INLAND RAIL

NARROMINE TO NARRABRI COMMUNITY CONSULTATIVE COMMITTEE PRESENTATION

19–20 March 2019

CCC PROJECT PROGRESS PRESENTATION - AGENDA

1. **Minutes from previous meeting – Business arising**
2. **Correspondence**
3. **Previous Actions**

   That ARTC deliver a report and presentation from its hydrologist on the flood modelling for the project to the March 2019 meeting of the CCC.

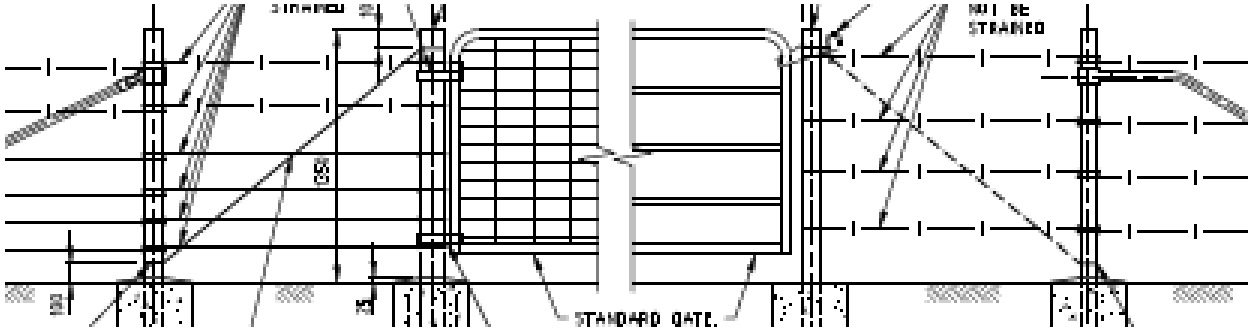
   That the Chair forward the link to the SEARs to Sub-committee members with distribution of the meeting minutes.
4. **Proponent report**
5. **Stakeholder and community consultation update**

   Overview and upcoming

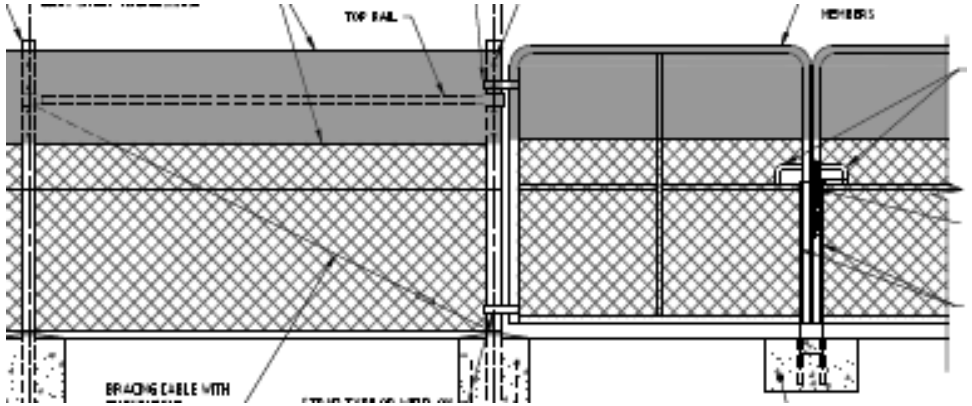
ACTIONS FROM LAST MEETING

REANNAN ELLABY – TECHNICAL APPROVALS LEAD
MATTHEW ERRINGTON – ENVIRONMENTAL ADVISOR
KYLE-JAMES GIGGACHER - PROJECT DELIVERY ENGINEER
ADAM WYATT - JACOBS GHD HYDROLOGIST

INDICATIVE FENCING TYPES



Standard Rural Wire Fence



Standard Fauna Exclusion Fence

RISK MANAGEMENT PROCESSES FOR FIRE IN PILLIGA FOREST

ARTC Emergency Management Procedure RLS-PR-044
https://www.artc.com.au/uploads/RLS-PR-044.pdf

PROTOCOLS FOR FREIGHTING HAZARDOUS MATERIALS

Australian Code for the Transport of Dangerous Goods by Road and Rail
https://www.ntc.gov.au/Media/Reports/(91D53582-C568-8B4A-6C7C-E746D36C65FD).pdf

BIODIVERSITY ASSESSMENT METHODOLOGY SUMMARY

Under ARTC review prior to submission to DP&E and OEH for review and endorsement. Update will be provided at next CCC meeting.

NOISE LOGGER LOCATIONS

https://s3-ap-southeast-2.amazonaws.com/ehq-production-australia/54e3fda3de3c294c11fc3466a9dbf61769dd70b5/documents/attachments/000/098/839/original/narromine-narrabri-noise-logger-locations.pdf?1550623946

FLOODING

PURPOSE

Existing and “missing links” pass through several major river systems

→ Cannot avoid flood affected land

Need some means of estimating:

- **Formation height**
- **Flood impacts**

→ Flood modelling

Source: MDBA

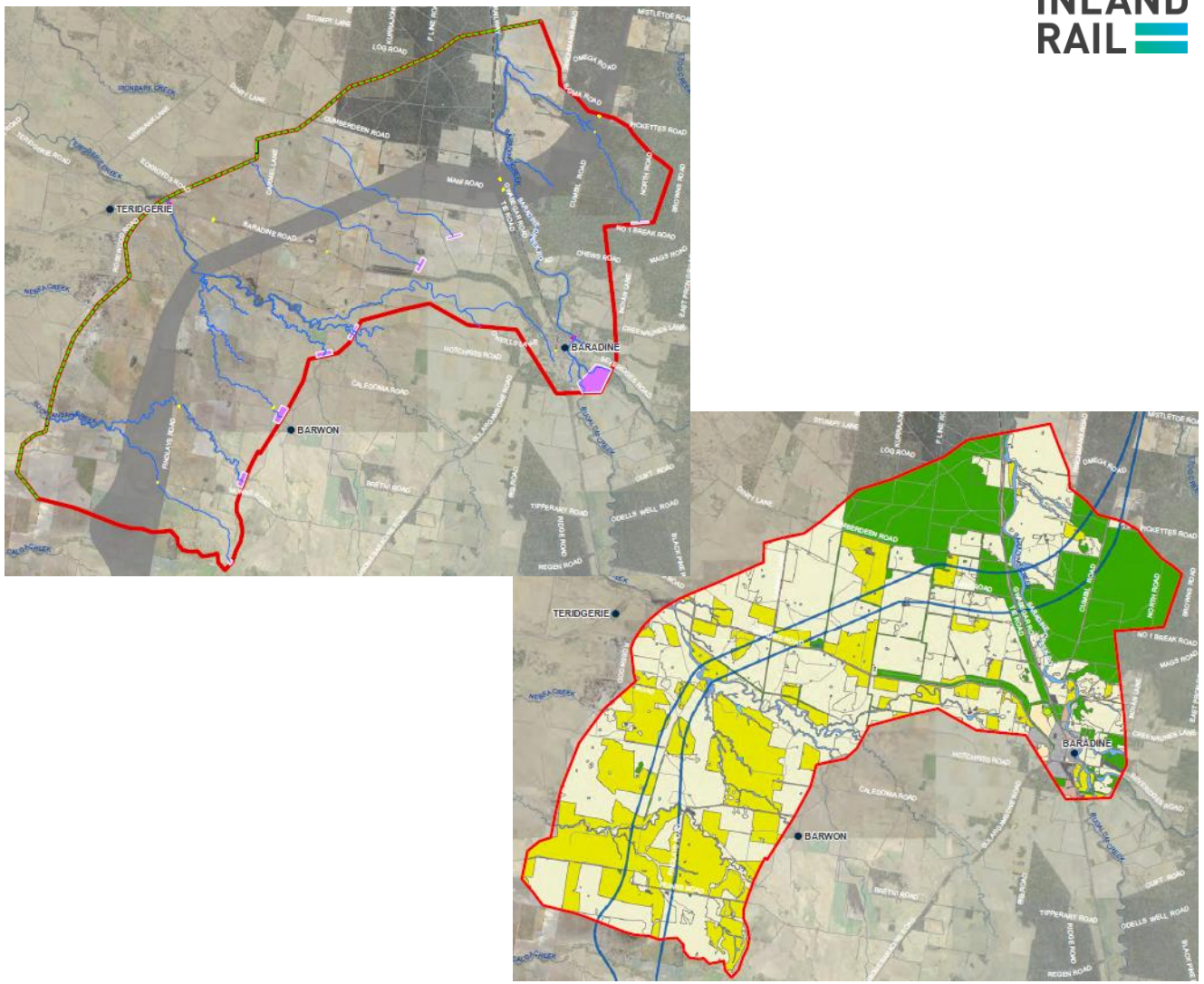
DEFINITIONS

AEP

- Annual exceedance probability
- Chance an event will occur (or be exceeded) in any year
- 1% AEP flood = 1% chance that a flood of at least this size occurring, on average, each year

Two dimensional flood modelling

- Gridded or irregular network
- No assumptions on flow direction
- Estimates flood depths
- Estimates velocities in two directions



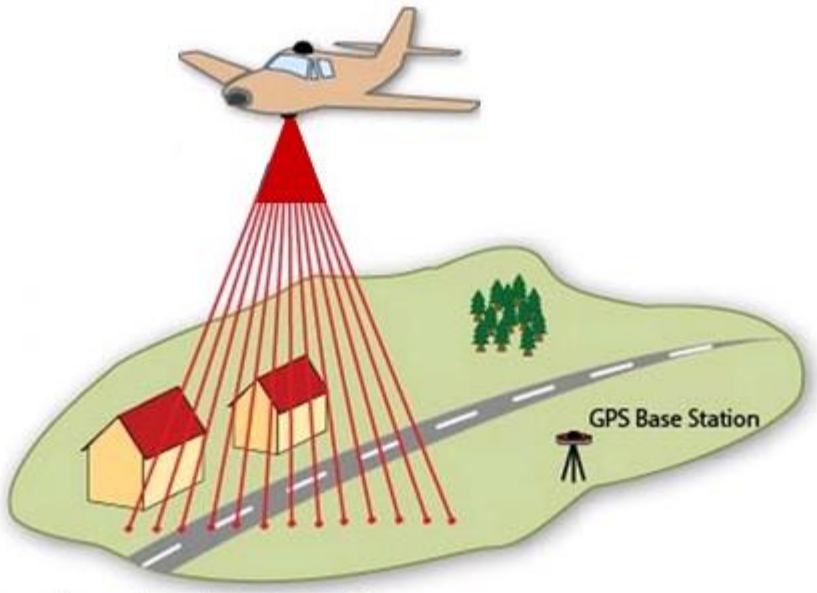
DEFINITIONS

Lidar

- Light detection and ranging
- Airborne laser survey
- Accuracy depends on point density

Afflux

- Relative change in flood depths
- Eg post-development minus existing



http://gmv.cast.uark.edu/wp-content/uploads/2013/01/ALS_scematic.jpg

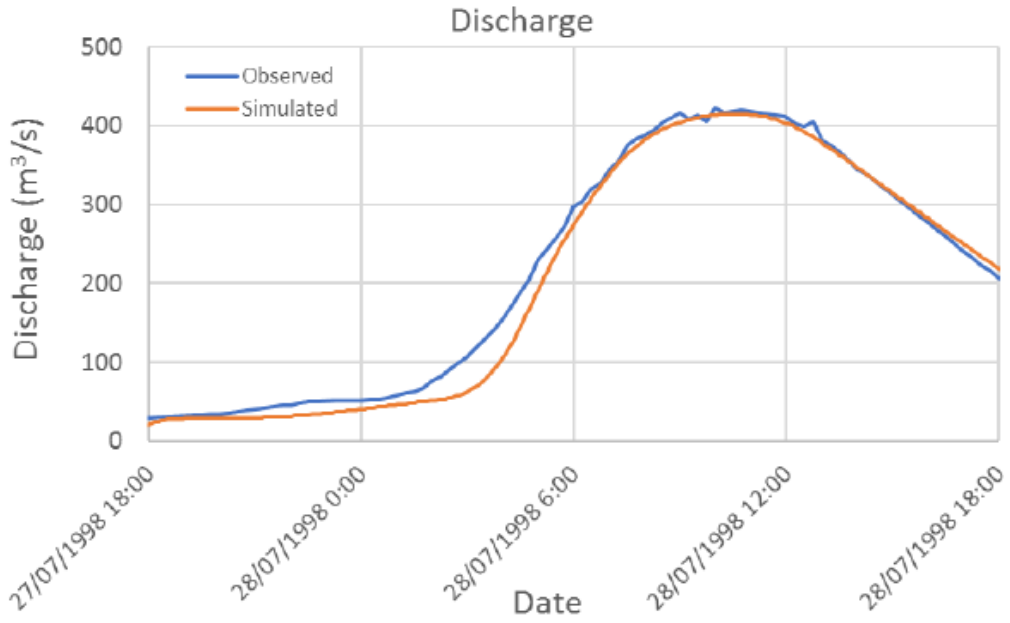
DEFINITIONS

Calibration

- Comparison of flood model outputs to observed flooding
- Modification of flood model parameters to improve agreement

