APPENDICES

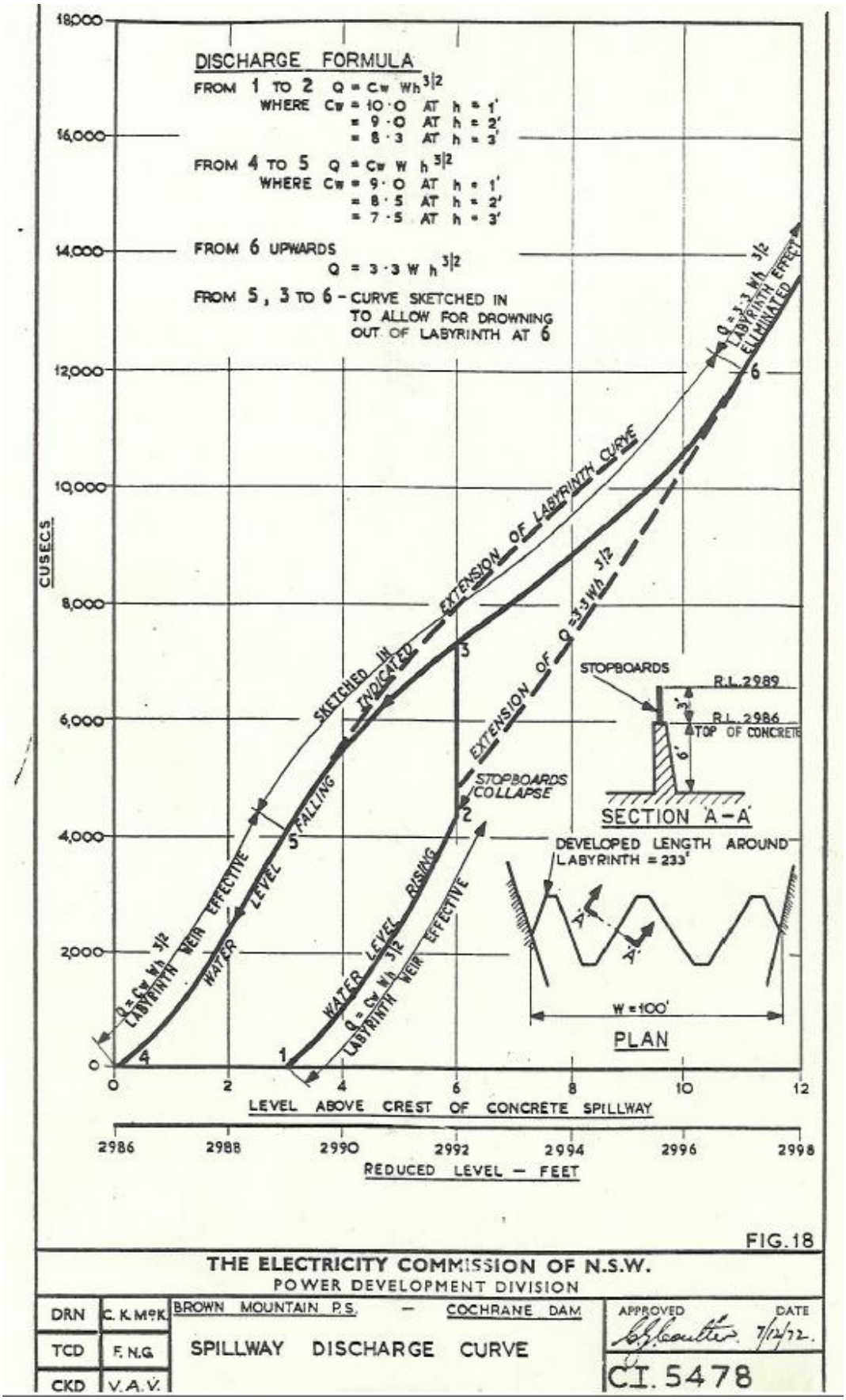
APPENDIX A – DAM RATING CURVES

Stage-Storage-Discharge Relationship for Brogo Dam

Level (m AHD)	Storage Volume (ML)	Discharge (m3/s)
77.5	0	0
80.0	31	0
82.5	132	0
85.0	330	0
87.5	677	0
90.0	1224	0
92.5	2022	0
95.0	3193	0
97.5	4707	0
100.0	6576	0
102.5	8877	0
102.6 *	8980	0
105.0	11696	268.0
107.5	15115	790.5
110.0	19120	1480.4
112.5	23873	2311.4
115.0	29457	3271.3
116.6	33485	3948.3
117.5	35956	4334.7
120.0	43573	6615.3

**Spillway level*

Stage-Discharge Relationship for Cochrane Dam



COCHRANE DAM - STORAGE TABLE

Level Metre	Level Feet	Storage ML Above BOL	Storage % Above BOL	Miscellaneous Notes
913.00	**9.4**	**3,575**	**132 (RED)**	**OPERATING POLICY** (Guide Only)
912.00	**6.1**	**3,264**	**120 (WHITE)**	Above 904.65 - Run continuously
911.05	3	2,968	110	901.60 to 904.65 - Run 0800 Mon to 1600 Friday
910.74	2	2,873	106	Below 901.60 - Weekdays 0800 to 1600
910.44	1	2,786	103	
910.13	**0**	**2,700**	**100 (FSL)**	**DAM SURVEILLANCE ALARMS**
909.83	-1	2,588	96	1A – White Alarm initiated at 912.0M (Float)
909.53	-2	2,519	93	1B – Red Alarm initiated at 913.0M (Float)
909.22	-3	2,441	90	2 - SES Rate of Rise 0.3M/hr above 911.0M
908.92	-4	2,346	87	OPTR – Rate of Rise 0.5M/hr between 905.0 and 911.0
908.61	-5	2,269	84	
908.31	-6	2,182	81	
908.00	-7	2,113	78	
907.70	-8	2,027	75	**CONTROL STRUCTURE INTAKES**
907.39	-9	1,967	73	896.72 - Valve C1
907.09	-10	1,880	70	896.11 - Valve B1
906.78	-11	1,811	67	894.29 - Valve C2
906.48	-12	1,734	64	893.68 - Valve B2
906.17	-13	1,665	62	890.02 - Valves B3 and C3
905.87	-14	1,600	59	
905.56	-15	1,535	57	
905.26	-16	1,471	54	
904.95	-17	1,415	52	
904.65	-18	1,346	50	
904.34	-19	1,277	47	
904.04	-20	1,216	45	**WATER CONSUMPTION RATES**
903.73	-21	1,156	43	No1 - 10.80 Ml / day
903.43	-22	1,104	41	No2 - 15.53 Ml / day
903.12	-23	1,052	39	No3 - 15.53 Ml / day
902.82	-24	992	37	No4 - 20.71 Ml / day
902.51	-25	940	35	No5 - 20.71 Ml / day
902.21	-26	884	33	Cochrane Dam = 72.48 Ml / day
901.91	-27	857	32	= 84 MWh / day
901.60	-28	785	29	
901.30	-29	742	27	**WATER UTILISATION FACTOR**
900.99	-30	698	26	WUF = 1.159 MWh / Ml
900.69	-31	655	24	
900.38	-32	612	23	
900.08	-33	569	21	
899.77	**-34**	**534**	**20**	
899.47	-35	491	18	**BVWUA**
899.16	-36	457	17	1] 100 Ml Emergency Reserve - All Year (12/6/97)
898.86	-37	414	15	2] 400 Ml Irrigation Reserve – 1/10 to 31/3 (29/3/94)
898.55	-38	388	14	3] One Unit continuous operation 1/10 to 31/3 (2/6/98)
898.25	-39	358	13	4] Advise when storage is 1000 Ml – 22/9/98
897.94	-40	327	12	
897.64	-41	293	11	
897.33	-42	267	10	**NOTE**
897.03	-43	241	9	Computer reading 0.1m High
896.72	-44	207	8	
896.42	-45	181	7	
896.11	-46	155	6	
895.81	-47	138	5	**DAM SPILLING**
895.50	**-48**	**112**	4	1] 17/8/98 to 24/8/98 - 910.26 m
895.20	-49	94	3	
894.89	-50	69	2.5	
894.59	-51	51	2	
894.29	-52	34	1	
893.98	-53	17	0.6	
893.68	-54	0	0 (BOL)	
890.02	-66	100	(MOL)	

NOTE:- 893.68 (-54) to 890.02 (-66) is inactive storage due to blocked intakes.

Updated : 06/10/98

APPENDIX B – COMPONENTS IN SITE SPECIFIC ANALYSIS

Component	Design Flood Event				
	20%AEP	10%AEP	5%AEP	2%AEP	1%AEP
Typical Spring Tide (m AHD)	0.86	0.86	0.86	0.86	0.86
Barometric Setup (m)	0.24	0.27	0.30	0.30	0.31
Wind Setup (m)	0.20	0.20	0.20	0.24	0.25
Wave Setup (m)	0.72	0.76	0.82	0.89	0.98
SUBTOTAL (mAHD)	**2.02**	**2.09**	**2.18**	**2.29**	**2.40**
2050 Sea Level Rise (m)	0.40	0.40	0.40	0.40	0.40
2100 Sea Level Rise (m)	0.90	0.90	0.90	0.90	0.90
2050 TOTAL (m AHD)	**2.42**	**2.49**	**2.58**	**2.69**	**2.80**
2100 TOTAL (mAHD)	**2.92**	**2.99**	**3.08**	**3.19**	**3.30**

APPENDIX C – DETAILED BLOCKAGE FACTORS AT BRIDGES

Princes Highway Large Span Bridge

Openings No.	Control Dimension (m)	Blockage Factors (%)					
		10% AEP	5% AEP	2% AEP	1% AEP	0.2% AEP	PMF
1	18	10	10	20	40	40	40
2	27	0	0	10	20	20	20
3	27	0	0	10	20	20	20
4	28	0	0	10	20	20	20
5	28	0	0	10	20	20	20
6	28	0	0	10	20	20	20
7	21	10	10	20	40	40	40
8	27	0	0	10	20	20	20
9	28	0	0	10	20	20	20
10	28	0	0	10	20	20	20
11	27	0	0	10	20	20	20
12	27	0	0	10	20	20	20
13	27	0	0	10	20	20	20
14	27	0	0	10	20	20	20
15	27	0	0	10	20	20	20
16	27	0	0	10	20	20	20
17	27	0	0	10	20	20	20
18	27	0	0	10	20	20	20
19	27	0	0	10	20	20	20
20	27	0	0	10	20	20	20
21	27	0	0	10	20	20	20
22	27	0	0	10	20	20	20
23	12	10	10	20	40	40	40

*0% clear, 100 % fully blocked

Tarraganda Lane Bridge – Bega River

Openings No.	Control Dimension (m)	Blockage Factors (%)					
		10% AEP	5% AEP	2% AEP	1% AEP	0.2% AEP	PMF
1	9	10	10	20	40	40	40
2	15	10	10	20	40	40	40
3	15	10	10	20	40	40	40
4	15	10	10	20	40	40	40
5	15	10	10	20	40	40	40
6	15	10	10	20	40	40	40
7	15	10	10	20	40	40	40
8	15	10	10	20	40	40	40
9	12	10	10	20	40	40	40

*0% clear, 100 % fully blocked

Tarraganda Lane Bridge – Bega River Anabranch

Openings No.	Control Dimension (m)	Blockage Factors (%)					
		10% AEP	5% AEP	2% AEP	1% AEP	0.2% AEP	PMF
1	7	50	50	100	100	100	100
2	11	10	10	20	40	40	40
3	11	10	10	20	40	40	40
4	12	10	10	20	40	40	40
5	8	10	10	20	40	40	40

*0% clear, 100 % fully blocked

Tathra - Bermagui Bridge

Openings No.	Control Dimension (m)	Blockage Factors (%)					
		10% AEP	5% AEP	2% AEP	1% AEP	0.2% AEP	PMF
1	15	10	10	20	40	40	40
2	15	10	10	20	40	40	40
3	16	10	10	20	40	40	40
4	17	10	10	20	40	40	40
5	17	10	10	20	40	40	40
6	17	10	10	20	40	40	40
7	28	0	0	10	20	20	20
8	35	0	0	10	20	20	20
9	35	0	0	10	20	20	20
10	34	0	0	10	20	20	20
11	23	10	10	20	40	40	40

*0% clear, 100 % fully blocked

Candelo

Openings No.	Control Dimension (m)	Blockage Factors (%)					
		10% AEP	5% AEP	2% AEP	1% AEP	0.2% AEP	PMF
1	21	10	10	20	40	40	40
2	22	10	10	20	40	40	40
3	20	10	10	20	40	40	40
4	13	10	10	20	40	40	40

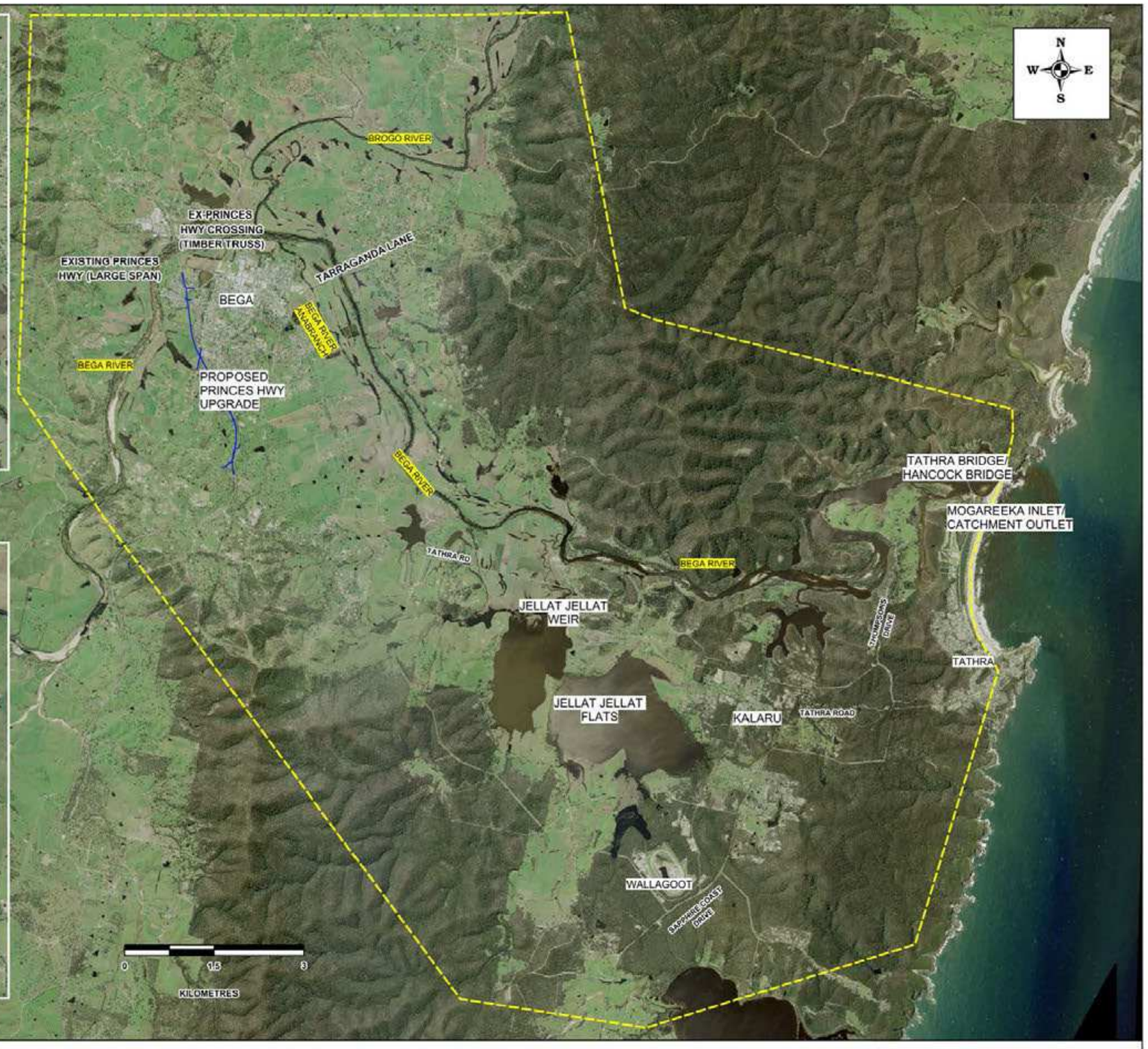
*0% clear, 100 % fully blocked

APPENDIX D – GENERAL CATCHMENT AND MODELLING INFORMATION

Figure D1 - Modelling Area
Figure D2 - Catchment Topography
Figure D3 - Hydraulic Structures

