



Upper Macleay Flood Study

August 2026



Purpose of the Flood Study



Provide council with first ever flood mapping for the Upper Macleay



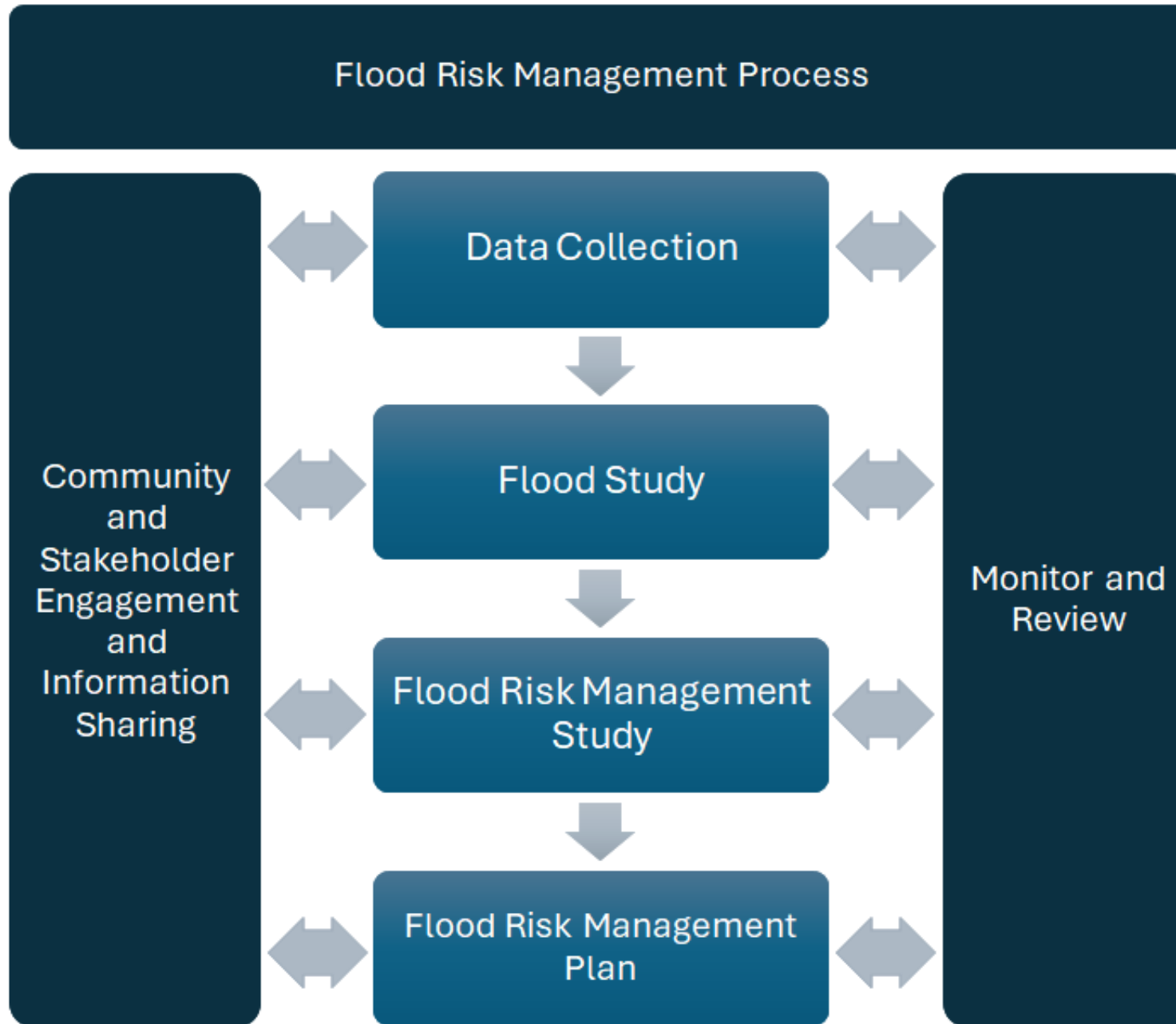
Reflect long flood history and latest design flood methods

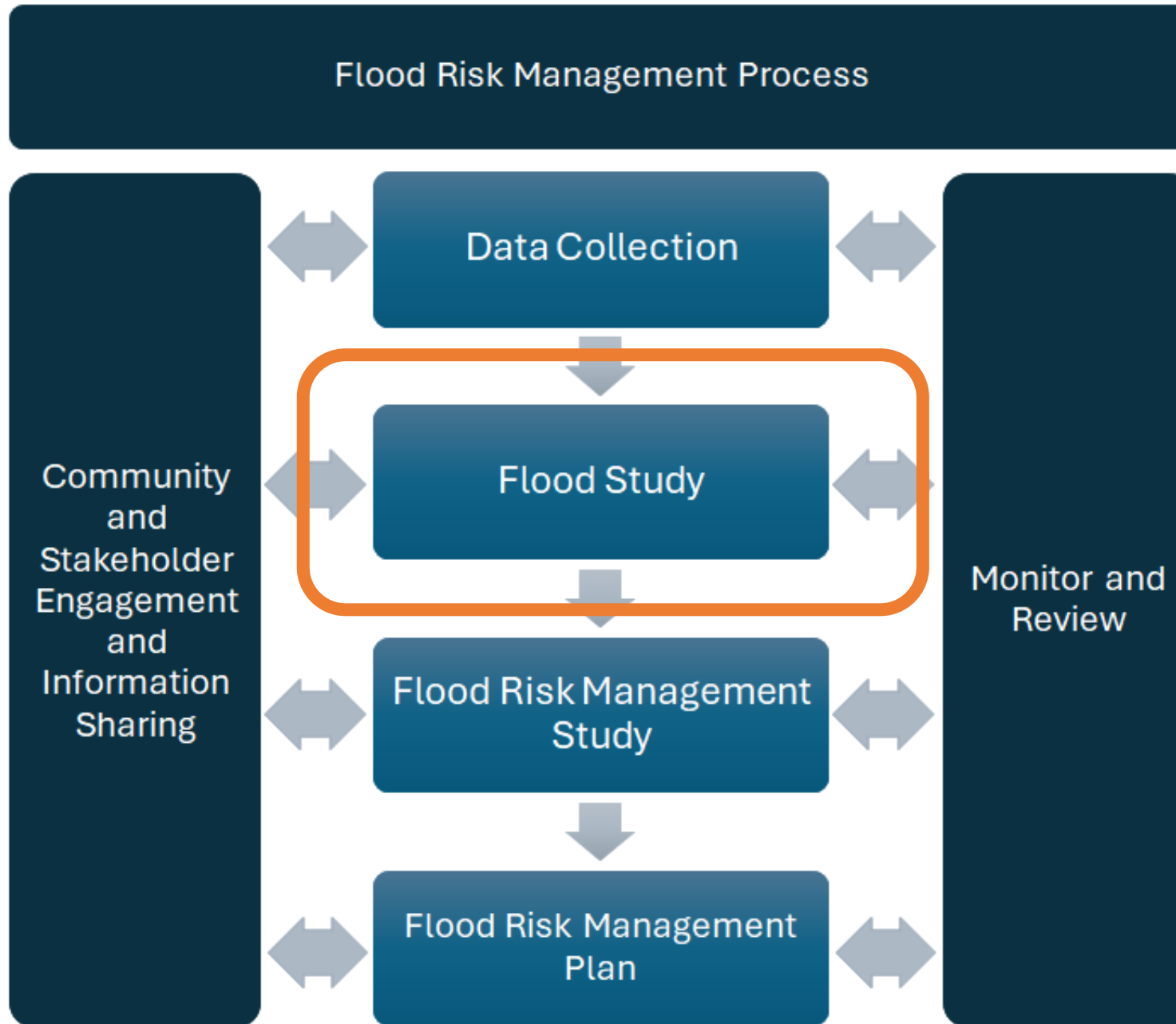


Platform for assessment of DA, future infrastructure
- Help inform where best to build



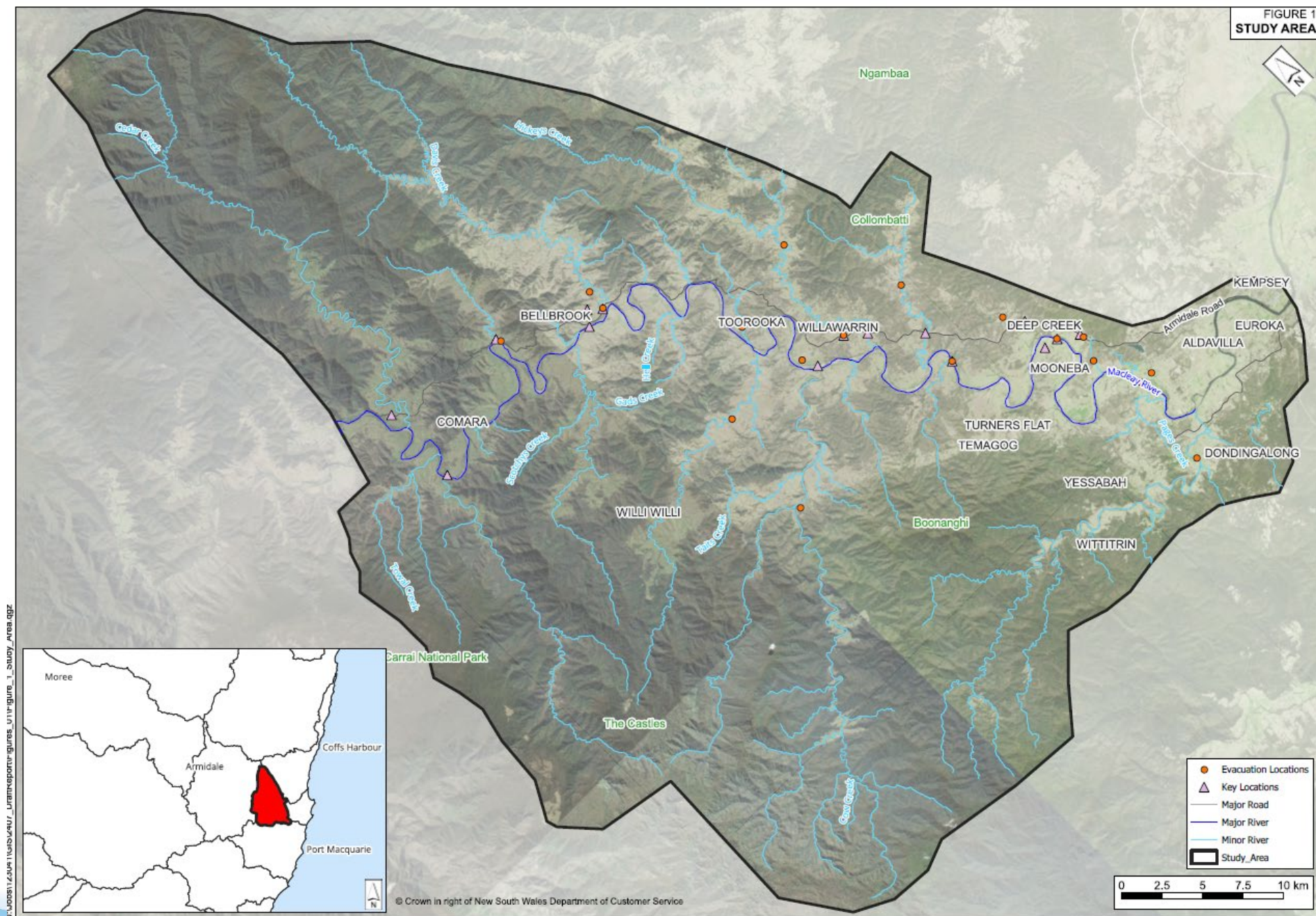
Produce a platform to assess management options to reduce risk to life





