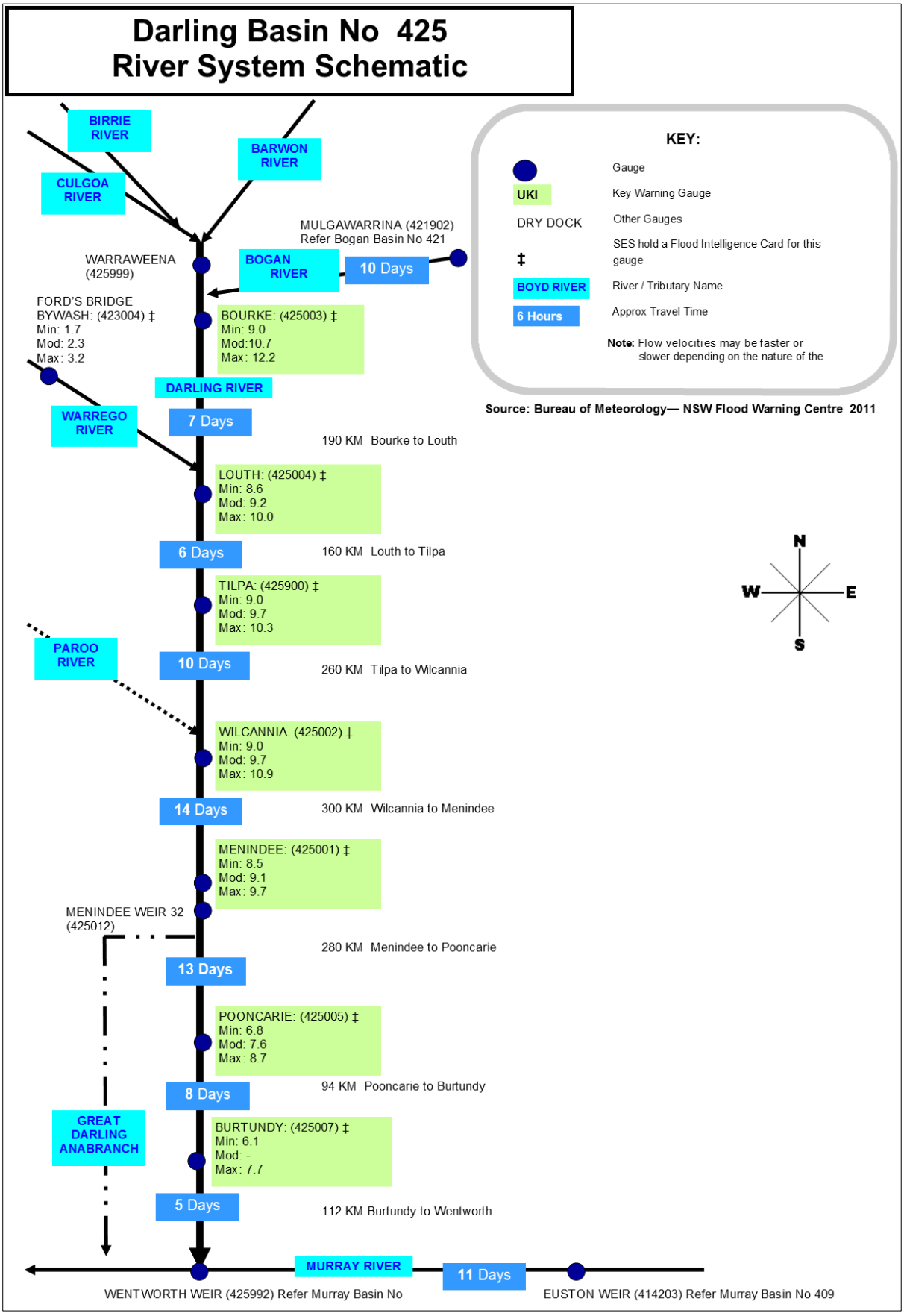
a. Table 14 lists communities liable to isolation and their potential periods of isolation. Information presented here is based on historical events during the last decade. There are no flood studies available to provide further information regarding potential isolations.

Table 14: Potential Periods of Isolation for Communities in the Bourke Shire LGA during a Major flood.

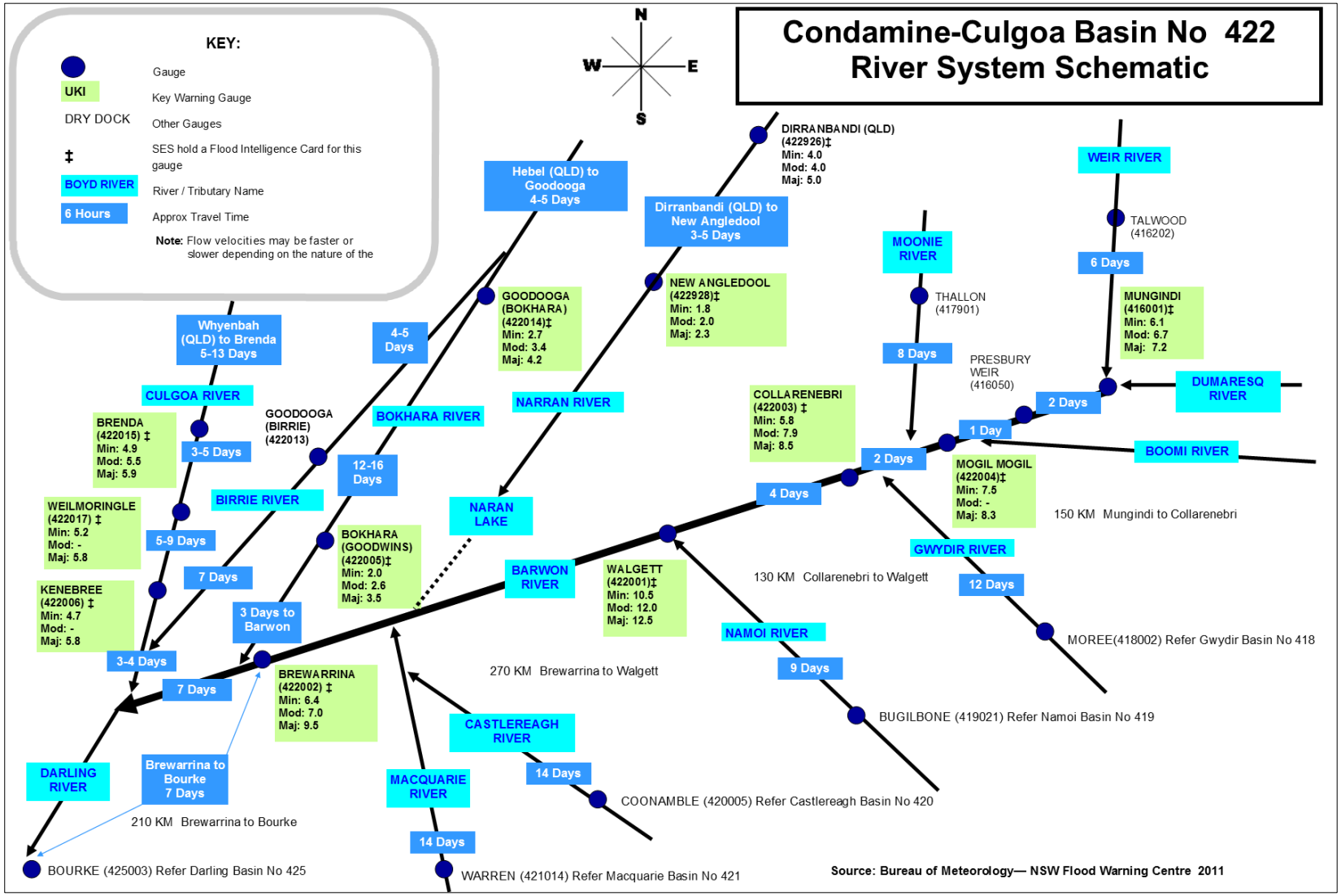
Town / Area (River Basin)	Population/ Dwellings	Flood Affect Classification	Approximate period isolation	Weeks								NOTES
				1	2	3	4	5	6	7	8	
Bourke	1909pp, 898 dwellings	Low flood island	2 - 4 weeks									Resupply to commence prior to isolation
Wanaaring	40pp, 16 dwellings	High Flood island	4 – 6 weeks									Resupply transport and medical
Louth	43pp, 23 dwelling	High Trapped Perimeter	2 – 4 weeks									Never known to isolate, however some potential for isolation above 14.2m
Fords Bridge	5pp, 3 dwelling	Rising Road Access	3 – 5 weeks									Resupply required sometimes
Alice Edwards Village	80pp, 19 dwelling 4 flats	Low Flood Island	2 – 4 weeks									Normally evacuated so resupply isn't normally required.
Rural Properties Bourke Shire	138	Various	4 or more weeks. Some months.									Resupply likely to be required after 5-10 days of isolation. Most are built up or have private levees.

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

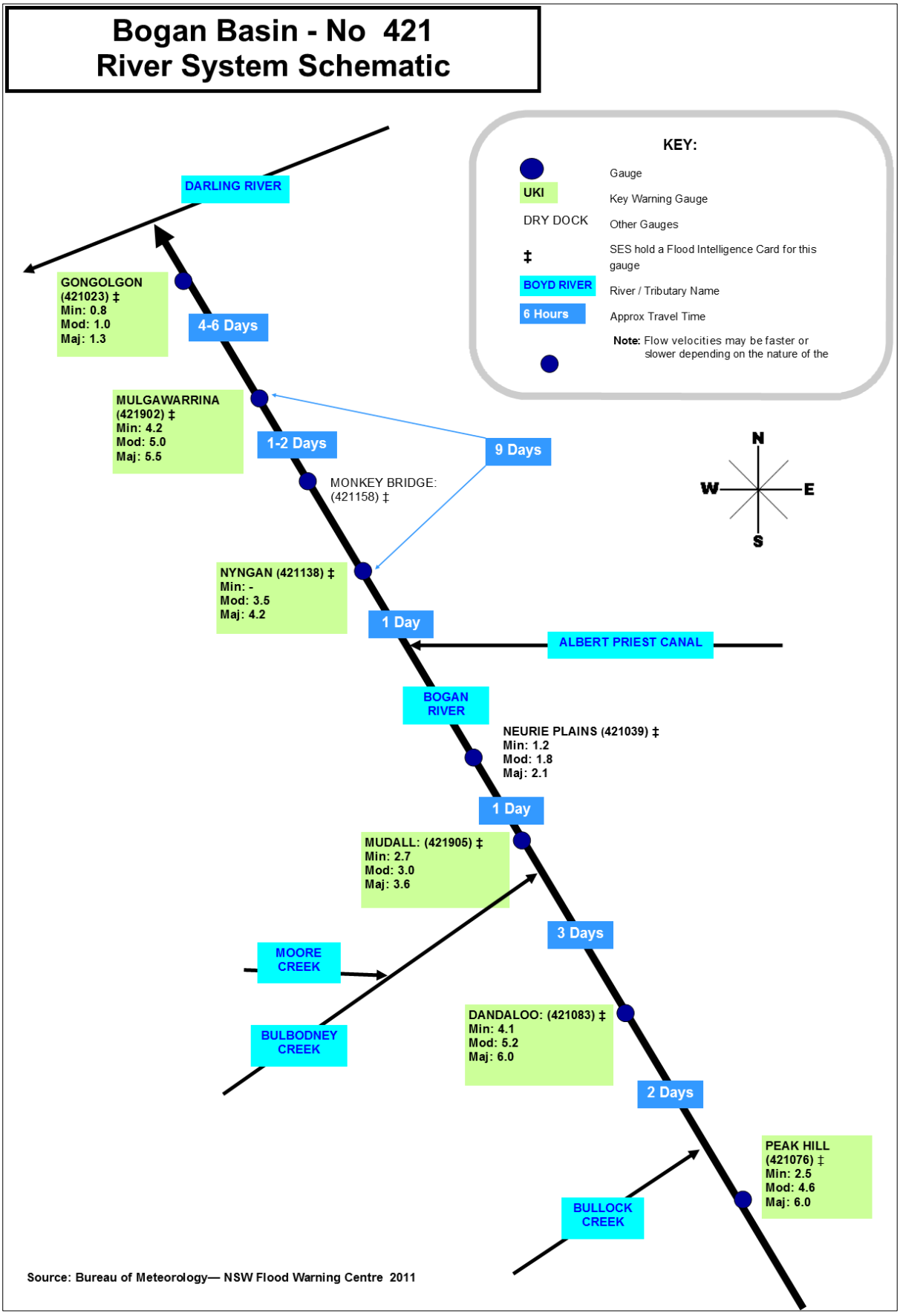
ANNEX 1A: DARLING RIVER BASIN SCHEMATIC



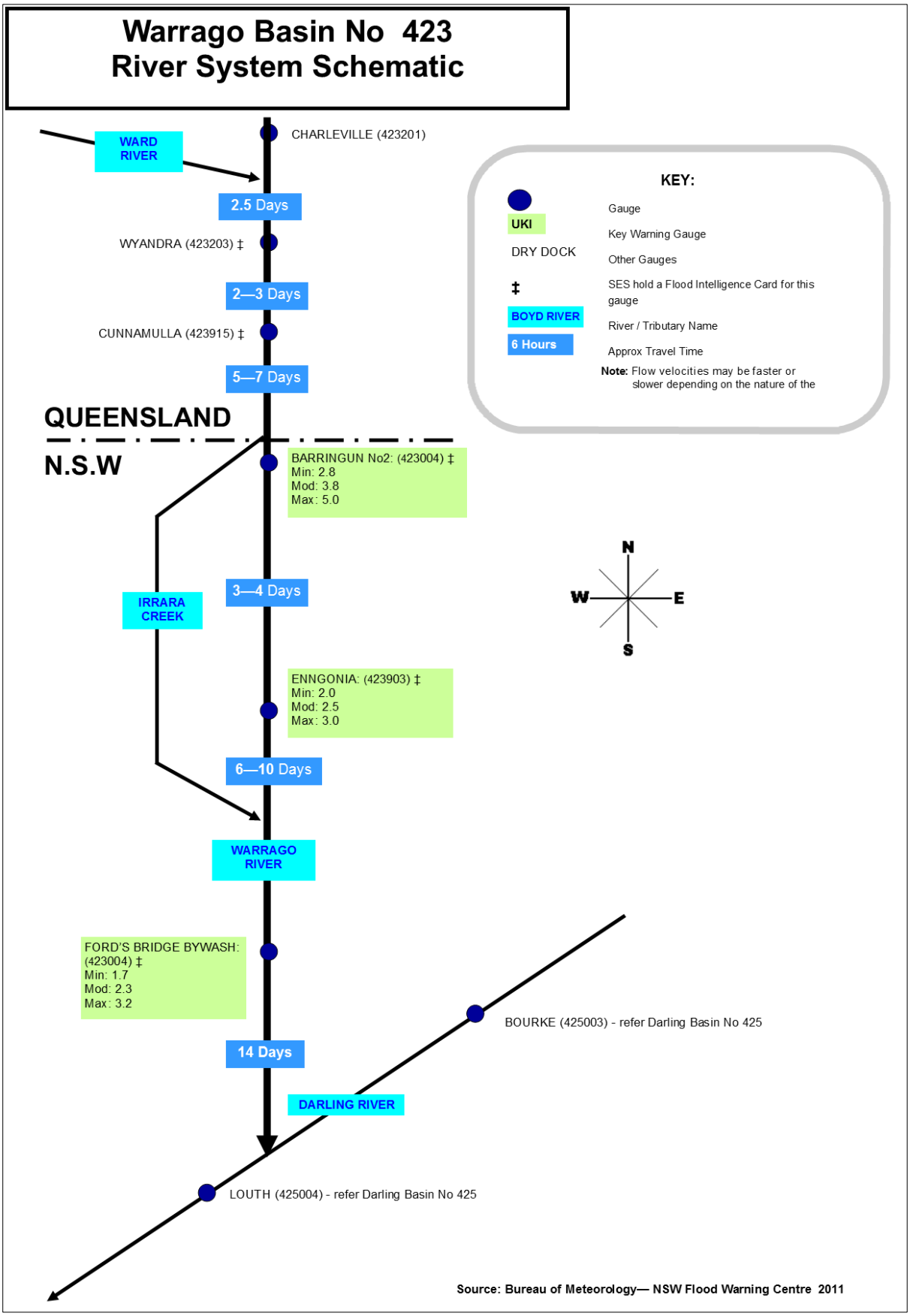
ANNEX 1B: CONDAMINE-CULGOA RIVER BASIN SCHEMATIC