INSET - BEGA

INSET - CANDELO



DISCLAIMER

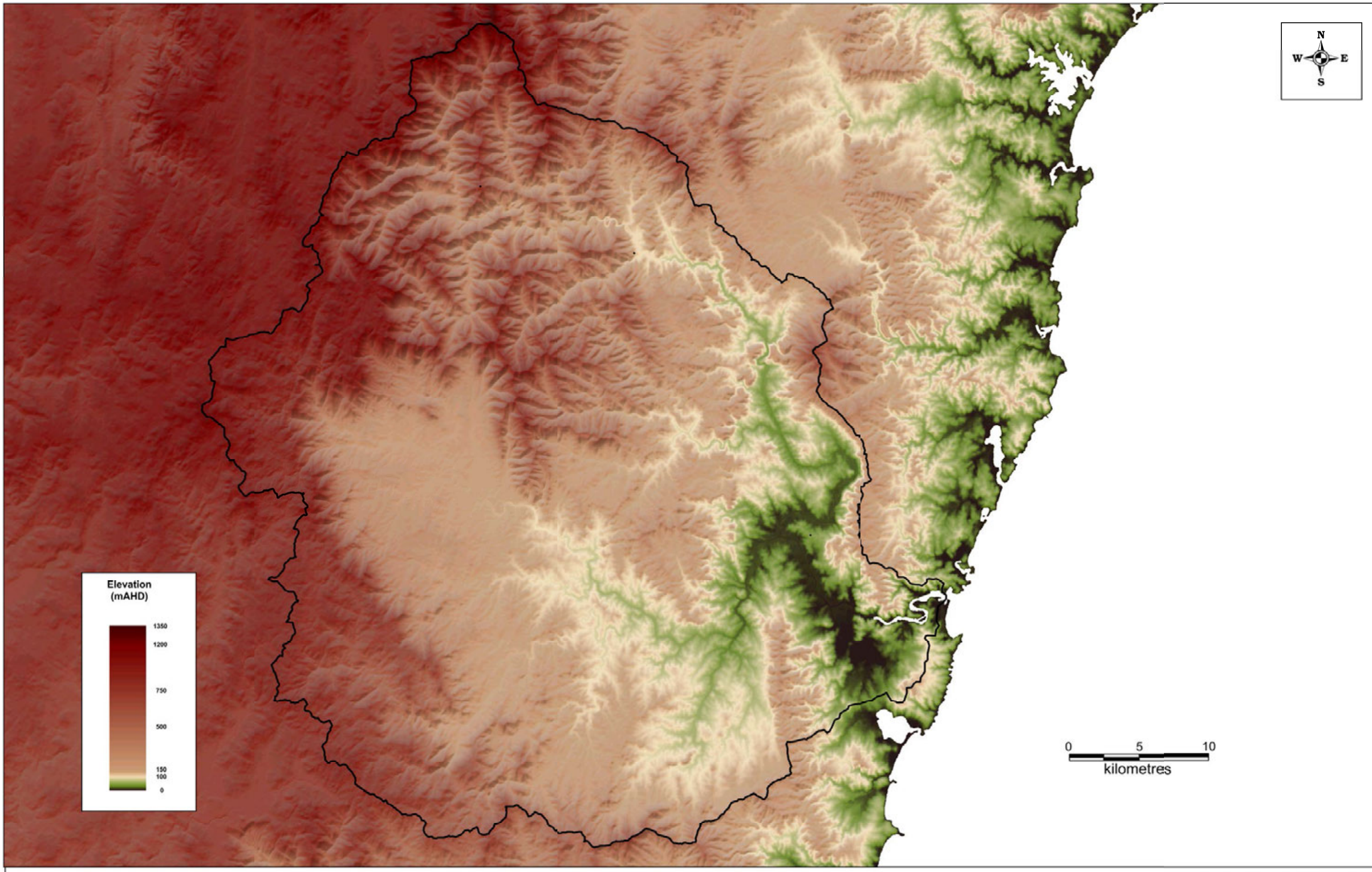
The accuracy of flood extents and hydraulic parameters shown on this map is limited to the level of accuracy of the survey data and modelling software available for flood modelling. The flood extents and hydraulic parameters on the map are only an indication of potential flooding conditions throughout the catchment for modelled design storm event and may vary from real flooding conditions.

EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure D1
Modelling Area



DISCLAIMER

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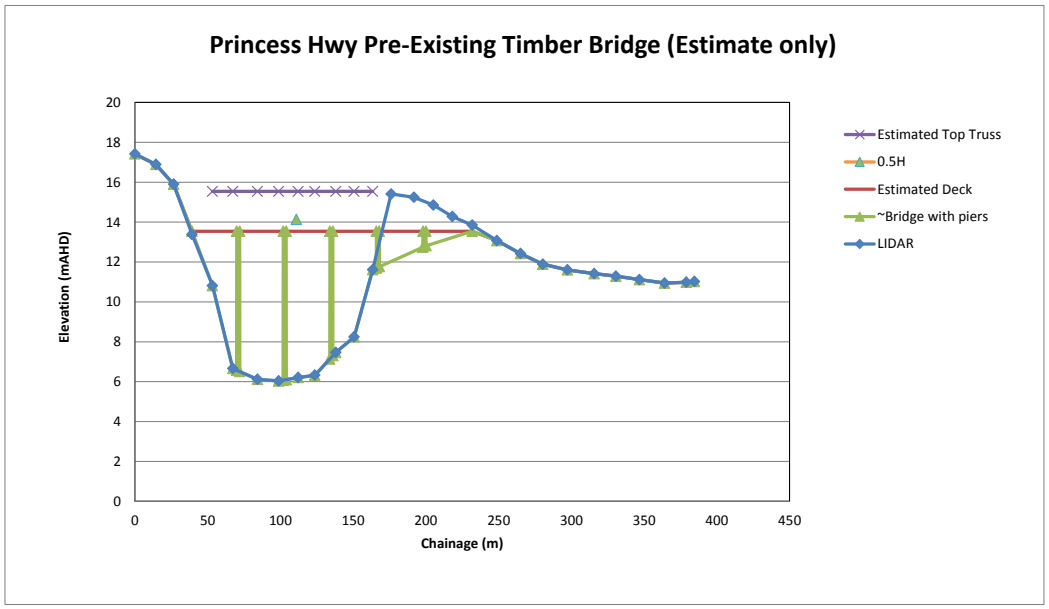
Catchment Boundary

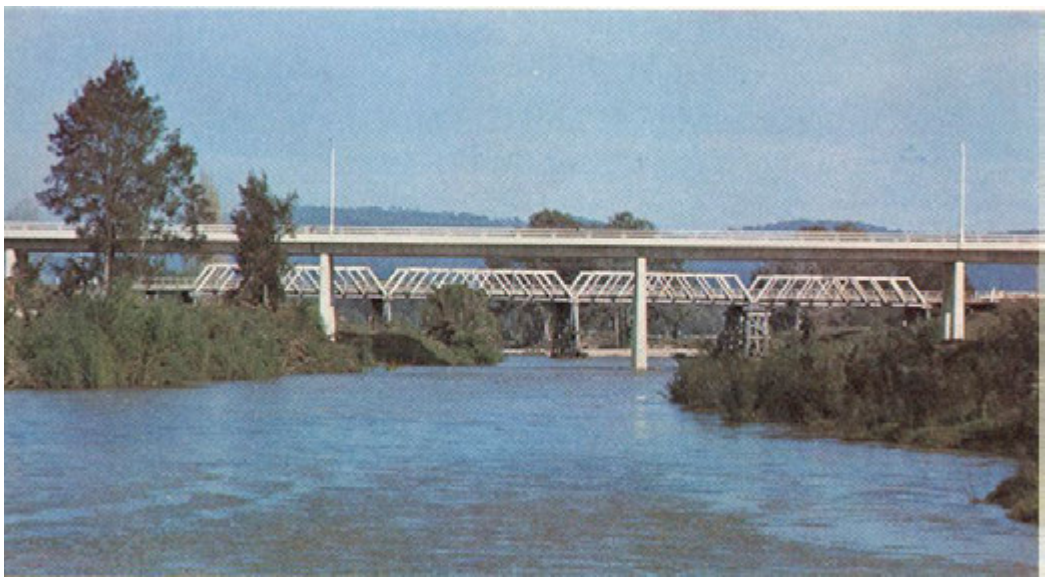
SMEC

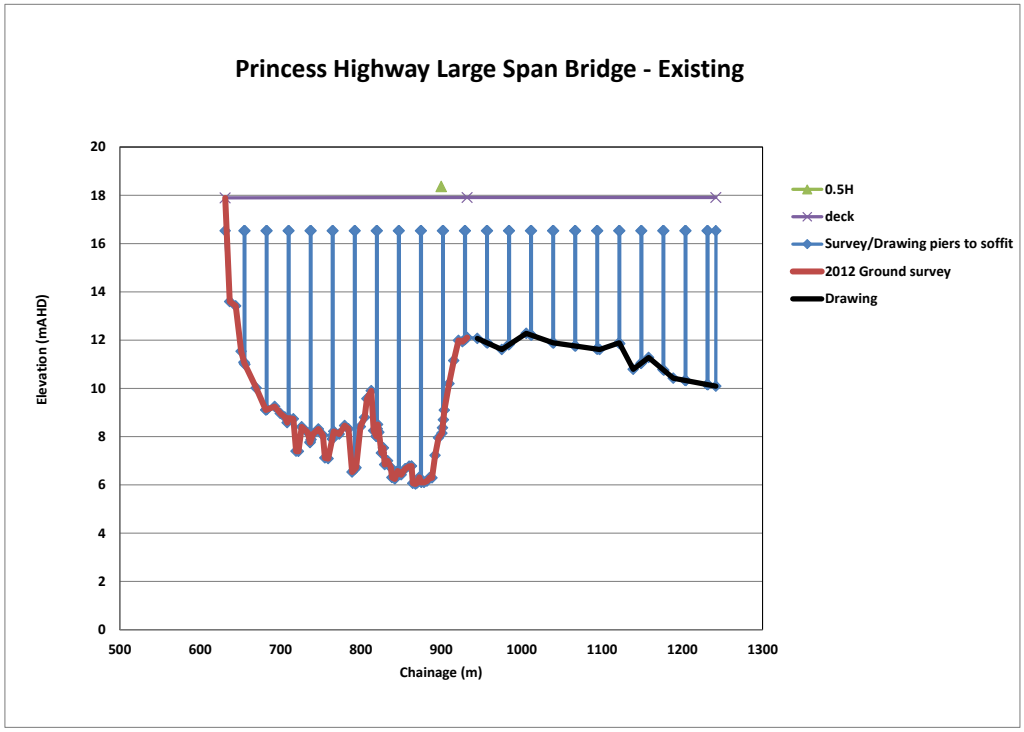
BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