Sensitivity testing

- Series of model variations to test the influence parameter selection has on predicted flood response



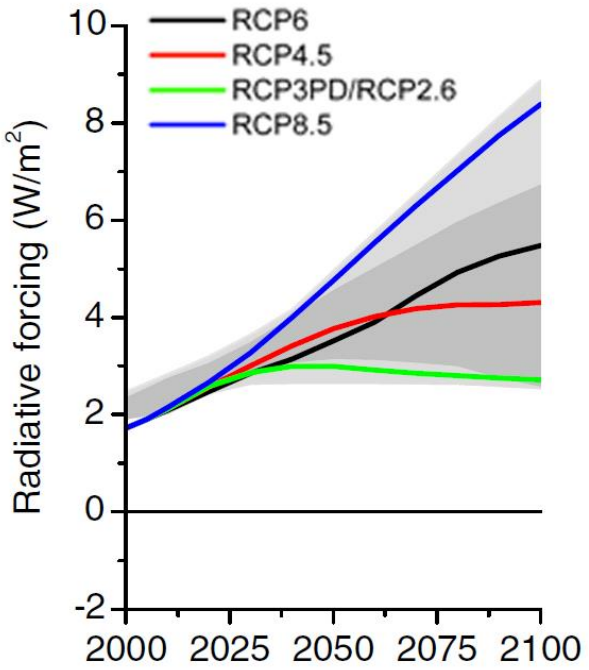
DEFINITIONS

Climate change

- Projected changes to design rainfall intensities
- About 20% increase by 2090 (RCP8.5)

Design criteria

- Set of criteria the design should achieve
- Flood immunity, afflux



Source: IPCC

INPUT DATA

Terrain

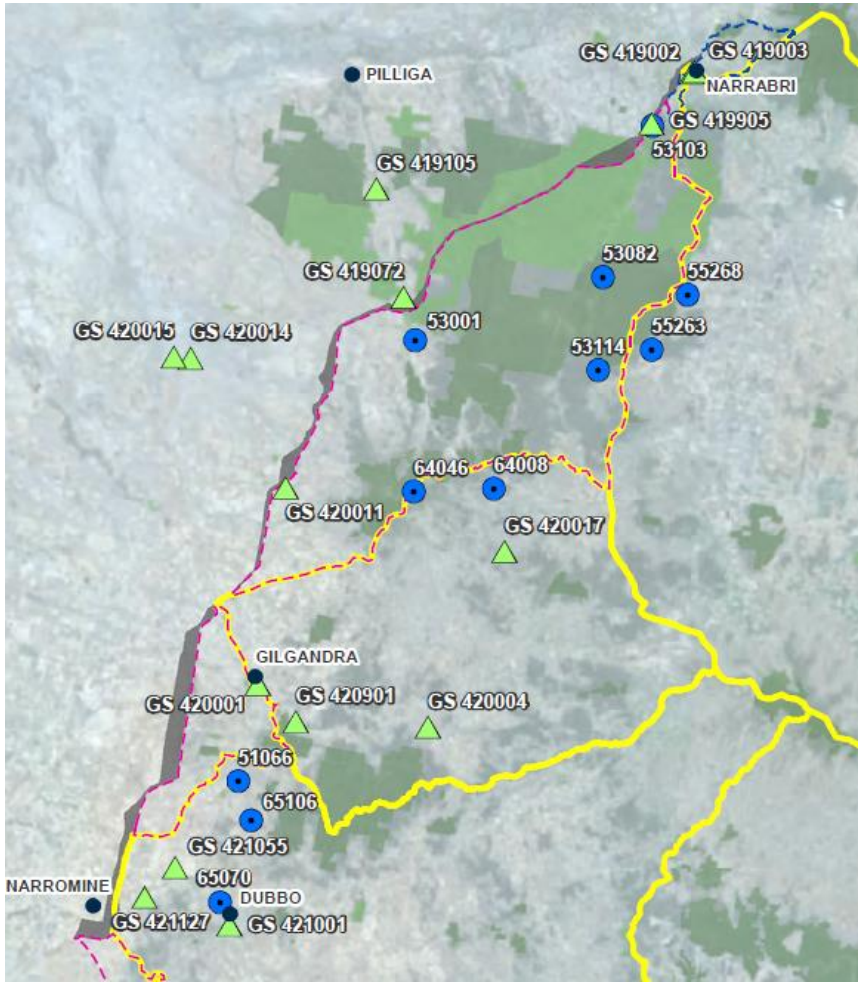
- LiDAR (ARTC; ELVIS)
- Shuttle radar (NASA)

Aerial photography

Previously developed Council models

- Narrabri
- Narromine

Historical rainfall and streamflow



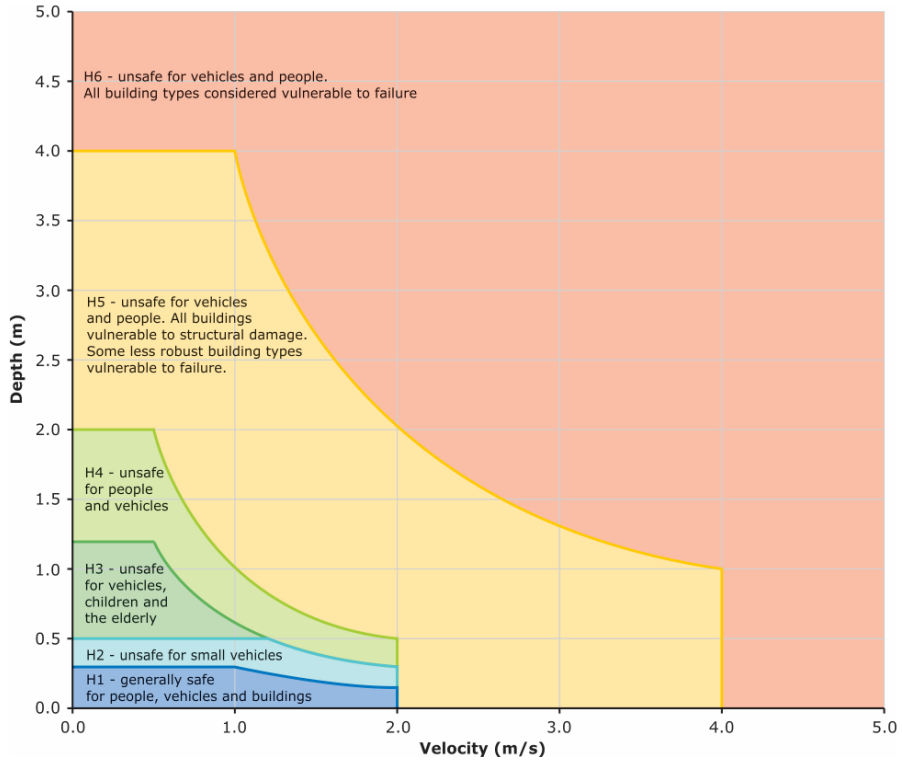
MODEL DEVELOPMENT

Standards, guidelines

- **Floodplain Development Manual (DIPNR 2005)**
- Manage flood hazards

- **Australian Rainfall and Runoff (2016)**
- Provide tools and guidance for flood model development
- Infiltration losses, design storm events, climate change
- Flood hazards

- **ARTC's Engineering Practices Manual**
- Minimum design criteria



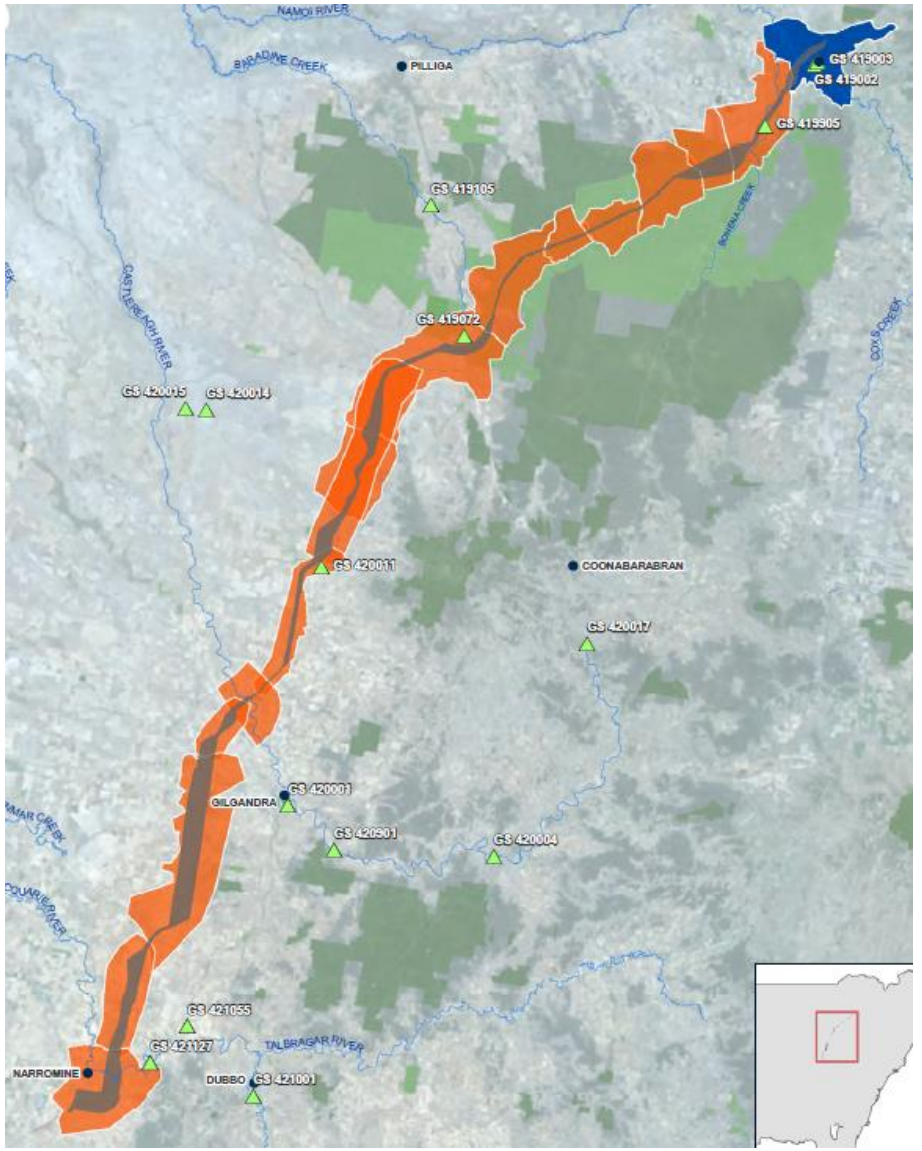
MODEL DEVELOPMENT

Sixteen flood models

- **Two existing models - Narromine and Narrabri**
- **Narromine model extended to include *Backwater Cowal***
- **Fourteen new models**

Each model includes:

- **Two-dimensional flood model (right)**
- **Catchment inflows**
- Hydrological model
- Estimated from gauging station



HYDROLOGY MODEL

Large ungauged catchments

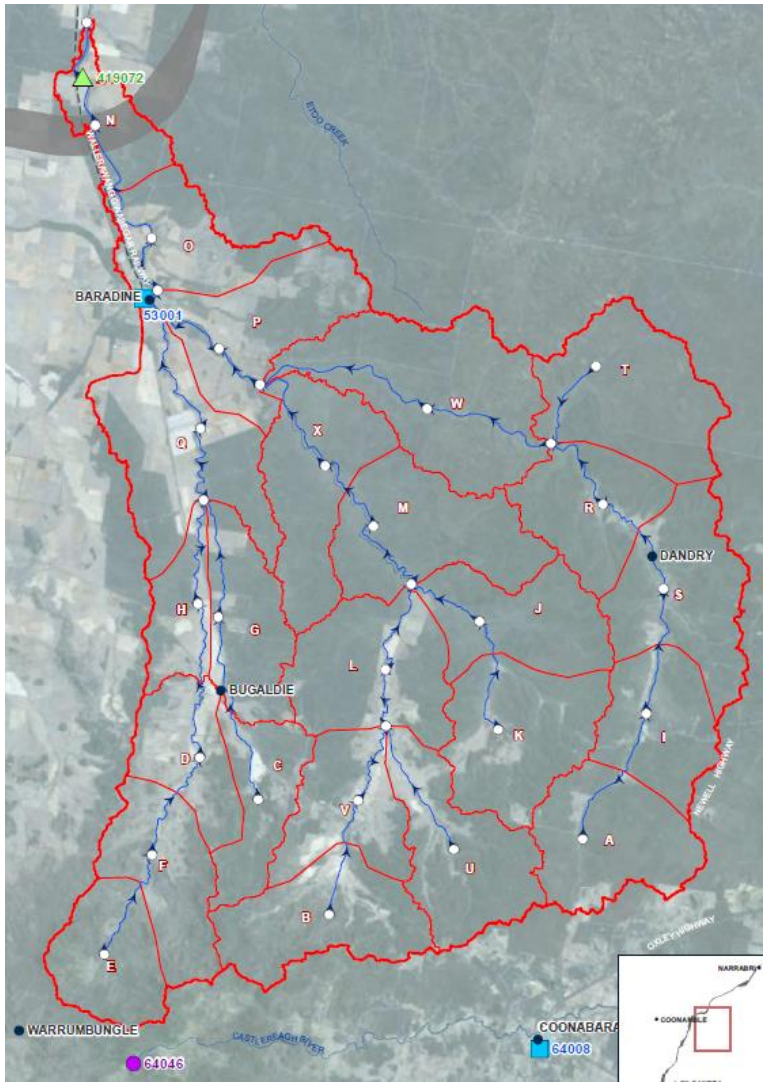
RORB runoff routing model

Series of cascading subcatchments

Flows routed between subcatchments

Parameters:

