

**TARCUTTA, LADYSMITH AND URANQUINTY  
FLOOD STUDIES**

**DEVELOPMENT AND TESTING  
OF FLOOD MODELS**

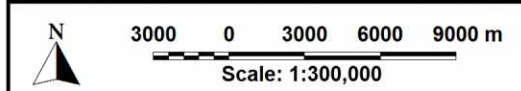
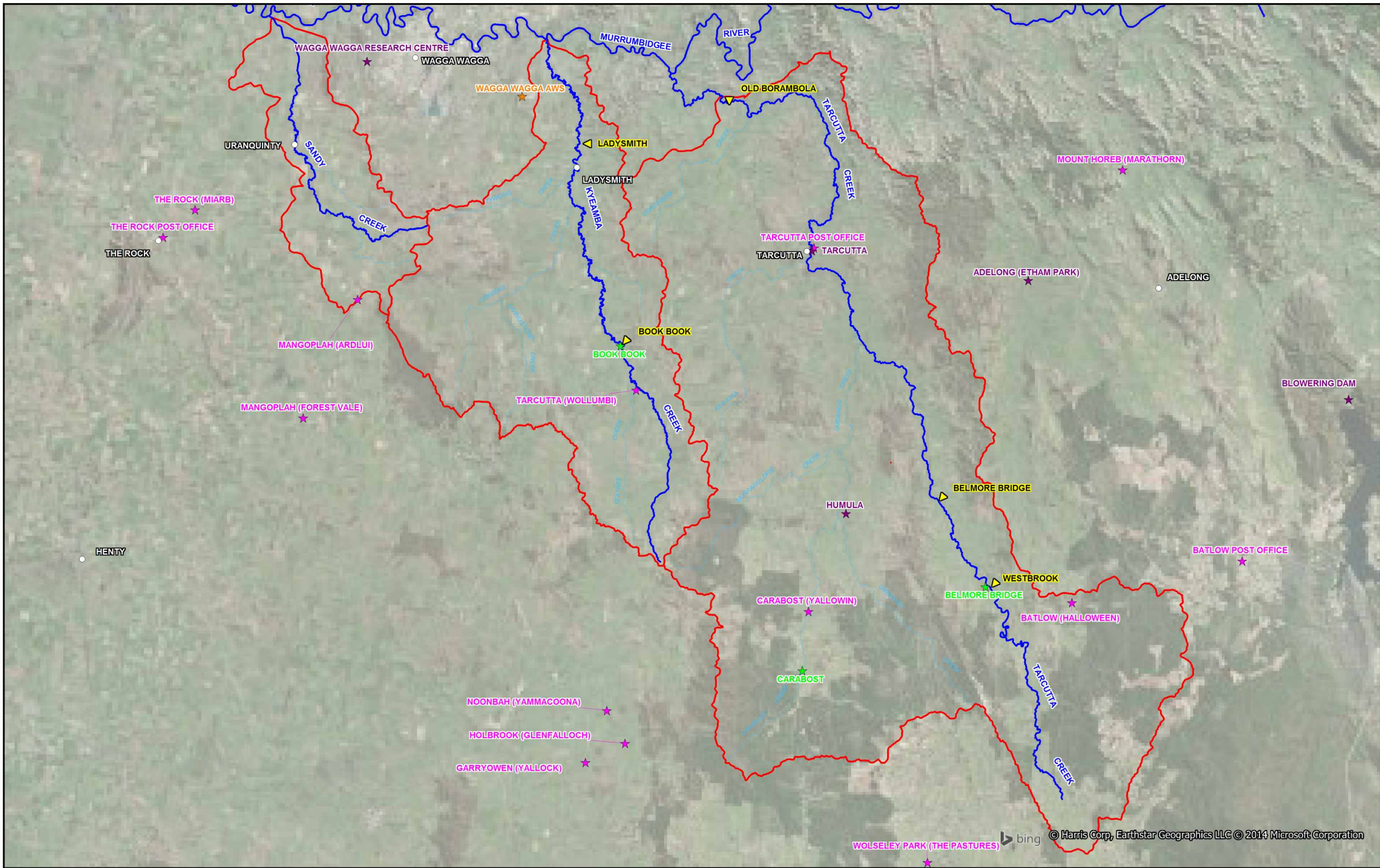
**VOLUME 2 – FIGURES AND APPENDICES**

**DRAFT REPORT FOR PUBLIC EXHIBITION**

**MARCH 2014**

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- 4.13 Uranquinty TUFLOW Model Results - March 2012 Flood (2 Sheets)



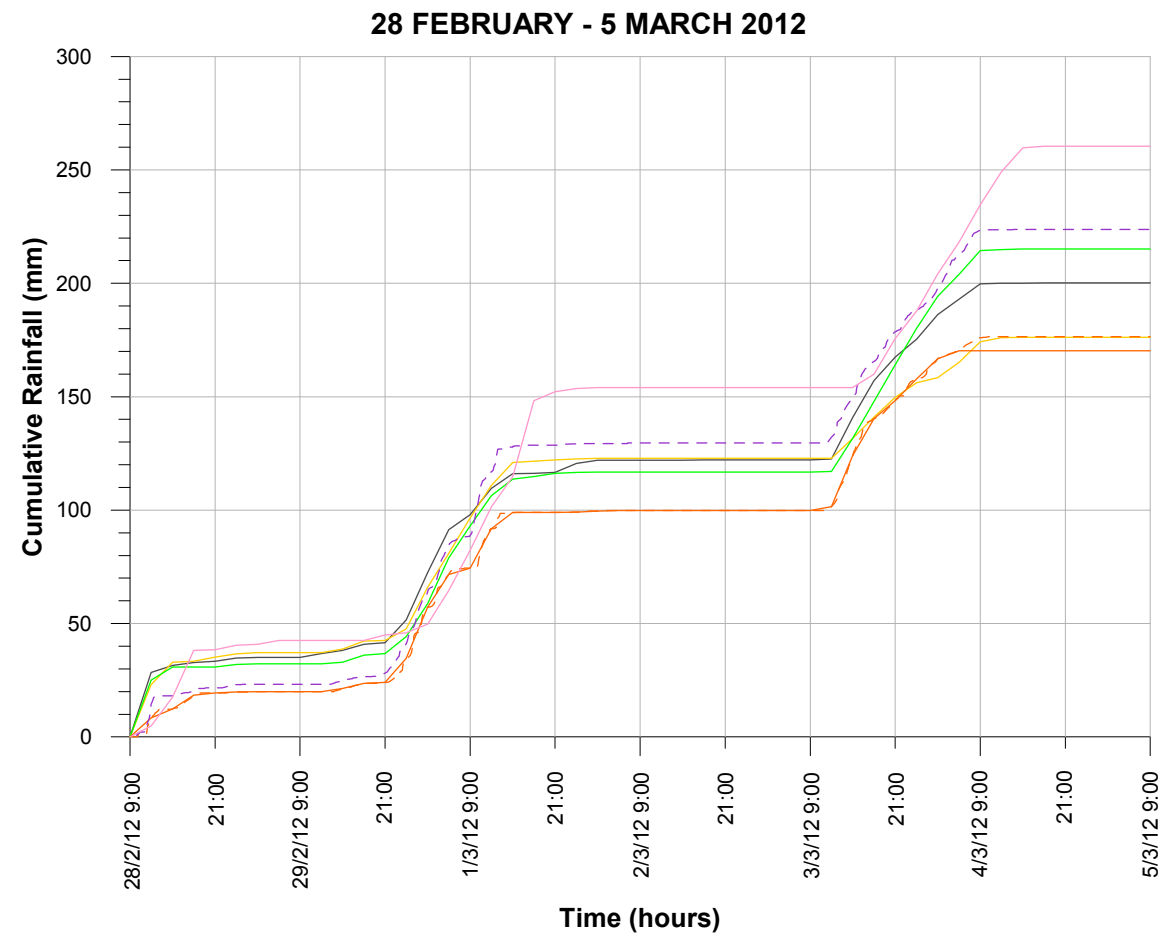
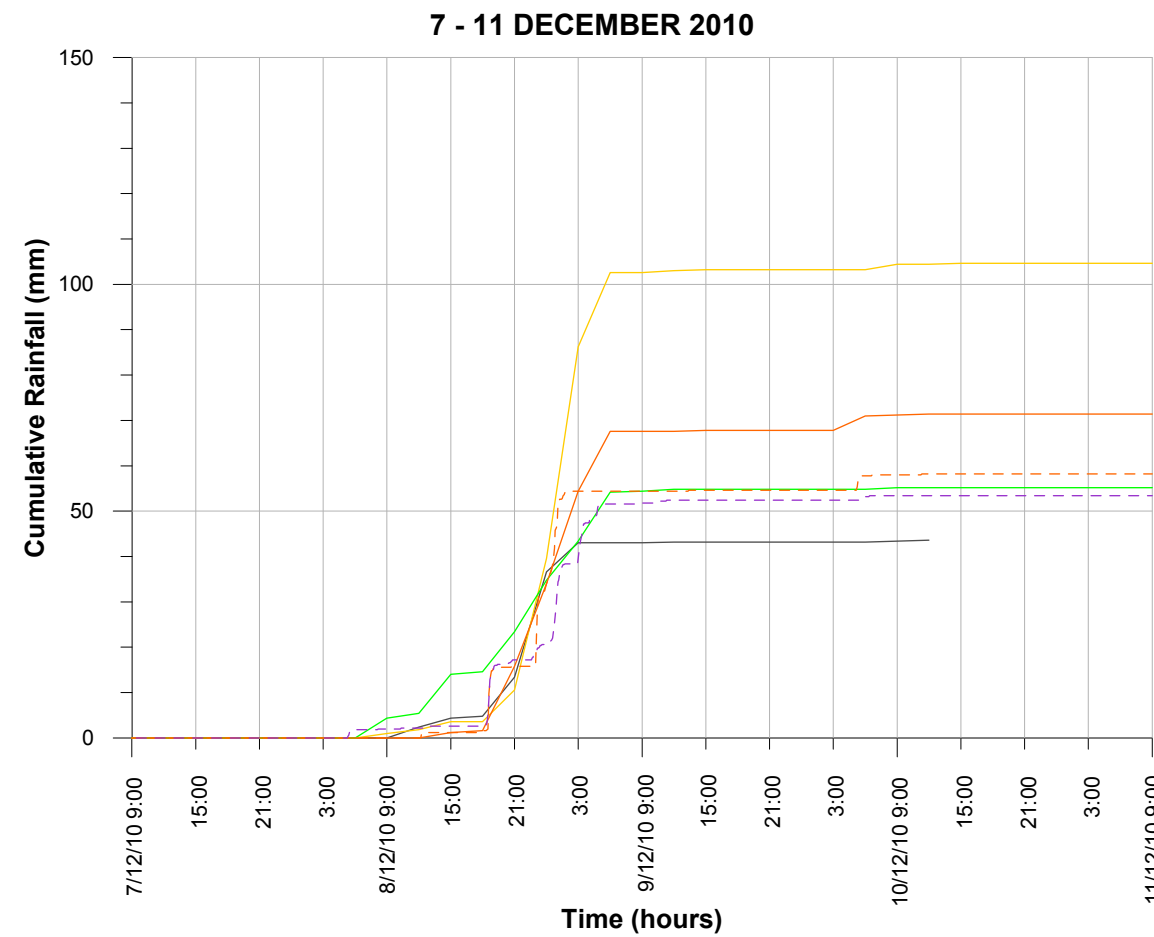
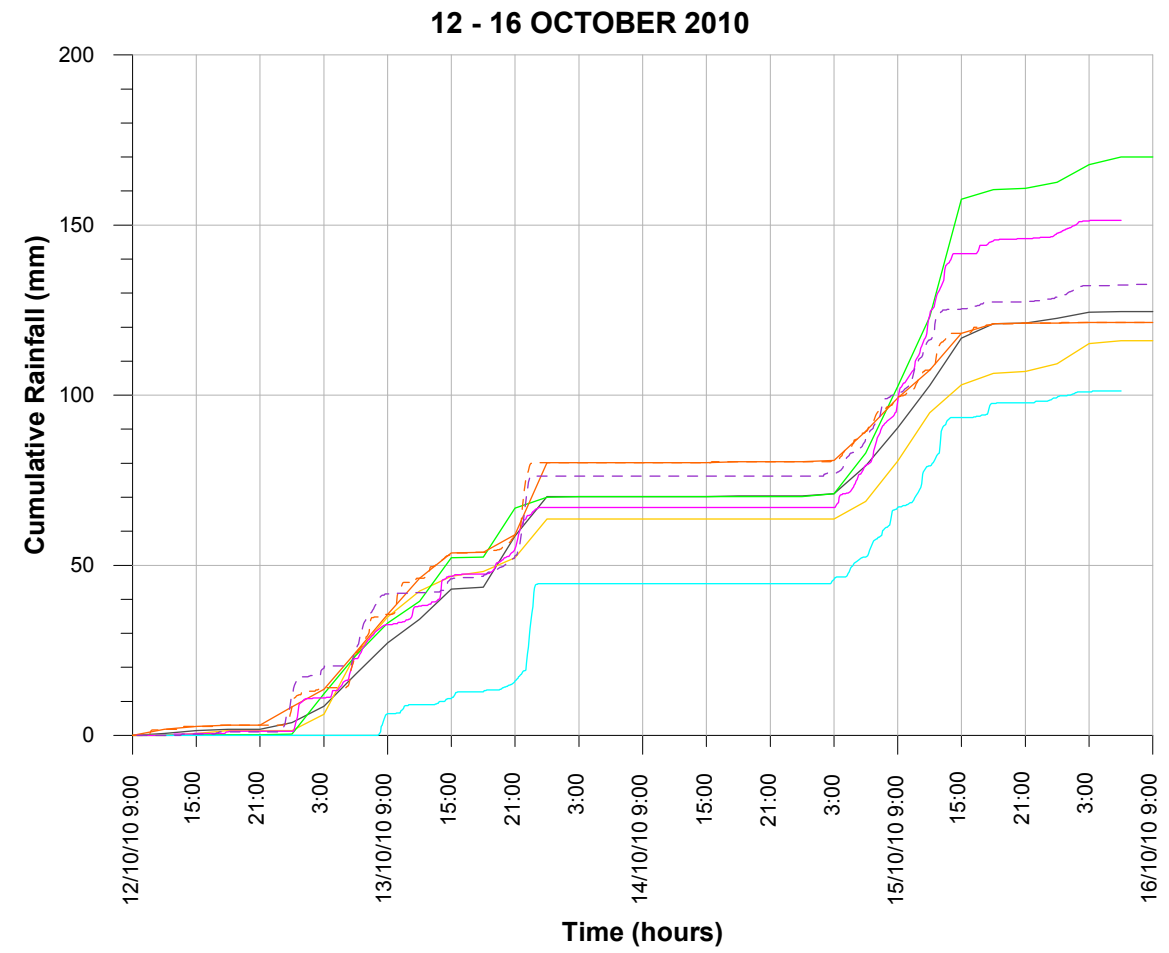
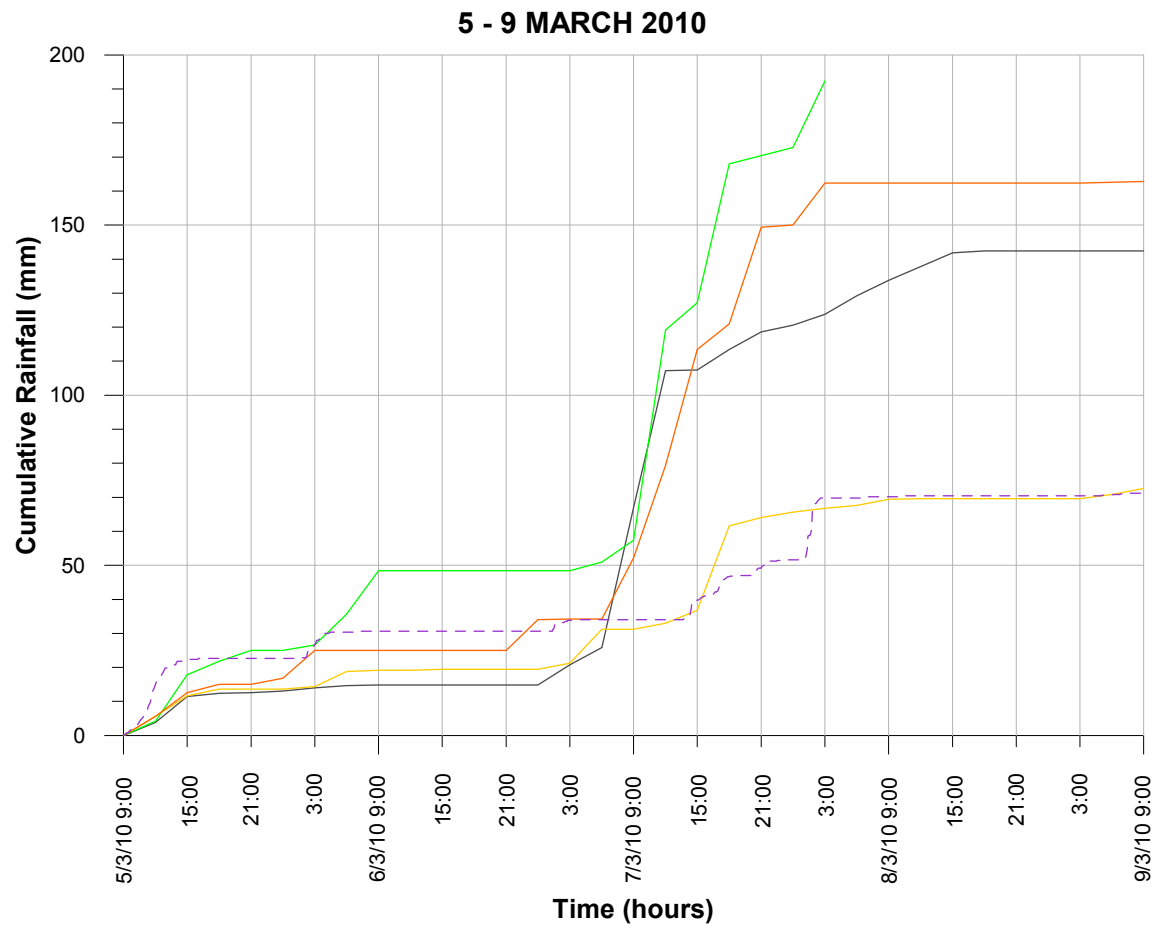
**LEGEND**