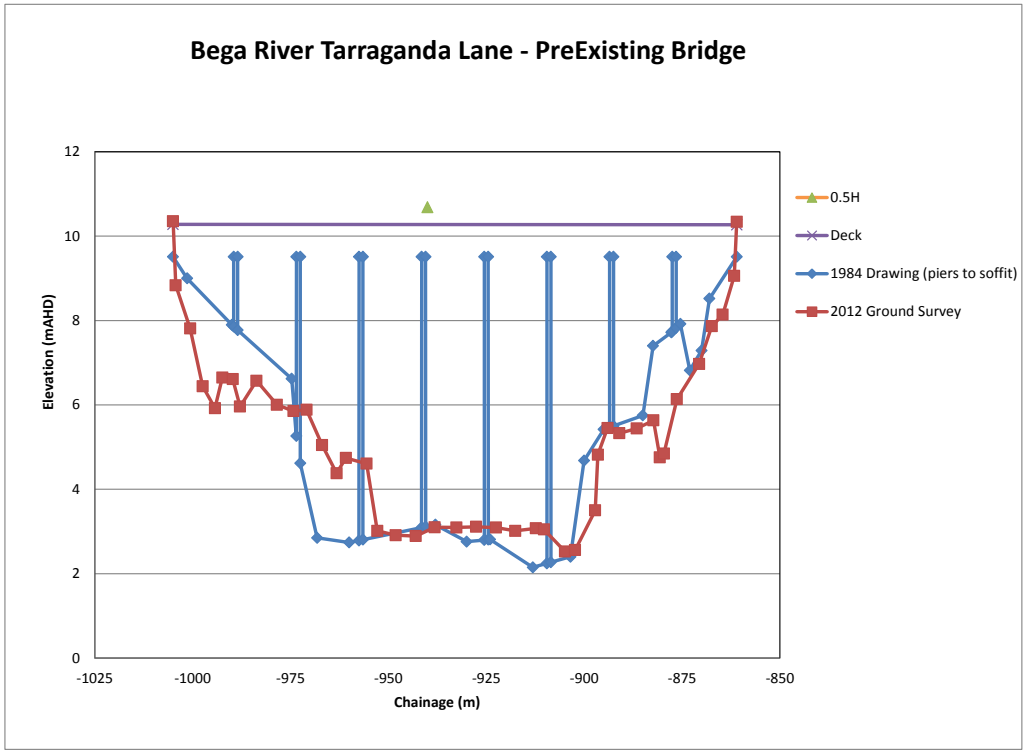
Figure D2
Catchment Topography

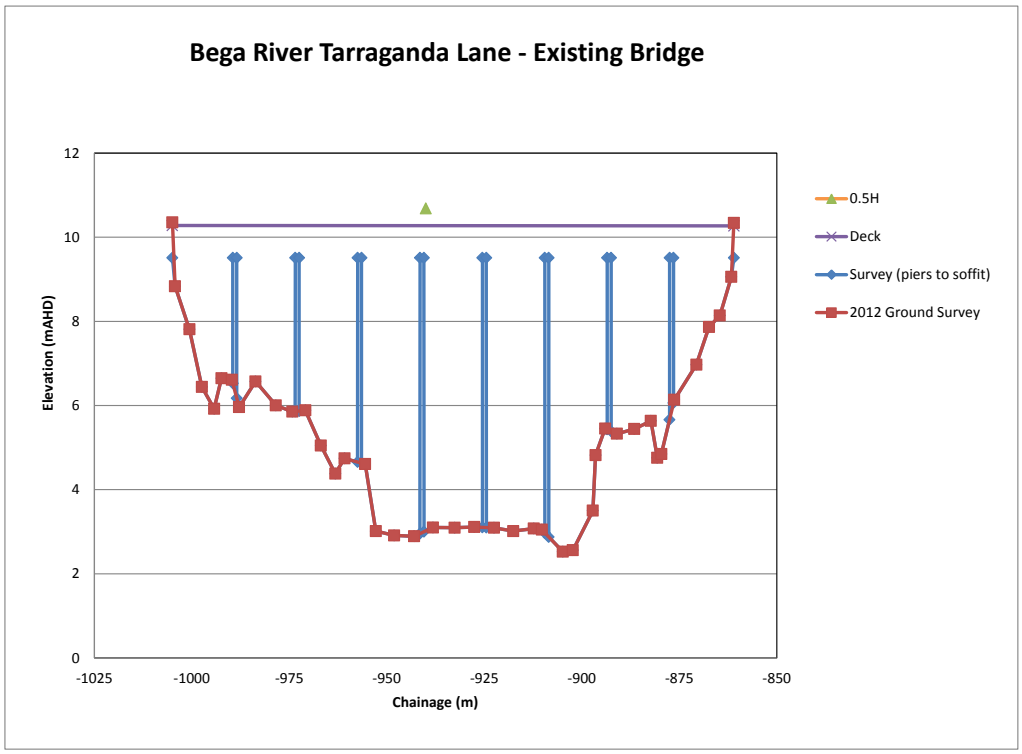
Figure D3 - Hydraulic Structures

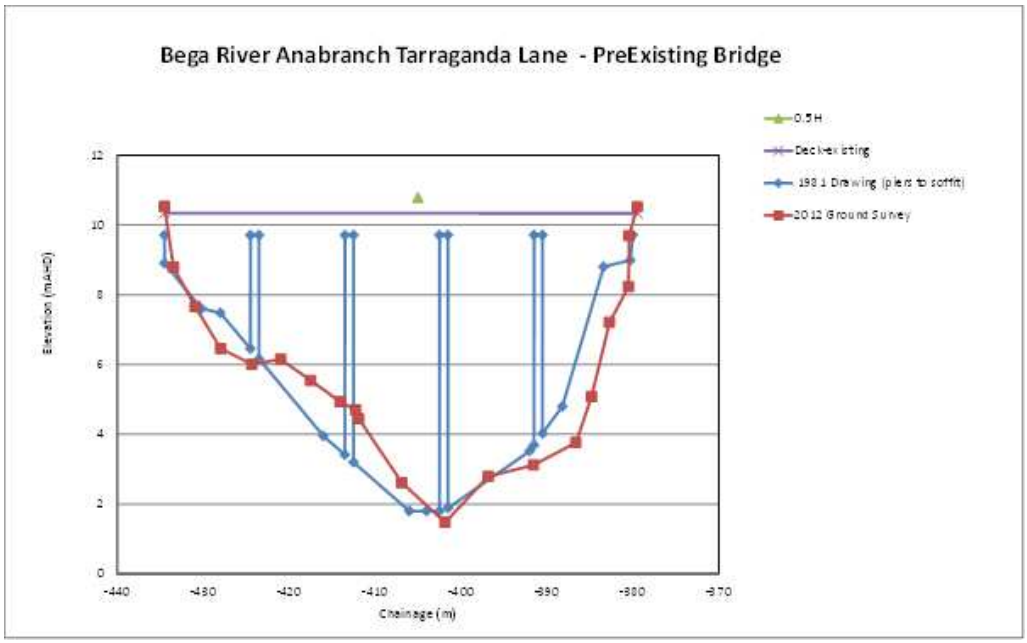


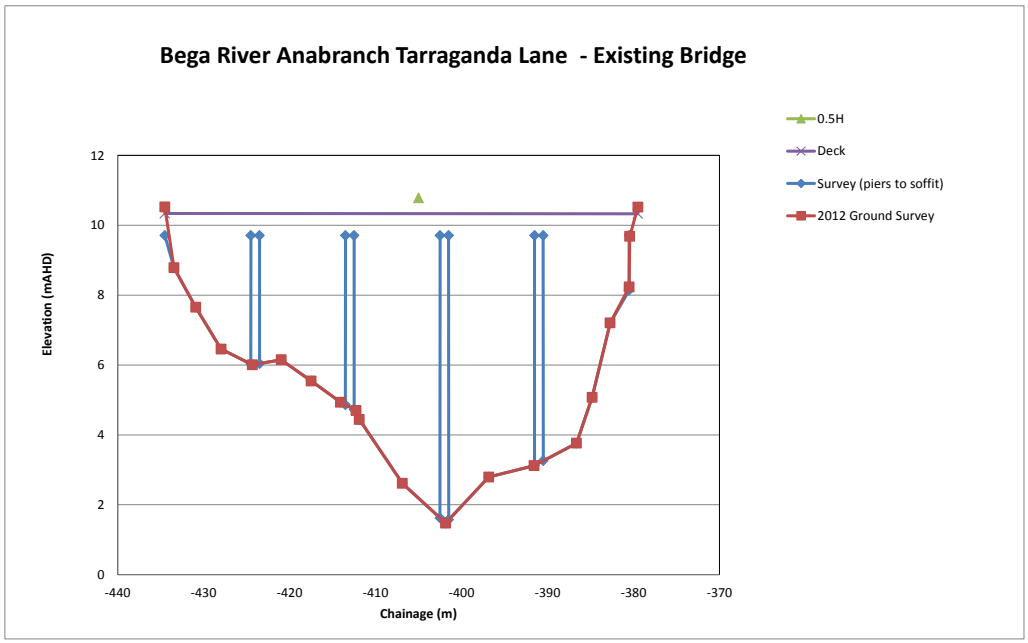


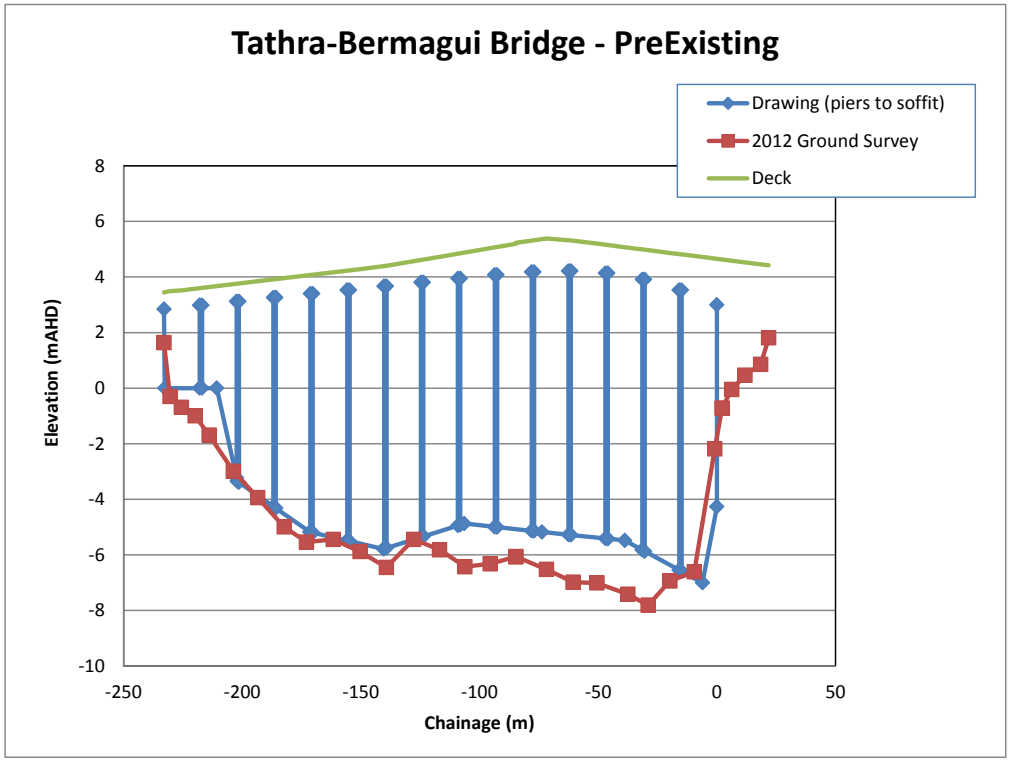

Princess Highway Large Span Bridge - Existing
Elevation (mAHD)
20
18
16
14
12
10
8
6
4
2
0
500
600
700
800
900
1000
1100
1200
1300
Chainage (m)
0.5H
deck
Survey/Drawing piers to soffit
2012 Ground survey
Drawing

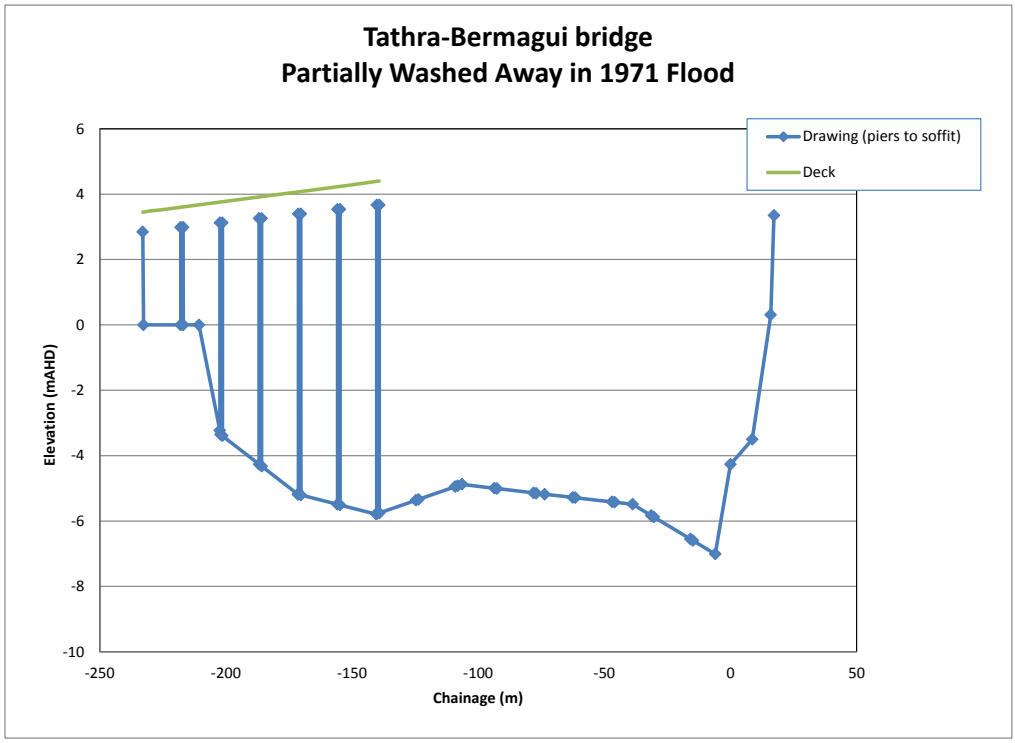

Bega River Tarraganda Lane - PreExisting Bridge
Elevation (mAHD)
12
10
8
6
4
2
0
-1025
-1000
-975
-950
-925
-900
-875
-850
Chainage (m)
0.5H
Deck
1984 Drawing (piers to soffit)
2012 Ground Survey

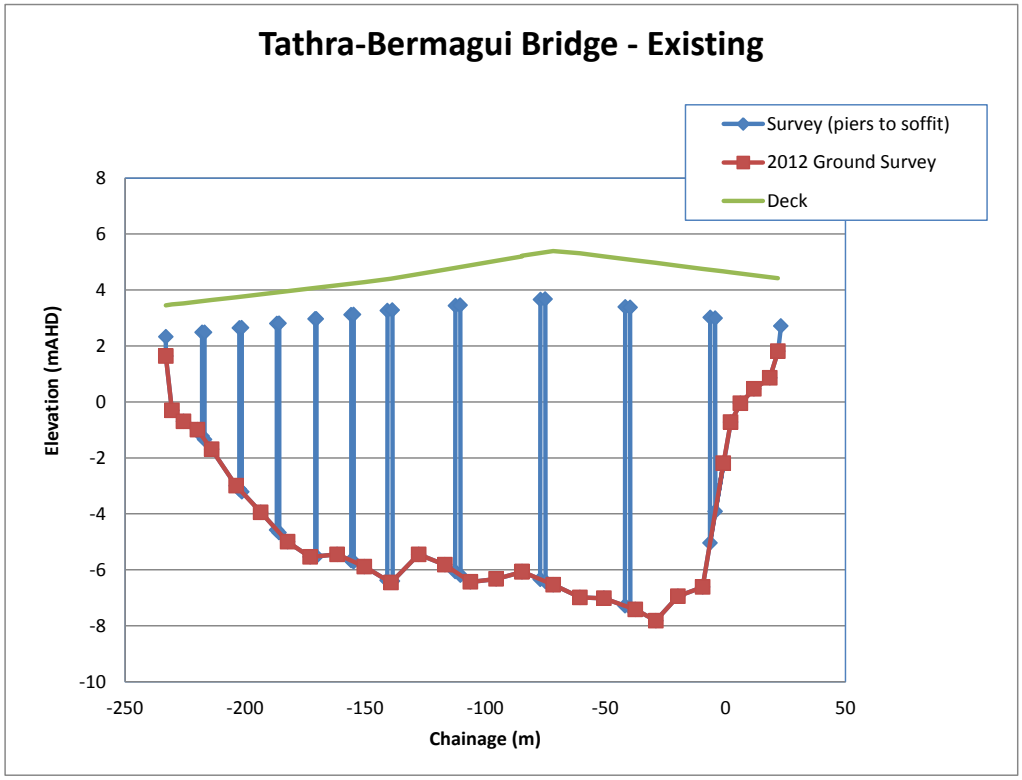

Bega River Tarraganda Lane - Existing Bridge
Elevation (mAHD)
12
10
8
6
4
2
0
-1025
-1000
-975
-950
-925
-900
-875
-850
Chainage (m)
0.5H
Deck
Survey (piers to soffit)
2012 Ground Survey

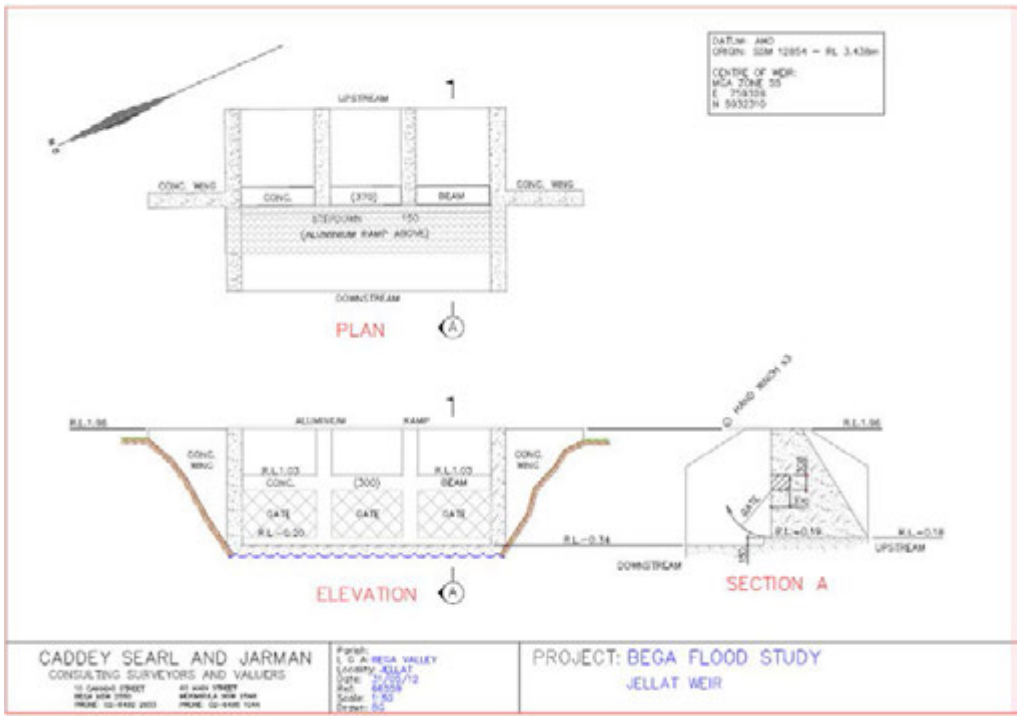

Bega River Anabranch Tarraganda Lane - PreExisting Bridge
0.5H
Deck-existing
1981 Drawing (piers to soffit)
2012 Ground Survey
Elevation (mAHD)
Chainage (m)