- Initial rainfall loss
- Continuing rainfall loss
- Storage delay (routing) parameter(Kc)

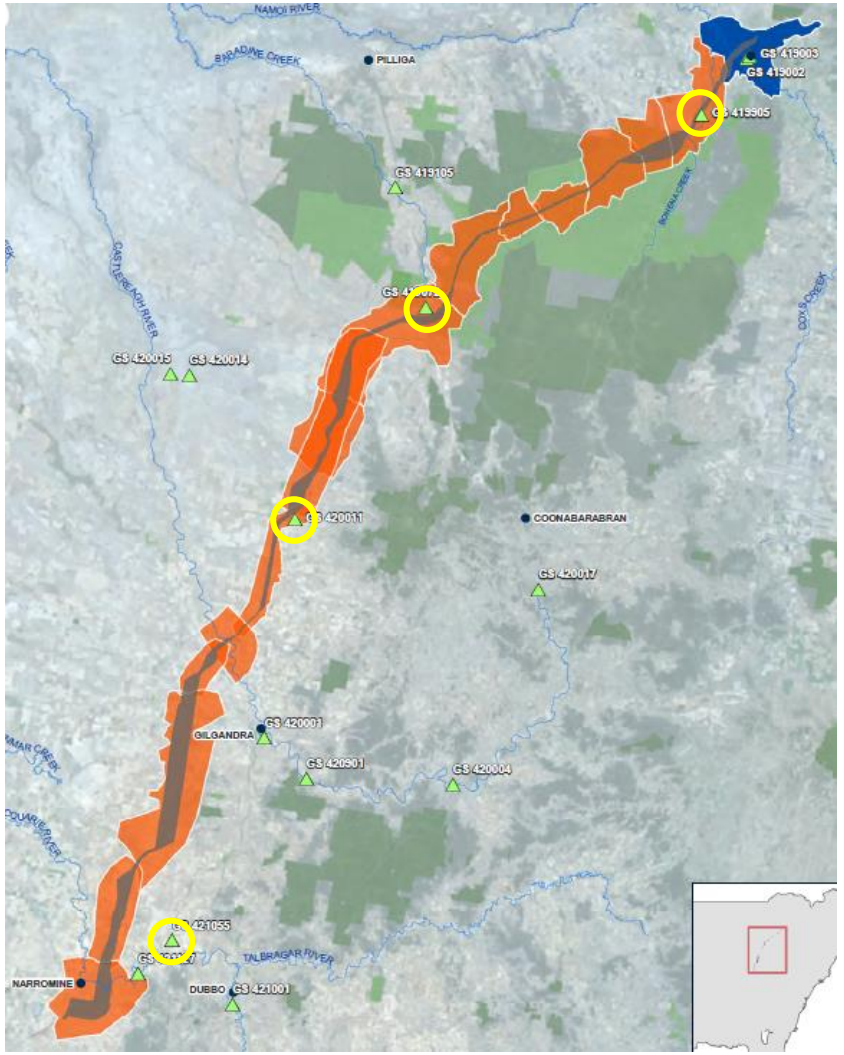


HYDROLOGY MODEL CALIBRATION

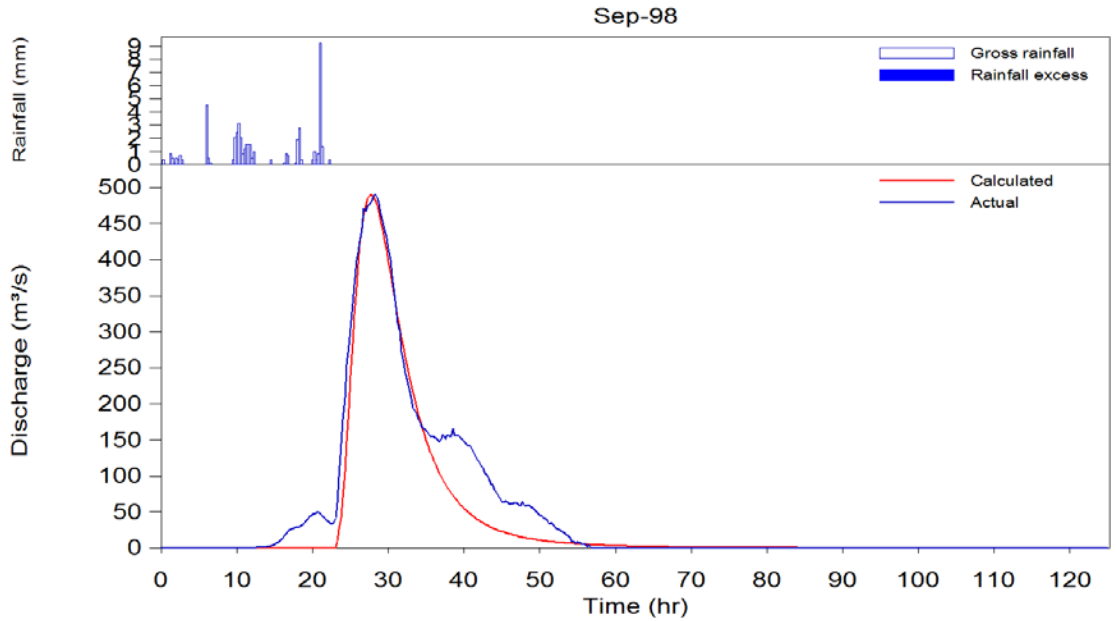
INLAND RAIL

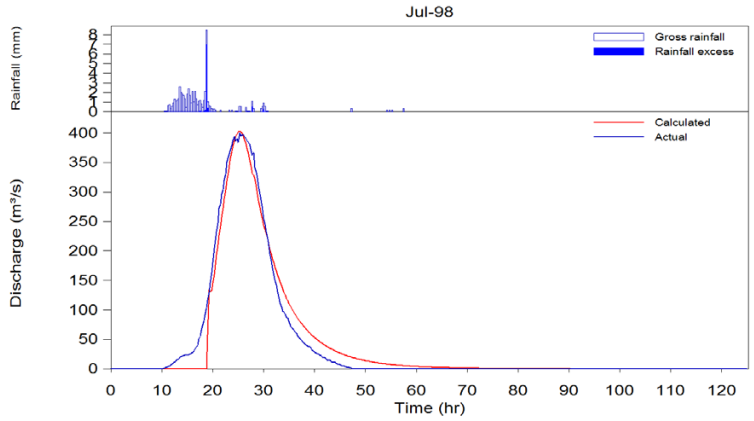
Four gauges available for calibration:

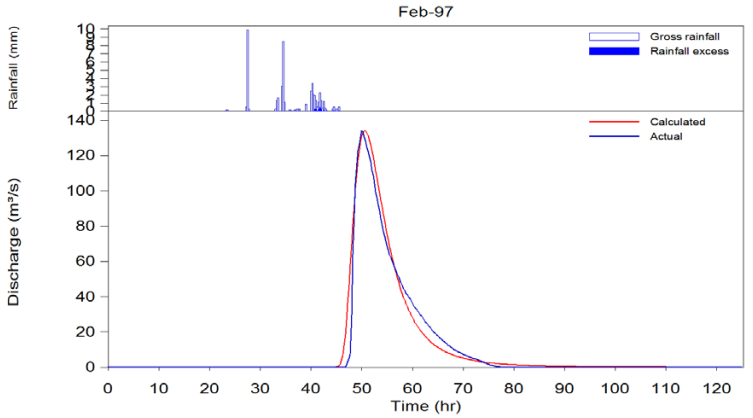
- **Bohena Creek (419905)**
- **Baradine Creek (419072)**
- **Baronne Creek (420011)**
- **Coolbaggie Creek (donor gauge) (421055)**

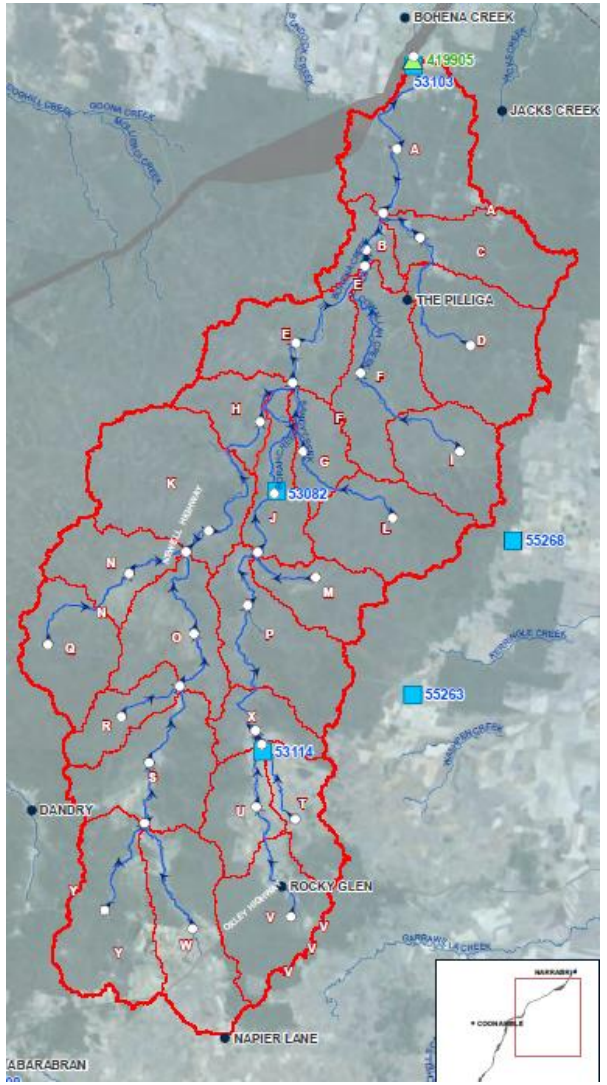


HYDROLOGY MODEL CALIBRATION (BOHENA CREEK)

