

GRETA FLOOD STUDY

VOLUME 2 – FINAL REPORT FIGURES AND APPENDICES C - F



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FIGURE 1
LOCALITY MAP

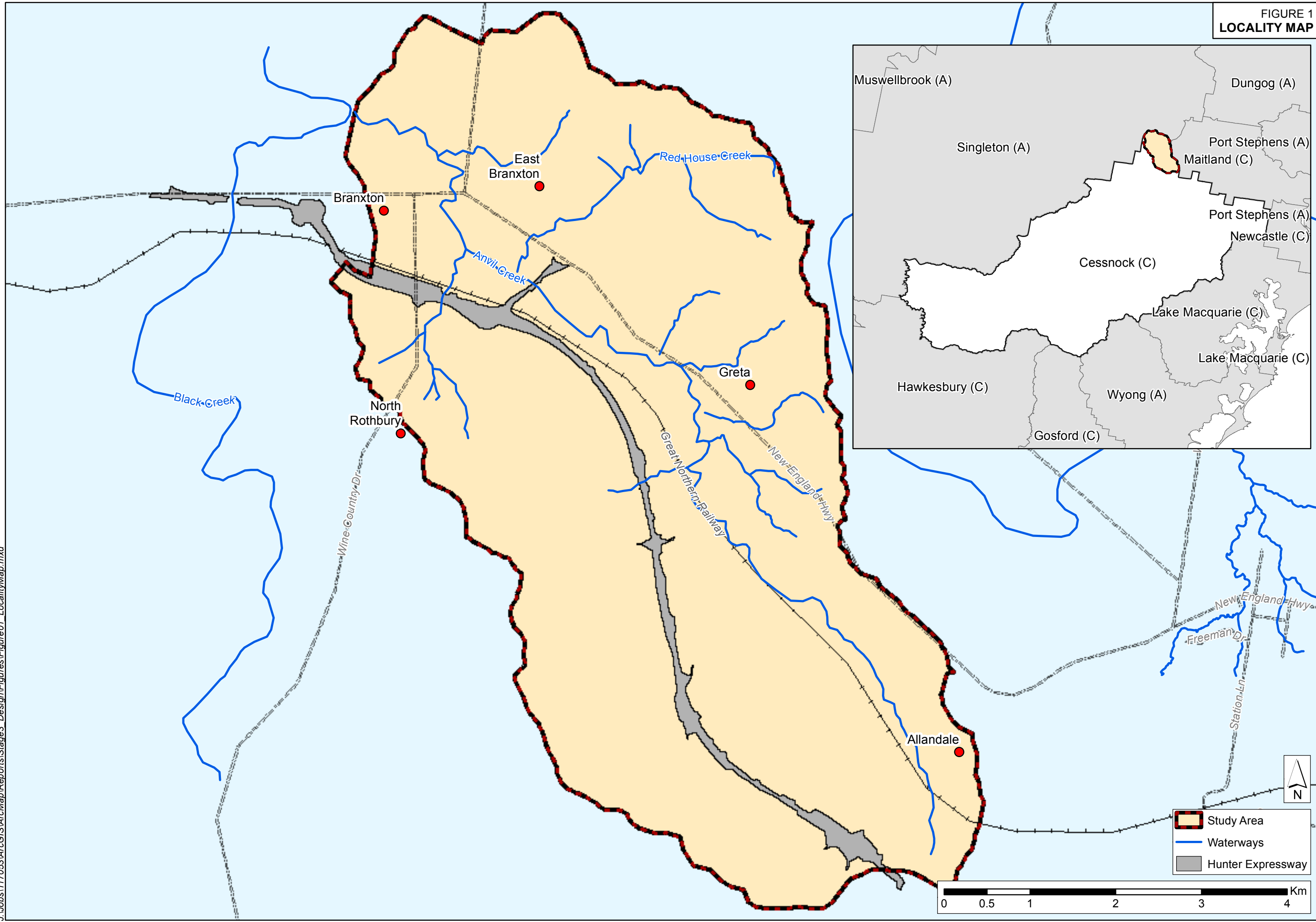


FIGURE 2
STUDY AREA

Flood modelling undertaken for the West St catchment does not reflect current catchment terrain or land use conditions. A revised flood assessment for this catchment may be necessary to update the catchment conditions.

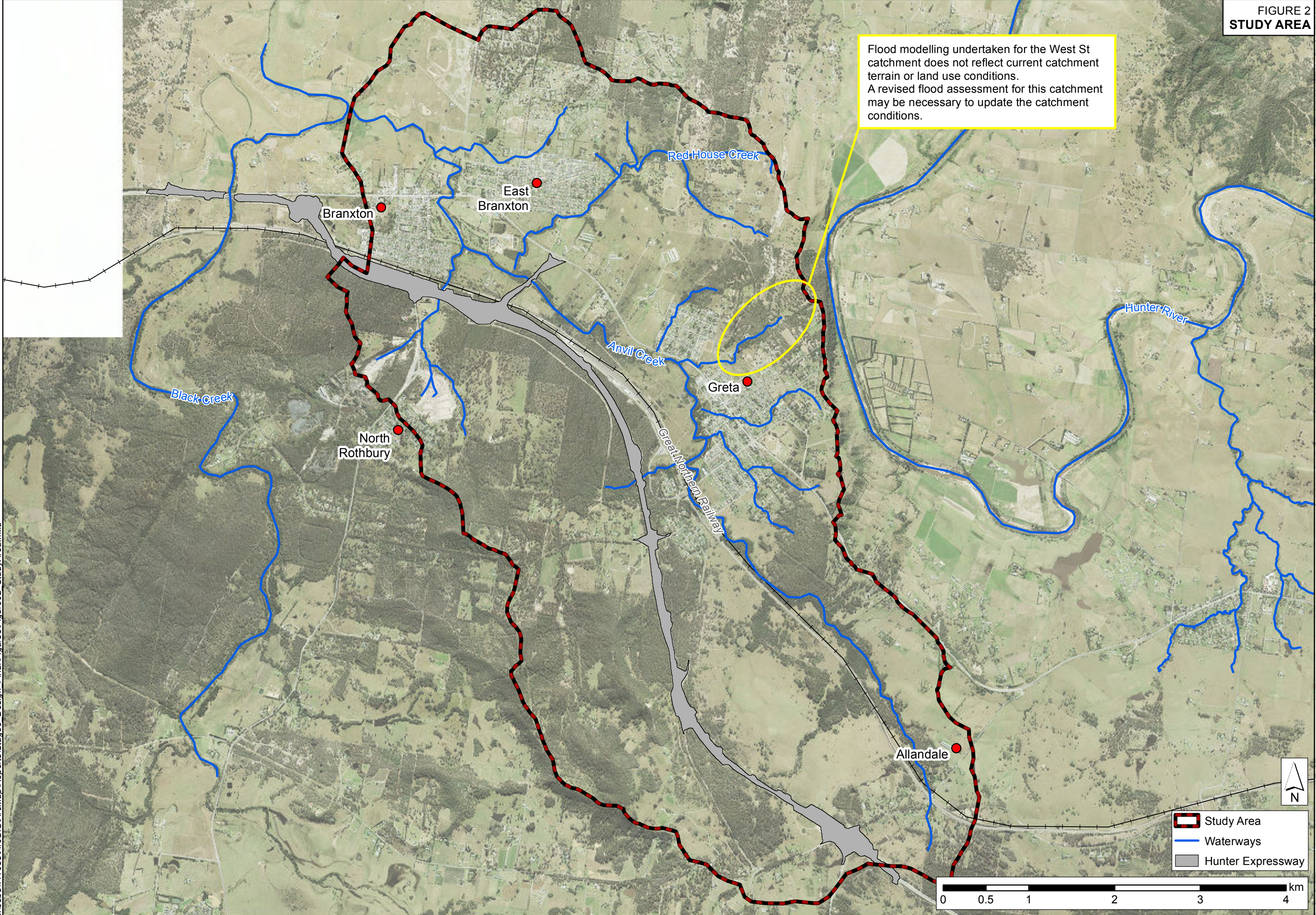


FIGURE 3
AVAILABLE SURVEY DATA

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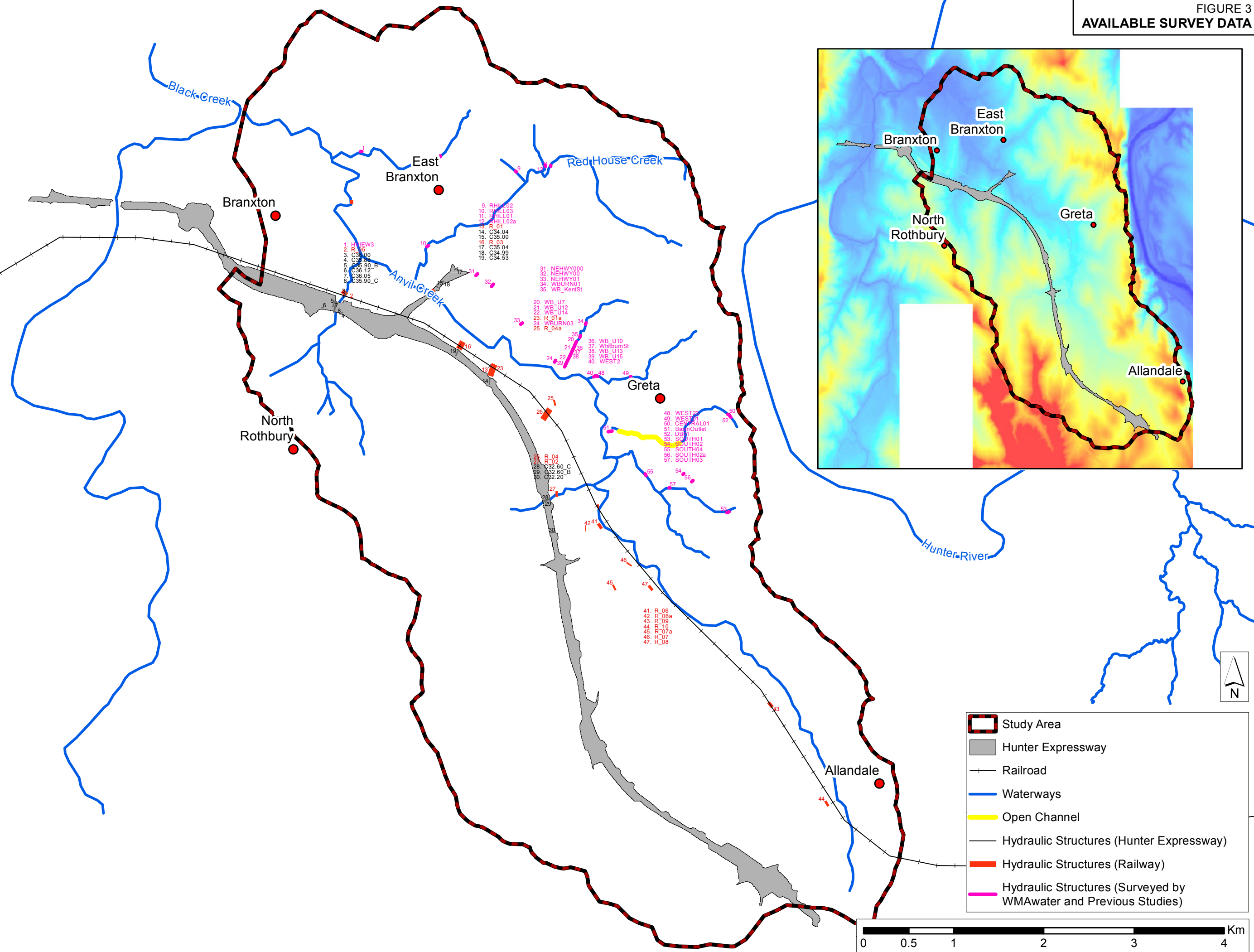


FIGURE 4
PLUVIOMETER RAINFALL GAUGES

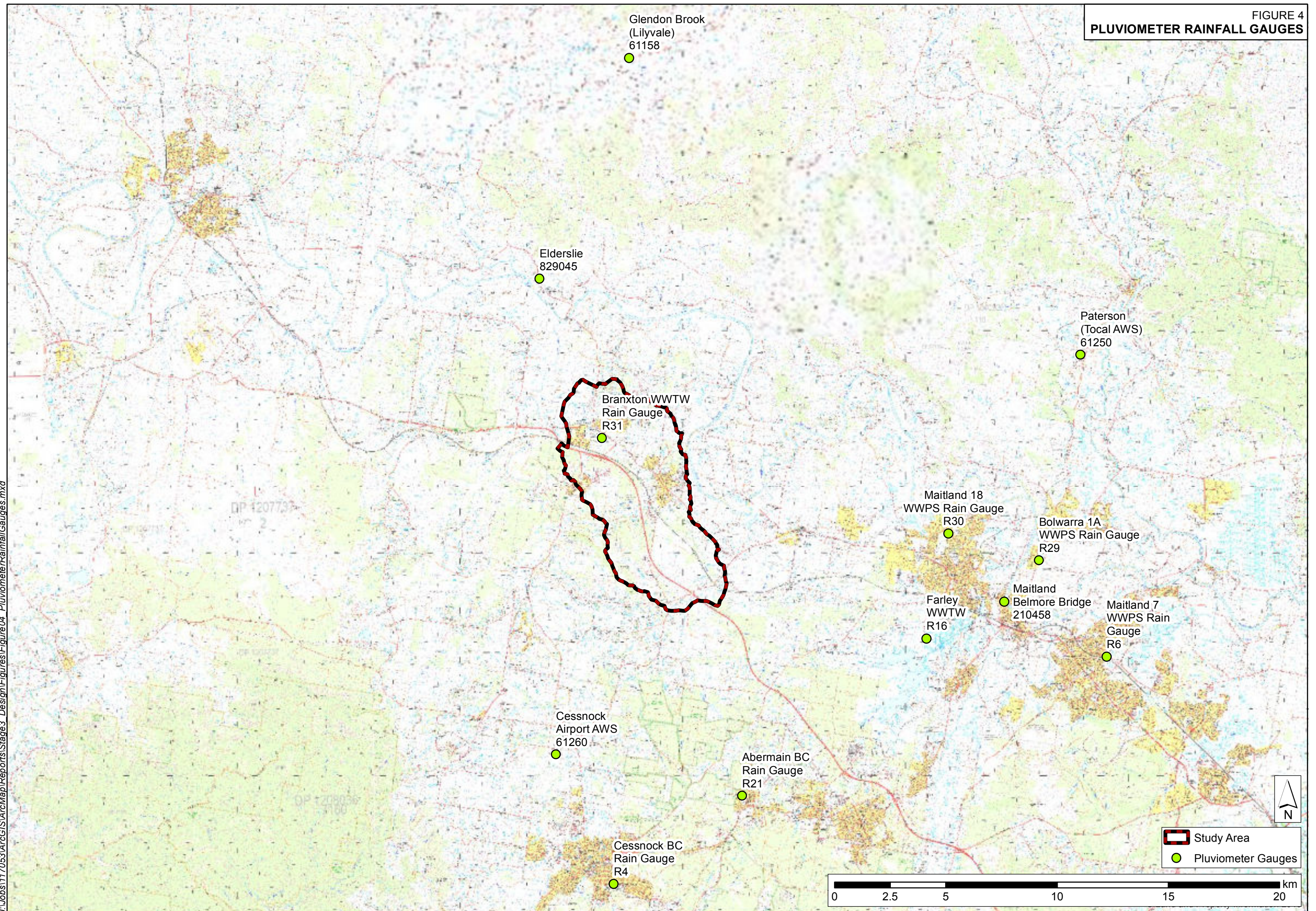


FIGURE 5
DAILY RAINFALL GAUGES

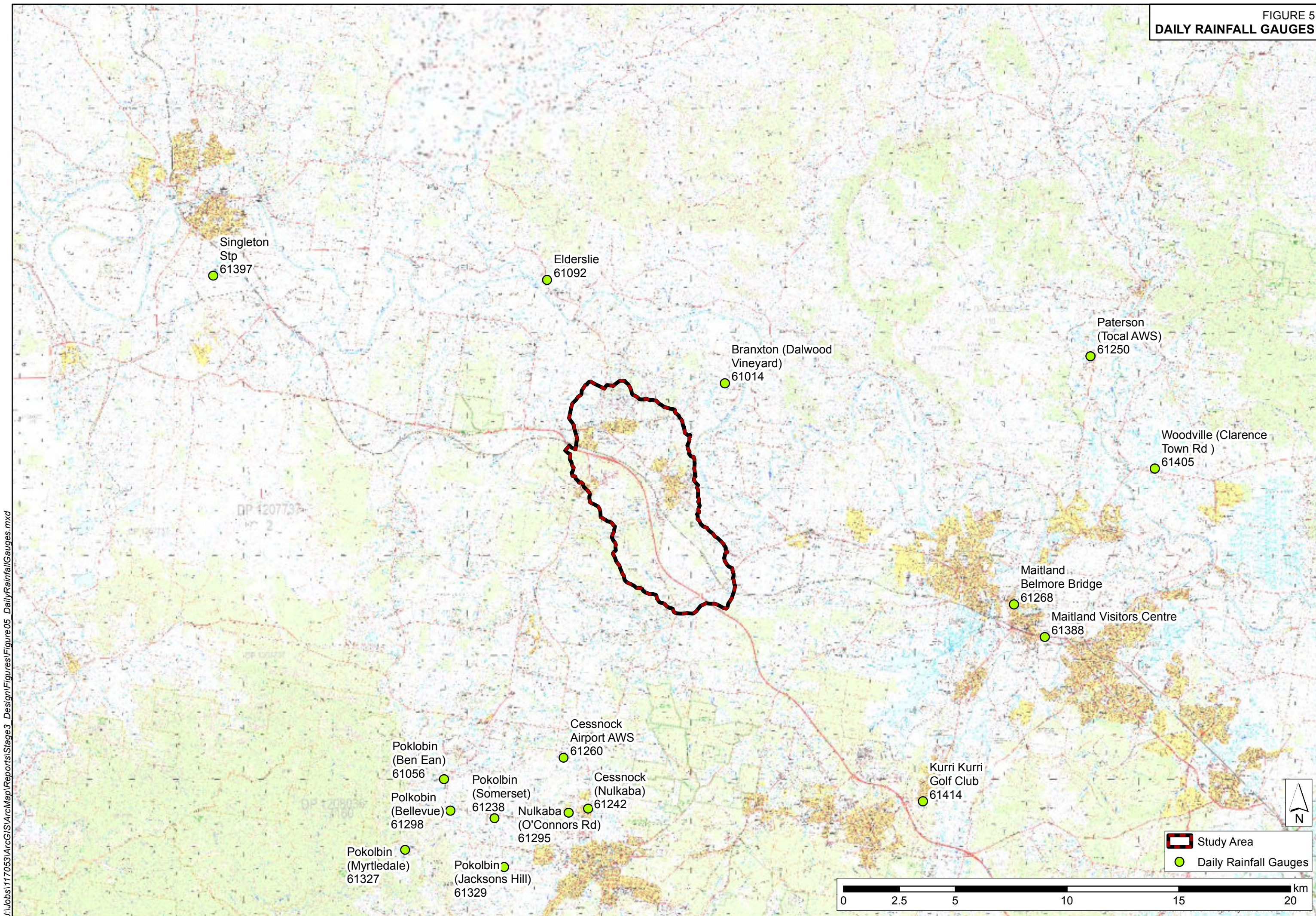


FIGURE 6
CUMULATIVE RAINFALL DATA
JUNE 2007 EVENT

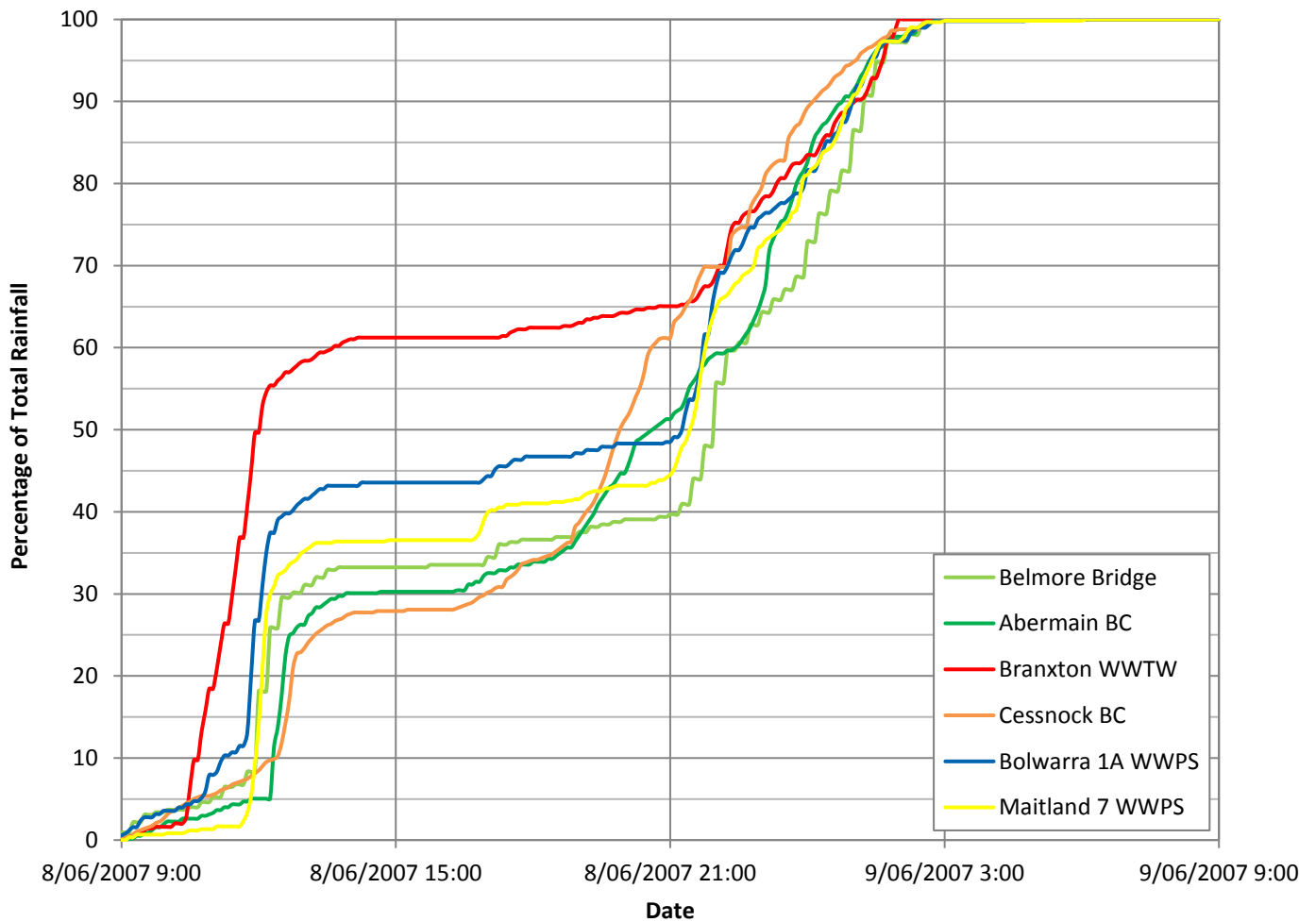
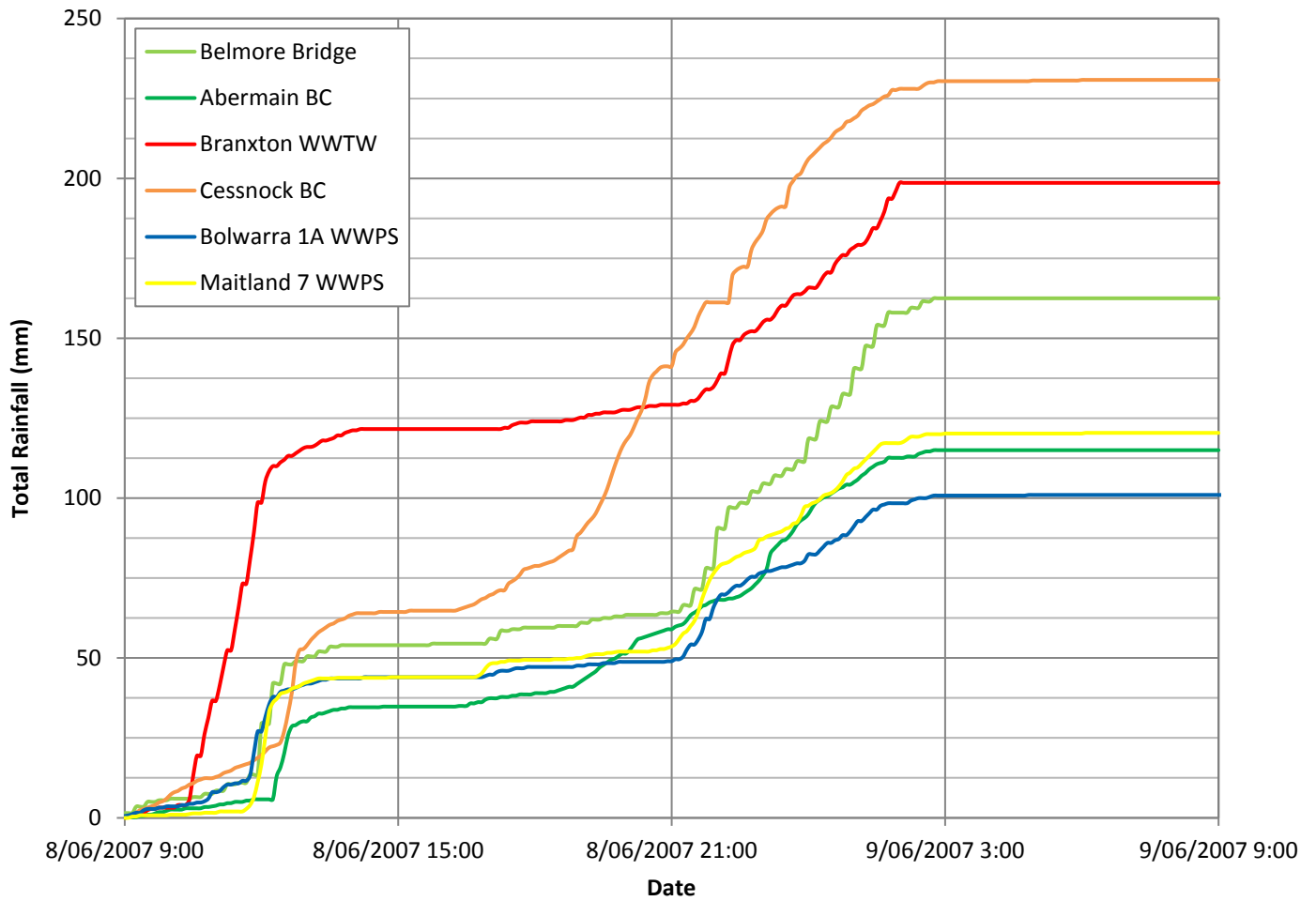


FIGURE 7
CUMULATIVE RAINFALL DATA
APRIL 2015 EVENT

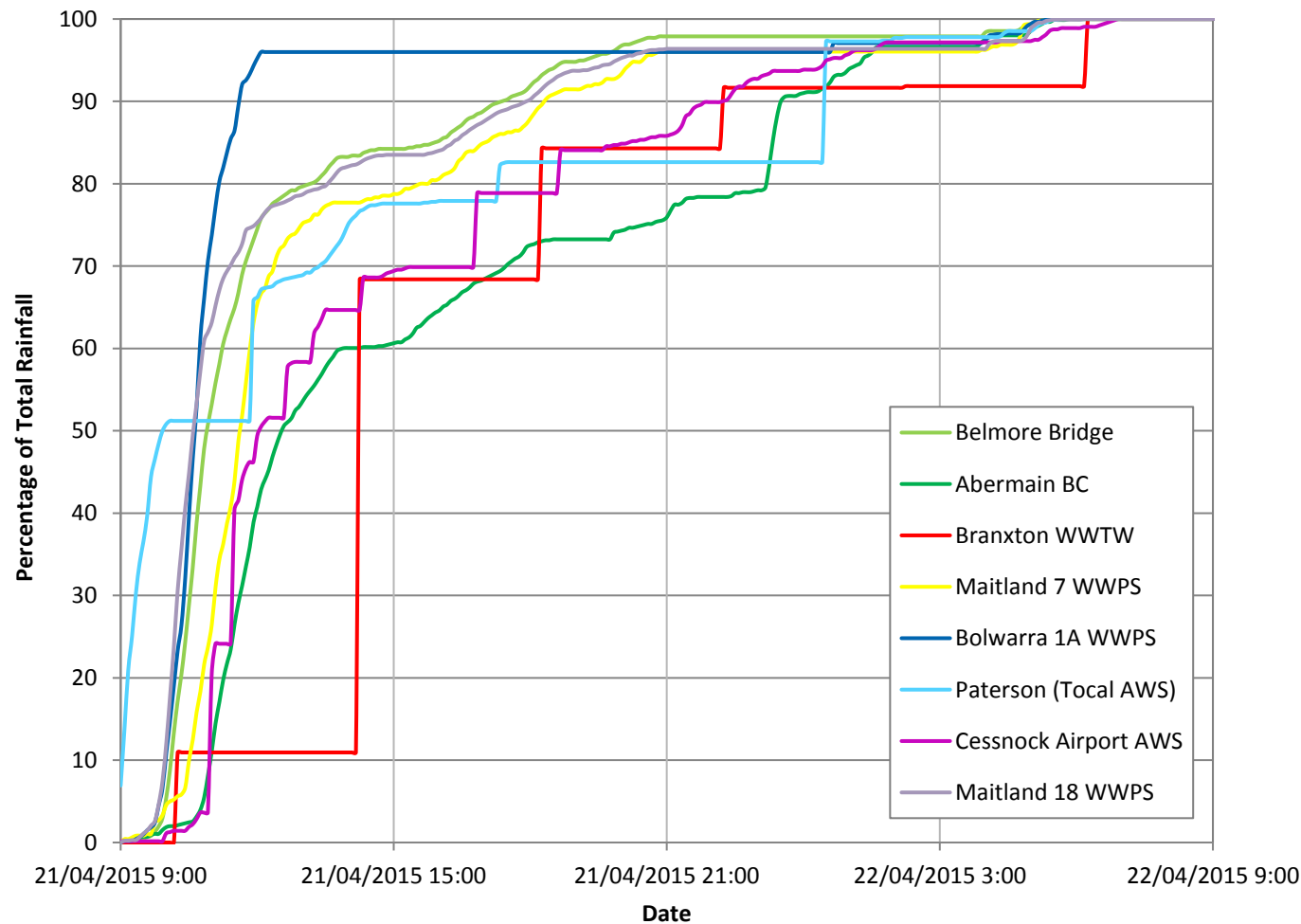
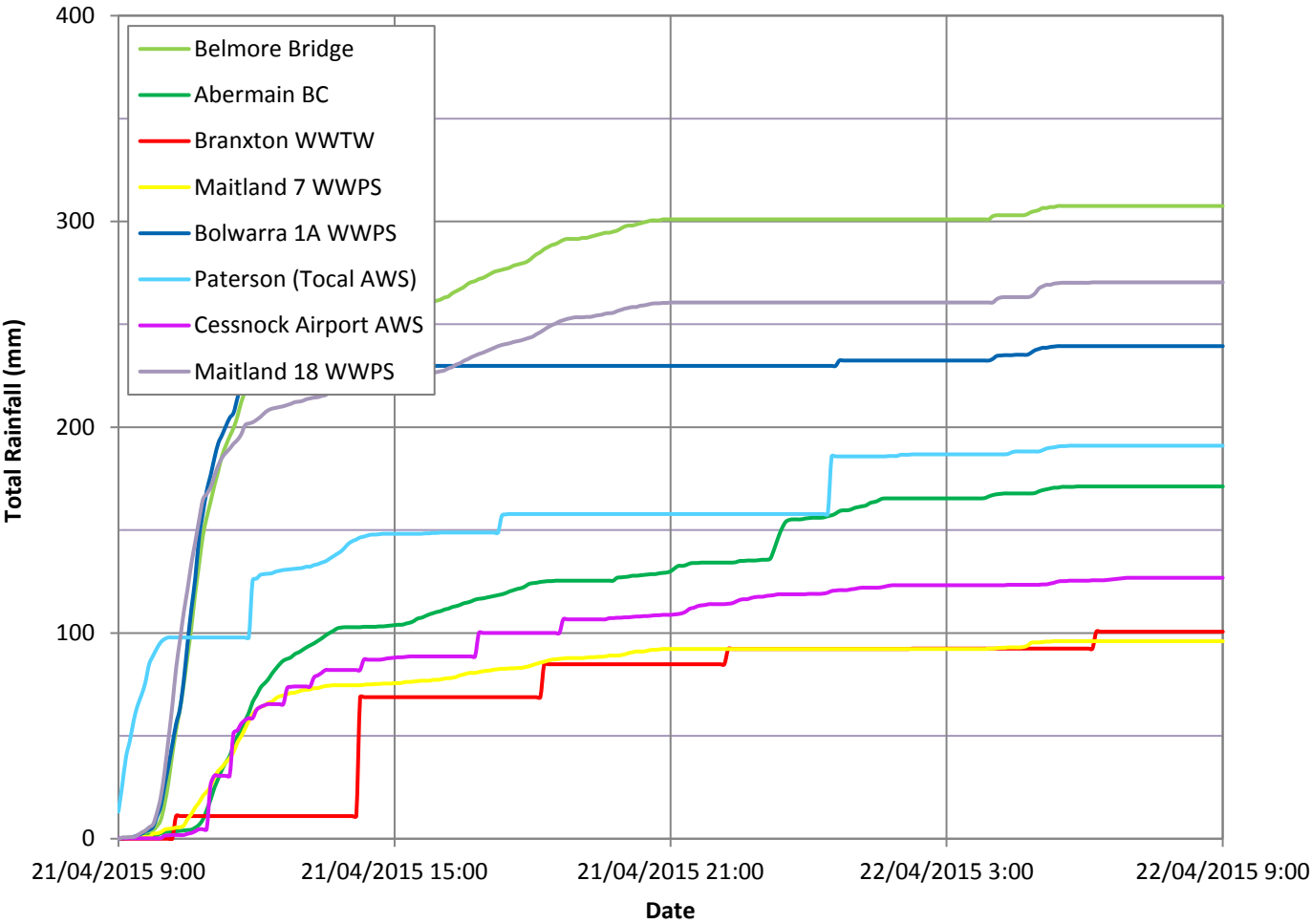
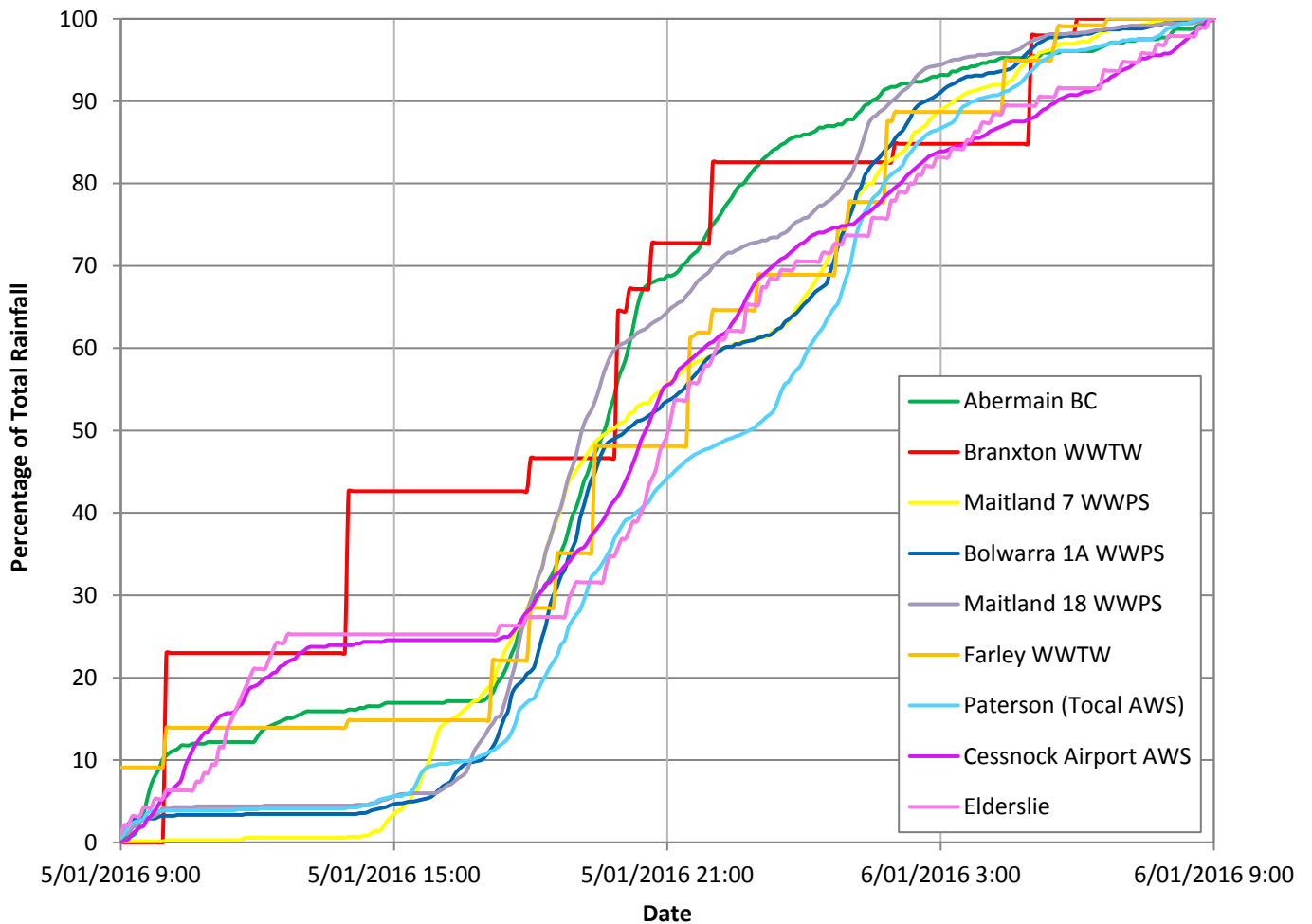
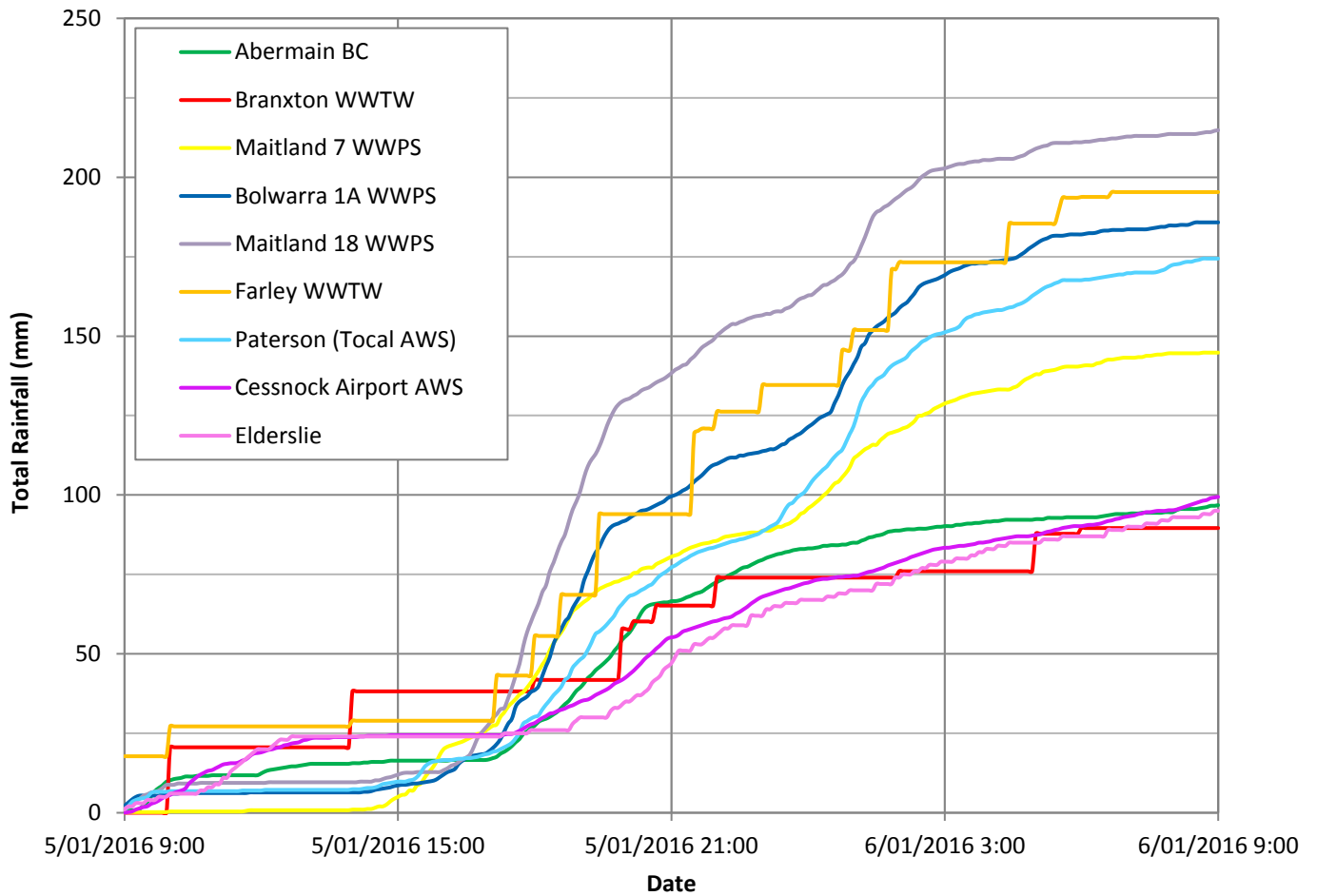
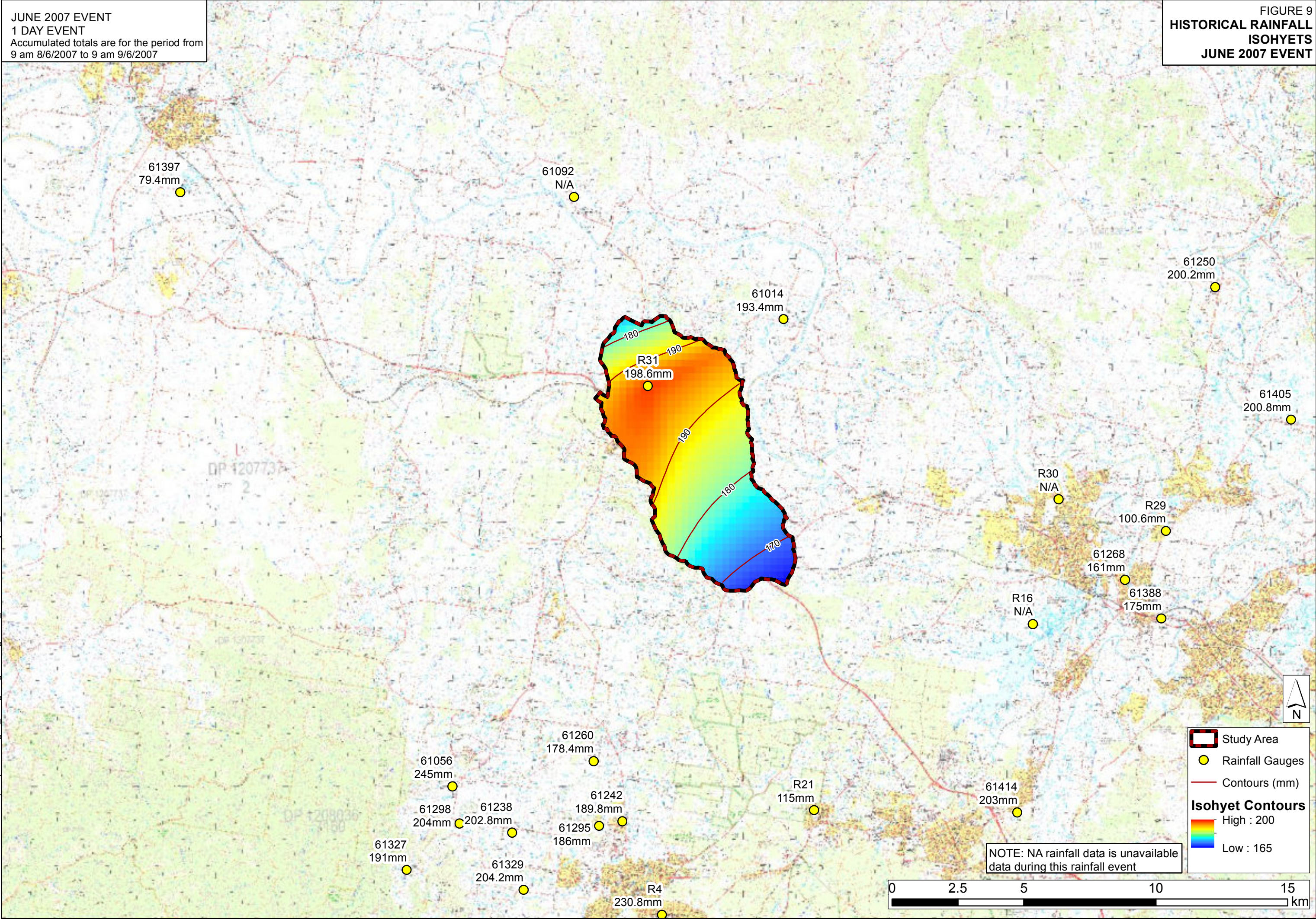