Bega River Anabranch Tarraganda Lane - Existing Bridge
0.5H
Deck
Survey (piers to soffit)
2012 Ground Survey
Elevation (mAHD)
Chainage (m)

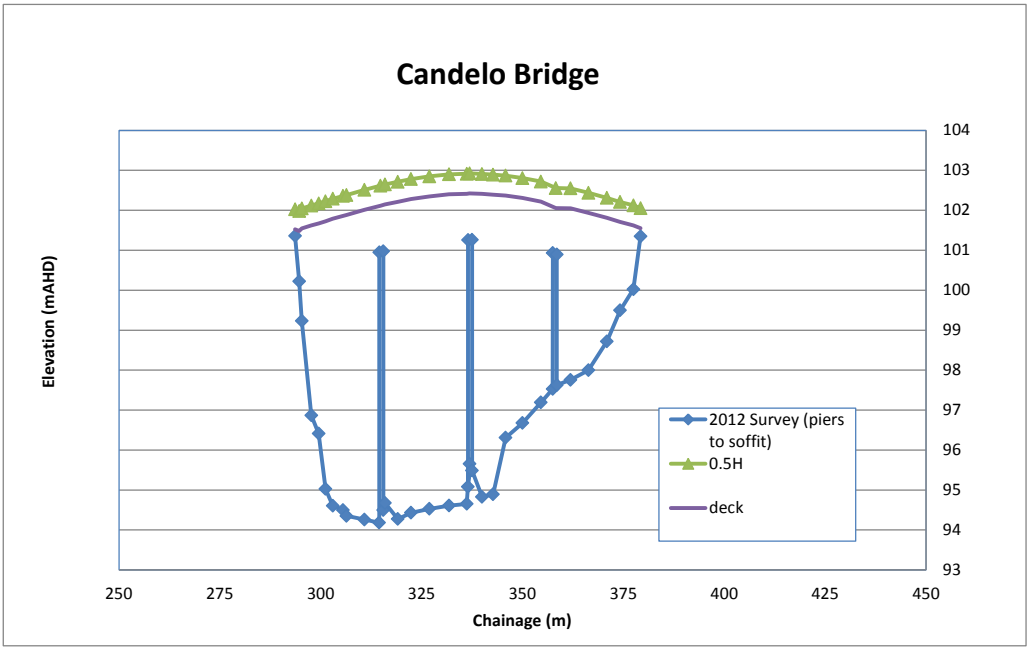

Tathra-Bermagui Bridge - PreExisting
Drawing (piers to soffit)
2012 Ground Survey
Deck
Elevation (mAHD)
8
6
4
2
0
-2
-4
-6
-8
-10
-250
-200
-150
-100
-50
0
50
Chainage (m)


Tathra-Bermagui bridge
Partially Washed Away in 1971 Flood
Drawing (piers to soffit)
Deck
Elevation (mAHD)
6
4
2
0
-2
-4
-6
-8
-10
-250
-200
-150
-100
-50
0
50
Chainage (m)


Tathra-Bermagui Bridge - Existing
Survey (piers to soffit)
2012 Ground Survey
Deck
Elevation (mAHD)
8
6
4
2
0
-2
-4
-6
-8
-10
-250
-200
-150
-100
-50
0
50
Chainage (m)


PLAN
ELEVATION
SECTION A
CADDEY SEARL AND JARMAN
CONSULTING SURVEYORS AND VALUERS
PROJECT: BEGA FLOOD STUDY
JELLAT WEIR


31/05/2012


Candelo Bridge
Elevation (mAHD)
104
103
102
101
100
99
98
97
96
95
94
93
250
275
300
325
350
375
400
425
450
Chainage (m)
2012 Survey (piers to soffit)
0.5H
deck

APPENDIX E – CALIBRATION AND VALIDATION

Figure E1 - Rainfall and Flow Gauging Stations
Figure E2 - Simulated Versus Gauged Hydrographs
Figure E3 - Modelling Surface Roughness Coefficients – Design Events

N
W E
S

LEGEND

- Manly Hydraulics Laboratory Pluviograph Station
- NSW Office of Water Pluviograph Station
- Bureau of Meteorology Pluviograph Station
- Bureau of Meteorology Daily Rainfall Station
- Gauging Station

Note: Not all Stations were available for Calibration and Validation of Historic Events

Road - Highway

0 7.5 15

KILOMETRES

DISCLAIMER

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CATCHMENT BOUNDARY

SMEC

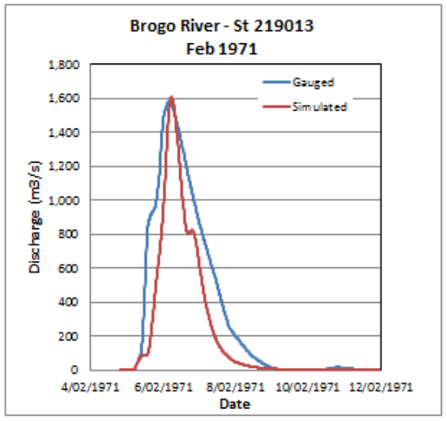
BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure E1
Rainfall and Flow Gauging Stations

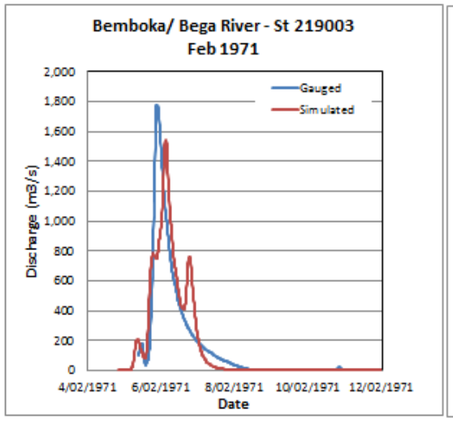
Figure E2 Simulated Versus Gauged Hydrographs

FEBRUARY 1971 EVENT - RUN1D

IL 35mm CL 5.0mm/hr



IL 35mm CL 1.5mm/hr



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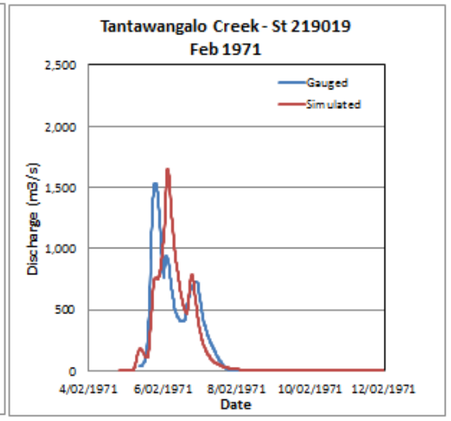
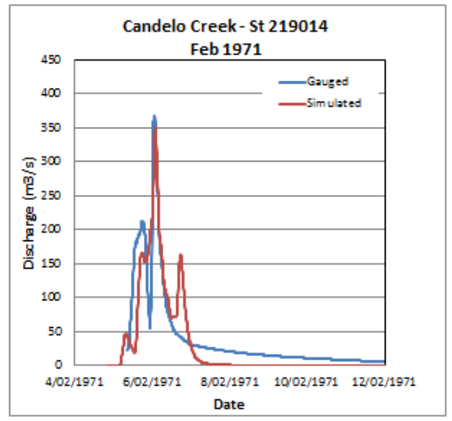
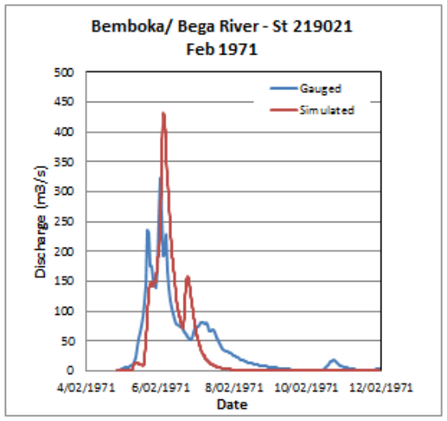


IL 35mm CL 3.0mm/hr

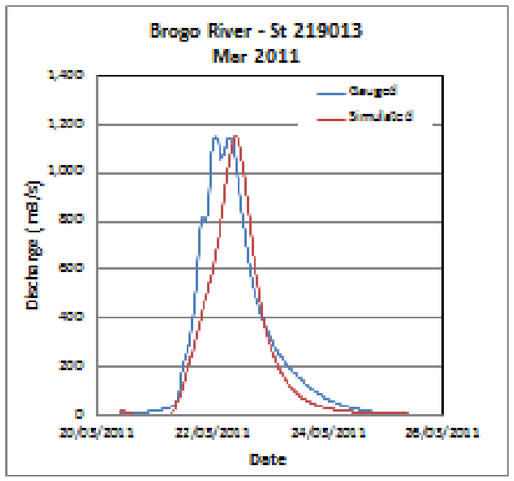


IL 35mm CL 5.0mm/hr

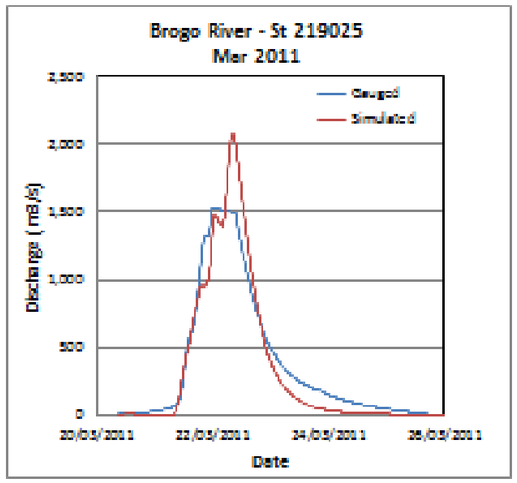


MARCH 2011 EVENT - RUN 2F

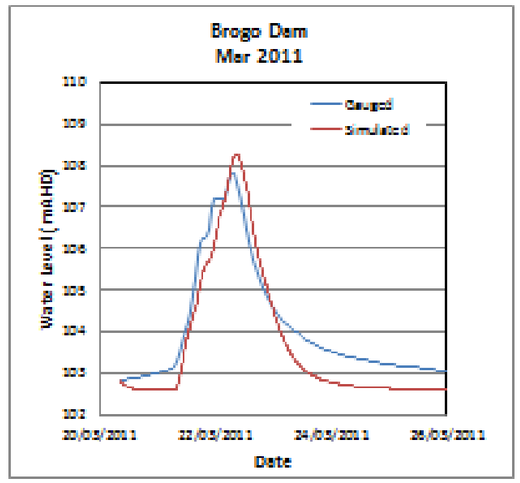
IL 35mm CL 5.0mm/hr



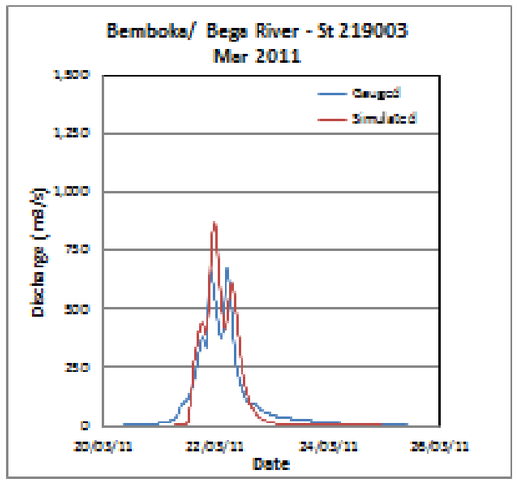
IL 35mm CL 5.0mm/hr



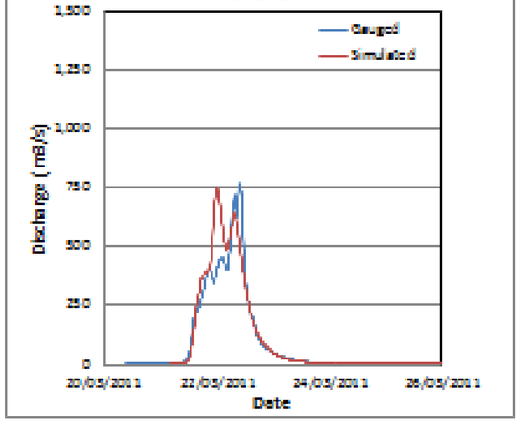
IL 35mm CL 5.0mm/hr



IL 35mm CL 5.0mm/hr



IL 35mm CL 5.0mm/hr



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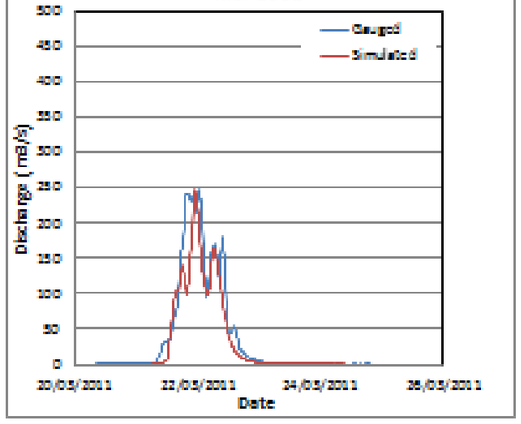

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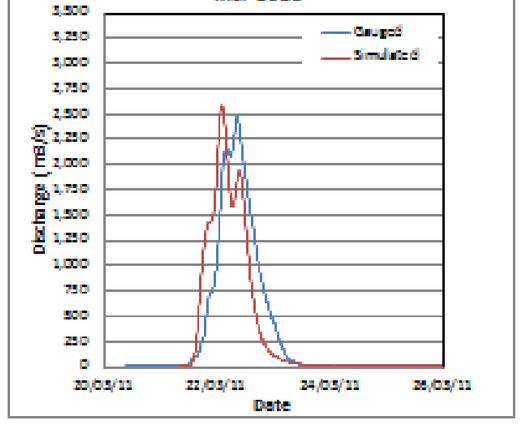

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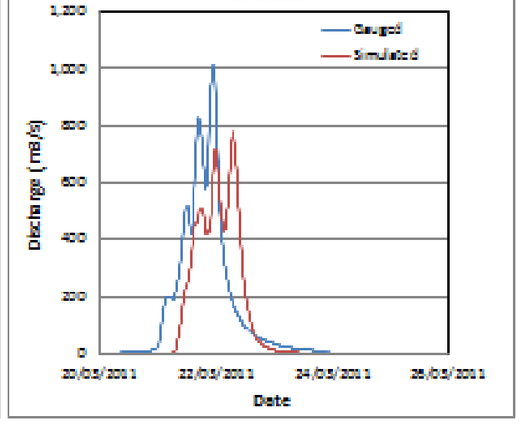