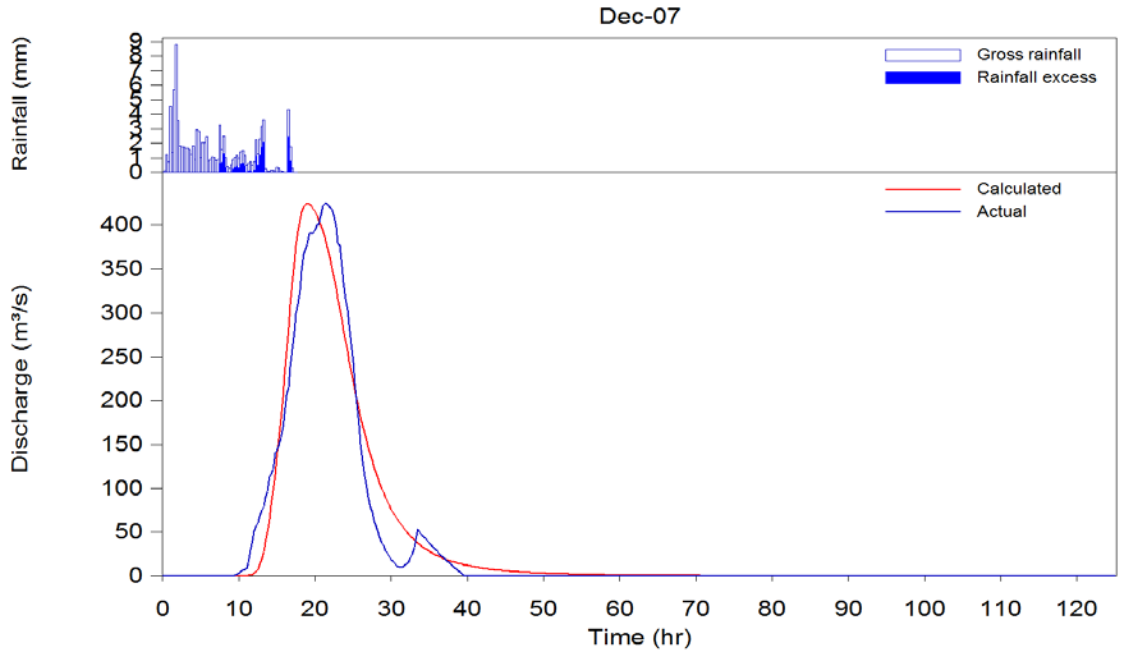


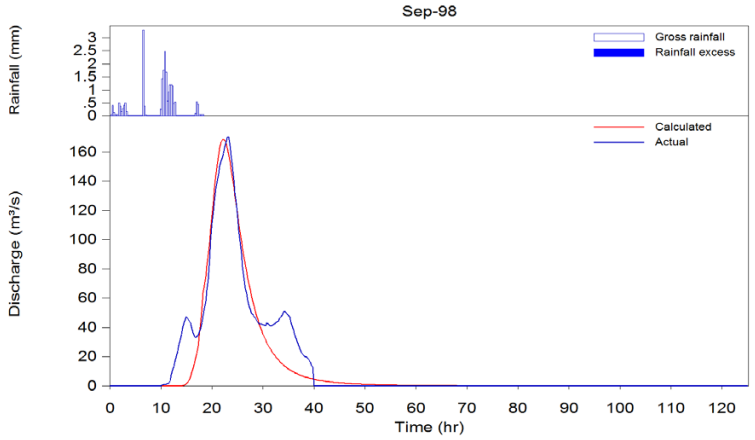


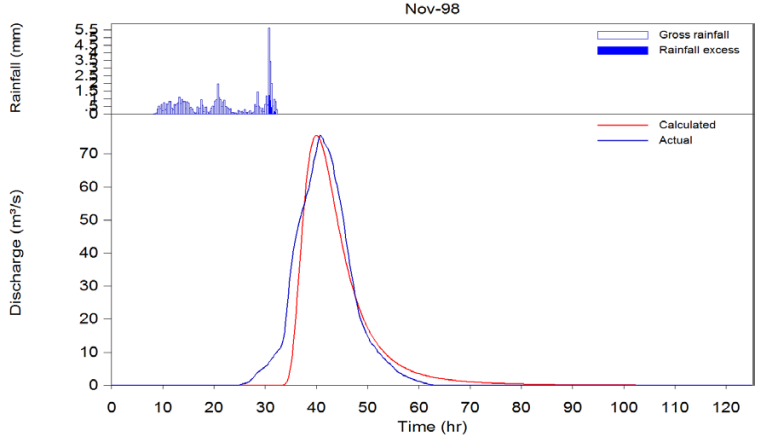


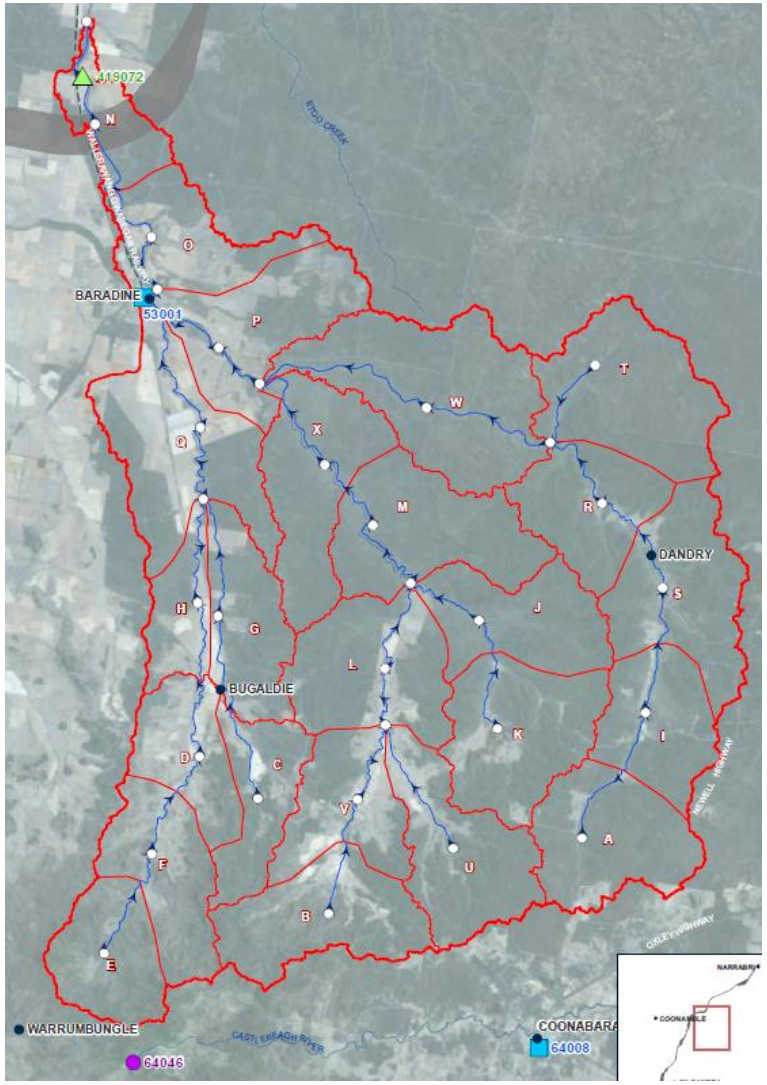


HYDROLOGY MODEL CALIBRATION (BARADINE CREEK)

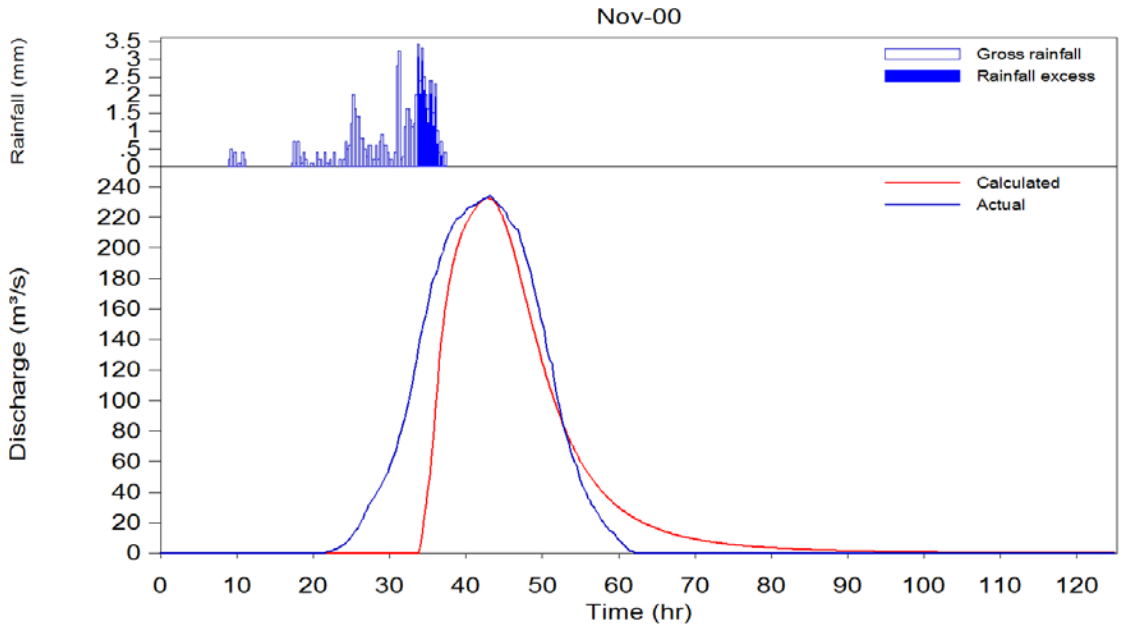


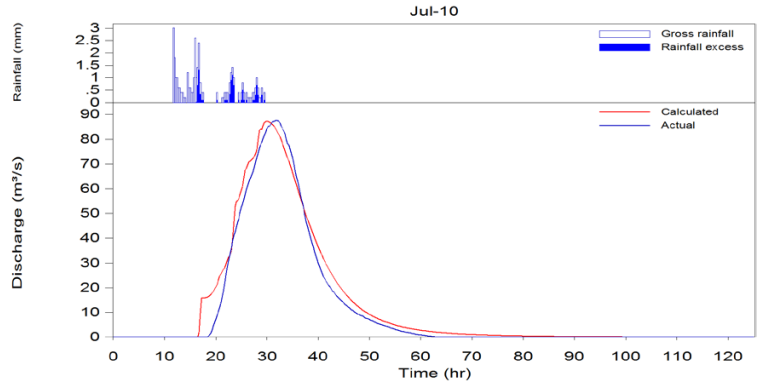


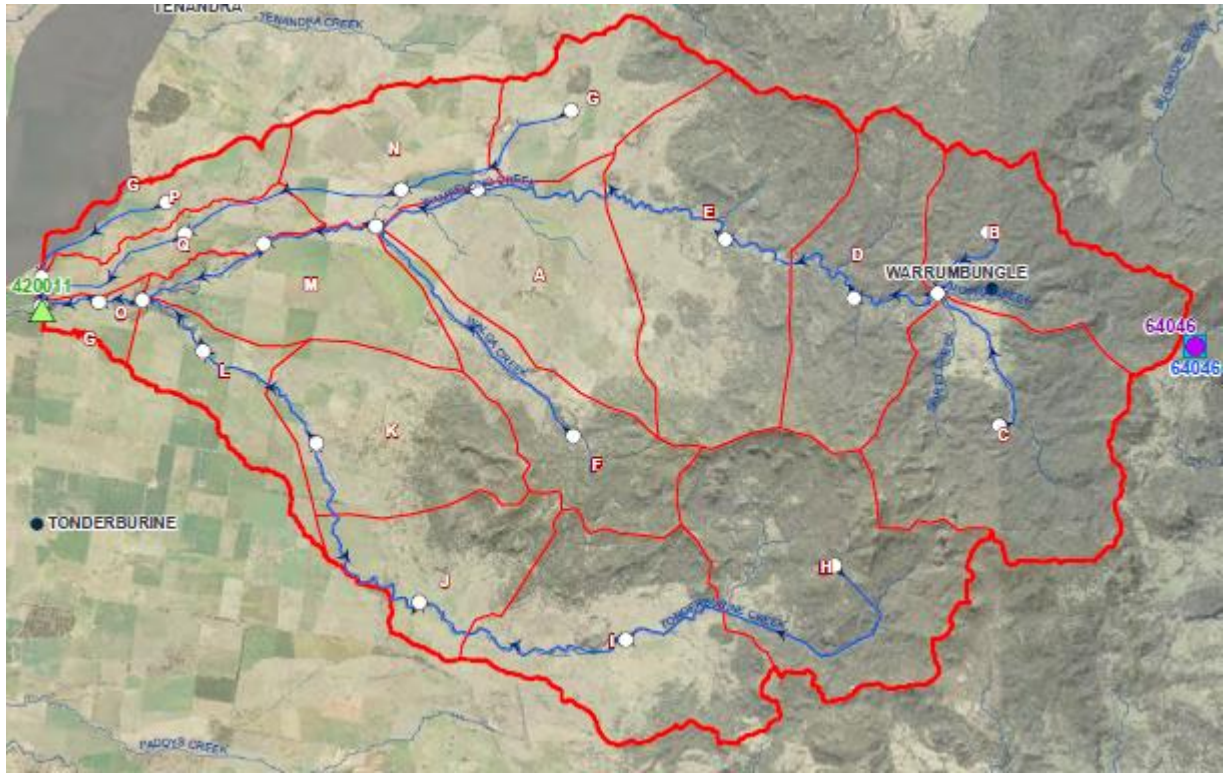




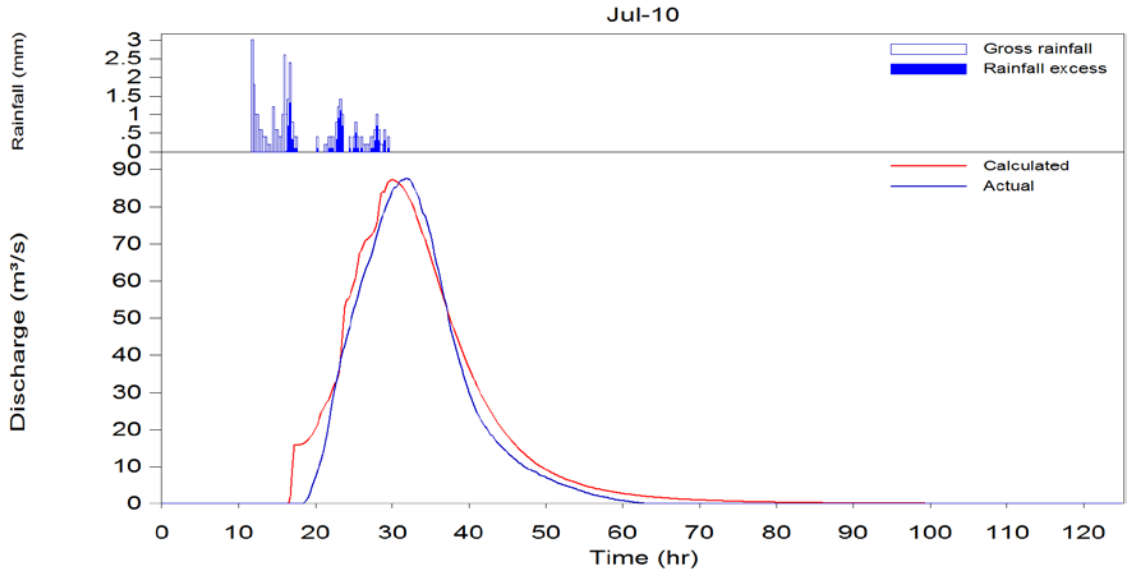
HYDROLOGY MODEL CALIBRATION (BARONNE CREEK)