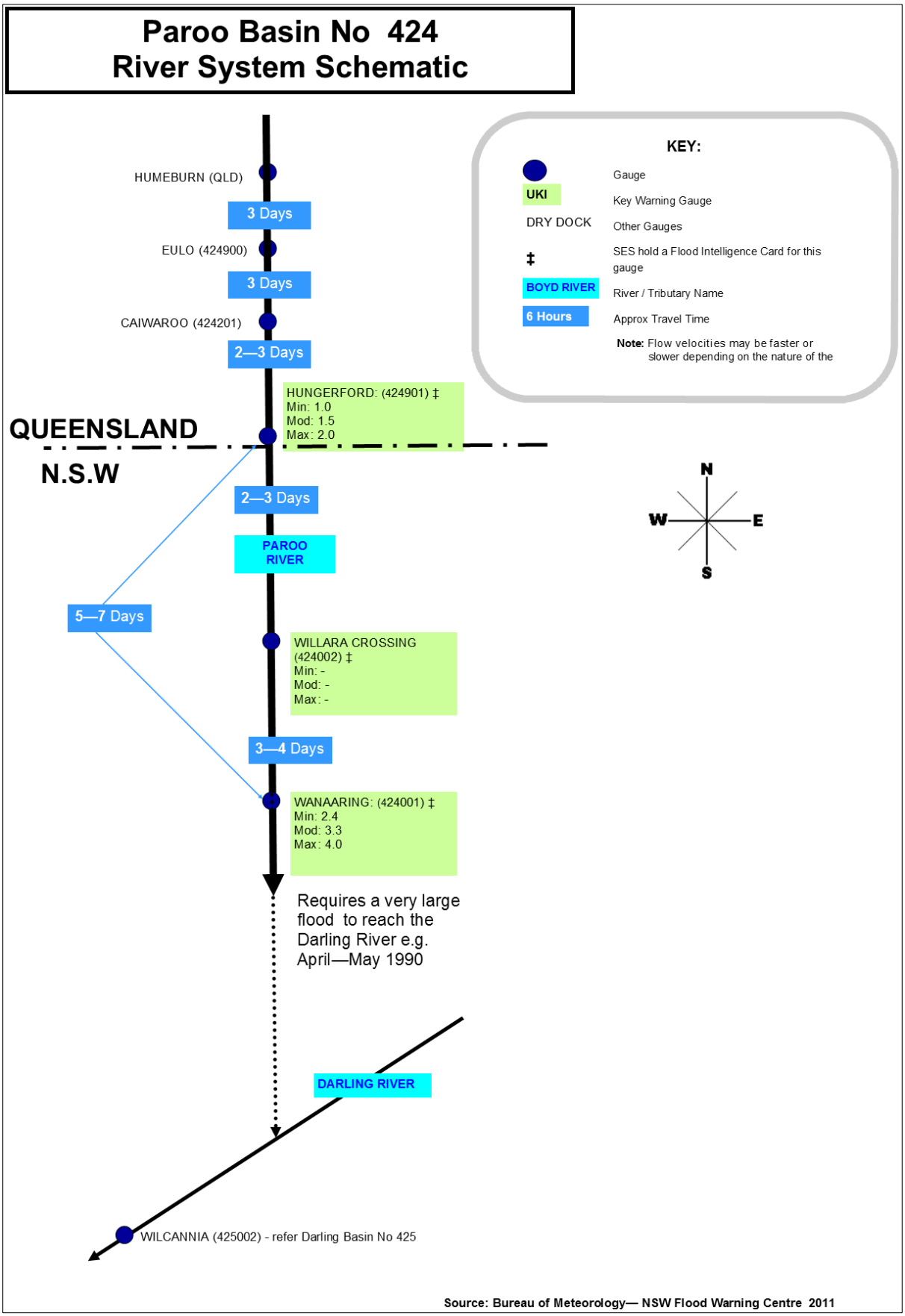
ANNEX 1C: BOGAN RIVER BASIN SCHEMATIC



ANNEX 1D: WARREGO RIVER BASIN SCHEMATIC



ANNEX 1E: PAROO RIVER BASIN SCHEMATIC

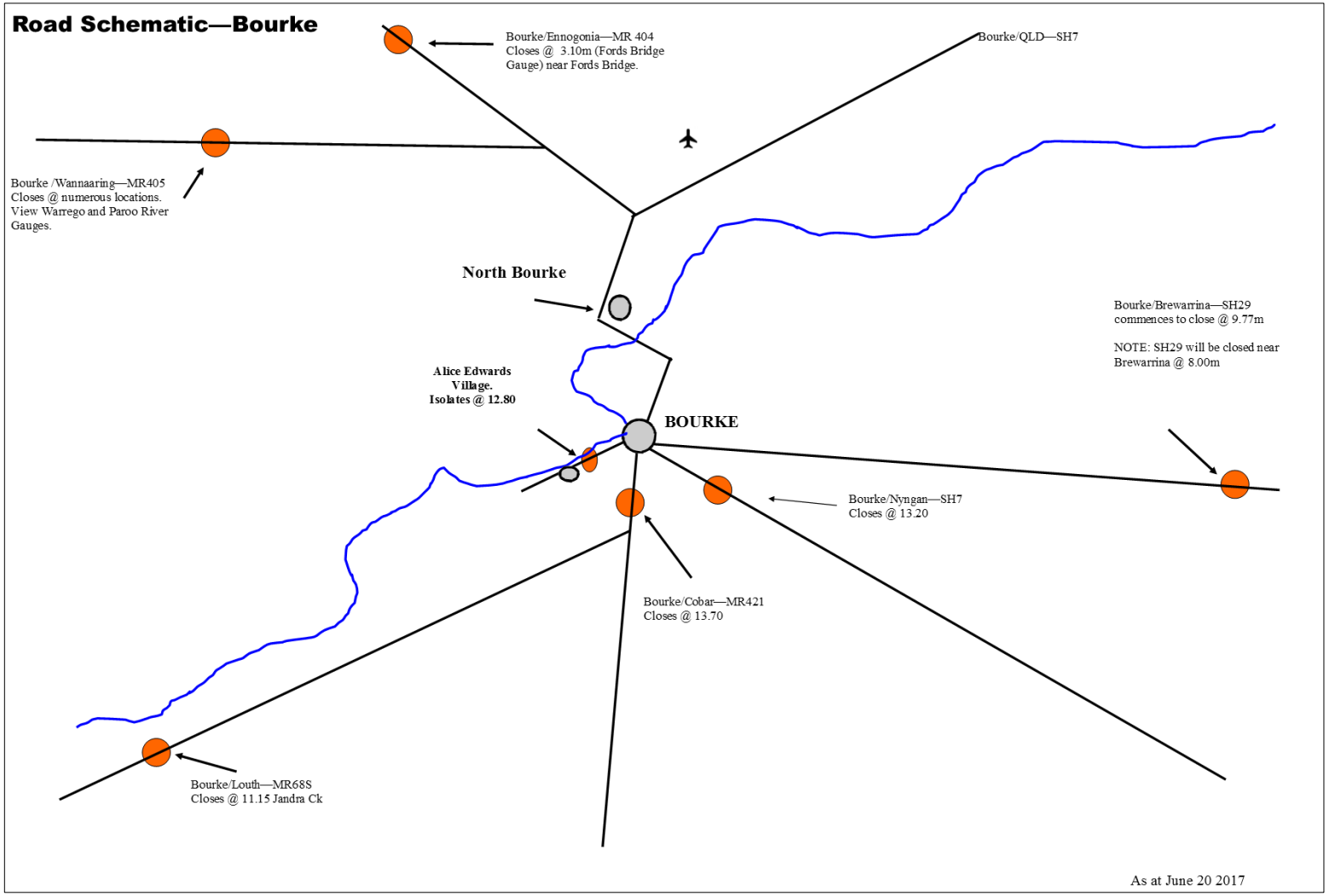


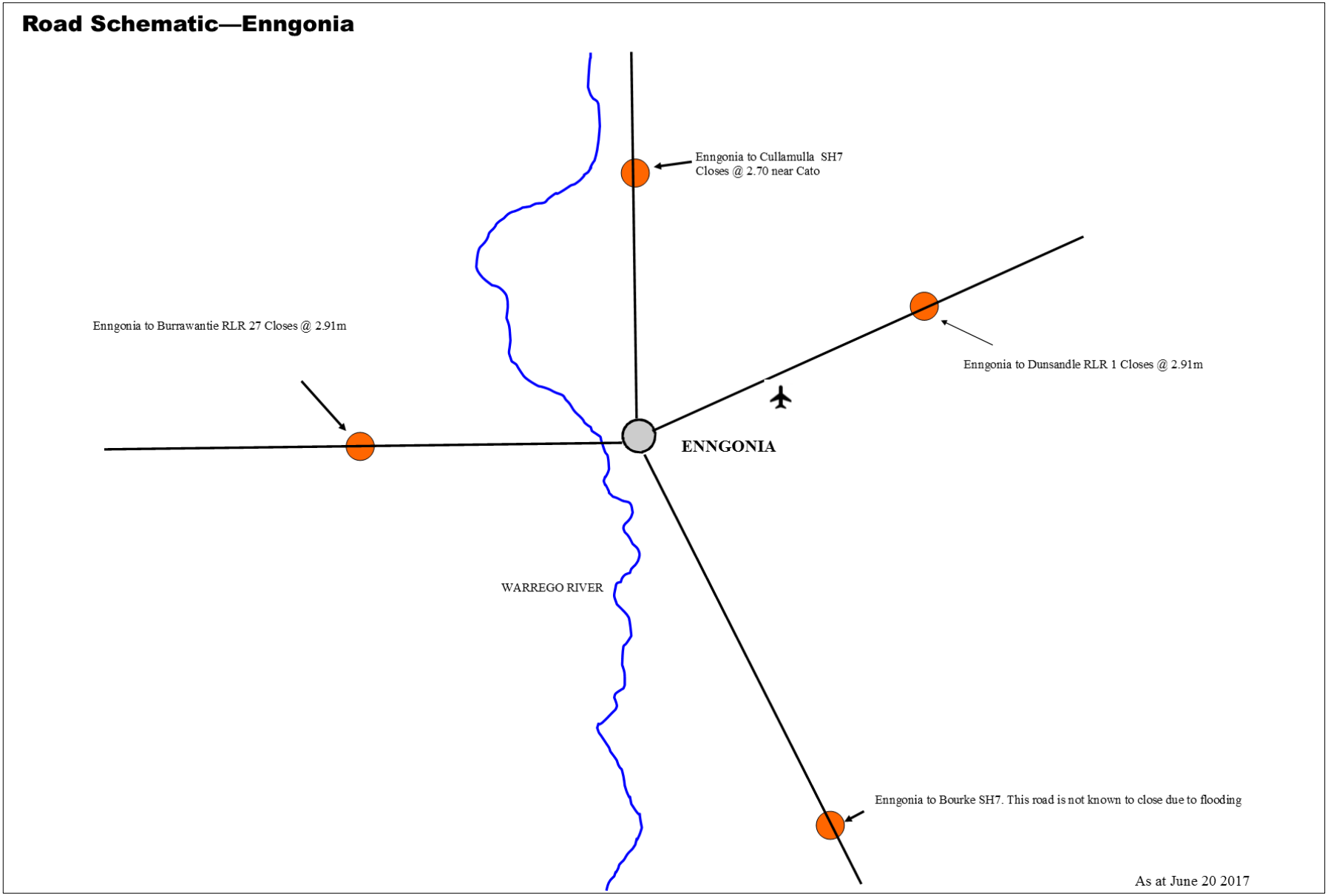
ANNEX 2: FACILITIES AT RISK OF FLOODING AND/OR ISOLATION

Facility Name	Street	Suburb	Comment
Schools			
Bourke Public School	Green Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
School of Distance Education	Green Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Bourke High School	Tarcoon Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
TAFE	Oxley Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
St Ignatius Primary School	Meek Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Koinonia Christian Academy	Mitchell Highway	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Pera Bore Christian Community School	Darling Farms, Wanaaring Road	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Wanaaring Primary School	O'Grady Street	Wanaaring	Protected by a levee, only at risk if it were to overtop or fail.
Louth Public School	Hughes Street	Louth	Protected by a levee, only at risk if it were to overtop or fail.
Child Care Centres			
PEOC Pre-School	Hope Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Bourke Pre School	Gorell Ave	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Facilities for the aged and/or infirm			
Bourke District Hospital	26 Tarcoon Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Bourke Aboriginal Health Services	61 Oxley Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.
Wanaaring Health Centre	Vicary Street	Wanaaring	Protected by a levee, only at risk if it were to overtop or fail.
Utilities and infrastructure			
			Unknown