MARCH 1983 EVENT - RUN4E

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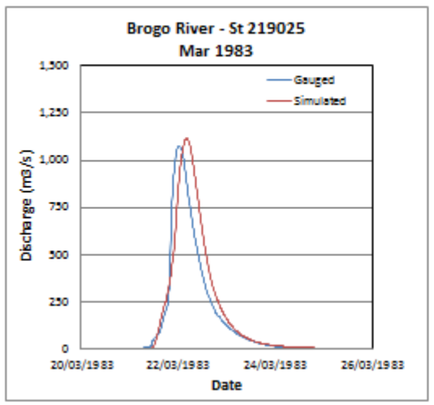

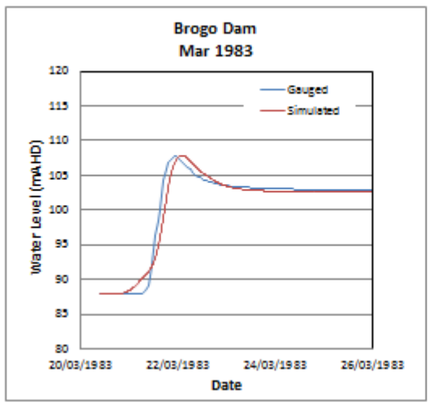

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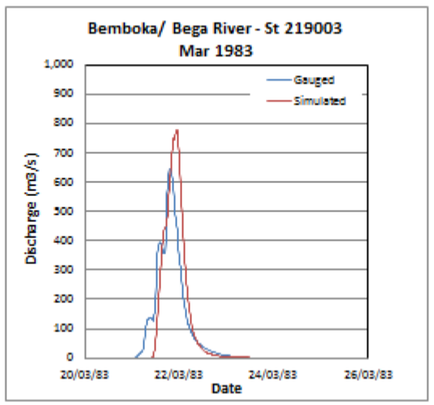
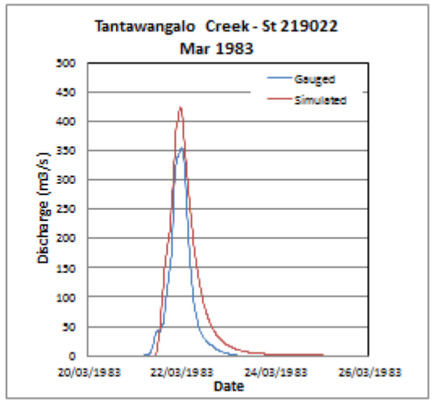


IL 35mm CL 10.0mm/hr



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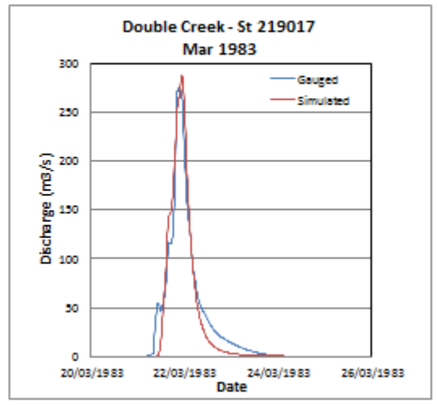

FEBRUARY 2010 EVENT (VALIDATION) – RUN 3A

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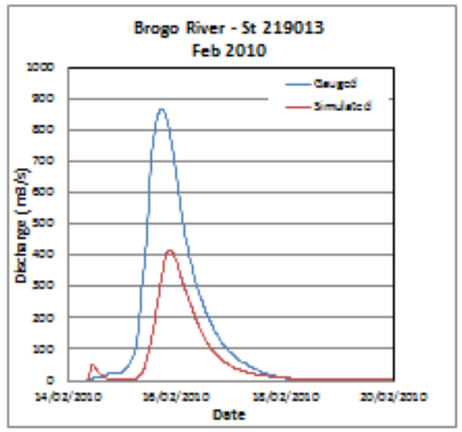

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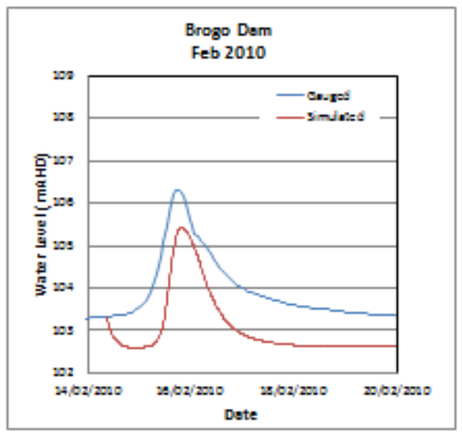

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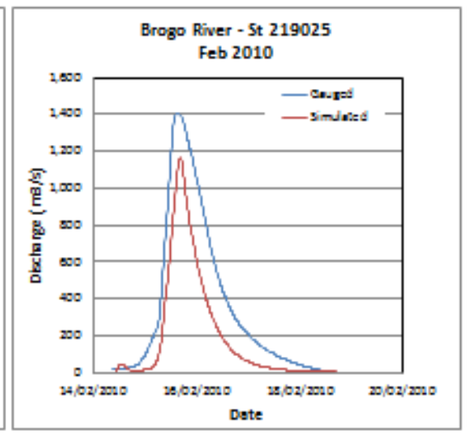

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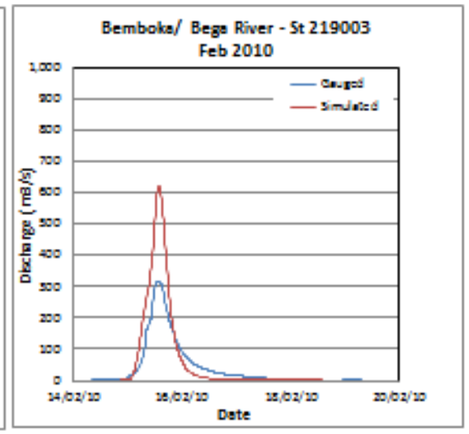
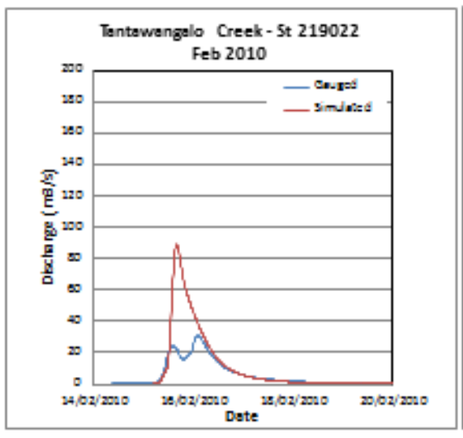
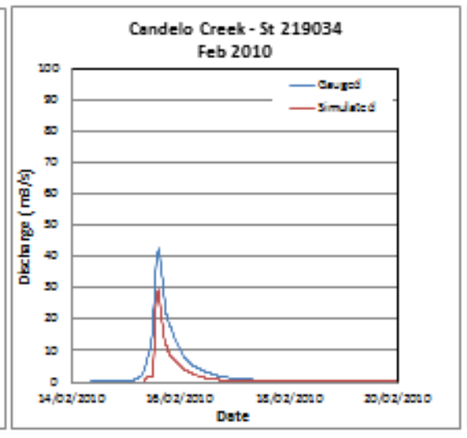


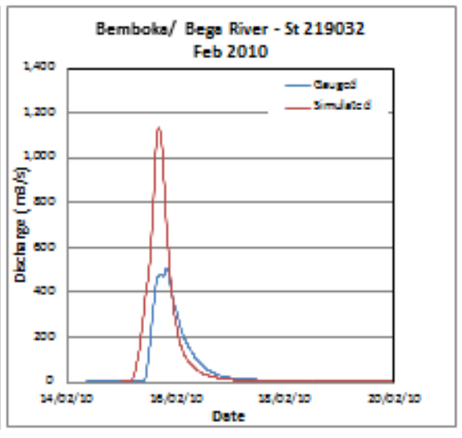
IL 35mm CL 5.0mm/hr



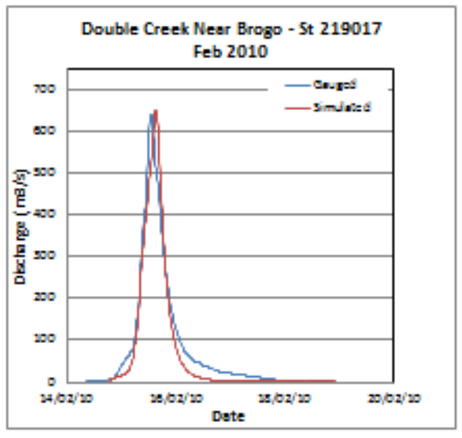
IL 35mm CL 4.0mm/hr

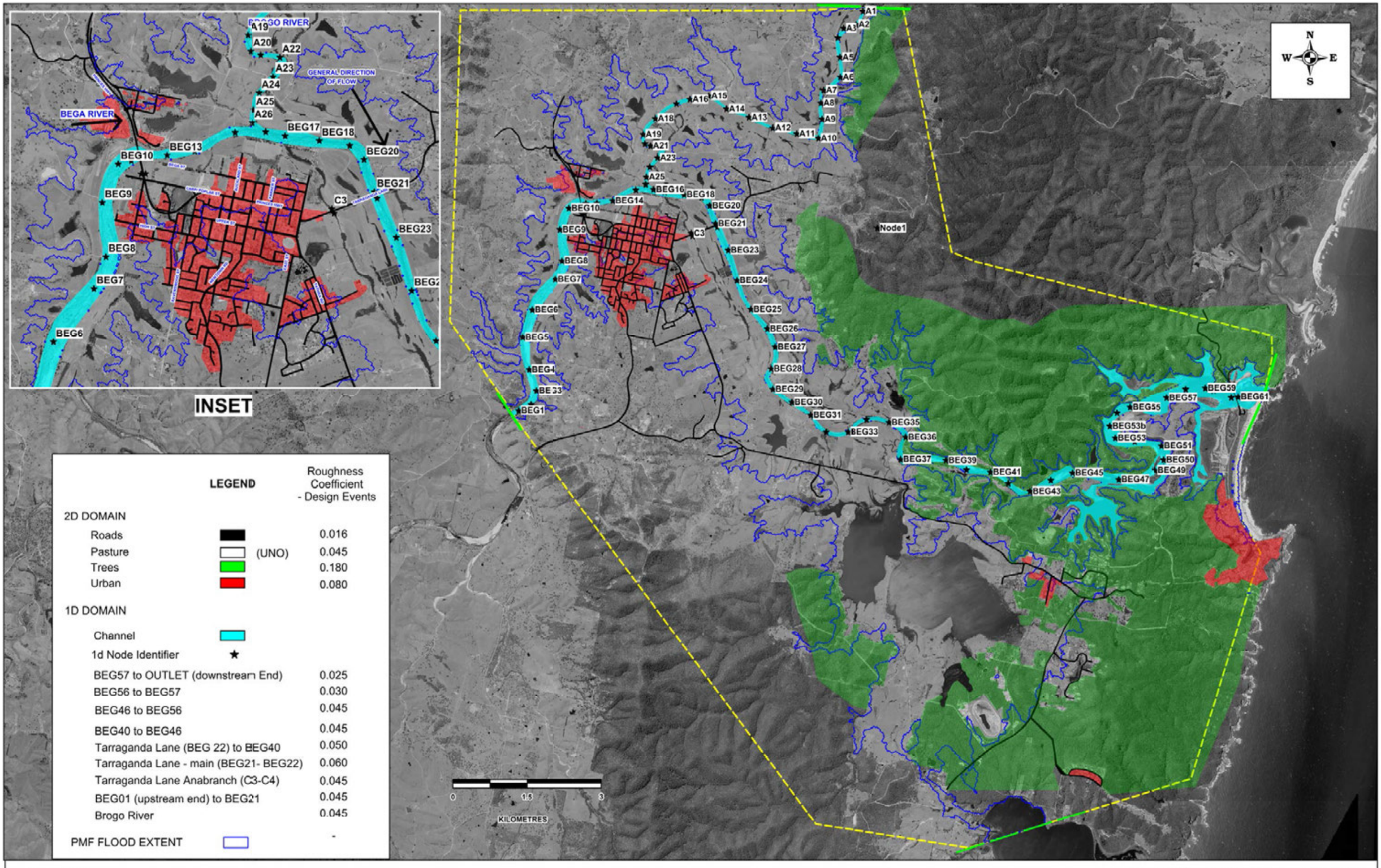


IL 35mm CL 4.0mm/hr



IL 35mm CL 2.5mm/hr





LEGEND		Roughness Coefficient - Design Events
2D DOMAIN		
Roads		0.016
Pasture	(UNO)	0.045
Trees		0.180
Urban		0.080
1D DOMAIN		
Channel		
1d Node Identifier	★	
BEG57 to OUTLET (downstream End)		0.025
BEG56 to BEG57		0.030
BEG46 to BEG56		0.045
BEG40 to BEG46		0.045
Tarraganda Lane (BEG 22) to BEG40		0.050
Tarraganda Lane - main (BEG21- BEG22)		0.060
Tarraganda Lane Anabranch (C3-C4)		0.045
BEG01 (upstream end) to BEG21		0.045
Brogo River		0.045
PMF FLOOD EXTENT		-

DISCLAIMER

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EXTENT OF MODELLING

SMEC

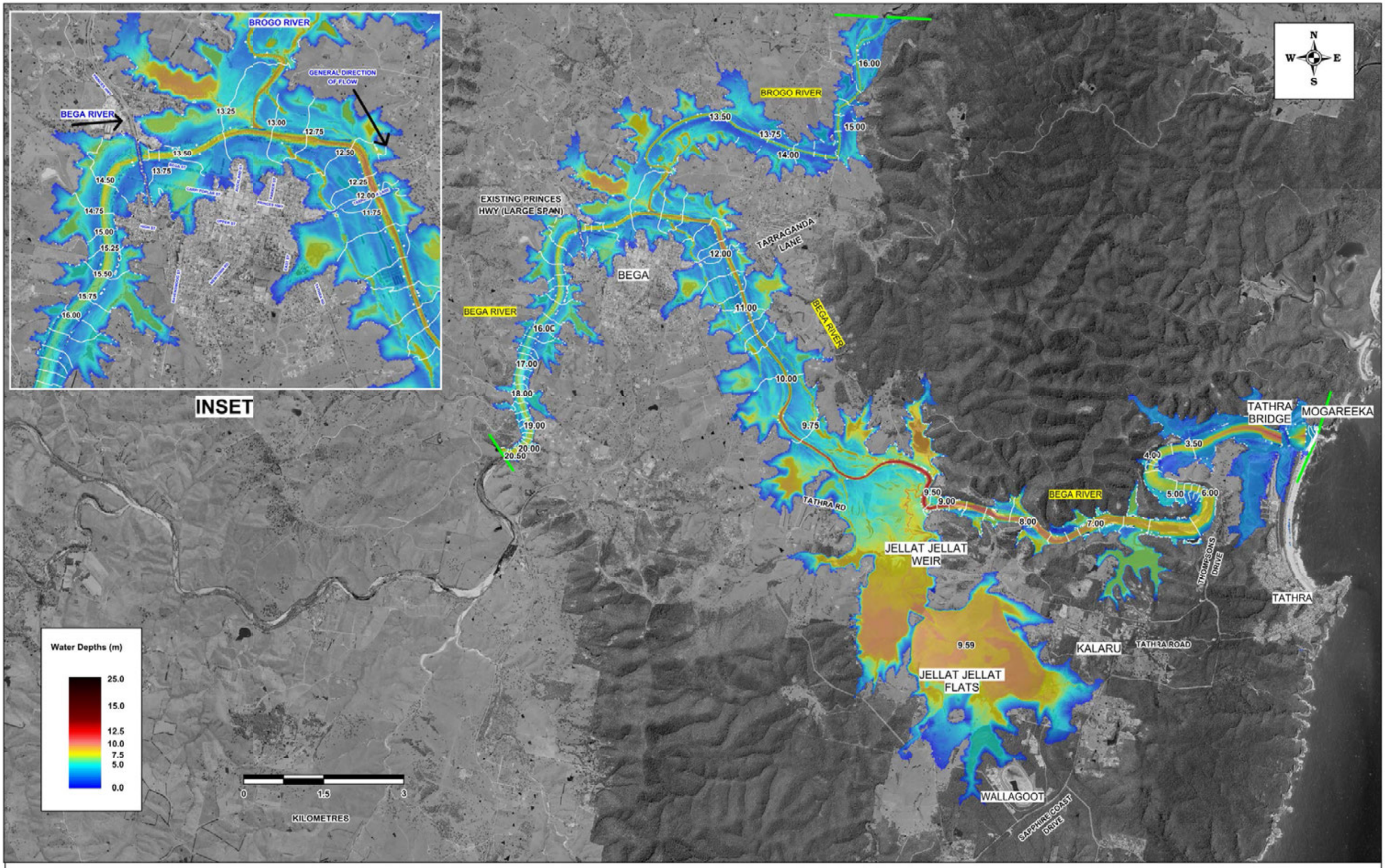
BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure E3
Modelling Surface Roughness Coefficients - Design Events