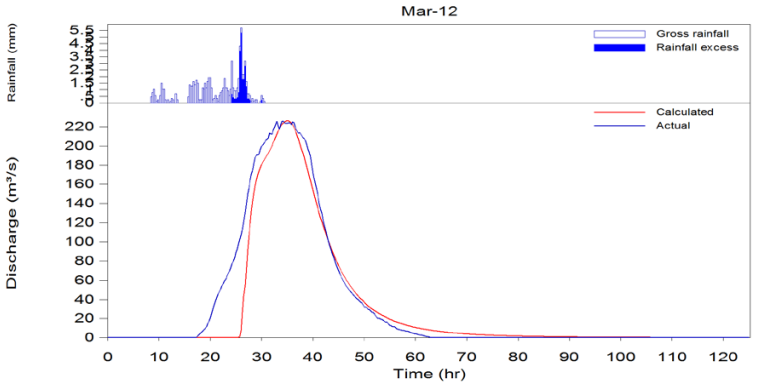


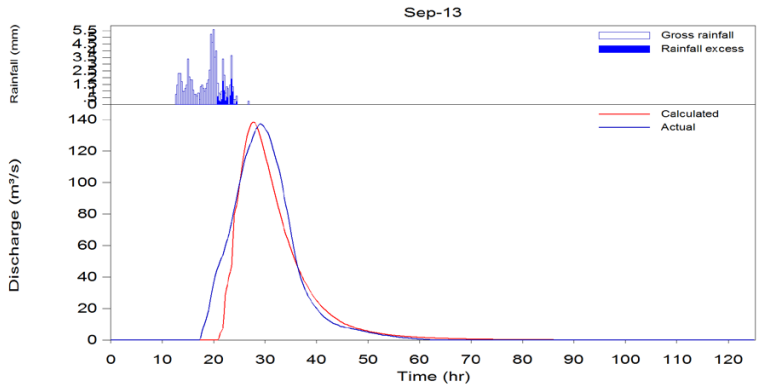




HYDROLOGY MODEL CALIBRATION (COOLBAGGIE CREEK)





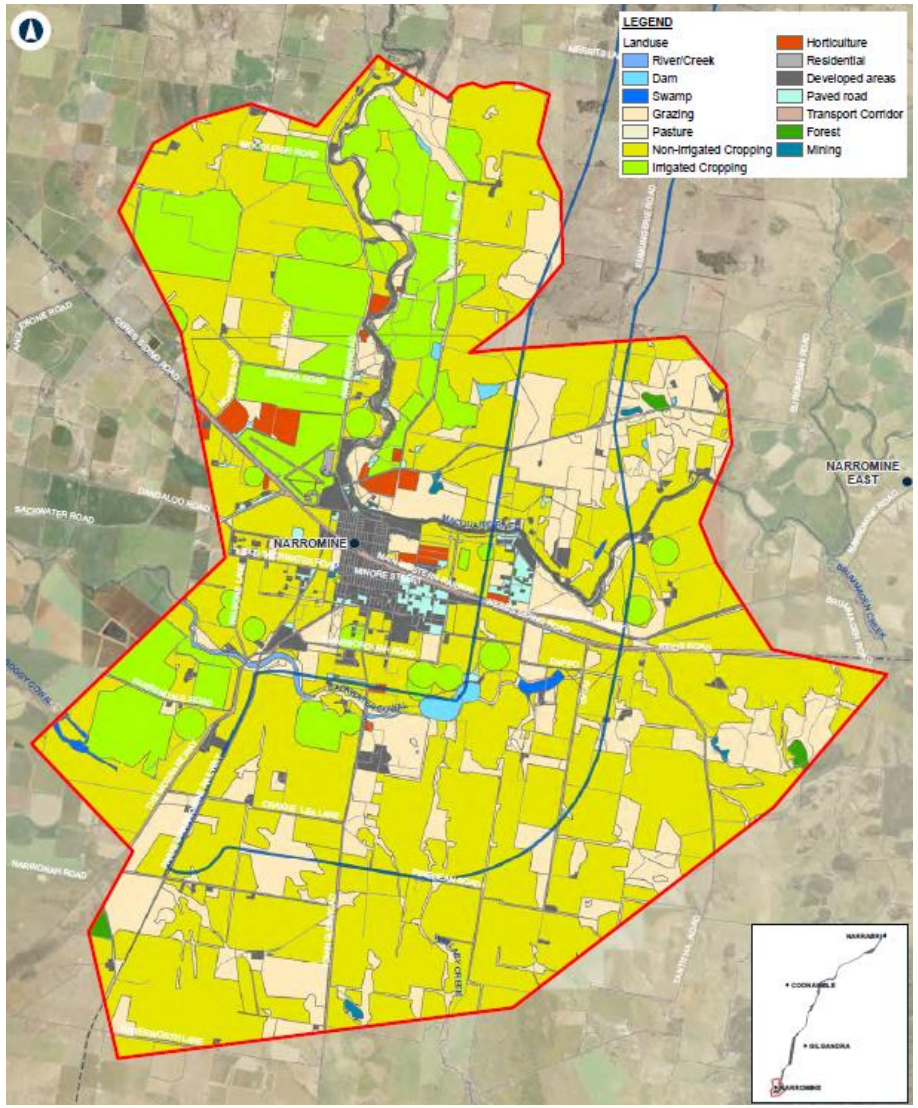


FLOOD MODEL

Two previously developed Council flood models:

- **Narromine (TUFLOW)**
- **Narrabri (MIKE FLOOD)**

The Narromine model has been extended to include the *Backwater Cowal*



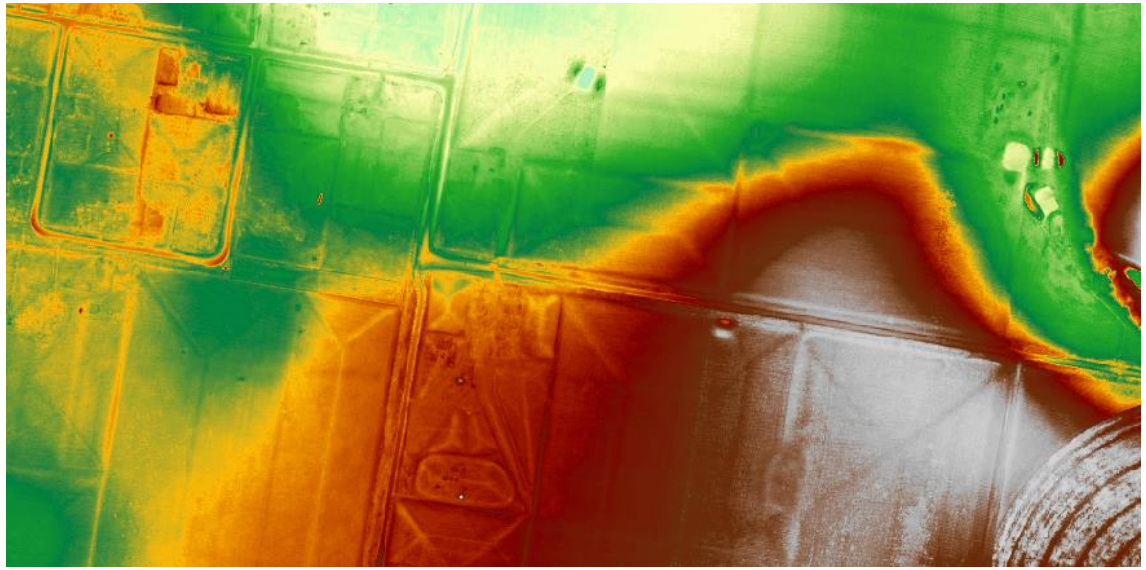
FLOOD MODEL

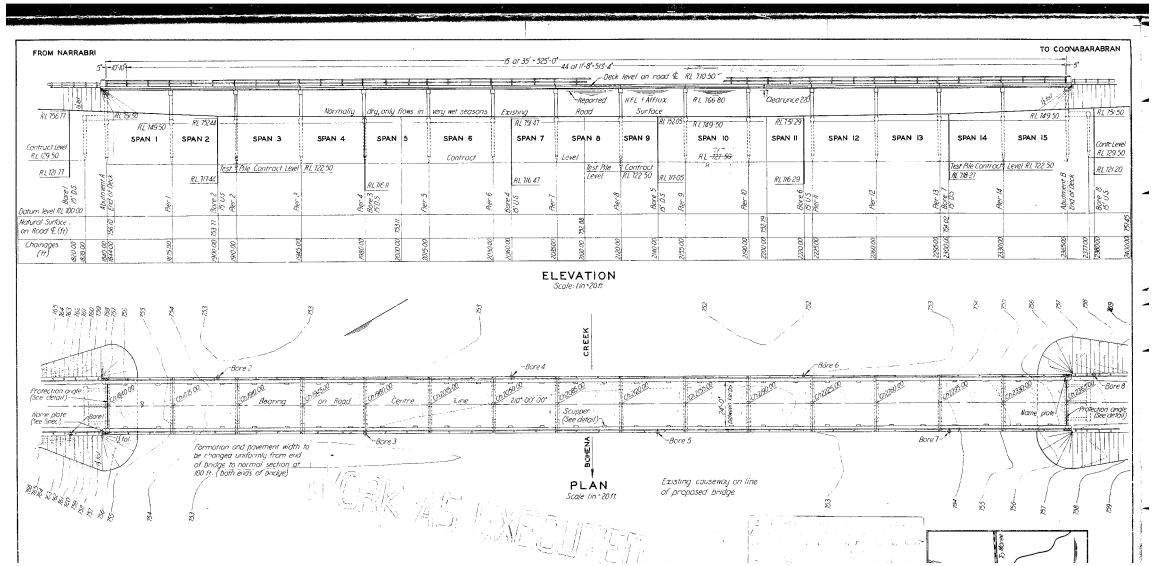
All flood models are based on LiDAR survey

No assumption regarding flow paths within the flood model extents

Dams and associated bunds and drains are included as topographic features (as captured by the LiDAR)

Existing culverts and bridges identified from aerial photography, and RMS drawings