FIGURE 8
CUMULATIVE RAINFALL DATA
JANUARY 2016 EVENT



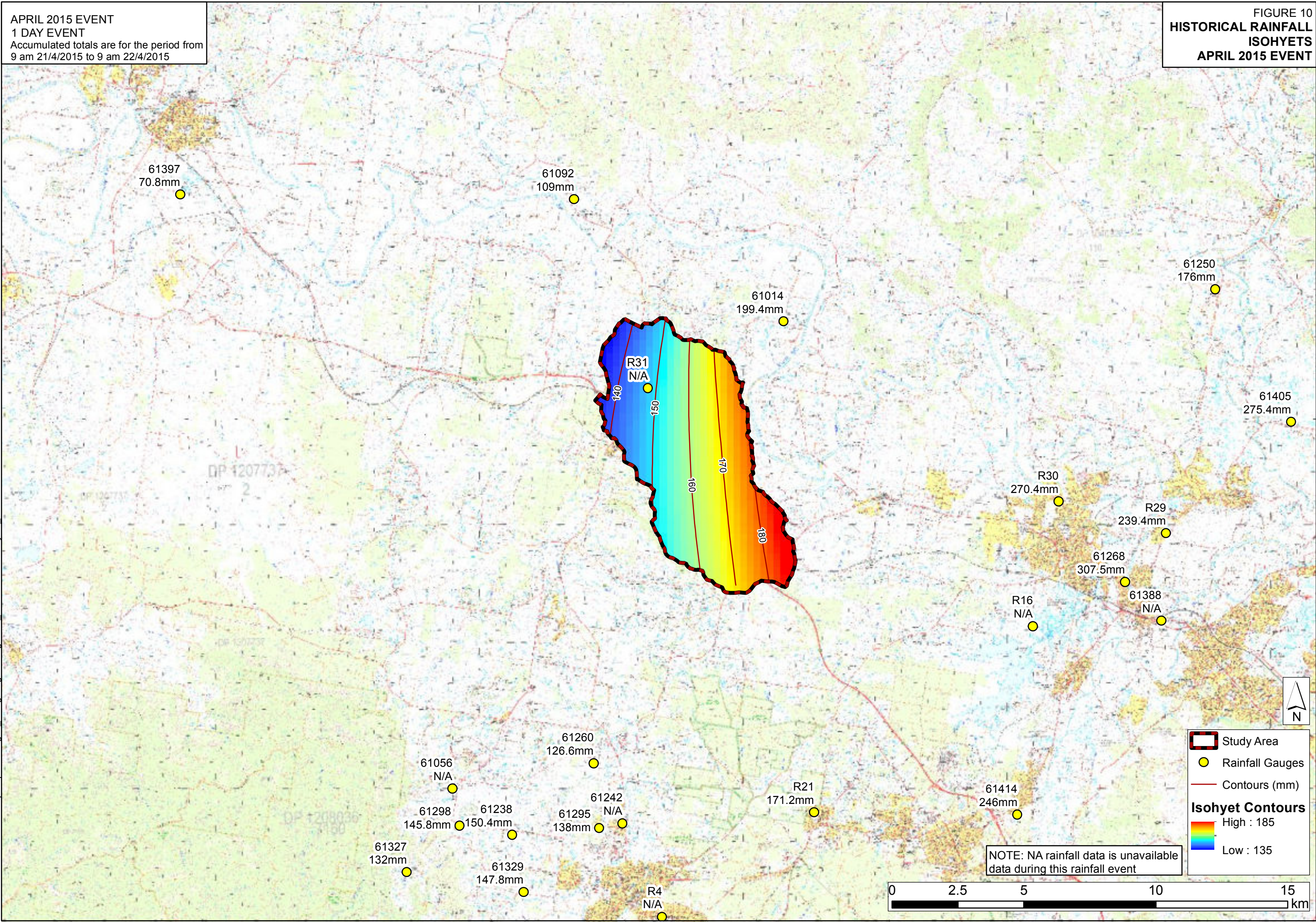
JUNE 2007 EVENT
1 DAY EVENT
Accumulated totals are for the period from
9 am 8/6/2007 to 9 am 9/6/2007

FIGURE 9
HISTORICAL RAINFALL
ISOHYETS
JUNE 2007 EVENT



APRIL 2015 EVENT
1 DAY EVENT
Accumulated totals are for the period from
9 am 21/4/2015 to 9 am 22/4/2015

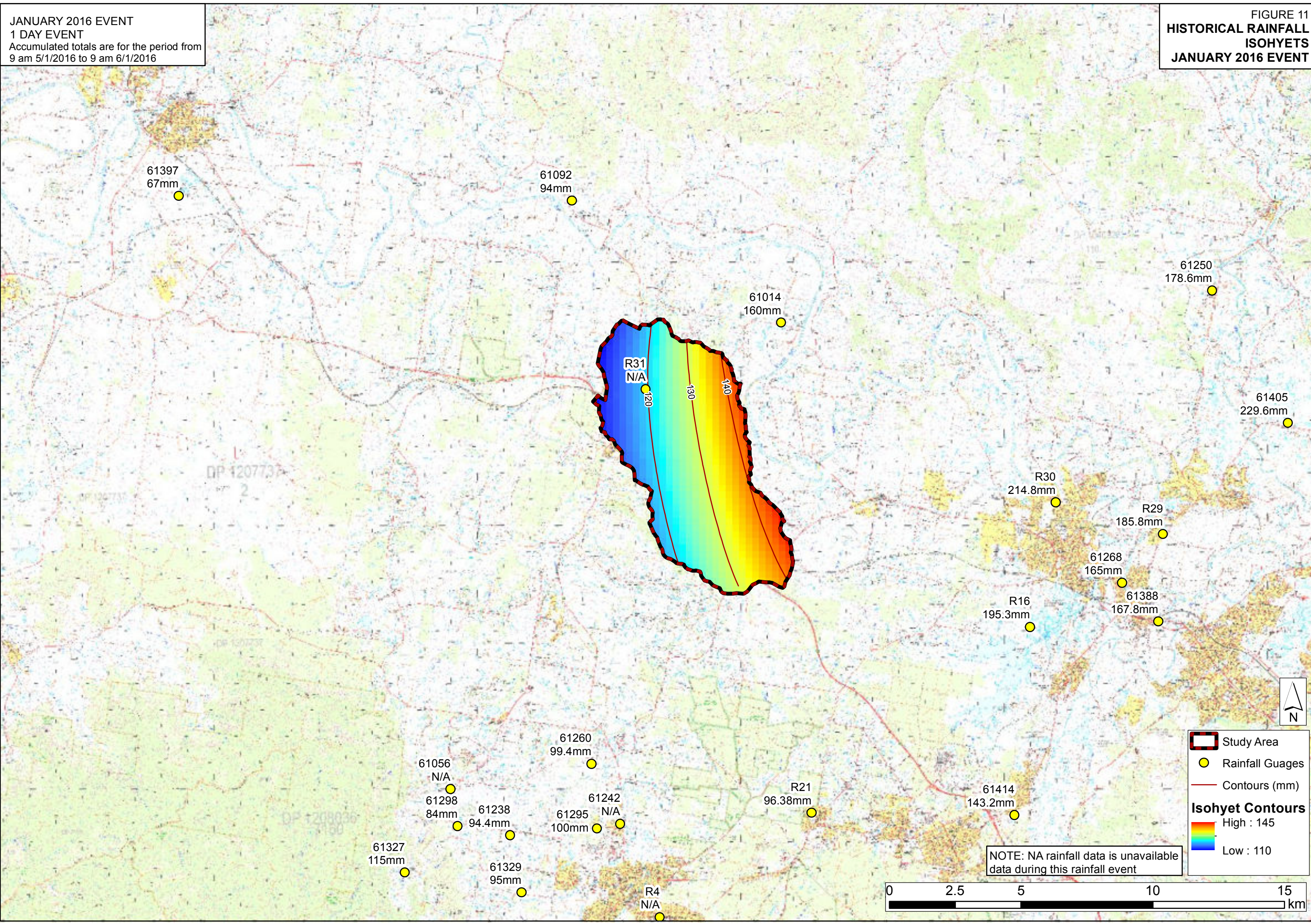
FIGURE 10
HISTORICAL RAINFALL
ISOHYETS
APRIL 2015 EVENT



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JANUARY 2016 EVENT
1 DAY EVENT
Accumulated totals are for the period from
9 am 5/1/2016 to 9 am 6/1/2016

FIGURE 11
HISTORICAL RAINFALL
ISOHYETS
JANUARY 2016 EVENT



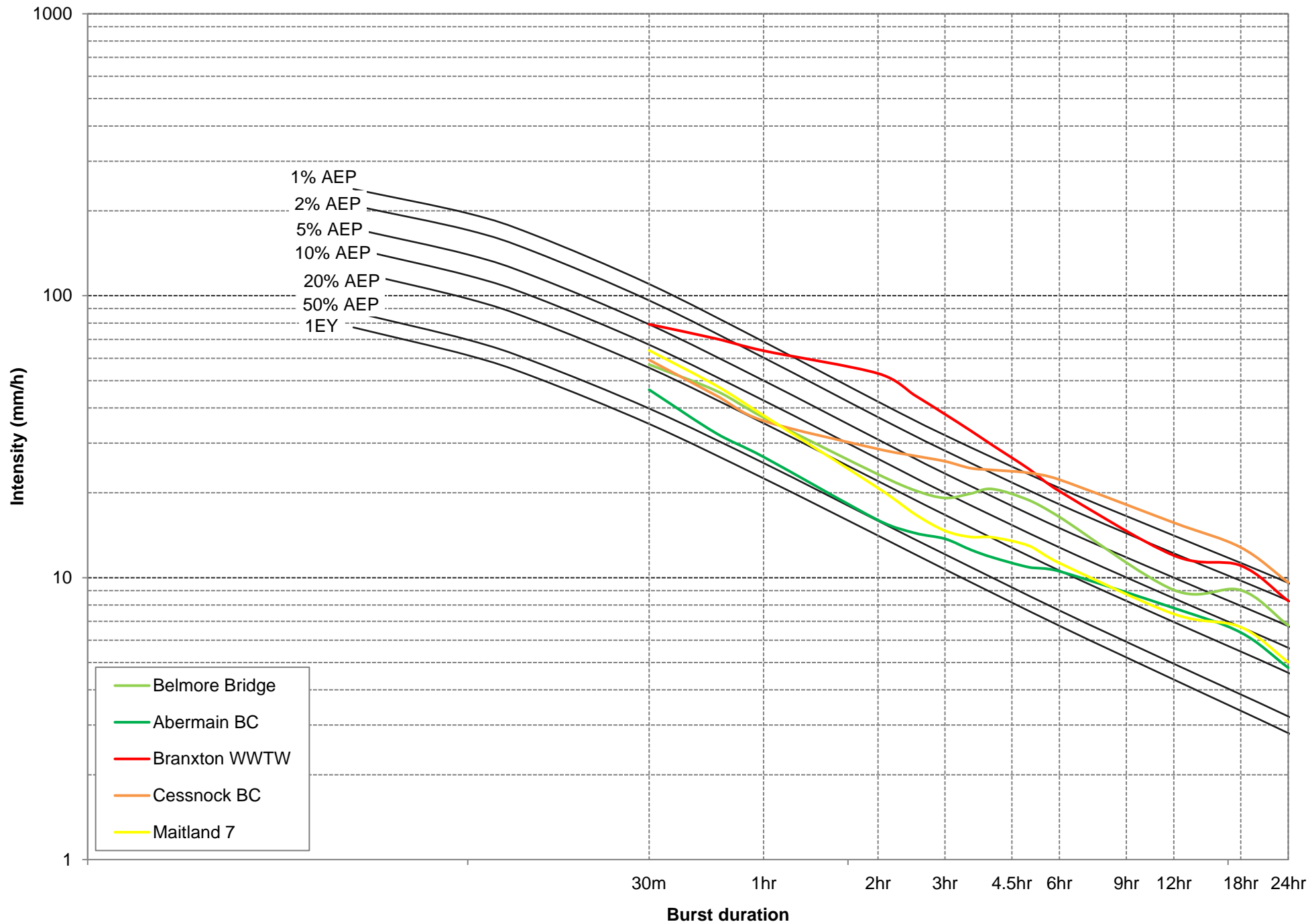


FIGURE 12
BURST INTENSITIES AND FREQUENCIES
JUNE 2007

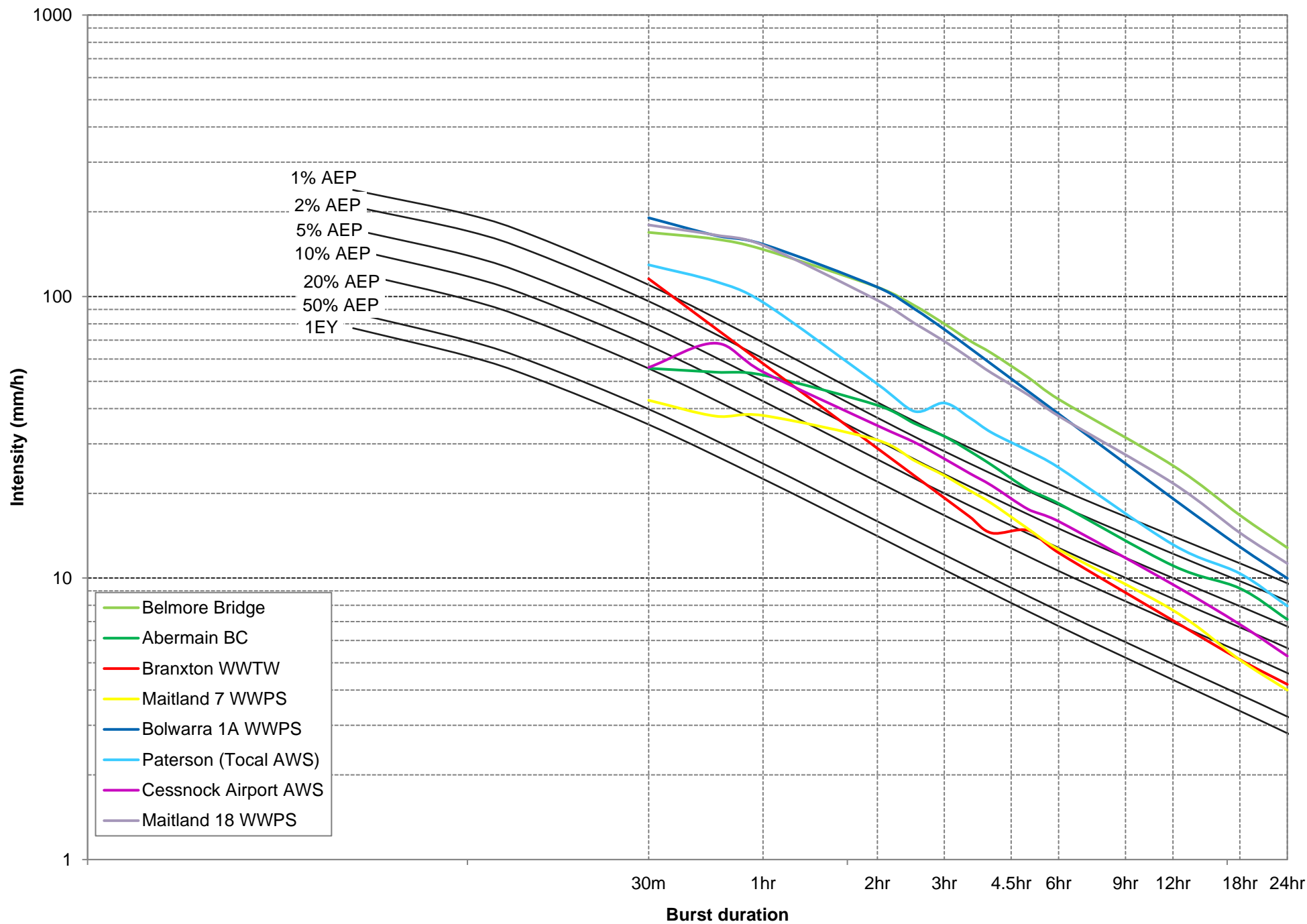


FIGURE 13
BURST INTENSITIES AND FREQUENCIES
APRIL 2015

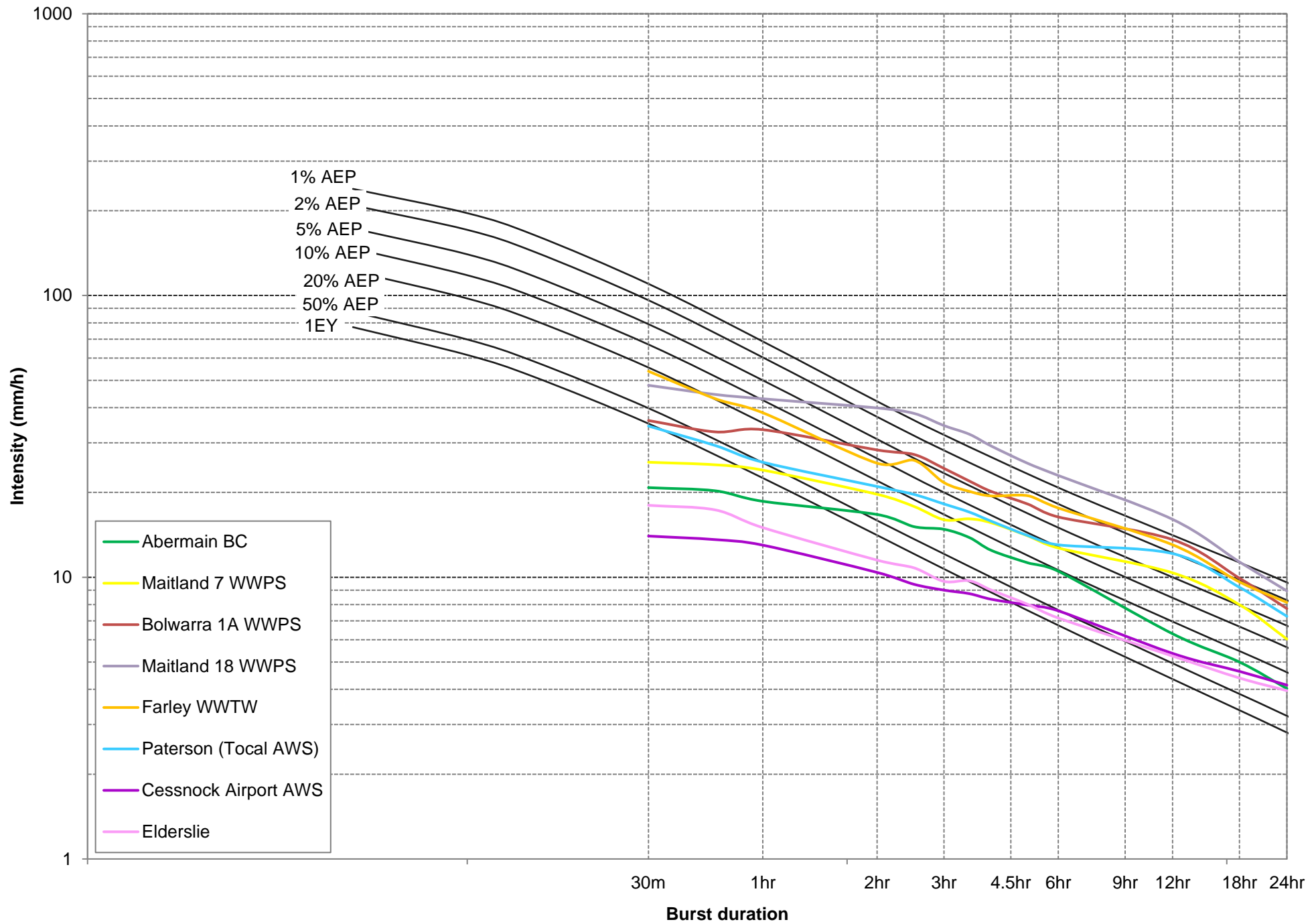
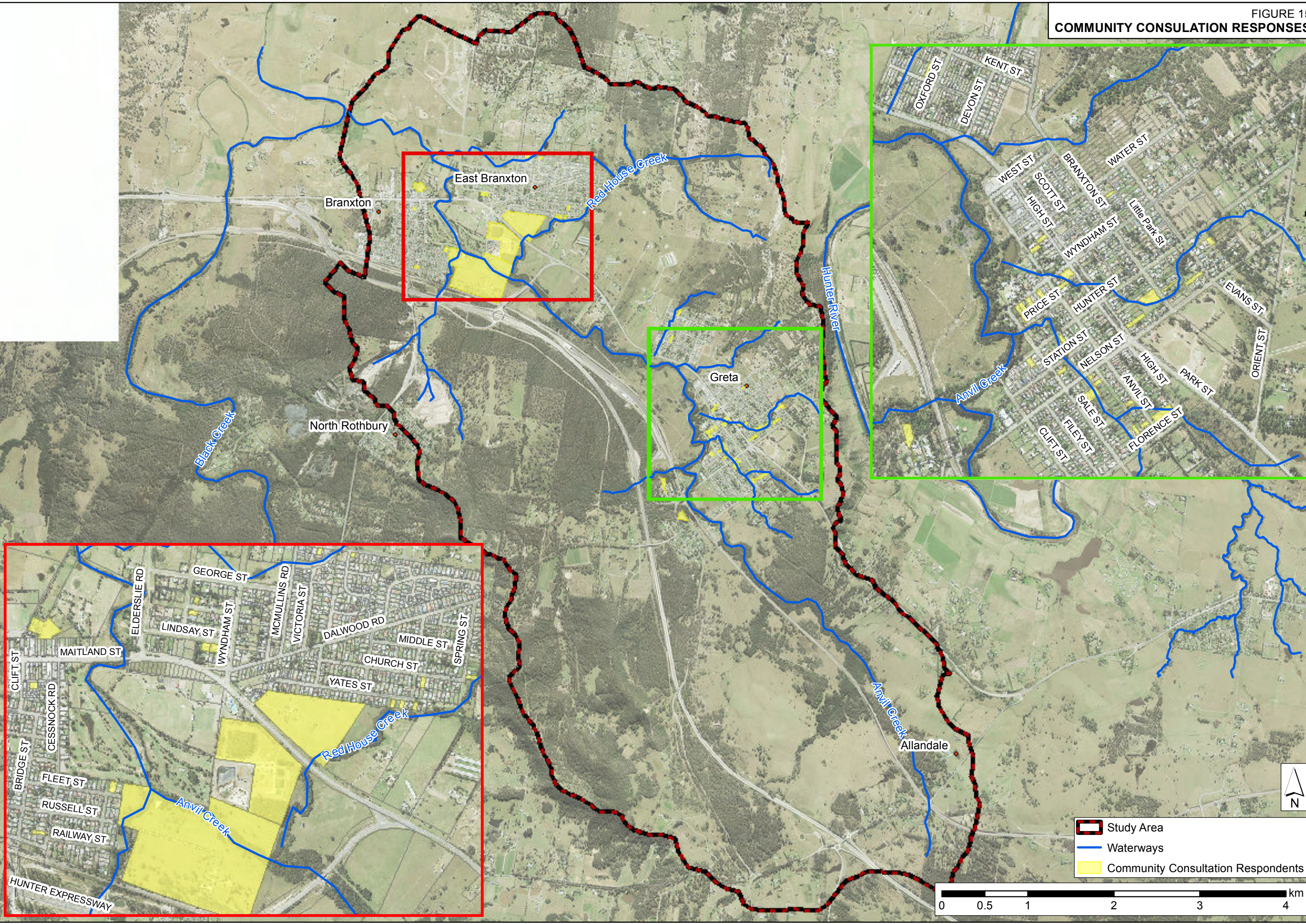


FIGURE 14
BURST INTENSITIES AND FREQUENCIES
JANUARY 2016



FLOOD MARKS FROM COMMUNITY CONSULTATION

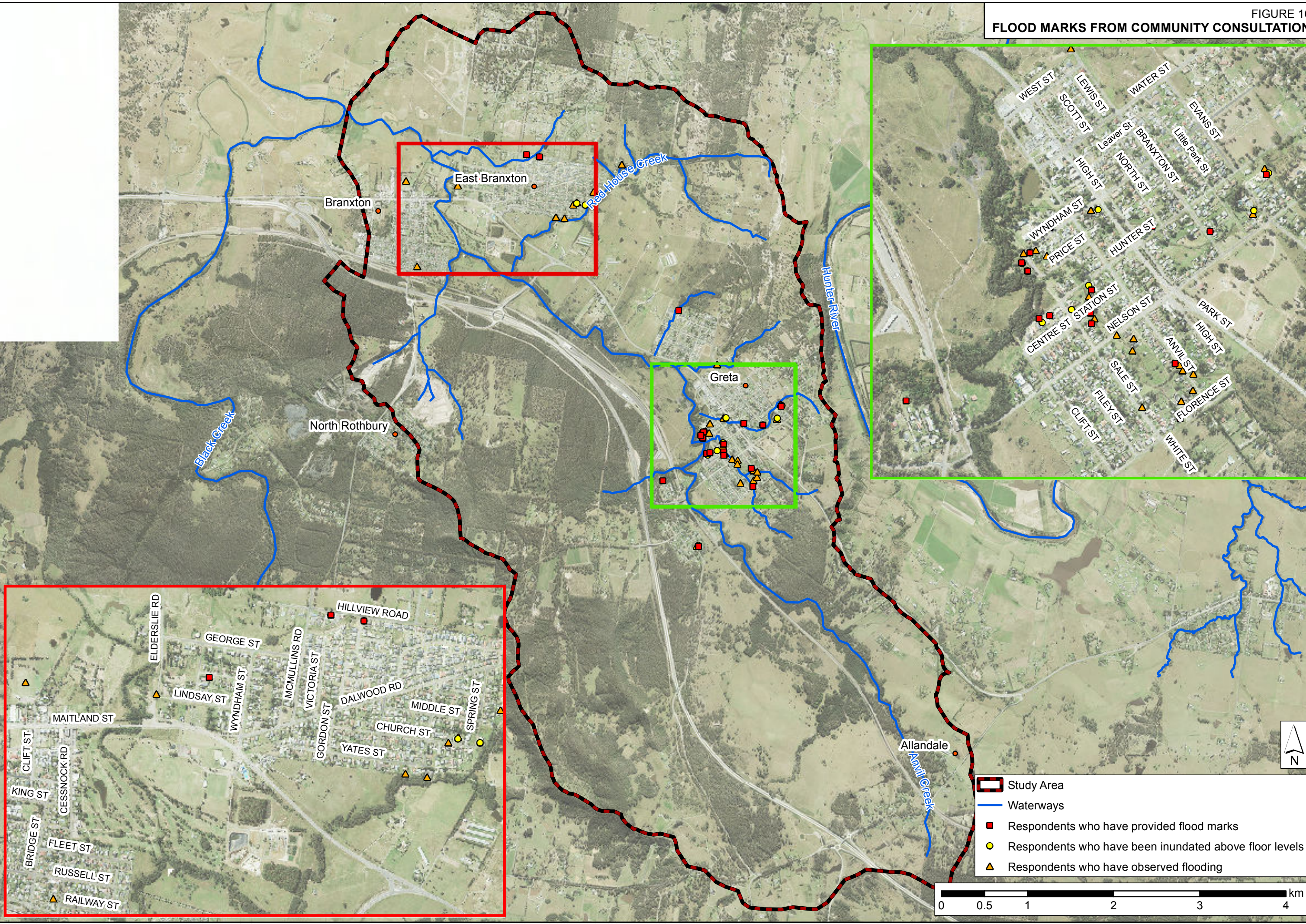
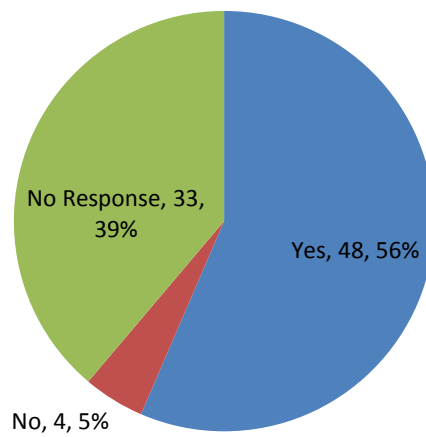
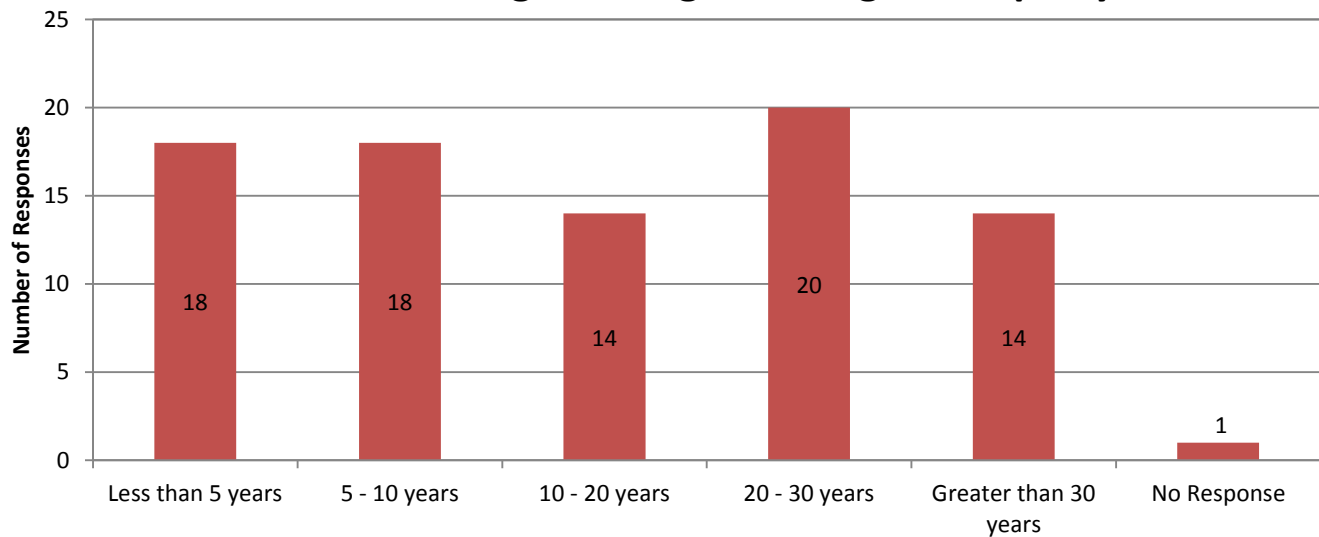


FIGURE 17a
COMMUNITY CONSULTATION RESPONSES

Residents Contactable



Period of Living/Owning/Working on Property



Length of Residence in Cessnock

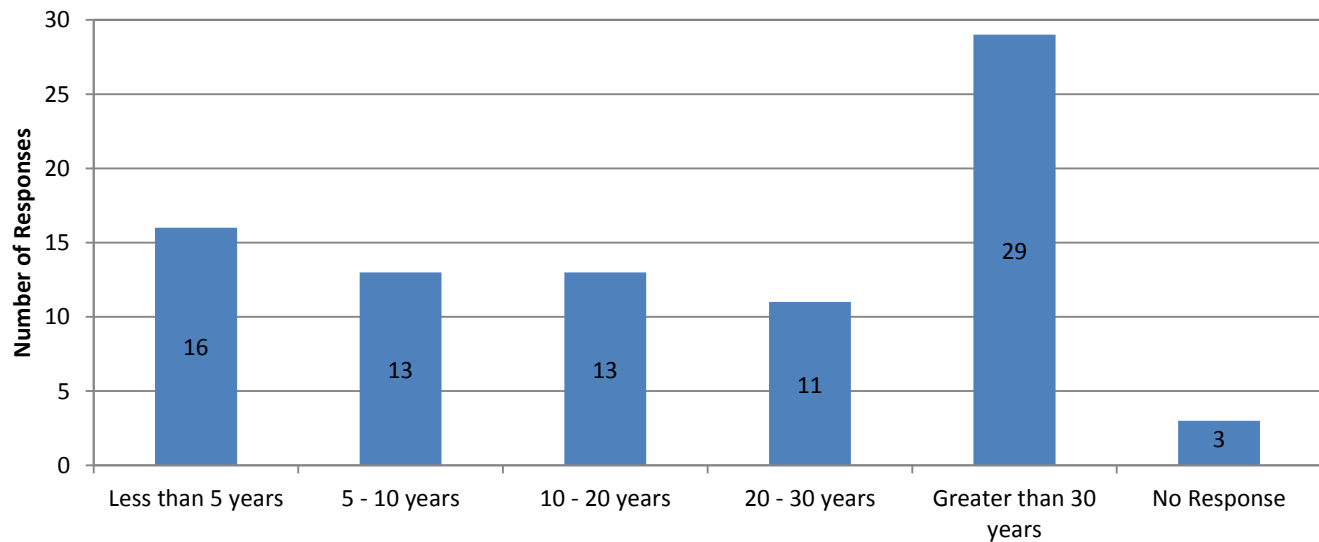
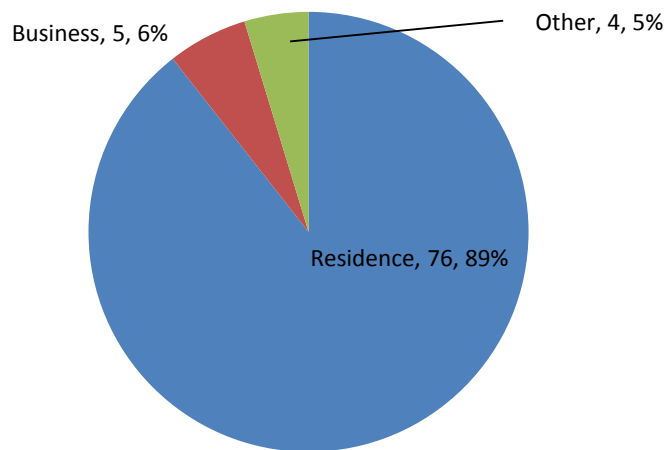
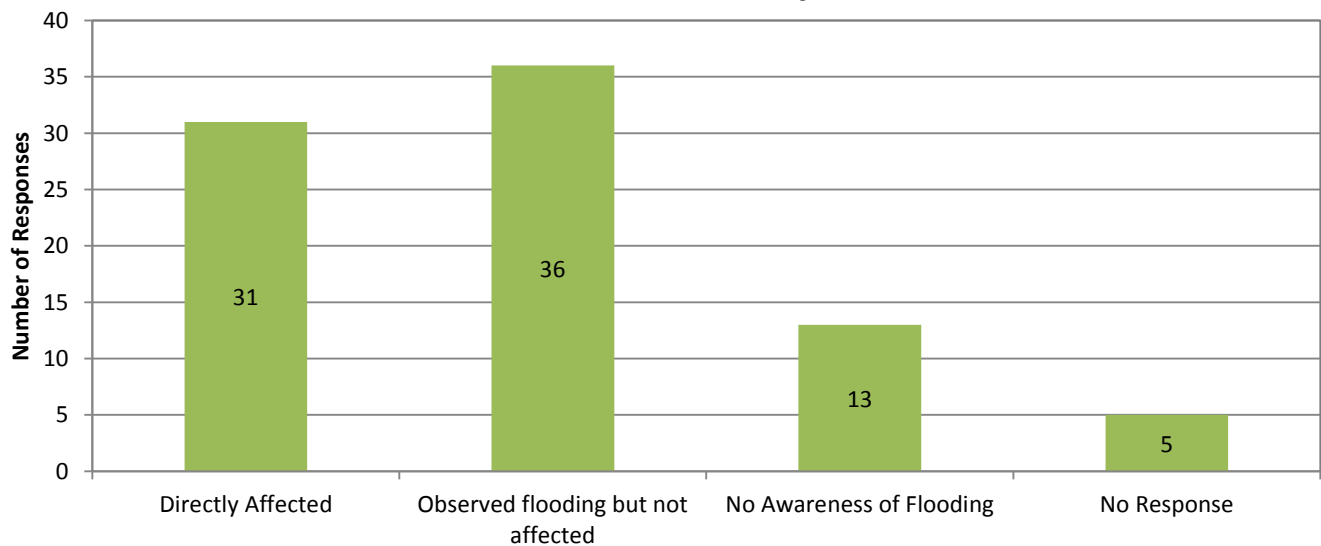


FIGURE 17b
COMMUNITY CONSULTATION RESPONSES

Type of Residence



Flood Affected Properties



Creek/Waterway Near Property

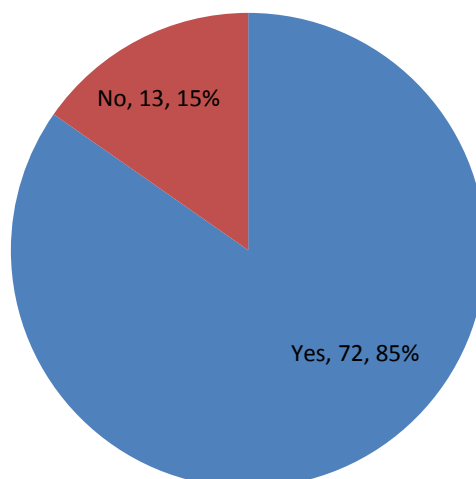
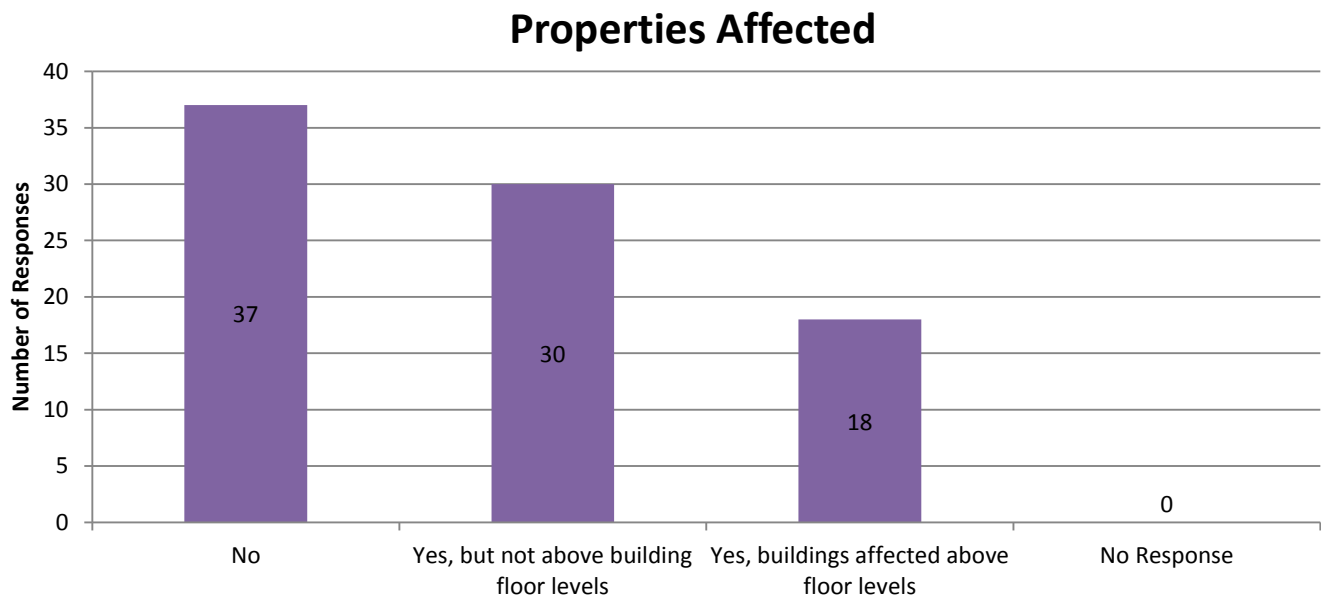
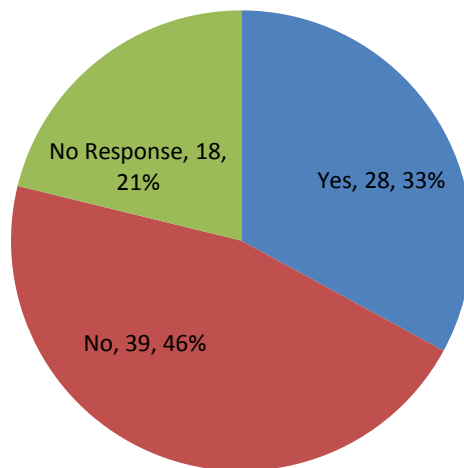