- ▼ Stream Gauge
- ★ Daily Rain Gauge
- ★ Pluviograph Station
- ★ All Weather Station (AWS)
- ★ BoM Flood Warning Network
- Study Catchments

**NOTE:**  
Note co-ordinates of Belmore Bridge rain gauge as per advice received from BoM.

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 1.1



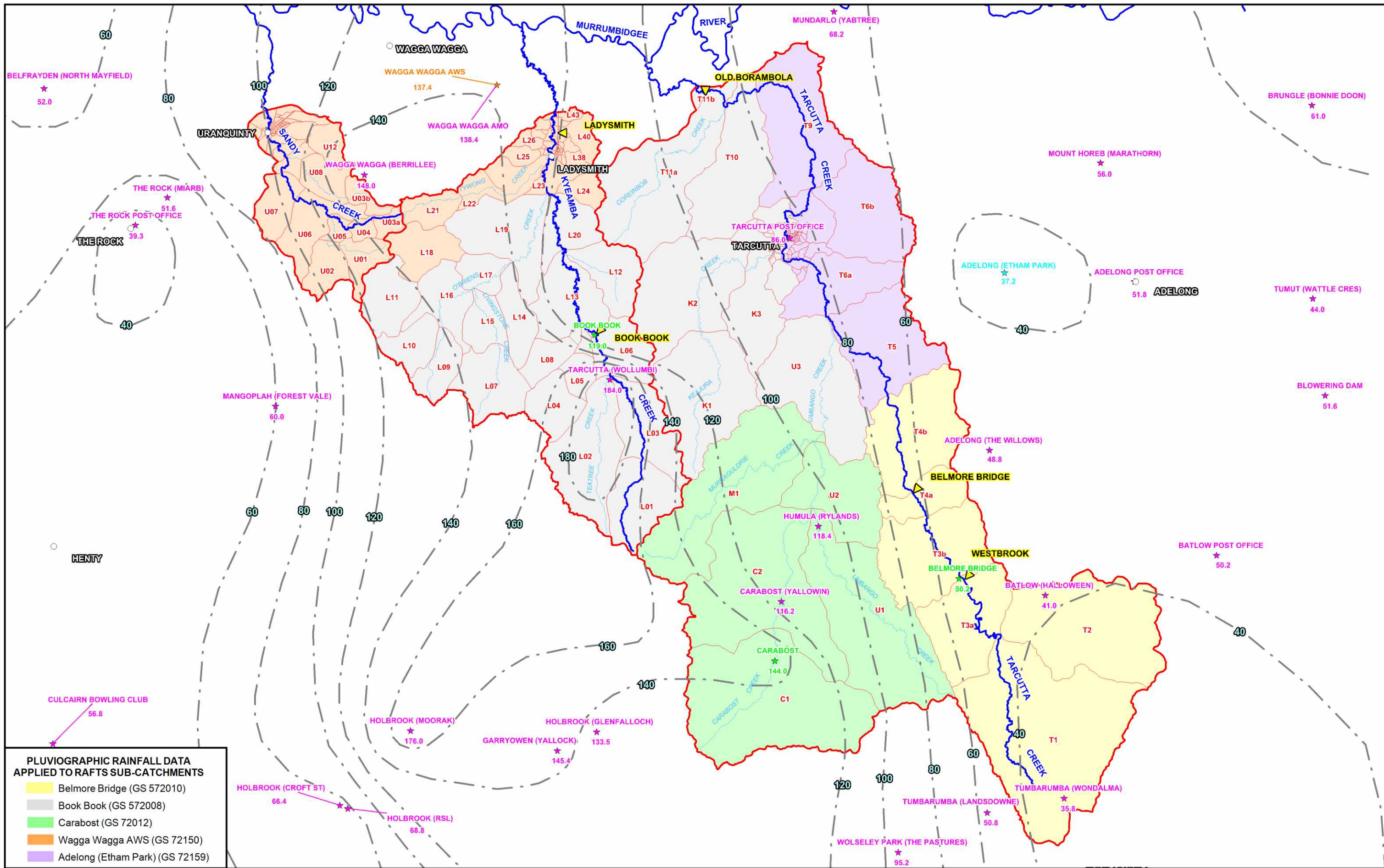
**LEGEND**

- Tarcutta (RMS)
- Humula (RMS)
- Wagga Wagga AWS (5 minute Data) (GS 72150)
- Wagga Wagga AWS (3 hourly Data) (GS 72150)
- Adelong (Etham Park) (GS 72159)
- Book Book (GS 572008)
- Belmore Bridge (GS 572010)
- Carabost (GS 72012)
- Batlow (GS 72004)

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

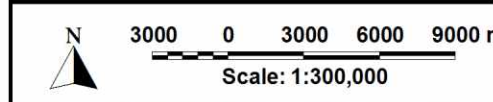
Figure 2.1  
CUMULATIVE STORM RAINFALLS





**PLUVIOGRAPHIC RAINFALL DATA APPLIED TO RAFTS SUB-CATCHMENTS**

- Belmore Bridge (GS 572010)
- Book Book (GS 572008)
- Carabost (GS 72012)
- Wagga Wagga AWS (GS 72150)
- Adelong (Etham Park) (GS 72159)



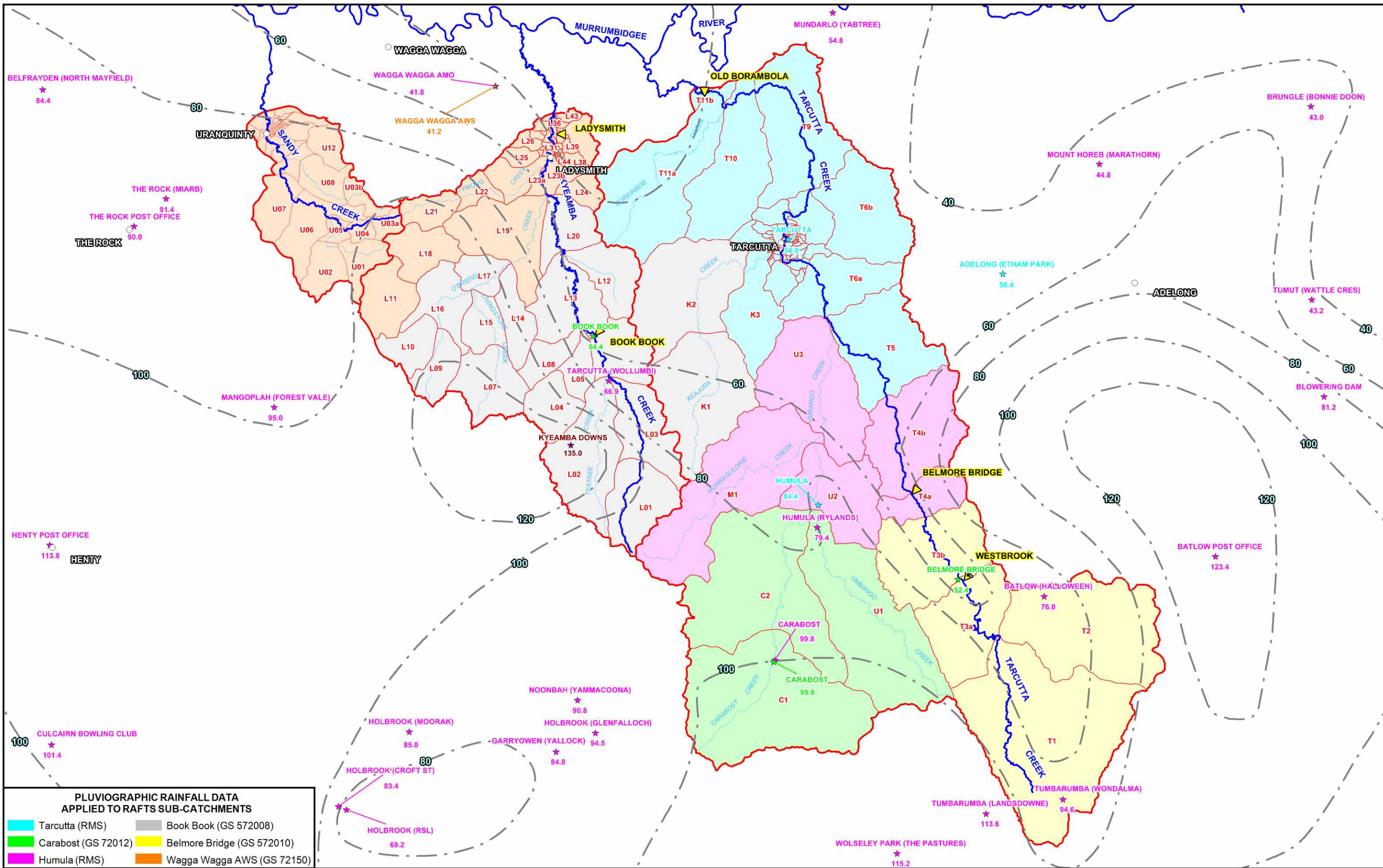
- LEGEND**
- ★ BoM Daily Rainfall Station and Recorded Depth (mm)
  - ★ BoM All Weather Station (AWS) and Recorded Depth (mm)
  - ★ BoM Pluviograph and Recorded Depth (mm)
  - ★ BoM Flood Warning Station and Recorded Depth (mm)
  - 120 — 48 Hour Depth of Rainfall (mm)
  - Catchment Boundary
  - T1 Sub-Catchment and Identifier
  - ▼ Stream Gauge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.2

ISOHYETAL MAP  
RAINFALL DAYS OF 7-8 MARCH 2010





**PLUVIOGRAPHIC RAINFALL DATA APPLIED TO RAFTS SUB-CATCHMENTS**

Tarcutta (RMS)	Book Book (GS 572008)
Carabost (GS 72012)	Belmore Bridge (GS 572010)
Humula (RMS)	Wagga Wagga AWS (GS 72150)

Scale: 1:300,000

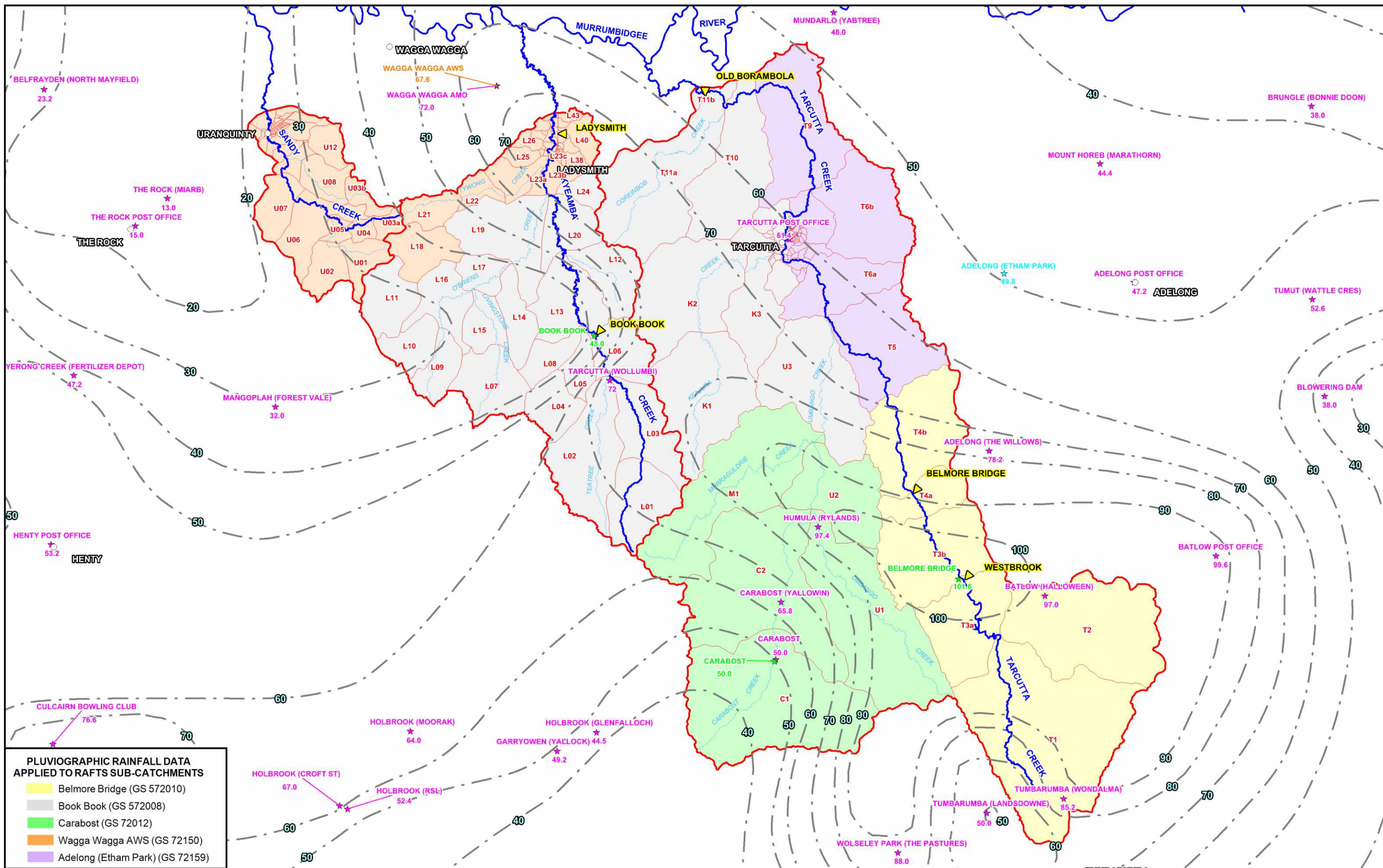
- LEGEND**
- ★ BoM Daily Rainfall Station and Recorded Depth (mm)
  - ★ BoM All Weather Station (AWS) and Recorded Depth (mm)
  - ★ BoM Pluviograph and Recorded Depth (mm)
  - ★ BoM Flood Warning Station and Recorded Depth (mm)
  - ★ SES FIR Location and Recorded Depth (mm)
  - 120 — 48 Hour Depth of Rainfall (mm)
  - Catchment Boundary
  - T1 Sub-Catchment and Identifier
  - ▽ Stream Gauge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.3