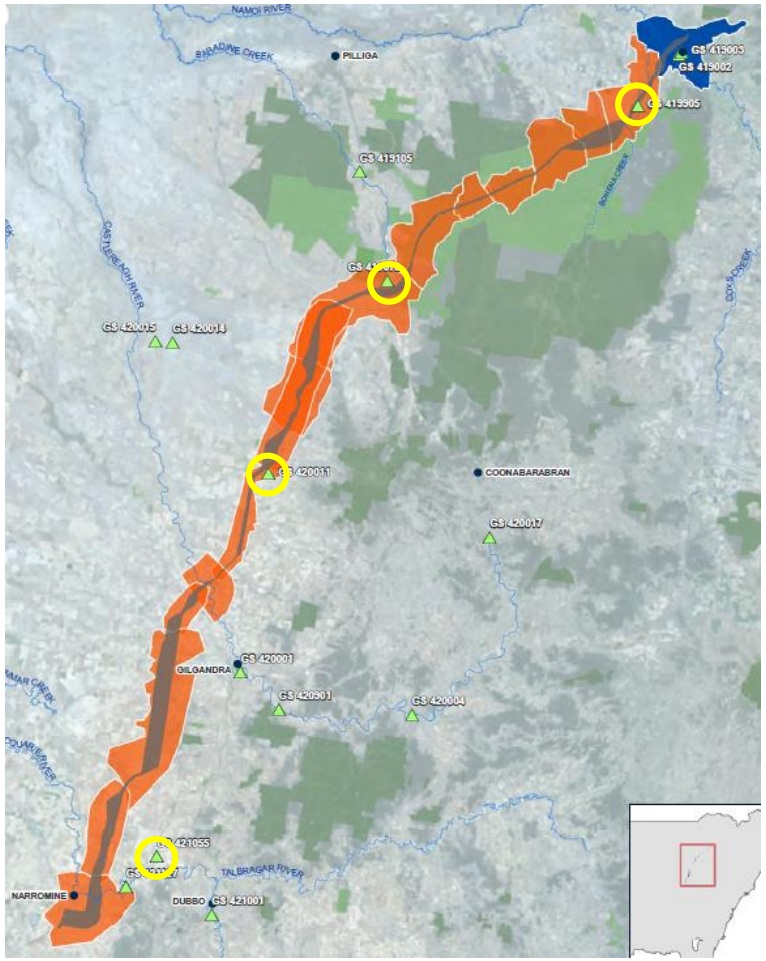


FLOOD MODEL CALIBRATION

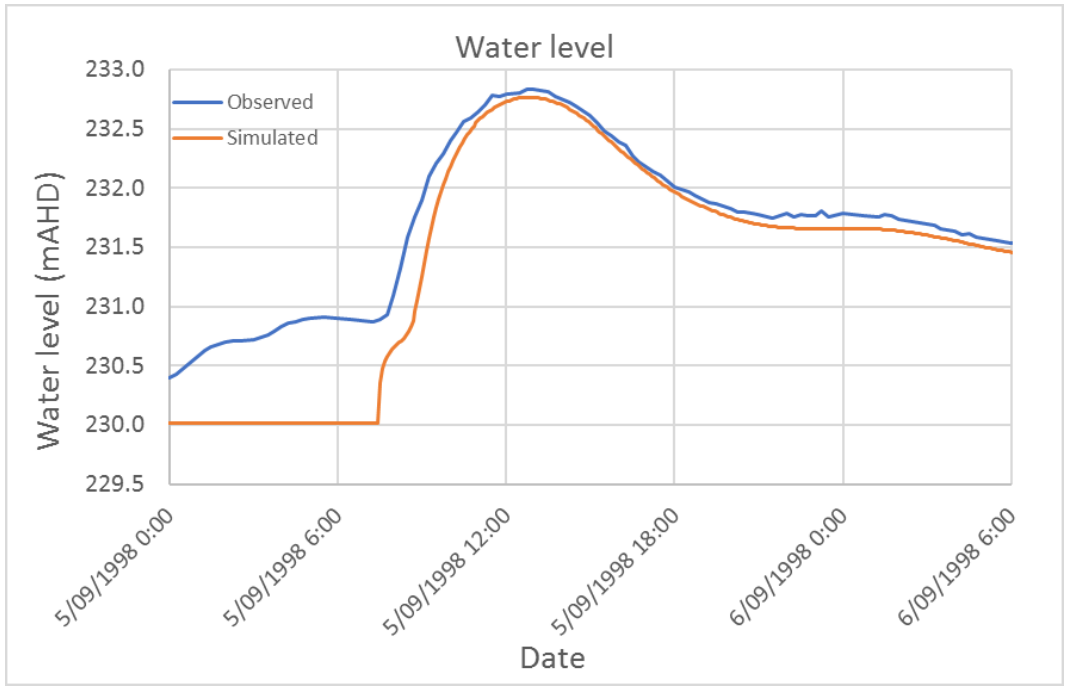
Three gauges available for calibration:

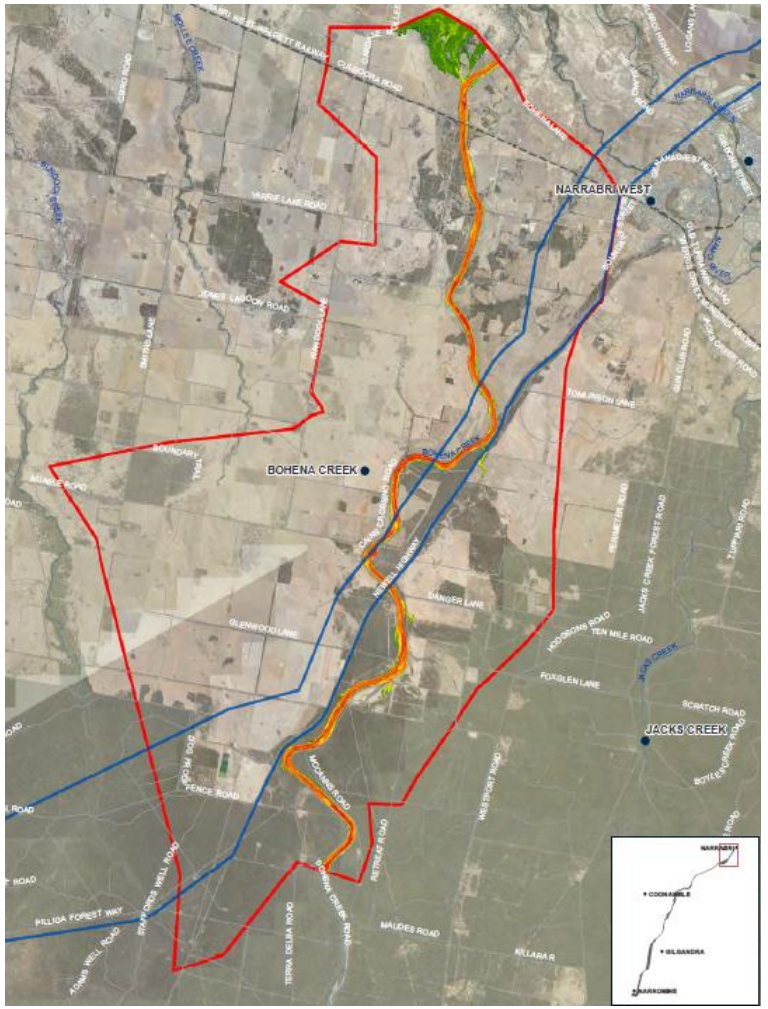
- **Bohena Creek (419905)**
- **Baradine Creek (419072)**
- **Baronne Creek (420011)**

Baradine and Baronne Creek gauges are discontinued, and are not surveyed to AHD.

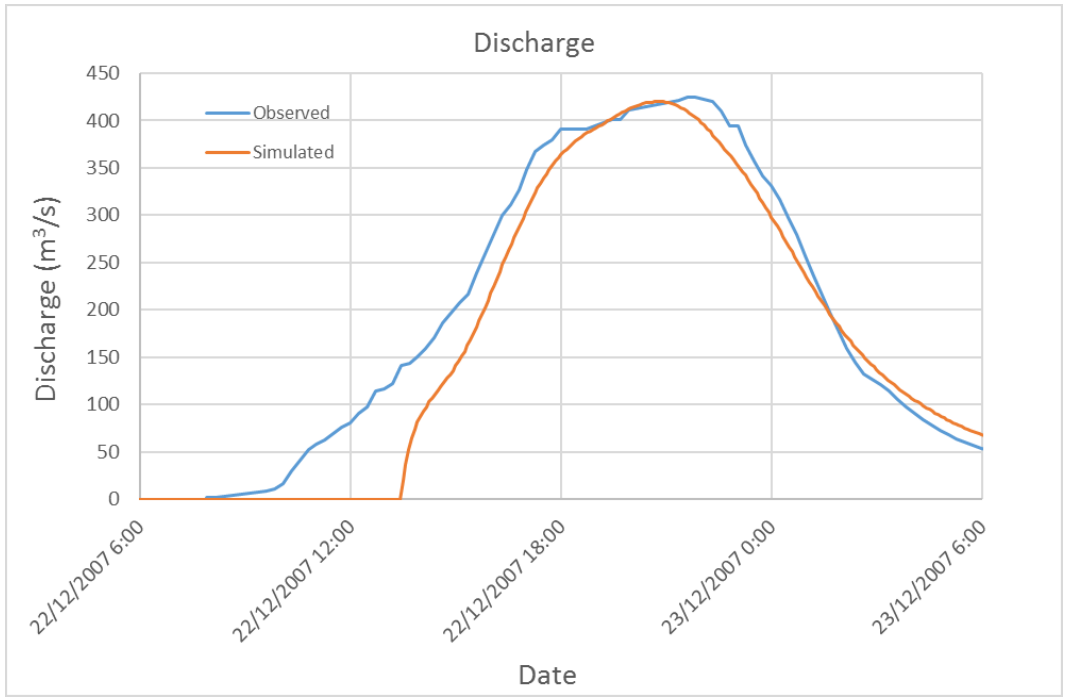


FLOOD MODEL CALIBRATION (BOHENA CREEK)

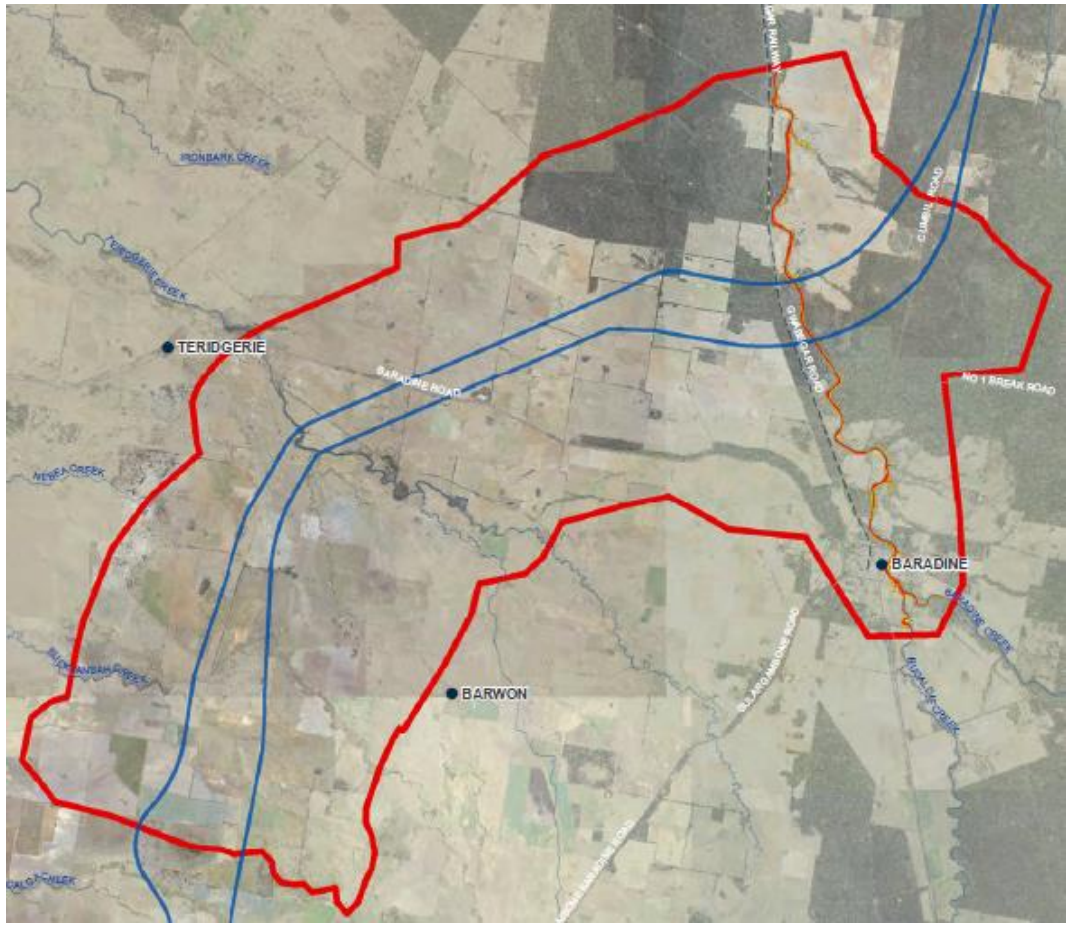




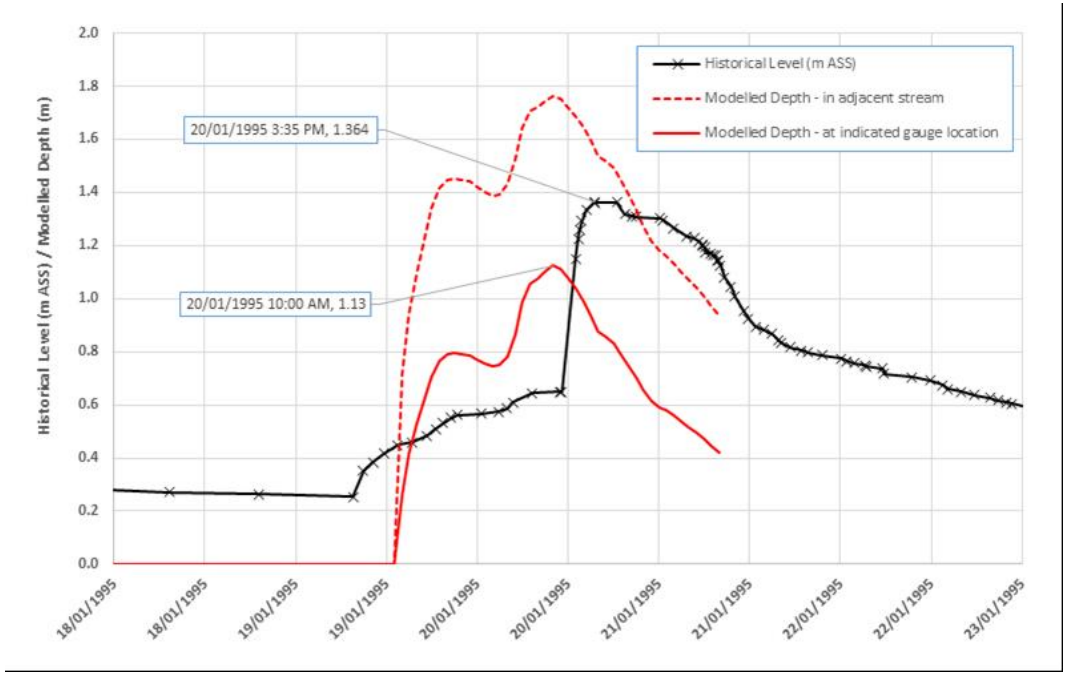
FLOOD MODEL CALIBRATION (BARADINE CREEK)