FIGURE 17c
COMMUNITY CONSULTATION RESPONSES



Flood Marks/Photos Available



Damage Caused to Properties

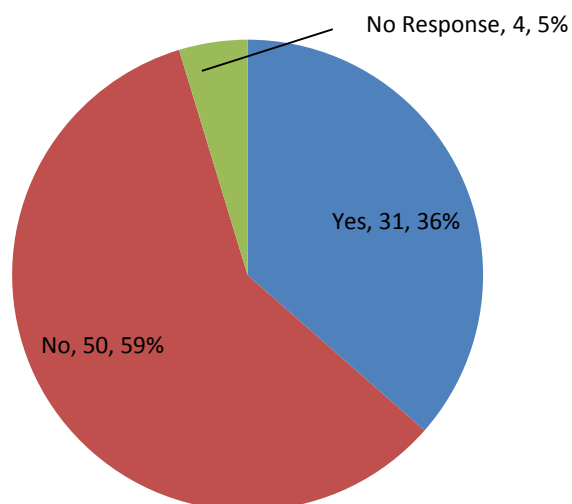


FIGURE 18
WBNM SUB-CATCHMENTS

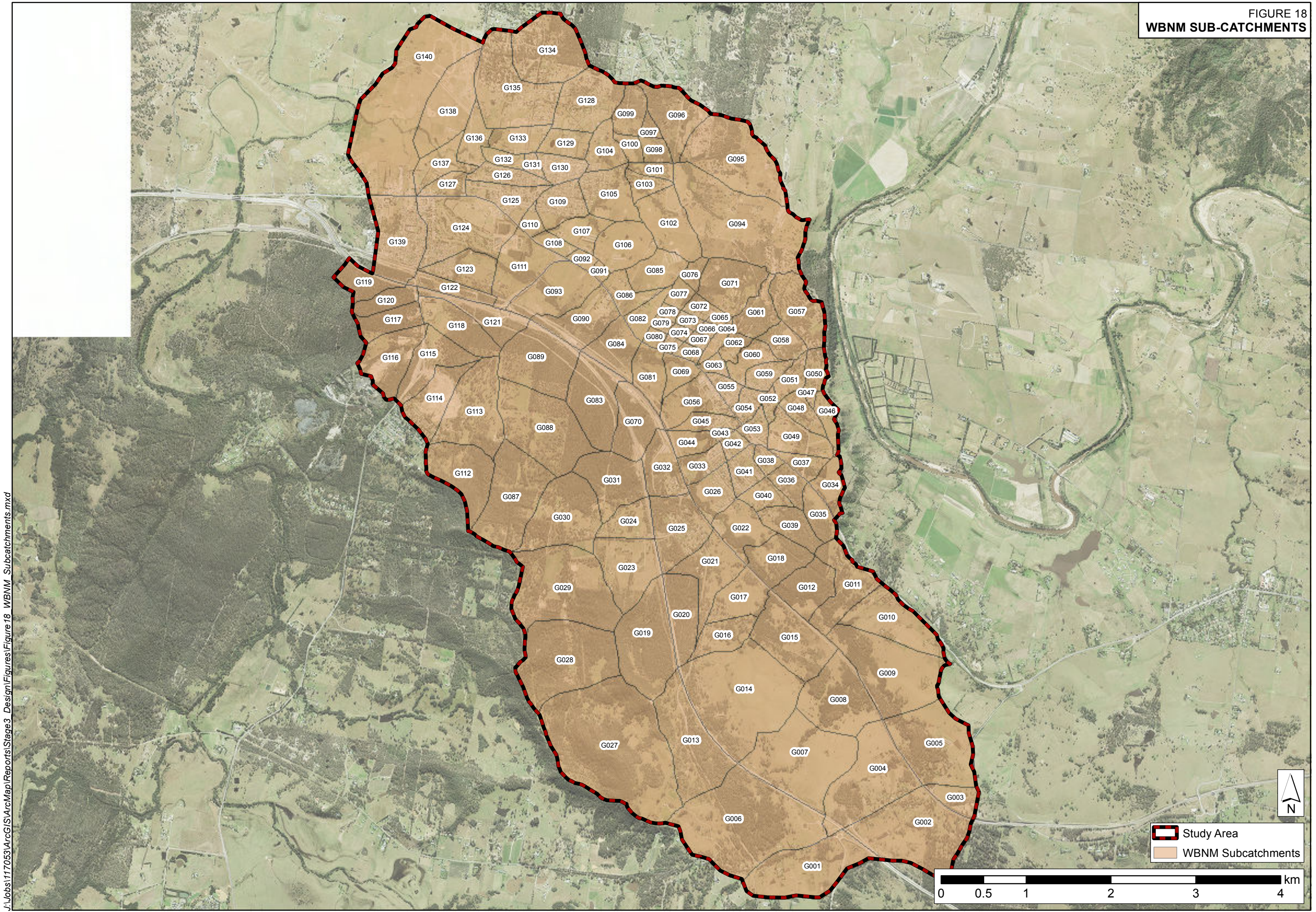


FIGURE 19
HYDRAULIC MODEL EXTENT

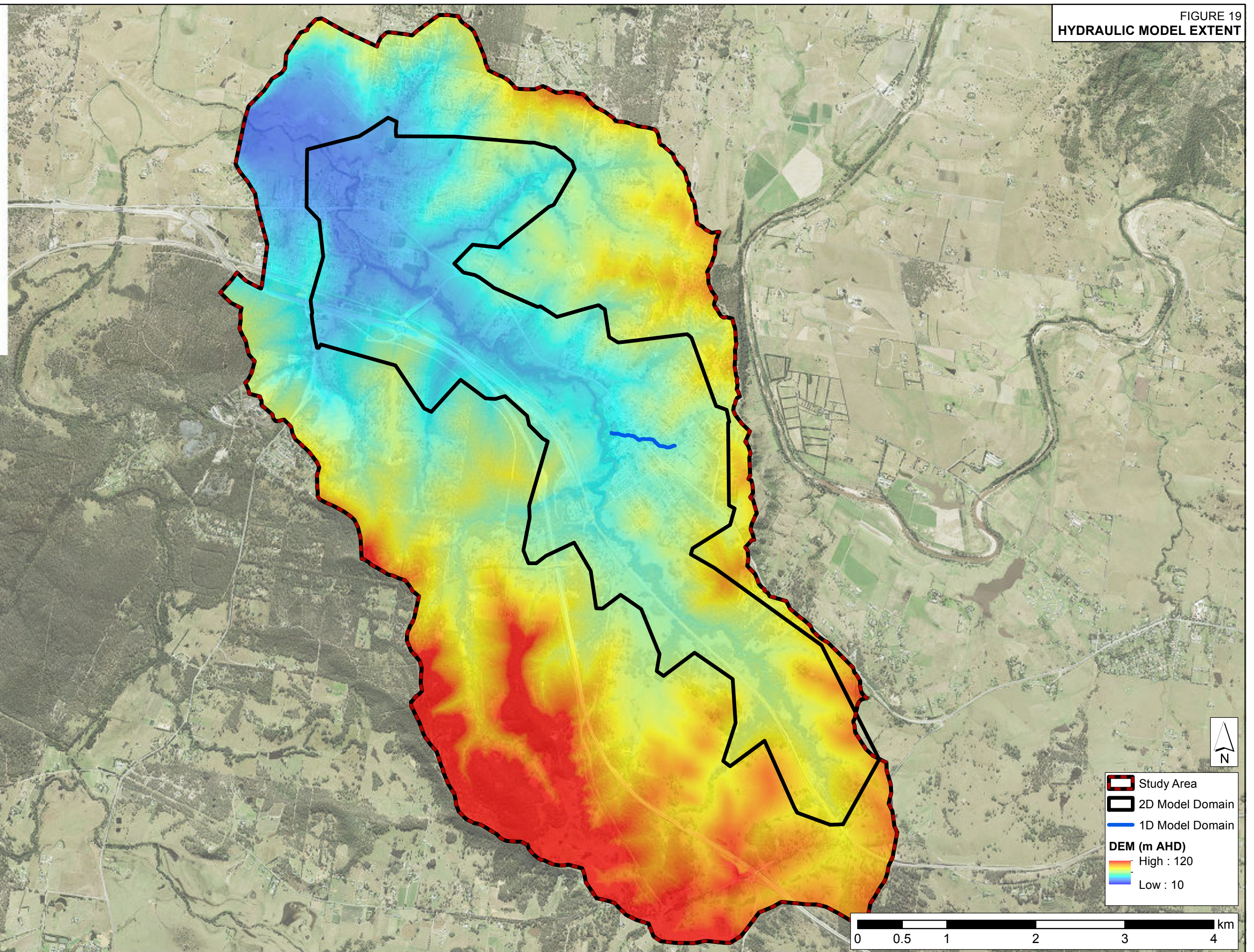


FIGURE 20
BOUNDARY CONDITIONS

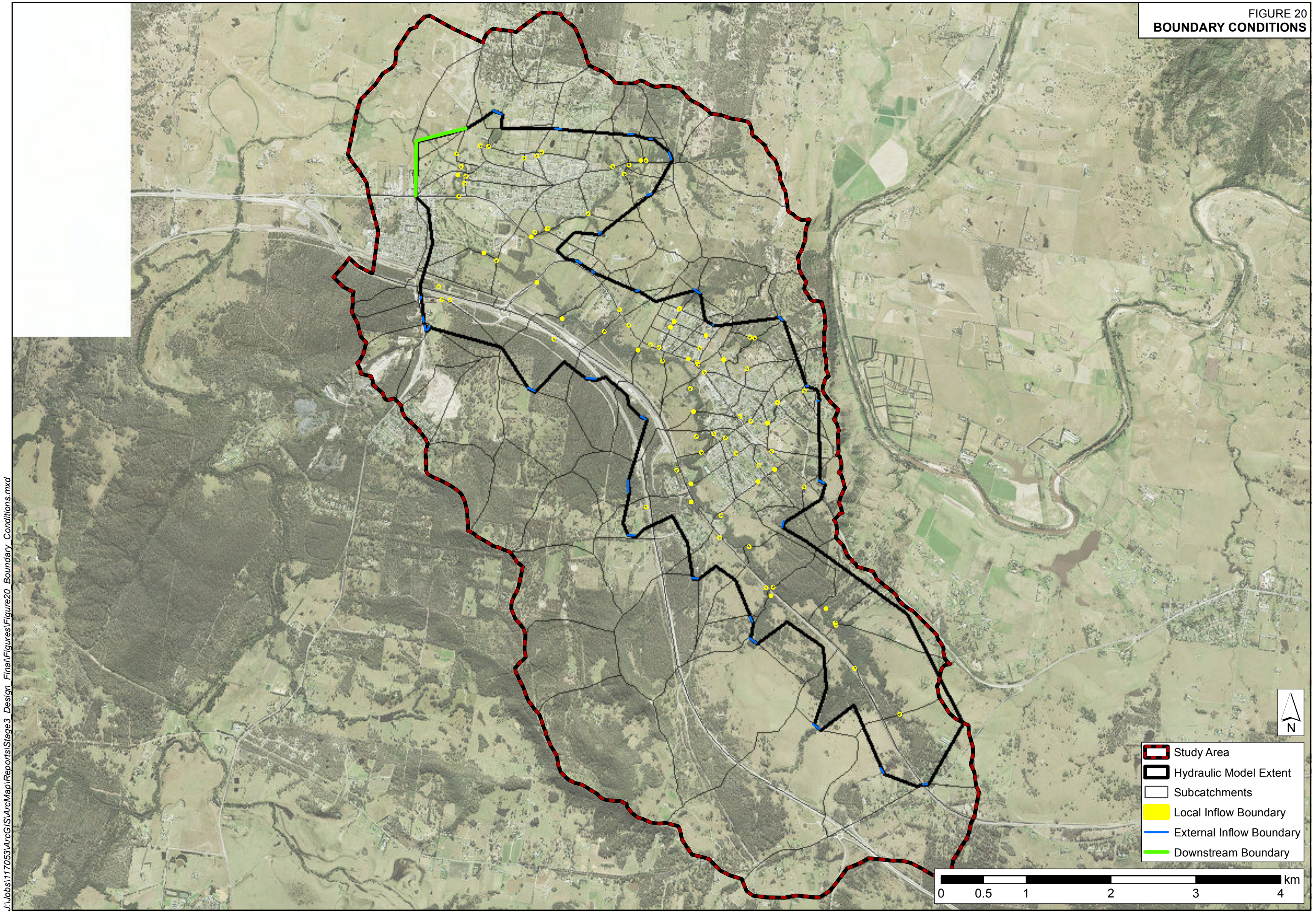


FIGURE 21
MANNINGS ROUGHNESS

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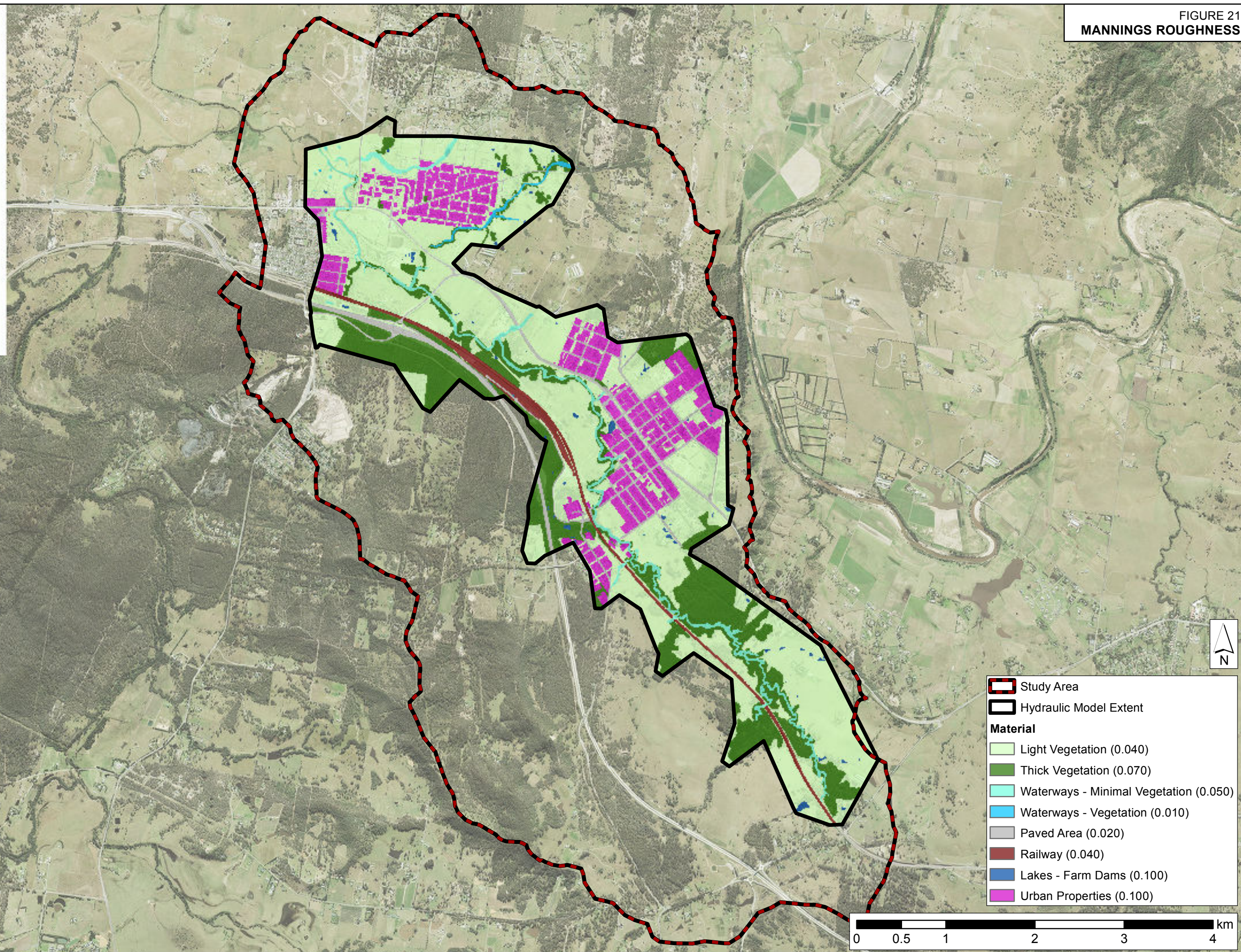
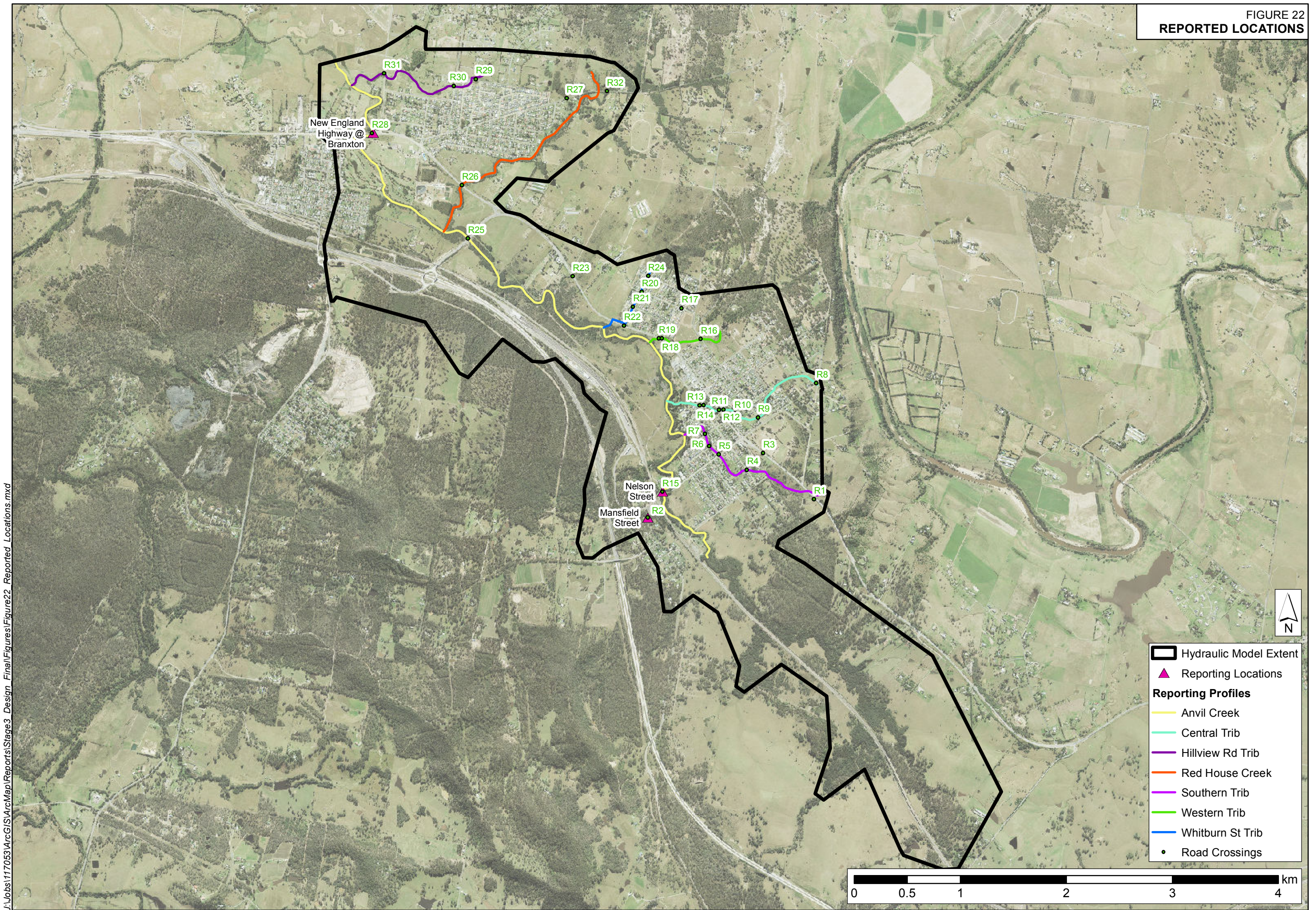


FIGURE 22
REPORTED LOCATIONS



Appendix C **Calibration Mapping**

Figure C1: Peak Flood Depths - April 2015 Event - Maitland 18 WWPS (R30)

Figure C2: Peak Flood Depths - April 2015 Event - Bolwarra 1A WWPS (R39)

Figure C3: Peak Flood Depths - January 2016 Event - Maitland 18 WWPS (R30)

Figure C4: Peak Flood Depths - January 2016 Event - Bolwarra 1A WWPS (R29)

Figure C5: Peak Flood Depths - June 2007 Event - Abermain BC (R21)

Figure C6: Peak Flood Depths - June 2007 Event - Branxton WWTW (R31)



FIGURE C1
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
APRIL 2015 EVENT - MAITLAND 18 WWPS (R30)

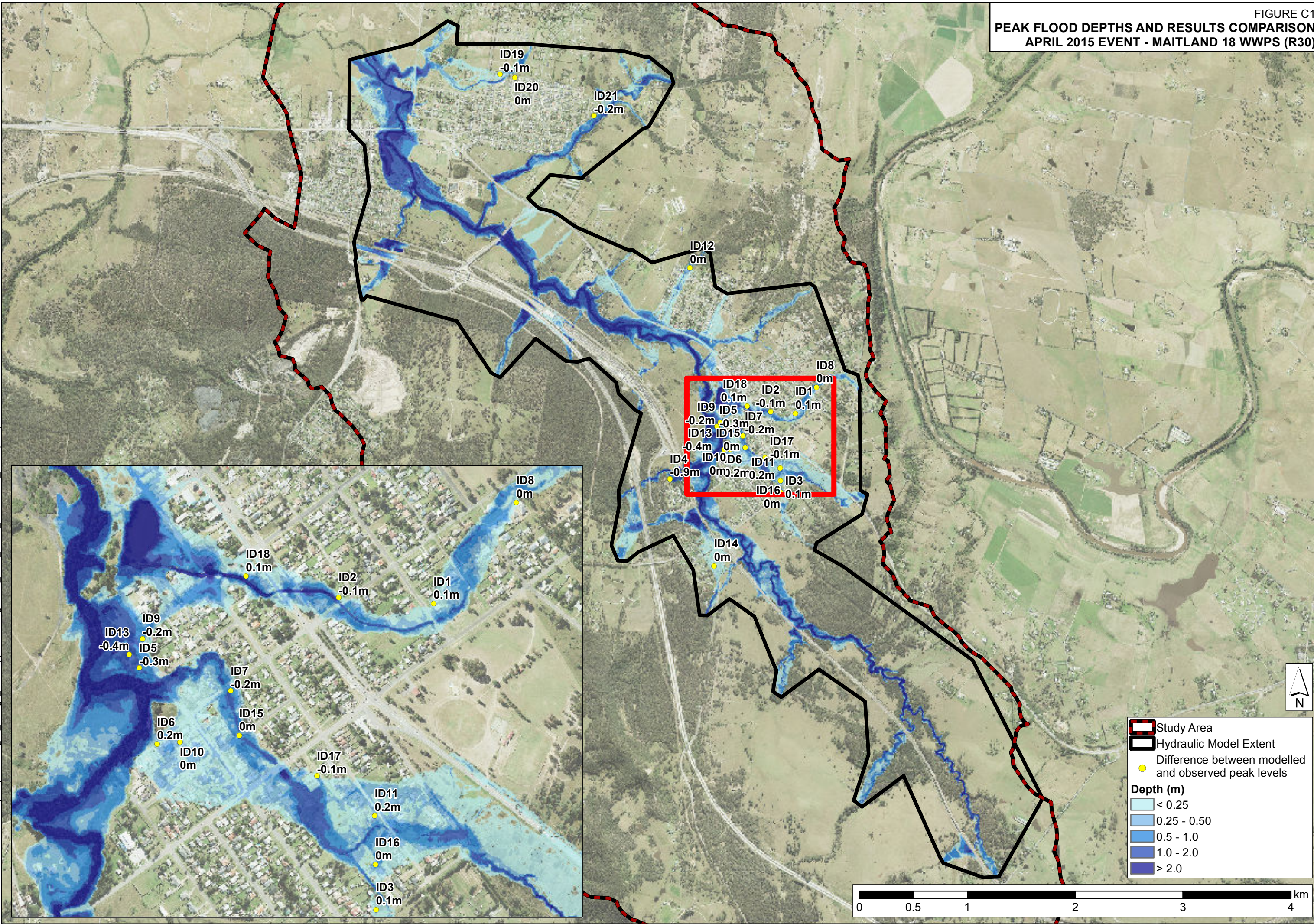


FIGURE C2
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
APRIL 2015 EVENT - BOLWARRA 1A WWPS (R39)

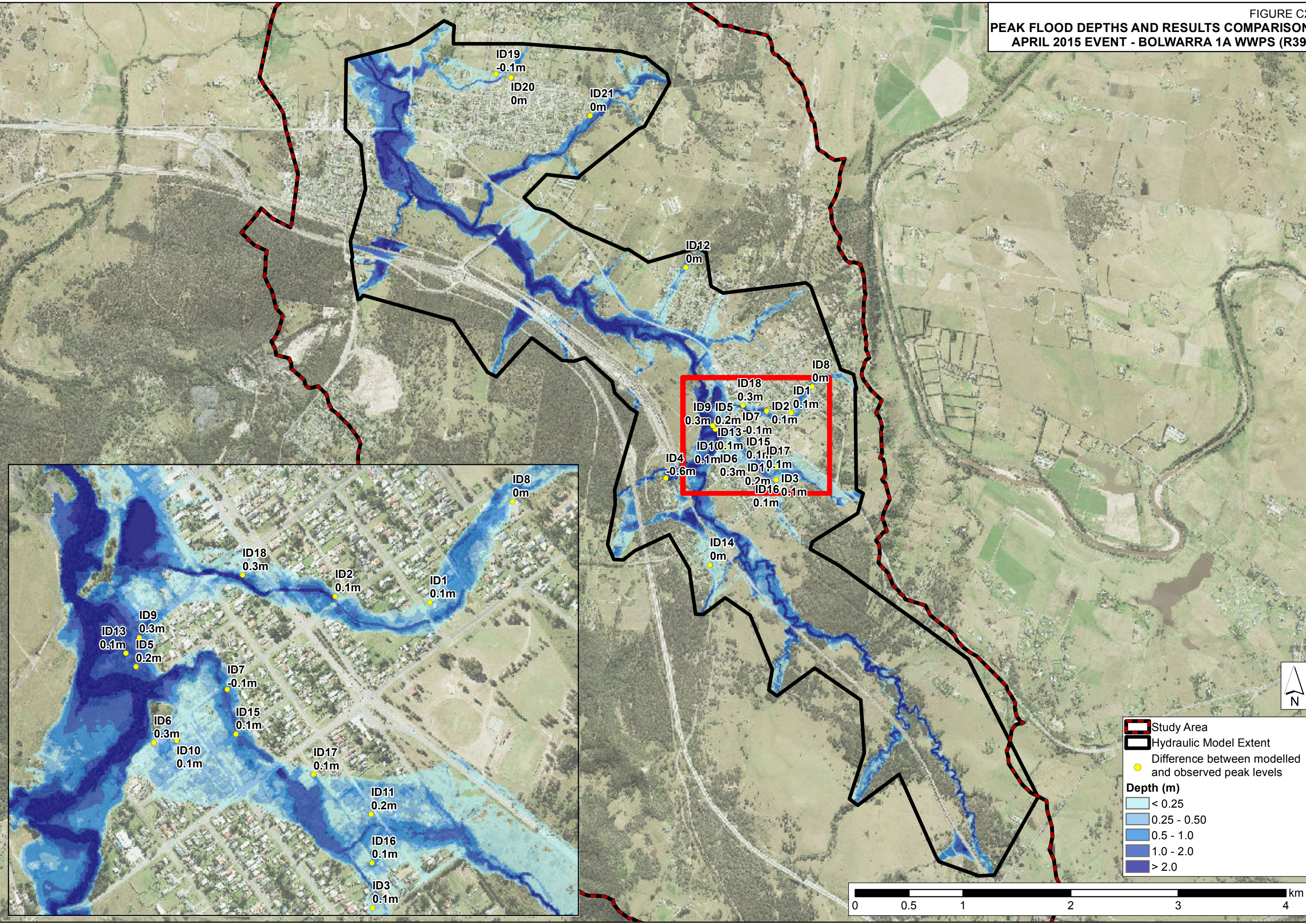


FIGURE C3
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
JANUARY 2016 EVENT - MAITLAND 18 WWPS (R30)

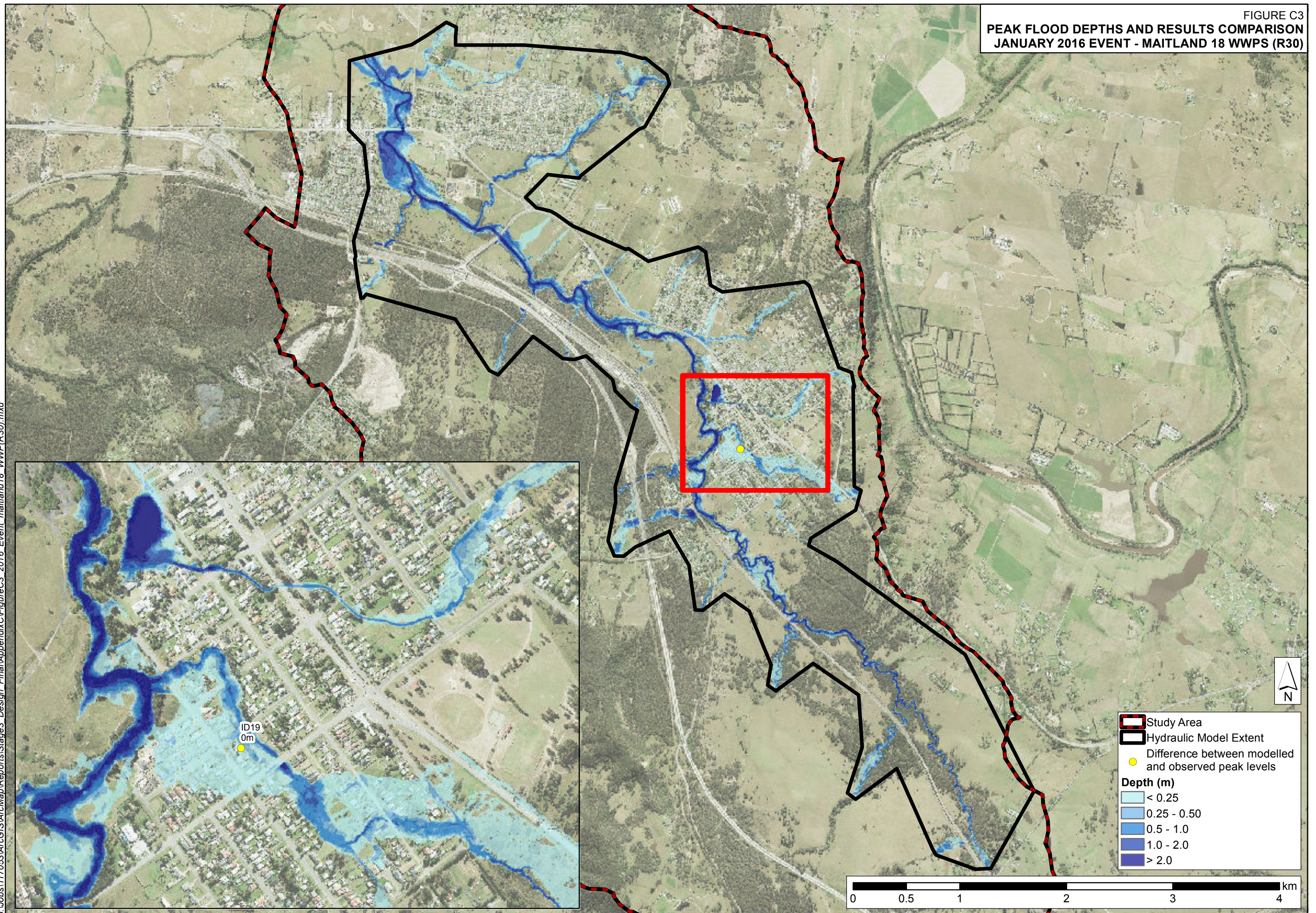


FIGURE C4
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
JANUARY 2016 EVENT - BOLWARRA 1A WWPS (R29)

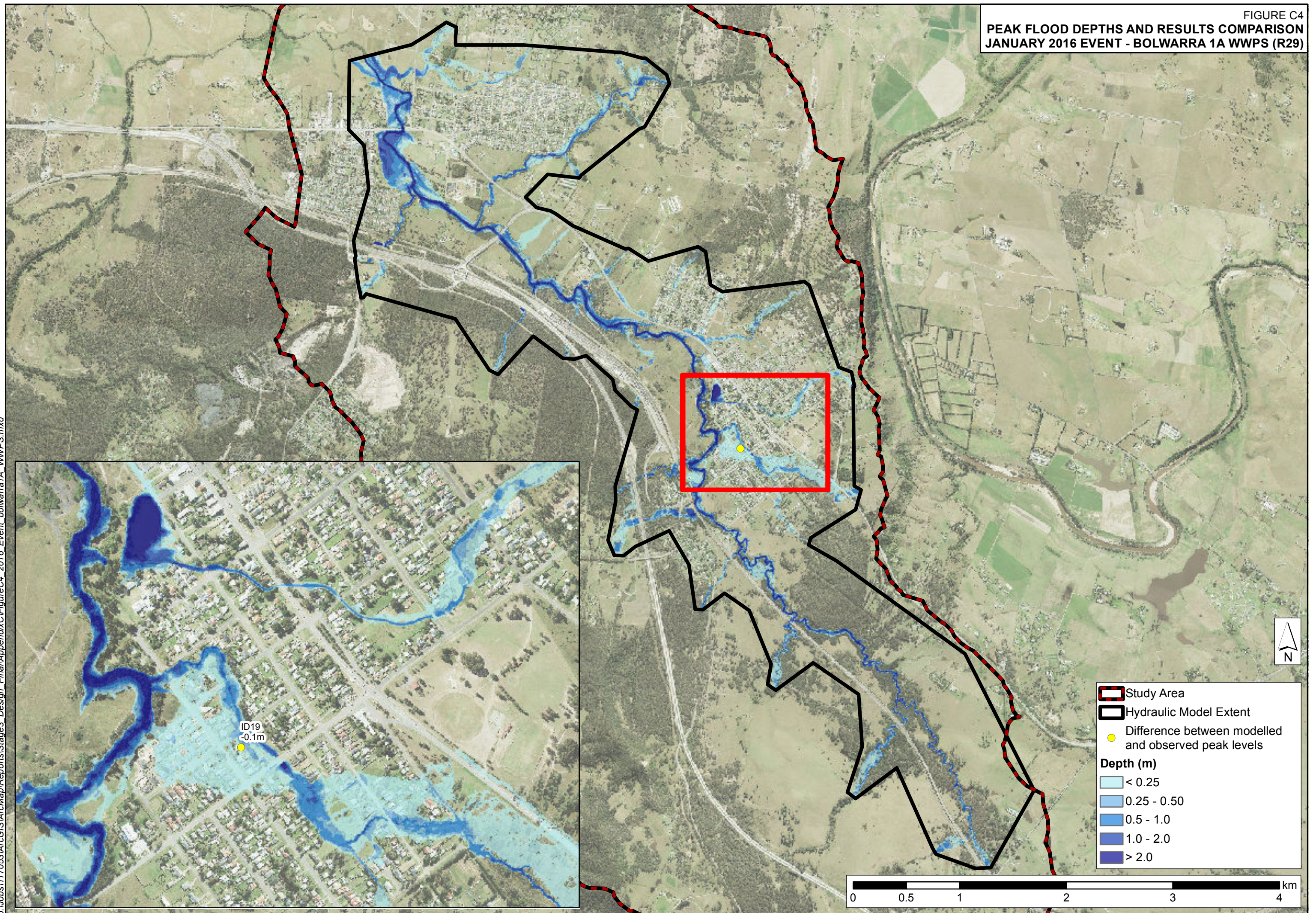


FIGURE C5
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
JUNE 2007 EVENT - ABERMAIN BC (R21)

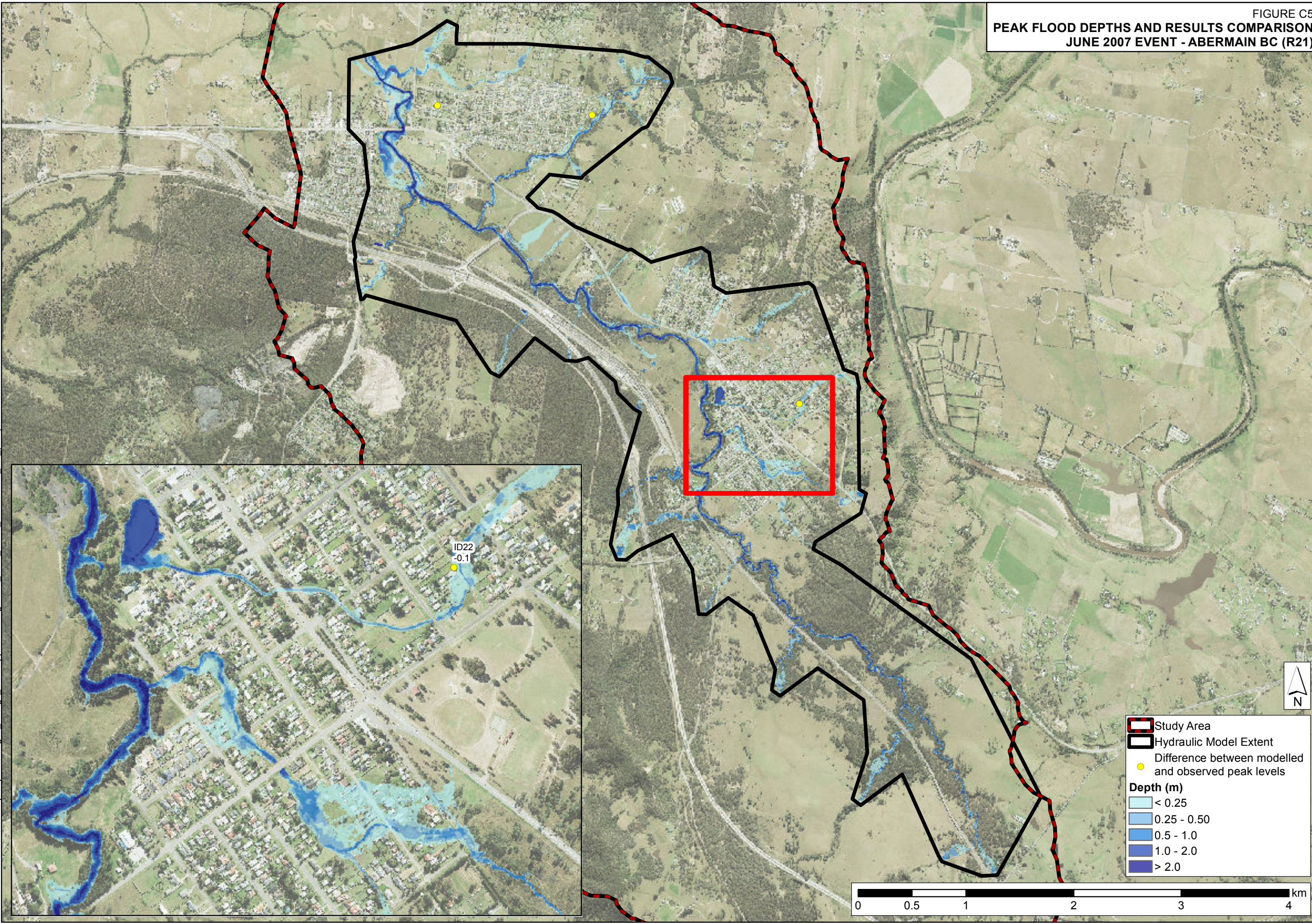
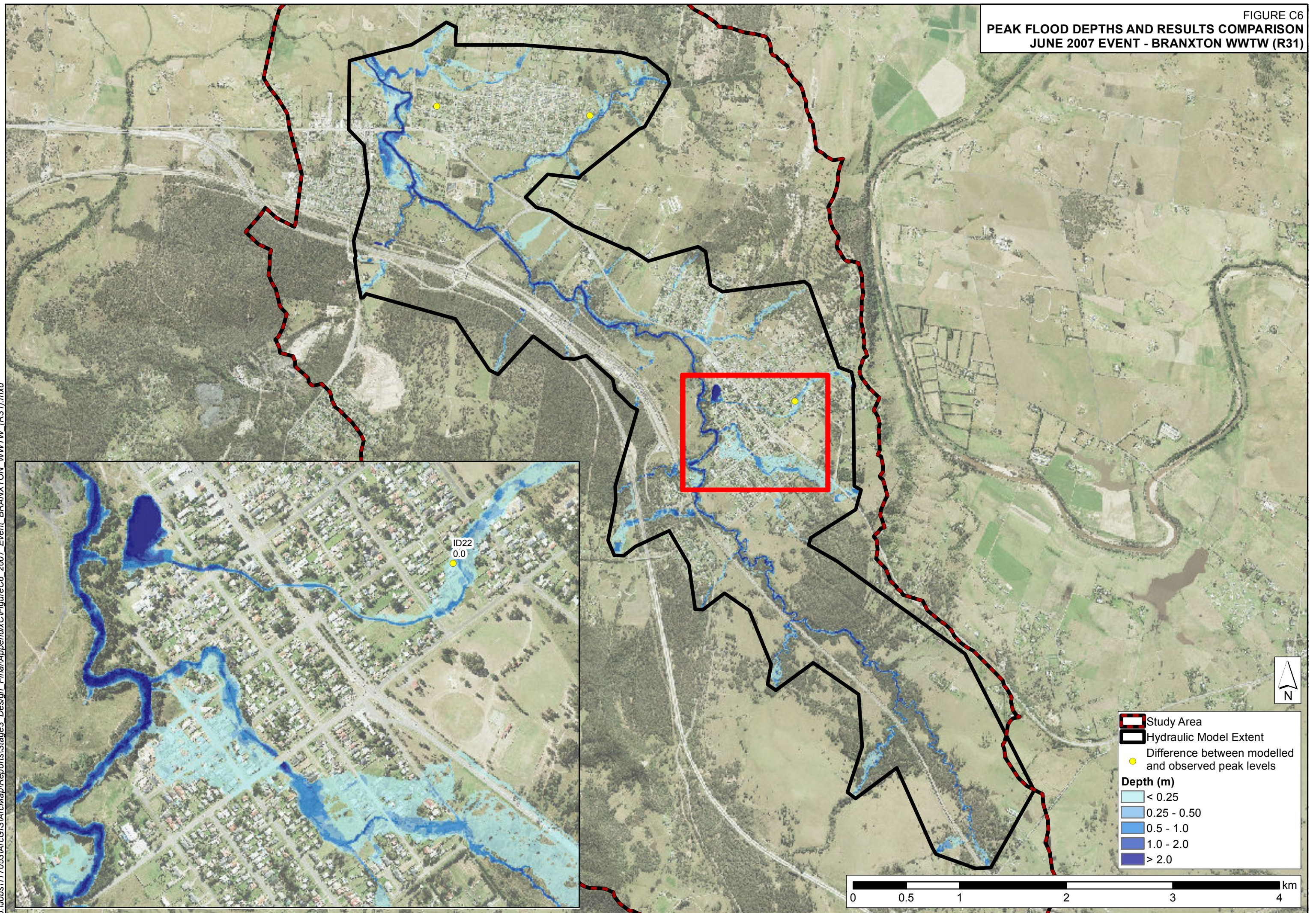


FIGURE C6
PEAK FLOOD DEPTHS AND RESULTS COMPARISON
JUNE 2007 EVENT - BRANXTON WWTW (R31)



Appendix D **Design Flood Mapping**

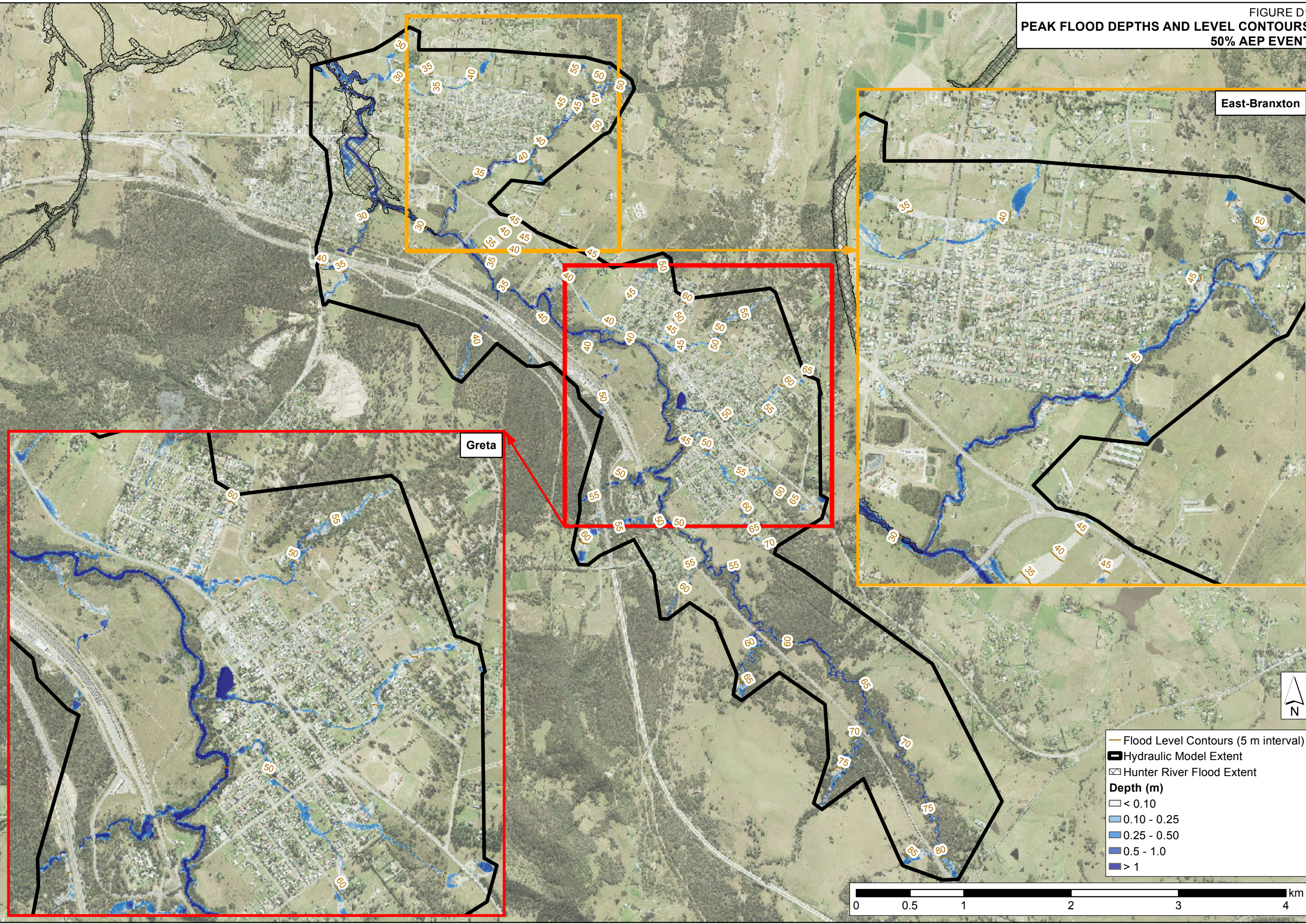
Figure D1: Peak Flood Depths and Level Contours – 50% AEP Event
Figure D2: Peak Flood Depths and Level Contours – 20% AEP Event
Figure D3: Peak Flood Depths and Level Contours – 10% AEP Event
Figure D4: Peak Flood Depths and Level Contours – 5% AEP Event
Figure D5: Peak Flood Depths and Level Contours – 2% AEP Event
Figure D6: Peak Flood Depths and Level Contours – 1% AEP Event
Figure D7: Peak Flood Depths and Level Contours – 0.5% AEP Event
Figure D8: Peak Flood Depths and Level Contours – 0.2% AEP Event
Figure D9: Peak Flood Depths and Level Contours – PMF Event
Figure D10: Peak Flood Velocities – 50% AEP Event
Figure D11: Peak Flood Velocities – 20% AEP Event
Figure D12: Peak Flood Velocities – 10% AEP Event
Figure D13: Peak Flood Velocities – 5% AEP Event
Figure D14: Peak Flood Velocities – 2% AEP Event
Figure D15: Peak Flood Velocities – 1% AEP Event
Figure D16: Peak Flood Velocities – 0.5% AEP Event
Figure D17: Peak Flood Velocities – 0.2% AEP Event
Figure D18: Peak Flood Velocities – PMF Event
Figure D19: Flood Hazard Categories (FDM) – 5% AEP Event
Figure D20: Flood Hazard Categories (FDM) – 1% AEP Event
Figure D21: Flood Hazard Categories (FDM) – 0.2% AEP Event
Figure D22: Flood Hazard Categories (FDM) – PMF Event
Figure D23: Flood Hazard Categories (ADR) – 5% AEP Event
Figure D24: Flood Hazard Categories (ADR) – 1% AEP Event
Figure D25: Flood Hazard Categories (ADR) – 0.2% AEP Event
Figure D26: Flood Hazard Categories (ADR) – PMF Event

Figure D27: Provisional Hydraulic Categories – 5% AEP Event
Figure D28: Provisional Hydraulic Categories – 1% AEP Event
Figure D29: Provisional Hydraulic Categories – 0.2% AEP Event
Figure D30: Provisional Hydraulic Categories – PMF Event
Figure D31: SES Emergency Response Classifications – 5% AEP Event
Figure D32: SES Emergency Response Classifications – 1% AEP Event
Figure D33: SES Emergency Response Classifications – 0.2% AEP Event
Figure D34: SES Emergency Response Classifications – PMF Event
Figure D35: Preliminary Flood Planning Area



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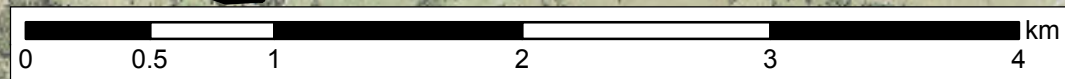
FIGURE D1
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
50% AEP EVENT