Study Area

- Upstream to 800m upstream of Armidale Rd/ Five Day Creek intersection in Comara on the Macleay River,
- Includes local tributaries draining into the Macleay River in this extent, and
- Downstream to upstream of the railway bridge at Kempsey (and the overflow points into Kempsey CBD in rare events).



FLOOD STUDY

1. COLLECT DATA



Rainfall, river,
topography

2. HYDROLOGY



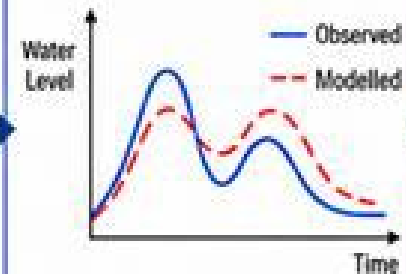
How much
runoff?

3. HYDRAULICS



Where does
water go?

4. MODEL CALIBRATION



Match model to
observations

5. FLOOD MAP



Depth, extent,
hazard

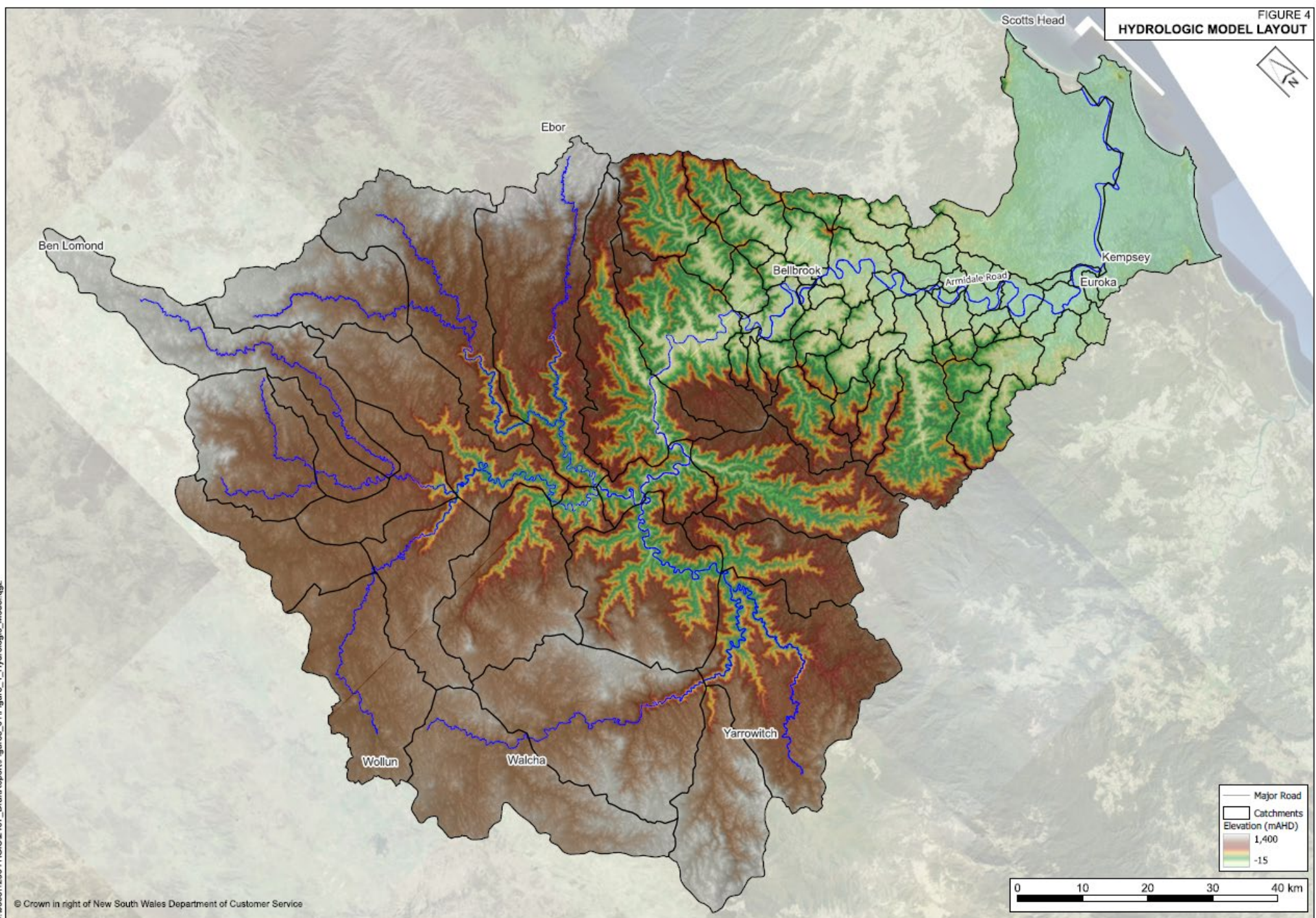
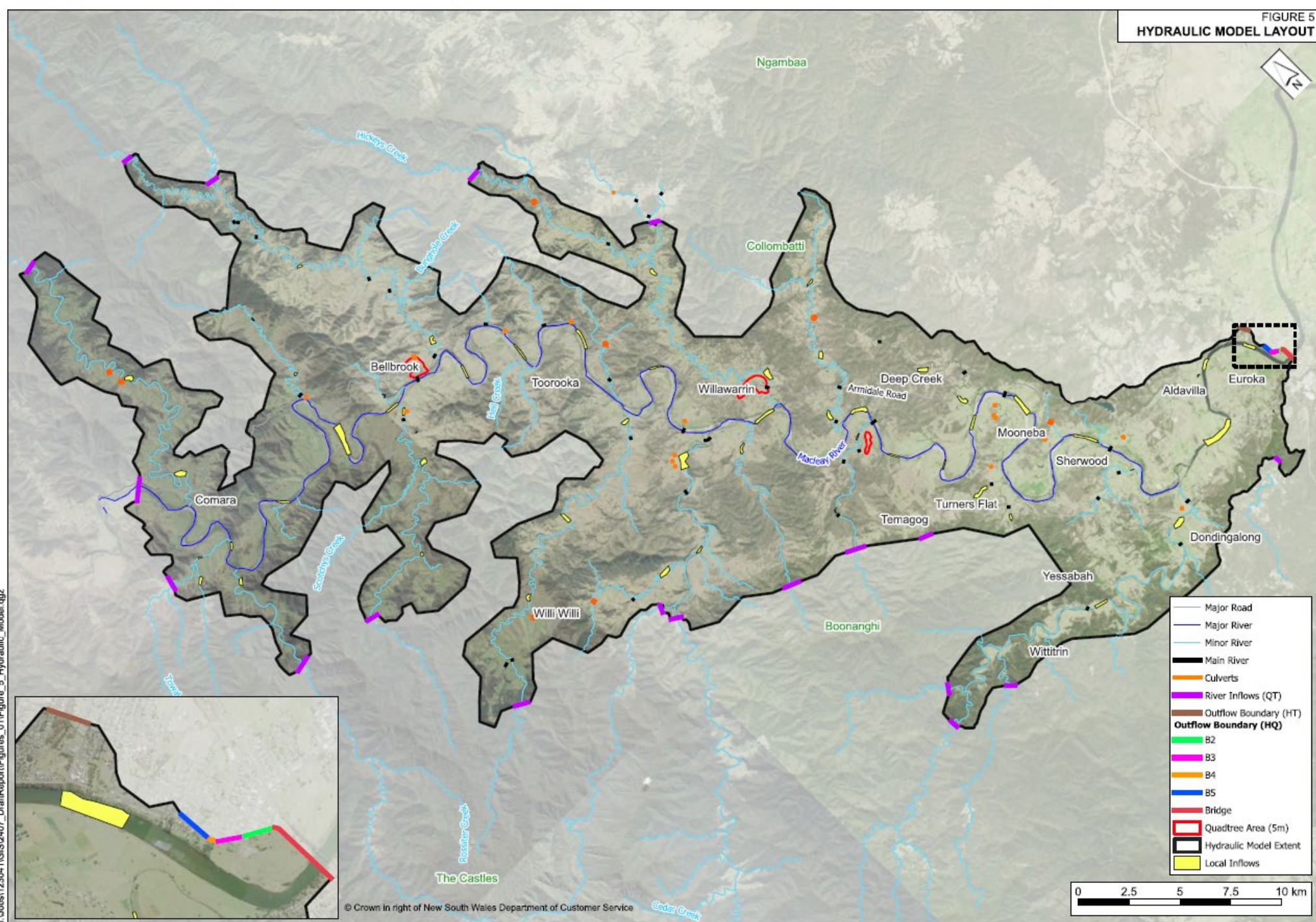
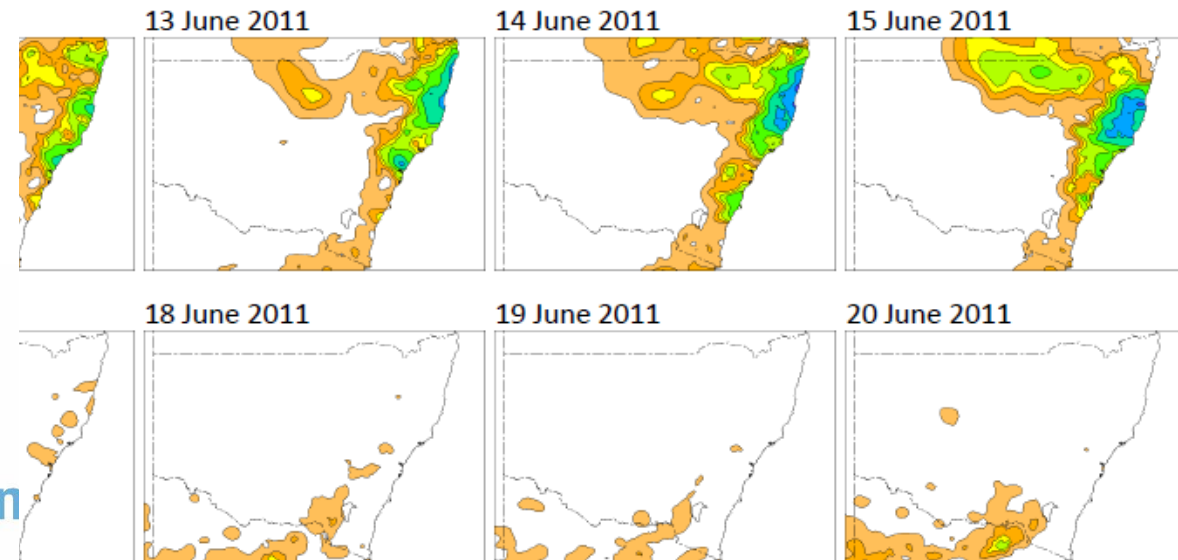