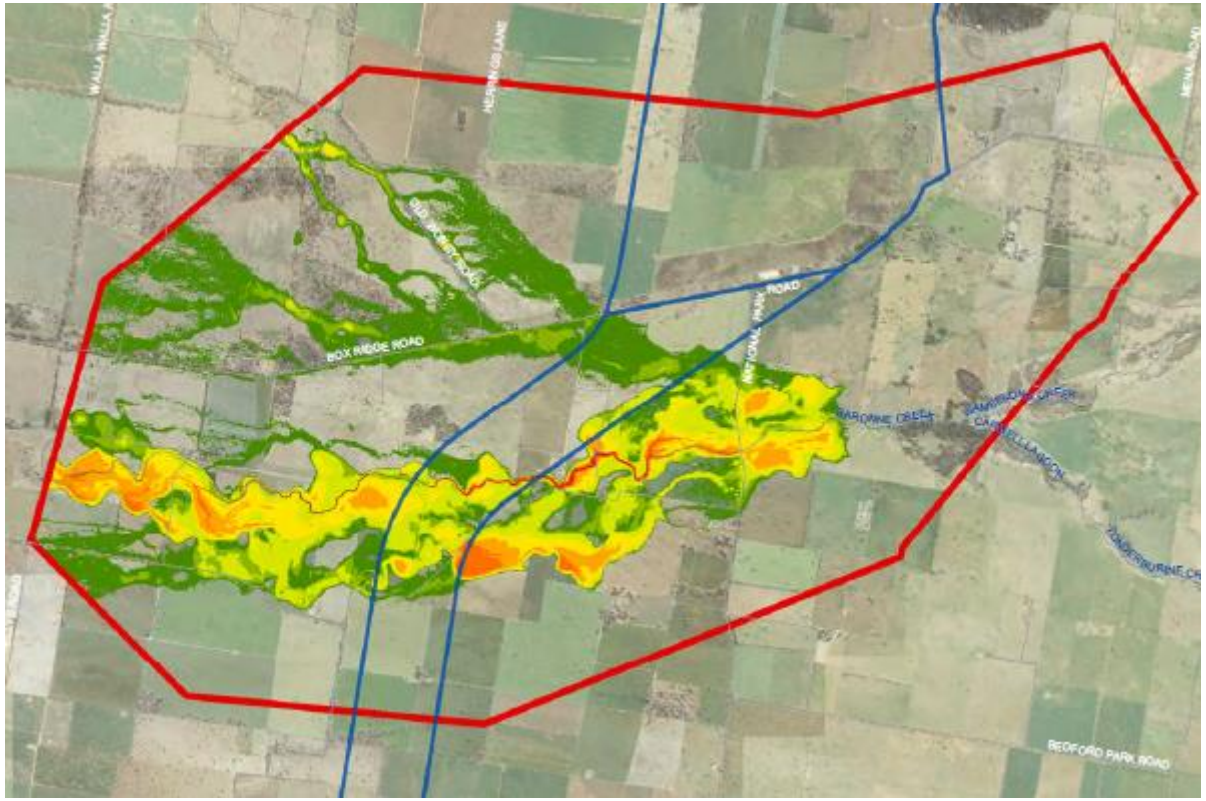
Historical flood levels not in AHD. Flows used in lieu.



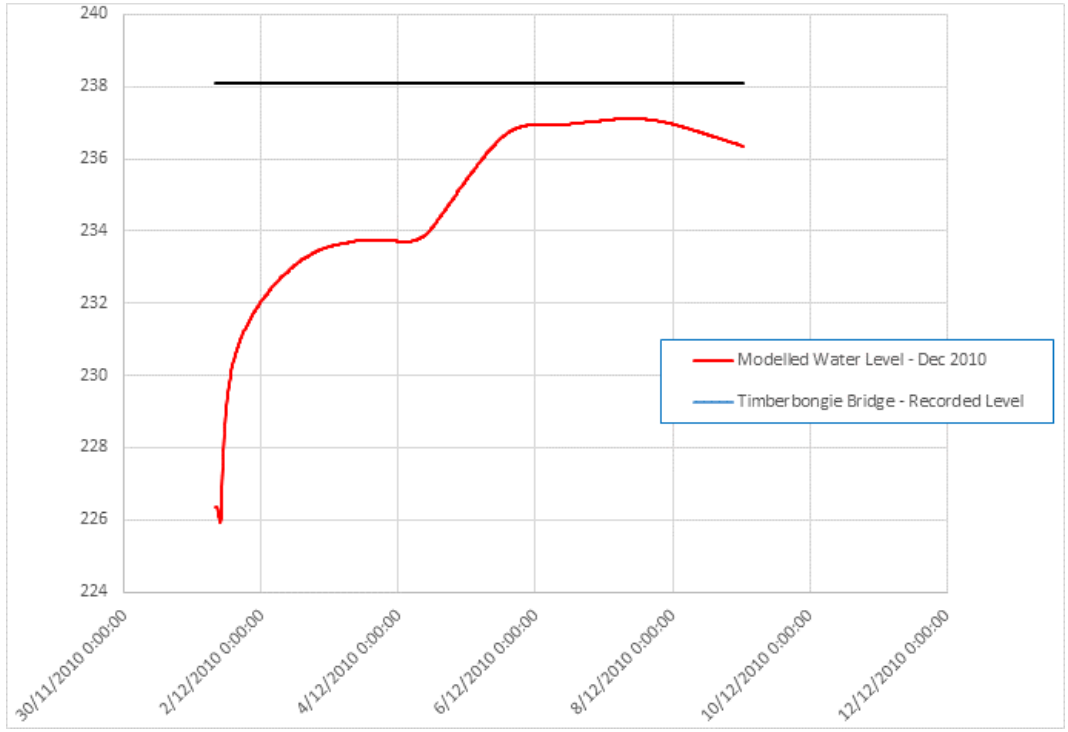
FLOOD MODEL CALIBRATION (BARONNE CREEK)

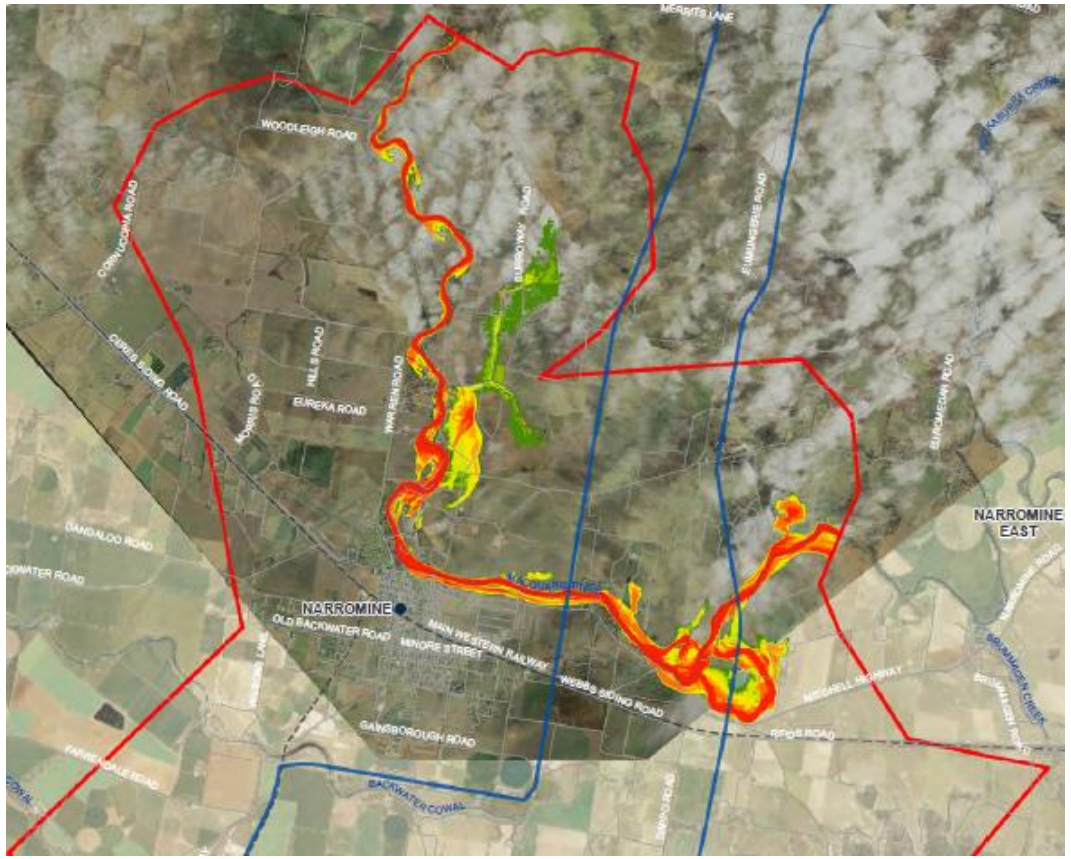


Historical flood levels not in AHD.
Flows unavailable for this event



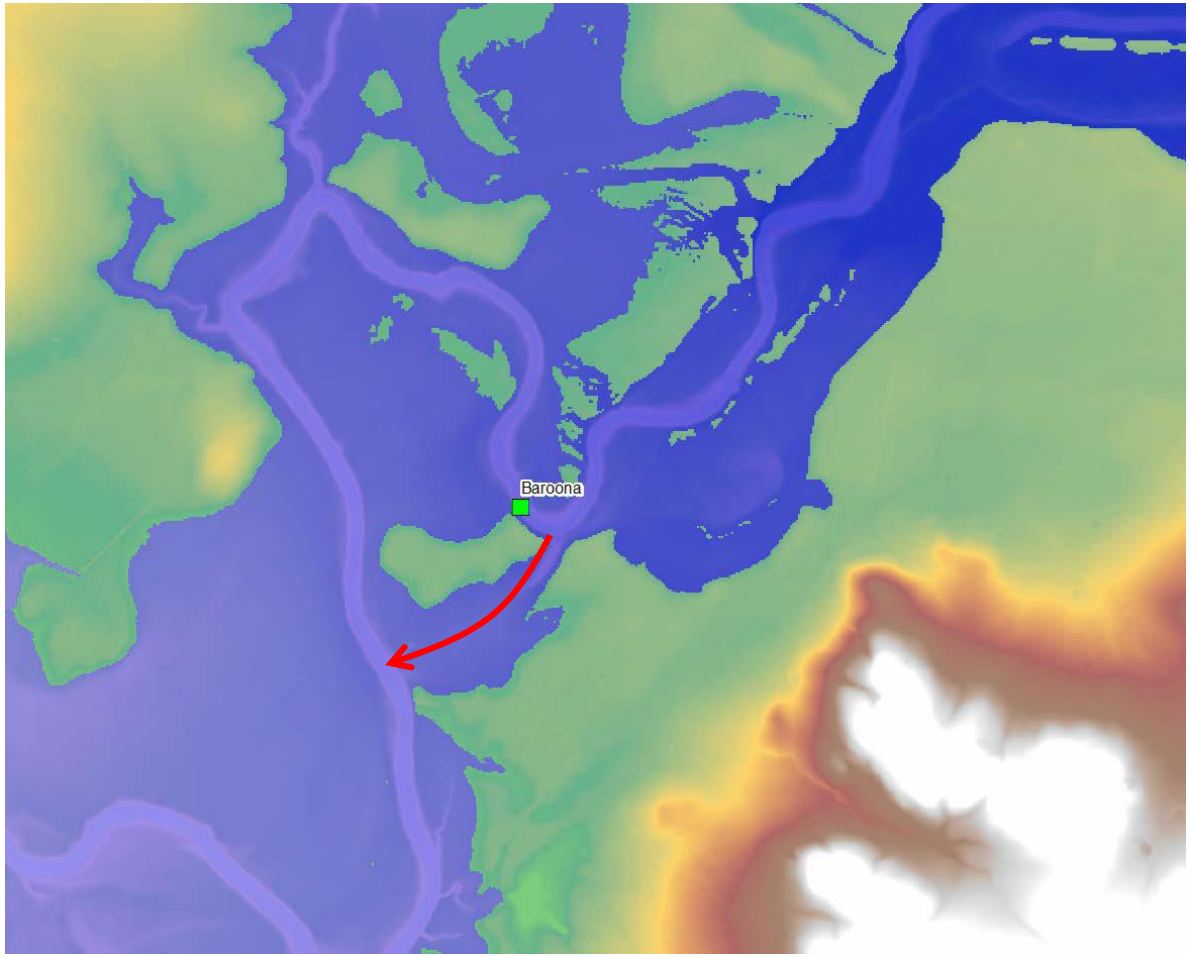
FLOOD MODEL CALIBRATION (NARROMINE)