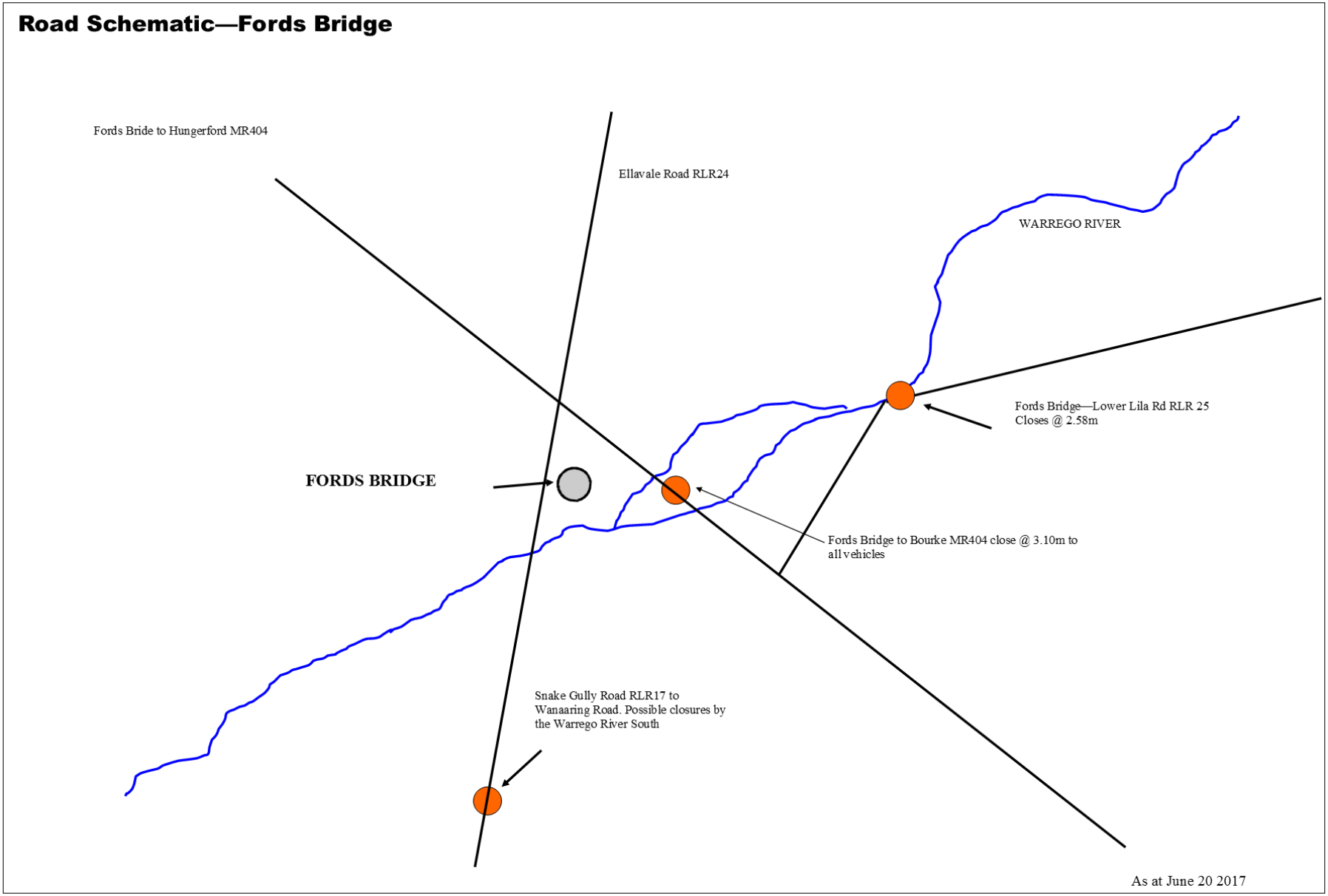
Facility Name	Street	Suburb	Comment
Camping Ground / Caravan Parks			
Mitchell Caravan Park	Becker Street	Bourke	Protected by a levee, only at risk if it were to overtop or fail.

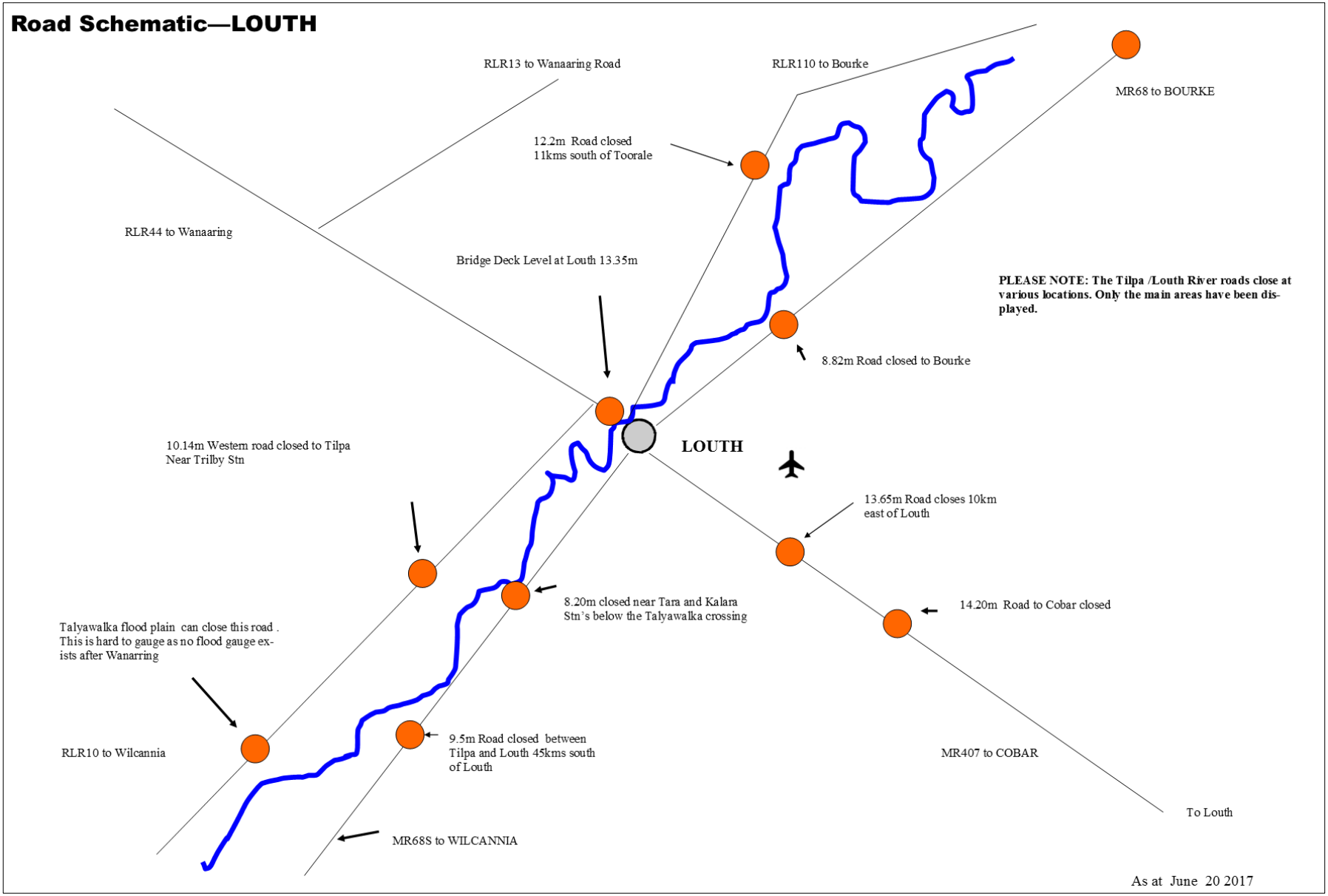
ANNEX 3: ROAD SCEHMATICS

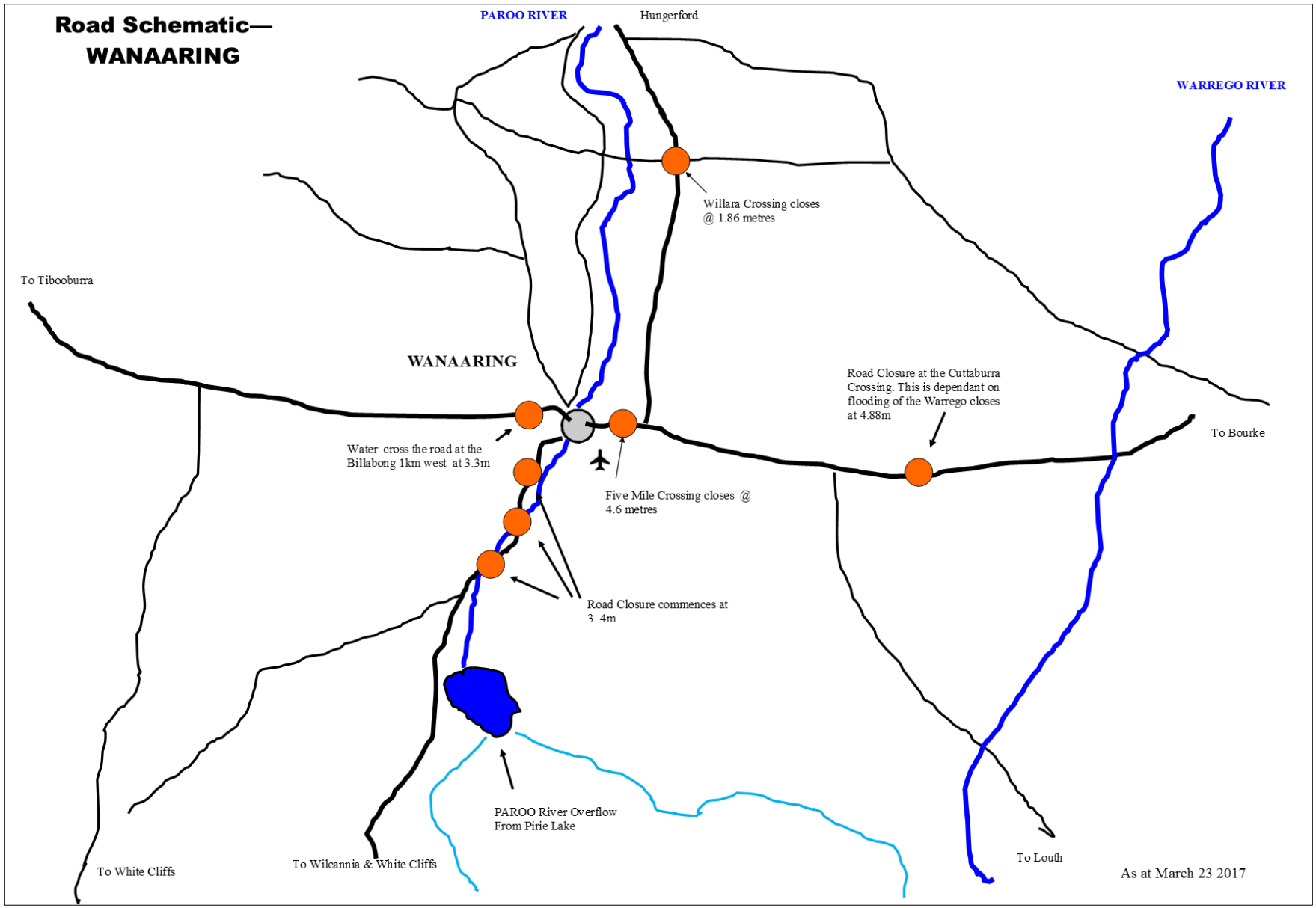



Road Schematic—Enngonia
Enngonia to Cullamulla SH7
Closes @ 2.70 near Cato
Enngonia to Burrawantie RLR 27 Closes @ 2.91m
Enngonia to Dunsandle RLR 1 Closes @ 2.91m
ENNGONIA
WARREGO RIVER
Enngonia to Bourke SH7. This road is not known to close due to flooding
As at June 20 2017

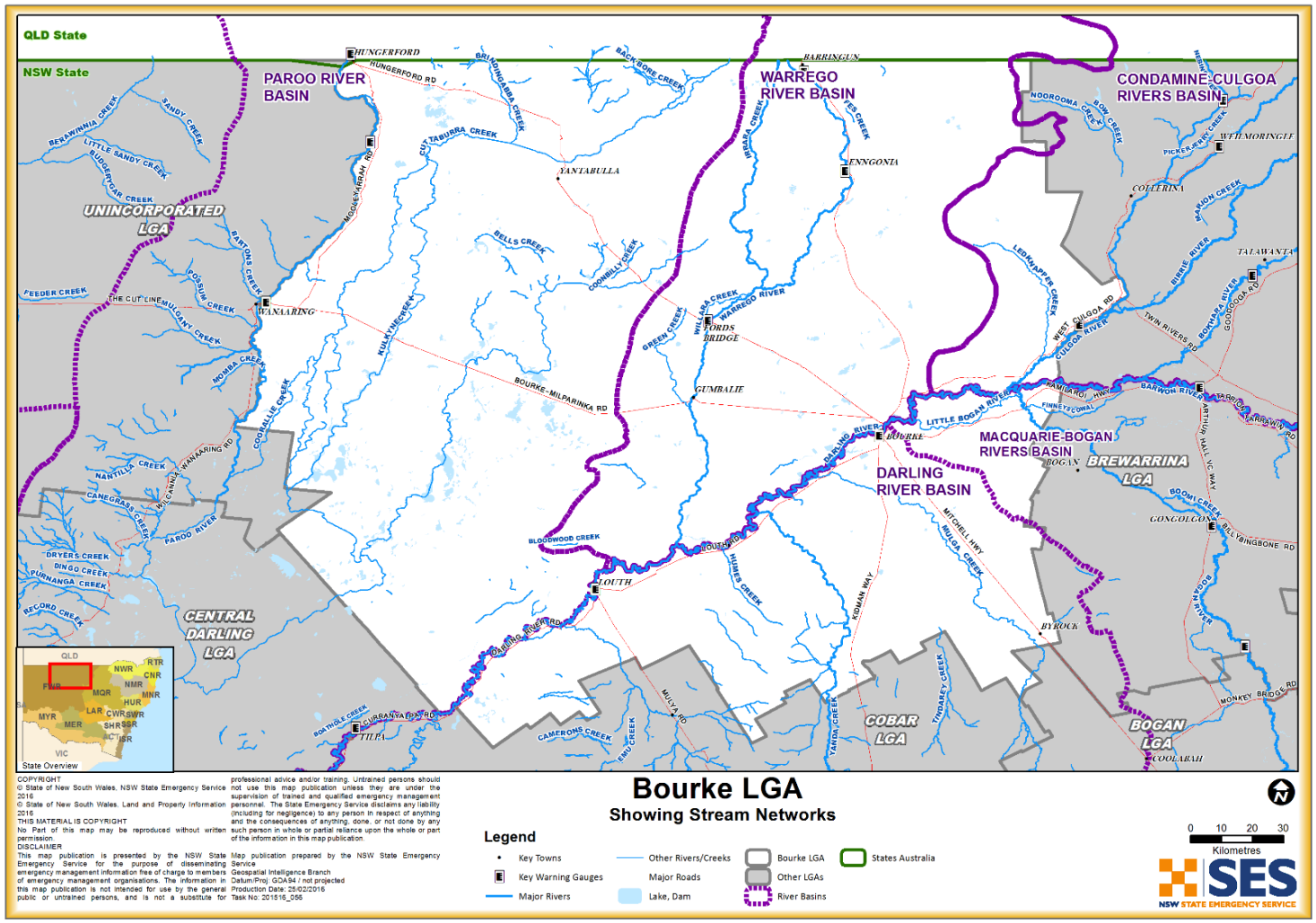
Road Schematic—Fords Bridge




Road Schematic—LOUTH
RLR13 to Wanaaring Road
RLR110 to Bourke
MR68 to BOURKE
12.2m Road closed
11kms south of Toorale
RLR44 to Wanaaring
Bridge Deck Level at Louth 13.35m
PLEASE NOTE: The Tilpa /Louth River roads close at various locations. Only the main areas have been displayed.
8.82m Road closed to Bourke
10.14m Western road closed to Tilpa
Near Trilby Stn
LOUTH
13.65m Road closes 10km
east of Louth
8.20m closed near Tara and Kalara
Stn's below the Talyawalka crossing
14.20m Road to Cobar closed
Talyawalka flood plain can close this road .
This is hard to gauge as no flood gauge exists after Wanarring
RLR10 to Wilcannia
9.5m Road closed between
Tilpa and Louth 45kms south
of Louth
MR407 to COBAR
To Louth
MR68S to WILCANNIA
As at June 20 2017