FIGURE 5
HYDRAULIC MODEL LAYOUT



Calibration events and data

- Observed flood levels
 - timeseries of flood levels needed to check model reproducing observed behaviour
 - Observed rainfall
-
- March 2001
 - June 2011



Why Calibrate

Improve Accuracy

- Ensures the model realistically represents how a catchment and river system respond to rainfall.

Increase Confidence in Predictions

- Provides greater assurance that flood scenarios are being modelled realistically.

Reduce Uncertainty

- Helps identify and minimise errors associated with assumptions, input data, and model parameters.

Validate Model Performance

- Demonstrates that the model can reproduce known historical flood events before being used for design or forecasting purposes.

Calibration

What do we need to calibrate

- Information on peak water levels
- Records of water level over time
- Rainfall records
- Information on key features that affect the water flow like levees and bridges



Calibration

What events do we have enough data for the calibrate

- 2001
- 2011

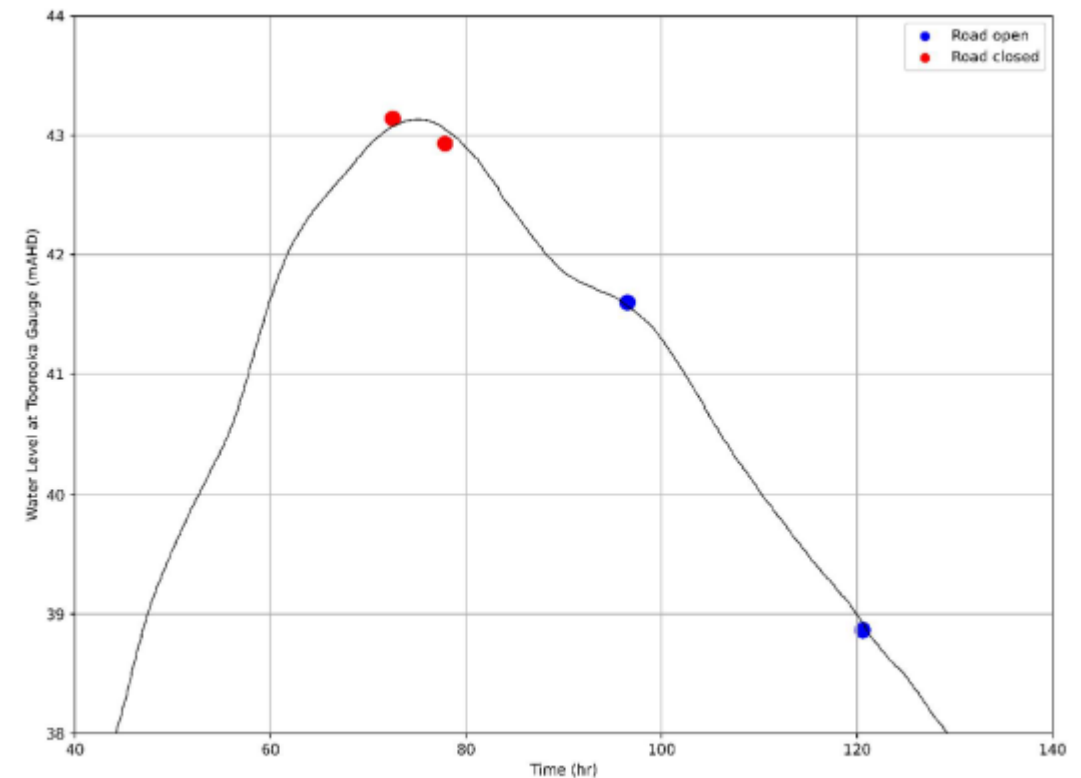


Diagram 5: Road Closure times vs Toorooka modelled flow

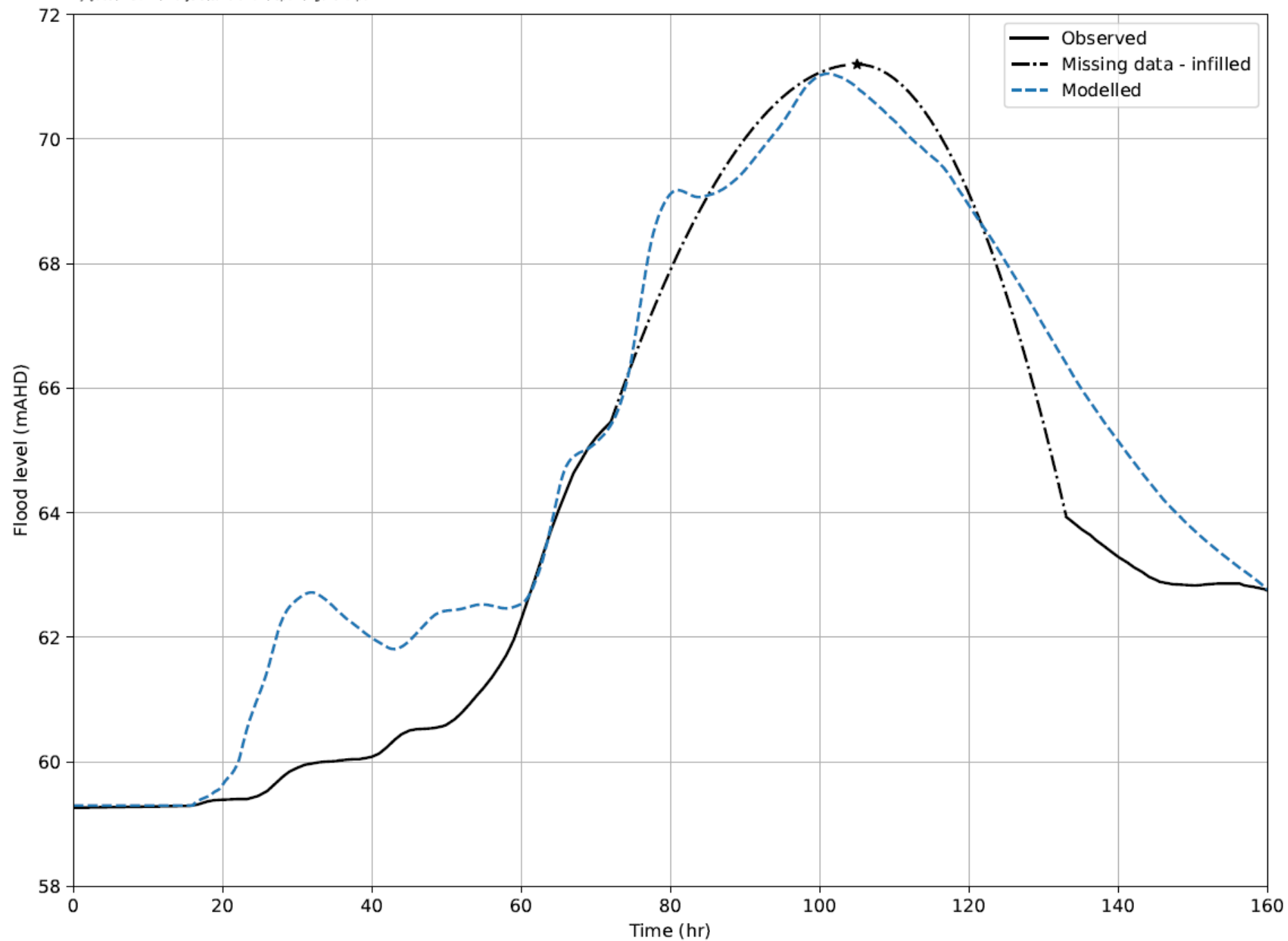


FIGURE 20
MODEL CALIBRATION
MODELLED VS OBSERVED
2001 EVENT - BELLBROOK

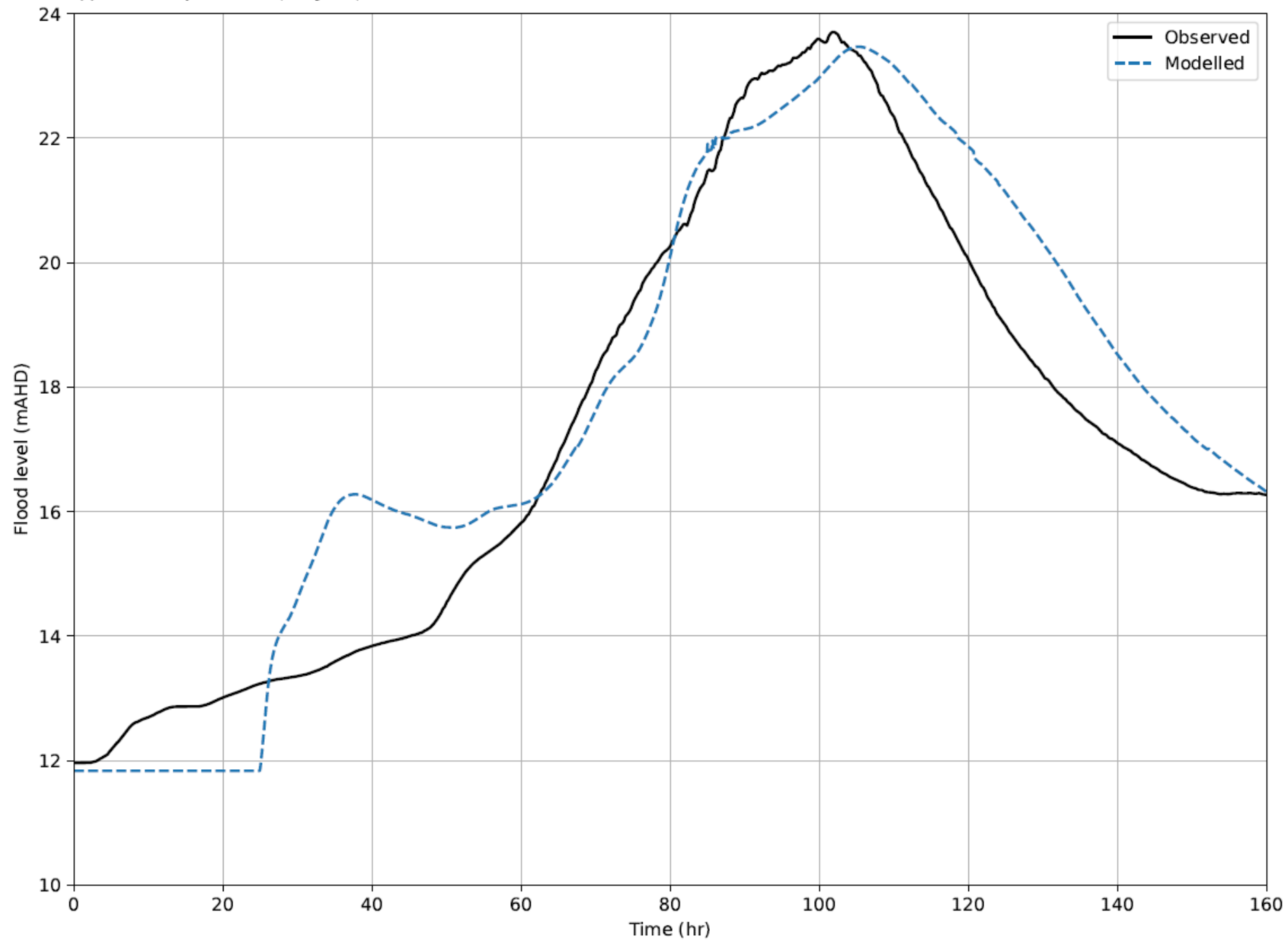
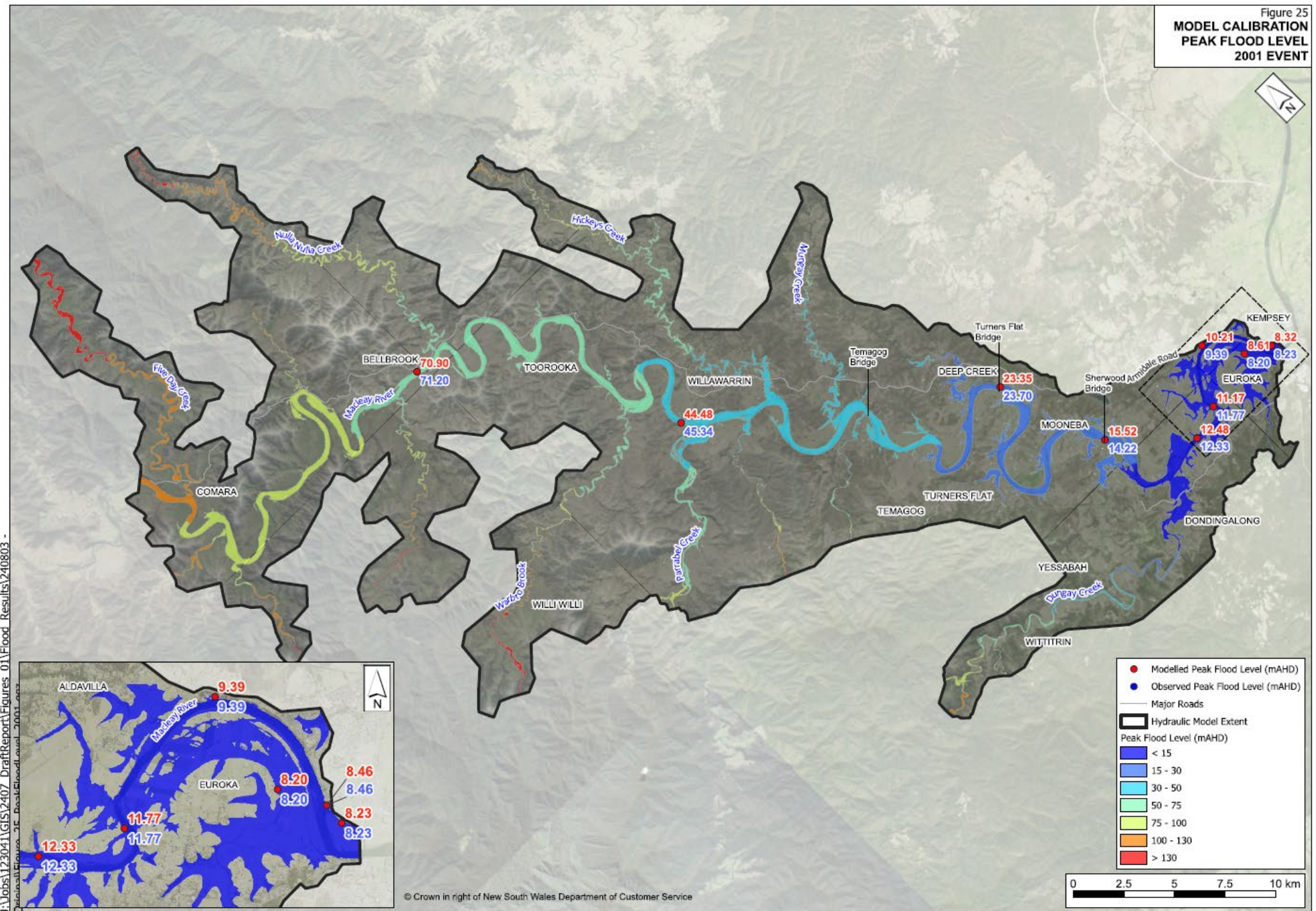


FIGURE 21
MODEL CALIBRATION
MODELLED VS OBSERVED
2001 EVENT - TURNERS FLAT

Figure 25
MODEL CALIBRATION
PEAK FLOOD LEVEL
2001 EVENT



J:\Jobs\123041\GIS\2407_DraftReport\Figures 01\Flood Results\240803 - Original\Figure 25 Peak Flood Level 2001.pdf