FLOOD MODEL CALIBRATION (NARROMINE)

- Narromine Council flood model
- Inflows estimated from Baroona gauge
- Gauge is located downstream of a breakout (via Pipeclay Gully)
- Likely that the gauge underestimates inflows into Narromine



DESIGN

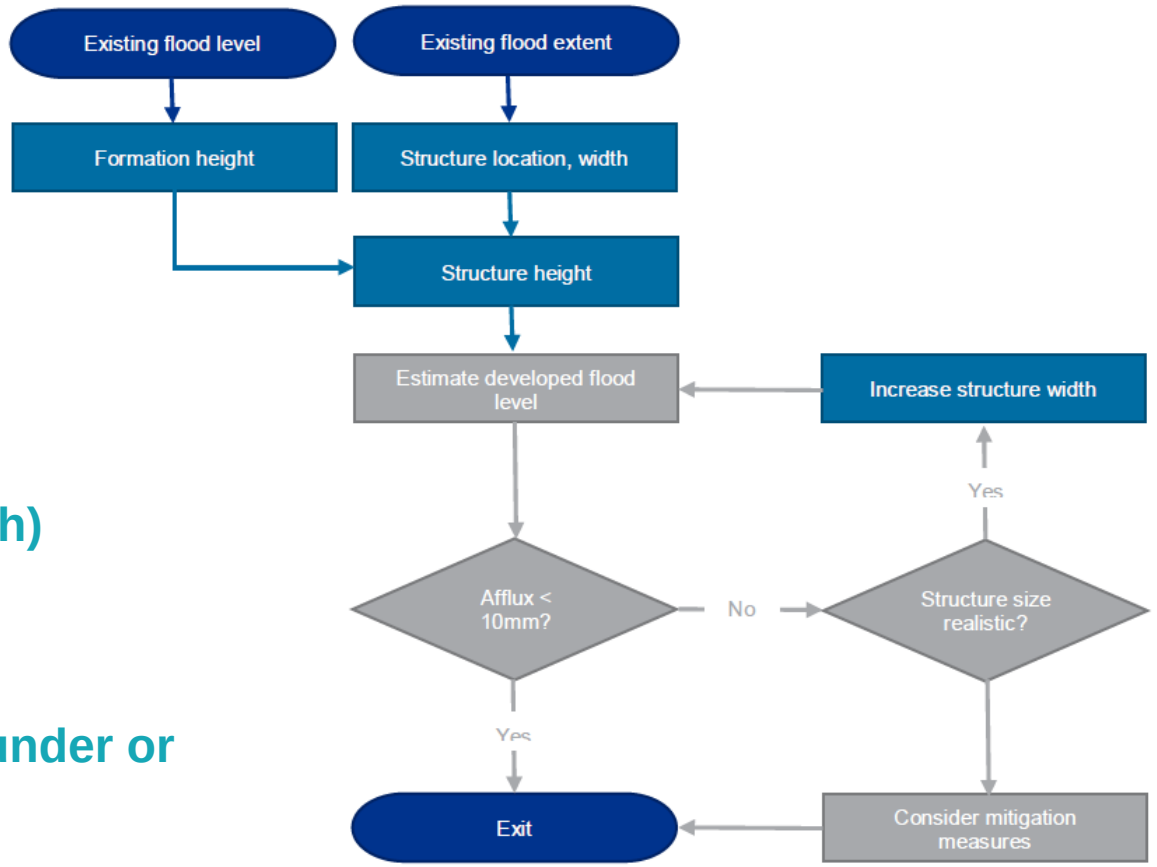
Rail formation:

- 1% AEP flood immunity
- Climate change (freeboard)

Design parameters:

- Less than 10mm afflux (critical infrastructure)
- Change in flood hazard category
- Increased flood duration (pasture and crop health)
- Change in flow velocities (watercourse stability)

Model parameter sensitivity testing – potential for under or over design?



IMPACT ASSESSMENT

Impact assessment requirements

1. 50% AEP (1 in 1.4 year flood)
2. 20% AEP (1 in 4.5 year flood)
3. 10% AEP (1 in 9.5 year flood)
4. 5% AEP (1 in 20 year flood)
5. 2% AEP (1 in 50 year flood)
6. 1% AEP (1 in 100 year flood)
7. 0.5% AEP (1 in 200 year flood)
8. 0.1% AEP (1 in 1000 year flood)
9. Probable maximum flood

IMPACT ASSESSMENT

For each of these nine flood events, mapping of:

1. Existing maximum flood depths and extents
2. Existing maximum flood velocities
3. Existing maximum flood hazard categories
4. Existing flood duration
5. Proposed maximum flood depths and extents
6. Proposed maximum flood velocities
7. Proposed maximum flood hazard categories
8. Proposed flood duration
9. Changes to the maximum flood depths and extents (afflux)
10. Changes to the maximum flood velocities
11. Changes to the maximum flood hazard categories
12. Changes to the flood duration

PROPONENT'S REPORT

REANNAN ELLABY – TECHNICAL APPROVALS LEAD
MATTHEW ERRINGTON – ENVIRONMENTAL ADVISOR
KYLE-JAMES GIGGACHER - PROJECT DELIVERY ENGINEER
ADAM WYATT - JACOBS GHD HYDROLOGIST

PROJECT OVERVIEW

WHAT IS INLAND RAIL?

- Connected
- Fast (Straight & Flat)
- Reliable (98%)
- Cost Effective

Feasibility Includes:

- Community Consultation
- Site investigations
- Feasibility Design
- Environmental Impact Assessment

FEASIBILITY FIELD INVESTIGATION UPDATE

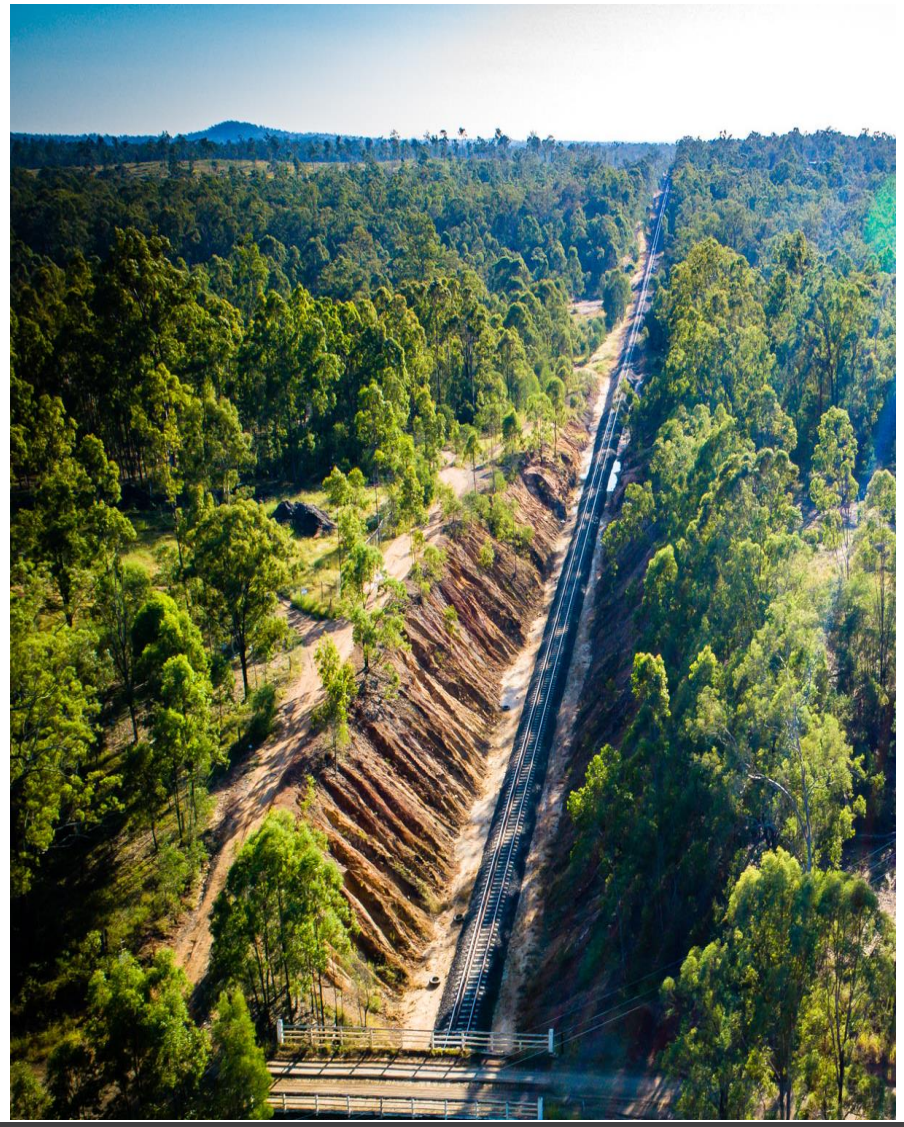
INLAND RAIL

ENGINEERING

- Geotechnical
- Survey
- Hydrology
- Utilities
- Road and Rail Interface
- Traffic and Transport
- Borrow Pits

ENVIRONMENTAL

- Terrestrial and Aquatic Ecology
- Cultural Heritage
- Surface and Groundwater
- Noise and Vibration
- Social Impact
- Agriculture and Land Use
- Landscape and Visual Amenity



STAKEHOLDER ENGAGEMENT AND CONSULTATION

HELENA OREL – NSW STAKEHOLDER MANAGER

CONSULTATION AND ENGAGEMENT

- Preparation ongoing for upcoming one on one meetings and consultation for focus area (final corridor is not decided yet)
- Project newsletter being distributed across N2N local government areas
- Preparation for contacting landowners about detailed property boundary surveys and advertising (cadastral surveys)

NARROMINE TO NARRABRI CADASTRAL SURVEYS

INLAND RAIL ARTC

INLAND RAIL

MARCH–MAY 2019

ARTC Inland Rail will soon commence cadastral surveys across the Narromine to Narrabri Inland Rail study area.

What are cadastral surveys?

Cadastral surveys help determine real property boundaries. A comprehensive survey assists in determining legal ownership and is key in any future property discussions.

Who will do the work?

This work will be conducted by a registered surveyor and will involve accessing private property.

Survey work is non-intrusive – focused on property boundaries – and does not require you to be present. Under the *Surveying and Spatial Information Act 2002*, a registered surveyor can enter private property to complete the necessary work.

When will they work on my property?

ARTC Inland Rail will contact all identified landowners to discuss the nature and timing of the survey work. Where access is not provided, landowners will be given sufficient written notice in accordance with the Act.

It is important to note that this survey work does not indicate the location of the focus area or the final rail corridor. Any additional work undertaken by ARTC will be subject to existing Land Access Agreements.

Want to know more?

ARTC is committed to working with landowners, communities, state and local governments as a vital part of our planning and consultation work, and we value your input. If you have any questions or comments about this fact sheet, please let us know.

1800 732 761 (24 hours, 7 days)

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CONSULTATION AND ENGAGEMENT

INLAND RAIL SUPPLY CHAIN OPPORTUNITIES SESSIONS

- ARTC Business Development Manager Michael Clancy will present at May CCCs
- Supply chain opportunities session Q & A first week of June
- Intended as a public session with Michael Clancy, representatives from businesses, growers, freight, logistics industry, NSW Farmers Association representatives, followed by BBQ

CONSULTATION AND ENGAGEMENT

PARTICIPATION IN THE LOCAL COMMUNITY

Engagement team sponsored and attended the Baradine Agricultural Show 16 March

INLAND RAIL

THANK YOU

ARTC

The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.