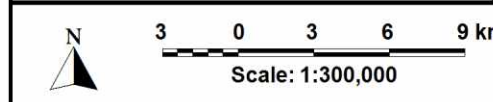
ISOHYETAL MAP  
RAIN DAYS OF 15-16 OCTOBER 2010





**PLUVIOGRAPHIC RAINFALL DATA APPLIED TO RAFTS SUB-CATCHMENTS**

- Belmore Bridge (GS 572010)
- Book Book (GS 572008)
- Carabost (GS 72012)
- Wagga Wagga AWS (GS 72150)
- Adelong (Etham Park) (GS 72159)



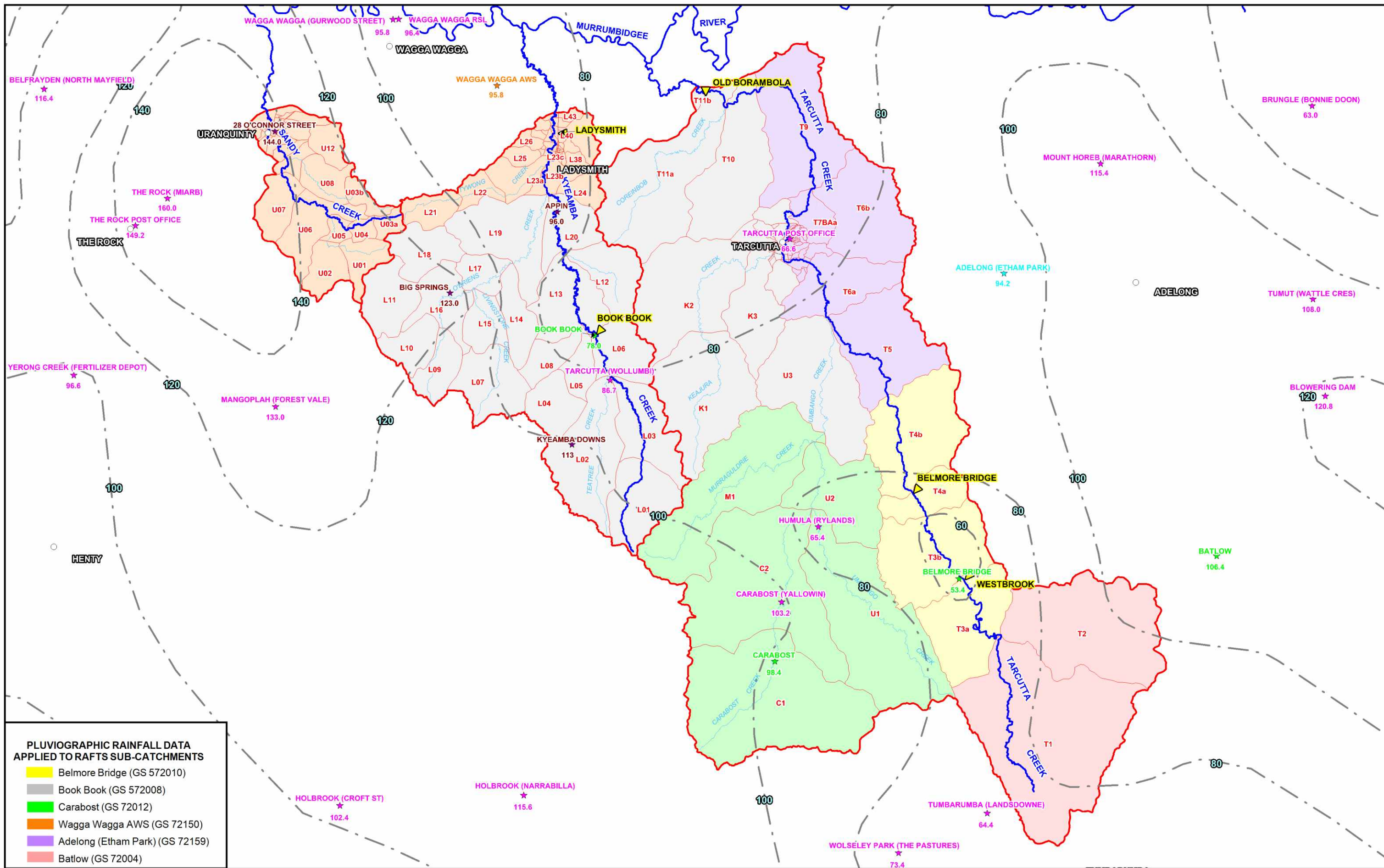
- LEGEND**
- ★ BoM Daily Rainfall Station and Recorded Depth (mm)
  - ★ BoM All Weather Station (AWS) and Recorded Depth (mm)
  - ★ BoM Pluviograph and Recorded Depth (mm)
  - ★ BoM Flood Warning Station and Recorded Depth (mm)
  - 70— 24 Hour Depth of Rainfall (mm)
  - Catchment Boundary
  - T1 Sub-Catchment and Identifier
  - ▼ Stream Gauge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.4

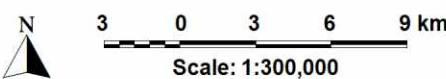
ISOHYETAL MAP  
RAIN DAY OF 9 DECEMBER 2010





**PLUVIOGRAPHIC RAINFALL DATA APPLIED TO RAFTS SUB-CATCHMENTS**

- Belmore Bridge (GS 572010)
- Book Book (GS 572008)
- Carabost (GS 72012)
- Wagga Wagga AWS (GS 72150)
- Adelong (Etham Park) (GS 72159)
- Batlow (GS 72004)



- LEGEND**
- ★ BoM Daily Rainfall Station and Recorded Depth (mm)
  - ★ BoM All Weather Station (AWS) and Recorded Depth (mm)
  - ★ BoM Pluviograph and Recorded Depth (mm)
  - ★ BoM Flood Warning Station and Recorded Depth (mm)
  - ★ SES FIR Location of Reported Depth (mm)
  - 120 48 Hour Depth of Rainfall (mm)
  - Catchment Boundary
  - T1 Sub-Catchment and Identifier
  - ▼ Stream Gauge

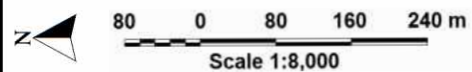
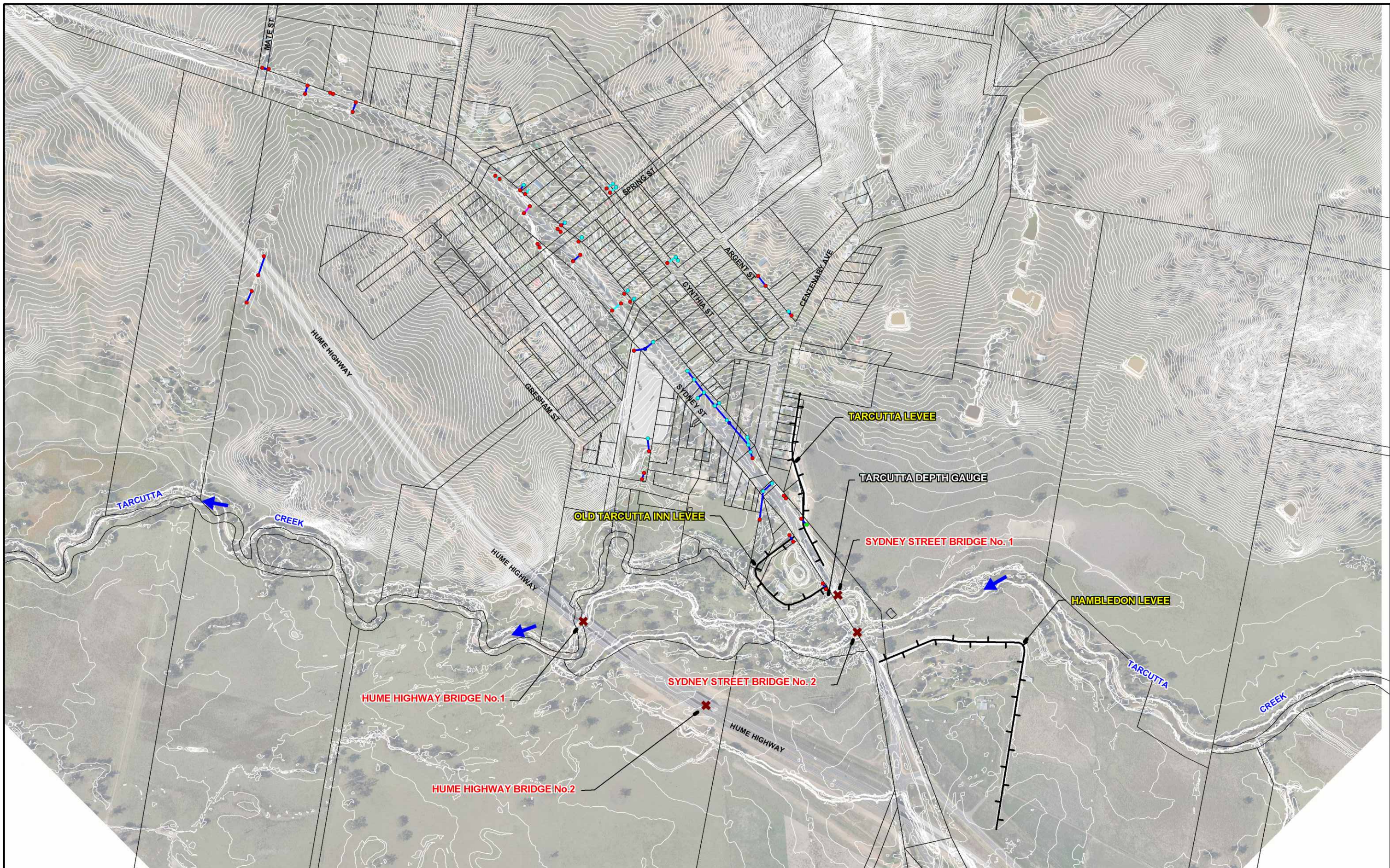
**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.5

ISOHYETAL MAP  
RAIN DAYS OF 4-5 MARCH 2012



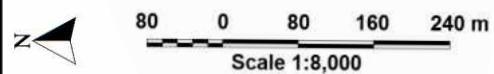




LEGEND	
	Pipe 450 mm Diameter
	Pipe 450 mm Diameter
	Box Culvert
	Bridge
	Inlet Pit
	Junction Pit
	Headwall
	Flood Gate
	Levee

TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS

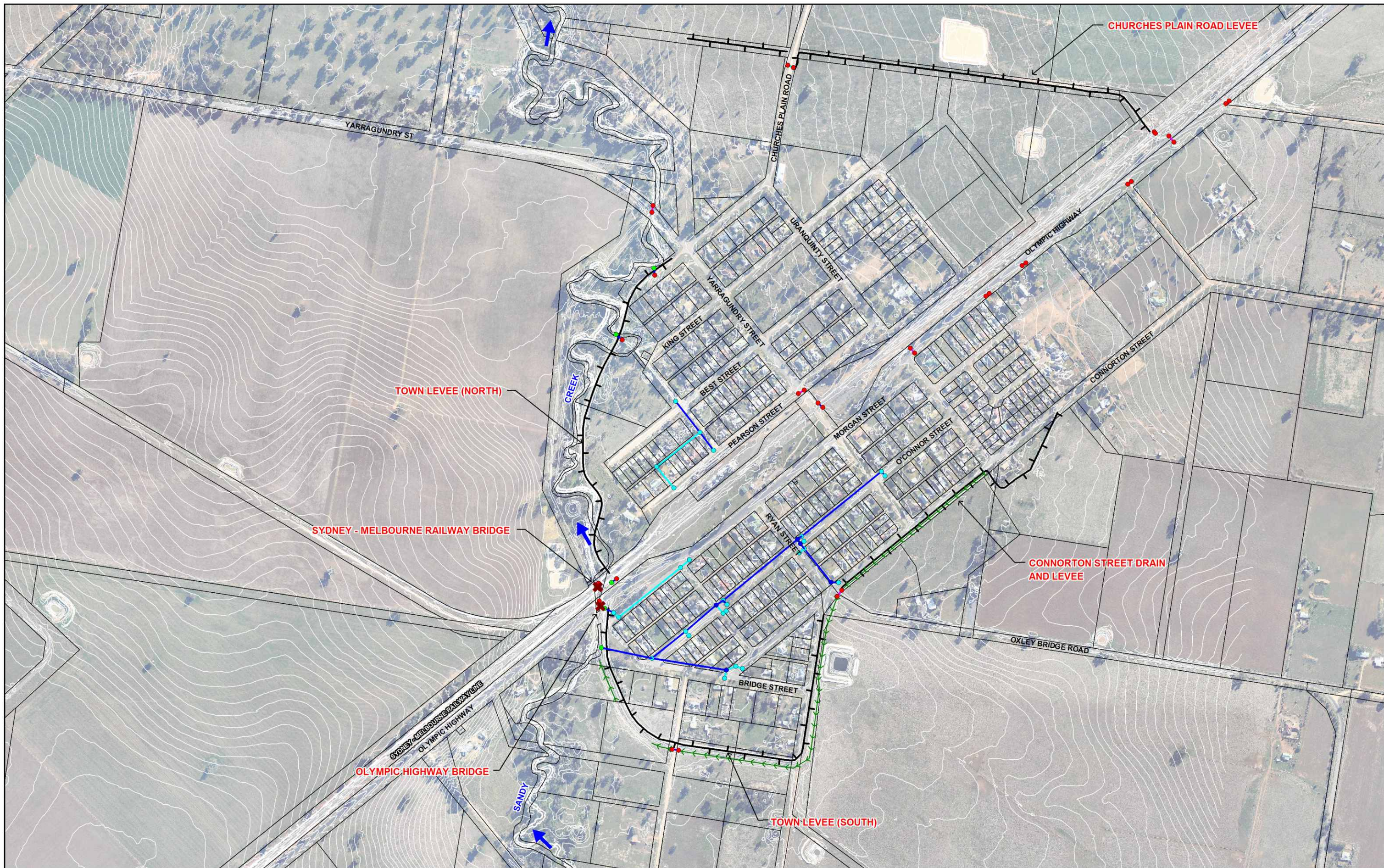
Figure 2.6



**LEGEND**

—●— Surveyed Stormwater Network

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**



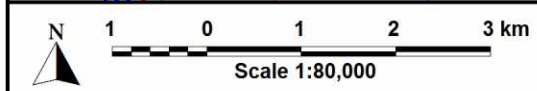
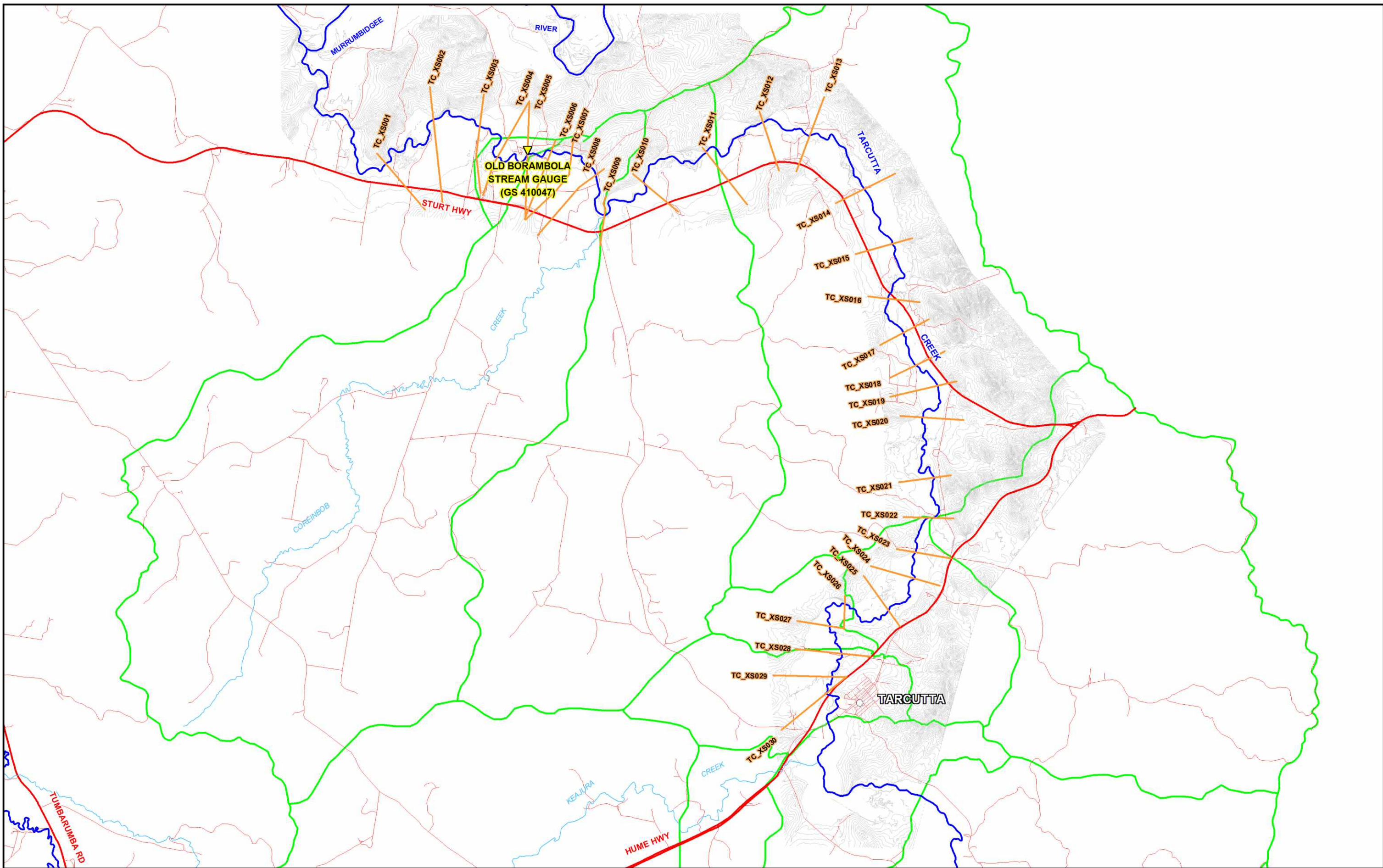
Scale: 1:8,000



LEGEND	
<span style="color: cyan;">—</span>	Pipe < 450 mm Diameter
<span style="color: blue;">—</span>	Pipe ≥ 450 mm Diameter
<span style="color: magenta;">—</span>	Box Culvert
	Levee
	Engineered Channel/ Drain
<span style="color: cyan;">●</span>	Inlet Pit
<span style="color: blue;">●</span>	Junction Pit
<span style="color: red;">●</span>	Headwall
<span style="color: green;">●</span>	Flood Gate
<span style="color: red;">✕</span>	Bridge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

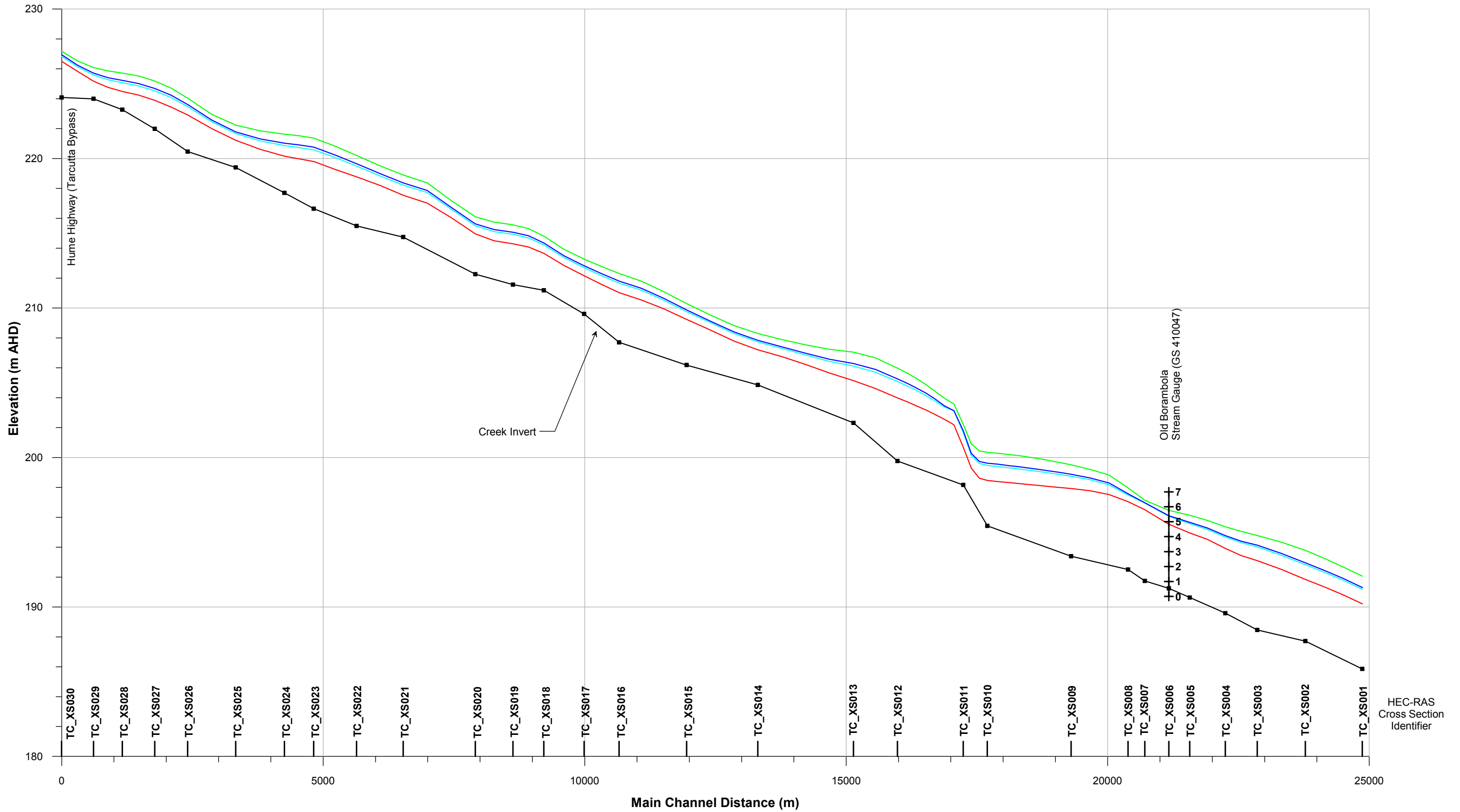
Figure 2.8



LEGEND

	Major Road		TC_XS001	HEC-RAS Cross Section and Identifier
	Minor Road			Stream Gauge
	Sub-catchment Boundary			

TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS



**HISTORIC WATER SURFACE PROFILE**

- March 2010 Flood
- October 2010 Flood
- December 2010 Flood
- March 2012 Flood

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

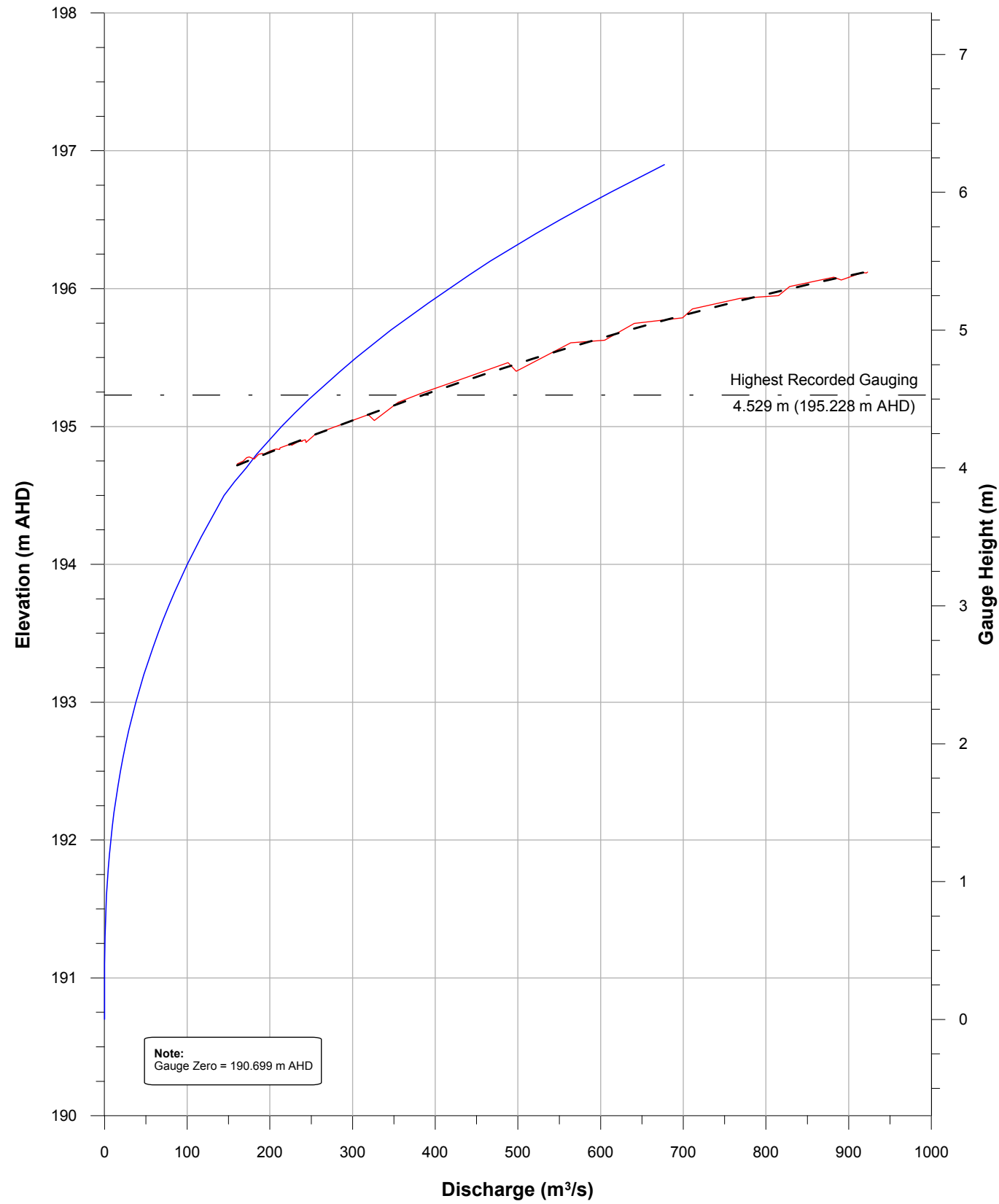
Figure 2.10

HISTORIC WATER SURFACE PROFILES  
TARCUTTA CREEK DOWNSTREAM OF TARCUTTA

**NOTE:**  
Refer Table 3.1 for comparison of recorded and modelled flood levels at Old Borambola Stream Gauge.



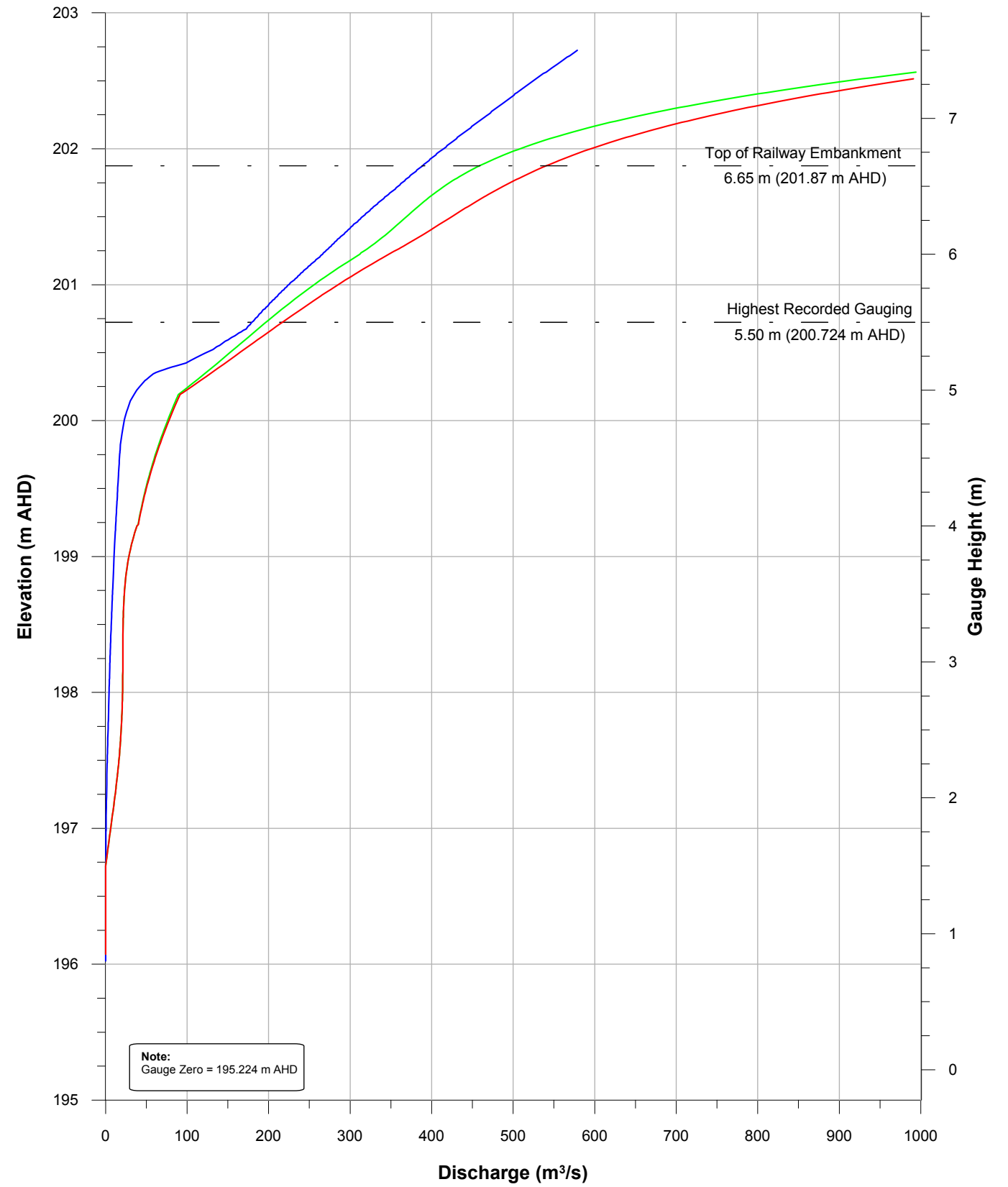
**TARCUTTA CREEK AT  
OLD BORAMBOLA STREAM GAUGE**



**LEGEND**

- DPIOW Rating Curve
- UNET Derived Rating Curve
- - - Second Order Polynomial Fit to High Flow Portion of Rating Curve