2001
flood
depths
animation

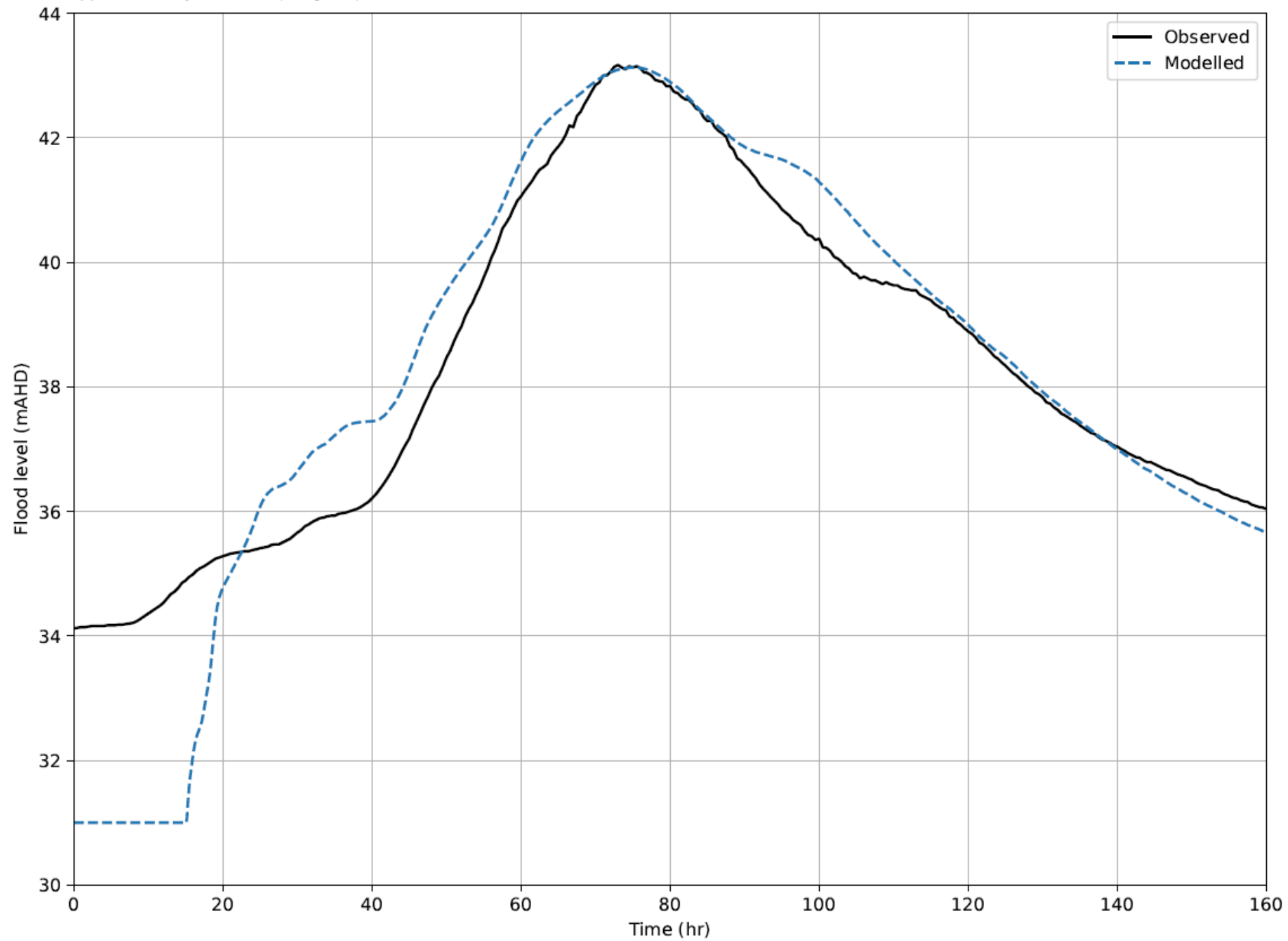
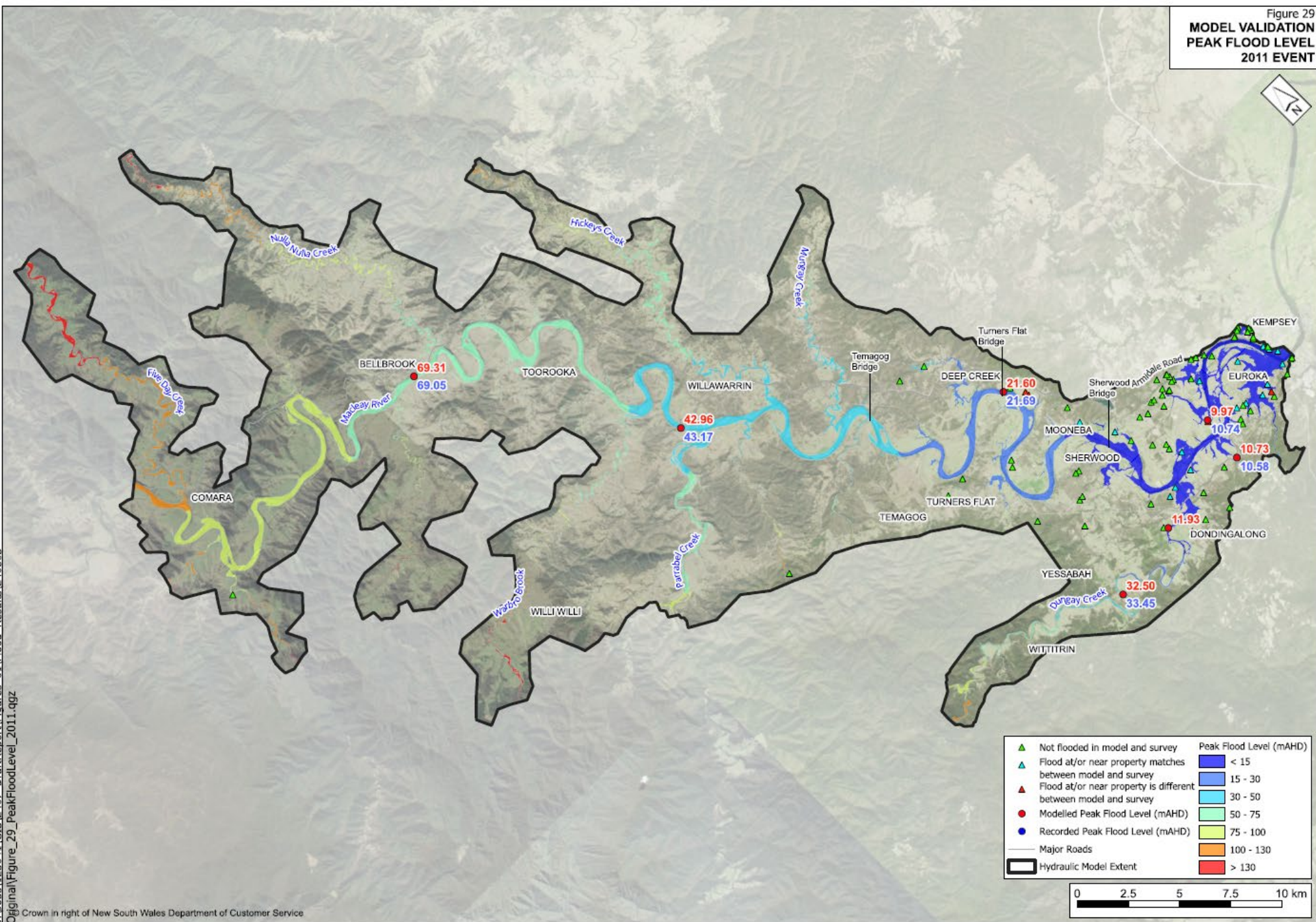


FIGURE 28
MODEL VALIDATION
MODELLED VS OBSERVED
2011 EVENT - TOOROOKA

Figure 29
MODEL VALIDATION
PEAK FLOOD LEVEL
2011 EVENT



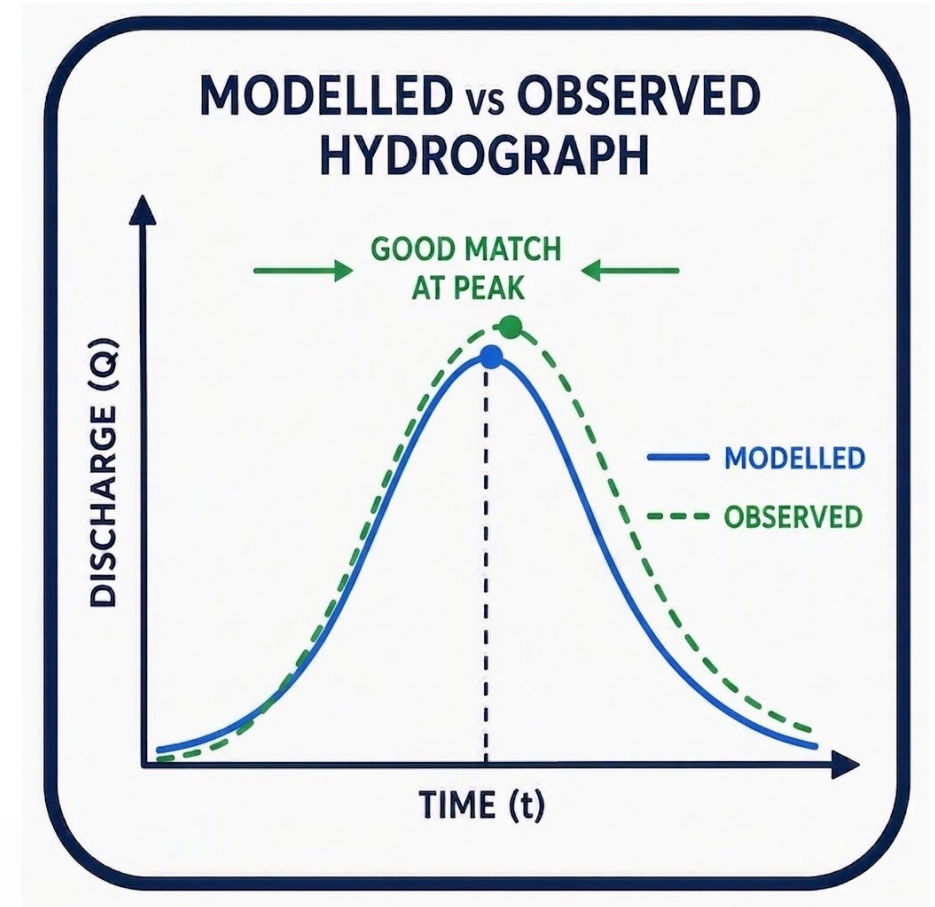
J:\jobs\123041\GIS\2407_DraftReport\Figures_01\Flood_Results\240803 - Original\Figure_29_PeakFloodLevel_2011.qgz