East-Branxton

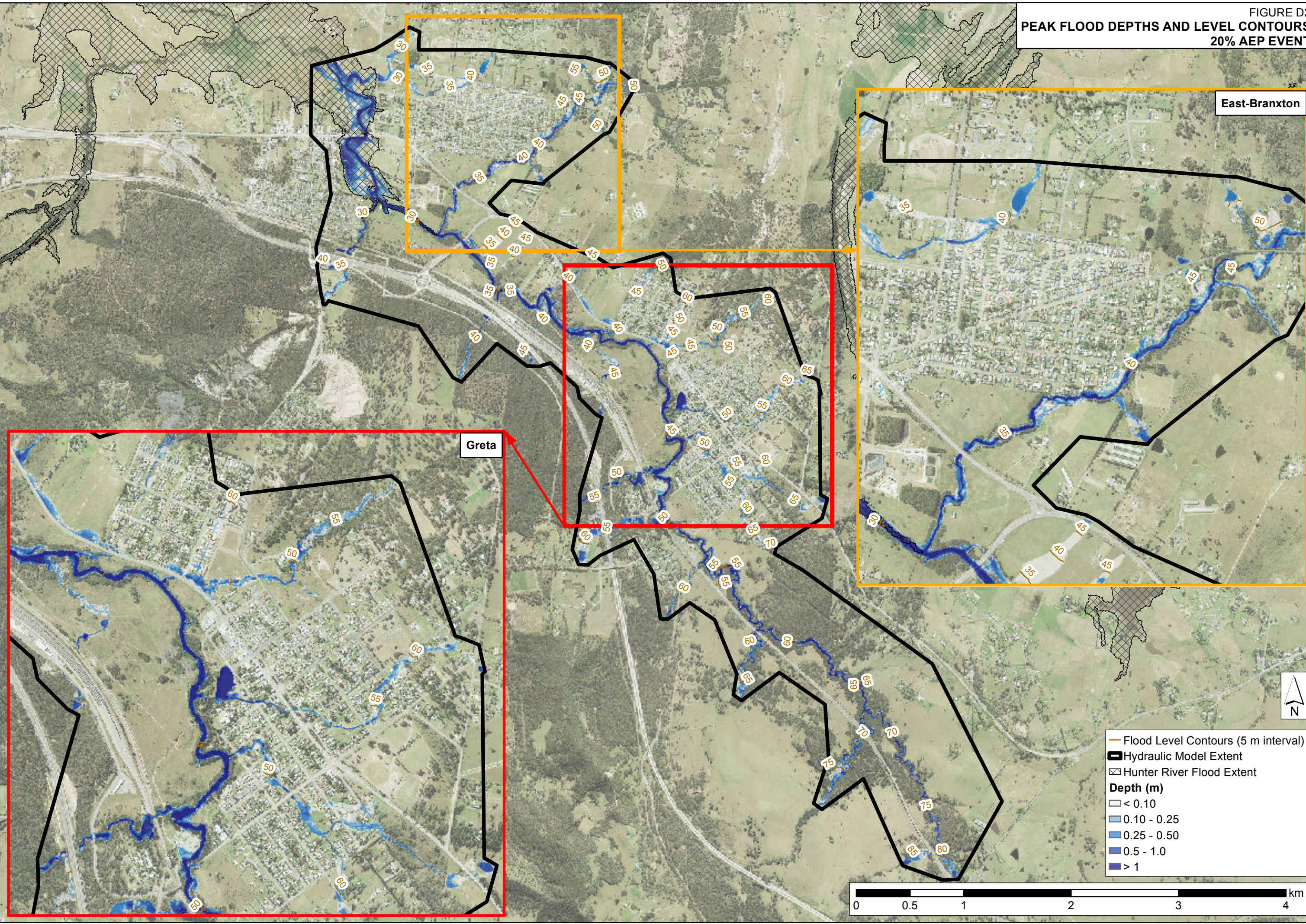
Greta

- Flood Level Contours (5 m interval)
- ▬ Hydraulic Model Extent
- ▨ Hunter River Flood Extent
- Depth (m)**
 - < 0.10
 - 0.10 - 0.25
 - 0.25 - 0.50
 - 0.5 - 1.0
 - > 1



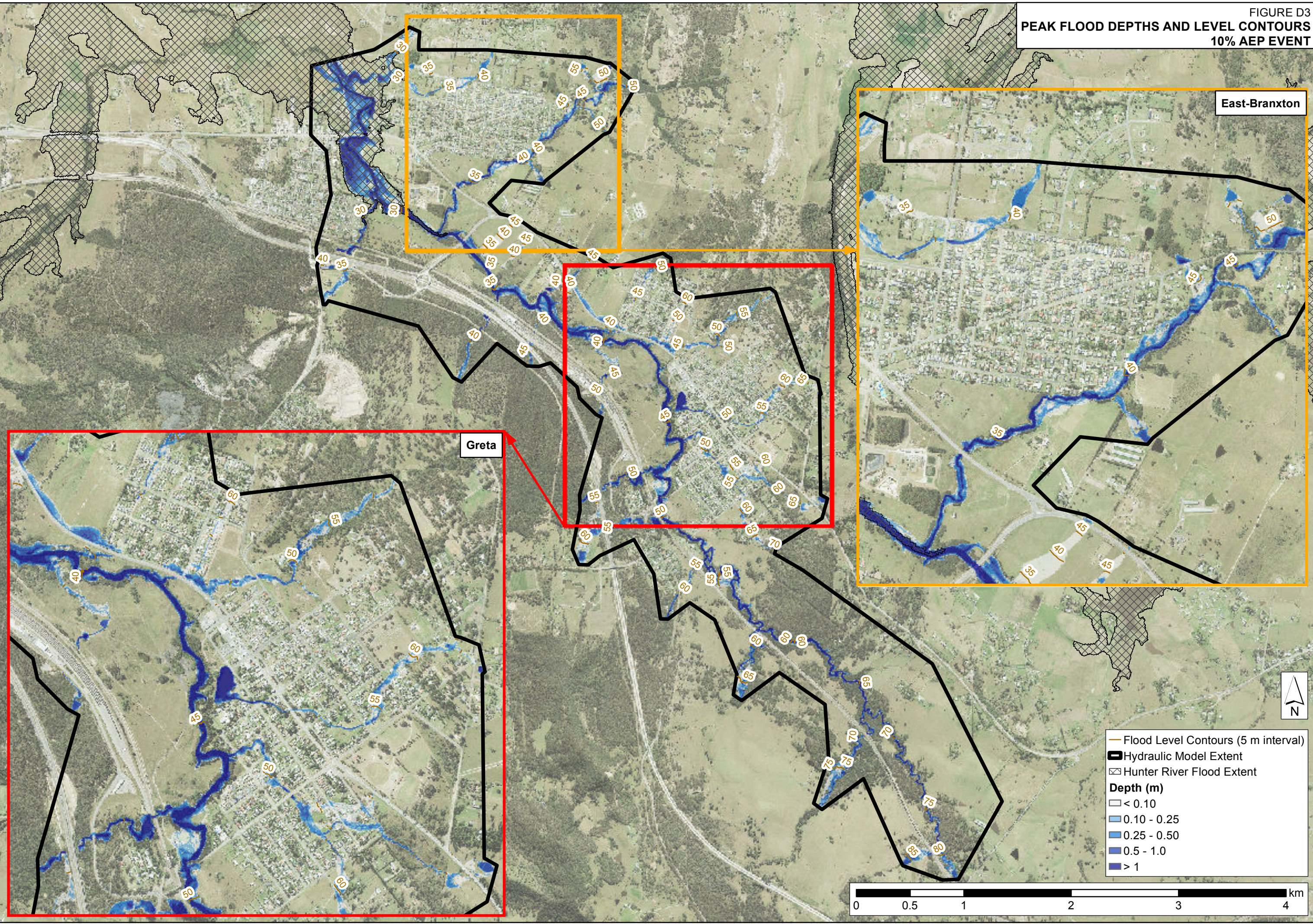
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FIGURE D2
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
20% AEP EVENT



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FIGURE D3
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
10% AEP EVENT

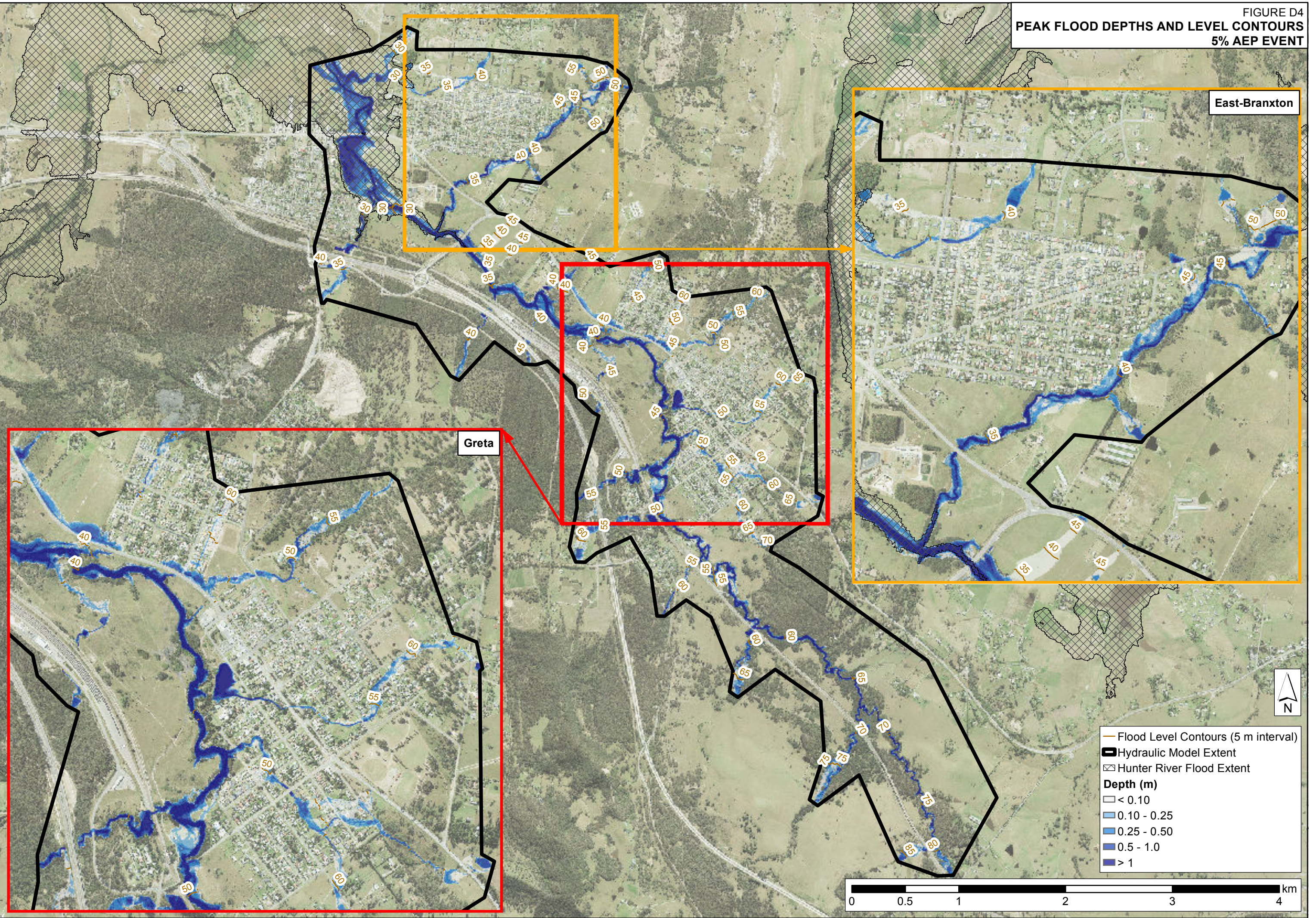


East-Bransford

Greta

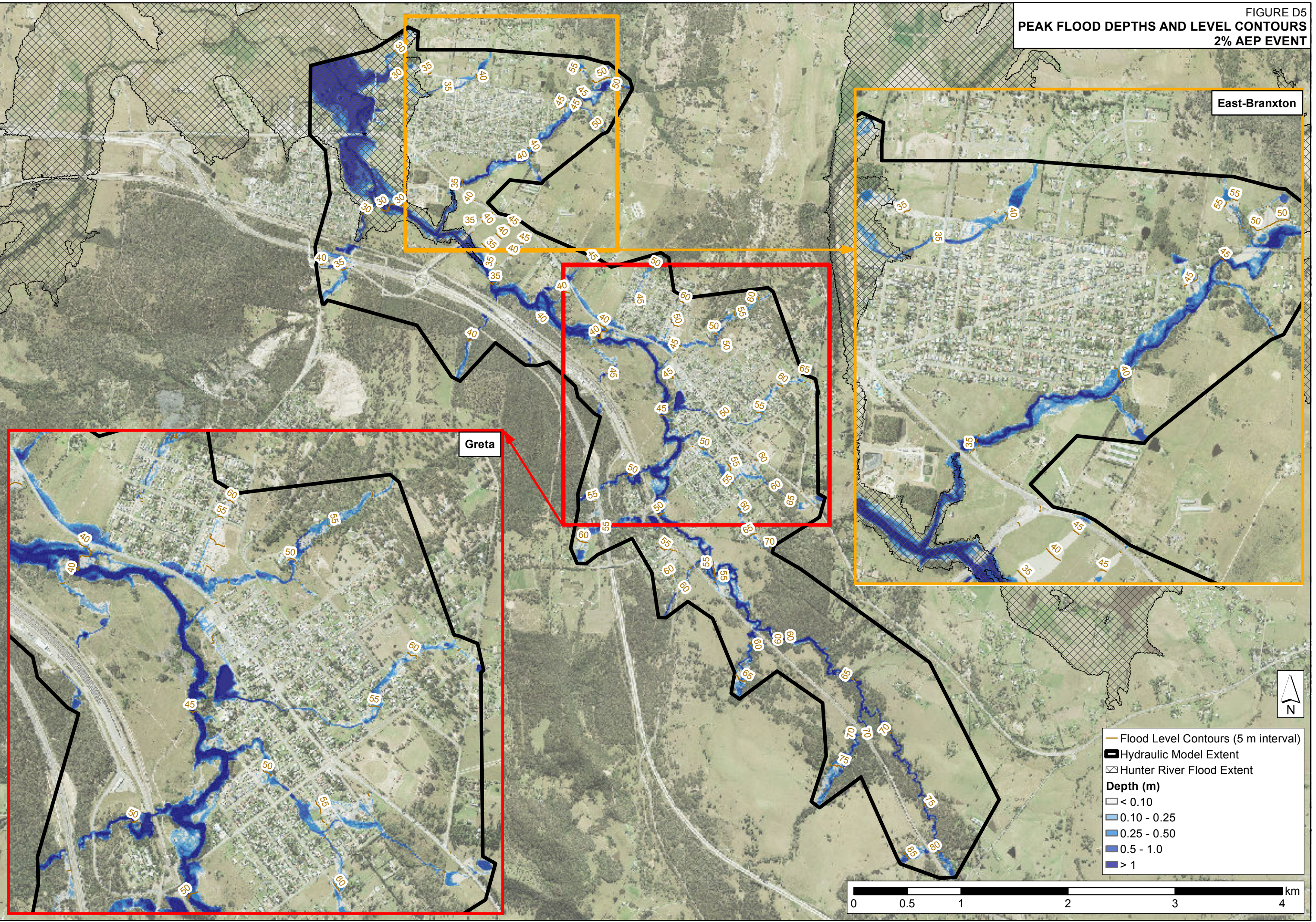
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FIGURE D4
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
5% AEP EVENT



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FIGURE D5
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
2% AEP EVENT

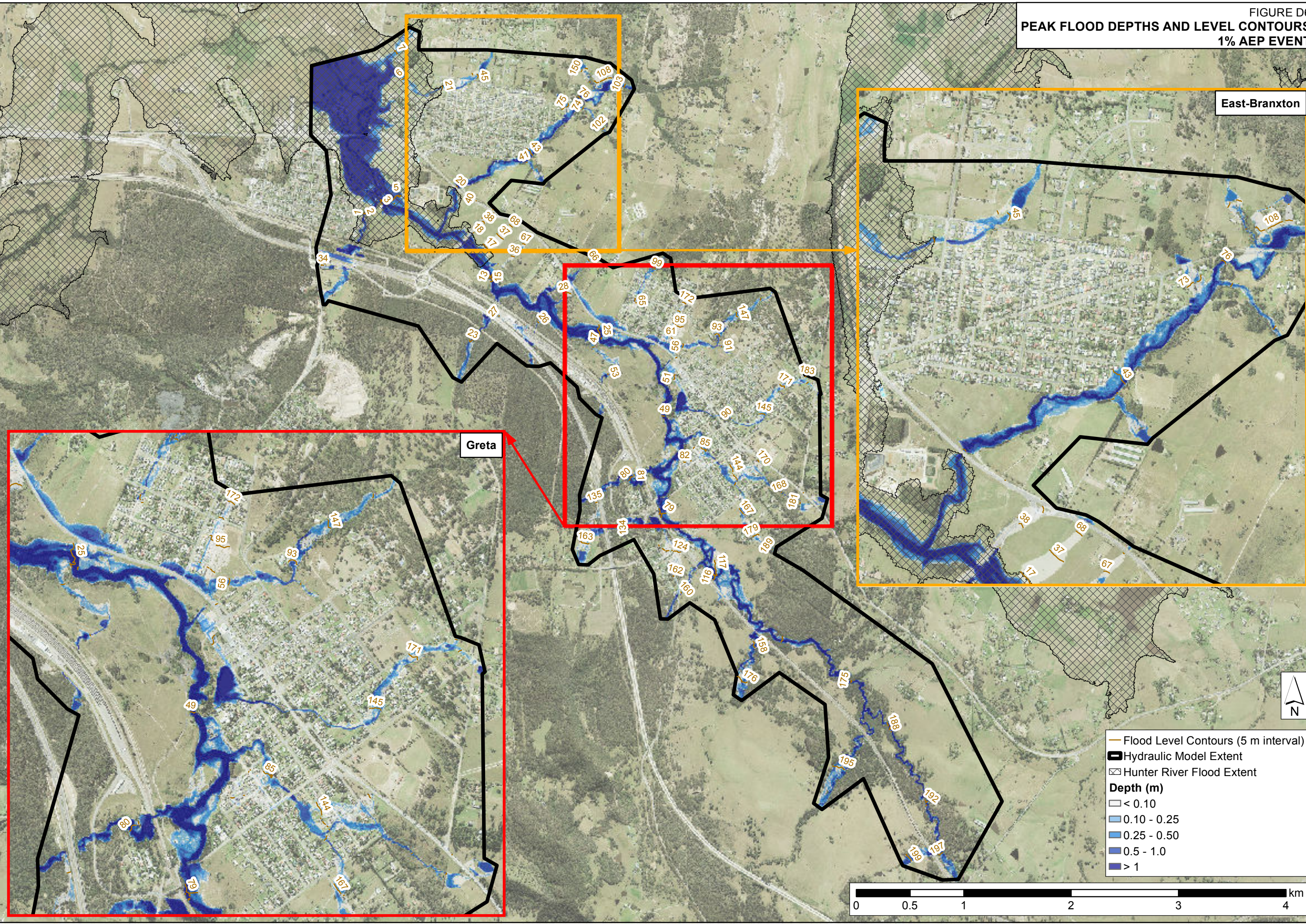


East-Braxton

Greta

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FIGURE D6
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
1% AEP EVENT



East-Branxton

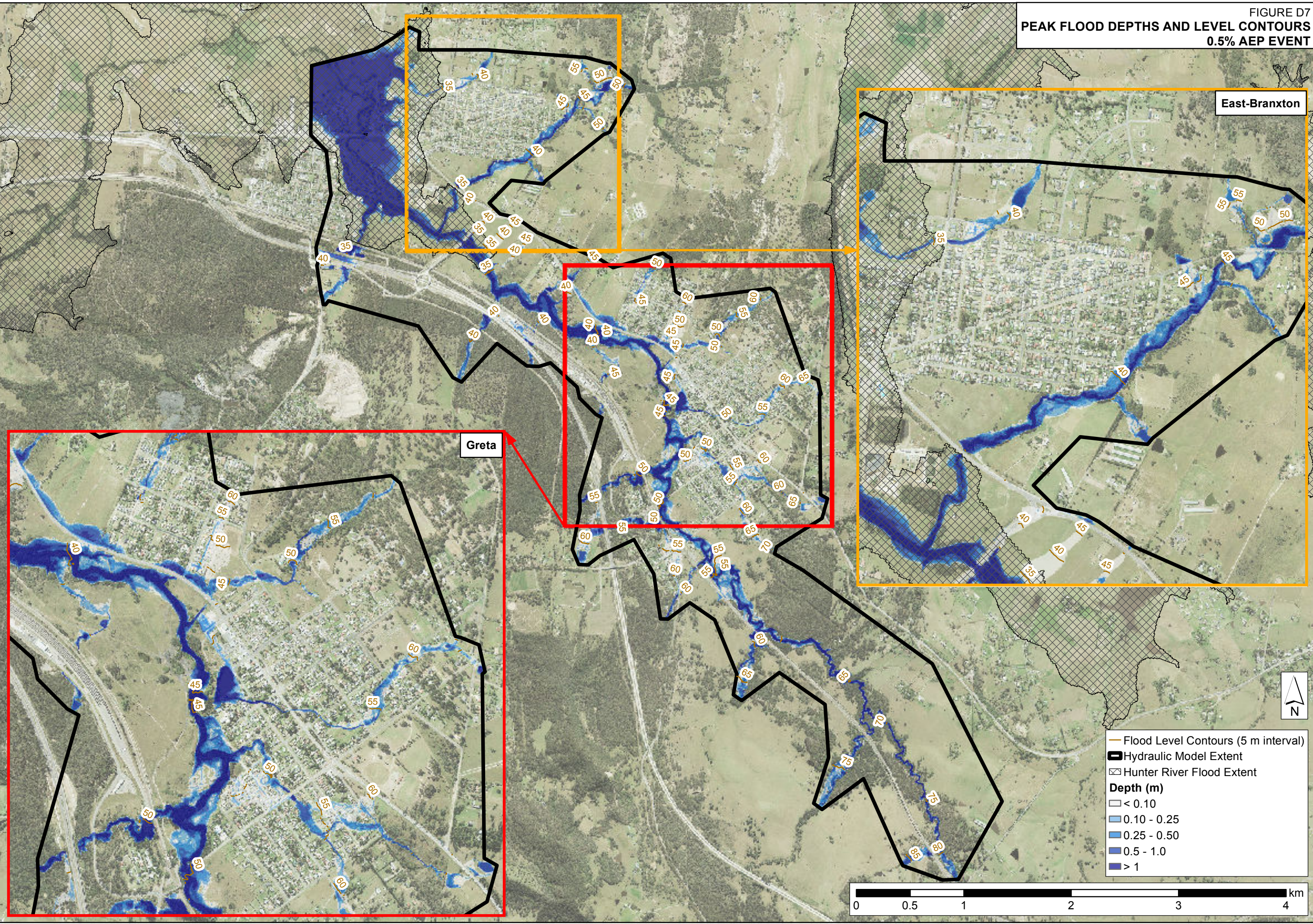
Greta

- Flood Level Contours (5 m interval)
- Hydraulic Model Extent
- Hunter River Flood Extent
- Depth (m)
 - < 0.10
 - 0.10 - 0.25
 - 0.25 - 0.50
 - 0.5 - 1.0
 - > 1

0 0.5 1 2 3 4 km

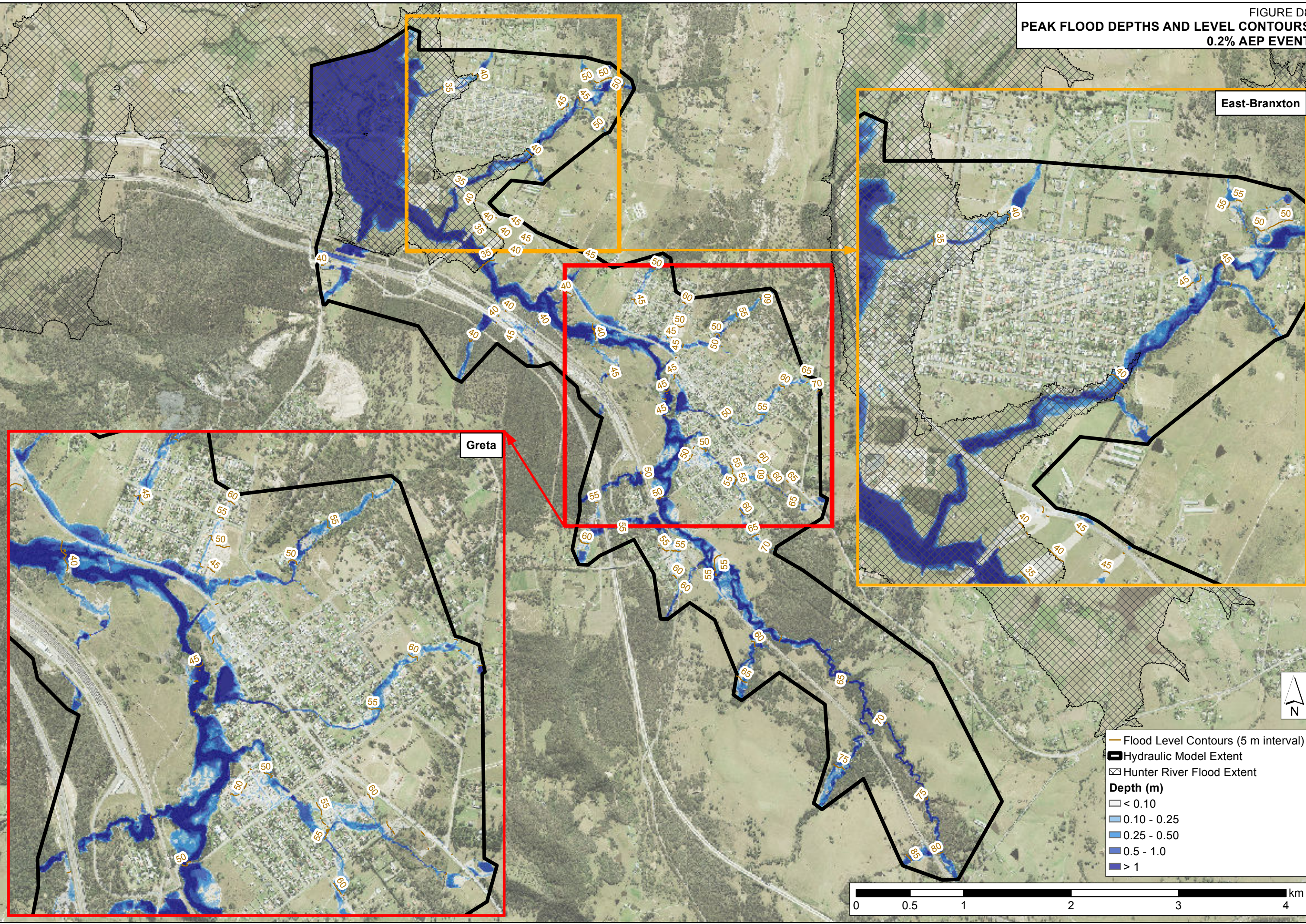
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FIGURE D7
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
0.5% AEP EVENT



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FIGURE D8
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
0.2% AEP EVENT