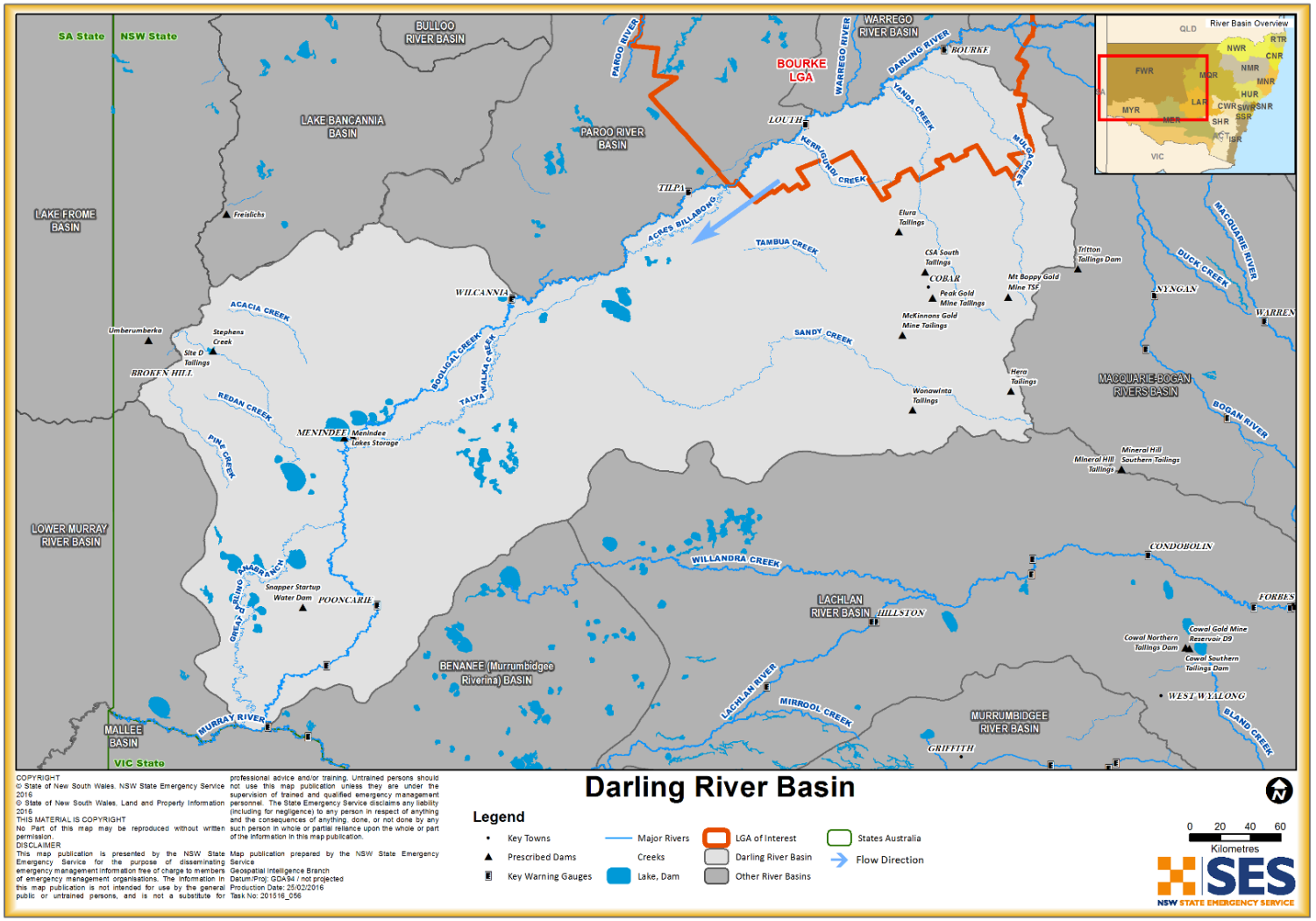

Road Schematic—
WANAARING
PAROO RIVER
Hungerford
WARREGO RIVER
Willara Crossing closes
@ 1.86 metres
To Tibooburra
WANAARING
Road Closure at the Cuttaburra
Crossing. This is dependant on
flooding of the Warrego closes
at 4.88m
To Bourke
Water cross the road at the
Billabong 1km west at 3.3m
Five Mile Crossing closes @
4.6 metres
Road Closure commences at
3..4m
PAROO River Overflow
From Pirie Lake
To White Cliffs
To Wilcannia & White Cliffs
To Louth
As at March 23 2017

MAP 1: BOURKE LGA RIVER BASINS



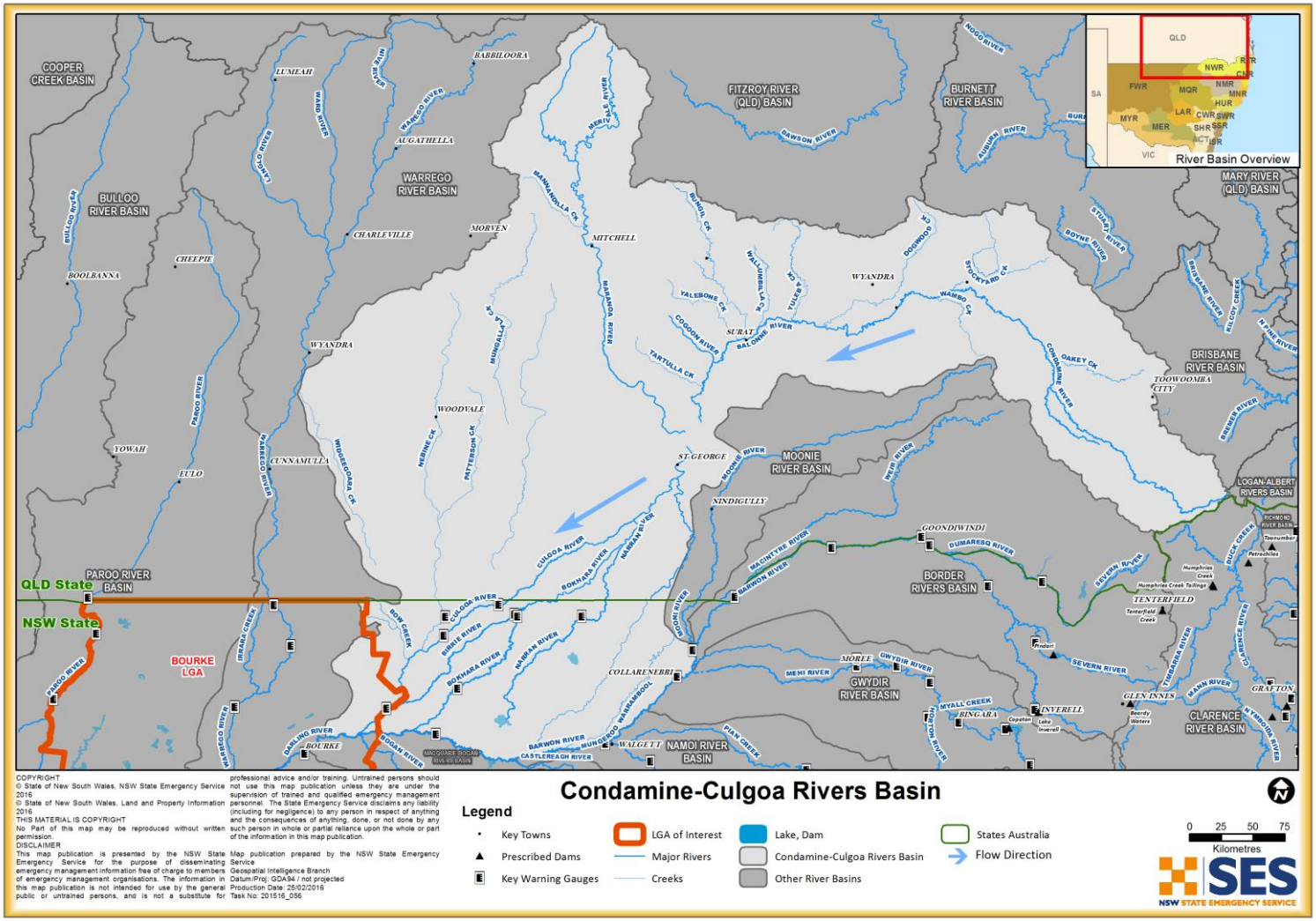
Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
Datum/Proj: GDA94 / not projected
Production Date: 25/02/2016
Task No: 201616_056

MAP 2: DARLING RIVER BASIN



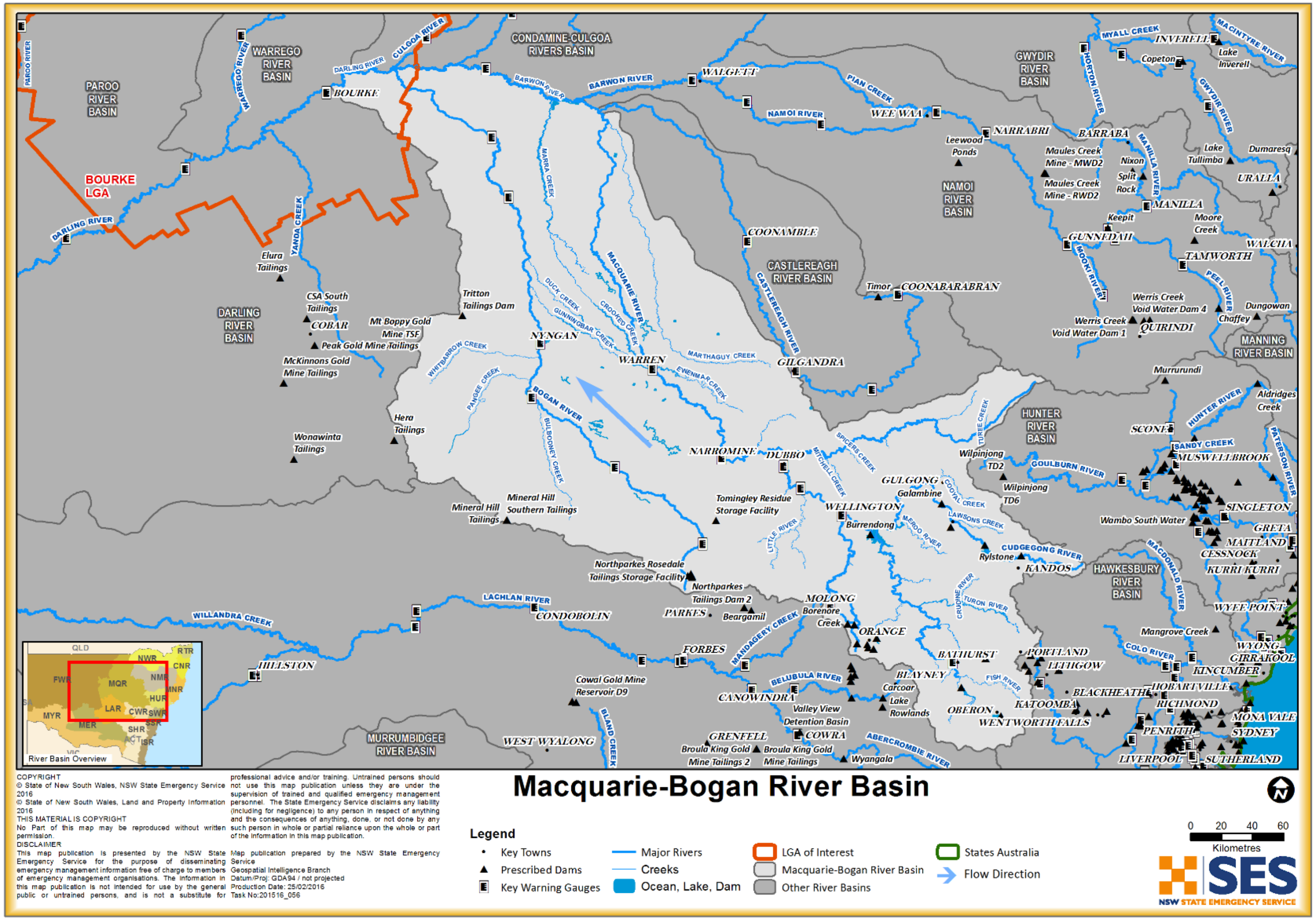
Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
Datum/Proj: GDA94 / not projected
Production Date: 25/02/2016
Task No: 201616_056

MAP 3: CONDAMONE-CULGOA RIVER BASIN

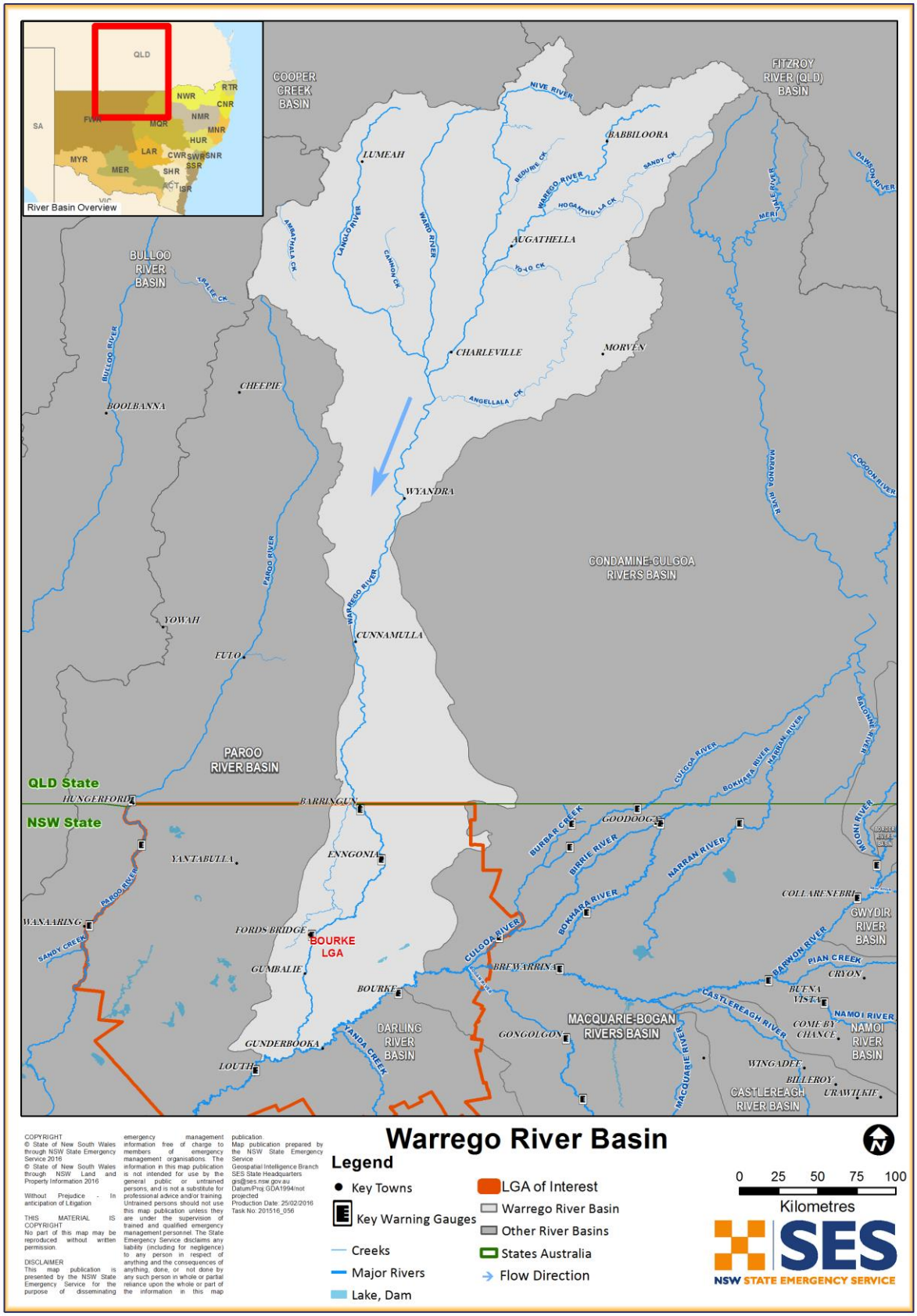


Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
Datum/Proj: GDA94 / not projected
Production Date: 25/02/2016
Task No: 201516_056