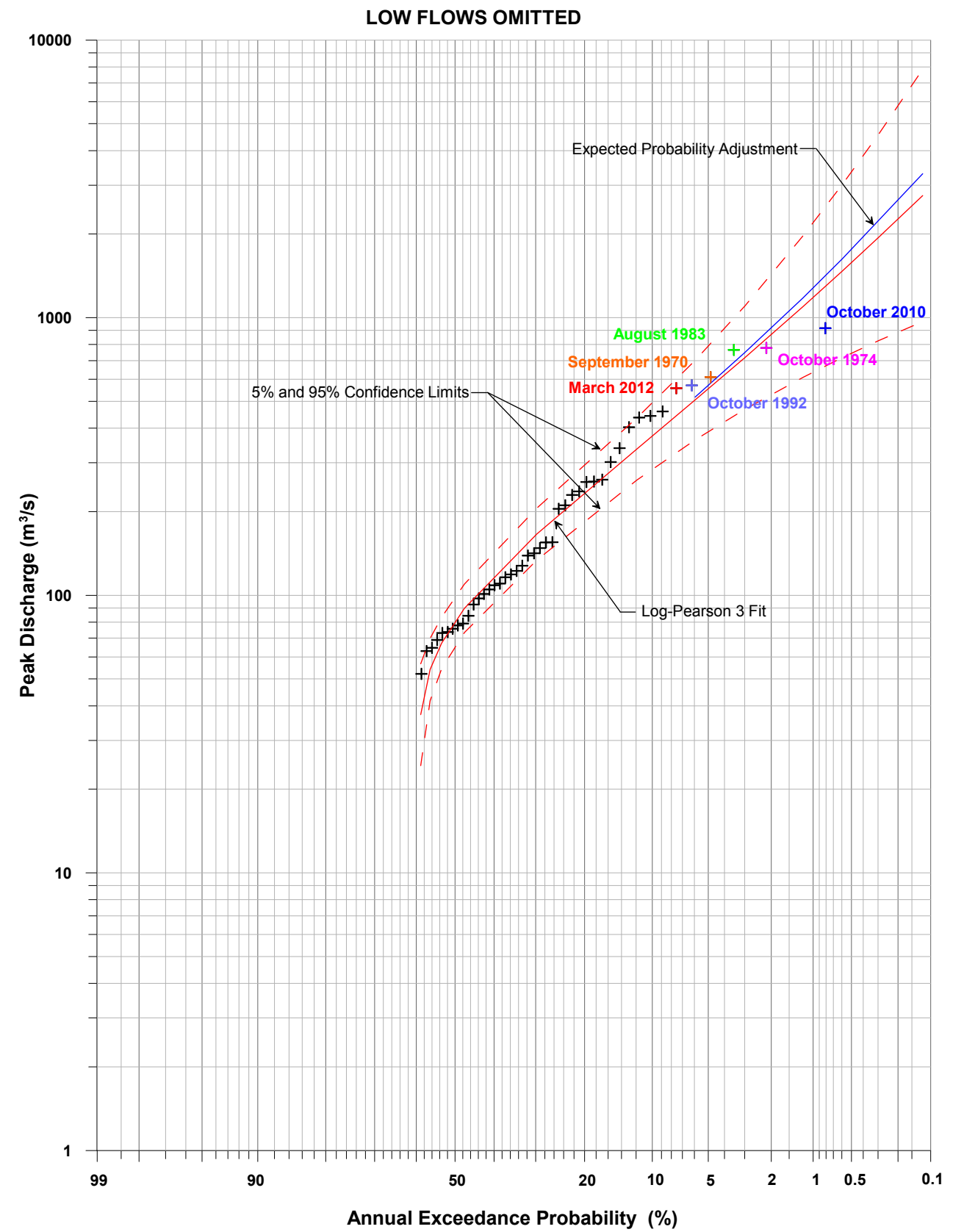
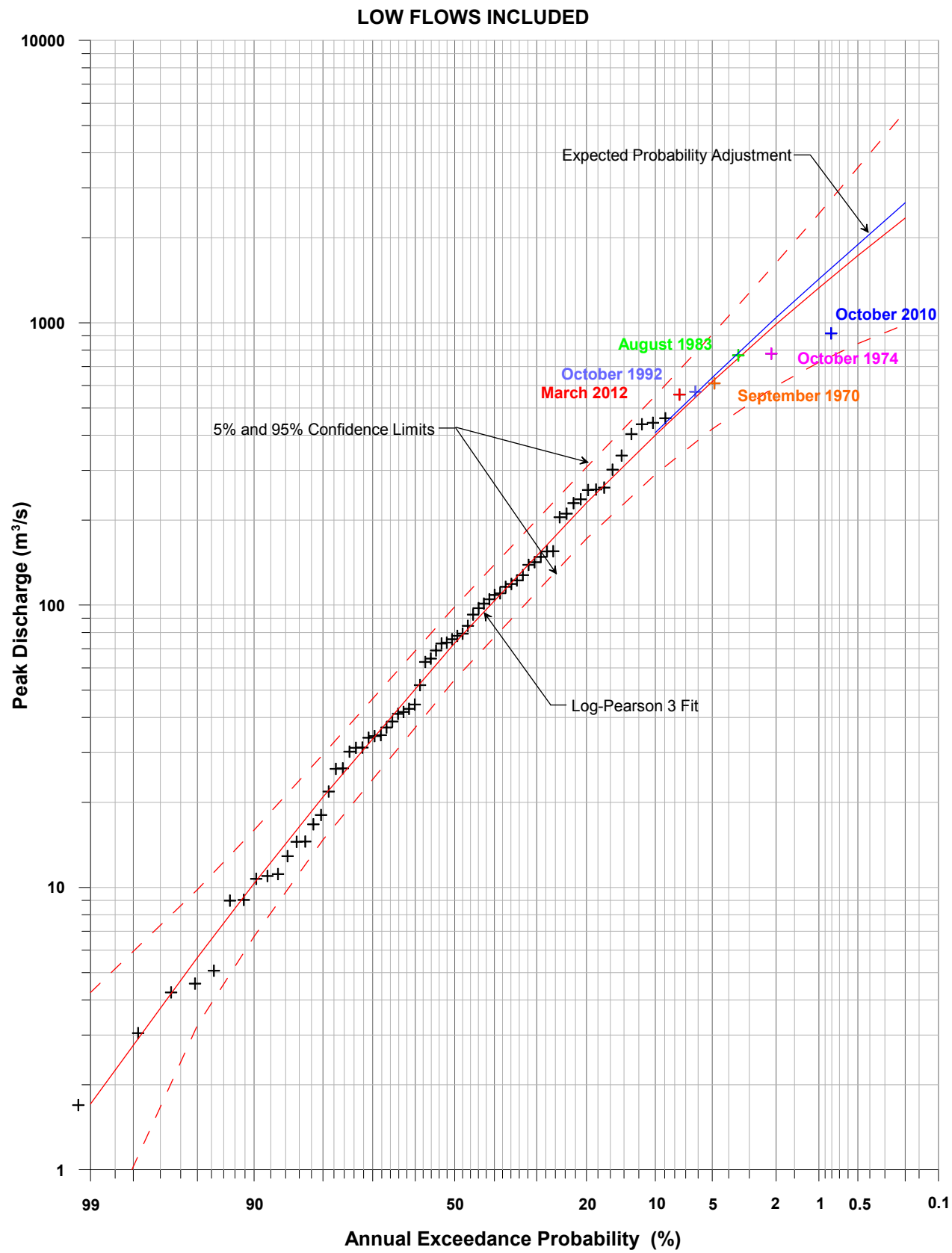
**KYEAMBA CREEK AT  
LADYSMITH STREAM GAUGE**



**LEGEND**

- DPIOW Rating Curve
- Pre-Scour Conditions
- Post-Scour Conditions



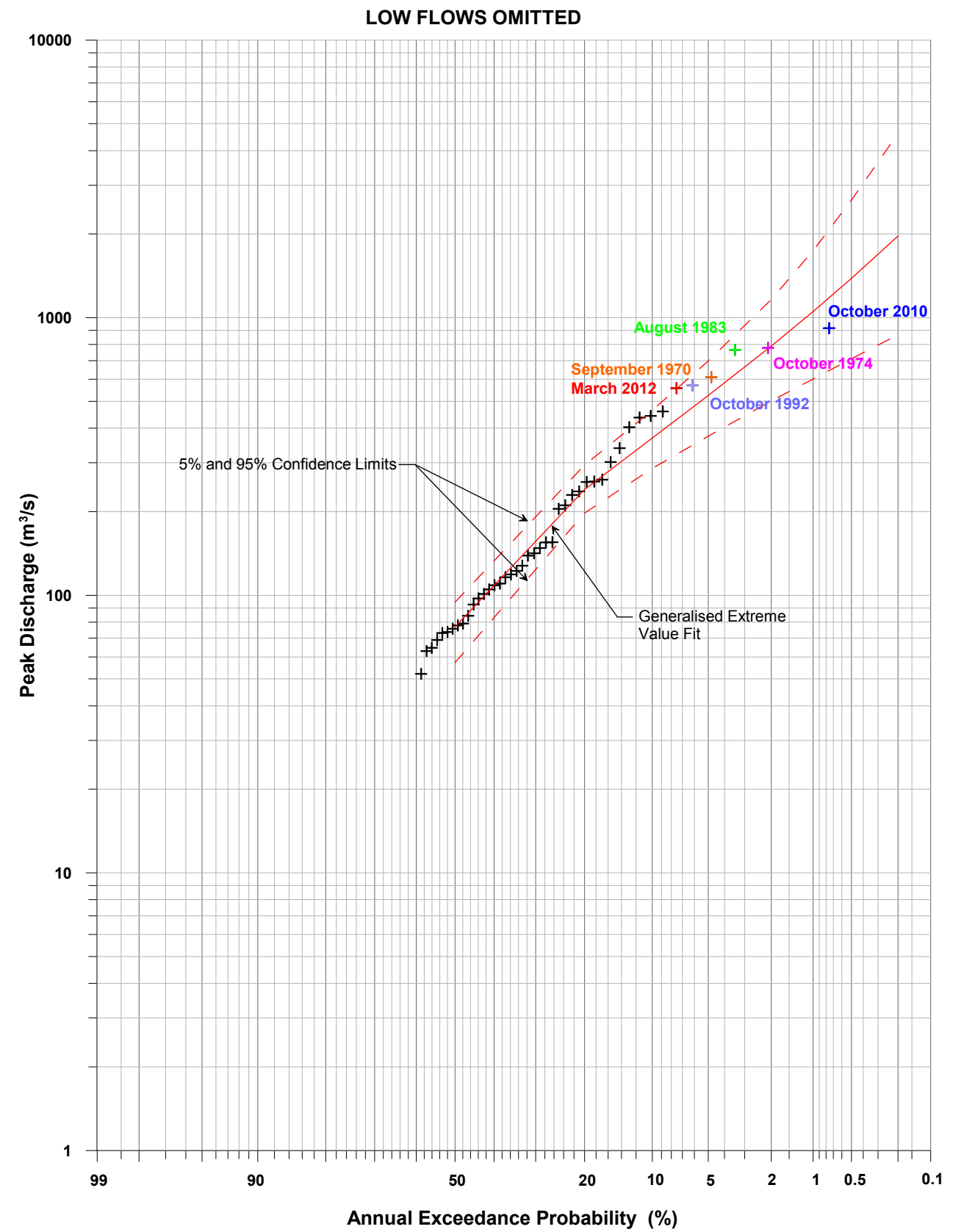
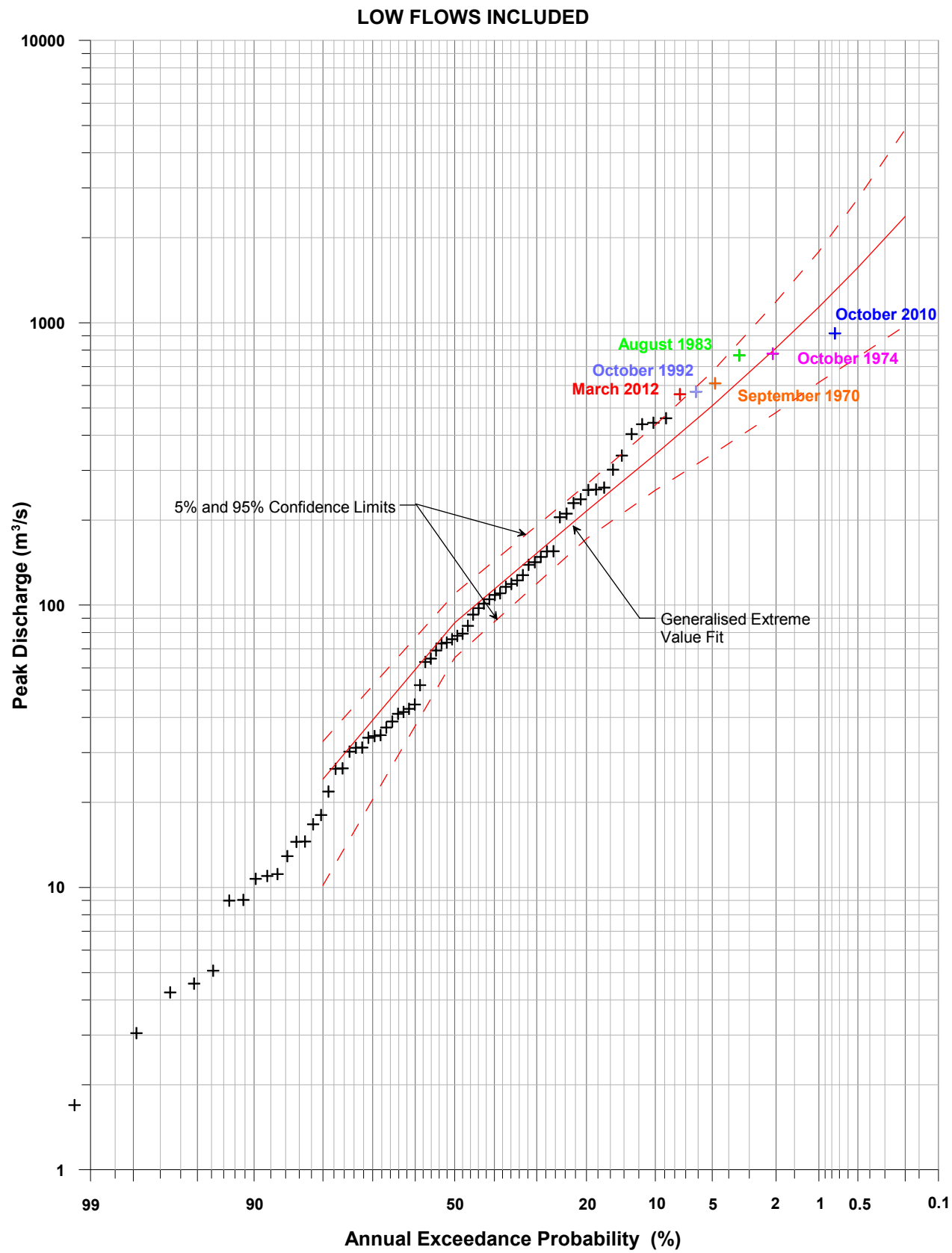


**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.12

FLOOD FREQUENCY RELATIONSHIP  
LOG-PEARSON 3 ANNUAL SERIES  
TARCUTTA CREEK AT OLD BORAMBOLA STREAM GAUGE (GS 410047)