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FIGURE D9
PEAK FLOOD DEPTHS AND LEVEL CONTOURS
PMF EVENT

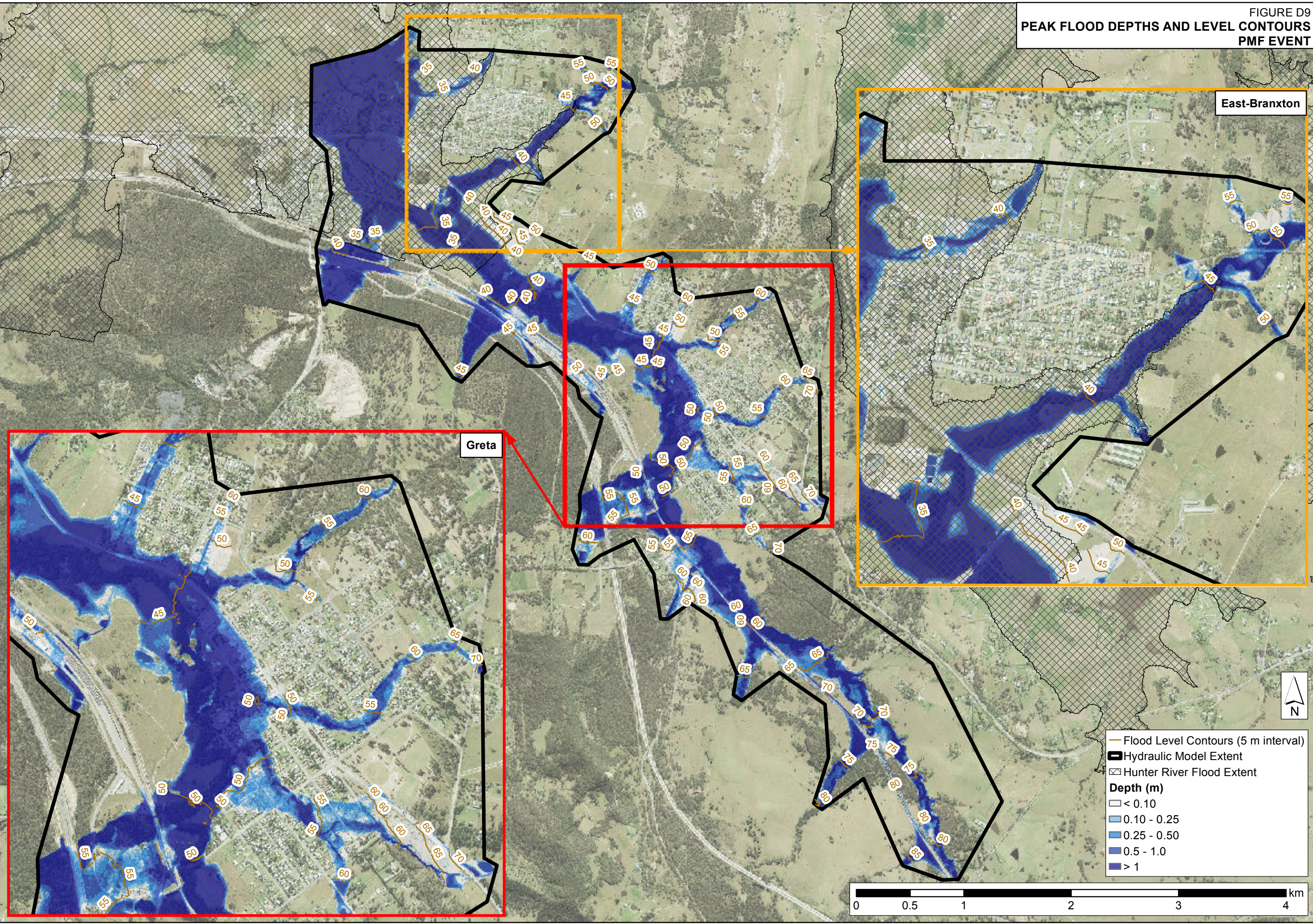


FIGURE D10
PEAK FLOOD VELOCITIES
50% AEP EVENT

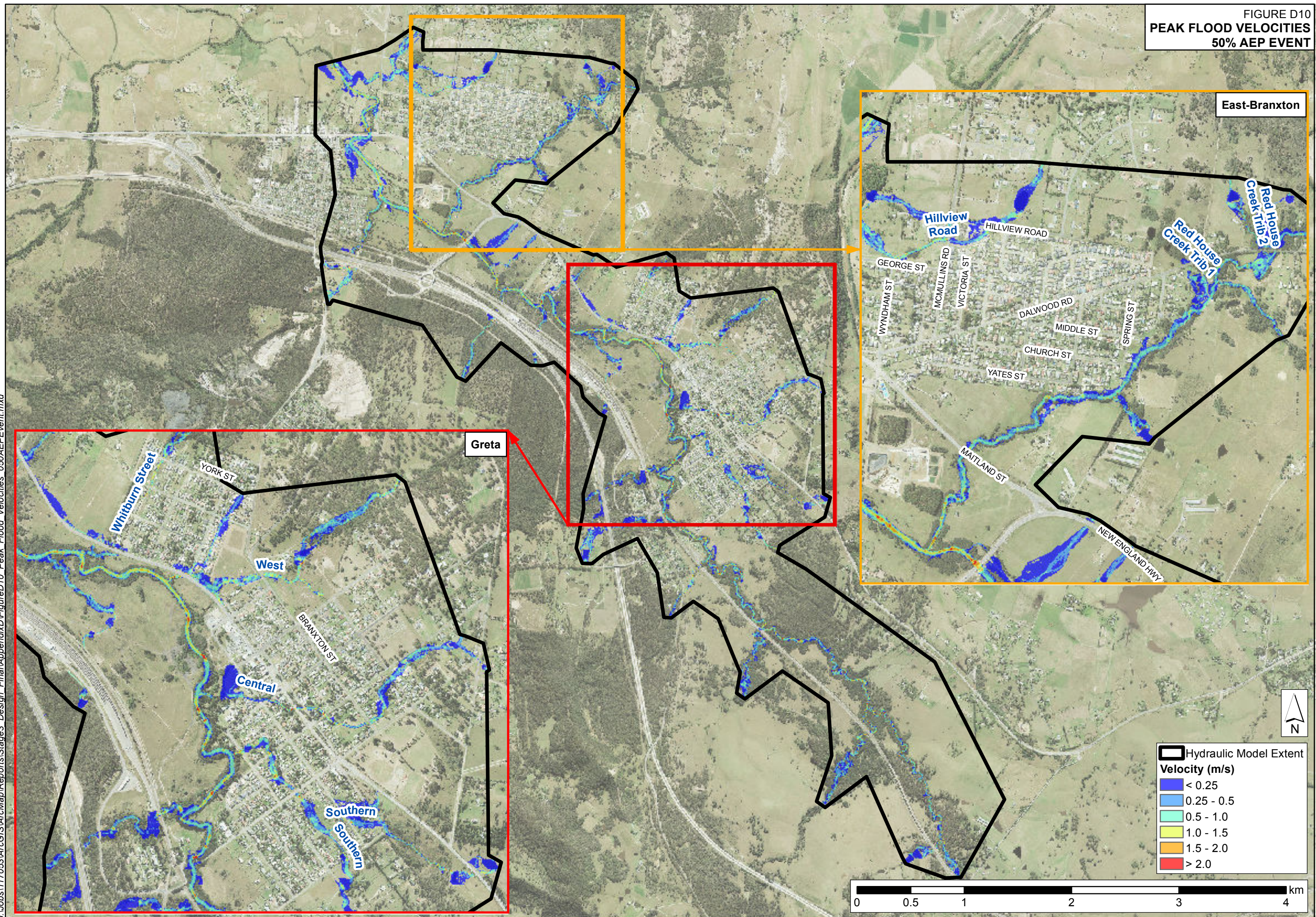


FIGURE D11
PEAK FLOOD VELOCITIES
20% AEP EVENT

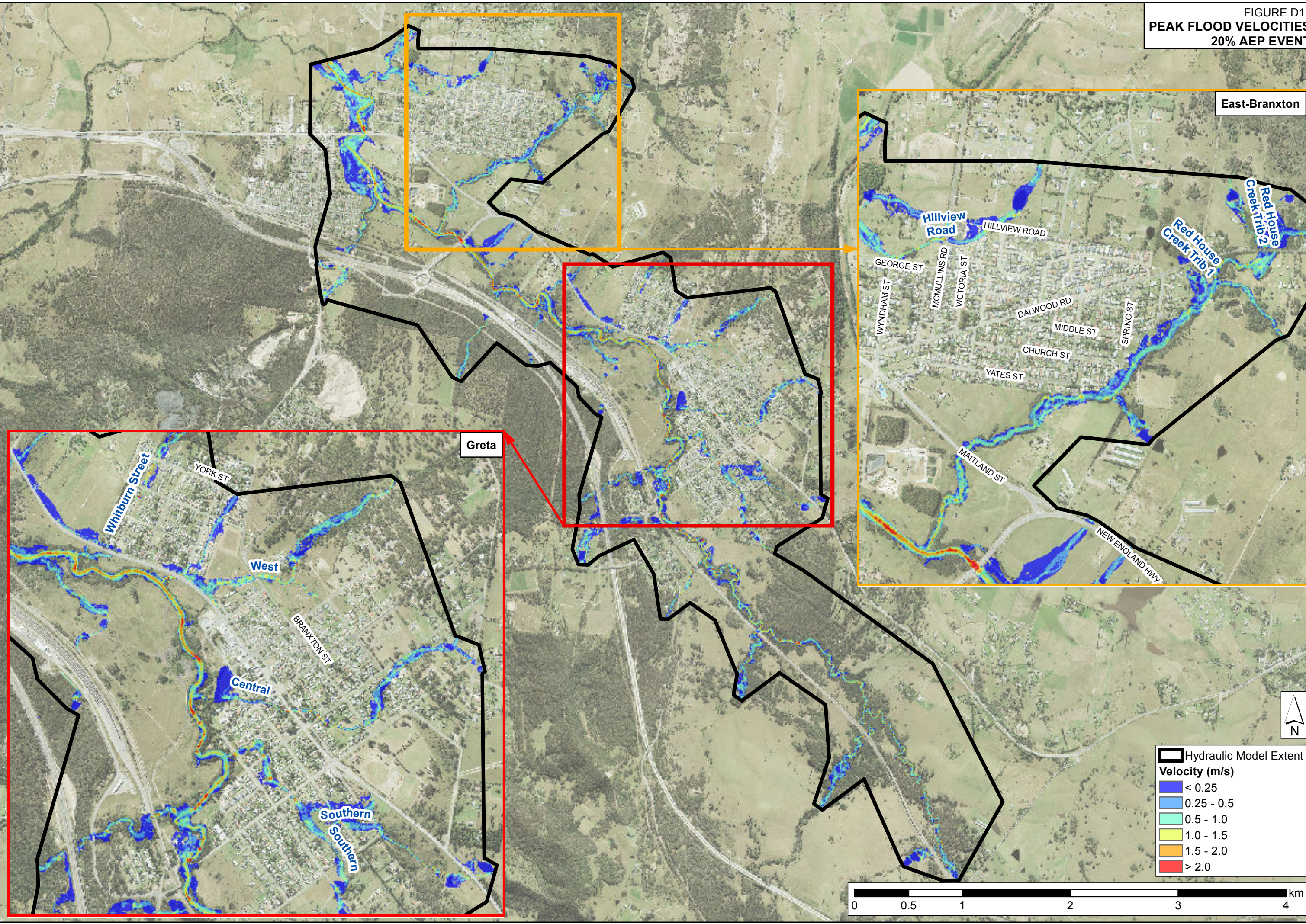


FIGURE D12
PEAK FLOOD VELOCITIES
10% AEP EVENT

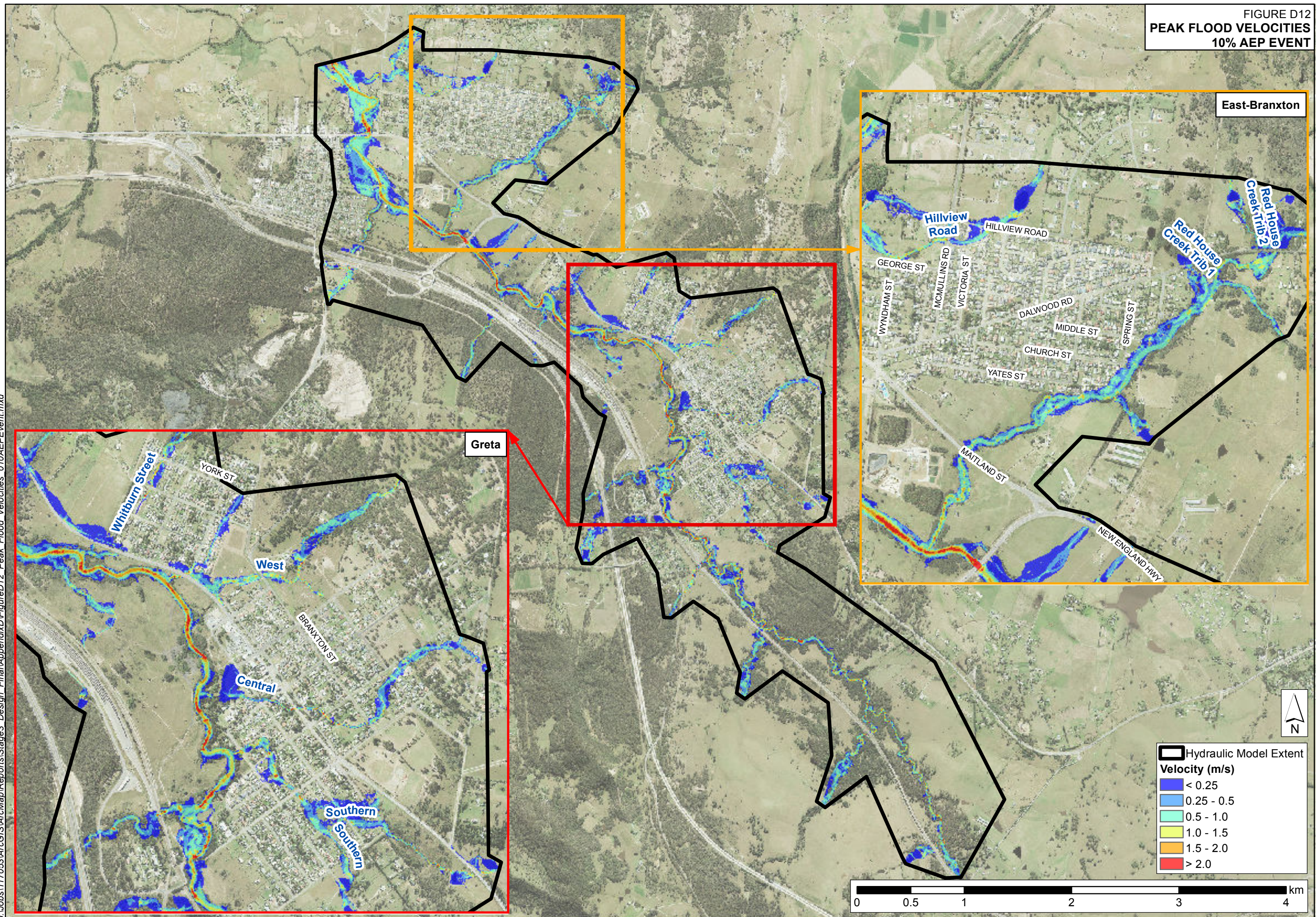


FIGURE D13
PEAK FLOOD VELOCITIES
5% AEP EVENT

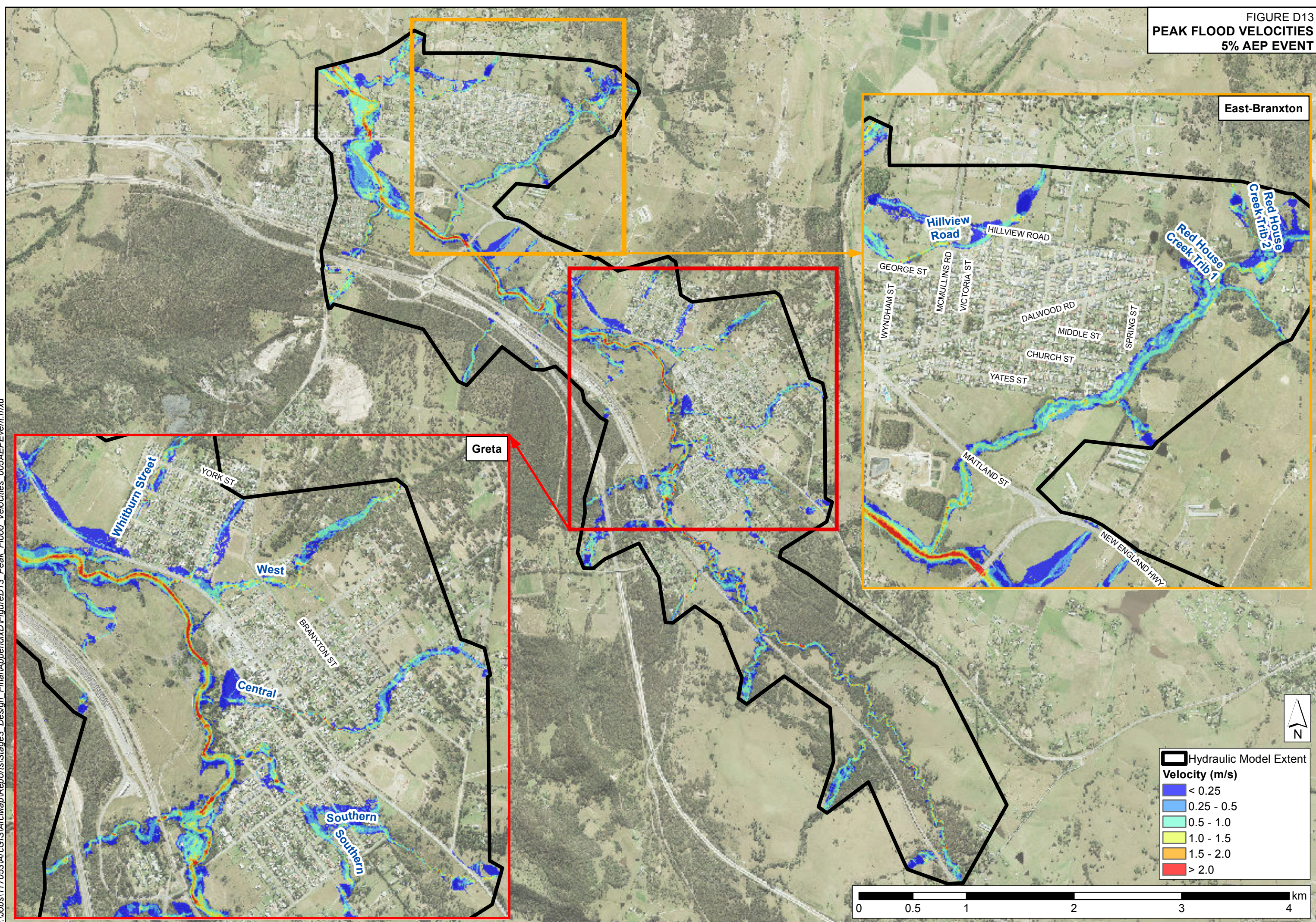


FIGURE D14
PEAK FLOOD VELOCITIES
2% AEP EVENT

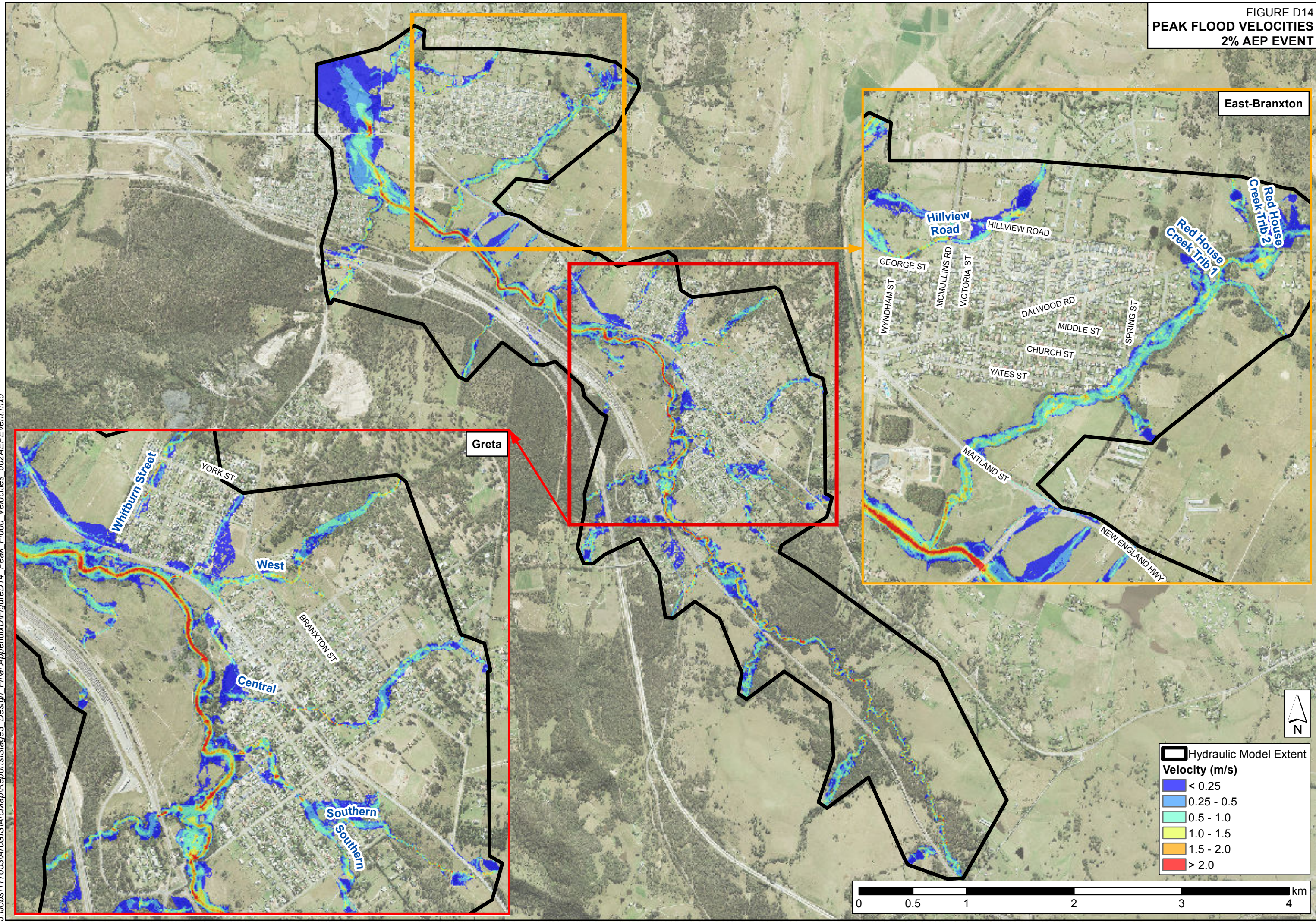


FIGURE D15
PEAK FLOOD VELOCITIES
1% AEP EVENT

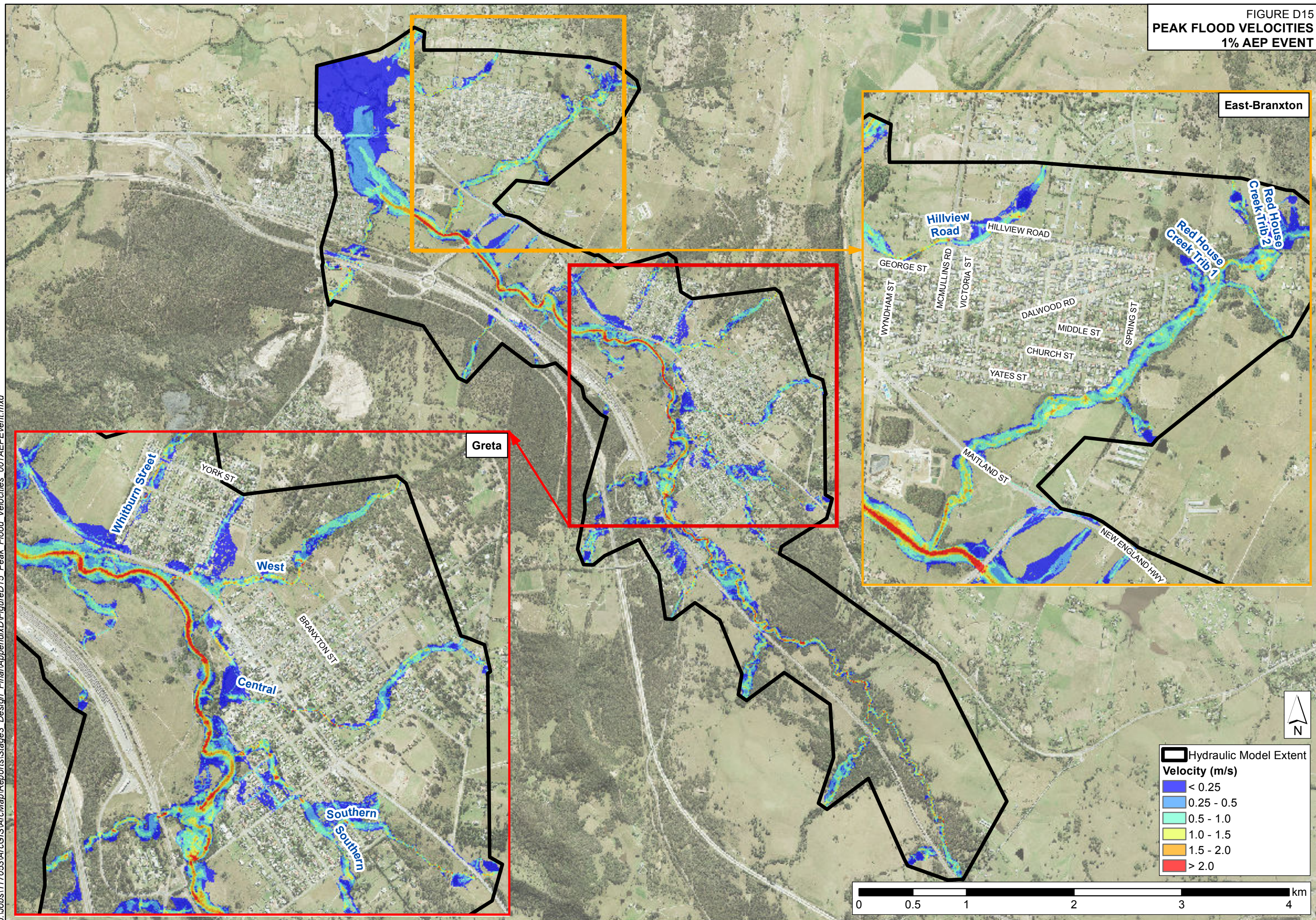


FIGURE D16
PEAK FLOOD VELOCITIES
0.5% AEP EVENT

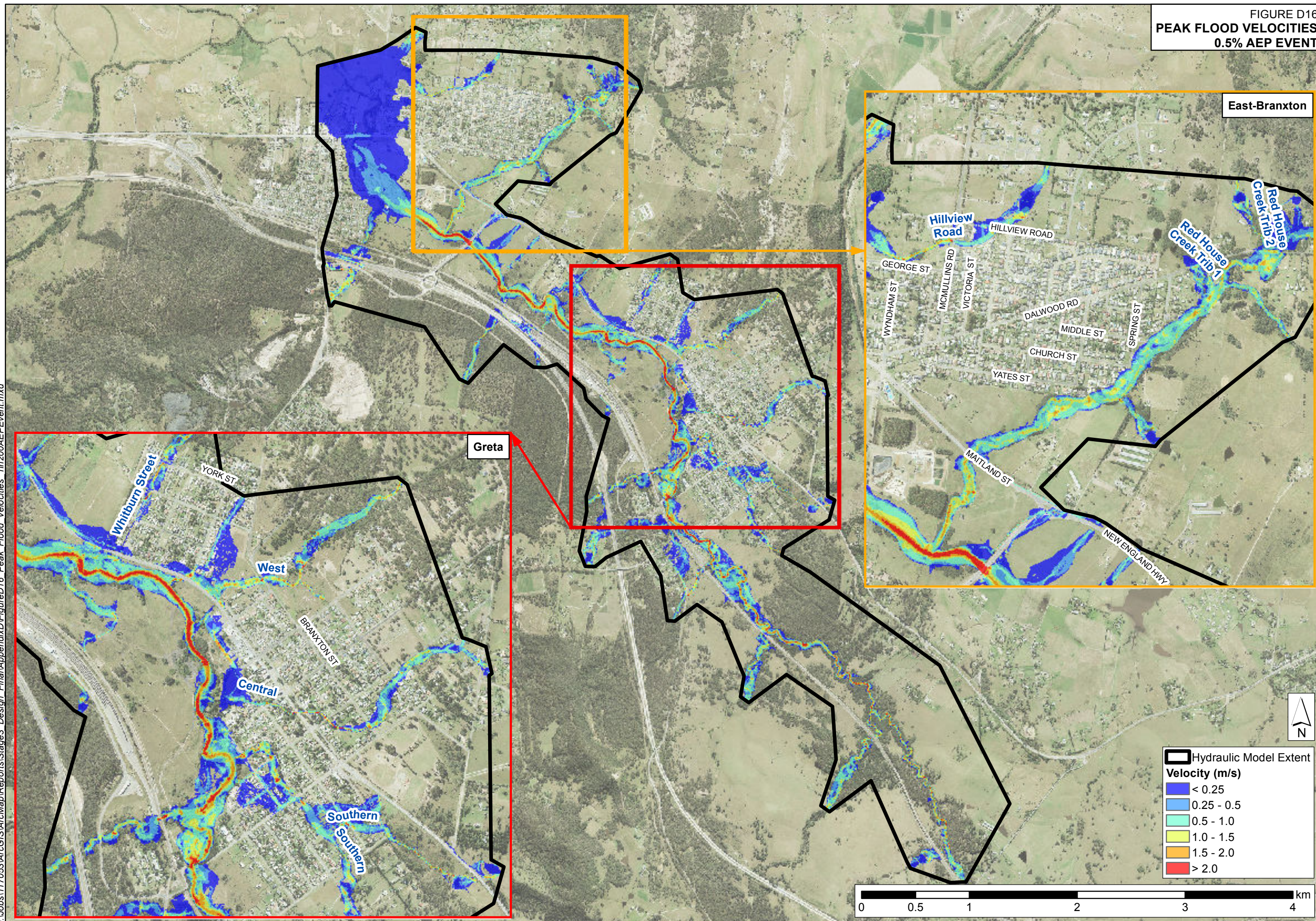


FIGURE D17
PEAK FLOOD VELOCITIES
0.2% AEP EVENT

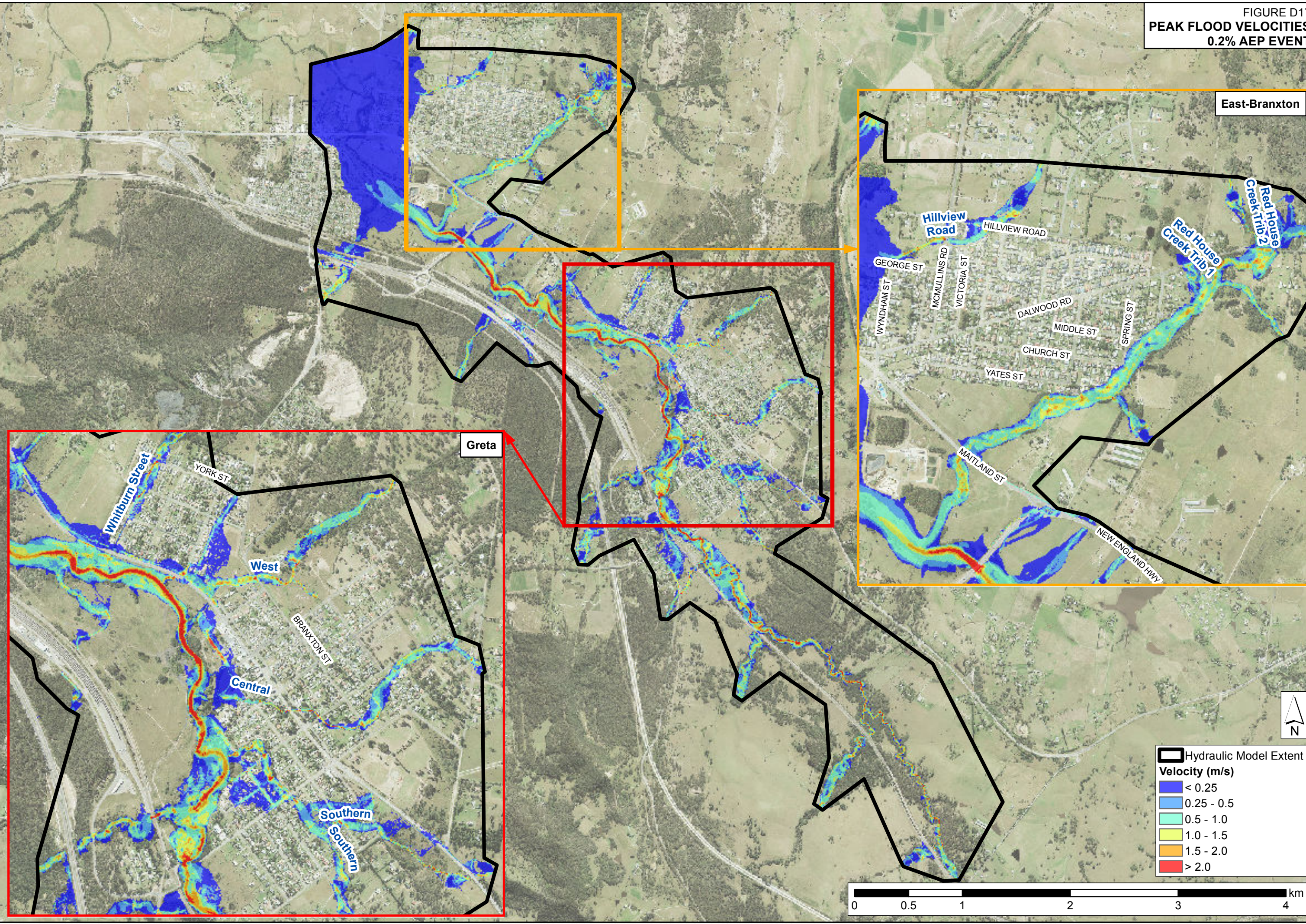


FIGURE D18
PEAK FLOOD VELOCITIES
PMF EVENT

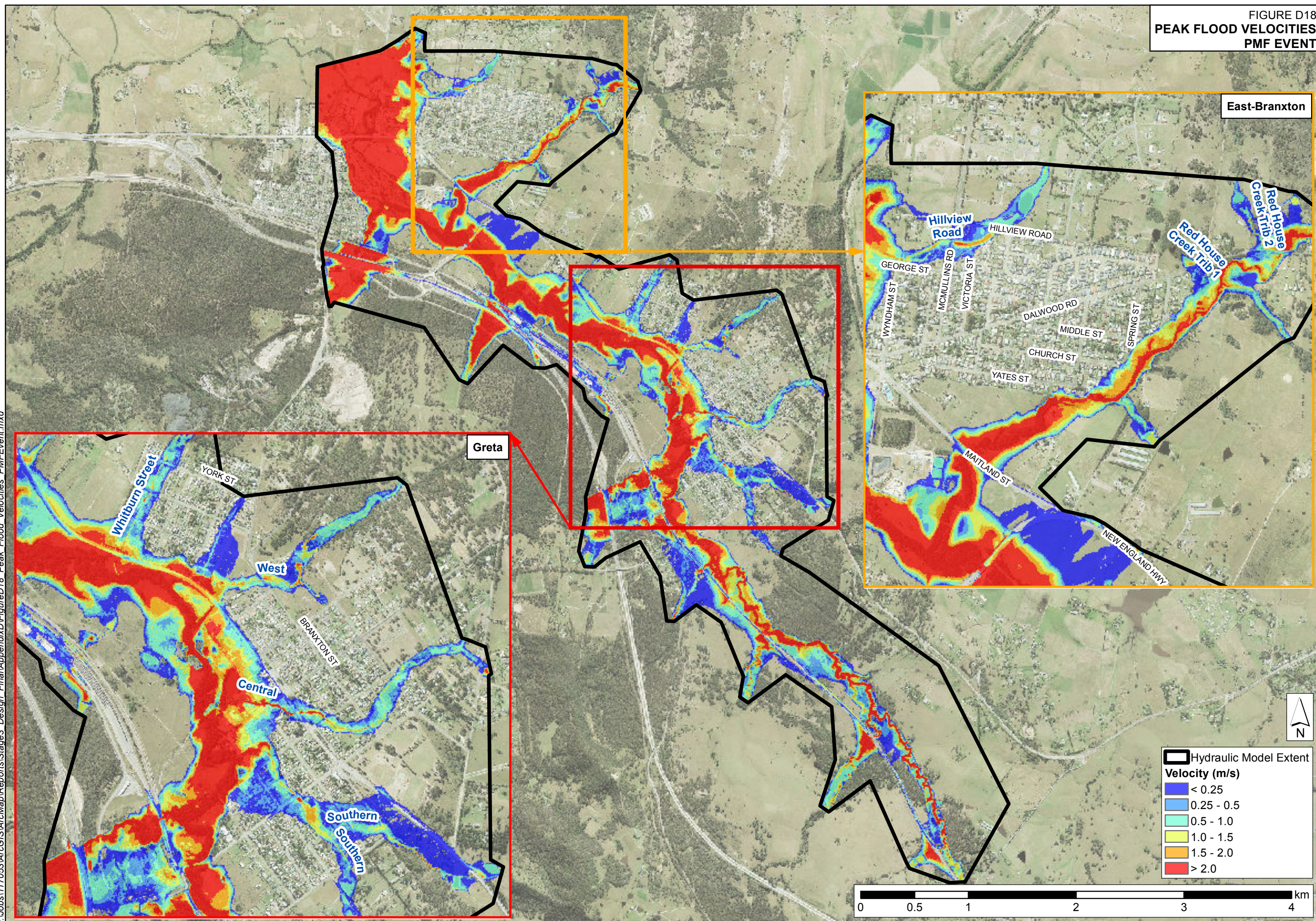


FIGURE D19
FLOOD HAZARD CATEGORIES FDM
5% AEP EVENT

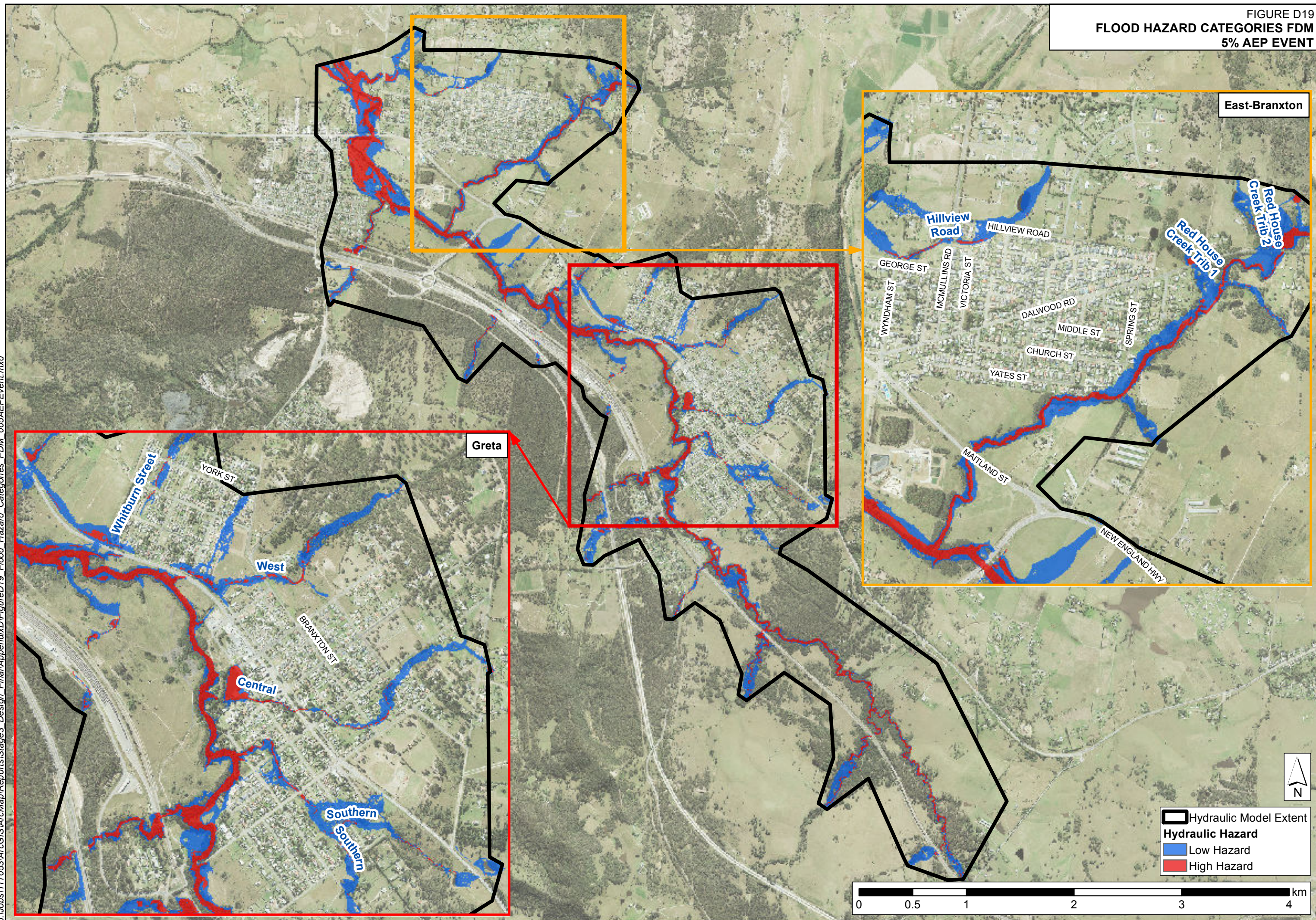


FIGURE D20
FLOOD HAZARD CATEGORIES FDM
1% AEP EVENT

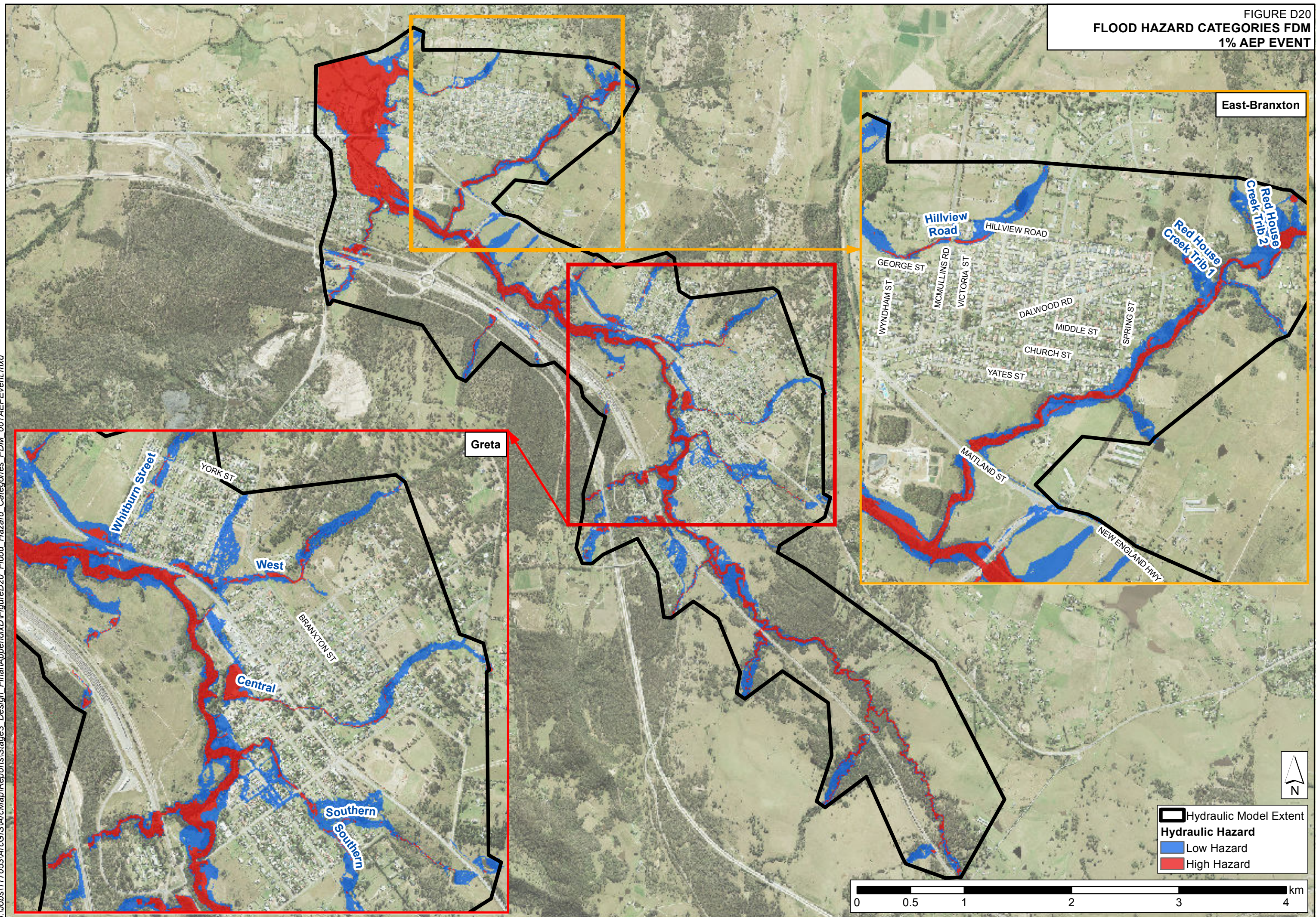


FIGURE D21
FLOOD HAZARD CATEGORIES FDM
0.2% AEP EVENT

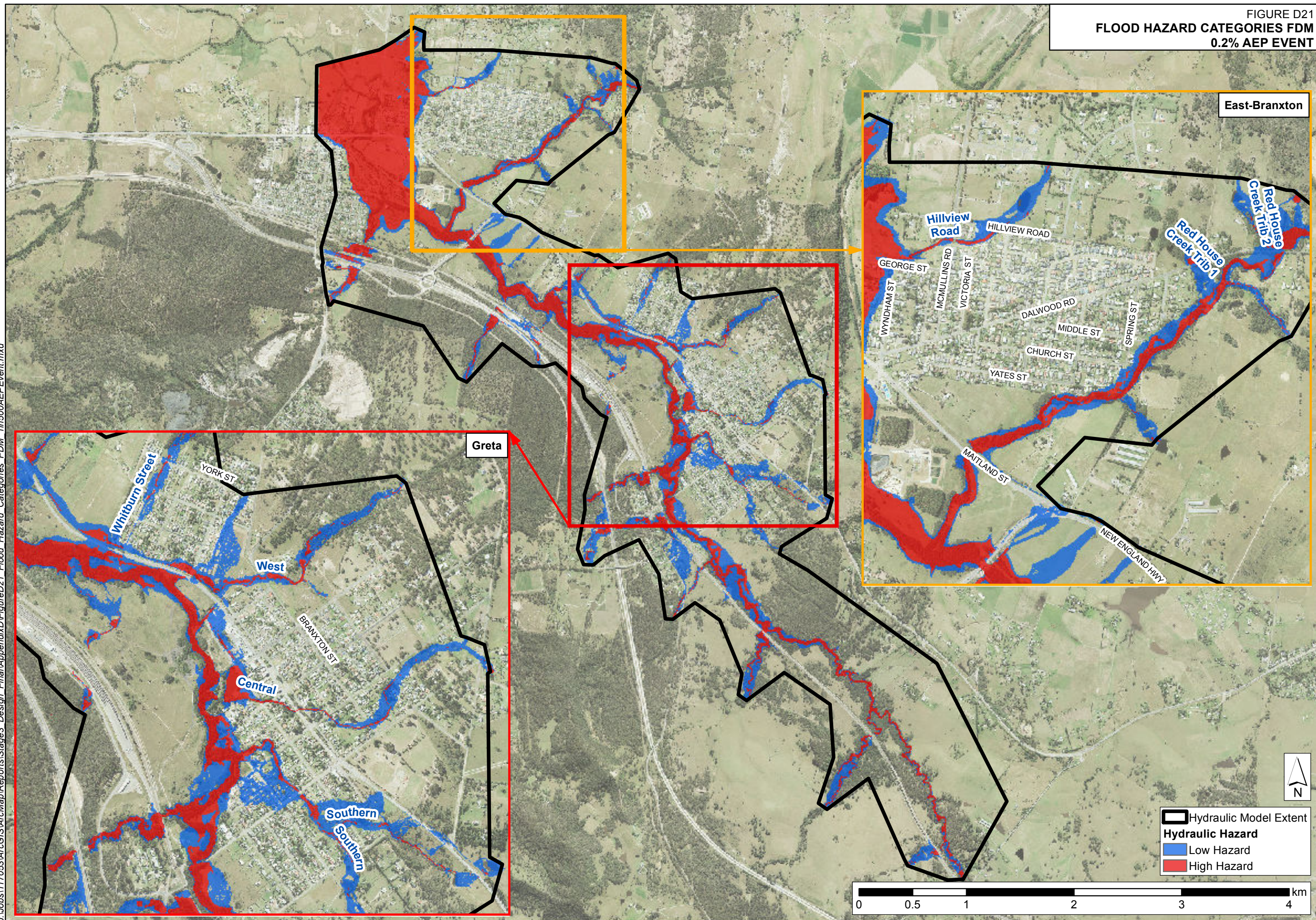


FIGURE D22
FLOOD HAZARD CATEGORIES FDM
PMF EVENT

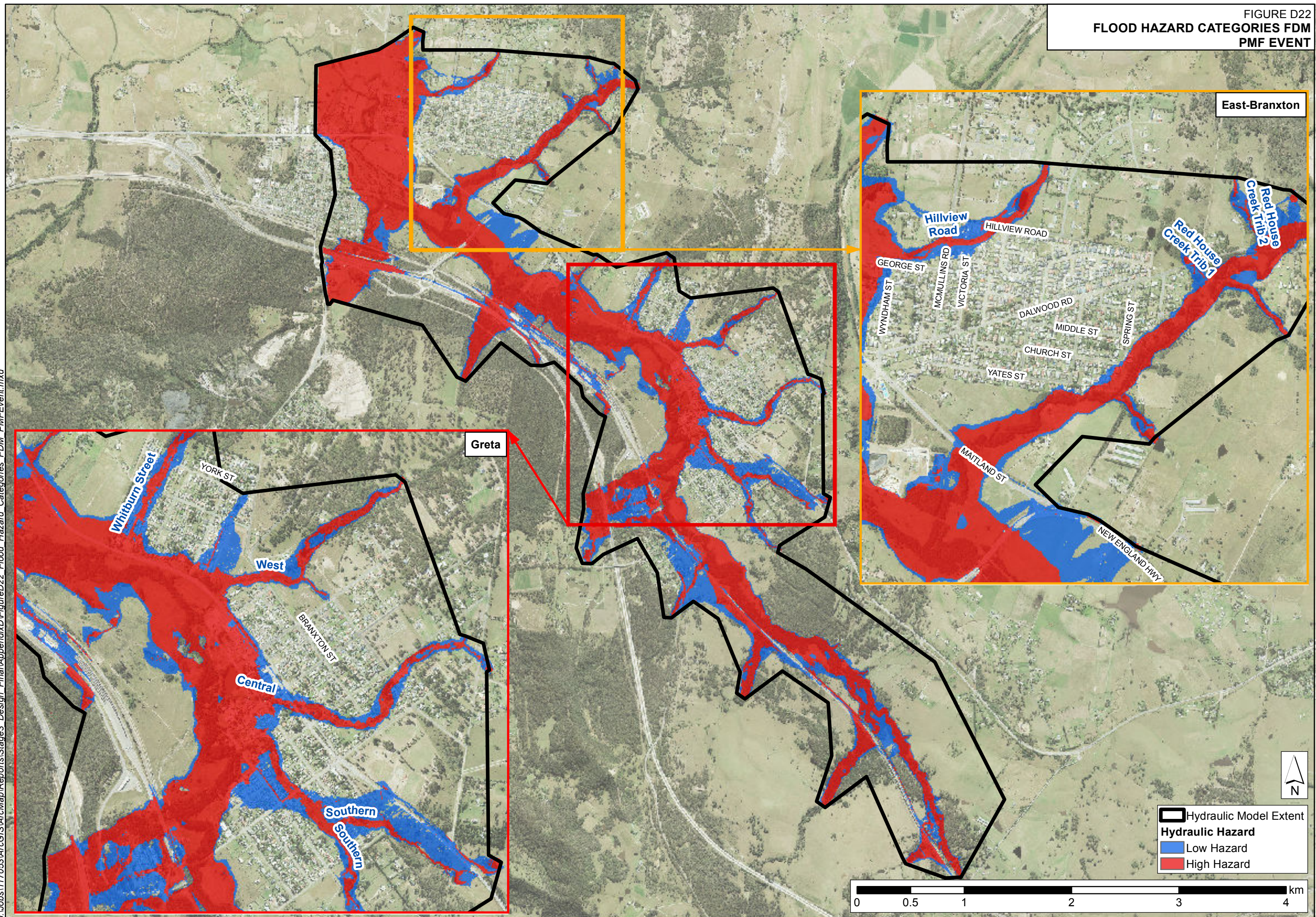


FIGURE D23
FLOOD HAZARD CATEGORIES ADR
5% AEP EVENT

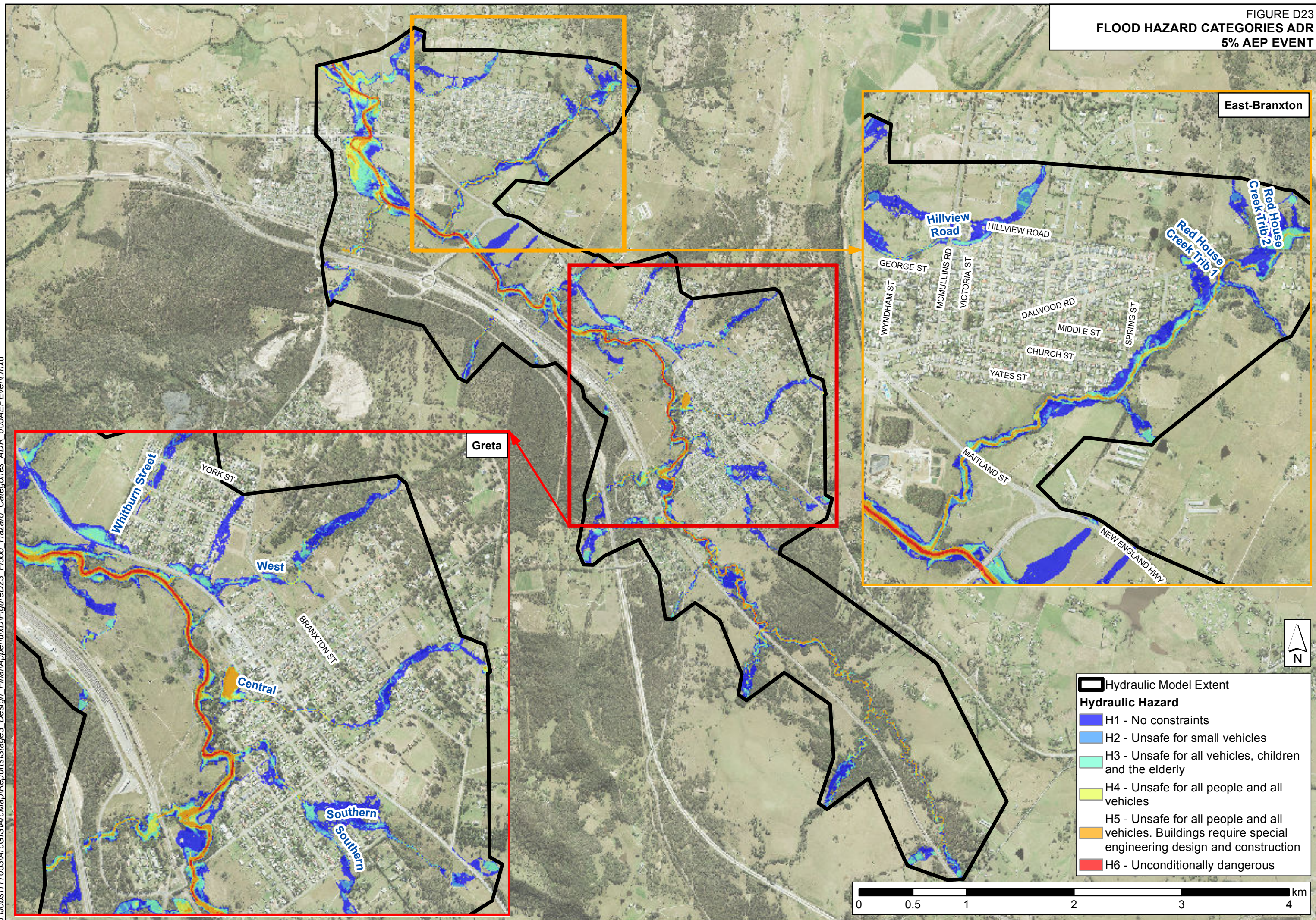


FIGURE D24
FLOOD HAZARD CATEGORIES ADR
1% AEP EVENT

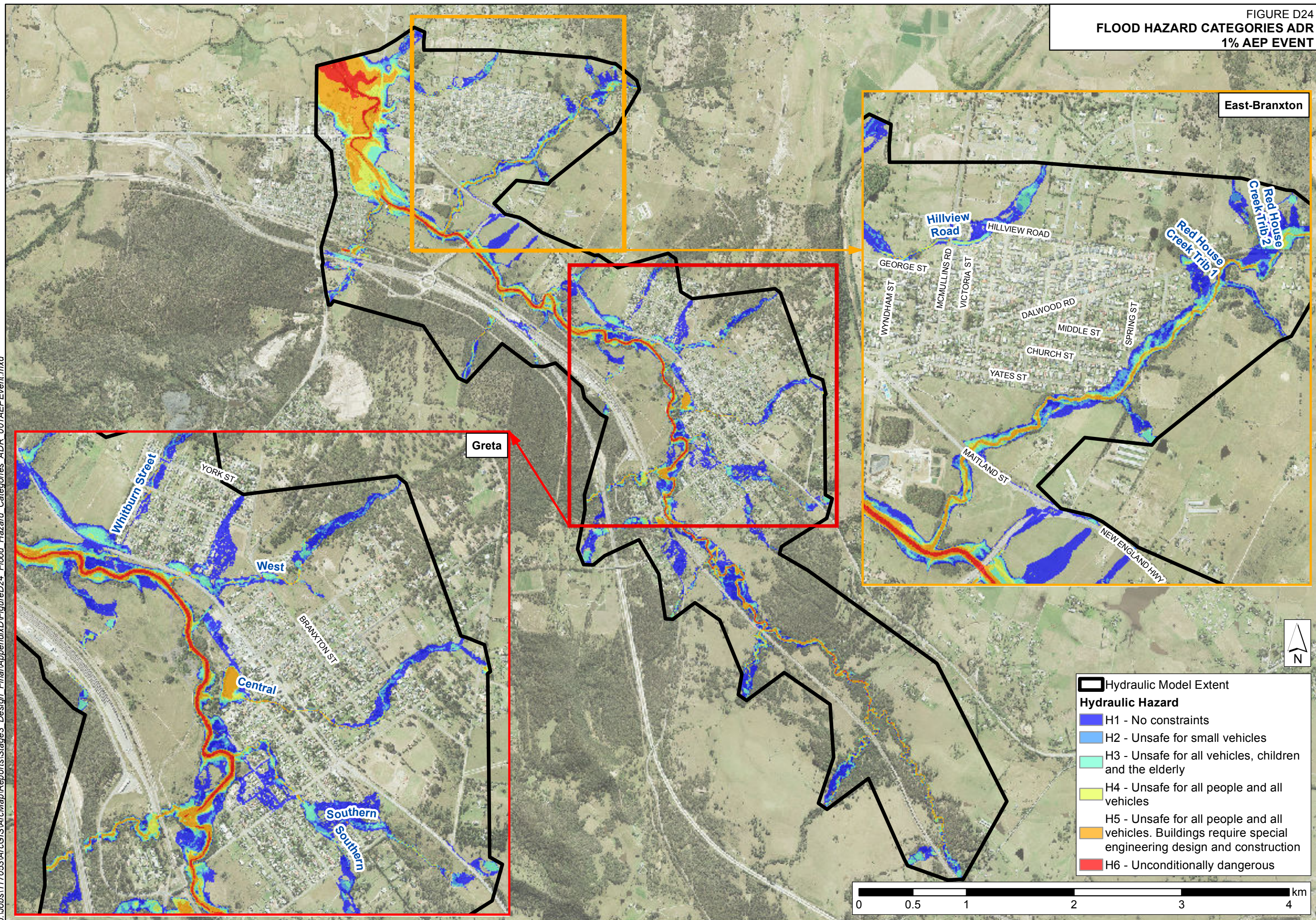


FIGURE D25
FLOOD HAZARD CATEGORIES ADR
0.2% AEP EVENT

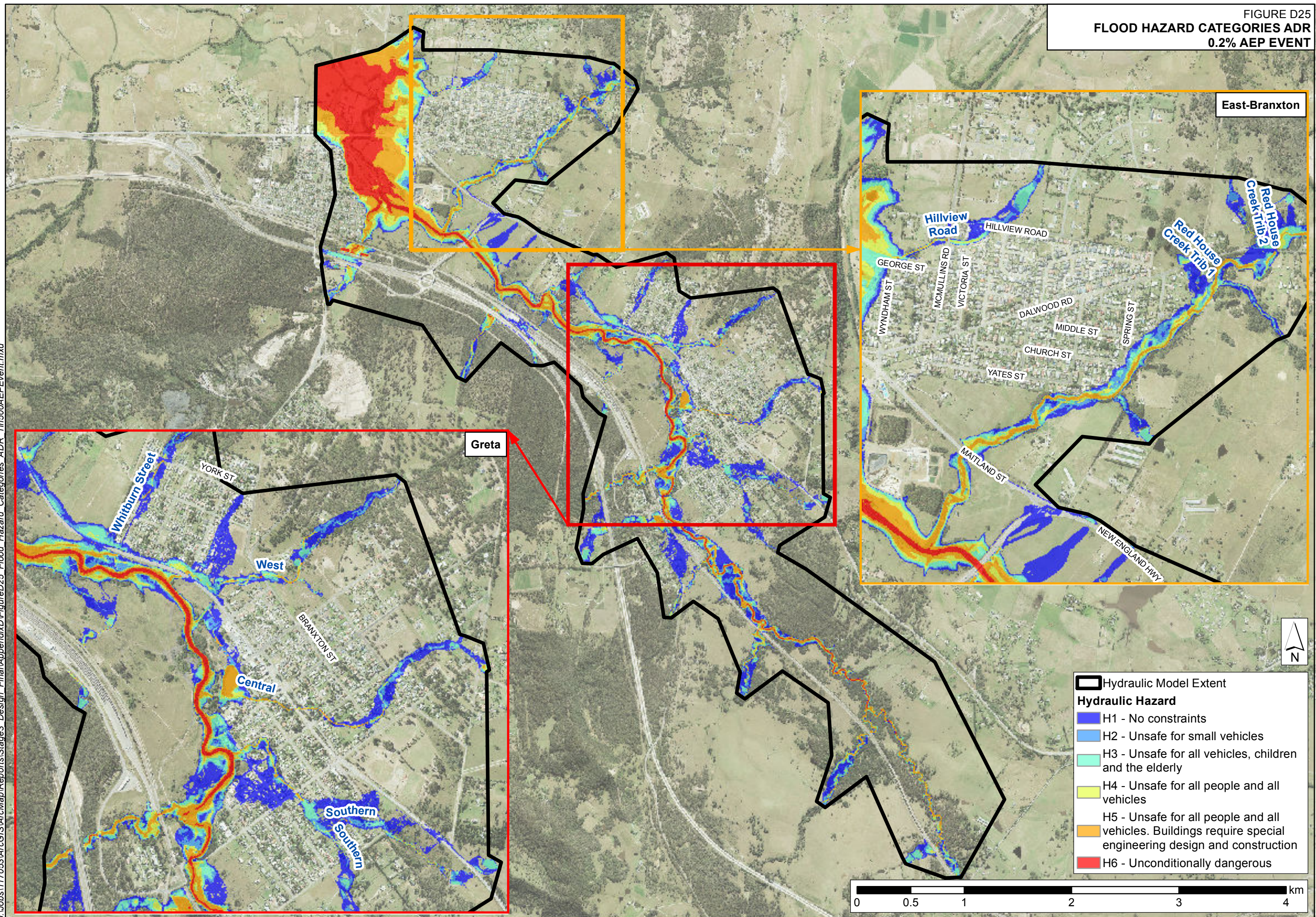


FIGURE D26
FLOOD HAZARD CATEGORIES ADR
PMF EVENT