APPENDIX F – DESIGN FLOOD MAPPING

Figure F1A - 10%AEP Flood Depths and Levels
Figure F1B - 5% AEP Flood Depths and Levels
Figure F1C - 2% AEP Flood Depths and Levels
Figure F1D - 1% AEP Flood Depths and Levels
Figure F1E - 0.2% AEP Flood Depths and Levels
Figure F1F - Probable Maximum Flood (PMF) Flood Depths and Levels

Figure F2A - 10% AEP Water Velocities
Figure F2B - 5% AEP Water Velocities
Figure F2C - 2% AEP Water Velocities
Figure F2D - 1% AEP Water Velocities
Figure F2E - 0.2% AEP Water Velocities
Figure F2F - Probable Maximum Flood (PMF) Water Velocities



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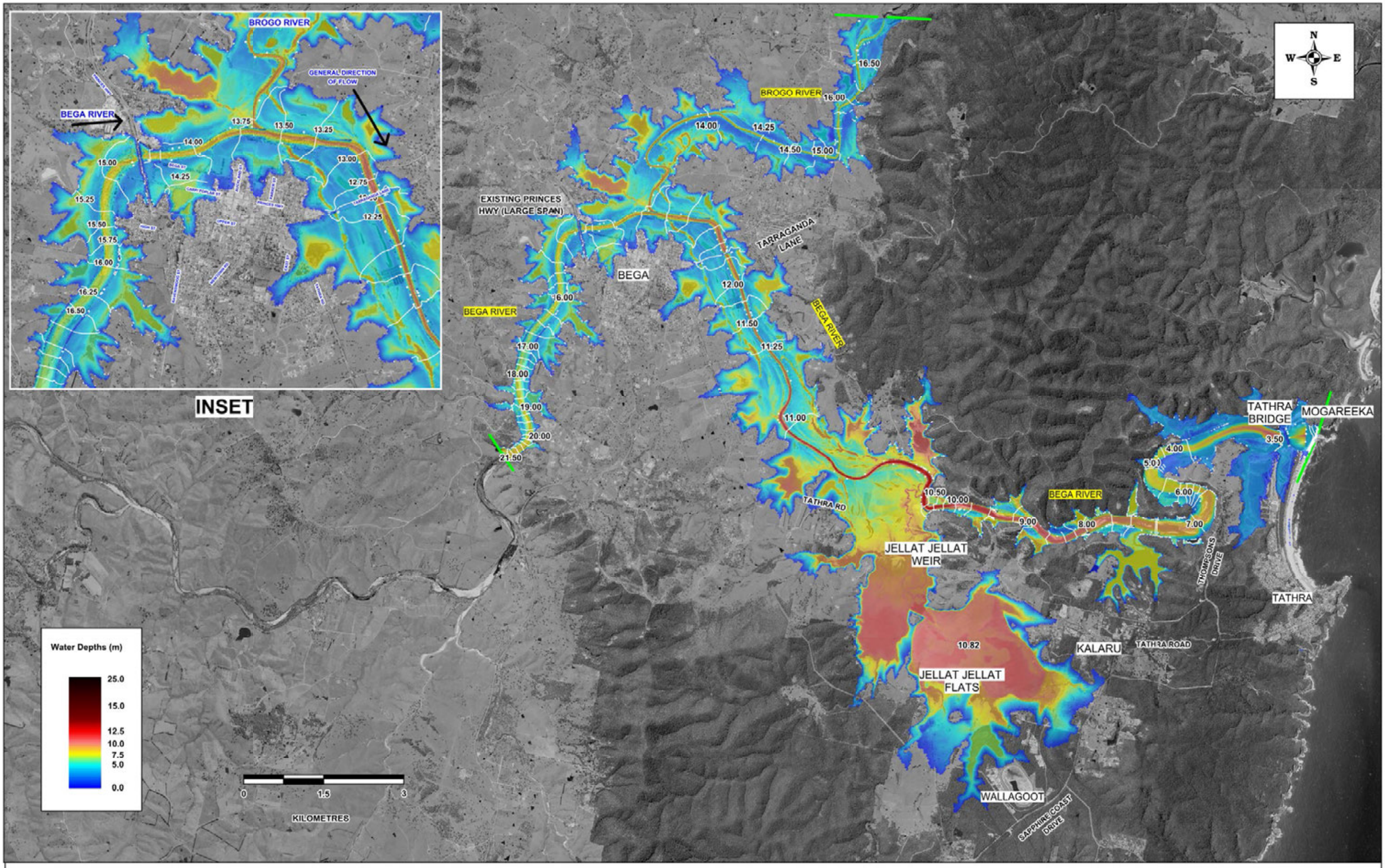
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1A
10% AEP Flood Depths and Levels



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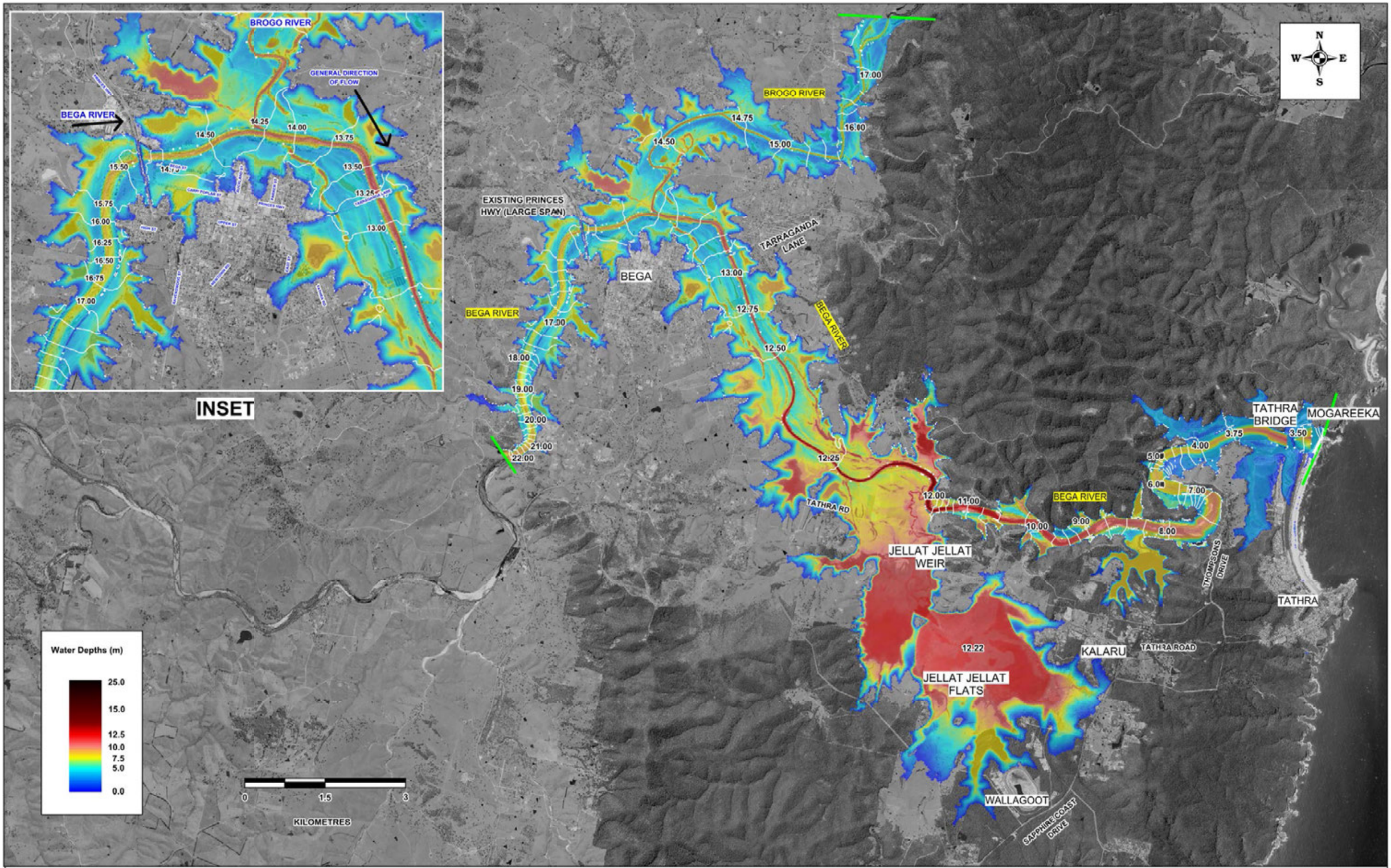
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1B
5% AEP Flood Depths and Levels



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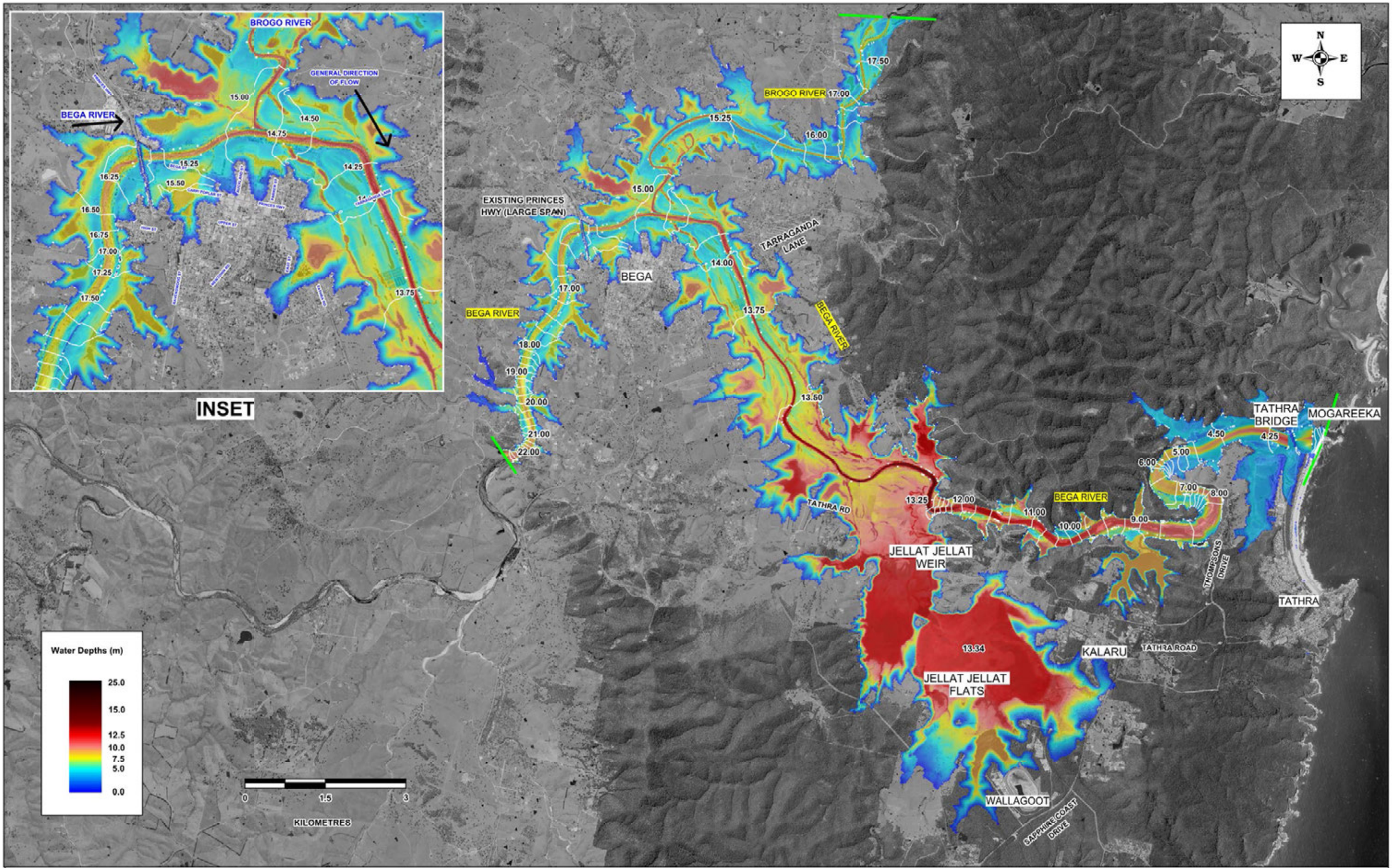
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1C
2% AEP Flood Depths and Levels