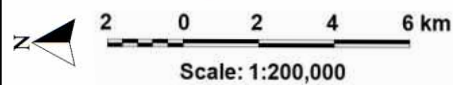
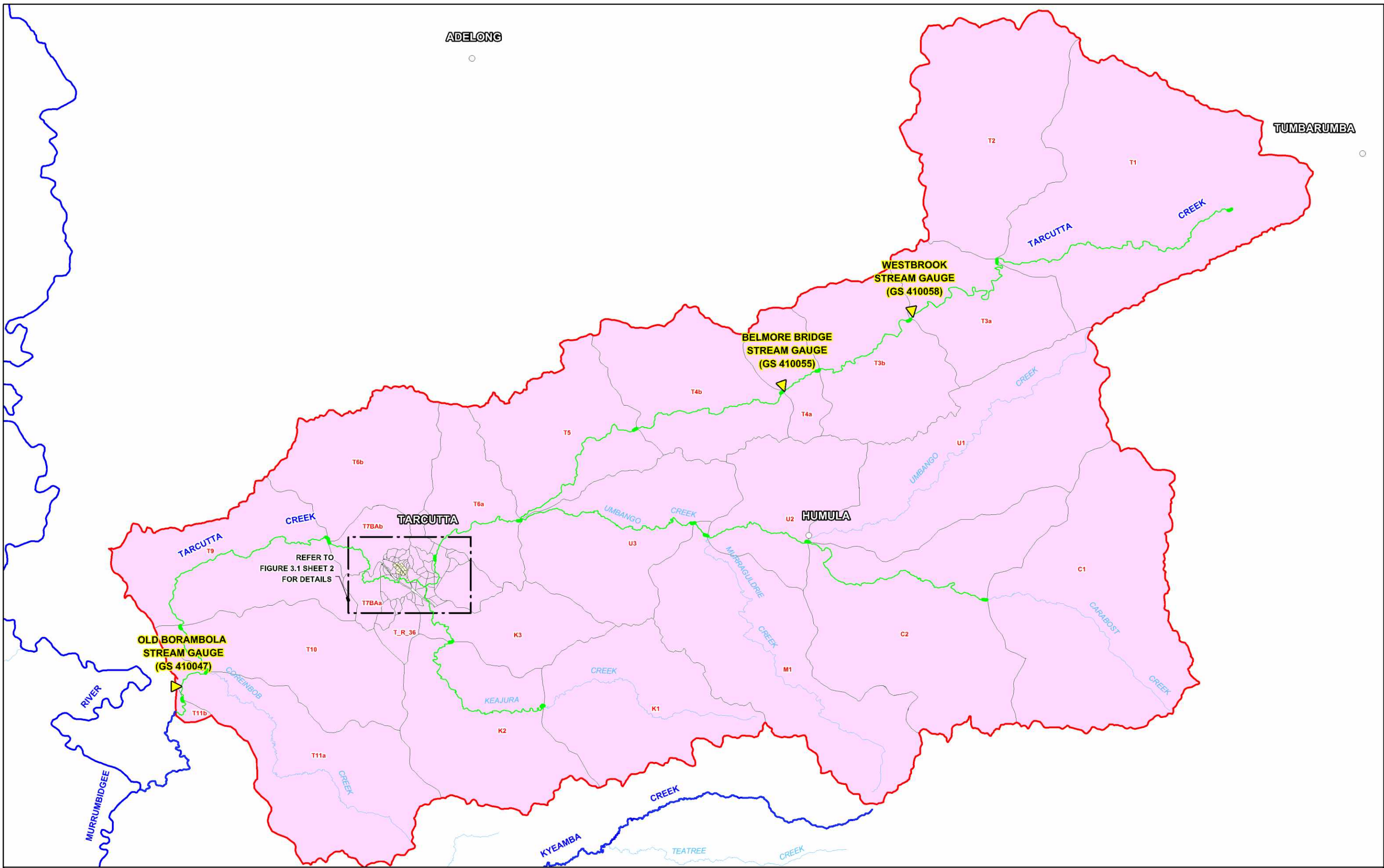


**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 2.13

FLOOD FREQUENCY RELATIONSHIP  
GENERALISED EXTREME VALUE ANNUAL SERIES  
TARCUTTA CREEK AT OLD BORAMBOLA STREAM GAUGE (GS 410047)

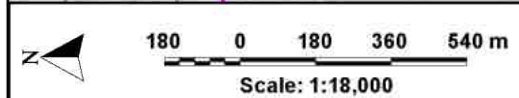
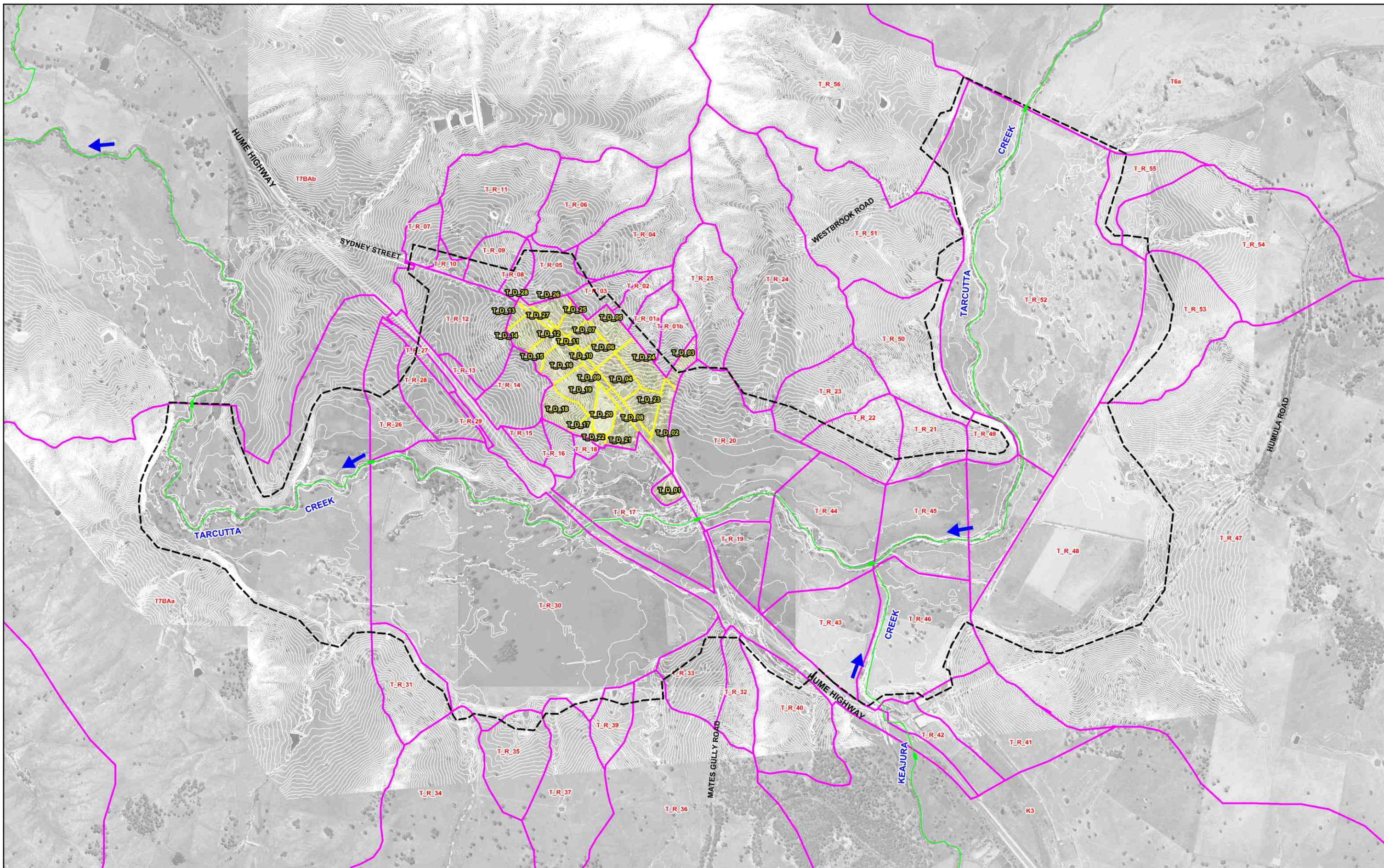




- LEGEND**
- DRAINS Sub-Catchment
  - K3 RAFTS Sub-Catchment and Identifier
  - RAFTS Sub-Catchment Link
  - Study Catchment
  - Stream Gauge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 3.1  
Sheet 1 of 2



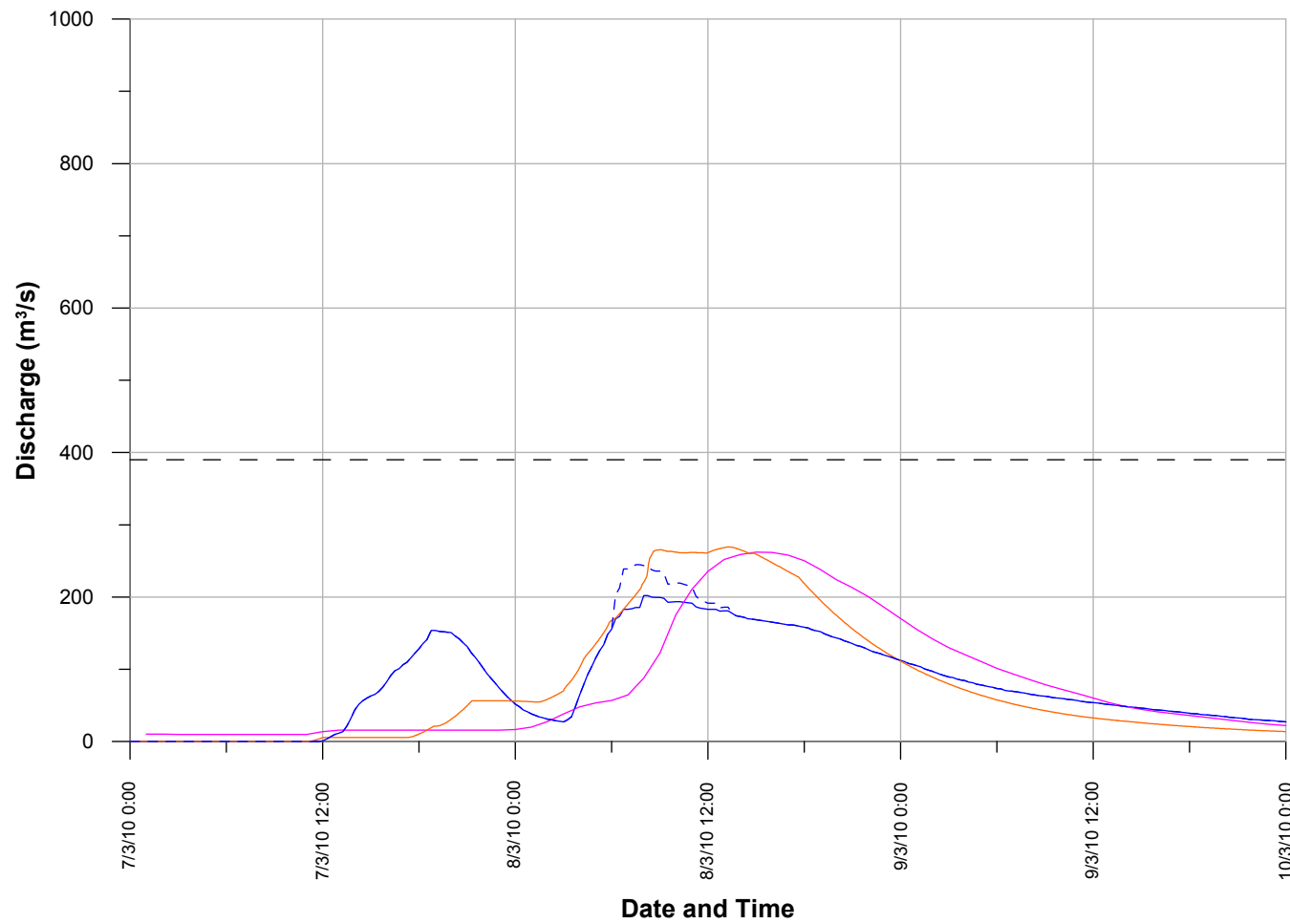
**LEGEND**

- T.D.02 DRAINS Sub-Catchment and Identifier
- T.R.33 RAFTS Sub-Catchment and Identifier
- RAFTS Sub-Catchment Link
- Two-Dimensional Model Boundary

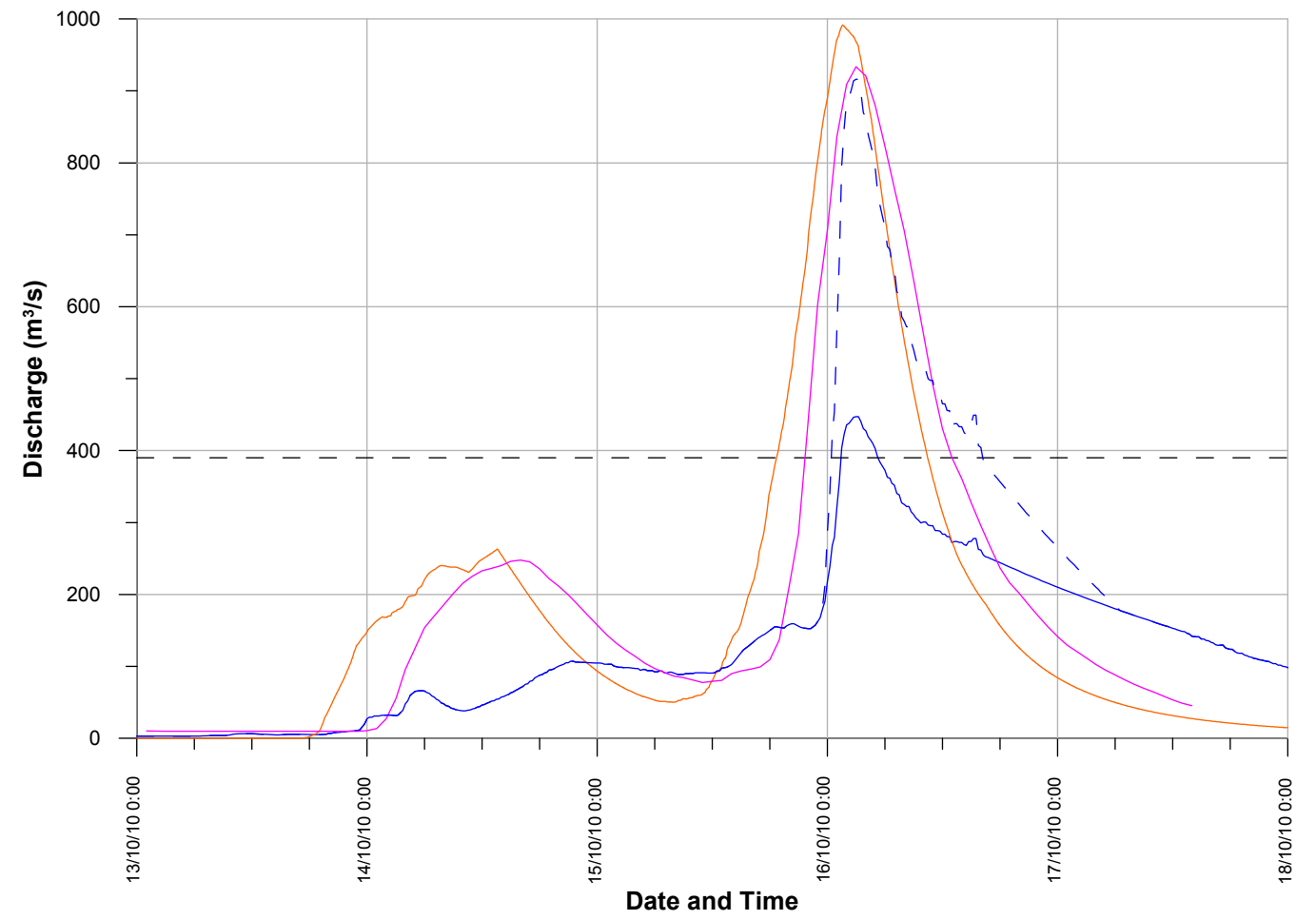
**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 3.1  
Sheet 2 of 2