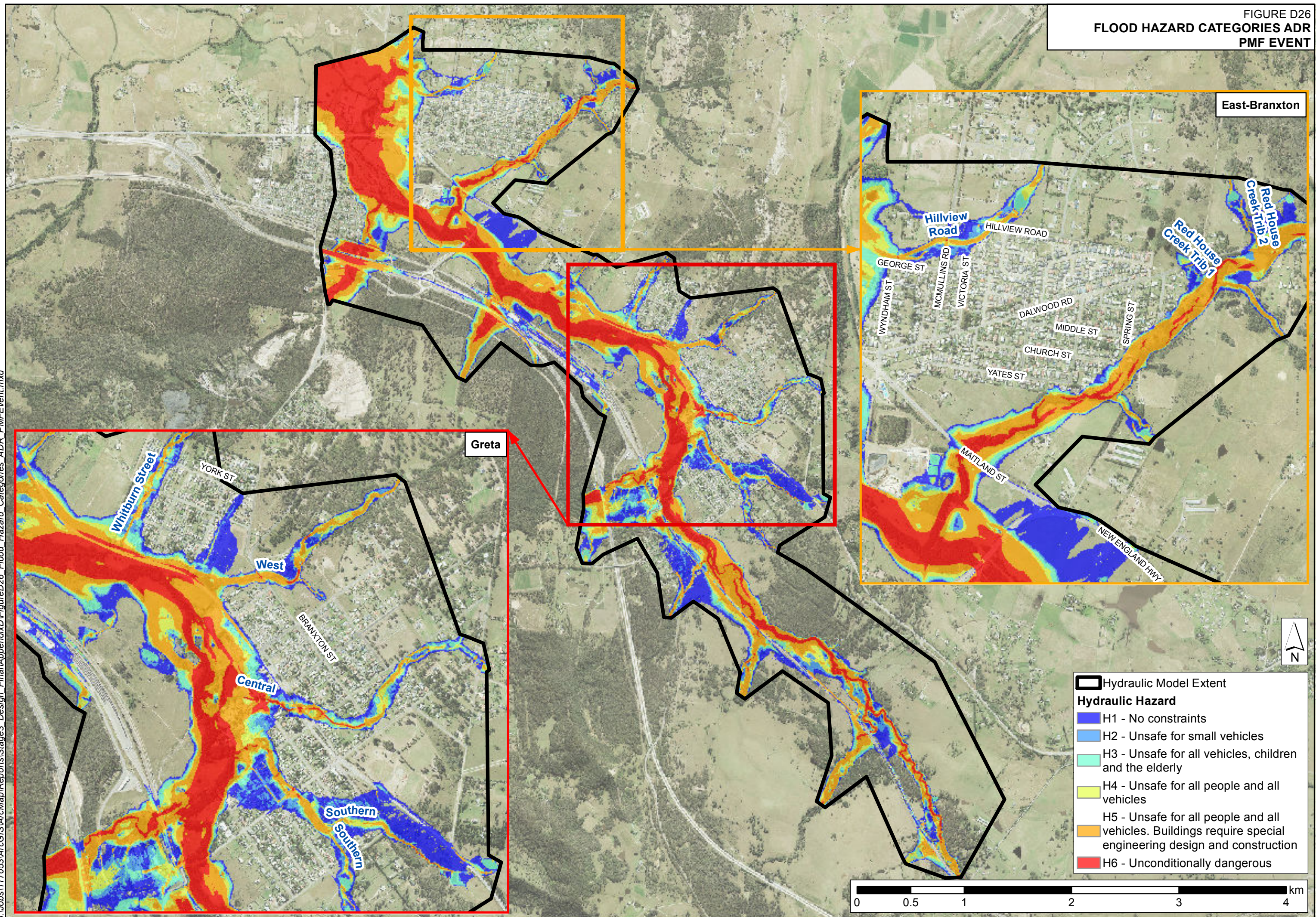


FIGURE D27
HYDRAULIC CATEGORIES
5% AEP EVENT

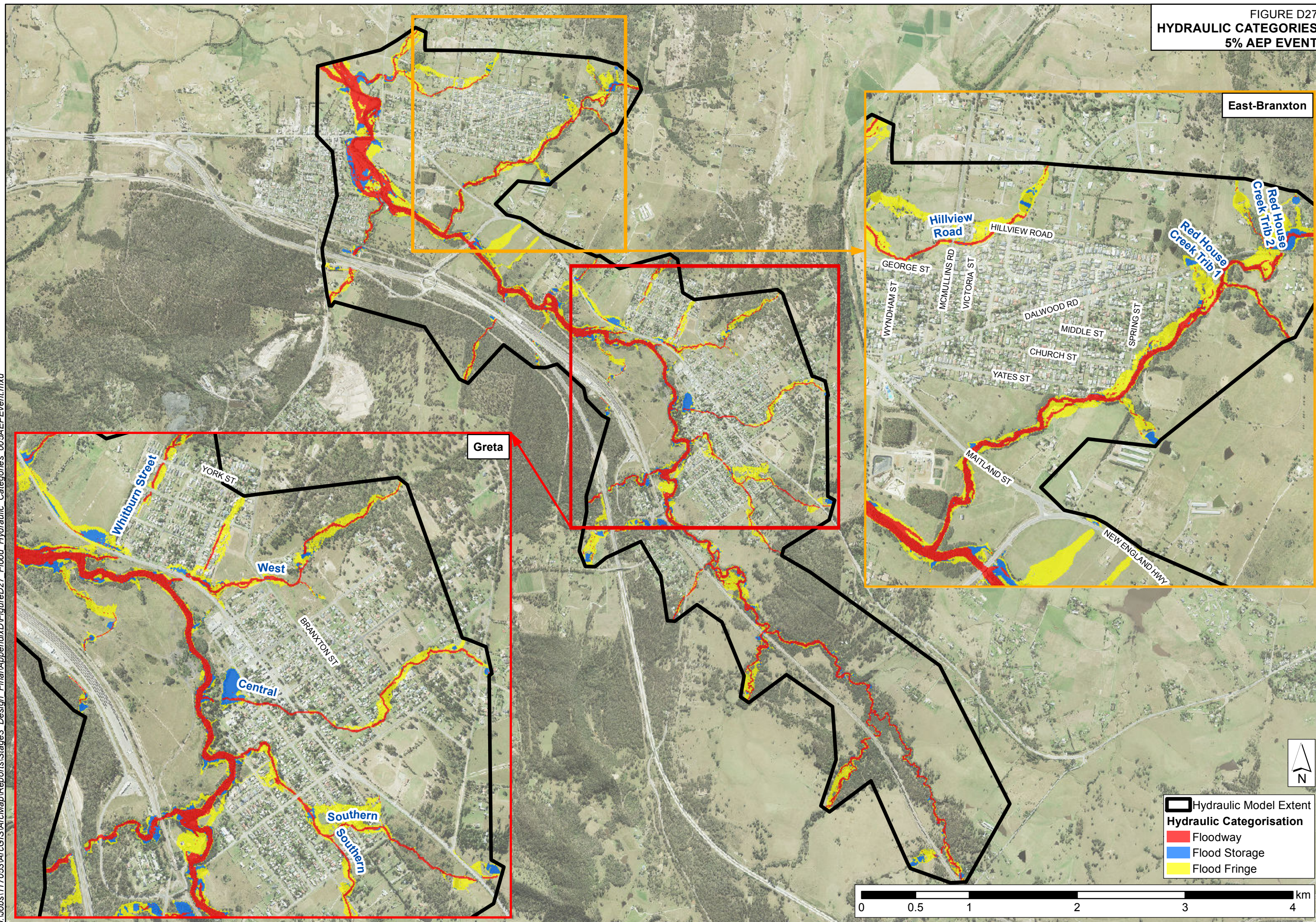


FIGURE D28
HYDRAULIC CATEGORIES
1% AEP EVENT

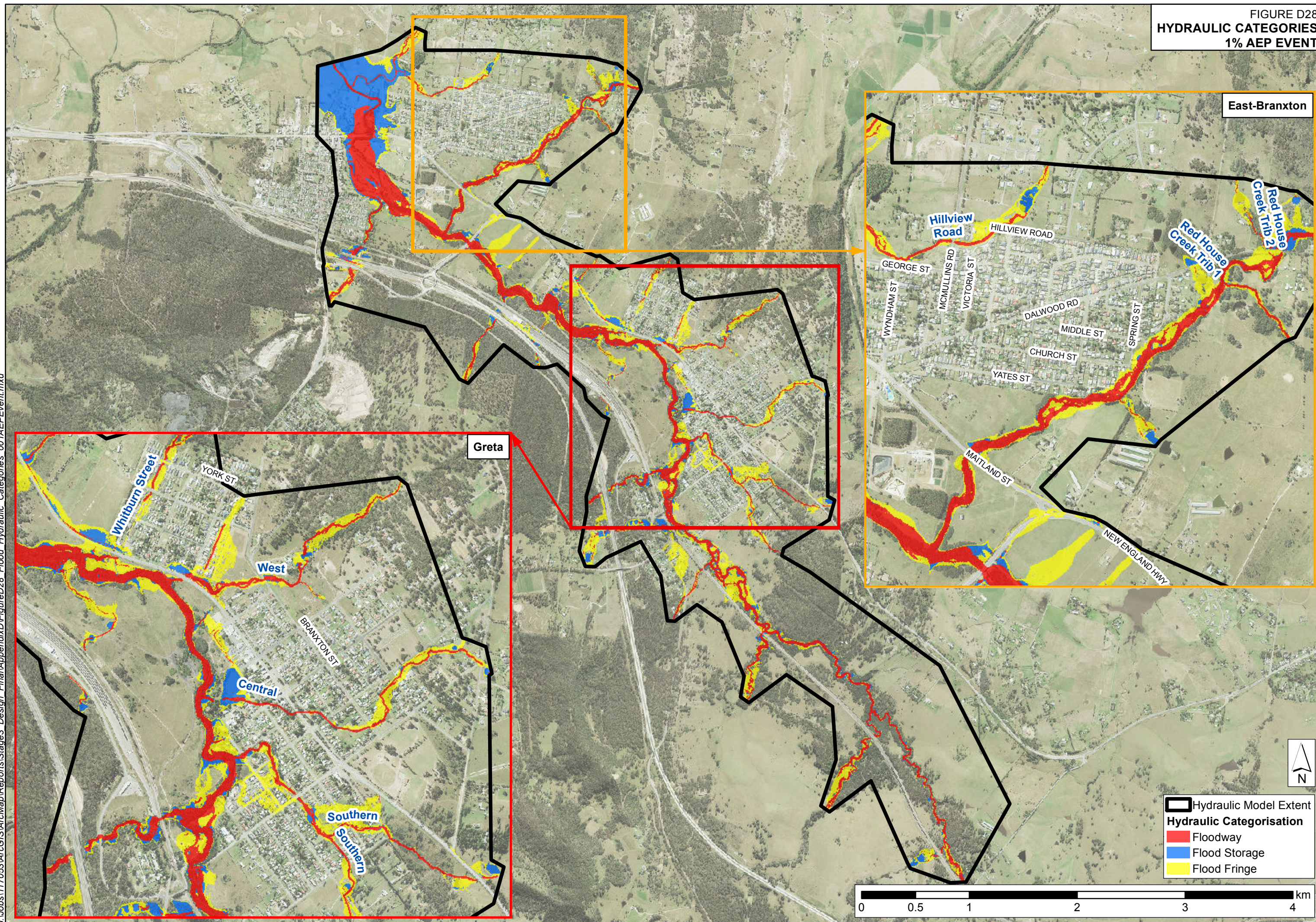


FIGURE D29
HYDRAULIC CATEGORIES
0.5% AEP EVENT

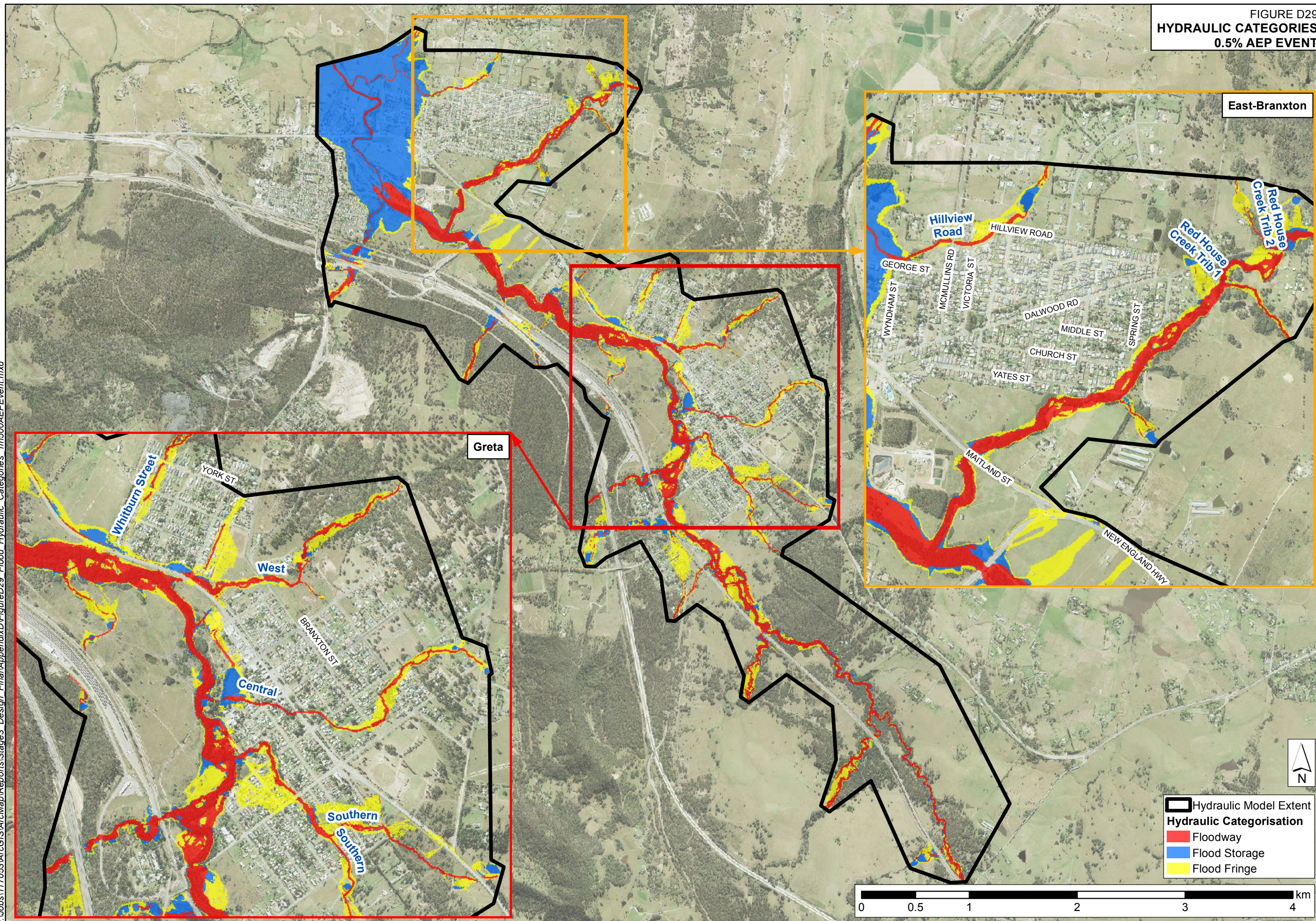
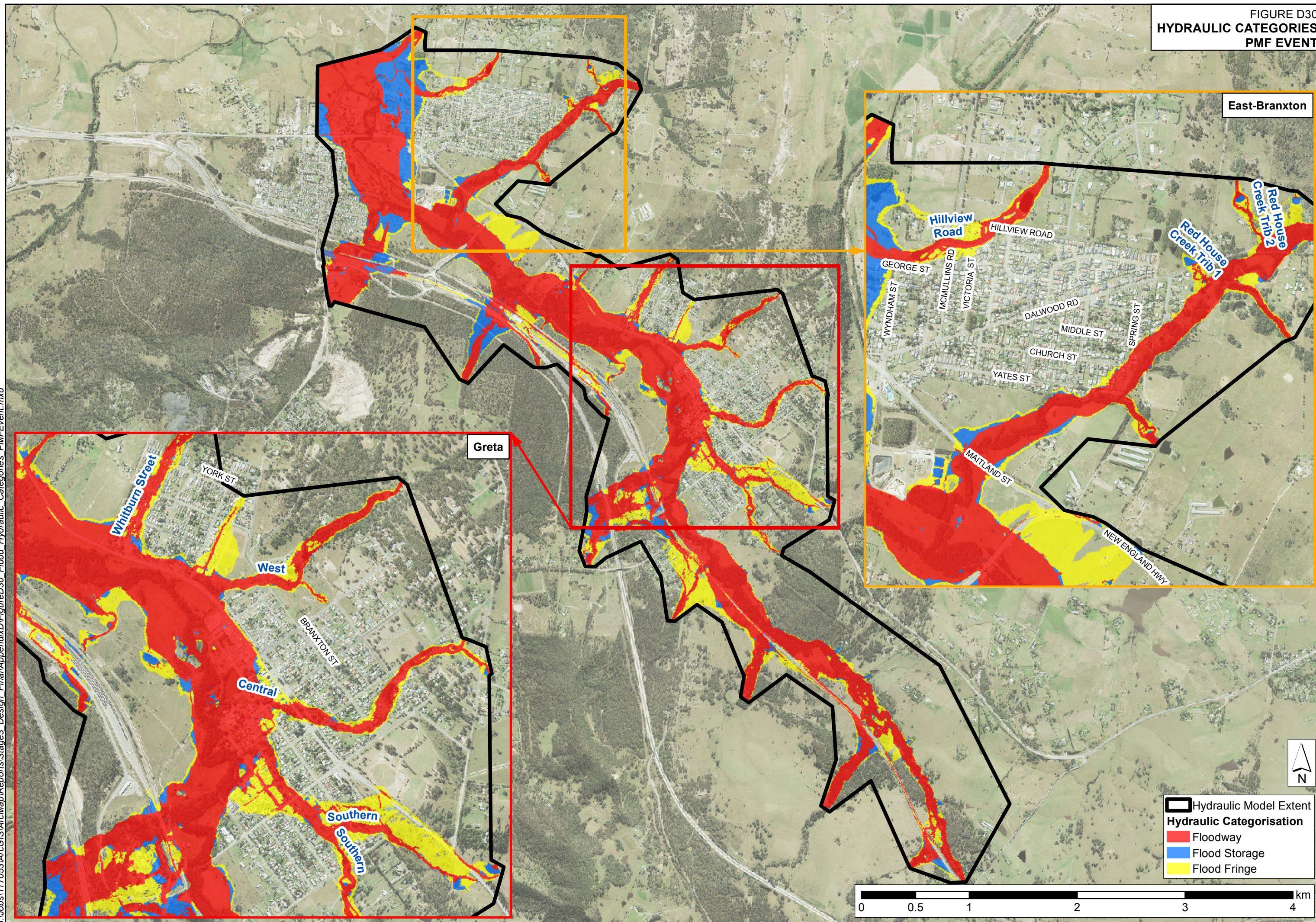
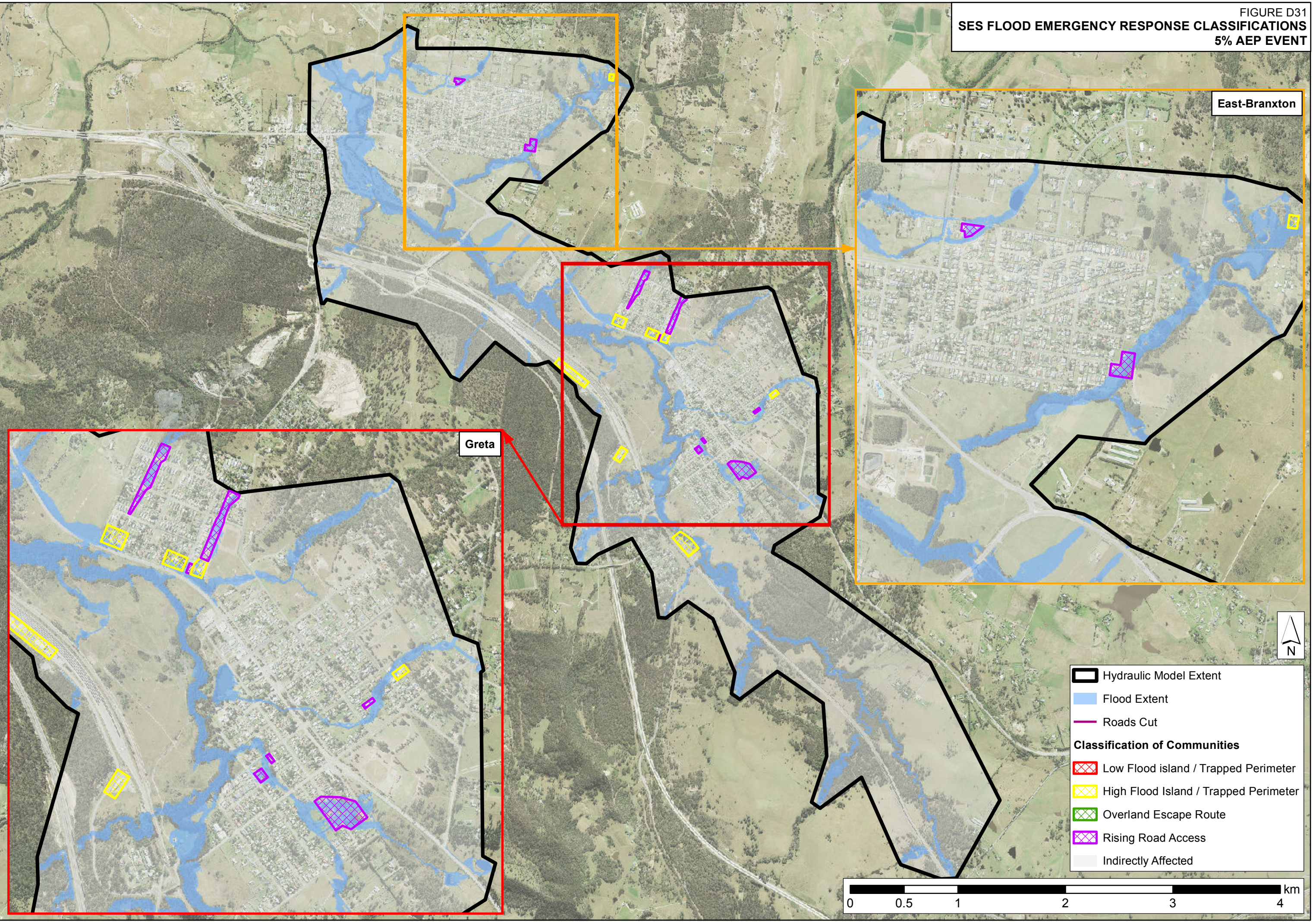


FIGURE D30
HYDRAULIC CATEGORIES
PMF EVENT



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






FIGURE D31
SES FLOOD EMERGENCY RESPONSE CLASSIFICATIONS
5% AEP EVENT



SES FLOOD EMERGENCY RESPONSE CLASSIFICATIONS
1 % AEP EVENT

East-Branxton

Greta

-  Hydraulic Model Extent
-  Flood Extent
-  Roads Cut
- Classification of Communities**
-  Low Flood island / Trapped Perimeter
-  High Flood Island / Trapped Perimeter
-  Overland Escape Route
-  Rising Road Access
-  Indirectly Affected

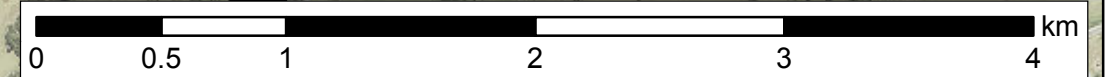
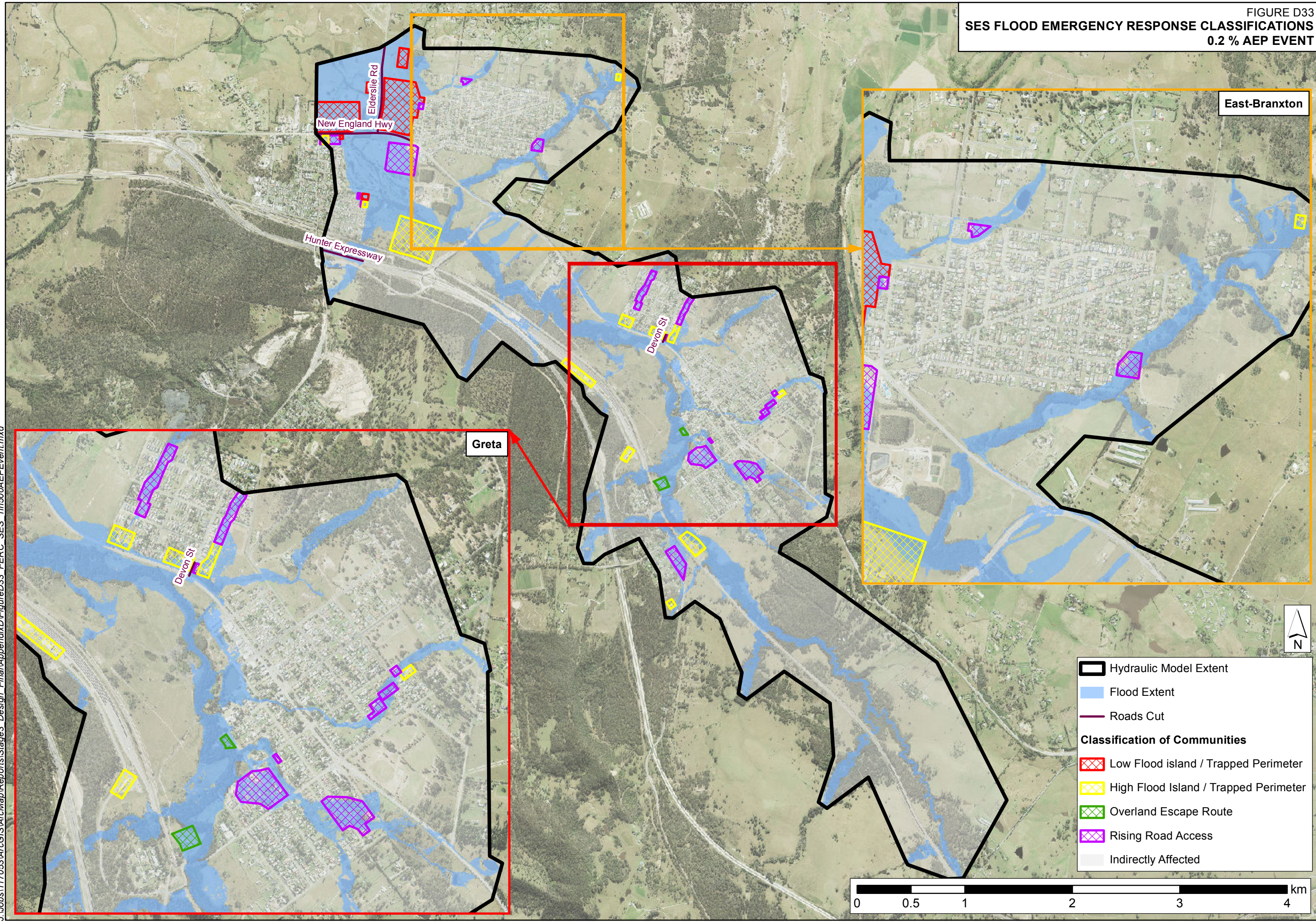


FIGURE D33
SES FLOOD EMERGENCY RESPONSE CLASSIFICATIONS
0.2 % AEP EVENT



Hydraulic Model Extent

Flood Extent

Roads Cut

Classification of Communities

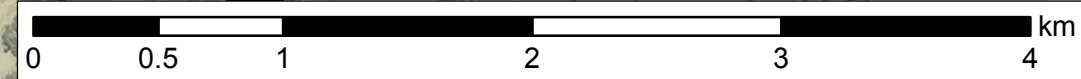
Low Flood island / Trapped Perimeter

High Flood Island / Trapped Perimeter

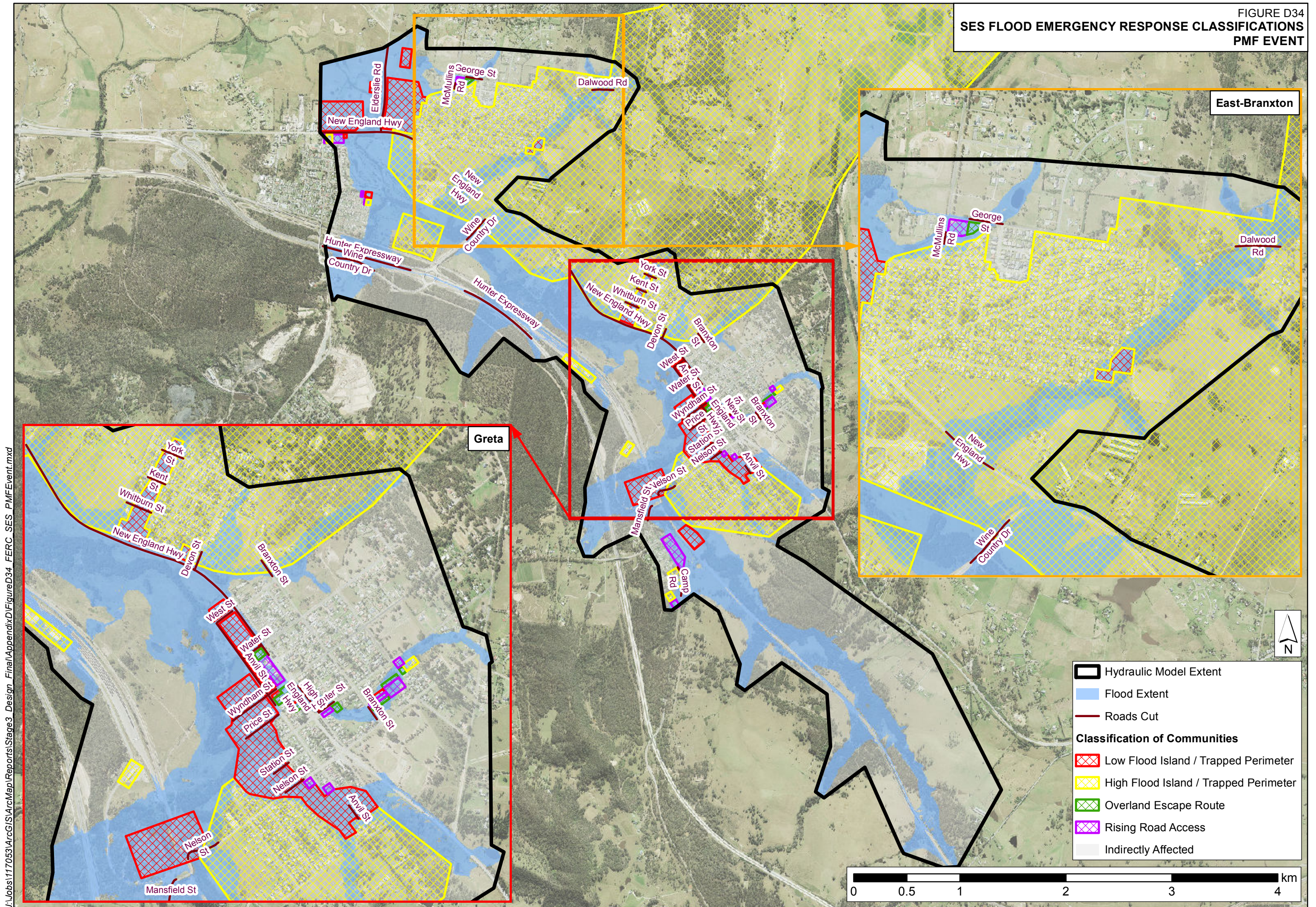
Overland Escape Route

Rising Road Access

Indirectly Affected



SES FLOOD EMERGENCY RESPONSE CLASSIFICATIONS
PMF EVENT



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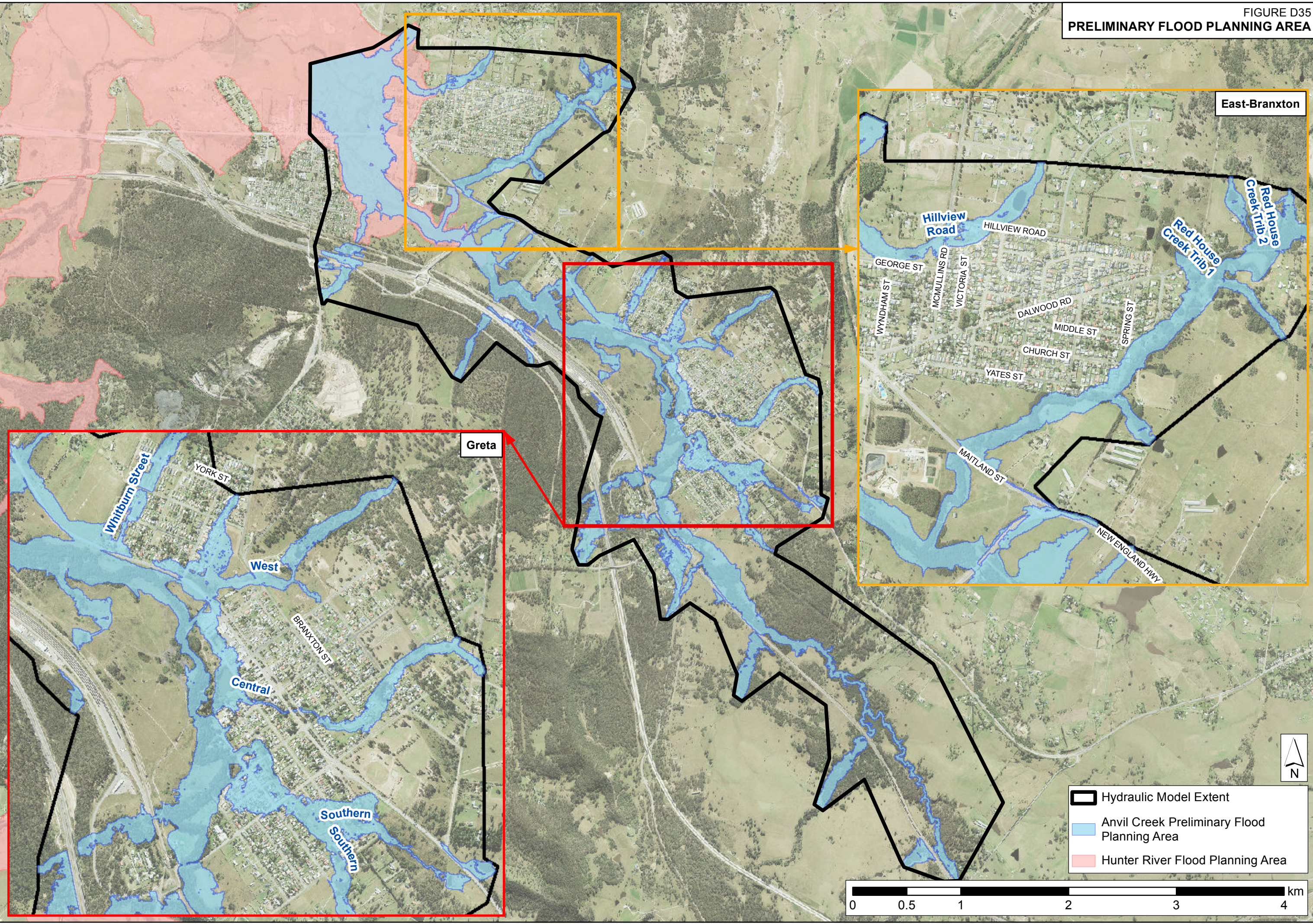


FIGURE D35
PRELIMINARY FLOOD PLANNING AREA

East-Bransxton

Greta

- Hydraulic Model Extent
- Anvil Creek Preliminary Flood Planning Area
- Hunter River Flood Planning Area