MAP 4: MACQUARIE-BOGAN RIVER BASIN

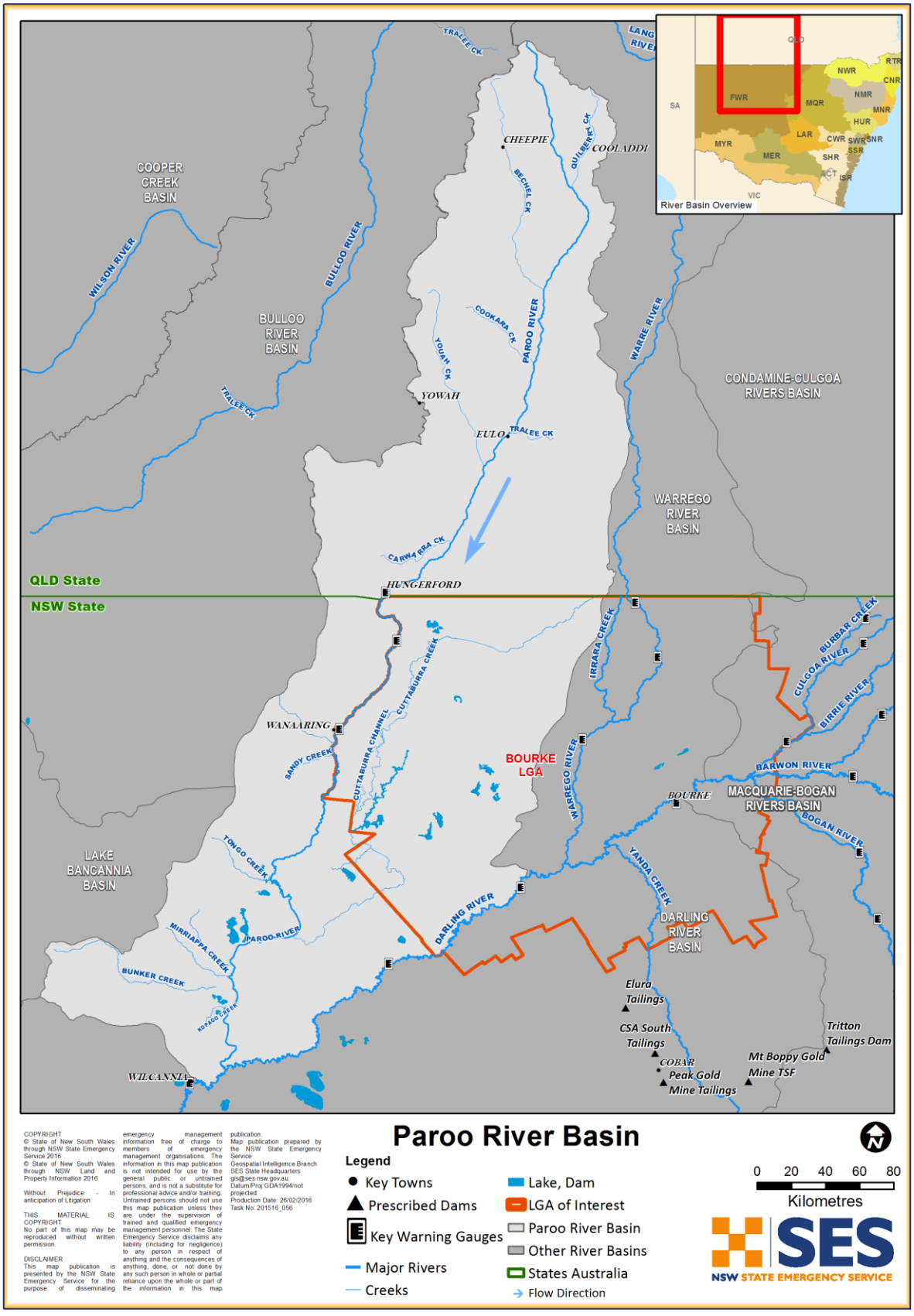


MAP 5: WARRAGO RIVER BASIN



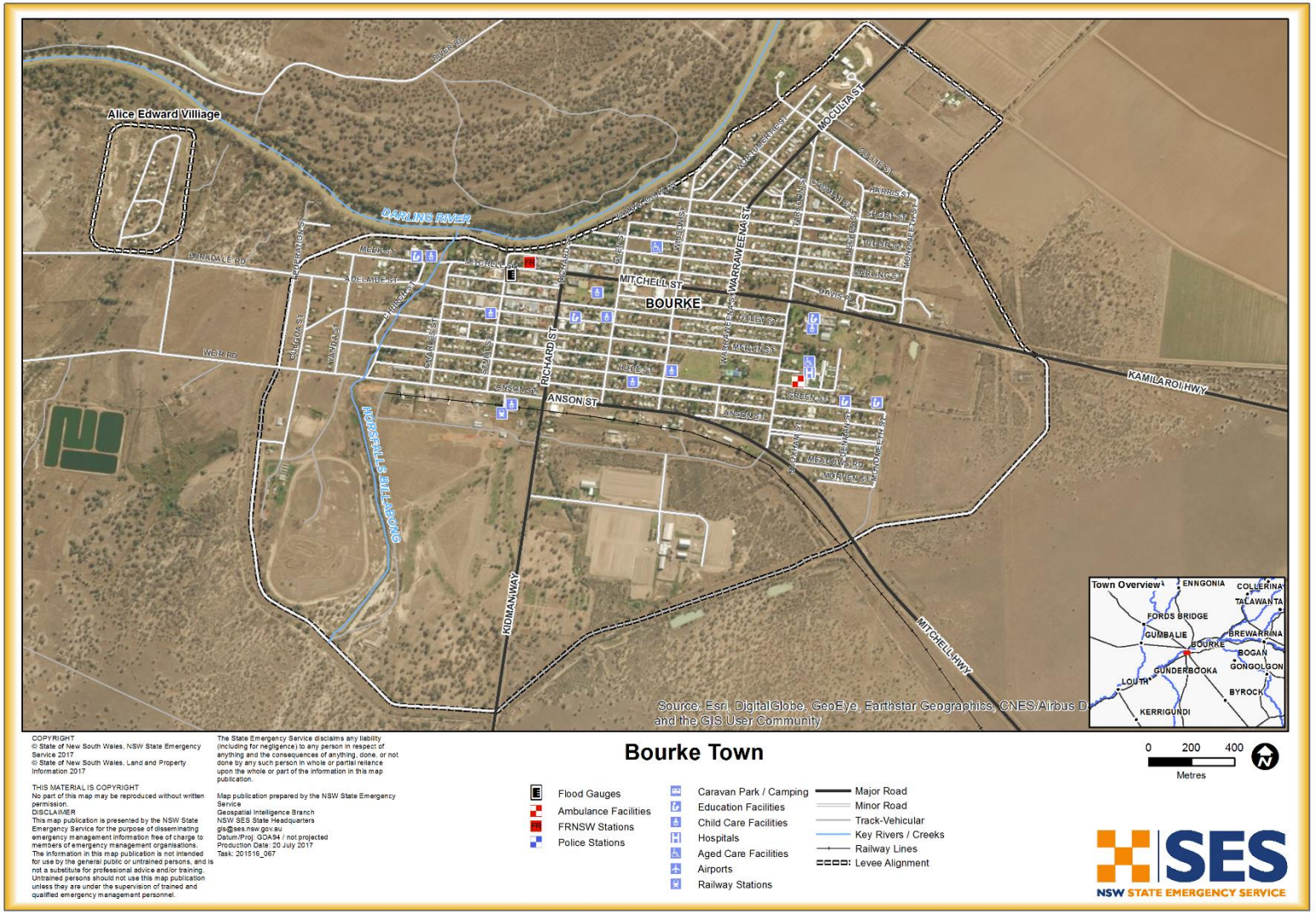
Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA1994/not projected
Production Date: 25/02/2016
Task No: 201516_056

MAP 6: PAROO RIVER BASIN



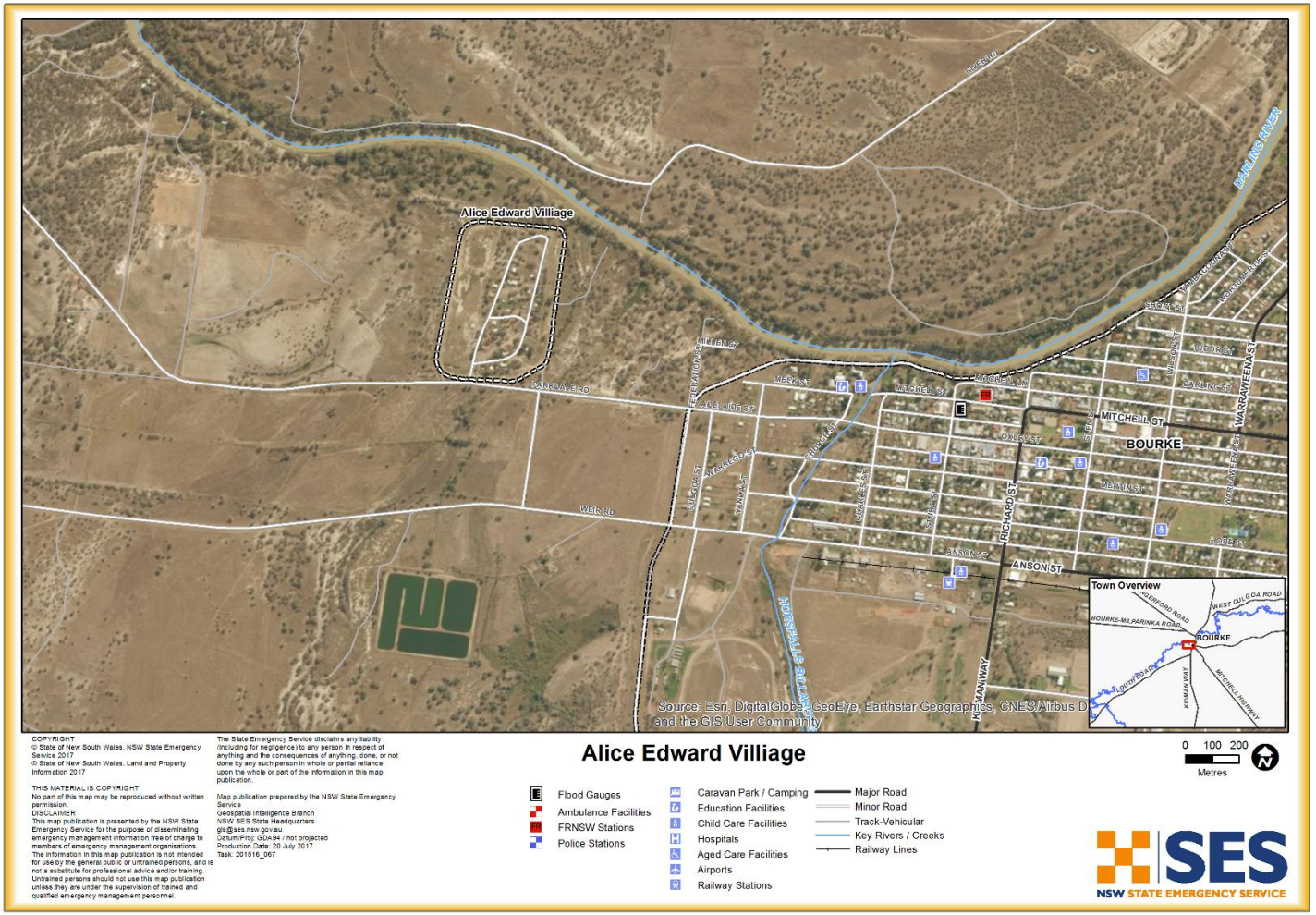
Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA1994/not projected
Production Date: 26/02/2016
Task No: 201516_056

MAP 7: BOURKE TOWN MAP



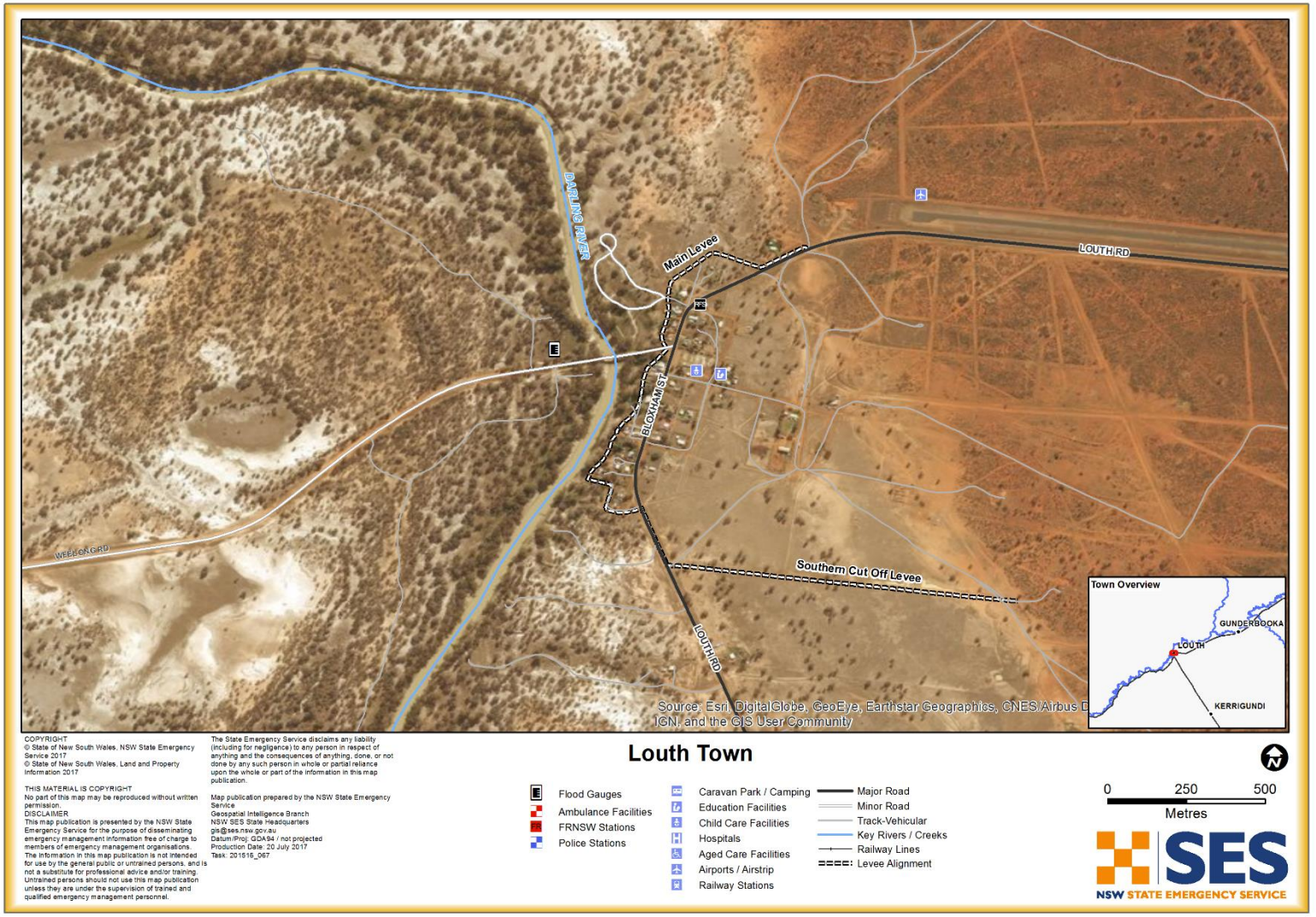
Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
NSW SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA94 / not projected
Production Date: 20 July 2017
Task: 201516_067