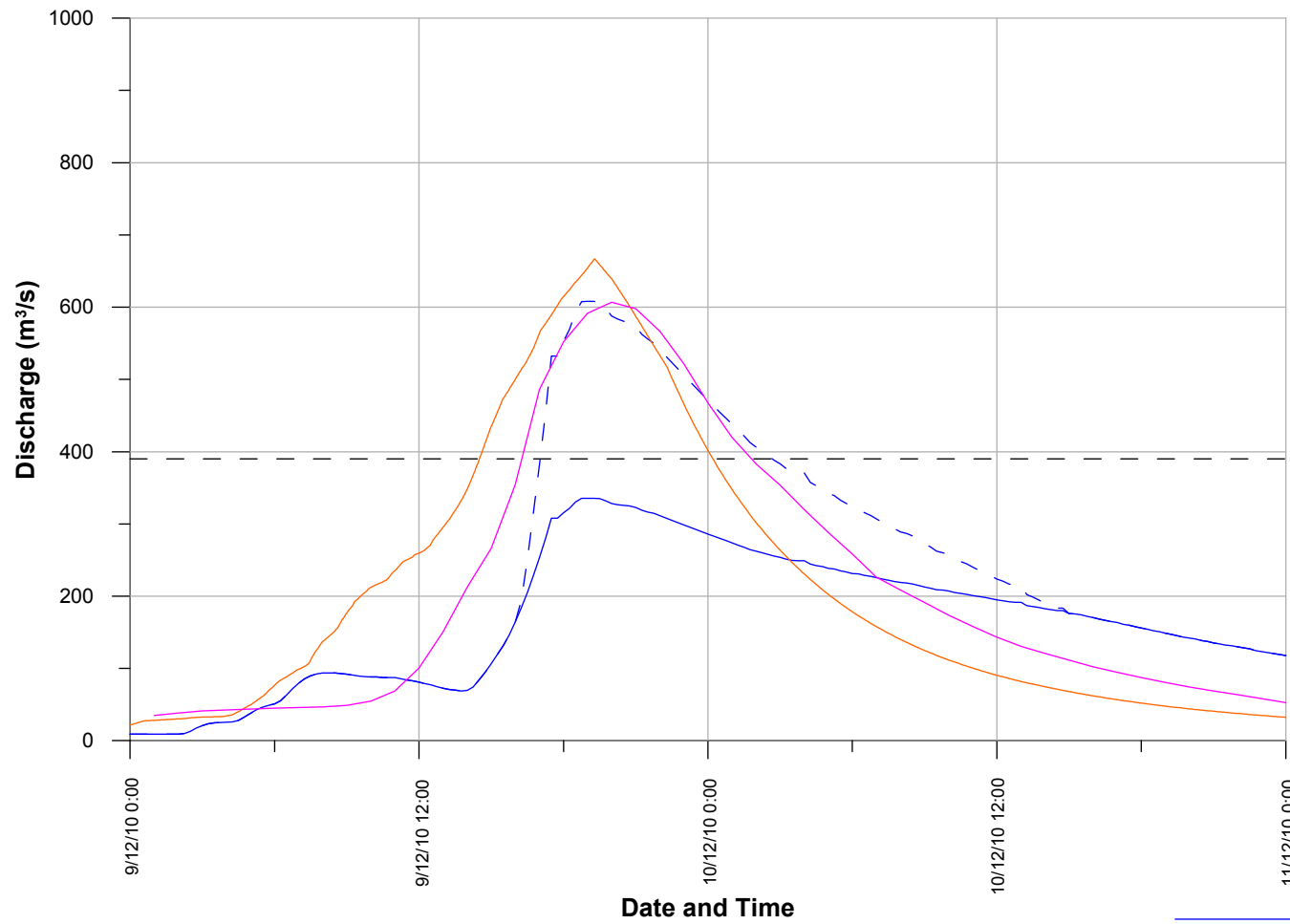
MARCH 2010



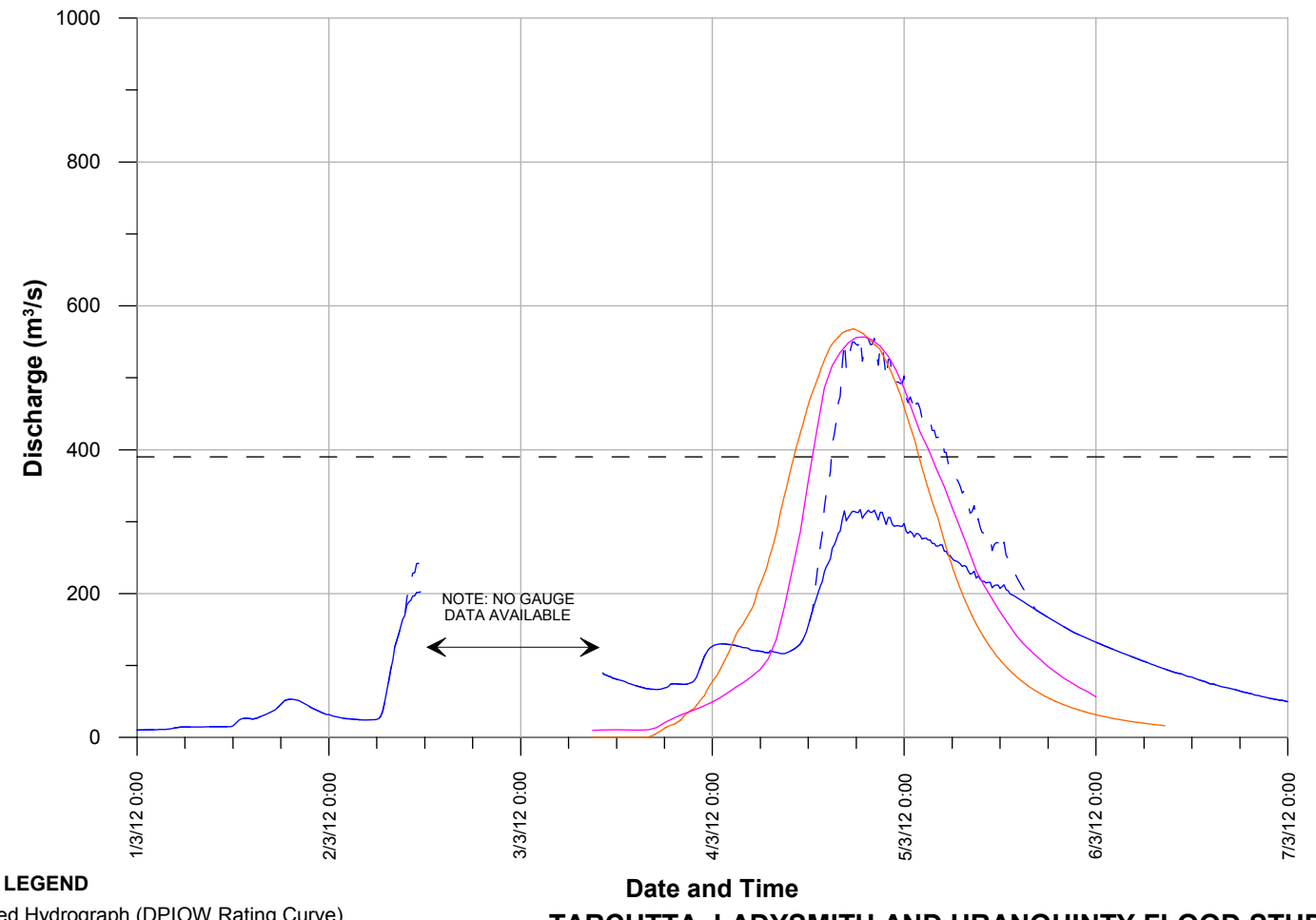
OCTOBER 2010



DECEMBER 2010



MARCH 2012



LEGEND

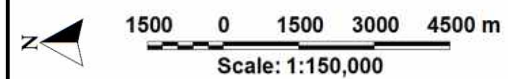
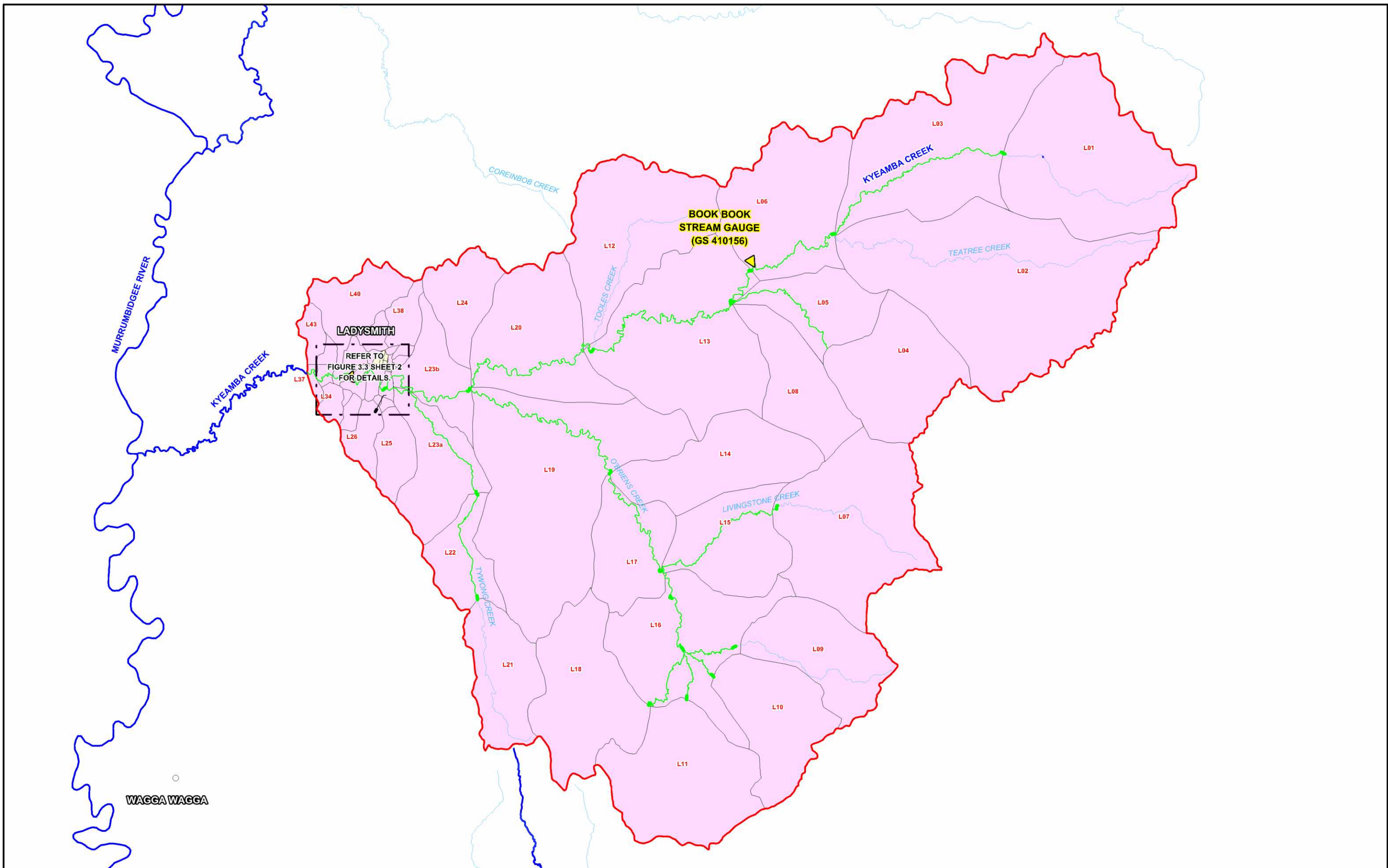
- Recorded Hydrograph (DPIOW Rating Curve)
- - - Recorded Hydrograph (Adjusted Rating Curve)
- Modelled Hydrograph (RAFTS)
- Modelled Hydrograph (UNET)
- - - Max. Gauged Discharge

TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS

Figure 3.2

TARCUTTA CREEK HISTORIC FLOWS AT OLD BORAMBOLA GAUGE (GS 410047)



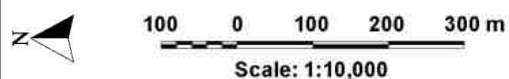
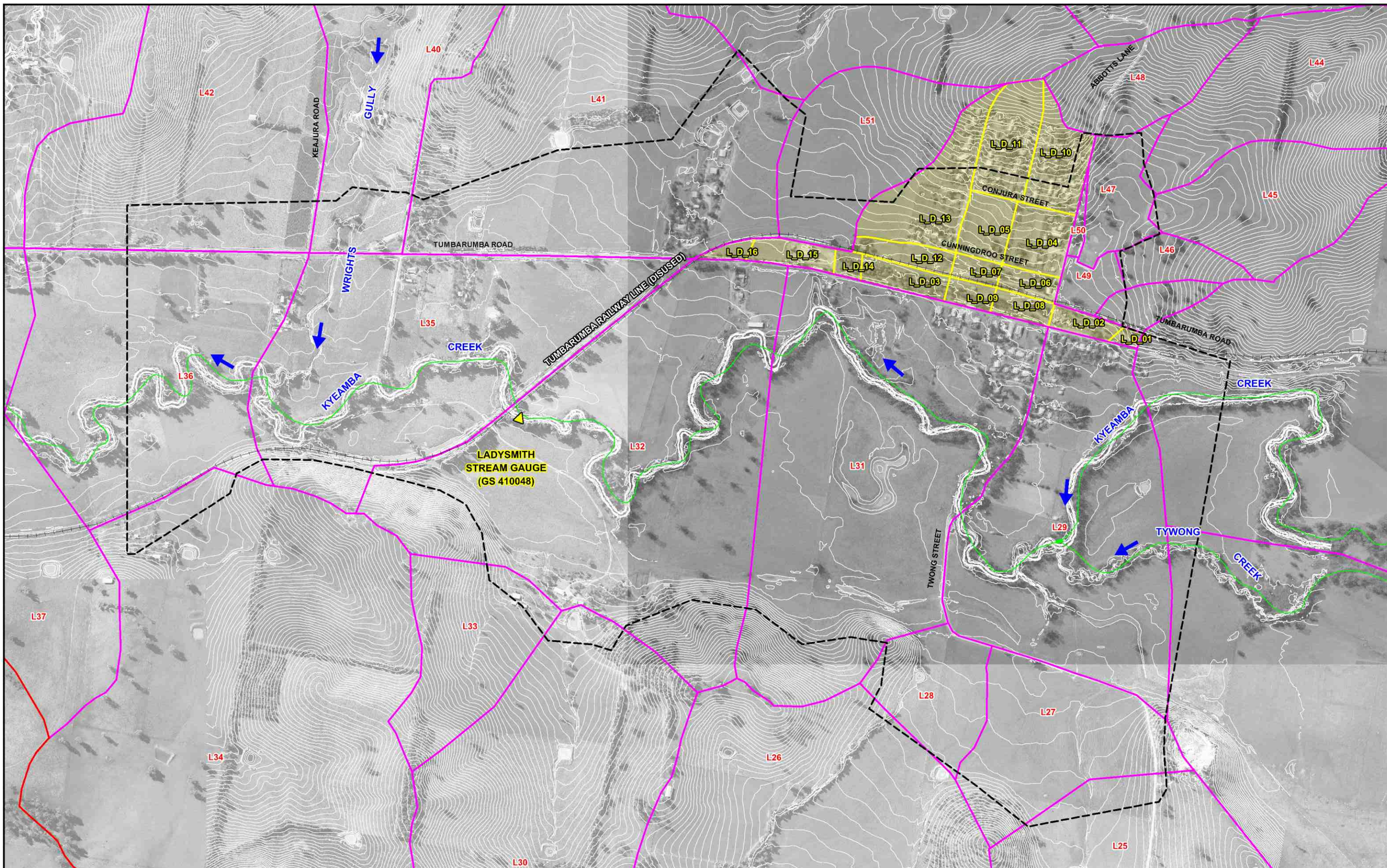


**LEGEND**

- DRAINS Sub-Catchment
- RAFTS Sub-Catchment and Identifier
- RAFTS Sub-Catchment Link
- Study Catchment
- Stream Gauge