0 0.5 1 2 3 4 km

Appendix E **Design Flood Plots and Tables**

Figure E1: Peak Water Level Profile – Anvil Creek

Figure E2: Peak Water Level Profile – Southern Tributary

Figure E3: Peak Water Level Profile – Central Tributary

Figure E4: Peak Water Level Profile – West Street Tributary

Figure E5: Peak Water Level Profile – Whitburn Street Tributary

Figure E6: Peak Water Level Profile – Red House Creek

Figure E7: Peak Water Level Profile – Hillview Road Tributary

Figure E8: Water Level Hydrograph – Mansfield Street

Figure E9: Water Level Hydrograph – Nelson Street

Figure E10: Water Level Hydrograph – Maitland Street

Figure E11: Water Level Hydrograph – Wine Country Drive



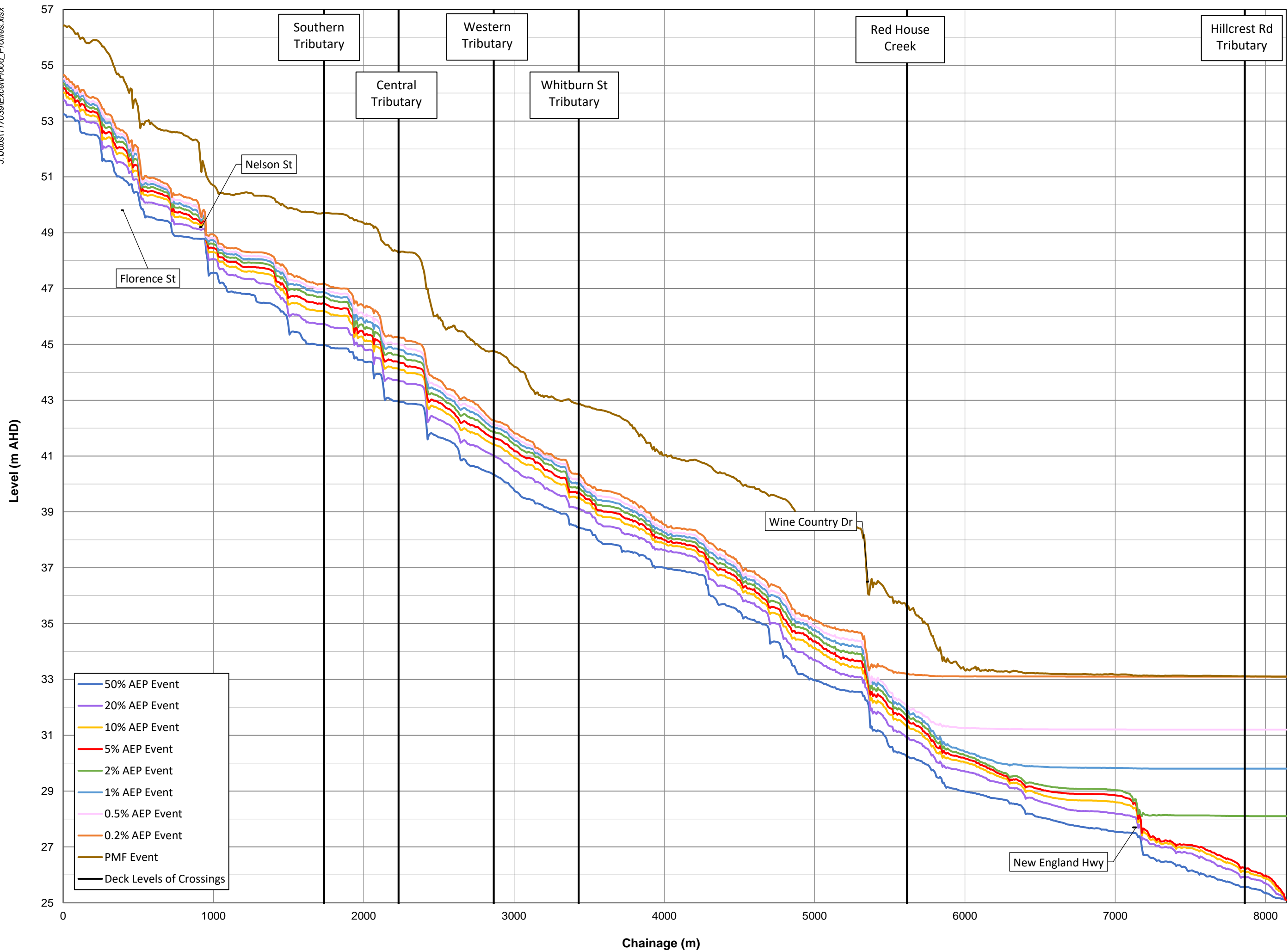


FIGURE E1
PEAK FLOOD LEVEL PROFILE
ANVIL CREEK
DESIGN STORMS

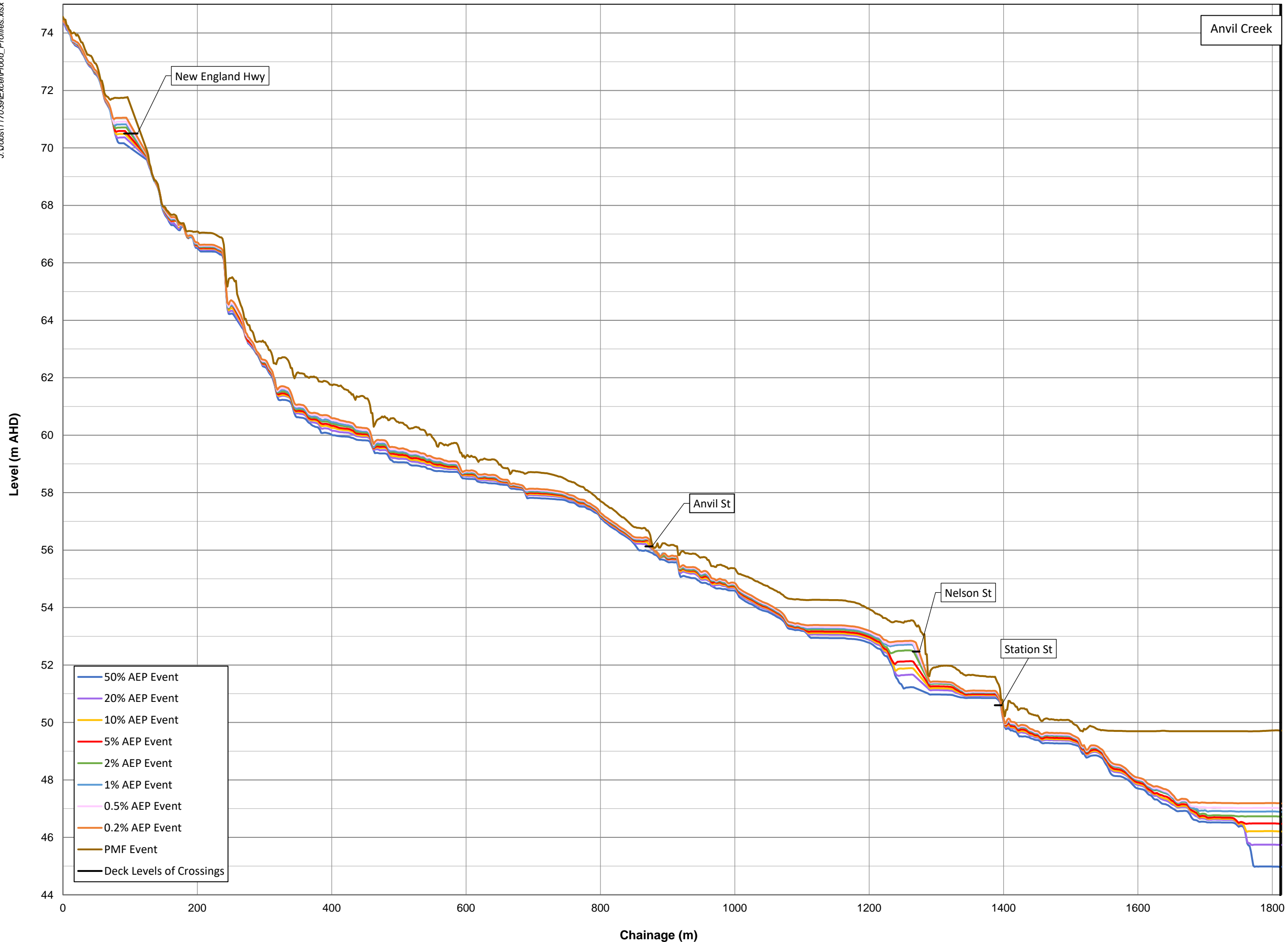


FIGURE E2
PEAK FLOOD LEVEL PROFILE
SOUTHERN TRIBUTARY
DESIGN STORMS

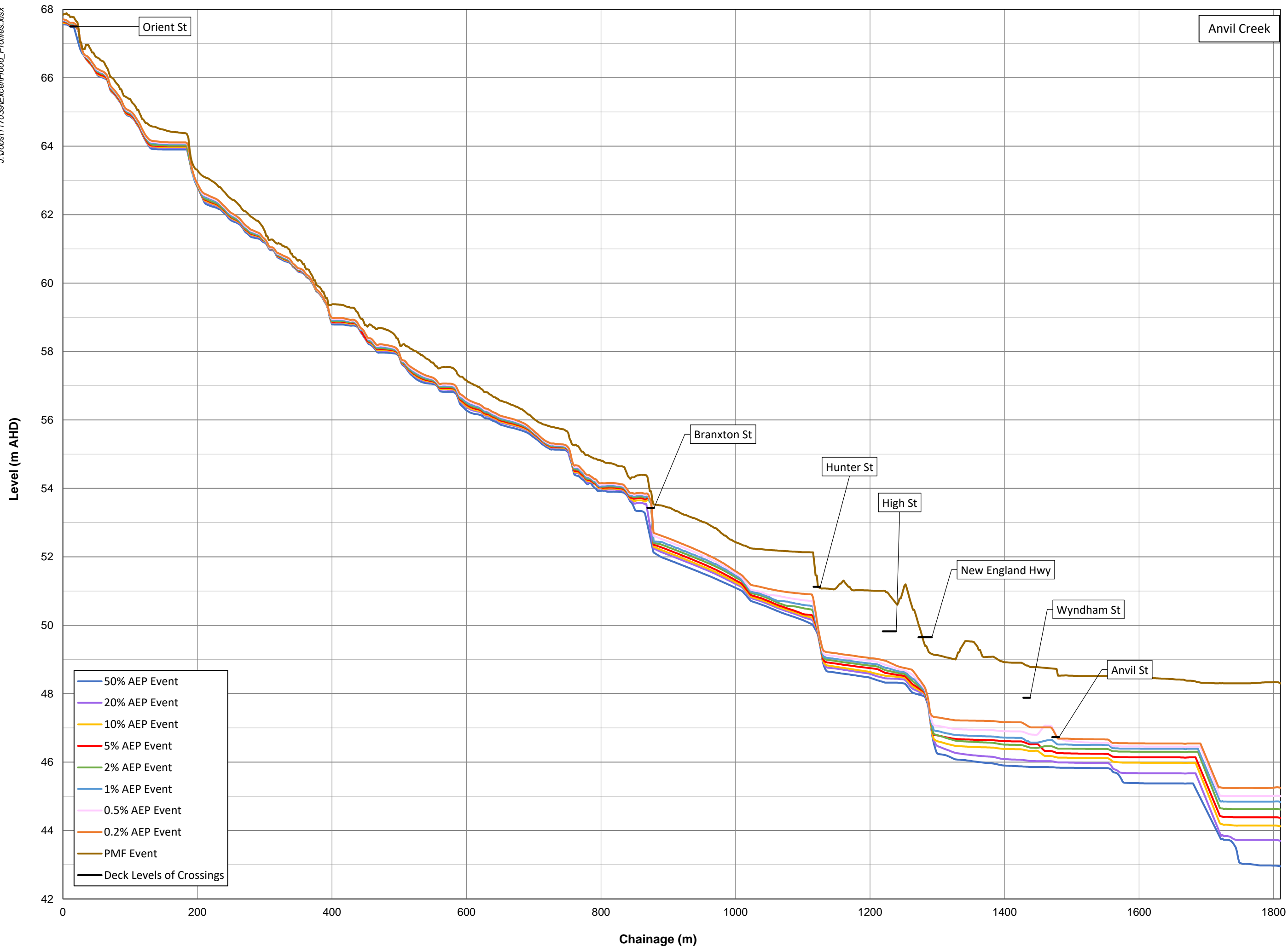


FIGURE E3
PEAK FLOOD LEVEL PROFILE
CENTRAL TRIBUTARY
DESIGN STORMS



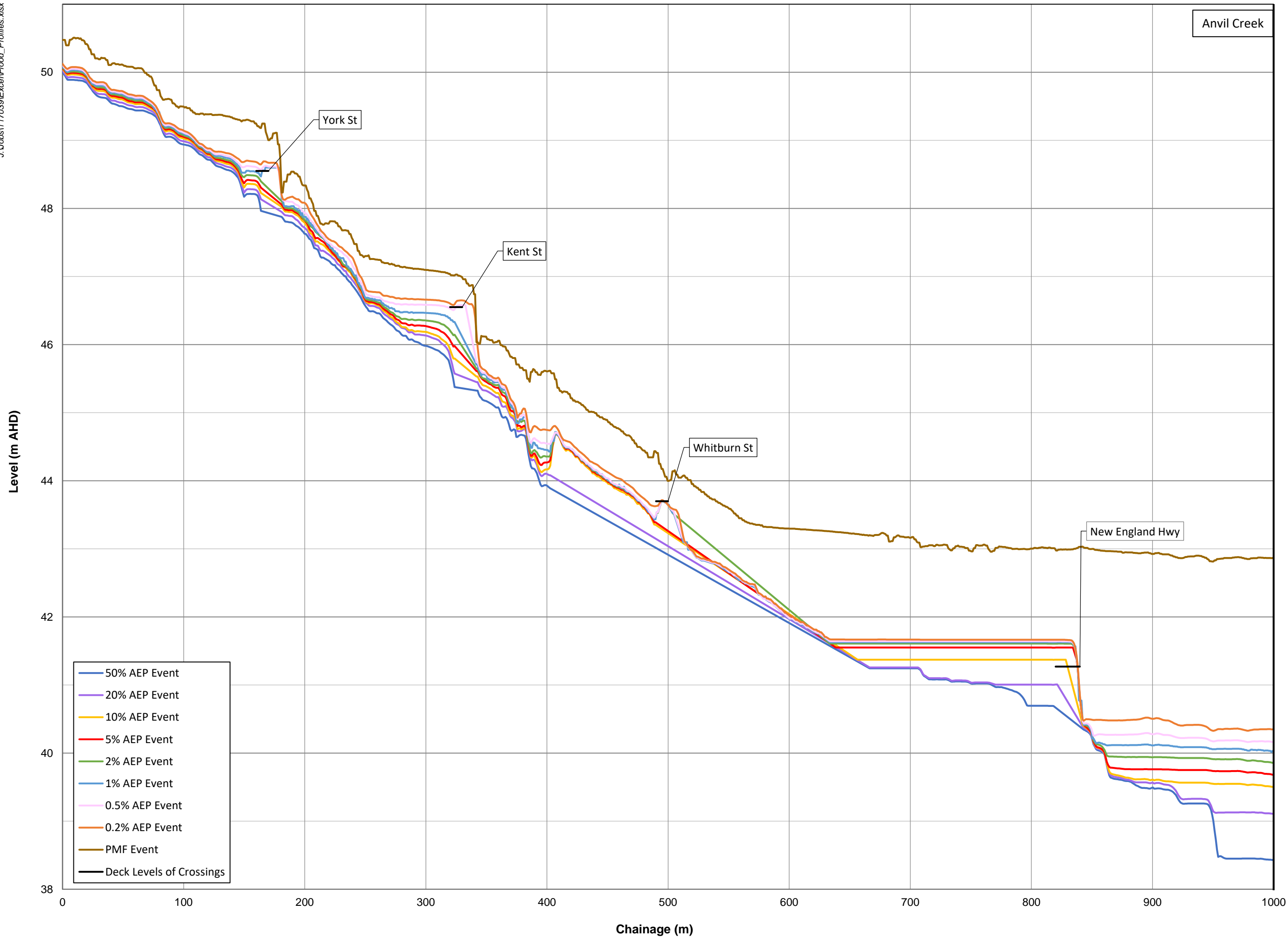


FIGURE E5
PEAK FLOOD LEVEL PROFILE
WHITBURN ST TRIBUTARY
DESIGN STORMS

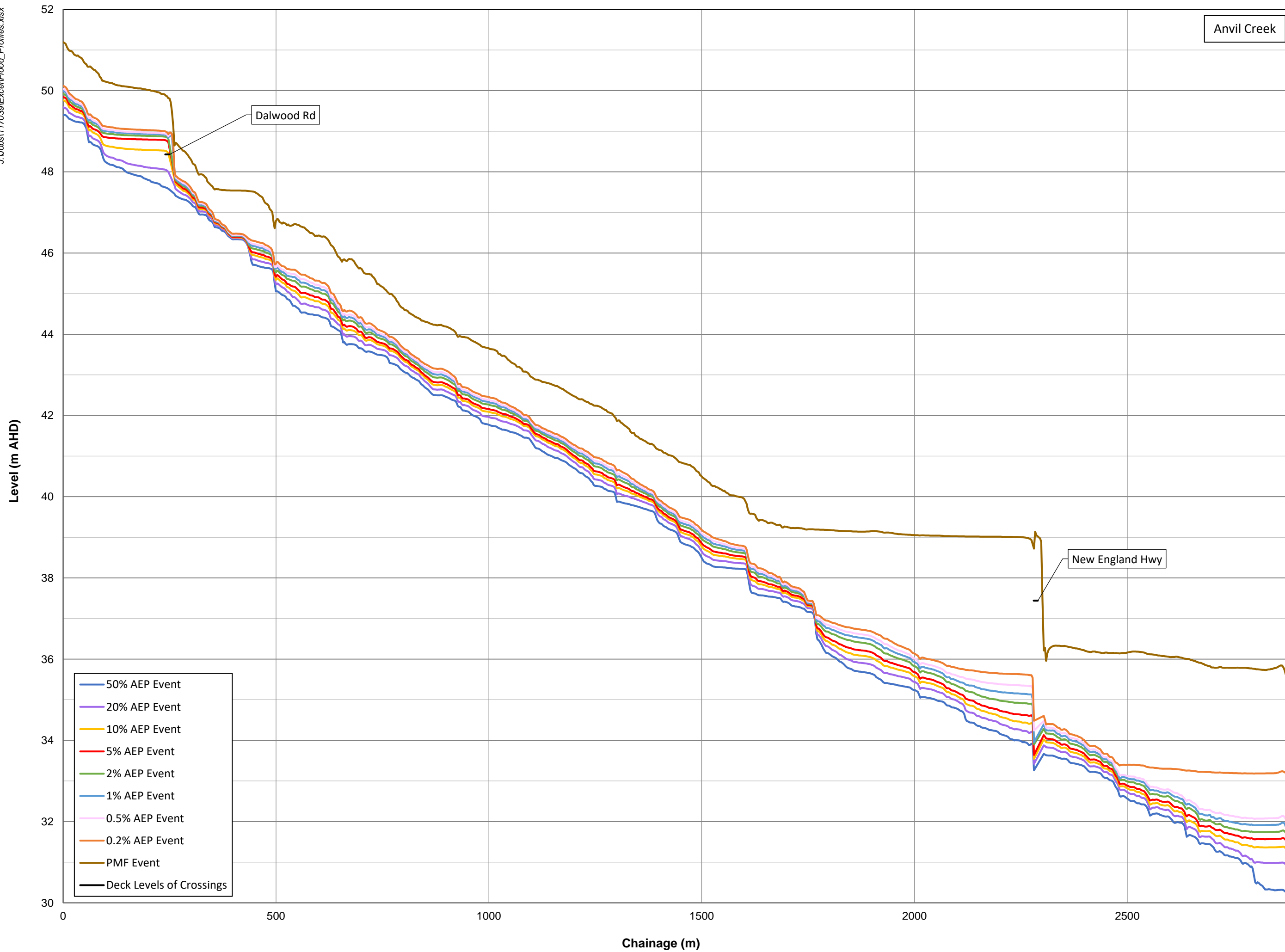


FIGURE E6
PEAK FLOOD LEVEL PROFILE
RED HOUSE CREEK
DESIGN STORMS

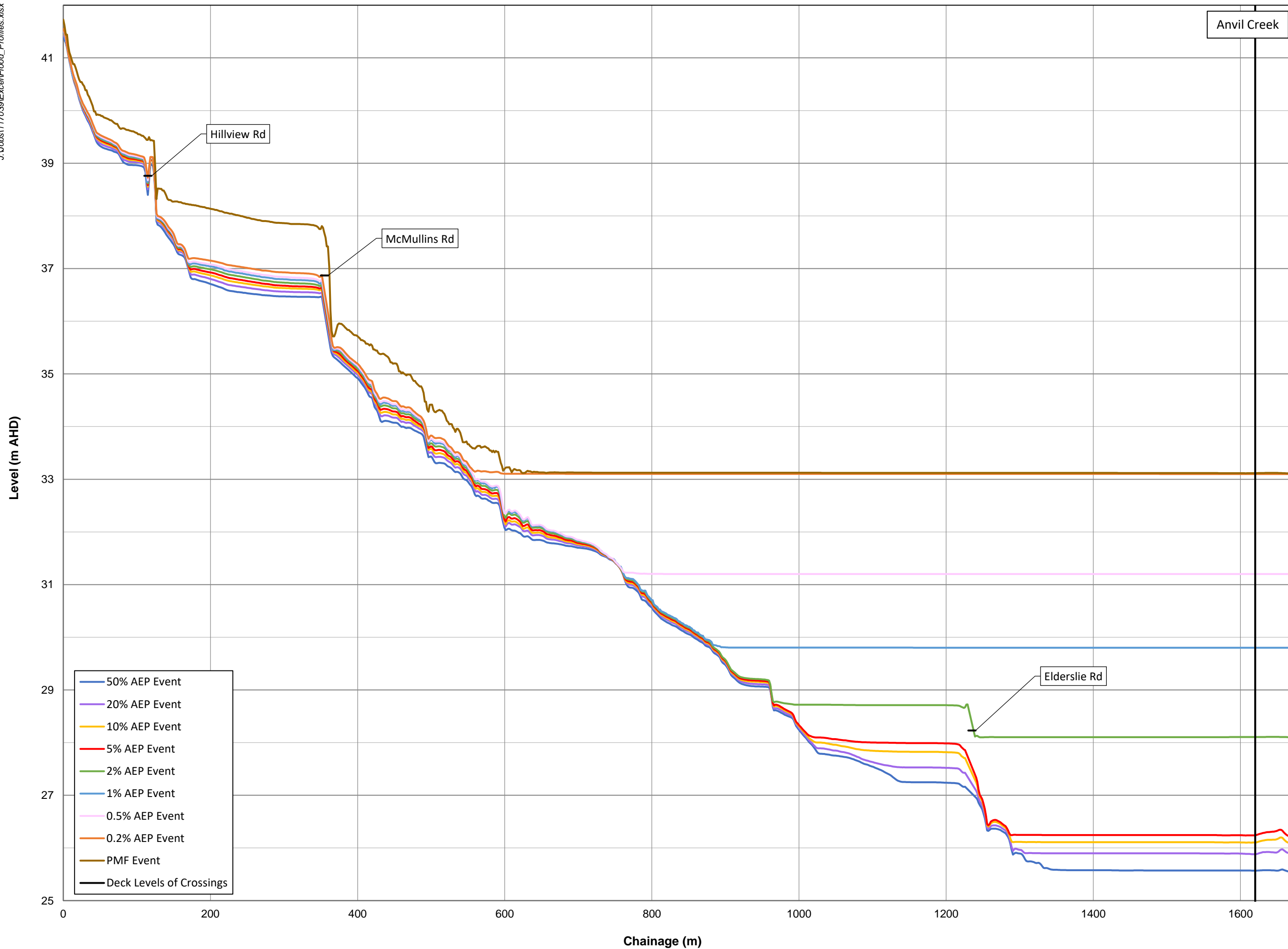


FIGURE E7
PEAK FLOOD LEVEL PROFILE
HILLVIEW RD TRIBUTARY
DESIGN STORMS

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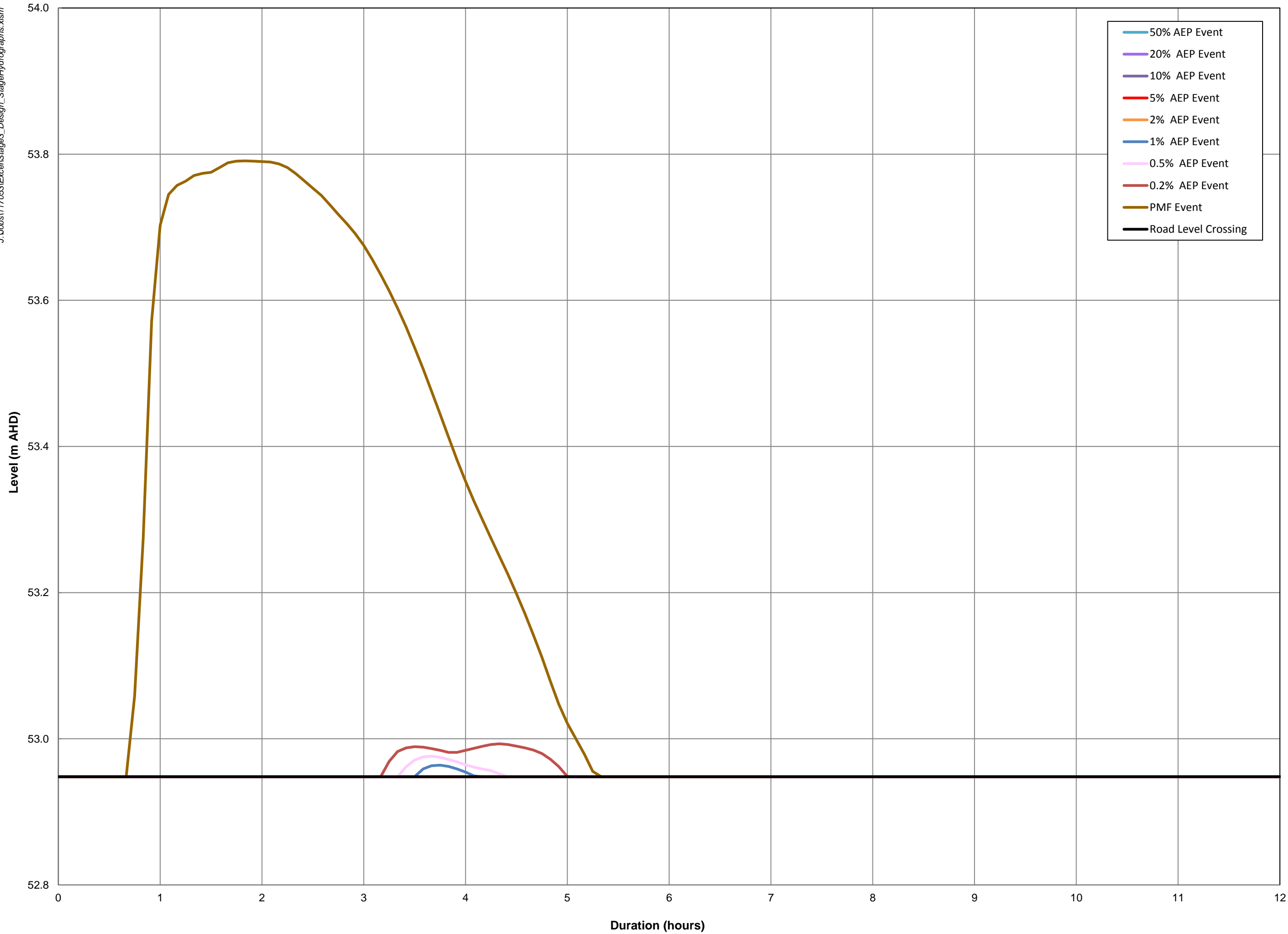


FIGURE E8
STAGE LEVEL HYDROGRAPH
MANSFIELD STREET
DESIGN STORMS

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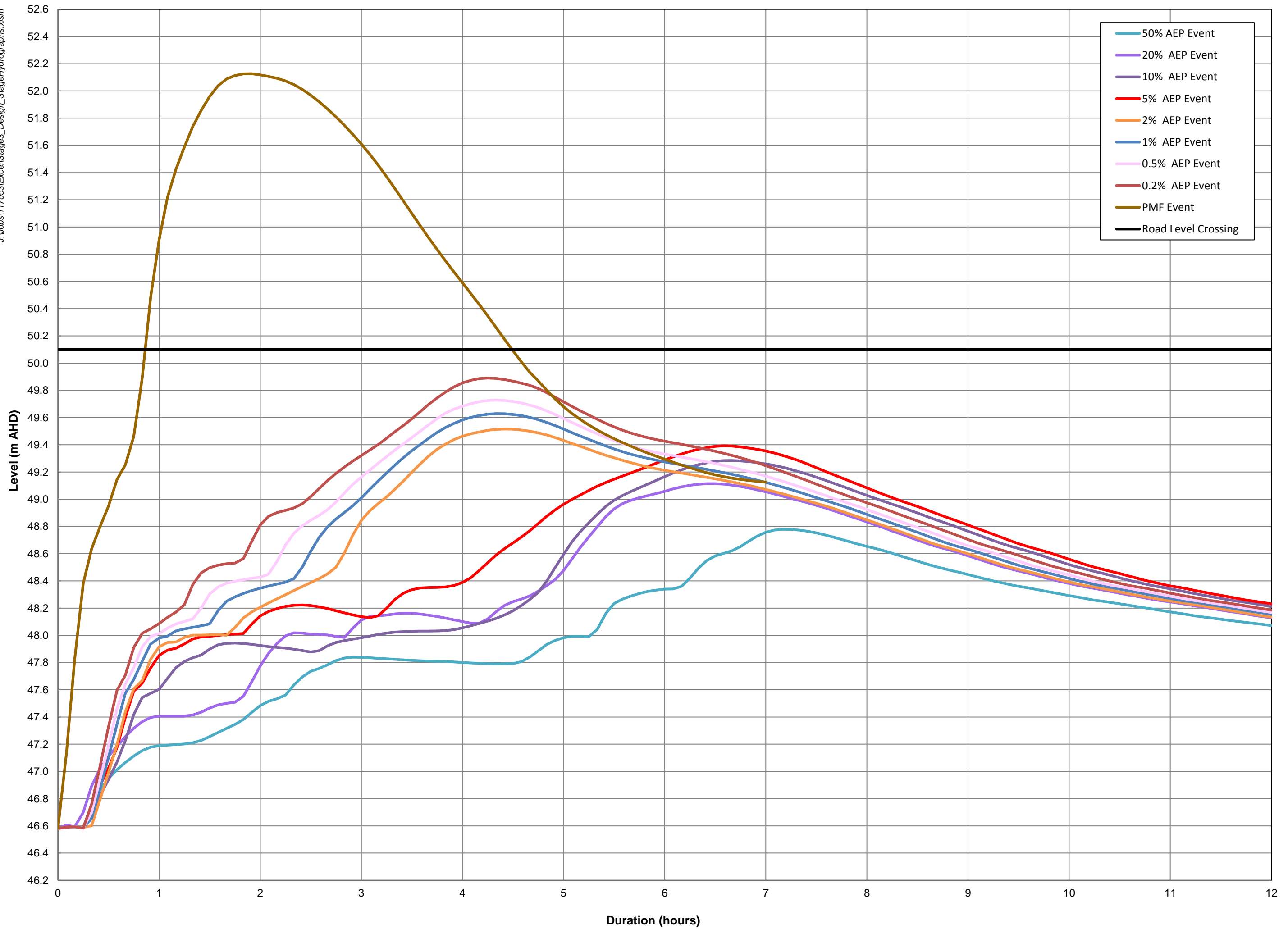


FIGURE E9
STAGE LEVEL HYDROGRAPH
NELSON STREET
DESIGN STORMS

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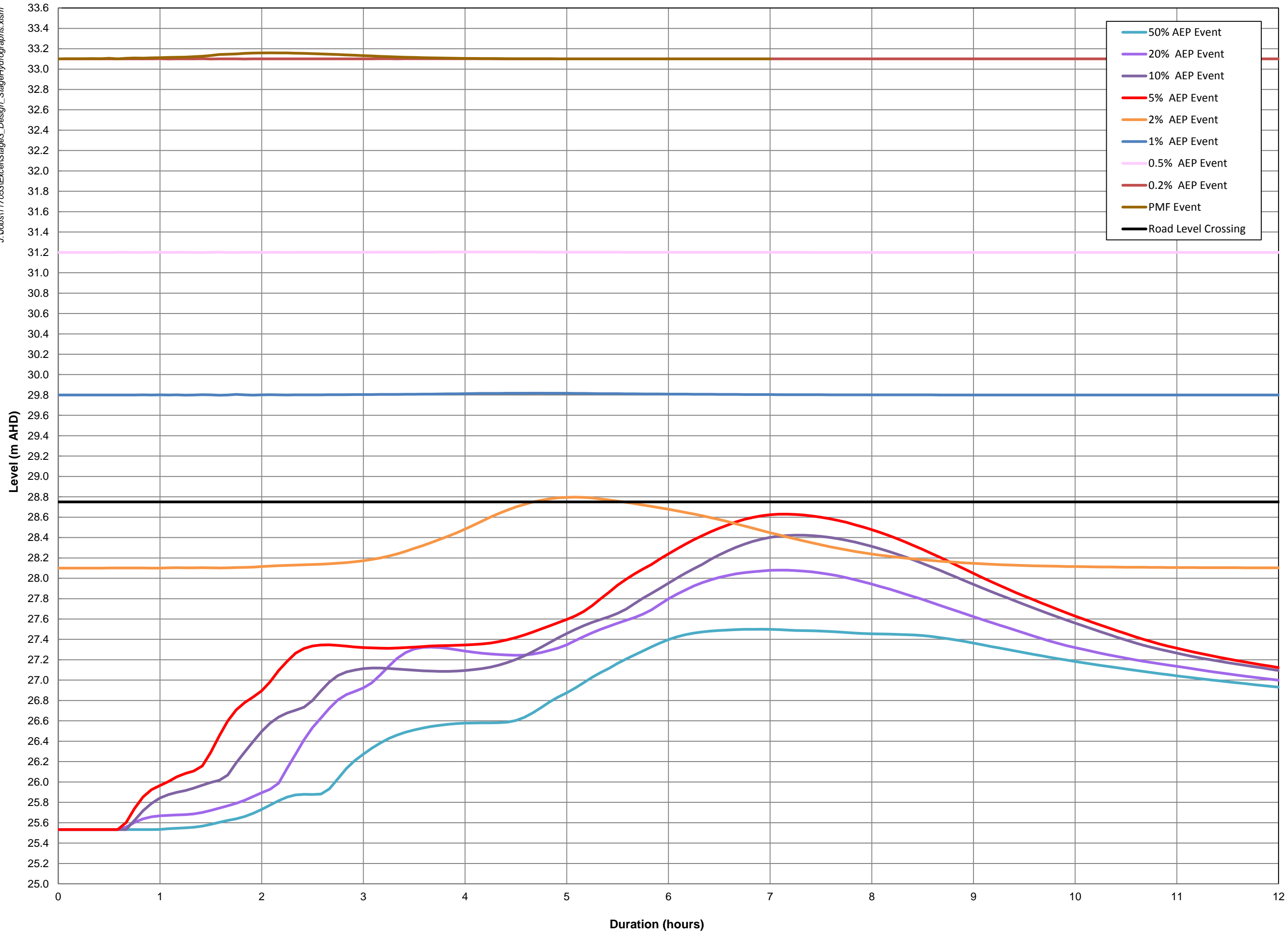


FIGURE E10
STAGE LEVEL HYDROGRAPH
MAITLAND STREET, BRANTXTON
DESIGN STORMS

J:\obs117053\Excel\Stage3_Design_StageHydrographs.xlsm

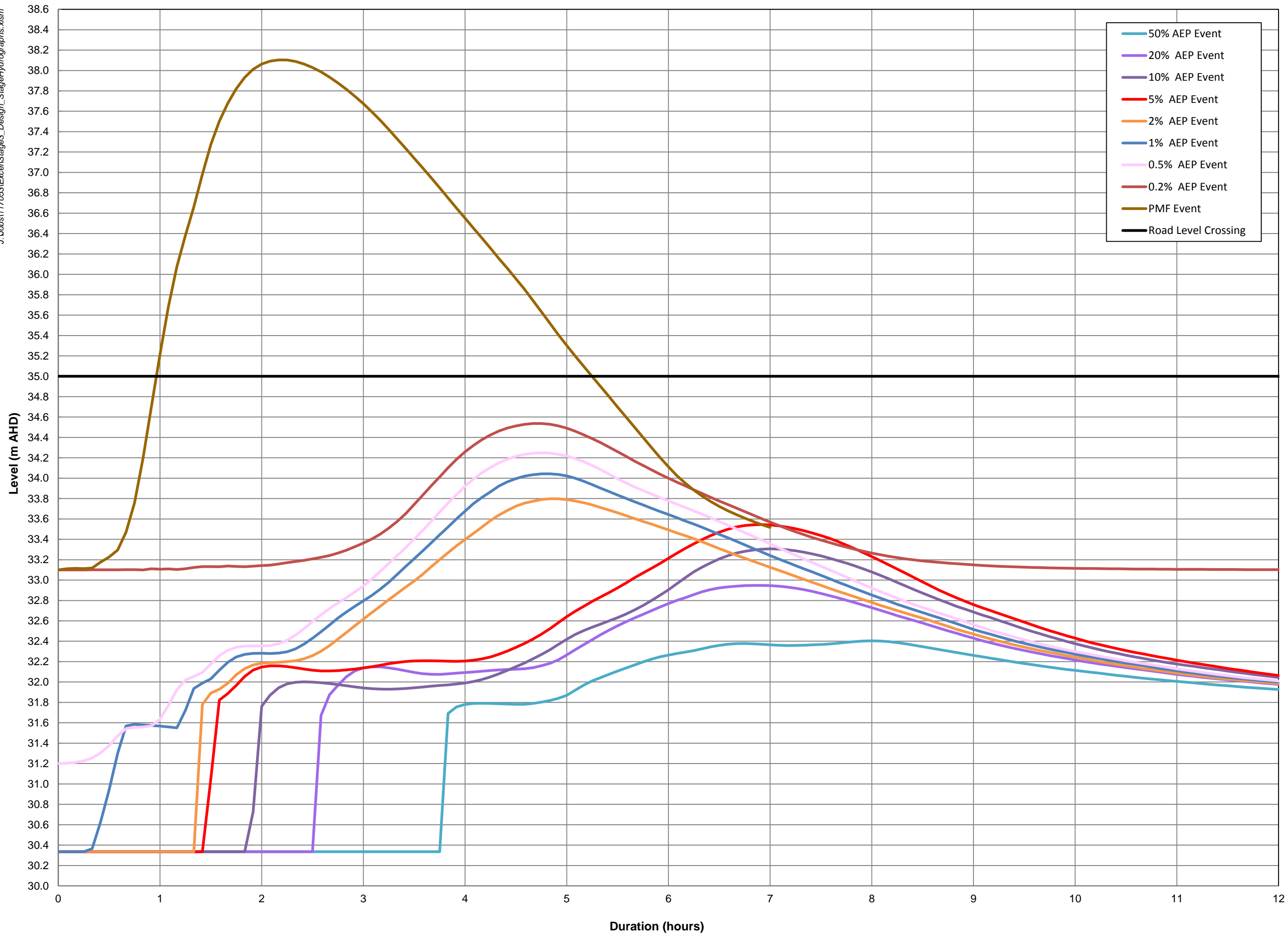


FIGURE E11
STAGE LEVEL HYDROGRAPH
WINE COUNTRY DRIVE
DESIGN STORMS

Table E1: Peak Flood Depths at Road Crossings (m)

ID	Location	50% AEP	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP	0.5% AEP	0.2% AEP	PMF
R01	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF
R02	Mansfield Road	NF	NF	NF	NF	NF	<0.1	<0.1	<0.1	0.8
R03	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	0.1
R04	Anvil Street	NF	NF	NF	NF	<0.1	<0.1	<0.1	0.1	0.3
R05	Nelson Street	NF	NF	NF	NF	NF	NF	NF	NF	0.4
R06	Station Street	<0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.5
R07	Hunter Street	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	1
R08	Orient Street	NF	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	0.2
R09	Branxton Street	NF	NF	NF	<0.1	<0.1	0.1	0.1	0.1	0.5
R10	Hunter Street	NF	NF	NF	NF	NF	NF	NF	NF	NF
R11	High Street	NF	NF	NF	NF	NF	NF	NF	NF	NF
R12	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF
R13	Wyndham Street	NF	NF	NF	NF	NF	NF	NF	NF	NF
R14	Anvil Street	NF	NF	NF	NF	NF	NF	NF	NF	NF
R15	Nelson Street	NF	NF	NF	NF	NF	NF	NF	NF	1.2
R16	Branxton Street	NF	NF	NF	NF	NF	<0.1	0.1	0.1	0.4
R17	Kent Street	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
R18	Devon Street	NF	NF	NF	NF	NF	<0.1	0.1	0.1	1.7
R19	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	1.6
R20	Kent Street	NF	NF	NF	NF	NF	NF	NF	<0.1	0.3
R21	Whitburn Street	NF	NF	NF	NF	<0.1	<0.1	<0.1	<0.1	0.3
R22	New England Highway	NF	NF	<0.1	0.2	0.2	0.3	0.3	0.3	1.6
R23	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	0.2
R24	York Street	NF	NF	NF	NF	NF	<0.1	0.1	0.2	0.8
R25	Wine Country Drive	NF	0.4	0.7	0.9	1.1	1.3	1.4	1.6	4.4
R26	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	0.7
R27	Dalwood Road	NF	NF	<0.1	0.1	0.1	0.1	0.1	0.1	0.3
R28	Maitland Street	NF	NF	NF	NF	<0.1	1.1	2.5	4.4	4.4
R29	Hillview Road	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.7
R30	McMullins Road	NF	NF	NF	NF	NF	NF	NF	NF	0.5
R31	Elderslie Road	NF	NF	NF	NF	NF	1.1	2.5	4.4	4.4
R32	Dalwood Road	NF	NF	NF	<0.1	0.1	0.1	0.1	0.2	1

Note: “NF” indicates road is not flooded

Table E2: Peak Flood Flow at Road Crossings

ID	Location	Type	50% AEP Event	20% AEP Event	10% AEP Event	5% AEP Event	2% AEP Event	1% AEP Event	0.5% AEP Event	0.2% AEP Event	PMF Event
R01	New England Highway, Greta	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.5
		Channel / Pipe flow	0.5	0.8	1.1	1.3	1.5	1.7	1.9	2.2	3.2
R02	Mansfield Road, Greta	Overbank / Overland	0.0	0.0	0.0	0.0	0.1	0.6	1.0	1.7	9.1
R03	New England Highway	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
		Channel / Pipe flow	0.8	0.9	0.9	1.0	1.1	1.3	1.5	1.7	6.9
R04	Anvil Street, Greta	Overbank / Overland	0.0	0.2	0.7	1.3	2.1	2.8	3.5	4.7	43.6
		Channel / Pipe flow	1.6	2.8	3.1	3.4	3.6	3.7	3.8	3.9	5.0
R05	Nelson Street, Greta	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.6	1.5	3.3	71.1
		Channel / Pipe flow	2.9	5.1	6.3	7.7	9.8	10.7	11.2	11.8	14.8
R06	Station Street	Overbank / Overland	3.0	5.2	6.3	7.7	10.0	11.2	12.8	15.4	88.6
R07	Hunter Street	Overbank / Overland	3.0	5.3	6.4	7.8	10.2	11.5	12.7	15.3	90.6
R08	Orient Street	Overbank / Overland	0.0	0.1	0.1	0.3	0.6	0.9	1.1	1.4	8.9
		Channel / Pipe flow	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4
R09	Branxton Street	Overbank / Overland	0.0	0.0	0.0	0.6	1.4	2.4	3.7	5.3	53.3
		Channel / Pipe flow	2.7	4.2	5.0	5.4	5.7	5.9	6.2	6.5	8.5
R10	Hunter Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	46.9
		Channel / Pipe flow	3.0	4.7	5.6	6.6	8.0	9.2	10.9	13.0	19.2
R11	High Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.7
		Channel / Pipe flow	3.3	5.2	6.3	7.6	9.1	10.5	12.2	14.4	22.0
R12	New England Highway	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.6
		Channel / Pipe flow	3.6	5.4	6.6	7.7	9.2	10.5	12.1	14.4	26.2
R13	Wyndham Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.0
		Channel / Pipe flow	3.3	5.1	6.3	7.6	8.9	12.3	13.3	14.7	39.6
R14	Anvil Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.1
		Channel / Pipe flow	3.3	5.1	6.1	7.5	8.8	13.5	15.0	14.2	41.1
R15	Nelson Street	Overbank / Overland	15.4	35.6	52.7	65.3	80.6	95.2	108.5	128.9	835.2
R16	Branxton Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.5	1.7	3.5	66.5
		Channel / Pipe flow	3.4	5.4	6.5	7.8	9.4	10.5	10.9	11.3	14.6
R17	Kent Street	Overbank / Overland	0.4	0.6	0.5	0.6	0.7	0.8	0.9	1.1	5.4
R18	Devon Street	Overbank / Overland	0.3	0.8	2.0	3.5	6.1	8.5	11.3	15.0	190.7
		Channel / Pipe flow	4.2	6.2	6.3	6.4	6.3	6.3	6.3	6.5	8.5
R19	New England Highway	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.4
		Channel / Pipe flow	4.5	6.7	8.1	9.7	12.0	13.8	15.2	17.3	17.9
R20	Kent Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	42.1
		Channel / Pipe flow	2.1	3.3	4.1	5.0	5.9	6.7	7.3	8.2	9.8
R21	Whitburn Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	44.2
		Channel / Pipe flow	2.4	3.7	4.5	5.5	6.5	7.4	8.1	10.5	14.2
R22	New England Highway	Overbank / Overland	0.0	0.0	0.0	0.1	1.4	2.6	3.5	5.2	102.4
		Channel / Pipe flow	2.4	3.7	4.5	5.5	6.5	7.4	8.1	10.1	13.7

R23	New England Highway	Overbank / Overland	0.0	0.0	0.1	0.3	0.6	0.8	1.1	1.6	125.1
		Channel / Pipe flow	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.1
R24	York Street	Overbank / Overland	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	33.8
		Channel / Pipe flow	1.8	2.7	3.7	4.4	5.2	6.0	6.9	8.5	11.9
R25	Wine Country Drive, Greta	Overbank / Overland	24.8	60.9	91.7	114.6	142.2	171.3	196.8	235.8	1742.7
R26	New England Highway	Overbank / Overland	8.7	13.9	18.5	22.6	29.9	35.6	40.9	48.3	182.6
		Channel / Pipe flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.5
R27	Dalwood Road, East-Branxton	Overbank / Overland	0.0	0.0	0.0	0.8	4.3	6.8	8.6	12.3	155.4
		Channel / Pipe flow	4.4	7.6	10.8	12.4	12.9	13.5	14.5	15.3	18.1
R28	Maitland Street, East-Branxton	Overbank / Overland	33.0	76.9	115.8	145.3	180.4	219.8	252.1	295.1	2223.3
R29	Hillview Road, East-Branxton	Overbank / Overland	0.1	0.1	0.5	0.9	1.4	2.0	2.2	2.9	31.7
		Channel / Pipe flow	1.6	2.5	3.0	3.3	3.6	4.0	4.3	4.7	10.3
R30	McMullins Road, East-Branxton	Overbank / Overland	0.2	0.3	0.1	0.2	0.2	0.1	0.0	0.0	36.2
		Channel / Pipe flow	5.9	6.1	5.5	6.2	7.0	8.2	9.0	10.5	19.3
R31	Elderslie Road, East-Branxton	Overbank / Overland	0.0	0.0	0.0	0.0	1.4	22.3	25.7	31.6	167.1
		Channel / Pipe flow	5.2	8.2	11.7	14.0	15.4	0.0	0.0	0.0	0.0
R32	Dalwood Road, East-Branxton	Overbank / Overland	0.0	0.0	0.3	0.7	1.0	1.2	1.5	1.9	12.7
		Channel / Pipe flow	0.5	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7

Note: Some pipes exhibit zero flow in large events due to a high tailwater level in which the culvert is completely submerged by the static tailwater level

Appendix F **Sensitivity Analysis Results**

Figure F1: Climate Change Sensitivity - 1% AEP Event - 10% increase in rainfall

Figure F2: Climate Change Sensitivity - 1% AEP Event - 20% increase in rainfall

Figure F3: Climate Change Sensitivity - 1% AEP Event - 30% increase in rainfall

Figure F4: Manning's 'n' Sensitivity – Increase by 20% for 1% AEP Event

Figure F5: Manning's 'n' Sensitivity – Decrease by 20% for 1% AEP Event

Figure F6: Blockage Sensitivity – No Blockage for 1% AEP Event

Figure F7: Blockage Sensitivity – Increased Blockage for 1% AEP Event

Figure F8: Rainfall losses – Continuing Loss Rate for April 2015 Event

Figure F9: Rainfall losses – Initial Loss for April 2015 Event

Figure F10: Downstream Boundary Sensitivity – 2007 Hunter River levels for June 2007 Event

Figure F11: Downstream Boundary Sensitivity – 5% AEP Hunter River levels for April 2015 Event

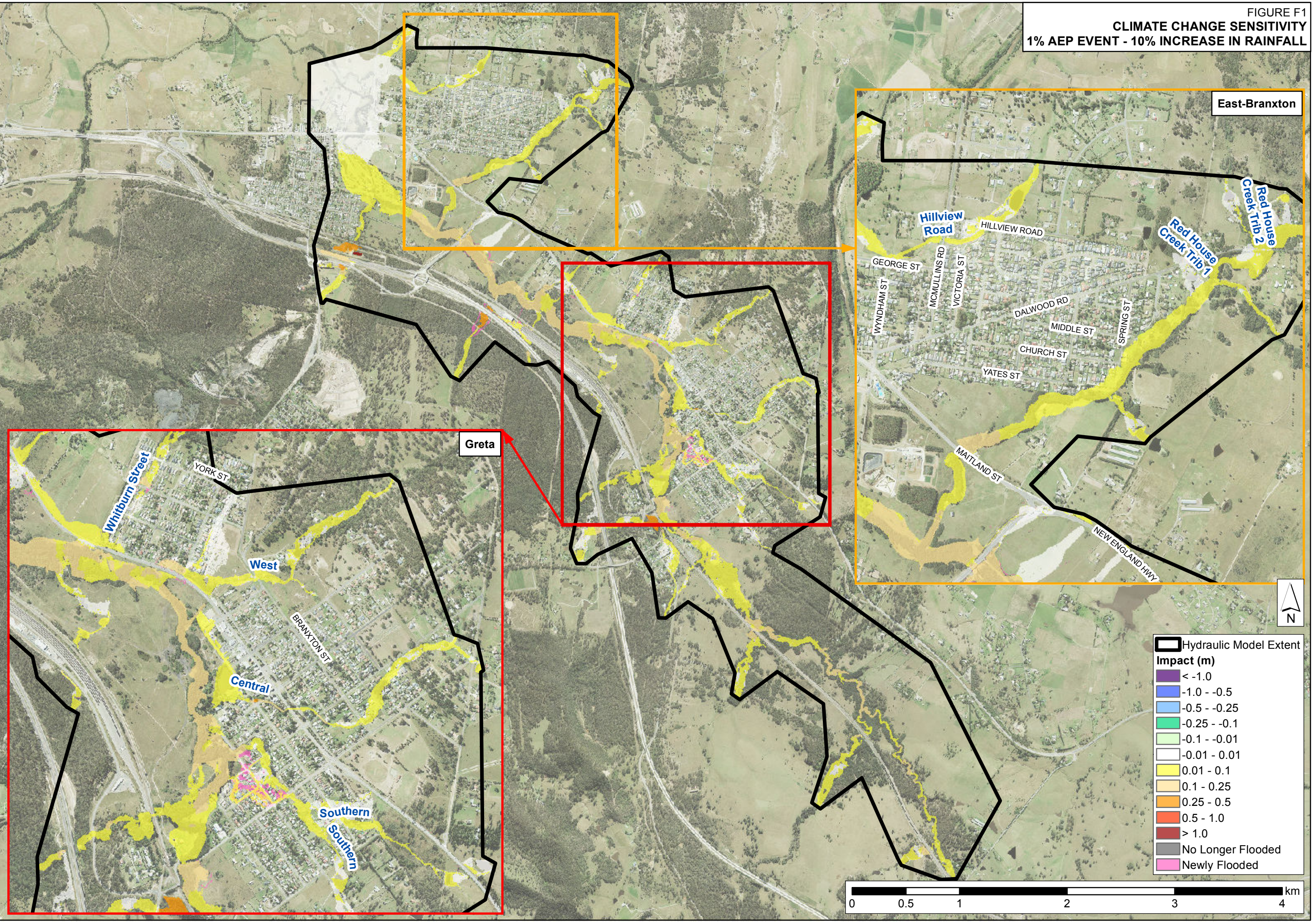
Figure F12: Catchment Lag parameter – Increase by 20% for 1% AEP Event

Figure F13: Catchment Lag parameter – Decrease by 20% for 1% AEP Event



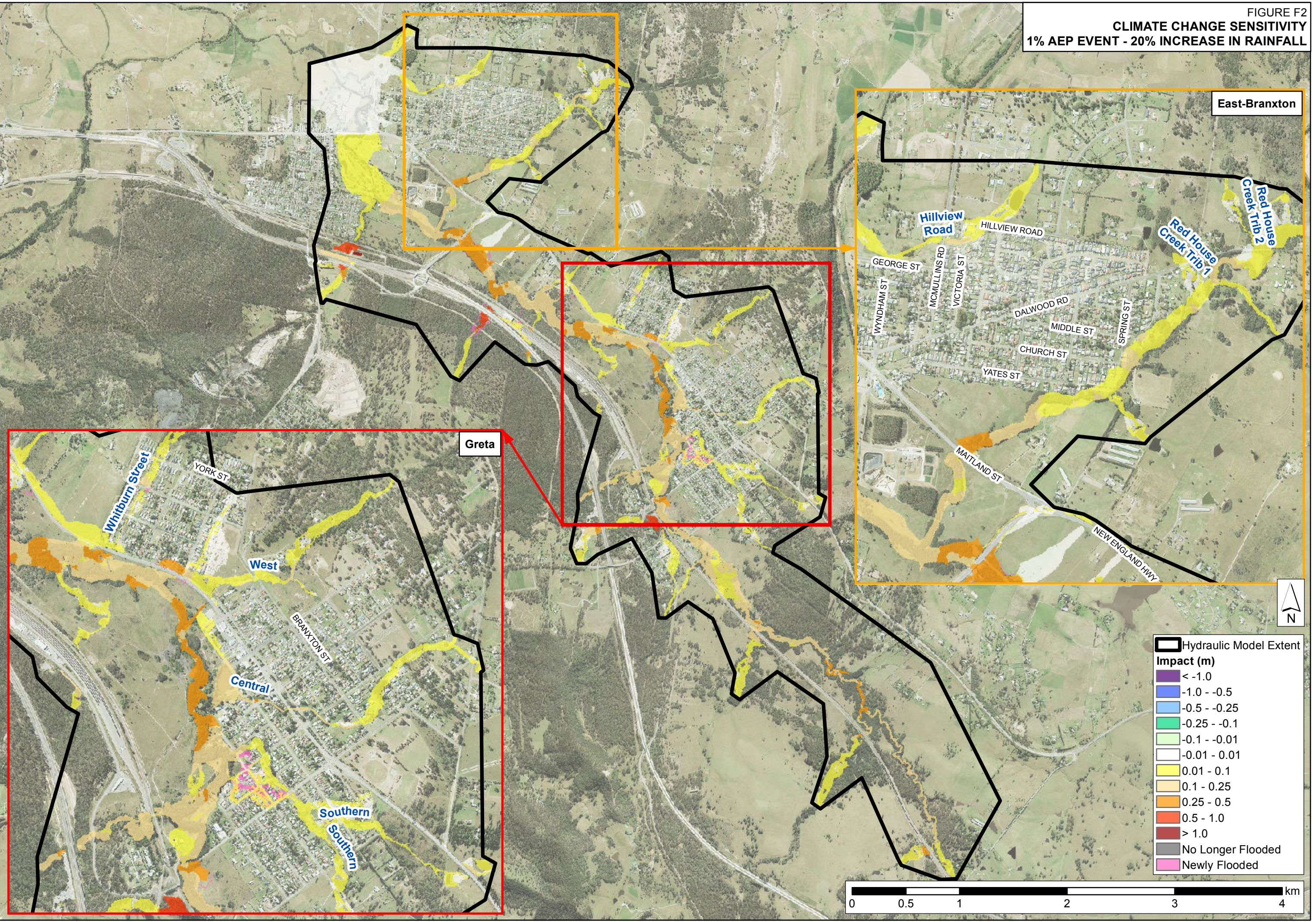
J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF1 CLIMATE CHANGE SENSITIVITY 1PC AEP EVENT - 10PC INCREASE IN RAINFALL.mxd