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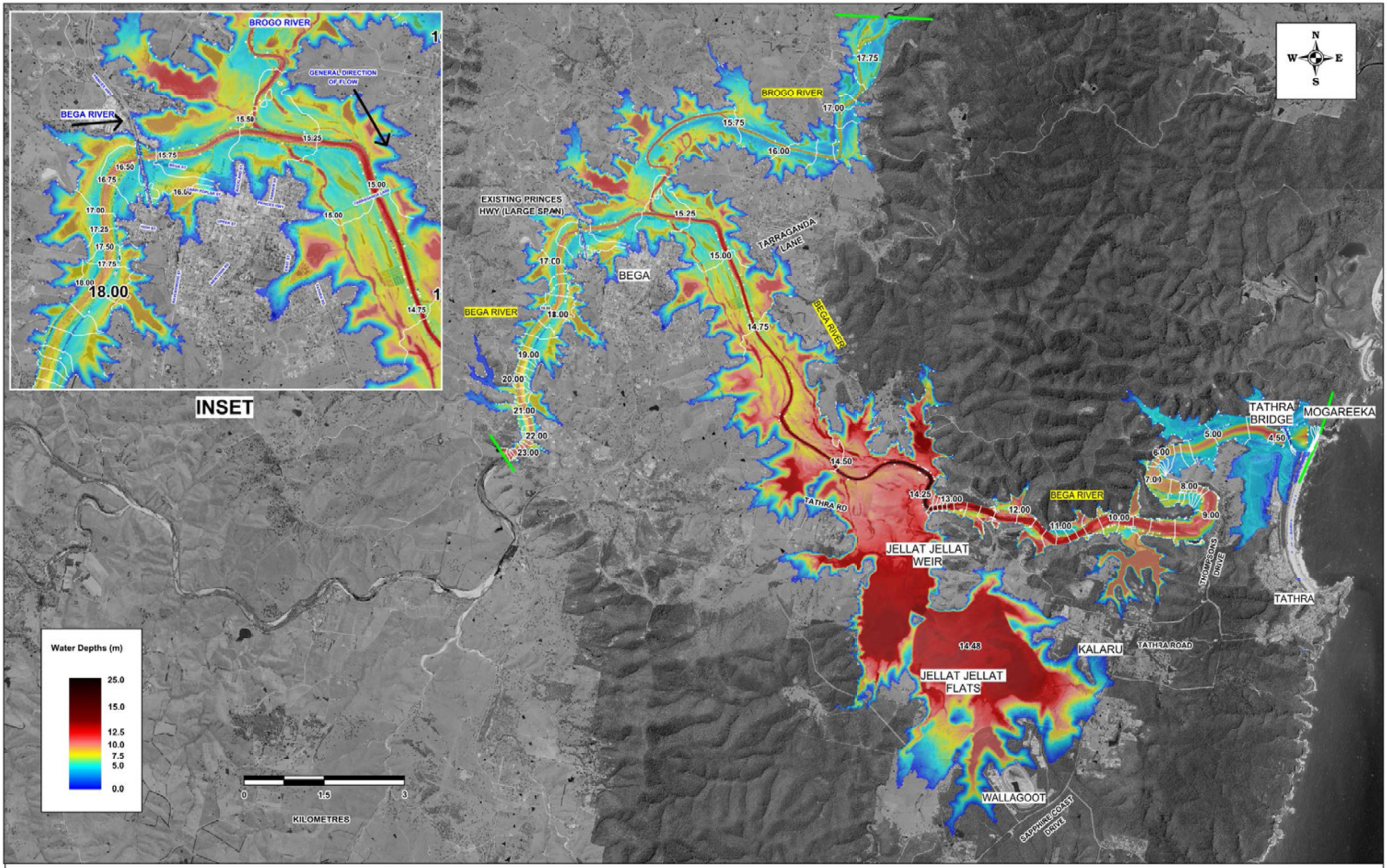
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1D
1% AEP Flood Depths and Levels



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EXTENT OF MODELLING

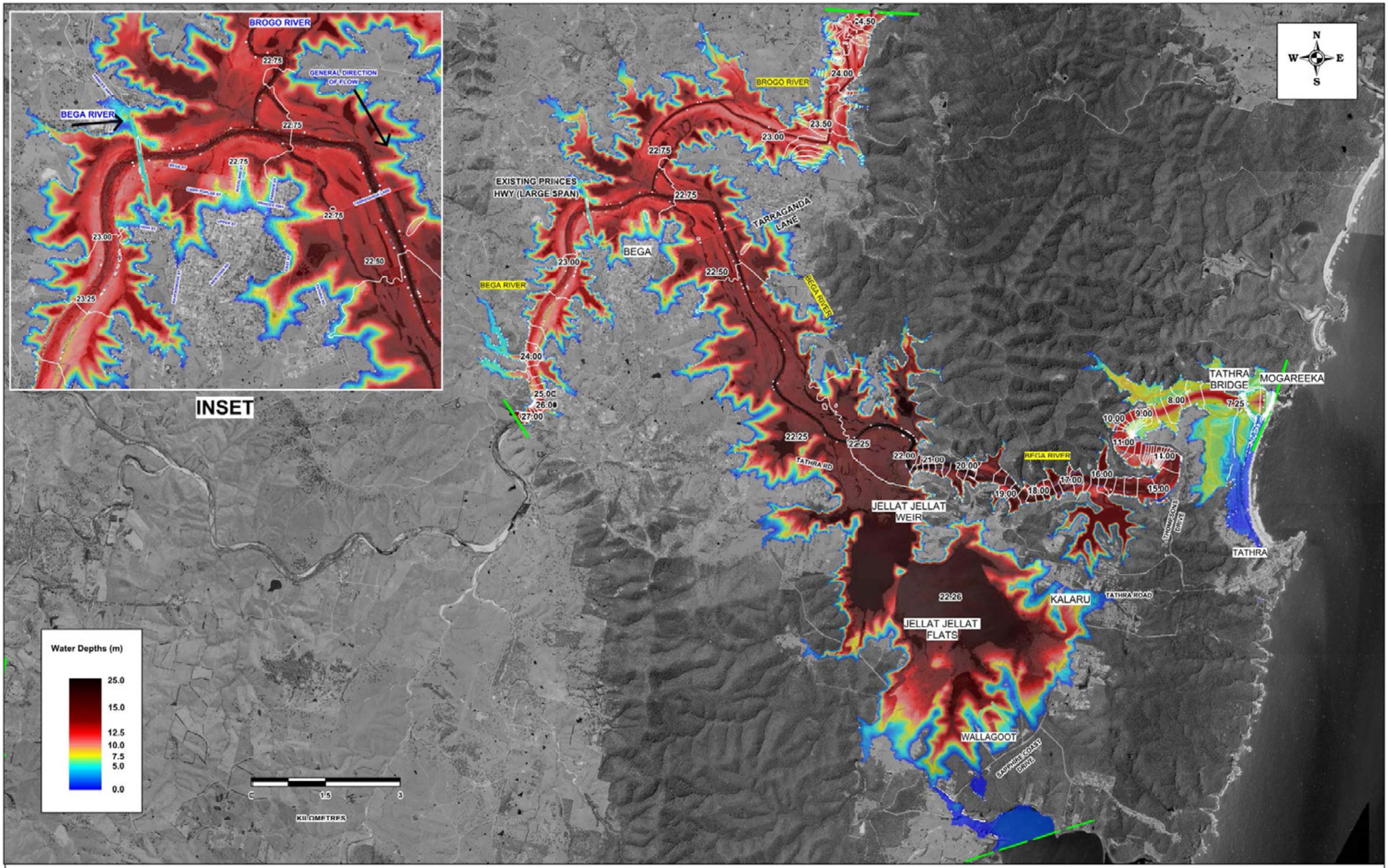
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1E

0.2% AEP Flood Depths and Levels



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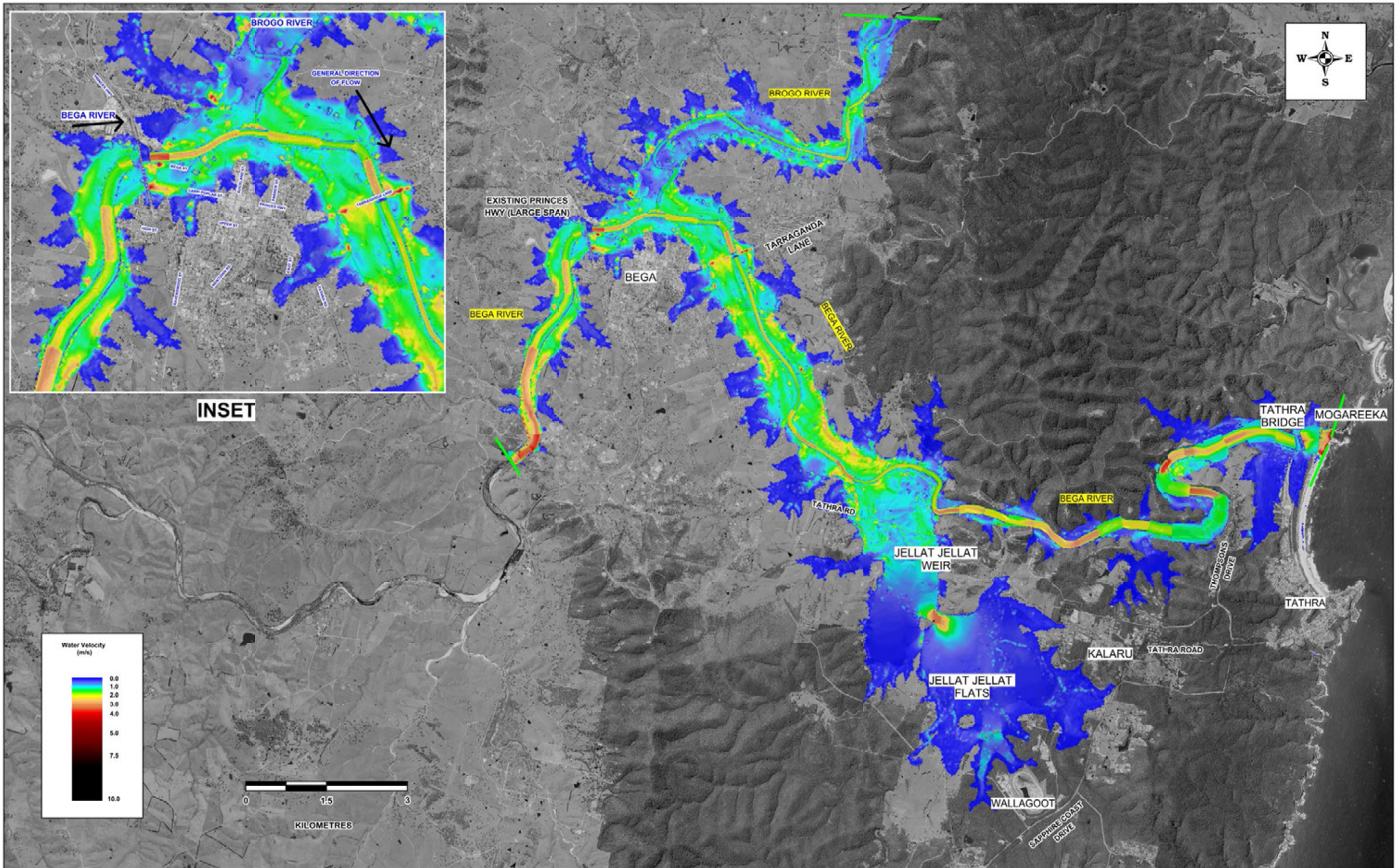
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F1F
PMF Flood Depths and Levels



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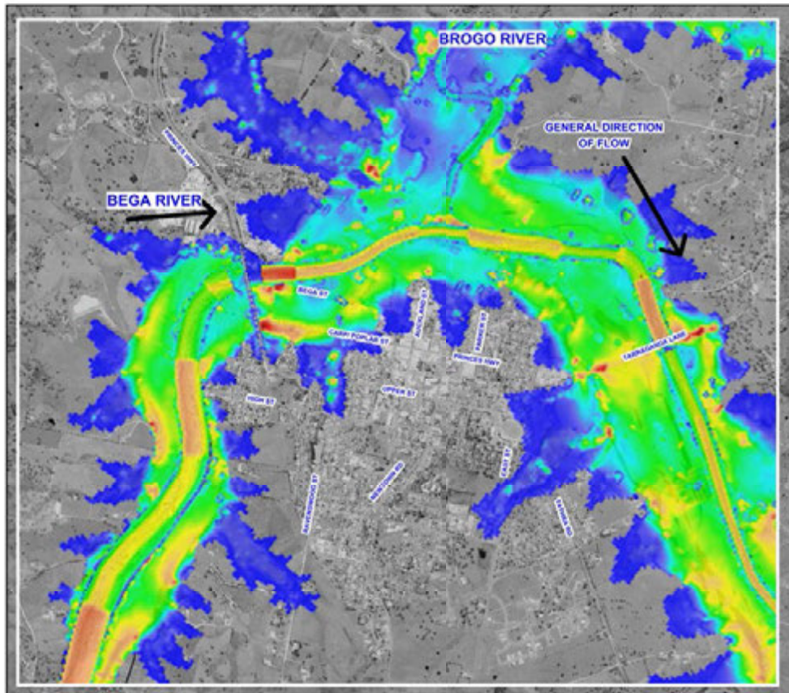
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2A
10% AEP Water Velocities



INSET

BROGO RIVER
EXISTING PRINCES HWY (LARGE SPAN)
TARRAGANDA LANE
BEGA
BEGA RIVER
BEGA RIVER
TATHRA RD
JELLAT JELLAT WEIR
BEGA RIVER
TATHRA BRIDGE
MOGAREEKA
THOMPSONS DRIVE
TATHRA
KALARU
TATHRA ROAD
JELLAT JELLAT FLATS
WALLAGOOT
SAPPHIRE COAST DRIVE

N
W
E
S

Water Velocity (m/s)
0.0
1.0
2.0
3.0
4.0
5.0
7.5
10.0

0 1.5 3
KILOMETRES

DISCLAIMER

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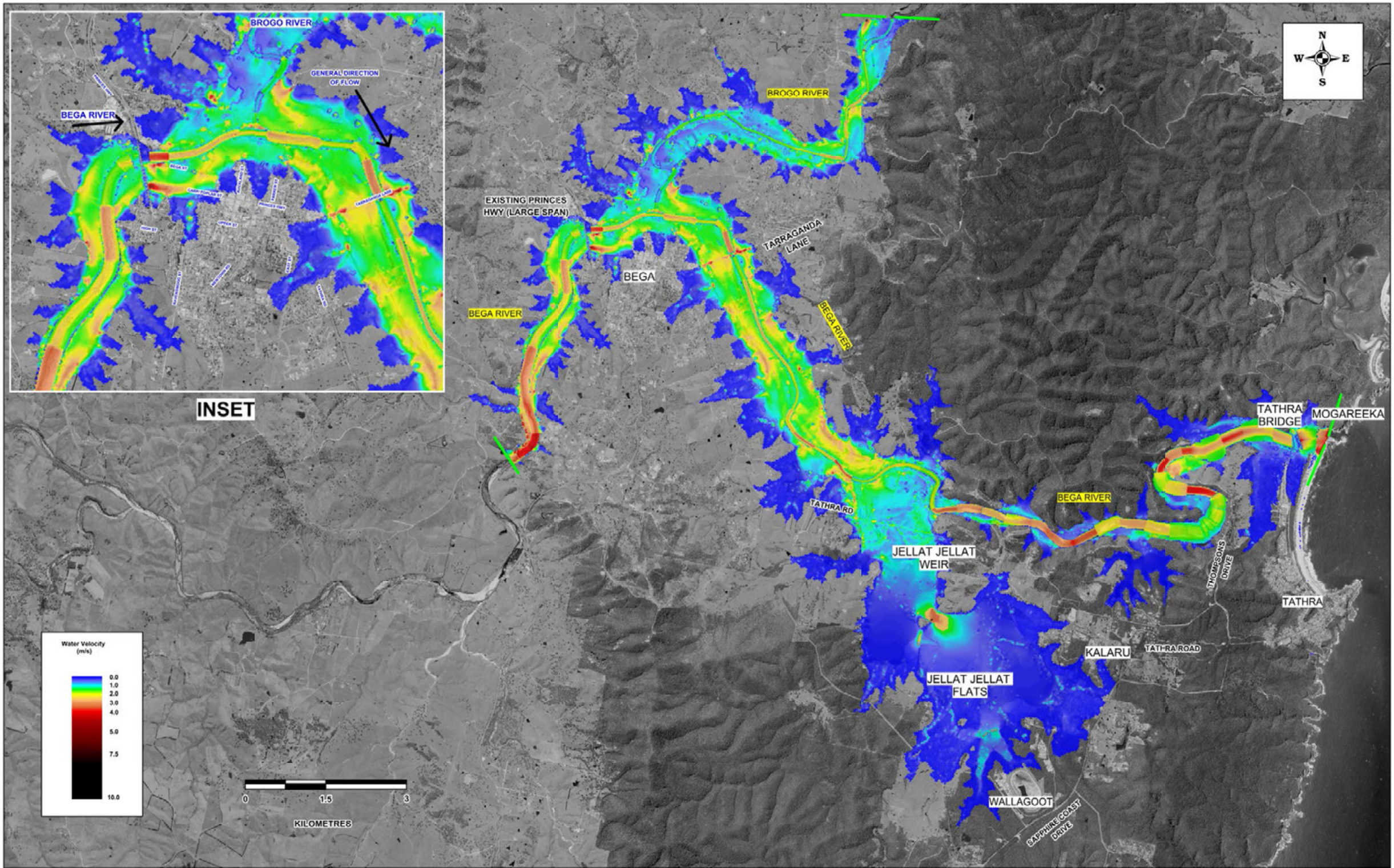
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2B
5% AEP Water Velocities