**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 3.3  
Sheet 1 of 2



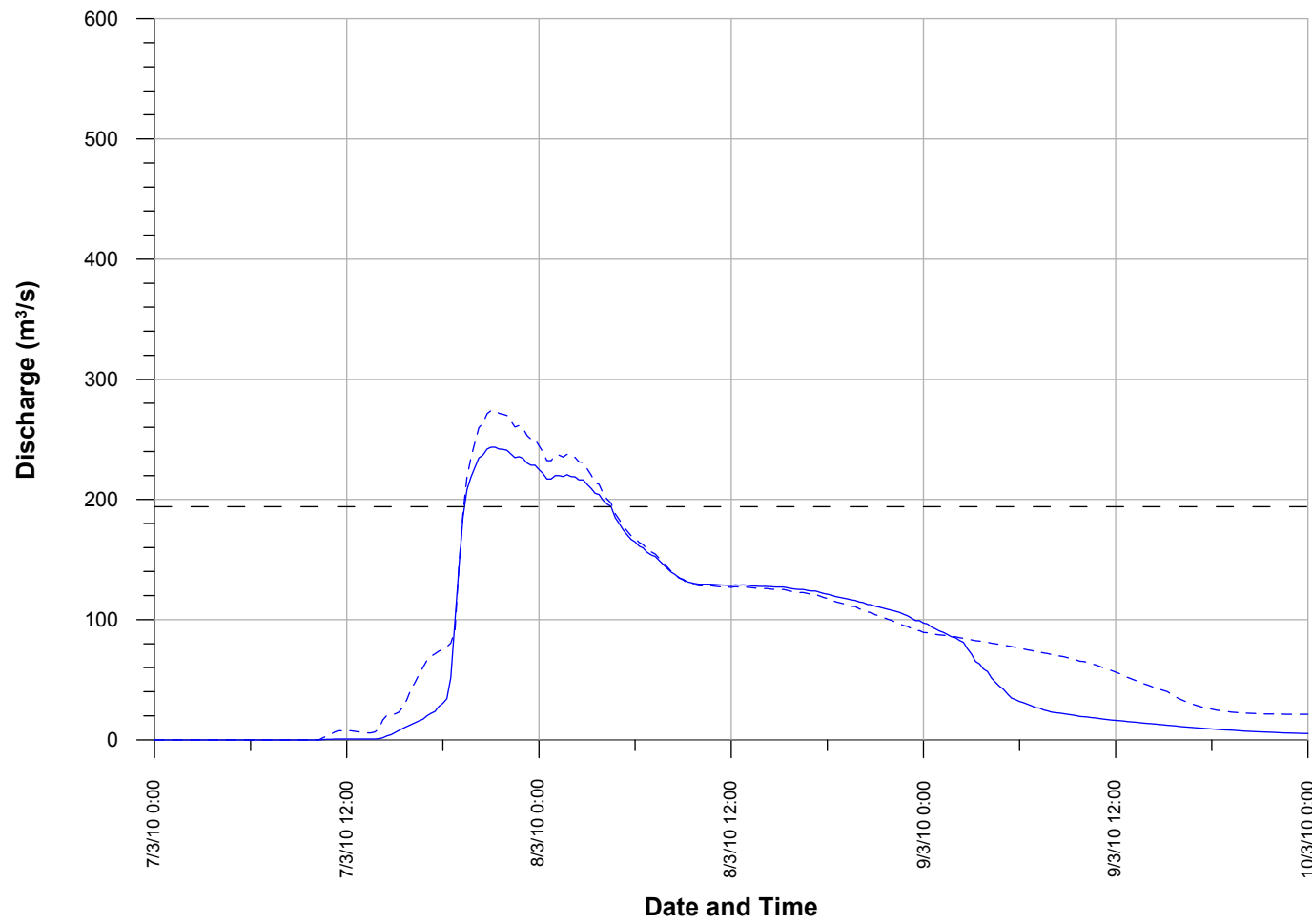
**LEGEND**

- Study Catchment
- Two-Dimensional Model Boundary
- ▾ Stream Gauge
- L\_D\_02 DRAINS Sub-Catchment and Identifier
- L27 RAFTS Sub-Catchment and Identifier
- RAFTS Sub-Catchment Link

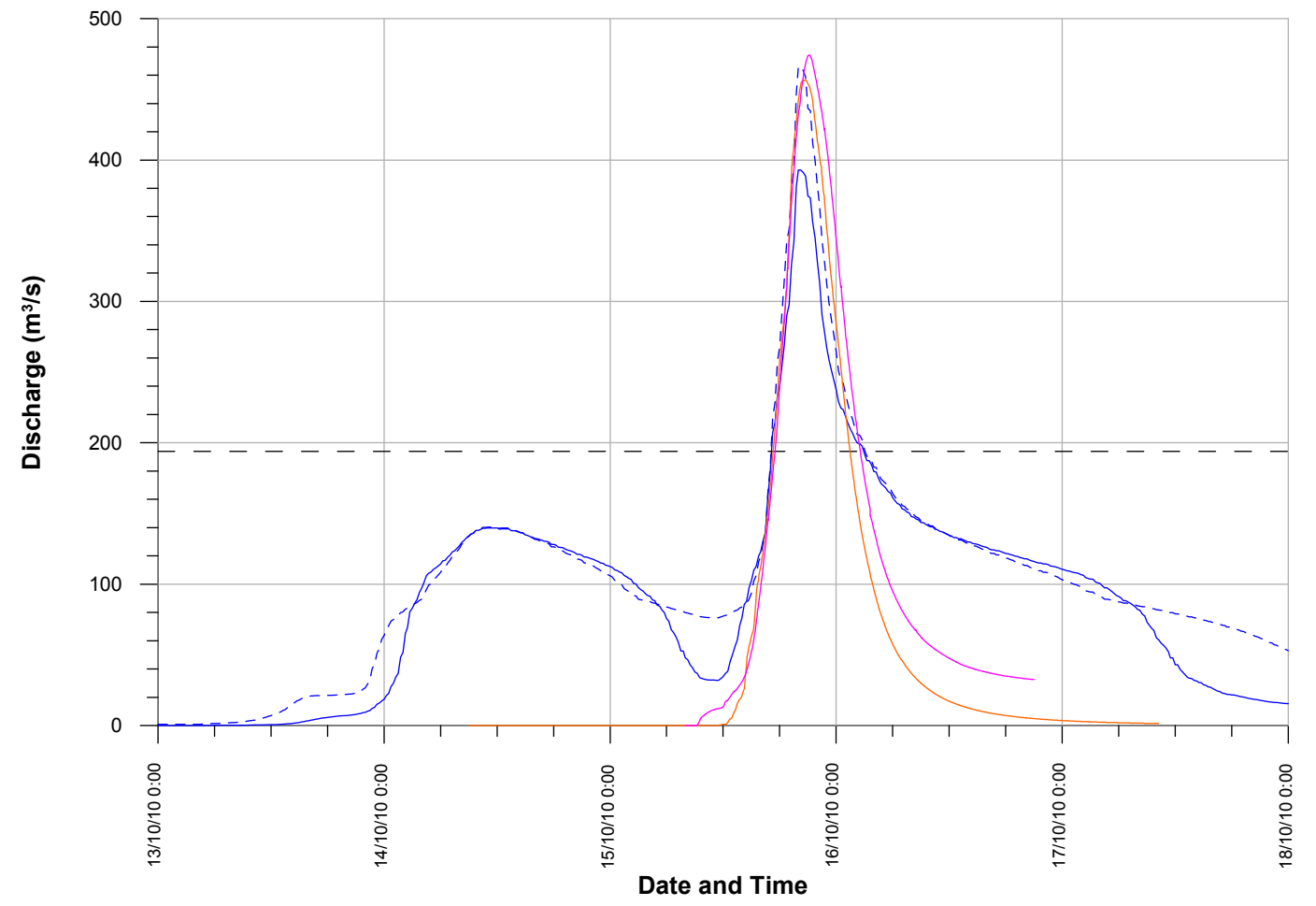
**TARCUTTA, LADYSMITH AND URANQUINTY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS**

Figure 3.3  
Sheet 2 of 2

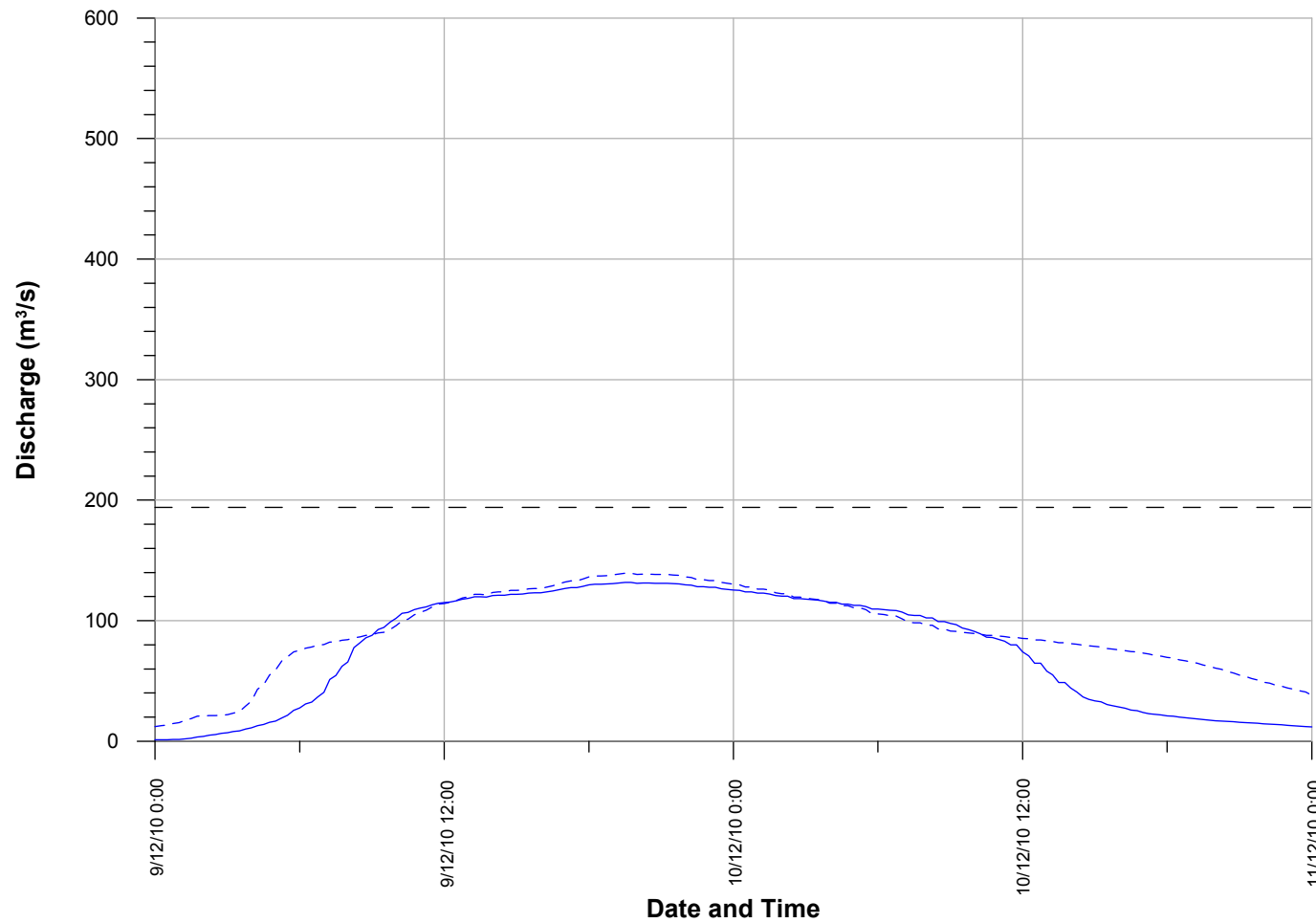
MARCH 2010



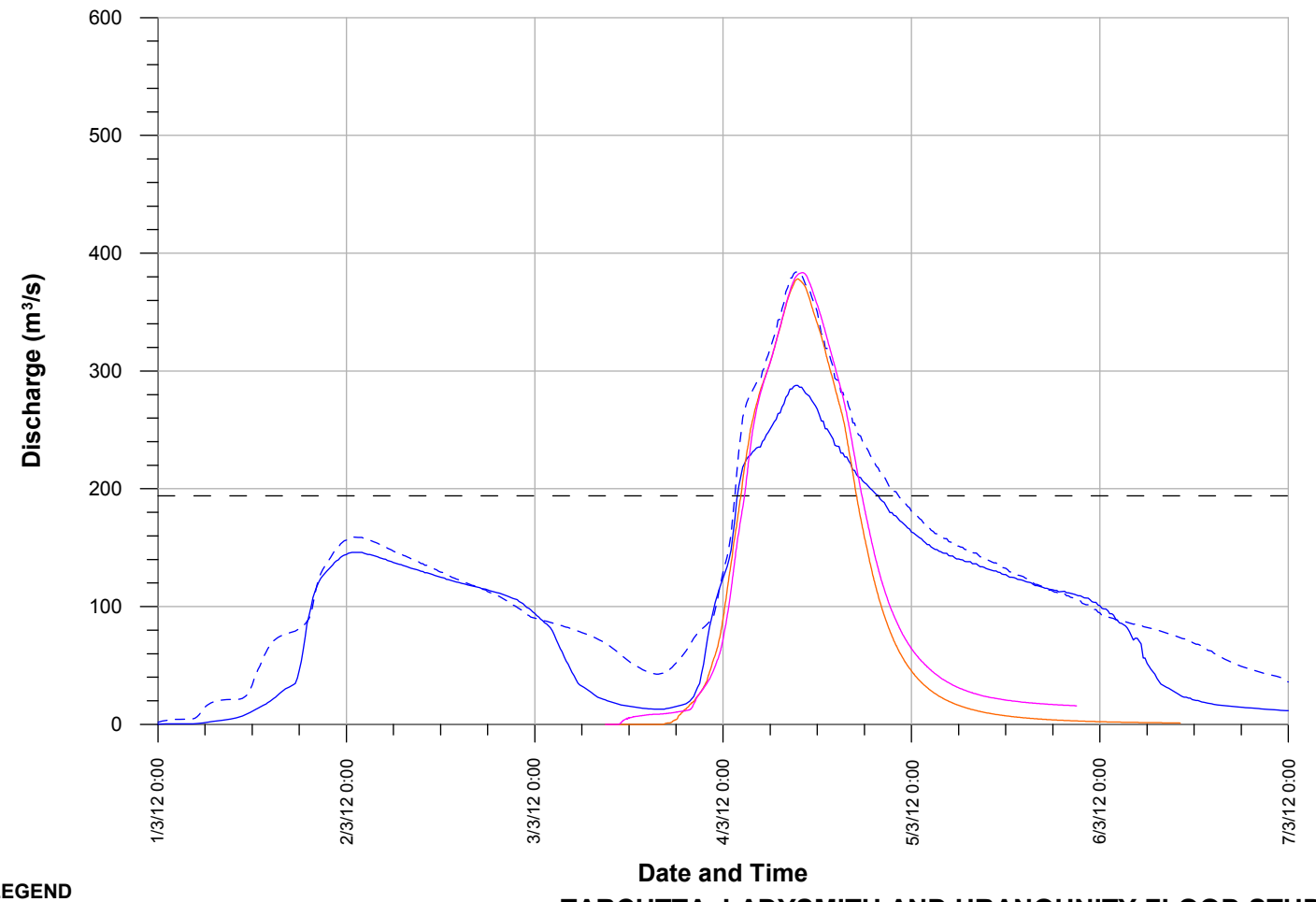
OCTOBER 2010



DECEMBER 2010



MARCH 2012



LEGEND

- Recorded Hydrograph (DPIOW Rating Curve)
- - - Adjusted Hydrograph (Adjusted Rating Curve)
- Modelled Hydrograph (RAFTS)
- TUFLOW Hydrograph (TUFLOW)
- - - Max. Gauge Discharge



TARCUTTA, LADYSMITH AND URANQUITY FLOOD STUDIES  
DEVELOPMENT AND TESTING OF FLOOD MODELS

Figure 3.4  
KYEAMBA CREEK HISTORIC FLOWS AT LADYSMITH GAUGE (GS 410048)