FIGURE F1
CLIMATE CHANGE SENSITIVITY
1% AEP EVENT - 10% INCREASE IN RAINFALL



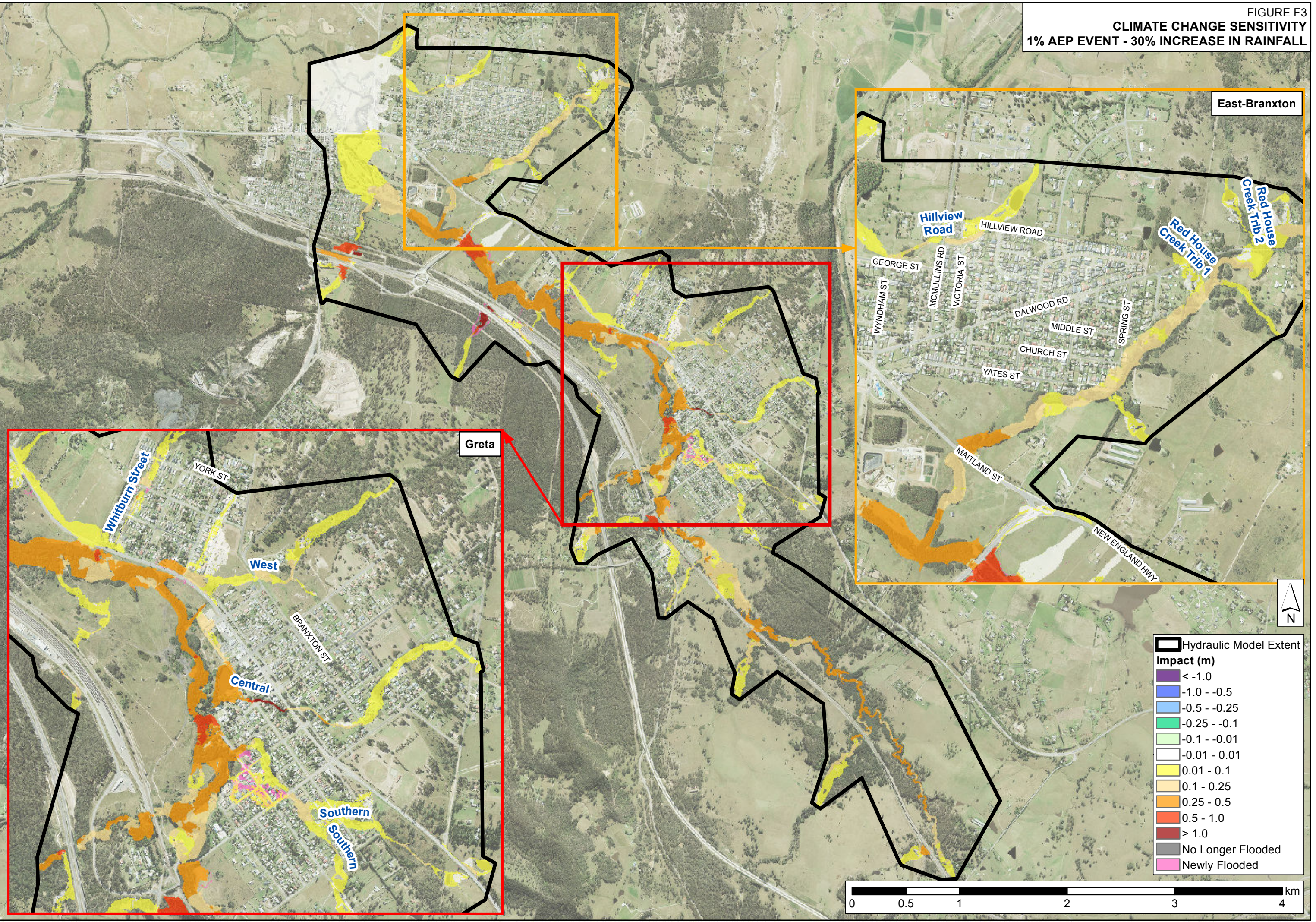
J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF2 CLIMATE CHANGE SENSITIVITY 1PC AEP EVENT - 20PC INCREASE IN RAINFALL.mxd

FIGURE F2
CLIMATE CHANGE SENSITIVITY
1% AEP EVENT - 20% INCREASE IN RAINFALL



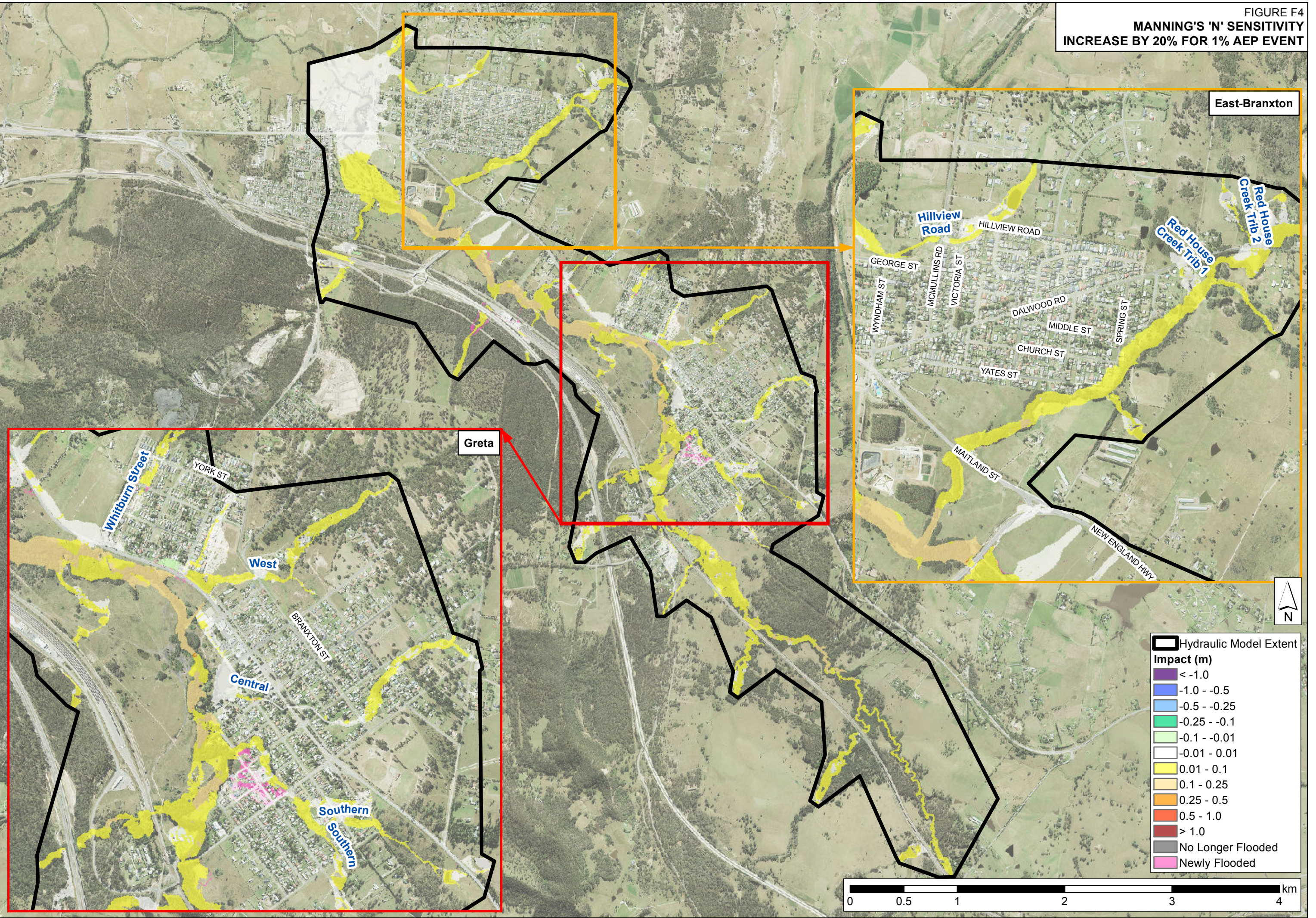
J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF3 CLIMATE CHANGE SENSITIVITY 1PC AEP EVENT - 30PC INCREASE IN RAINFALL.mxd

FIGURE F3
CLIMATE CHANGE SENSITIVITY
1% AEP EVENT - 30% INCREASE IN RAINFALL



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FIGURE F4
MANNING'S 'N' SENSITIVITY
INCREASE BY 20% FOR 1% AEP EVENT



J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF5_MANNING'S 'N' SENSITIVITY DECREASE BY 20% FOR 1% AEP EVENT.mxd

FIGURE F5
MANNING'S 'N' SENSITIVITY
DECREASE BY 20% FOR 1% AEP EVENT

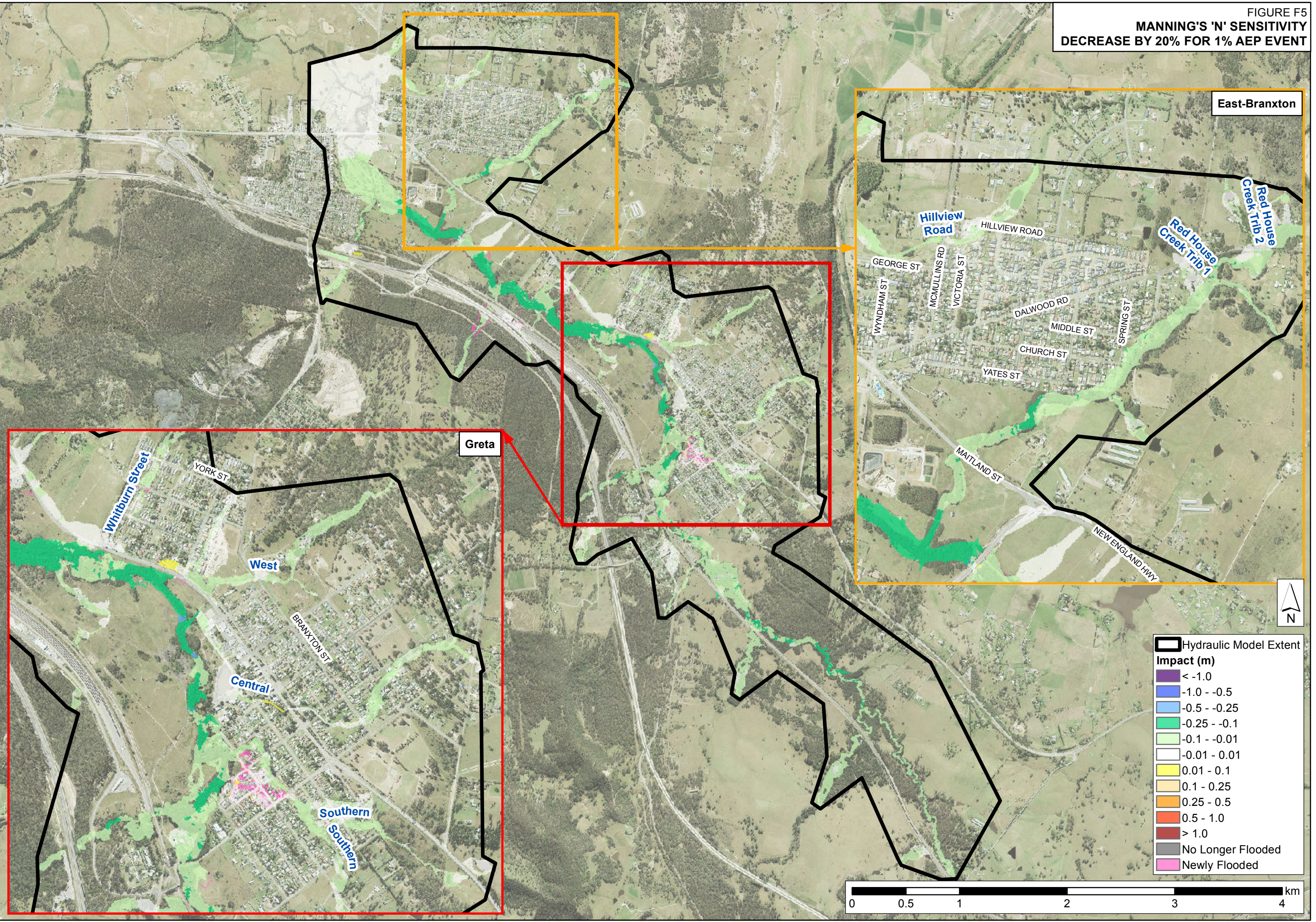
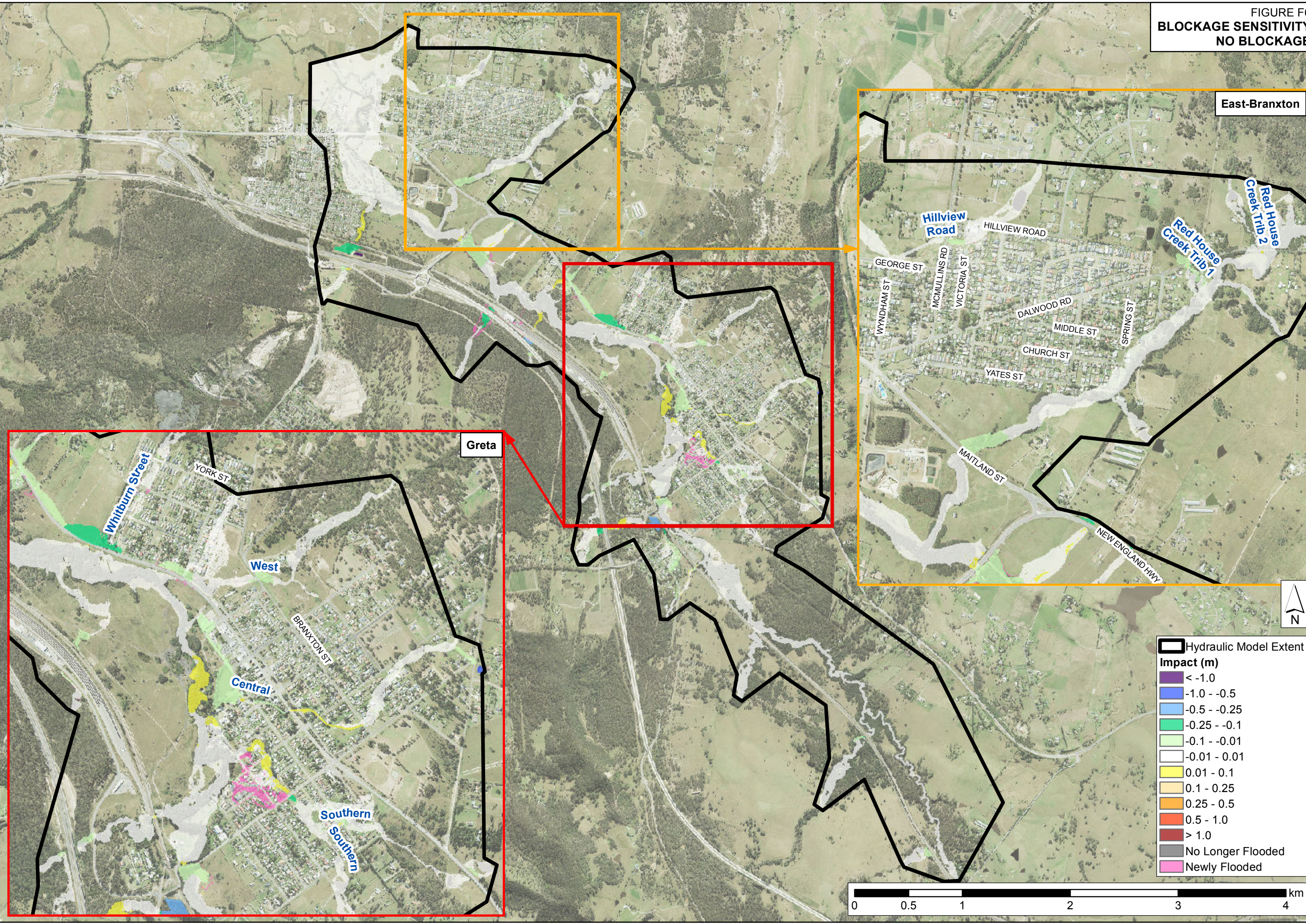


FIGURE F6
BLOCKAGE SENSITIVITY
NO BLOCKAGE



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FIGURE F7
BLOCKAGE SENSITIVITY
HIGH BLOCKAGE

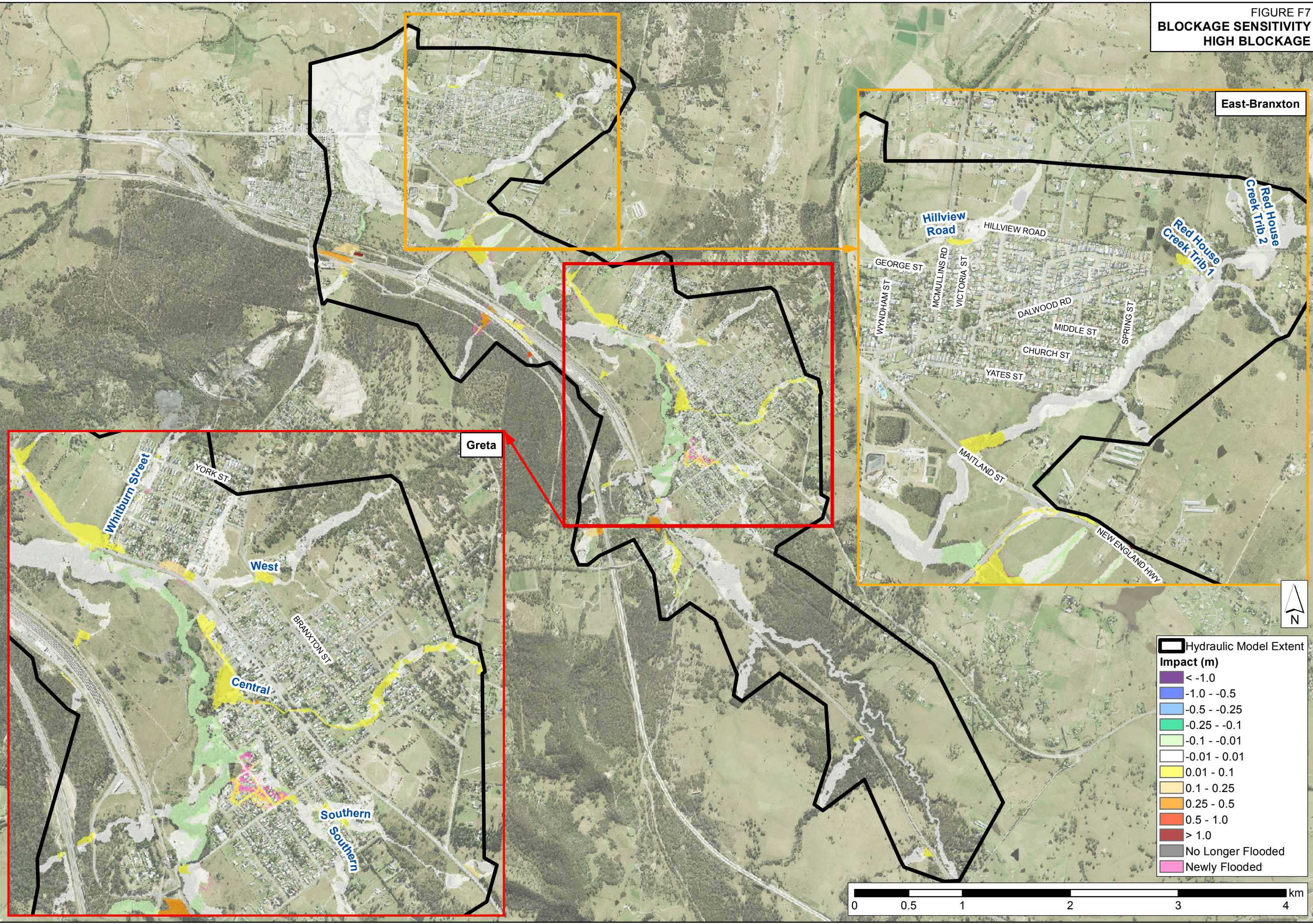


FIGURE F08
 APRIL 2015
 CONTINUING LOSS SENSITIVITY
 (0 MM/HR VERSUS 2 MM/HR)

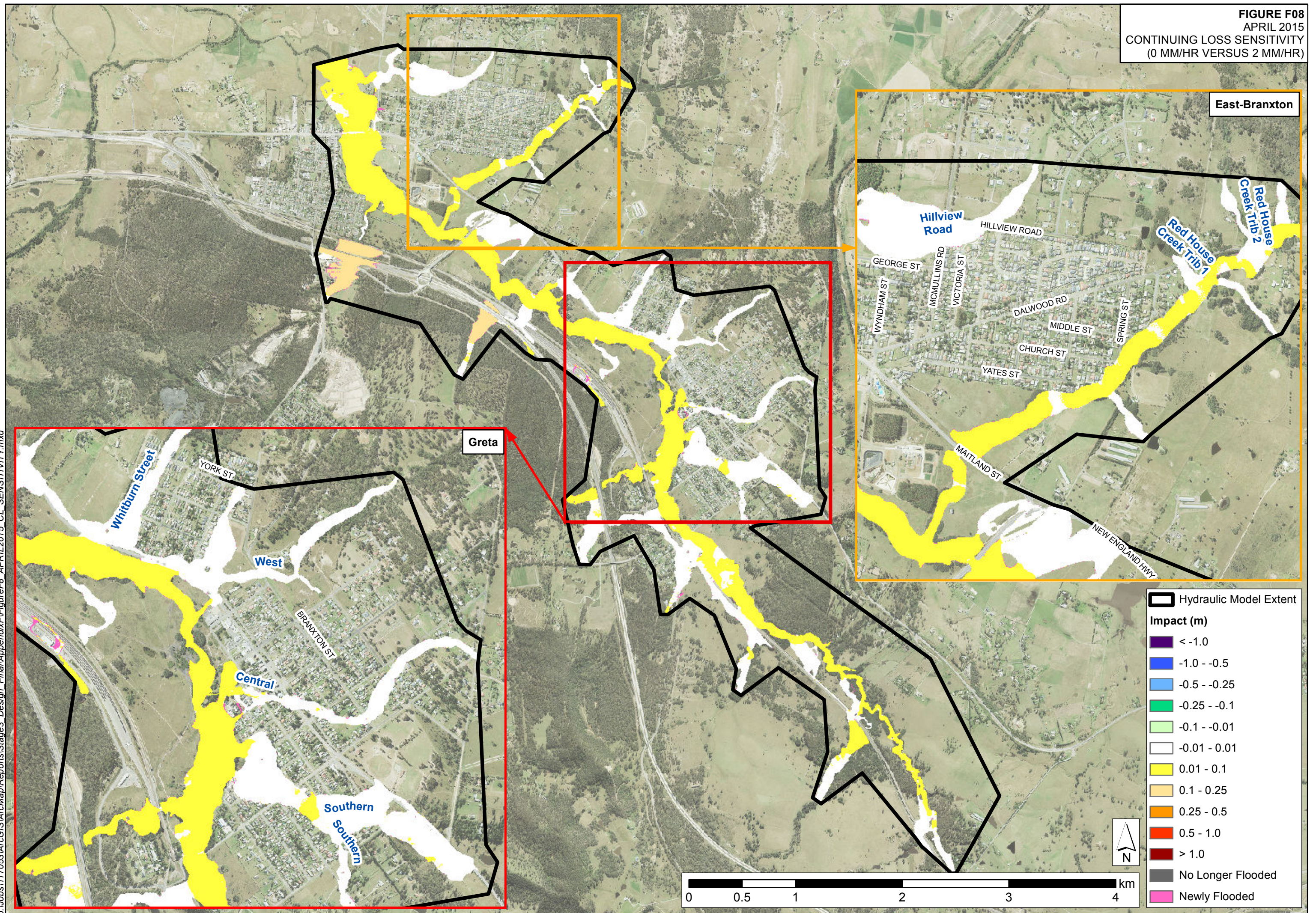


FIGURE F9
 APRIL 2015
 INITIAL LOSS SENSITIVITY
 (30 MM VERSUS 10 MM)

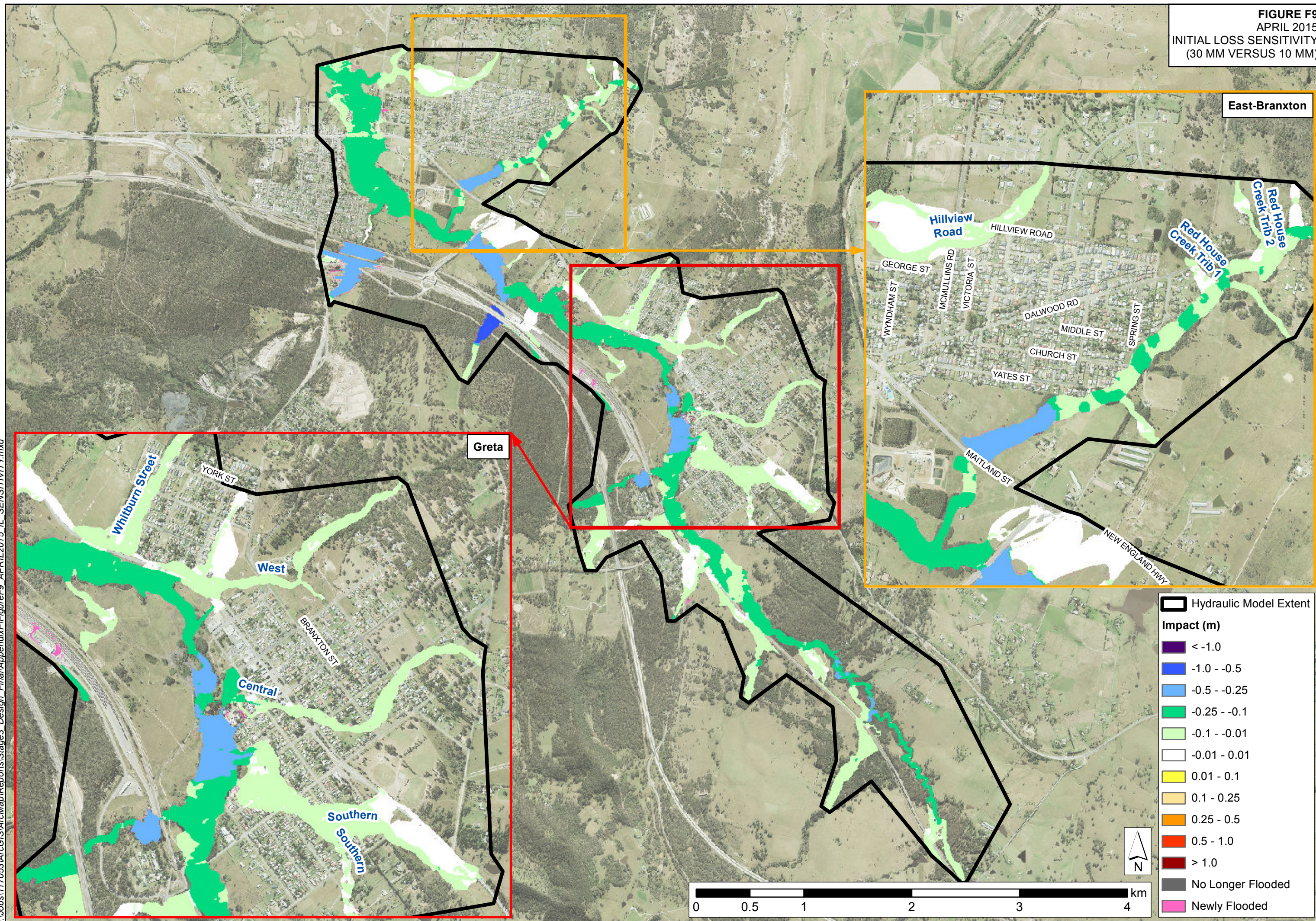
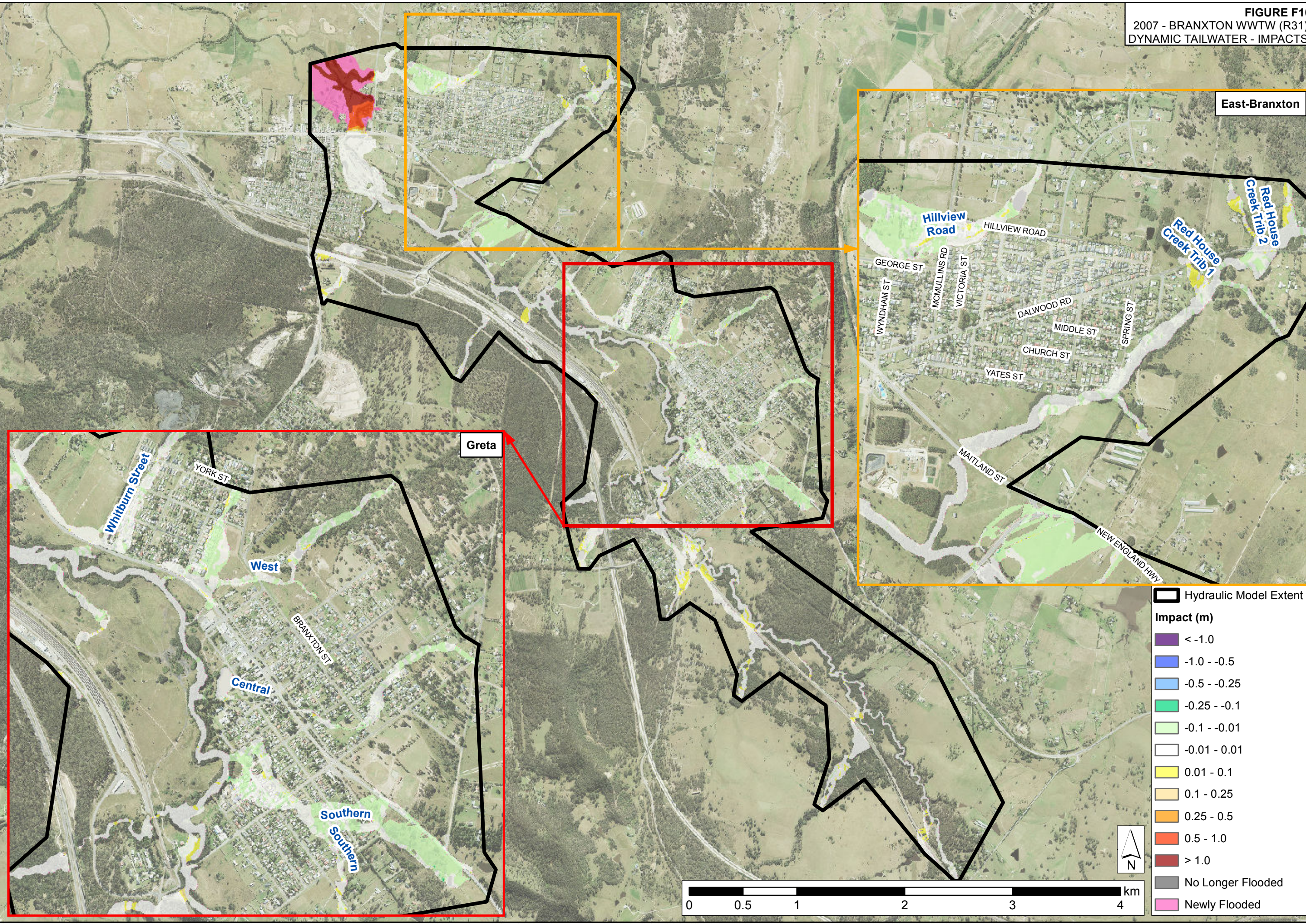


FIGURE F10
2007 - BRANXTON WWTW (R31)
DYNAMIC TAILWATER - IMPACTS

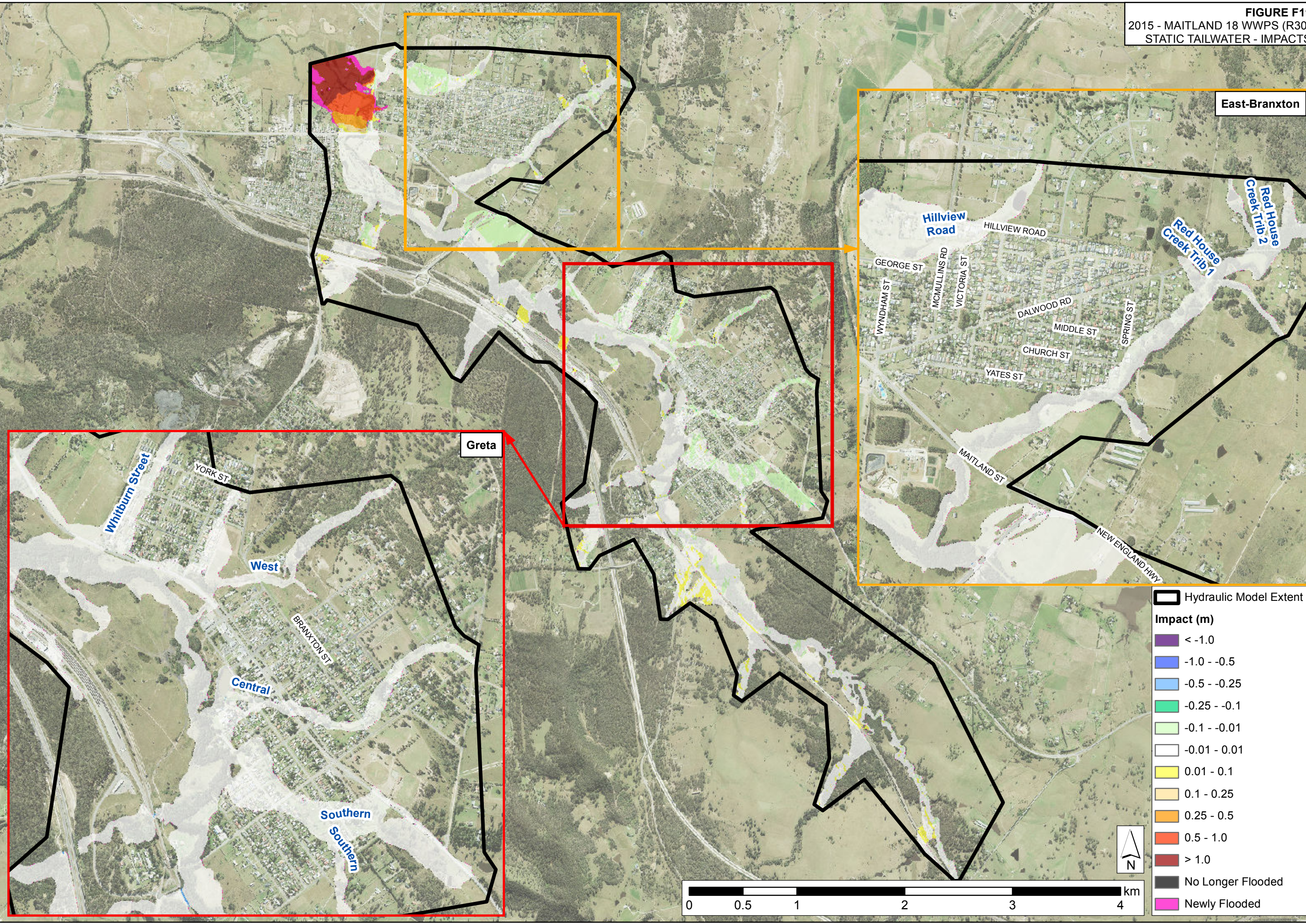


Hydraulic Model Extent

Impact (m)

< -1.0
-1.0 - -0.5
-0.5 - -0.25
-0.25 - -0.1
-0.1 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.25
0.25 - 0.5
0.5 - 1.0
> 1.0
No Longer Flooded
Newly Flooded

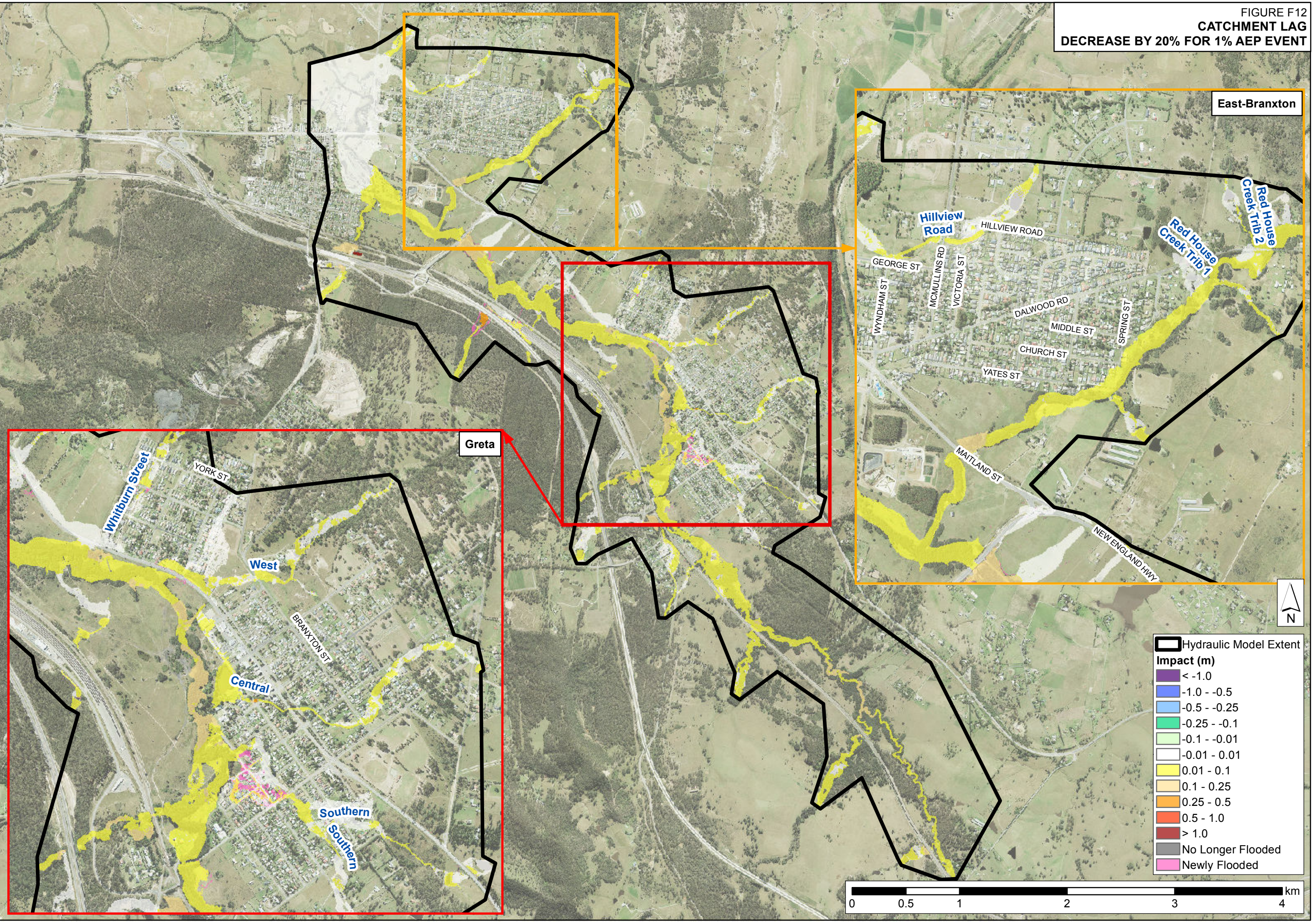
FIGURE F11
2015 - MAITLAND 18 WWPS (R30)
STATIC TAILWATER - IMPACTS



J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF11_2015_STATIC_TWL_SENSITIVITY.mxd

J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF12_CATCHMENT LAG DECREASE BY 20PC FOR 1PC AEP EVENT.mxd

FIGURE F12
CATCHMENT LAG
DECREASE BY 20% FOR 1% AEP EVENT



J:\Jobs\117053\ArcGIS\Map\Reports\Stage3_Design_Final\Appendix\FigureF13_CATCHMENT LAG INCREASE BY 20PC FOR 1PC_AEP_EVENT.mxd

FIGURE F13
CATCHMENT LAG
INCREASE BY 20% FOR 1% AEP EVENT

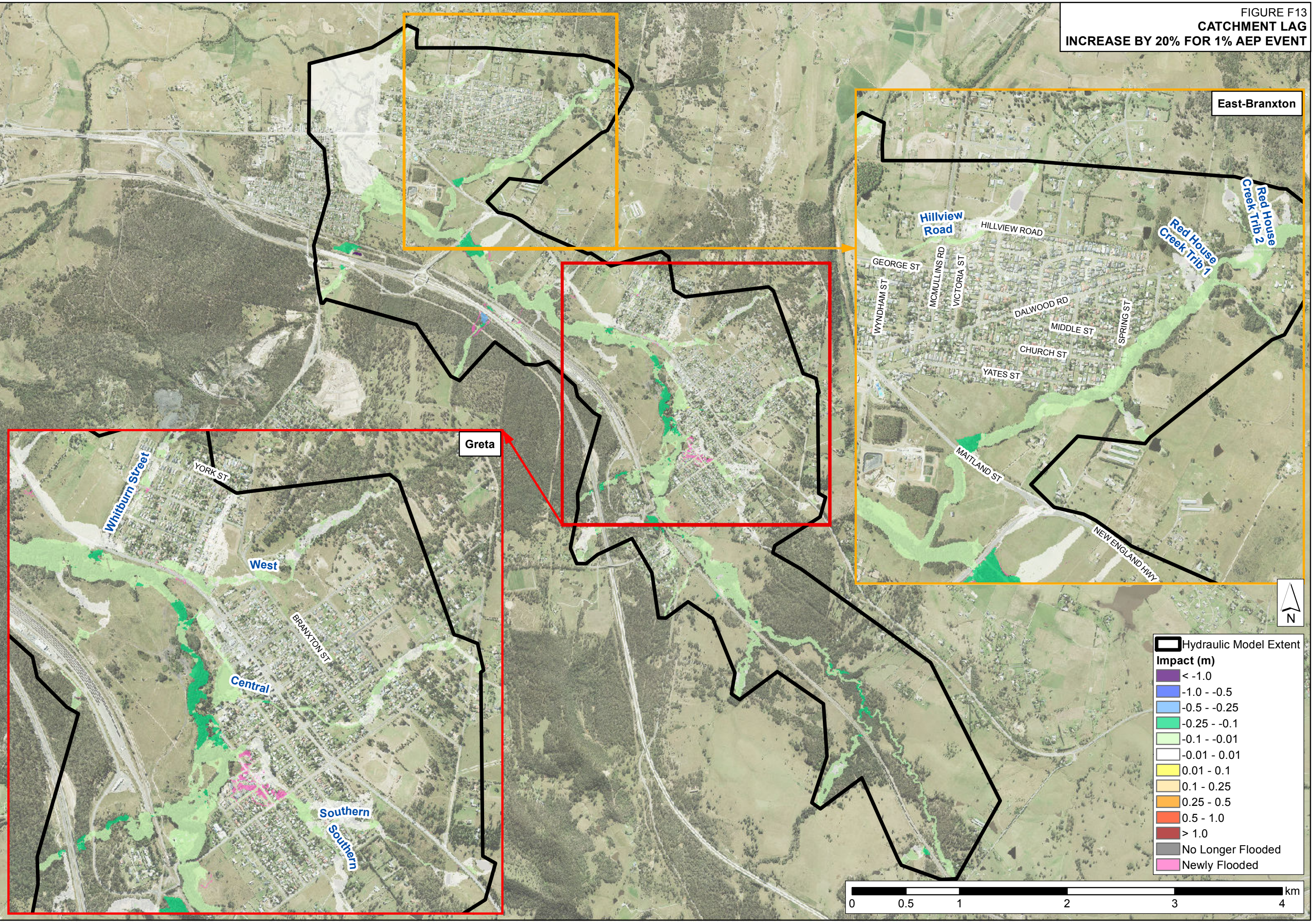


Table F1: Change in Peak Flood Levels for Sensitivity Analysis (m)

ID	Location	1% AEP (mAHD)	Rainfall Increase			Catchment Lag		Blockage		Mannings 'n'	
			10% Increase	20% Increase	30% Increase	20% Decrease	20% Increase	No Blockage	High Blockage	20% Decrease	20% Increase
R01	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R02	Mansfield Road	53.0	-	-	-	-	-	-	NF	-	-
R03	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R04	Anvil Street	56.4	-	-	-	-	-	-	-	-	-
R05	Nelson Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R06	Station Street	50.8	-	-	-	-	-	-	-	-	-
R07	Hunter Street	49.1	-	-	+0.1	-	-	-	-	-	-
R08	Orient Street	67.6	-	-	-	-	-	-	-	-	-
R09	Branxton Street	53.7	-	-	-	-	-	-	-	-	-
R10	Hunter Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R11	High Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R12	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R13	Wyndham Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R14	Anvil Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R15	Nelson Street	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R16	Branxton Street	47.6	-	+0.1	+0.1	-	NF	NF	-	-	-
R17	Kent Street	54.9	-	-	-	-	-	-	-	-	-
R18	Devon Street	43.2	-	+0.1	+0.1	-	-	-	-	-	-
R19	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R20	Kent Street	NF	NF	NF	-	NF	NF	NF	NF	NF	NF
R21	Whitburn Street	43.6	-	-	-	-	-	-	-	-	-
R22	New England Highway	41.6	-	-	-	-	-	-0.2	-	-	-
R23	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R24	York Street	48.4	+0.1	+0.1	+0.2	+0.1	-	NF	+0.1	-	-
R25	Wine Country Drive	33.5	+0.1	+0.3	+0.4	+0.1	-0.1	-	-	-	-
R26	New England Highway	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R27	Dalwood Road	49.2	-	-	-	-	-	-0.1	-	-	-
R28	Maitland Street	29.8	-	-	-	-	-	-	-	-	-
R29	Hillview Road	39.1	-	-	-	-	-	-	-	-	-
R30	McMullins Road	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF
R31	Elderslie Road	29.8	-	-	-	-	-	-	-	-	-
R32	Dalwood Road	47.8	-	+0.1	+0.1	-	-	-	-	-0.1	+0.1

Note: “NF” indicates road is not flooded
“-” indicates a change of less than 0.1 m