MAP 8: ALICE EDWARDS VILLAGE MAP

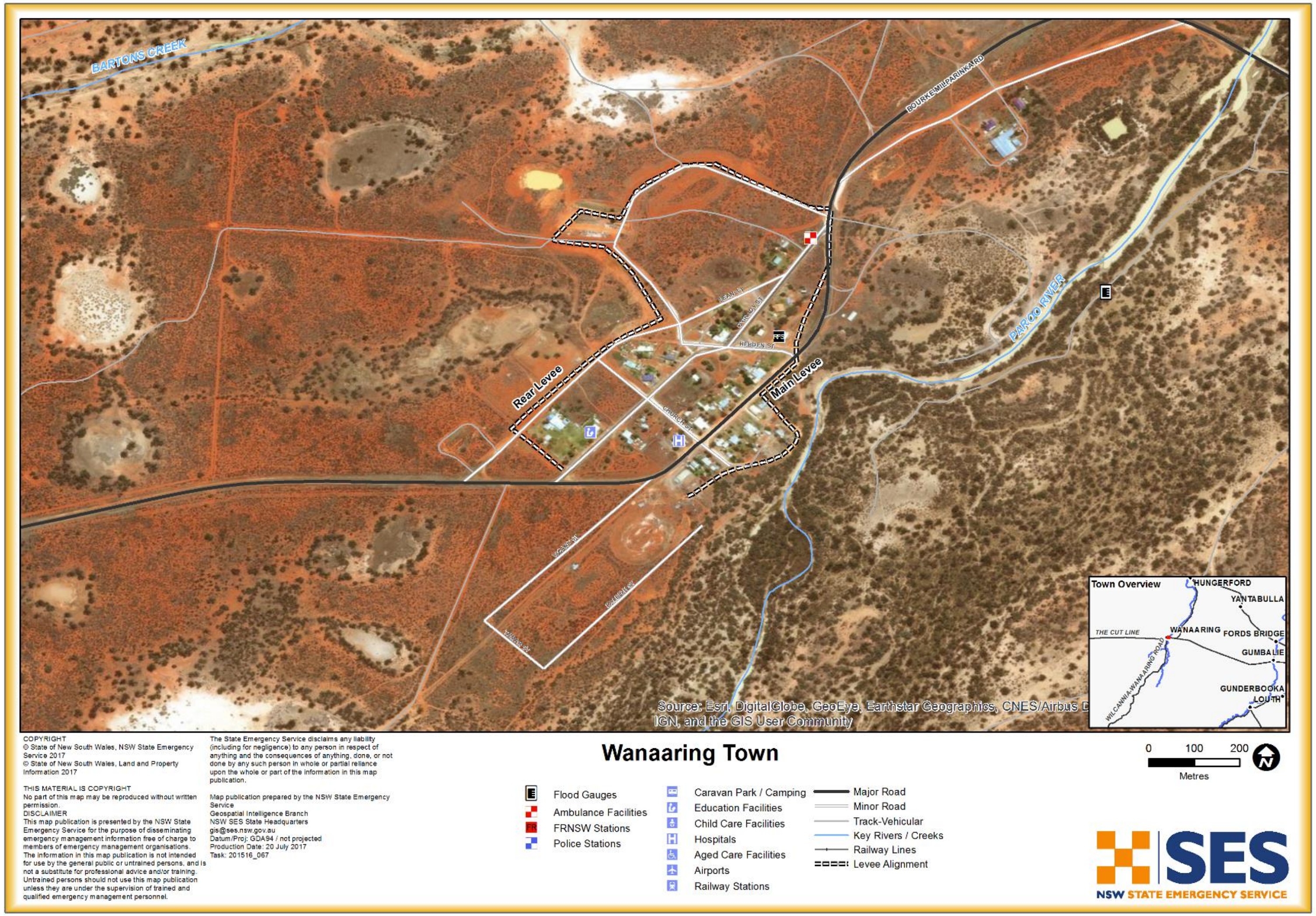


Map publication prepared by the NSW State Emergency Service
Geospatial Intelligence Branch
NSW SES State Headquarters
gis@ses.nsw.gov.au
Datum/Proj: GDA94 / not projected
Production Date: 20 July 2017
Task: 201516_067

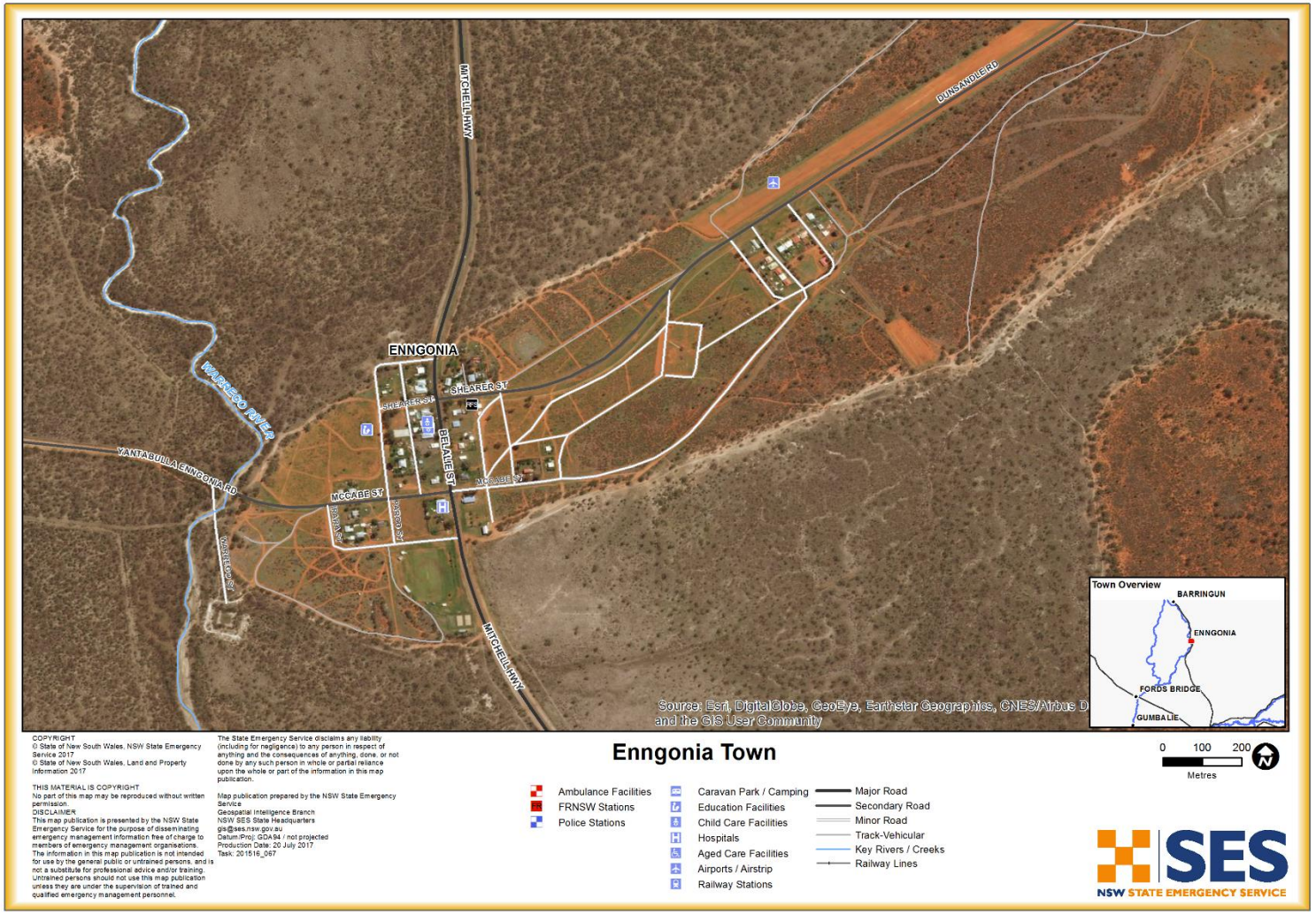
MAP 9: LOUTH TOWN MAP



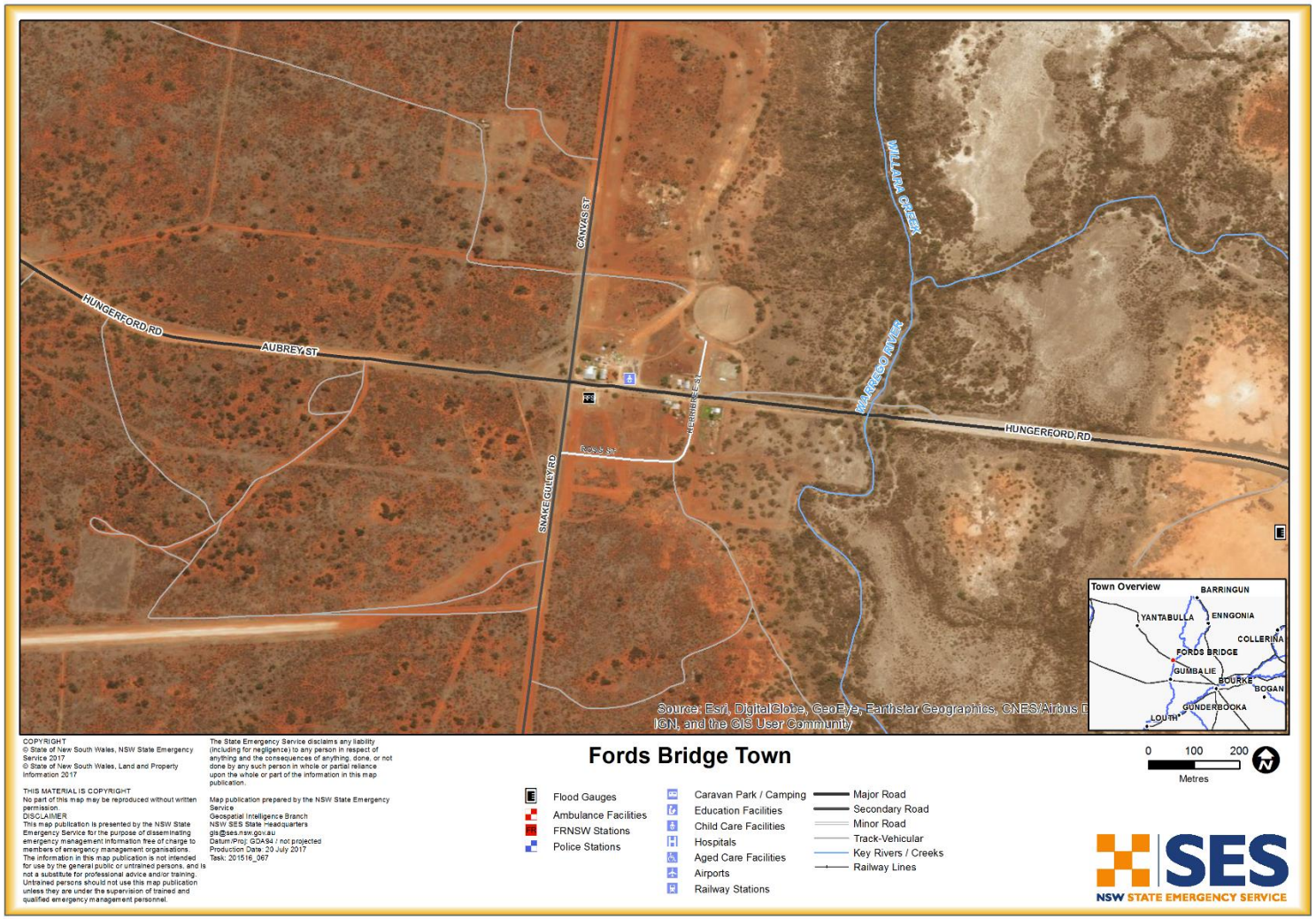
MAP 10: WANAARING TOWN MAP



MAP 11: ENNGONIA TOWN MAP



MAP 12: FORDS BRIDGE TOWN MAP



LIST OF REFERENCES

1. **Australian Bureau of Statistics.** 2011 Census Quick Stats: Bourke LGA. *Australian Bureau of Statistics Cenus.* [Online] Australian Bureau of Statistics, 2013. [Cited: February 26, 2016.] http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/LGA11150?opendocument&navpos=220.

2. **URS Australia Pty Ltd with DHI Water and Environment.** *Compendium of Data: Rural Flood Study Darling River Floodplain (Bogan River Confluence to Louth).* Parramatta : Prepared for the NSW Department of Environment and Climate Change, 24 June 2009. 43167506.

3. **Australian Bureau of Meterology.** Australian Bureau of Meterology. [Online] Feb 23, 2016. [Cited: Feb 23, 2016.] http://www.bom.gov.au/climate/averages/tables/cw_048013.shtml.

4. **NSW SES.** *Wanaaring Flood Levee Inspection of Emergency Works .* s.l. : Internal NSW SES document, 2011.

5. **NSW Public Works.** *Visual Audit of Bourke Levee.* January 2015. Report Number: DC13066.

6. **Bourke Shire Council.** Bourke Temp Levee Design. 19 June 2016. Vol. Email Correspondance: .

7. **Works, Public.** *NSW Urban Flood Levee Review Data Capture Questionnaire.*

8. **NSW Public Works.** *Weilmoringle and Alice Edwards Levee Inspection 8 January 2011.* 8 January 2011.

9. —. NSW Urban Flood Levee Review Data Capture Questionnaire - Louth. 2012.

10. **NSW Public Works - NSW Water Solutions.** Louth and Tilpa Levees Inspection. February 2012. DC120011.

11. **NSW Public Works.** Louth Levee Supplementary Engineering Report. 28 January 2012.

12. —. NSW Urban Flood Levee Review Data Capture Questionnaire - Louth. s.l. : NSW Public Works , 2012.

13. —. NSW Urban Flood Levee Review - Data Capture Questionnaire for Wanaaring Levee. s.l. : NSW Public Works, 2012.

14. **Australian Bureau of Statistics.** 2016 Census. 2013.