What gives us confidence we are calibrating well



Good match of the peaks



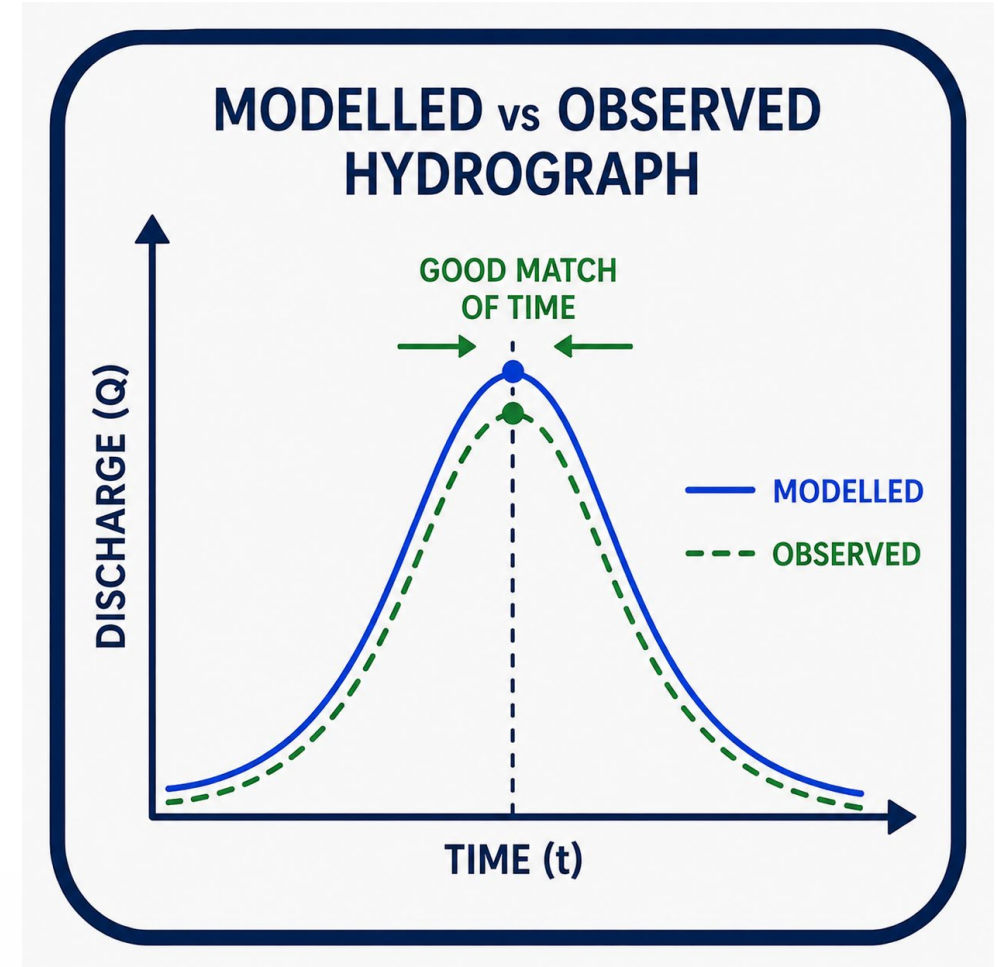
What gives us confidence we are calibrating well



Good match of the peaks



Matching the timing of when the water arrives



What gives us confidence we are calibrating well



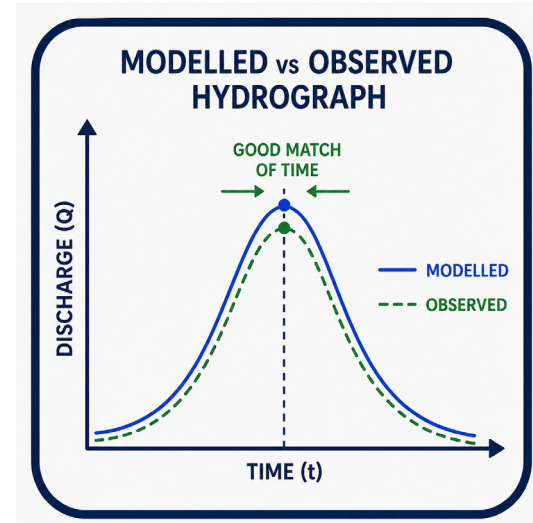
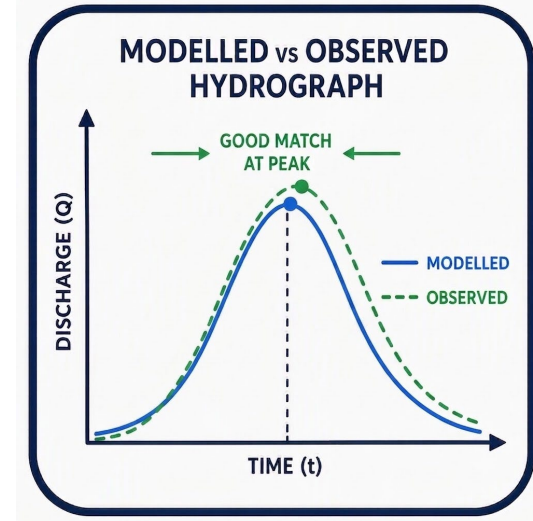
Good match of the peaks



Matching the timing of when the water arrives



Have a good match on small events and big events

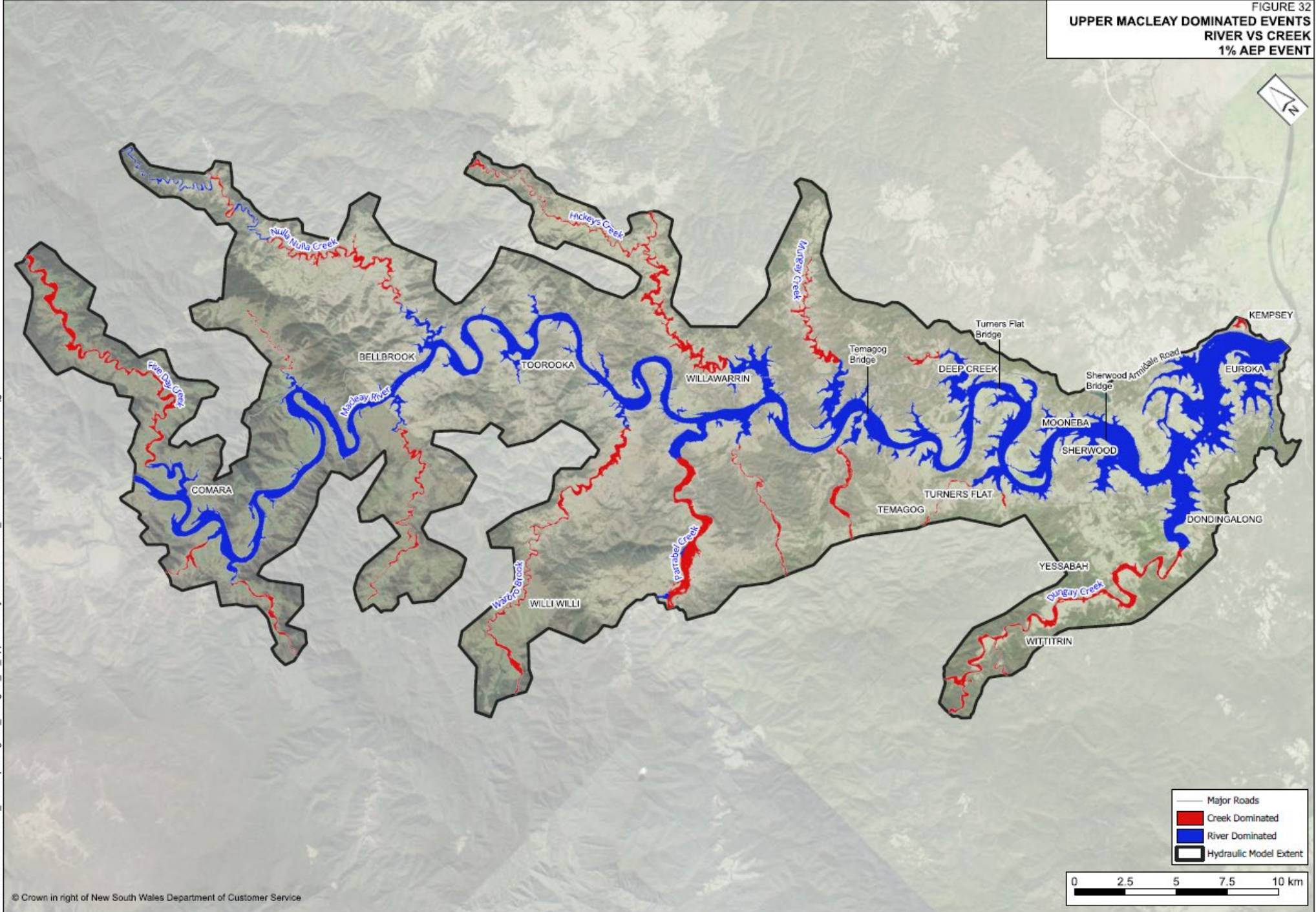


Design Event Modelling

- Now we are confident our model reproduces observed behaviour we move to design event modelling
- Statistical representation of rainfall
- Design event terminology
 - 1 % or 1 in 100 Annual Exceedance Probability – 1% chance of occurring or being exceeded in any year
- Model both local tributary floods as well as main river
- Use for mitigation and planning
- To identify areas that might become problems in larger events
- Avoid creating problems through development in the future