NSW STATE EMERGENCY SERVICE

SES RESPONSE ARRANGEMENTS FOR BOURKE SHIRE

Volume 3 of the Bourke Shire Local Flood Plan

Last Update: April 2008

FloodSafe

ANNEX C - GAUGES MONITORED BY THE BOURKE SES LOCAL HEADQUARTERS

Gauge Name	Type	AWRC No	Stream	Flood Classification		
				Min	Mod	Maj
Kenebree *	Manual	422006	Culgoa	4.7		5.8
Barringun ‡	Manual	423003	Warrego	2.0	3.0	4.5
Barringun #2 *‡	Telemetric	423004	Warrego	2.8	3.8	5.3
Enngonia *‡	Manual	423903	Warrego	2.0	2.5	3.0
Fords Bridge	Telemetric	423001	Warrego			
Fords Bridge Bywash *‡	Telemetric	423002	Warrego	1.7	2.3	3.2
Hungerford *‡	Manual	424901	Paroo	1.0	1.3	2.0
Wanaaring *†	Manual	424001	Paroo	2.4	3.3	4.0
Willara Crossing ‡	Telemetric	424002	Paroo			
Bourke *‡	Telemetric	425003	Darling	9.0	10.7	12.2
Louth *‡	Telemetric	425004	Darling	8.6	9.2	10.0
Mungindi *	Telemetric	416001	Barwon	6.1	6.7	7.2
Mogil Mogil	Telemetric	422004	Barwon	7.5		8.3
Collarenebri *	Telemetric	422003	Barwon	5.8	7.9	8.5
Walgett *	Telemetric	422001	Barwon	11.2	12.0	12.5
Brewarrina *‡	Telemetric	422023	Barwon	6.4	7.0	9.5

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 Far West 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
Prime TV	Orange
IMPARJA-TV	Alice Springs
ABC-TV	Sydney
Seven Central	Townsville

Radio Stations:

Station	Location	Frequency	Modulation
2WEB	Bourke	2WEB	Bourke
2CUZ FM	Bourke	2CUZ FM	Bourke
ABC	Broken Hill	ABC	Broken Hill
ABC	Orange	ABC	Orange
ABC	Dubbo	ABC	Dubbo
2BH	Broken Hill	2BH	Broken Hill
2DU	Dubbo	2DU	Dubbo

Other Agencies:

1. Far West and Western Slopes District Emergency Operations Controllers.
2. Bourke, Broken Hill, Wanaaring, Enngonia and Wilcannia Police Patrols.
3. Macquarie and Murray SES Region Headquarters.
4. Wentworth Shire SES Local Controller.
5. NRMA, Bourke Office.
6. East Australian Pipeline Limited, Cobar.
7. Department of Land and Water Conservation, Bourke, Dubbo and Menindee Lakes.
8. Department of Community Services, Bourke.
9. Ambulance Service of NSW, Dubbo Control Centre.

10. National Parks and Wildlife Service, Bourke.
11. The Tilpa Hotel.
12. Shindy's Inn, Louth.
13. Aboriginal and Torres Strait Islander Commission, Bourke.

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 NSW Police Force will provide security for your property while you are away.

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

General

1. The following caravan parks are flood liable:

2. There are four caravan parks in the Bourke Shire. They are generally not subject to flooding as they are either on high ground or protected by the town levee bank. They may become isolated due to road closures in some cases of major level floods.

3. The Caravan Parks are located as follows :

4. Kidman's Camp Caravan Park – Cunnamulla Road, Bourke.

5. Mitchell Caravan Park – Mitchell Street, Bourke.

6. Bullamunta Caravan Park – Mitchell Highway, North Bourke.

7. Bush Tucker Inn – Border Gate, Barringun.

Advising Procedures

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

9. 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.

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

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

    - Provide a contact address and telephone number.

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

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

11. 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.

12. The Bourke 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

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

14. When an evacuation order is given:

15. 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 Bourke or Barringun if they have their own transport, or move to the caravan office to await transport.

16. 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:

- Bourke – J.B.Renshaw Complex, Anson Road, Bourke.

17. Caravan park managers will:

18. Ensure that their caravan park is capable of being evacuated within 24 hours.

19. Advise the Bourke 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.

20. Check that no people remain in non-removable vans that are likely to be inundated.

21. Inform the Bourke SES Local Controller when the evacuation of the caravan park has been completed.

22. Provide the Bourke SES Local Controller with a register of people that have been evacuated.

Return of Occupants and Vans

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

24. 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 G - SCHOOLS IN THE BOURKE SHIRE