FIGURE 32
UPPER MACLEAY DOMINATED EVENTS
RIVER VS CREEK
1% AEP EVENT

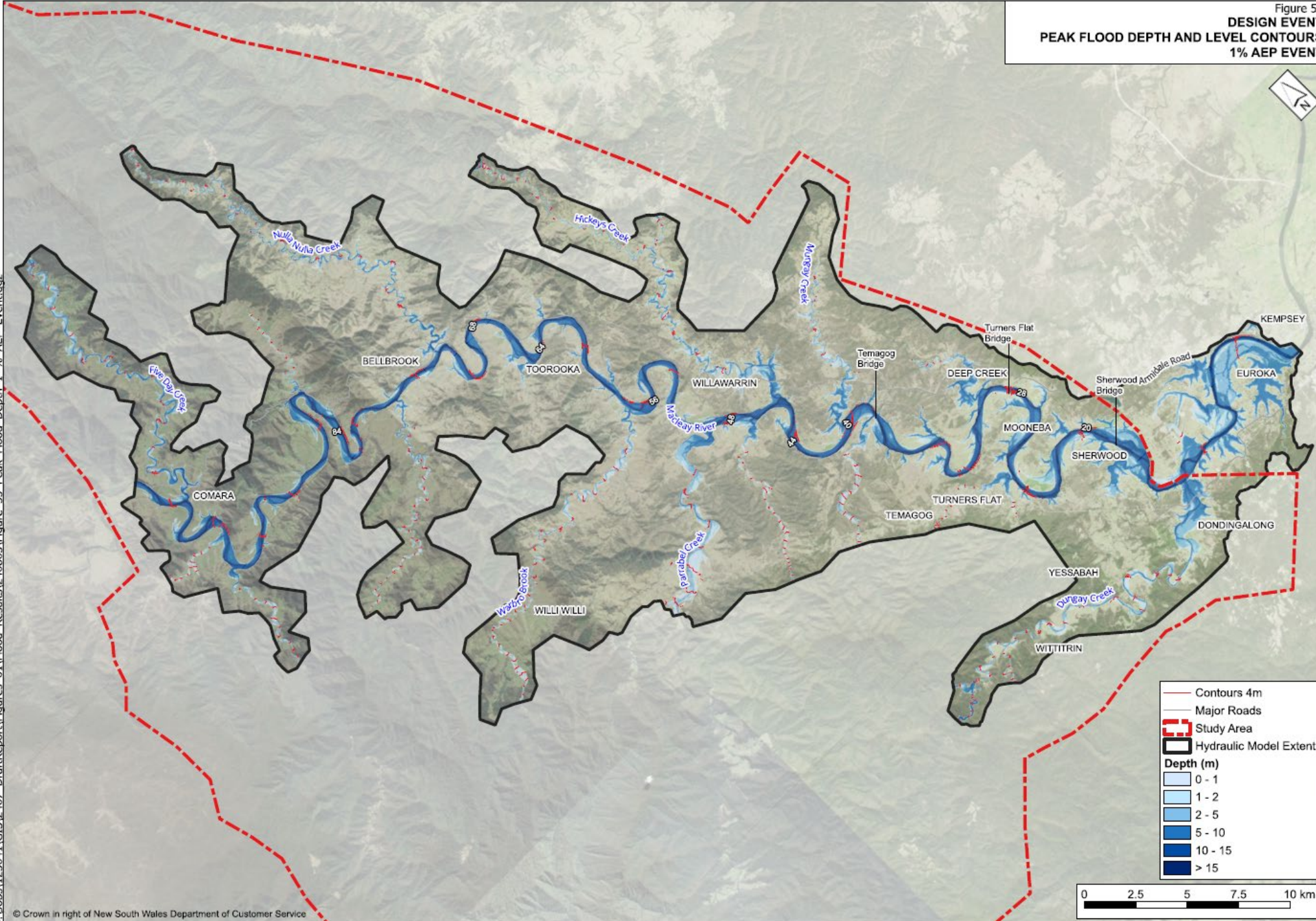


J:\loba\123041\GIS\2407_DraftReport\Figures_01\Figure_32_UpperMacleayDominatedEvents_RiverVSCreek1pcAEPEvent.qgz

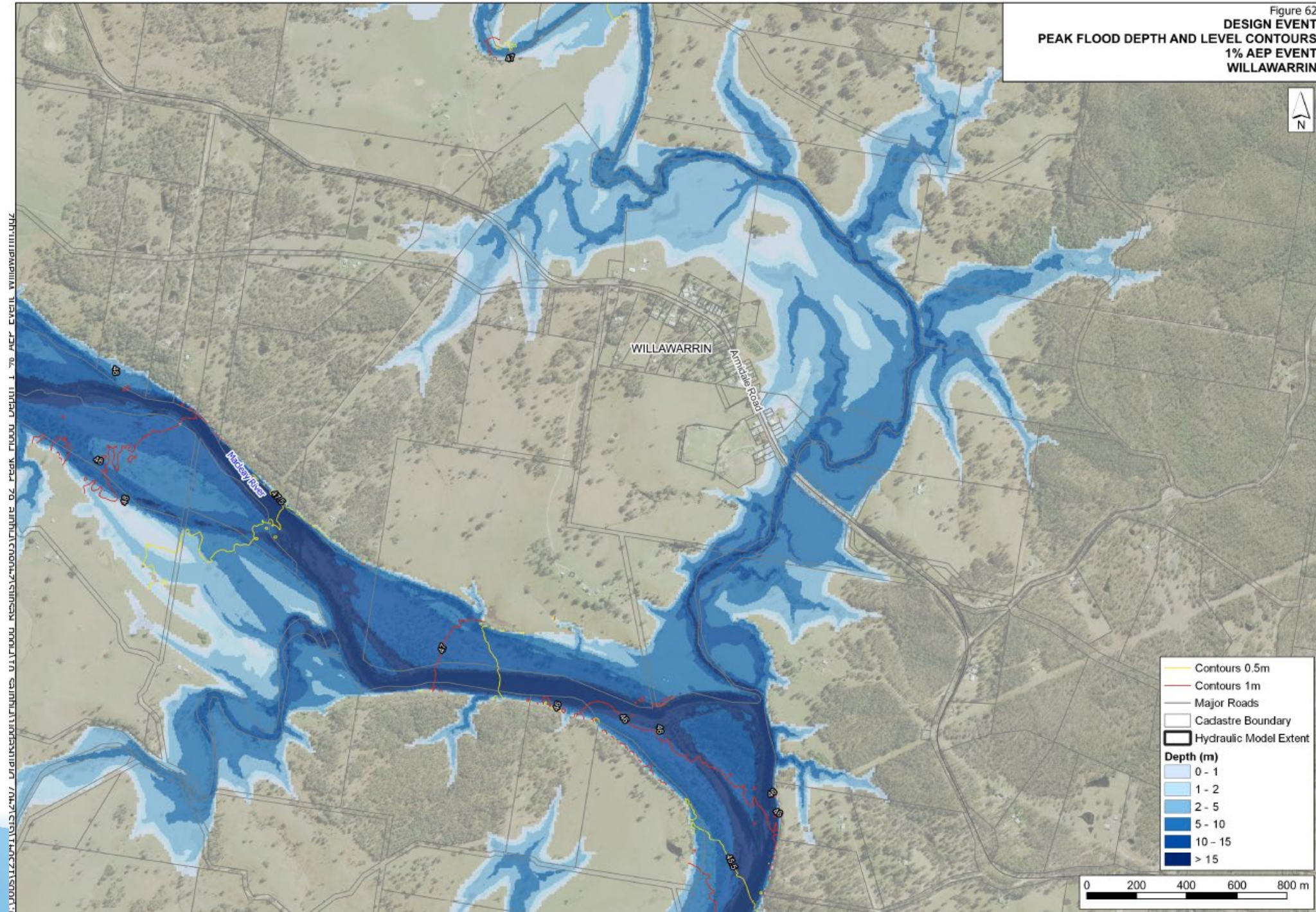
Figure 53
DESIGN EVENT
PEAK FLOOD DEPTH AND LEVEL CONTOURS
1% AEP EVENT



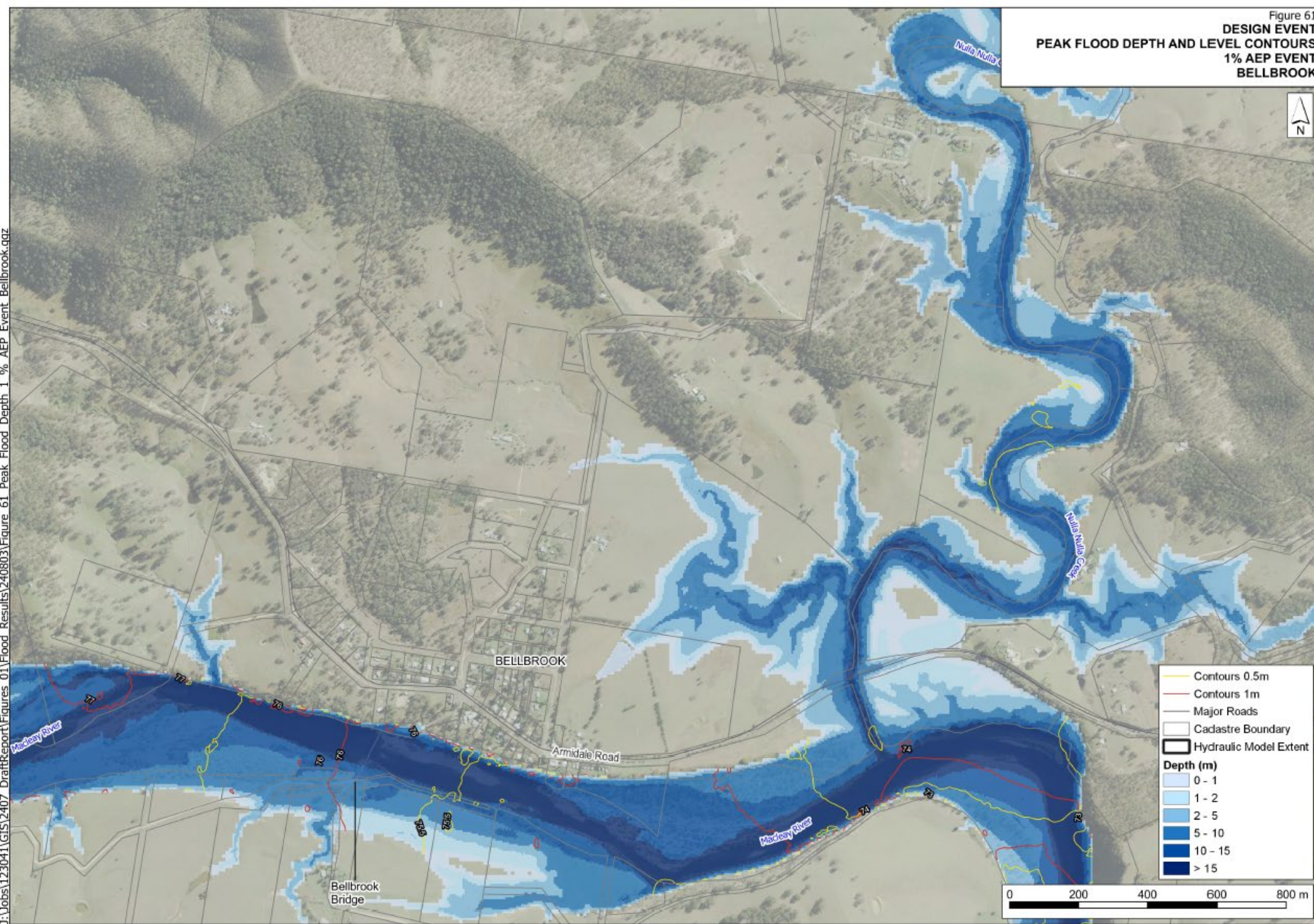
R:\Jobs\12304\GIS\2407_DraftReport\Figures_01\Flood_Results\240803\Figure 53 Peak Flood Depth 1 % AEP Event.qgz



1% AEP



J:\Jobs\123041\GIS\2407 DraftReport\Figures 01\Flood Results\240803\Figure 61 Peak Flood Depth 1 % AEP Event Bellbrook.qgz



What outputs do you get?



Indicative design flood levels and depths



Velocities



Maps identifying areas subject to high hazards



Indicative maps that inform into Councils planning documents – Flood planning area, flood planning constraint categories



Emergency management planning information

Whats Next

- Public exhibition period
- After feedback on whether the model matches what community has observed
- Future stages -Management study and plan

Questions ?



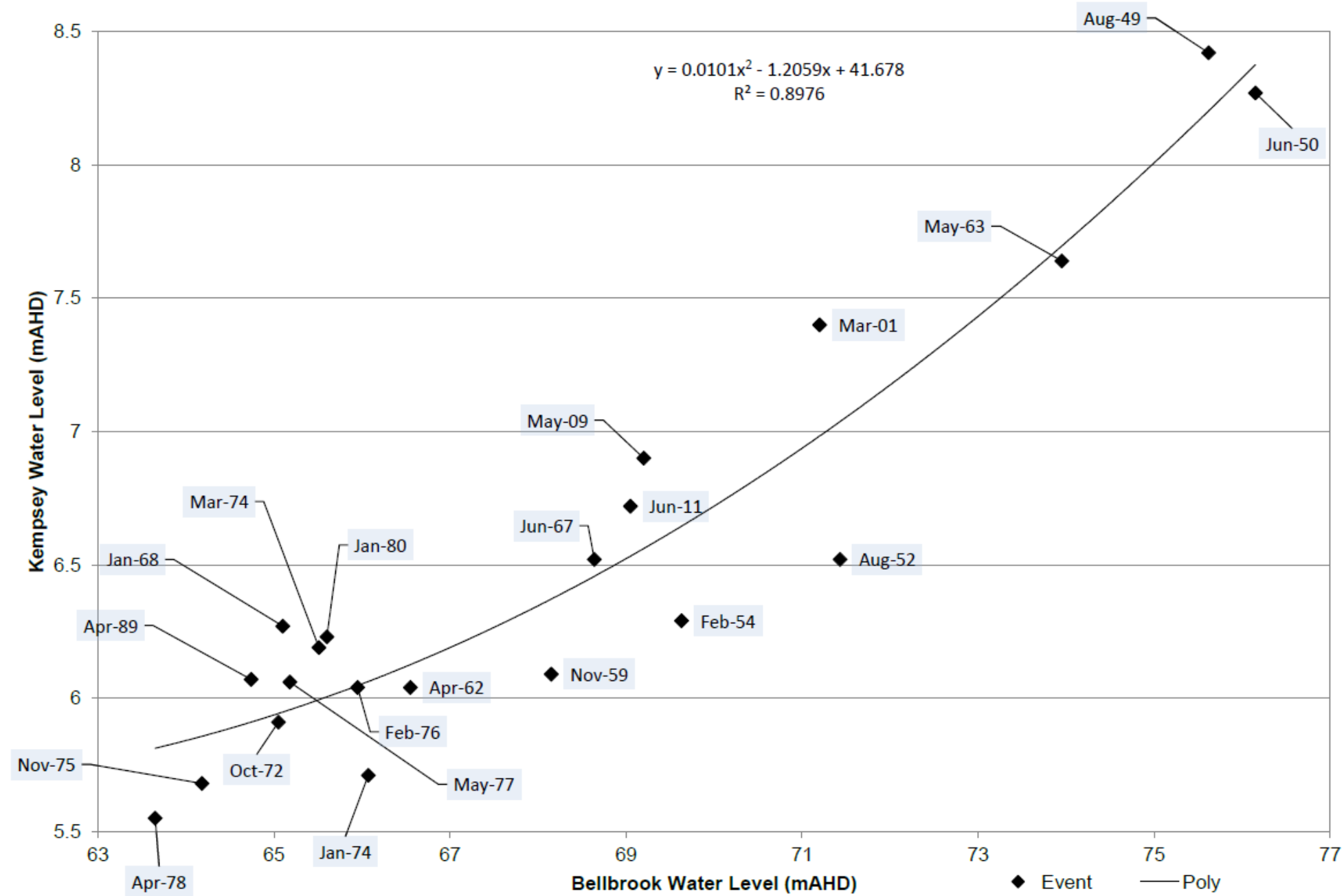


FIGURE 9
CORRELATION
BELLBROOK TO KEMPSEY

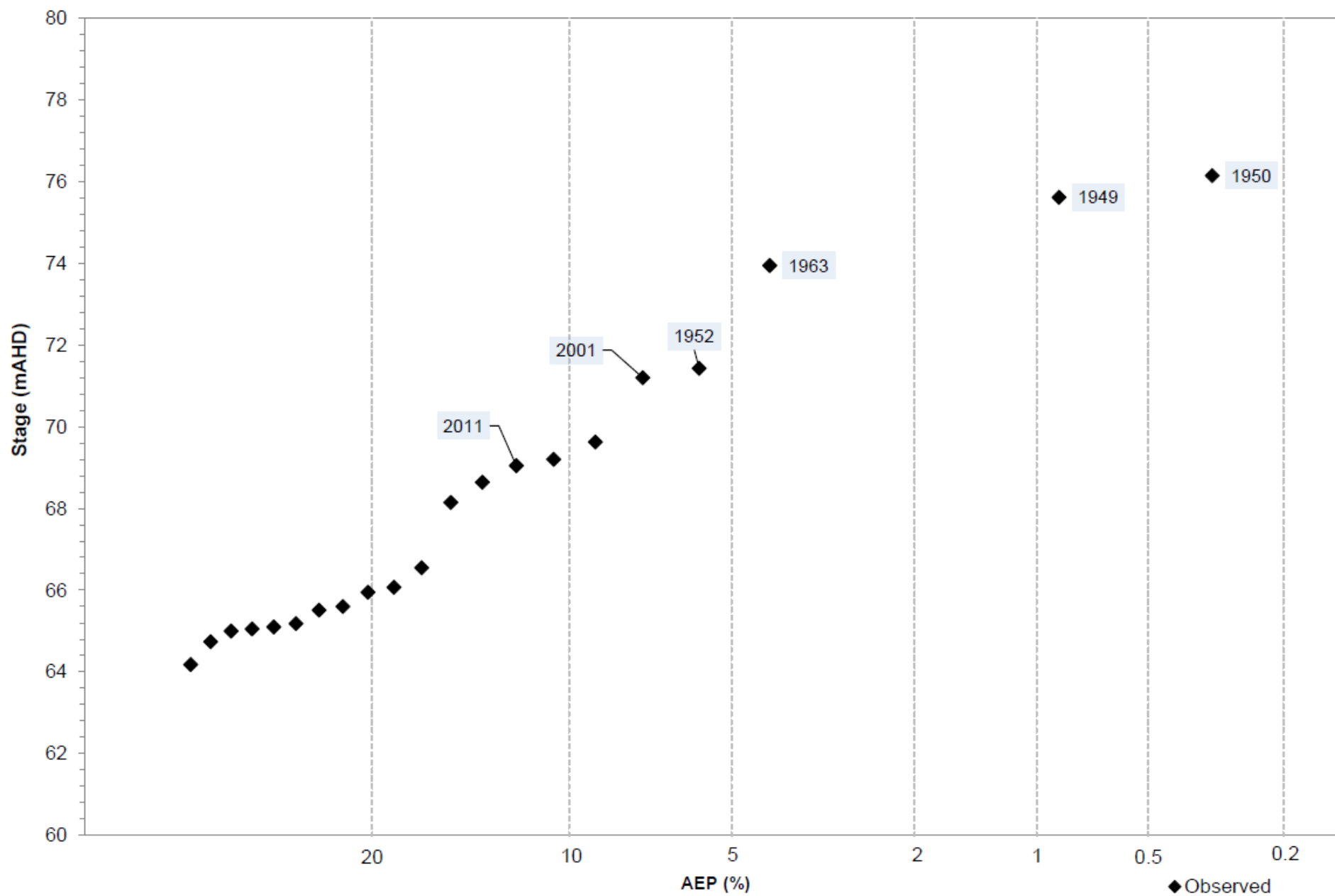


FIGURE 13
STAGE FREQUENCY ANALYSIS
BELLBROOK