Bourke

Bourke Public School
Green Street

School of Distance Education
Green Street

Bourke High School
Tarcoon Street

TAFE
Oxley Street

PEOC Pre-School
Hope Street

St Ignatius Primary School
Meek Street

Koinonia Christian Academy
Mitchell Hwy

Pera Bore Christian Community
School
Darling Farms,
Wanaaring Road

Byrock

Byrock Public School

Enngonia

Enngonia Public School

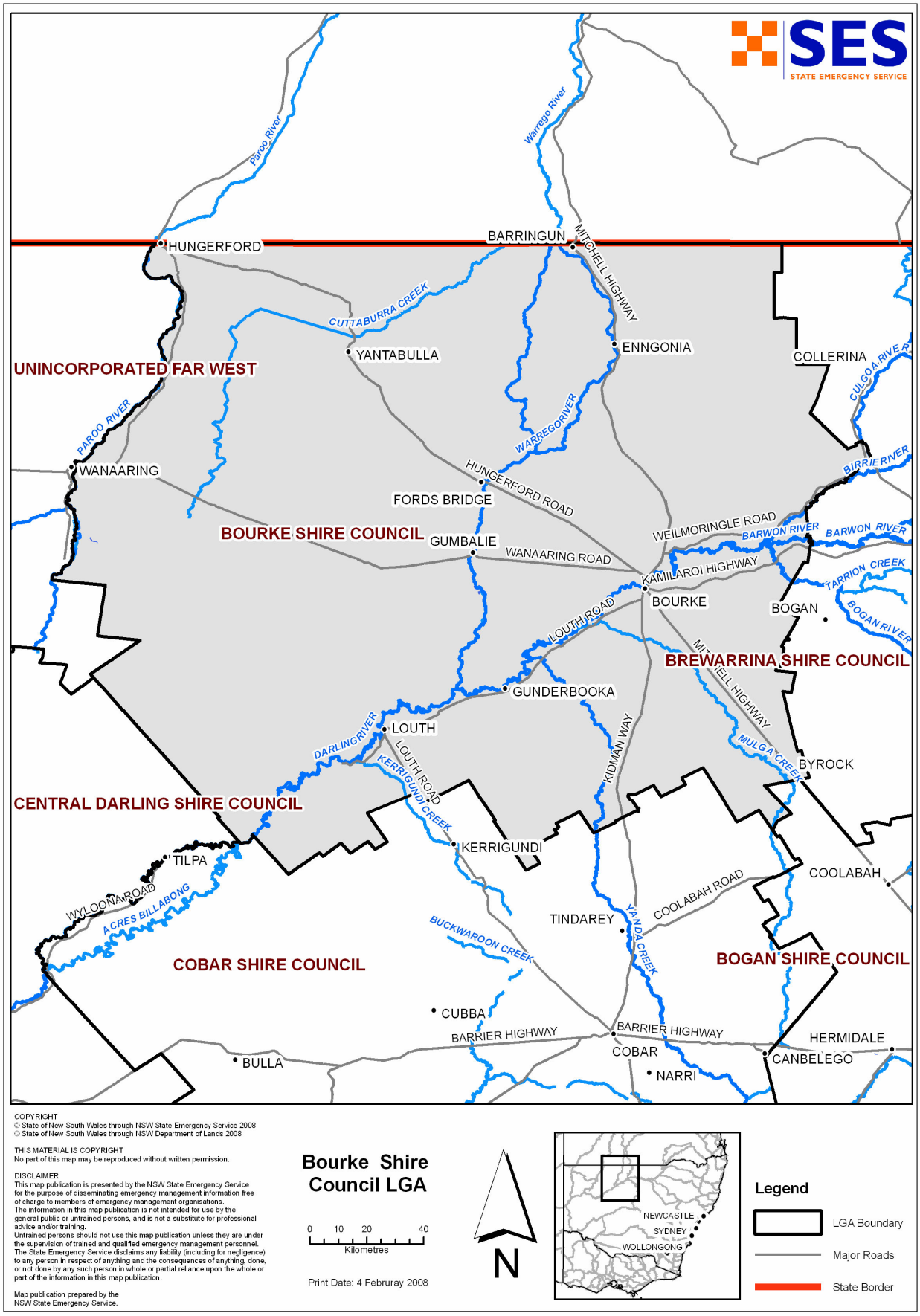
Louth

Louth Public School

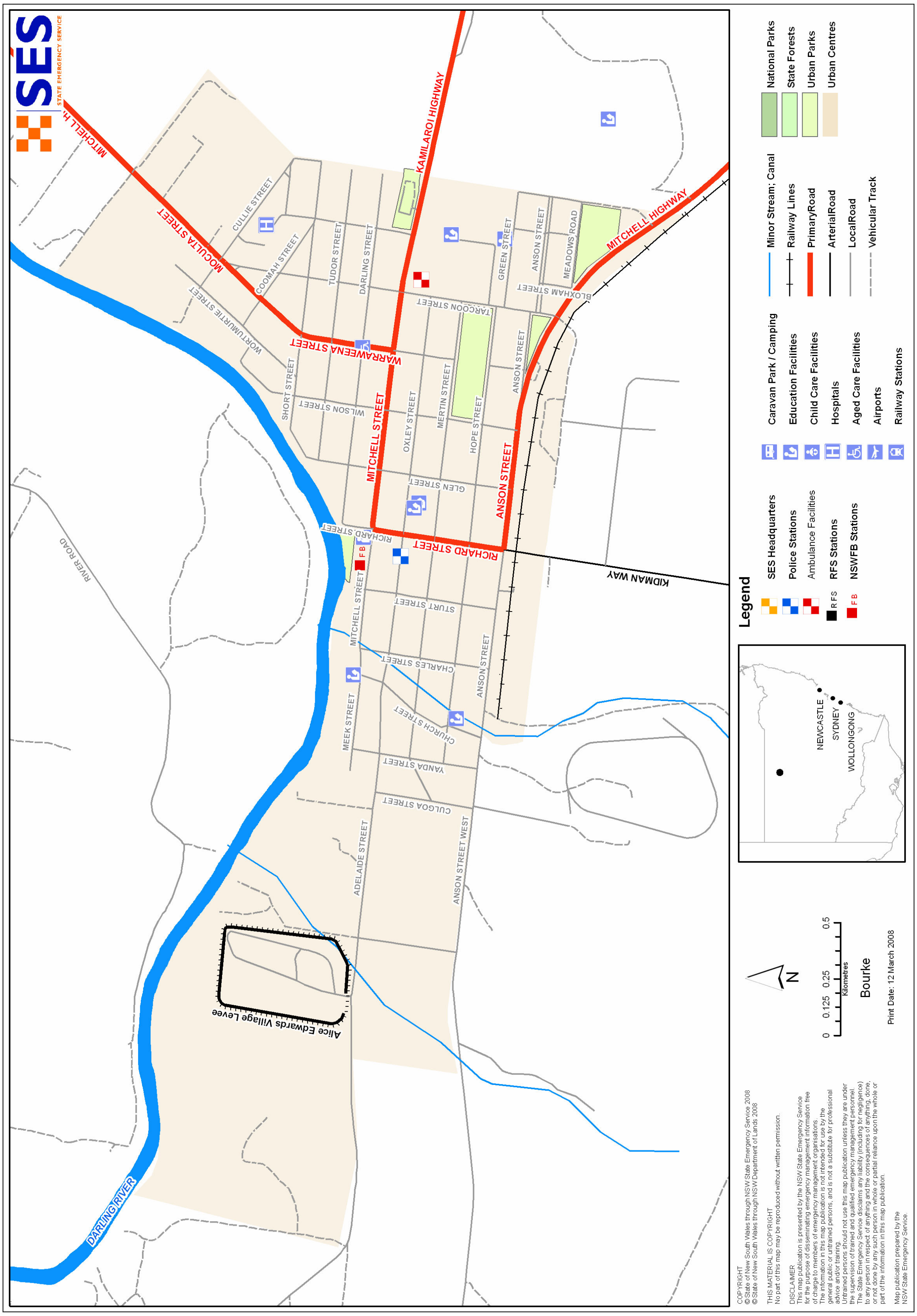
Wanaaring

Wanaaring Public School
O'Grady Street

MAP 1 - RIVER BASINS AND COUNCIL AREA

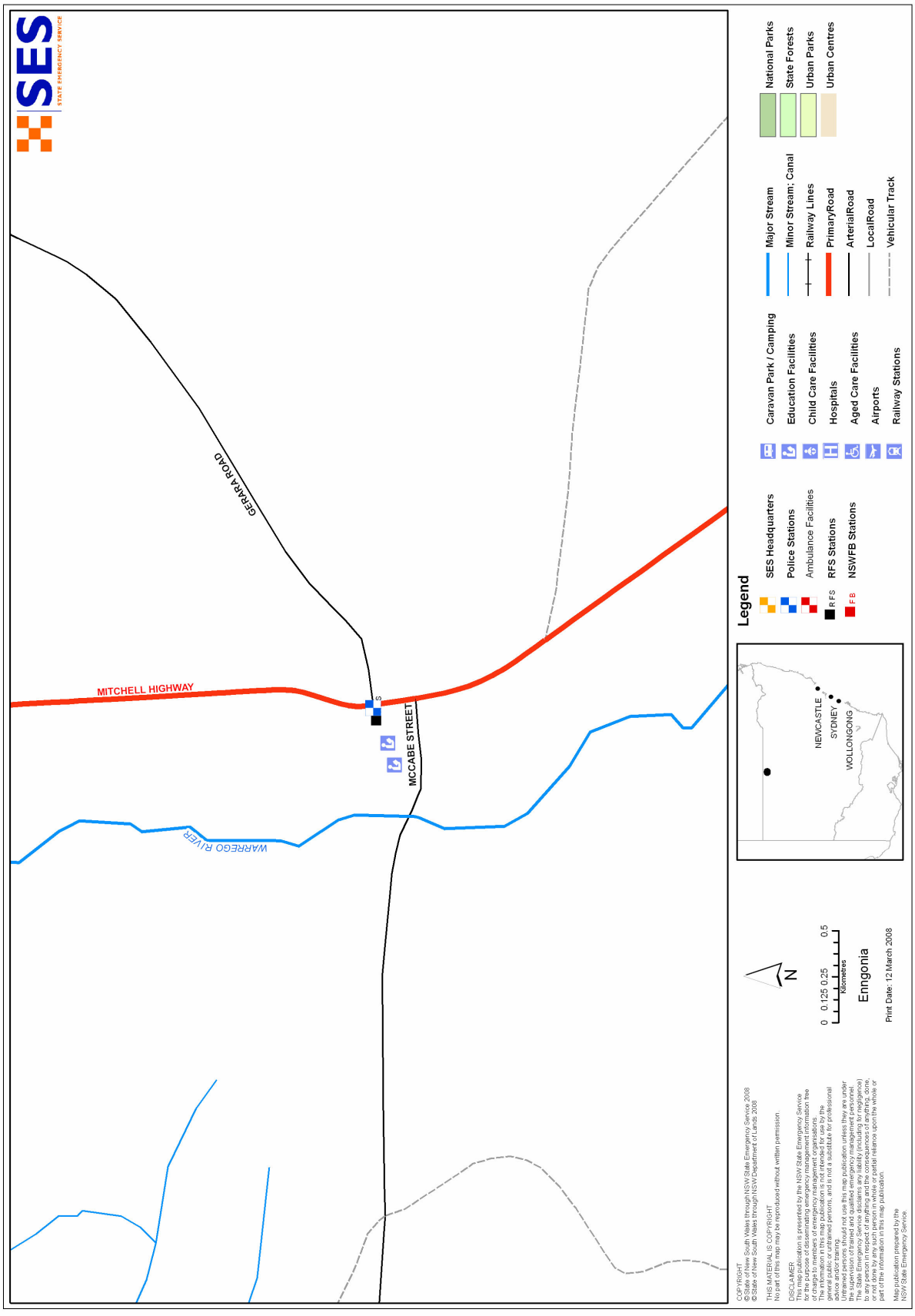


MAP 2 - BOURKE

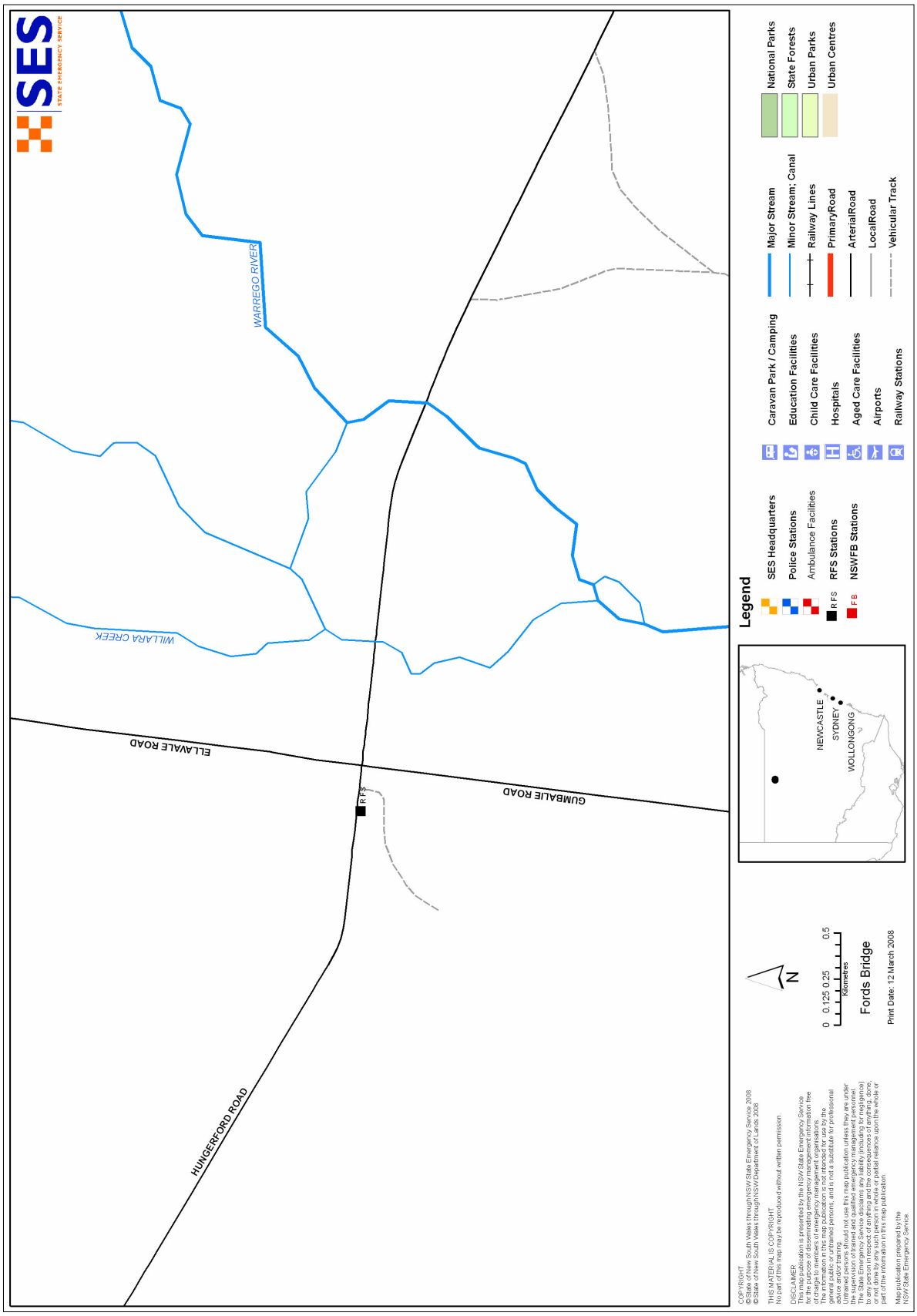


SES
STATE EMERGENCY SERVICE
MITCHELL HIGHWAY
KAMILAROI HIGHWAY
MITCHELL HIGHWAY
KIDMAN WAY
MOCULTA STREET
CULLIE STREET
COOMAH STREET
TUDOR STREET
DARLING STREET
WORTUMURTIE STREET
WARRAWEENA STREET
SHORT STREET
WILSON STREET
MITCHELL STREET
OXLEY STREET
MERTIN STREET
HOPE STREET
TARCOON STREET
GREEN STREET
ANSON STREET
MEADOWS ROAD
BLOXHAM STREET
GLEN STREET
RICHARD STREET
STURT STREET
CHARLES STREET
CHURCH STREET
MEEK STREET
YANDA STREET
CULGOA STREET
ADELAIDE STREET
ANSON STREET WEST
RIVER ROAD
DARLING RIVER
Alice Edwards Village Levee
FB
NEWCASTLE
SYDNEY
WOLLONGONG
Legend
SES Headquarters
Police Stations
Ambulance Facilities
RFS Stations
NSWFB Stations
Caravan Park / Camping
Education Facilities
Child Care Facilities
Hospitals
Aged Care Facilities
Airports
Railway Stations
Minor Stream; Canal
Railway Lines
PrimaryRoad
ArterialRoad
LocalRoad
Vehicular Track
National Parks
State Forests
Urban Parks
Urban Centres
N
0 0.125 0.25 0.5
Kilometres
Bourke
Print Date: 12 March 2008

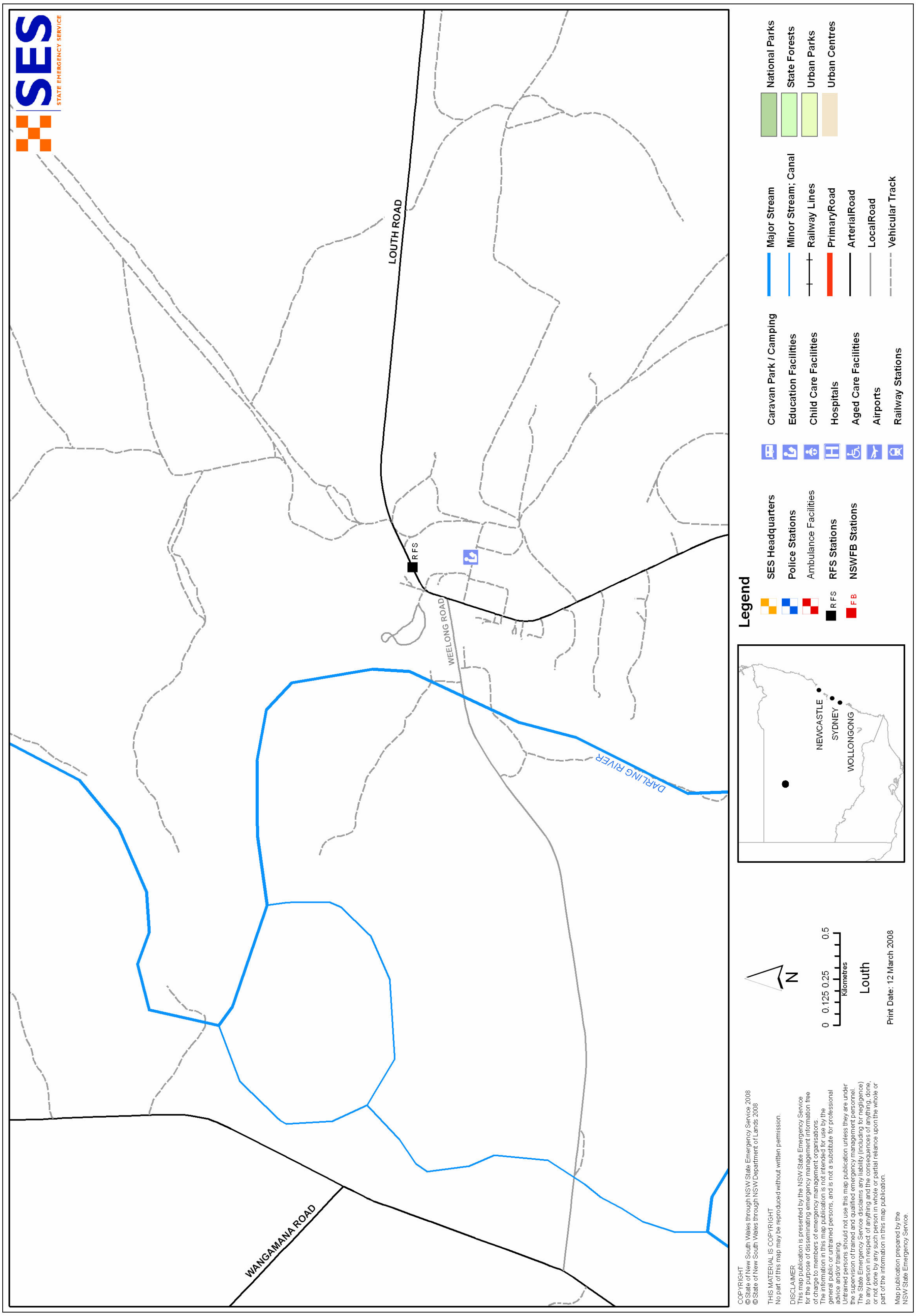
MAP 3 - ENNGONIA



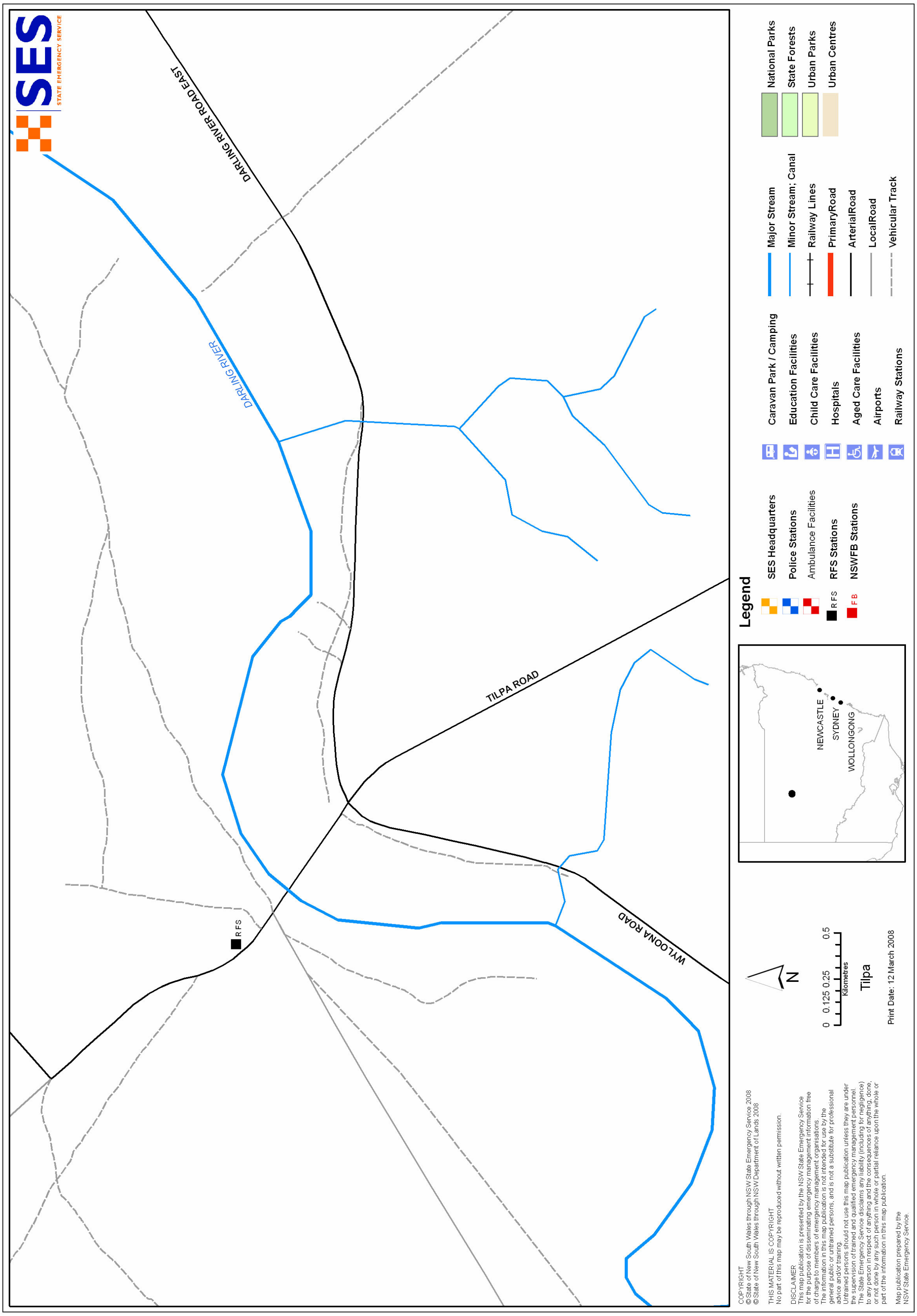
MAP 4 - FORDS BRIDGE



MAP 5 - LOUTH


SES
STATE EMERGENCY SERVICE
LOUTH ROAD
WEELONG ROAD
DARLING RIVER
WANGAMANA ROAD
RFS
Legend
SES Headquarters
Police Stations
Ambulance Facilities
RFS Stations
NSWFB Stations
Caravan Park / Camping
Education Facilities
Child Care Facilities
Hospitals
Aged Care Facilities
Airports
Railway Stations
Major Stream
Minor Stream; Canal
Railway Lines
PrimaryRoad
ArterialRoad
LocalRoad
Vehicular Track
National Parks
State Forests
Urban Parks
Urban Centres
NEWCASTLE
SYDNEY
WOLLONGONG
N
0 0.125 0.25 0.5
Kilometres
Louth
Print Date: 12 March 2008

MAP 6 - TILPA


SES
STATE EMERGENCY SERVICE
DARLING RIVER ROAD EAST
DARLING RIVER
TILPA ROAD
WYLOONA ROAD
RFS
Legend
SES Headquarters
Police Stations
Ambulance Facilities
RFS Stations
NSWFB Stations
Caravan Park / Camping
Education Facilities
Child Care Facilities
Hospitals
Aged Care Facilities
Airports
Railway Stations
Major Stream
Minor Stream; Canal
Railway Lines
PrimaryRoad
ArterialRoad
LocalRoad
Vehicular Track
National Parks
State Forests
Urban Parks
Urban Centres
NEWCASTLE
SYDNEY
WOLLONGONG
N
0 0.125 0.25 0.5
Kilometres
Tilpa
Print Date: 12 March 2008
COPYRIGHT
© State of New South Wales through NSW State Emergency Service 2008
© State of New South Wales through NSW Department of Lands 2008
THIS MATERIAL IS COPYRIGHT
No part of this map may be reproduced without written permission.
Map publication prepared by the NSW State Emergency Service.

MAP 7 - WANAARING