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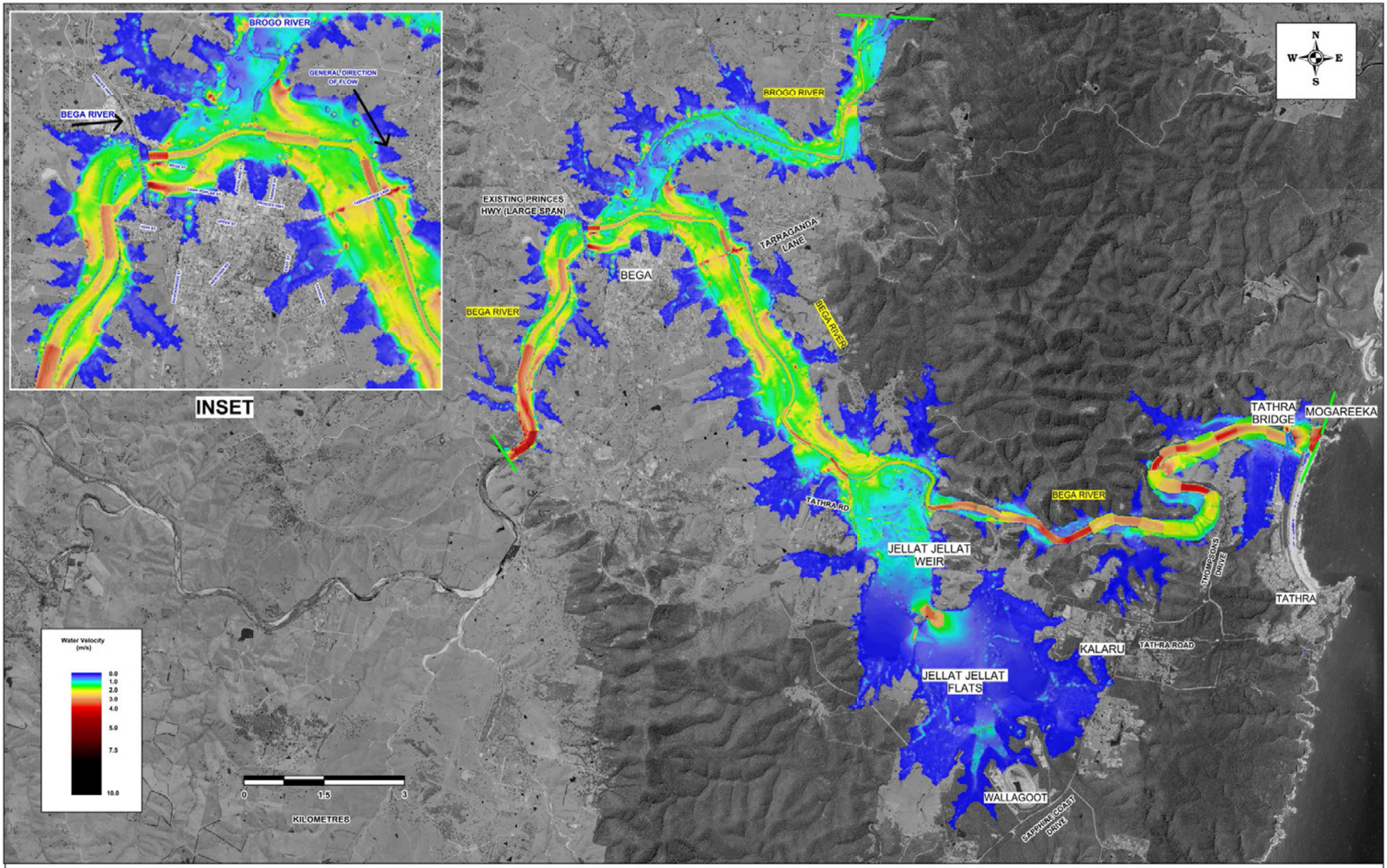
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2C
2% AEP Water Velocities



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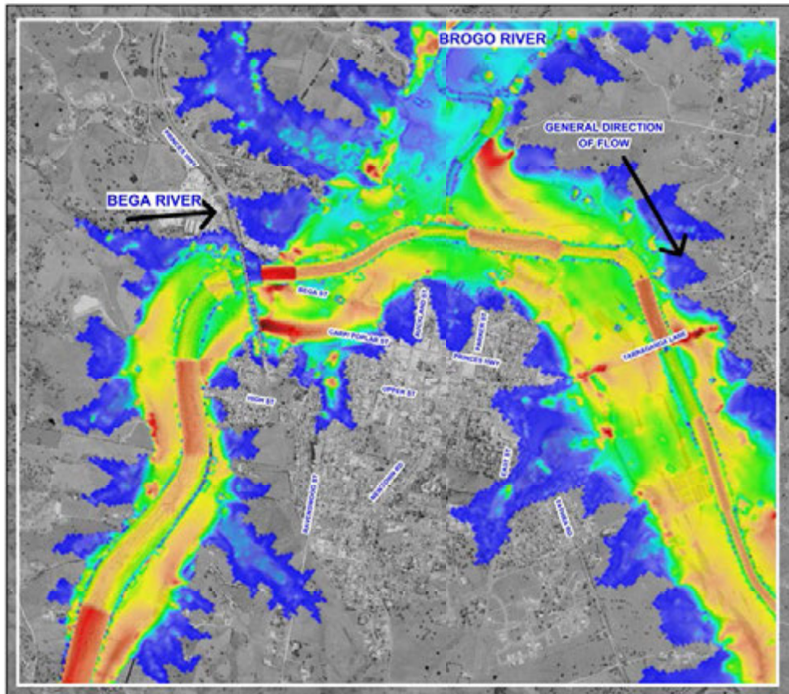
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2D
1% AEP Water Velocities



INSET

BROGO RIVER

EXISTING PRINCES HWY (LARGE SPAN)

TARRAGANDA LANE

BEGA

BEGA RIVER

BEGA RIVER

TATHRA RD

BEGA RIVER

TATHRA BRIDGE

MOGAREEKA

JELLAT JELLAT WEIR

SAPPHIRE COAST DRIVE

TATHRA

KALARU

TATHRA ROAD

JELLAT JELLAT FLATS

WALLAGOOT

SAPPHIRE COAST DRIVE

N

W E

S

Water Velocity (m/s)

0.0
1.0
2.0
3.0
4.0
5.0
7.5
10.0

0 1.5 3

KILOMETRES

DISCLAIMER

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EXTENT OF MODELLING

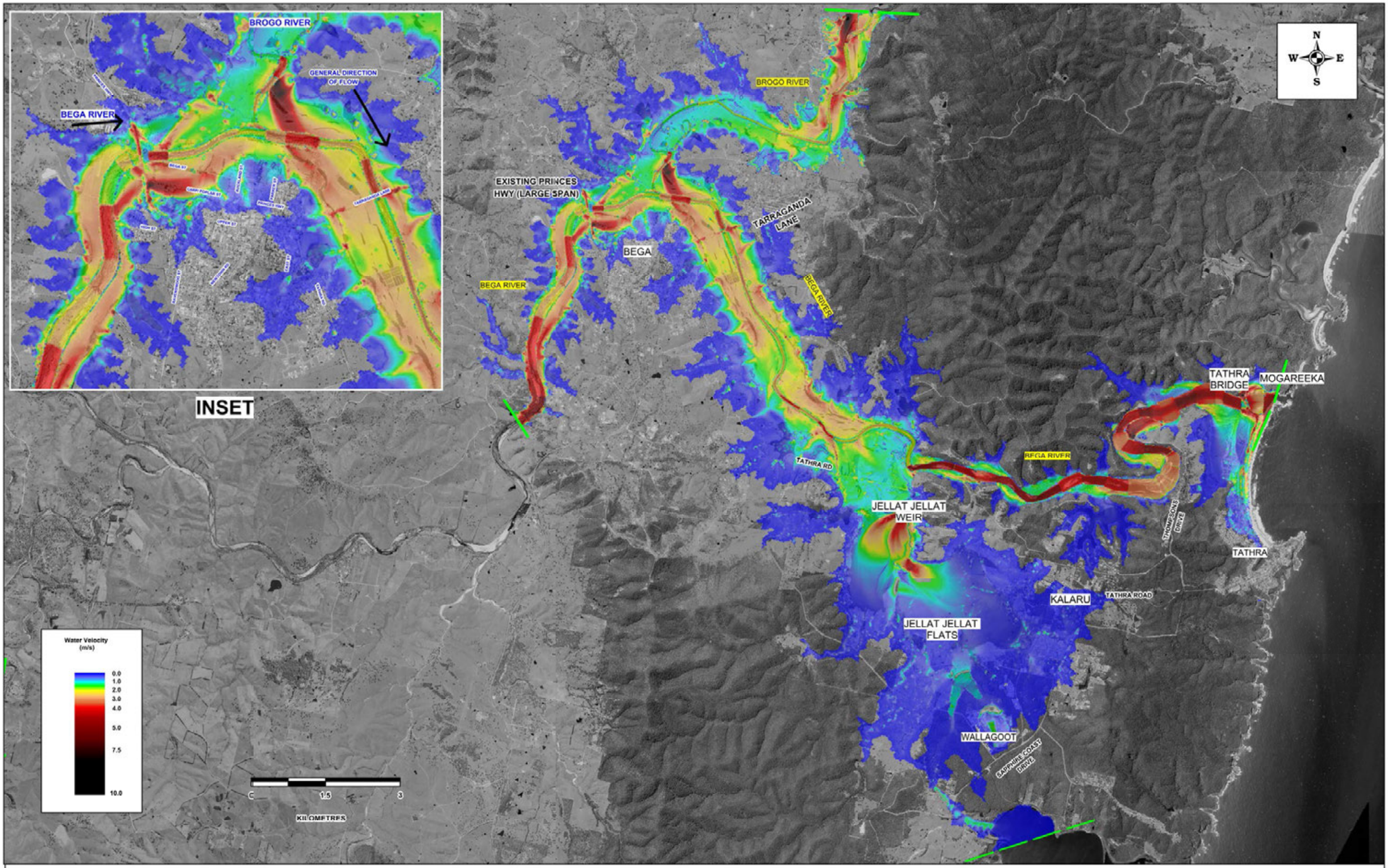
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2E

0.2% AEP Water Velocities



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EXTENT OF MODELLING

SMEC

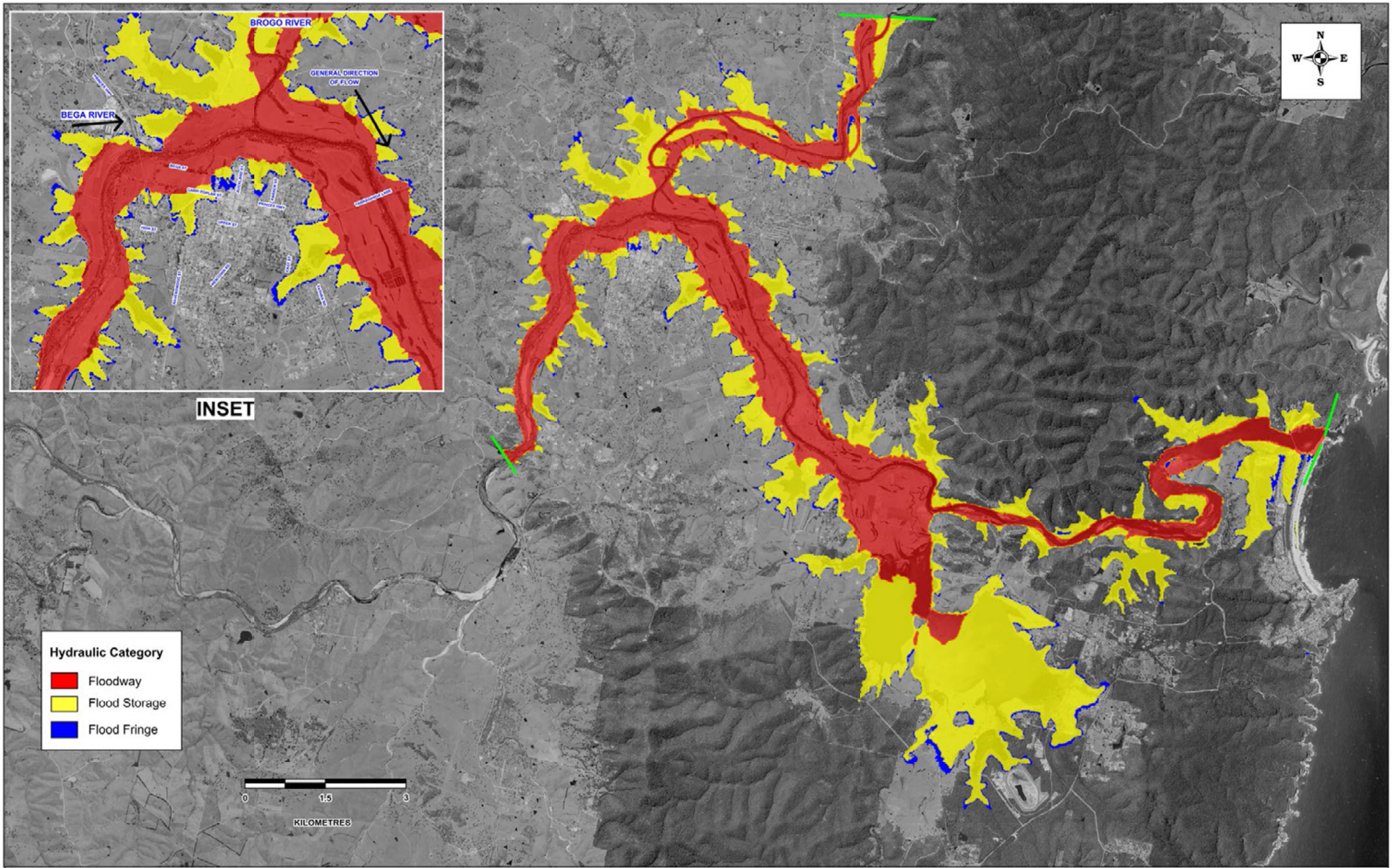
BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure F2F
PMF Water Velocities

APPENDIX G – HYDRAULIC AND HAZARD CATEGORISATION

Figure G1A - 10% AEP Hydraulic Categories
Figure G1B - 5% AEP Hydraulic Categories
Figure G1C - 2% AEP Hydraulic Categories
Figure G1D - 1% AEP Hydraulic Categories
Figure G1E - 0.2% AEP Hydraulic Categories
Figure G1F - Probable Maximum Flood (PMF) Hydraulic Categories

Figure G2A - 10% AEP Flow Hazard
Figure G2B - 5% AEP Flow Hazard
Figure G2C - 2% AEP Flow Hazard
Figure G2D - 1% AEP Flow Hazard
Figure G2E - 0.2% AEP Flow Hazard
Figure G2F - Probable Maximum Flood (PMF) Flow Hazard



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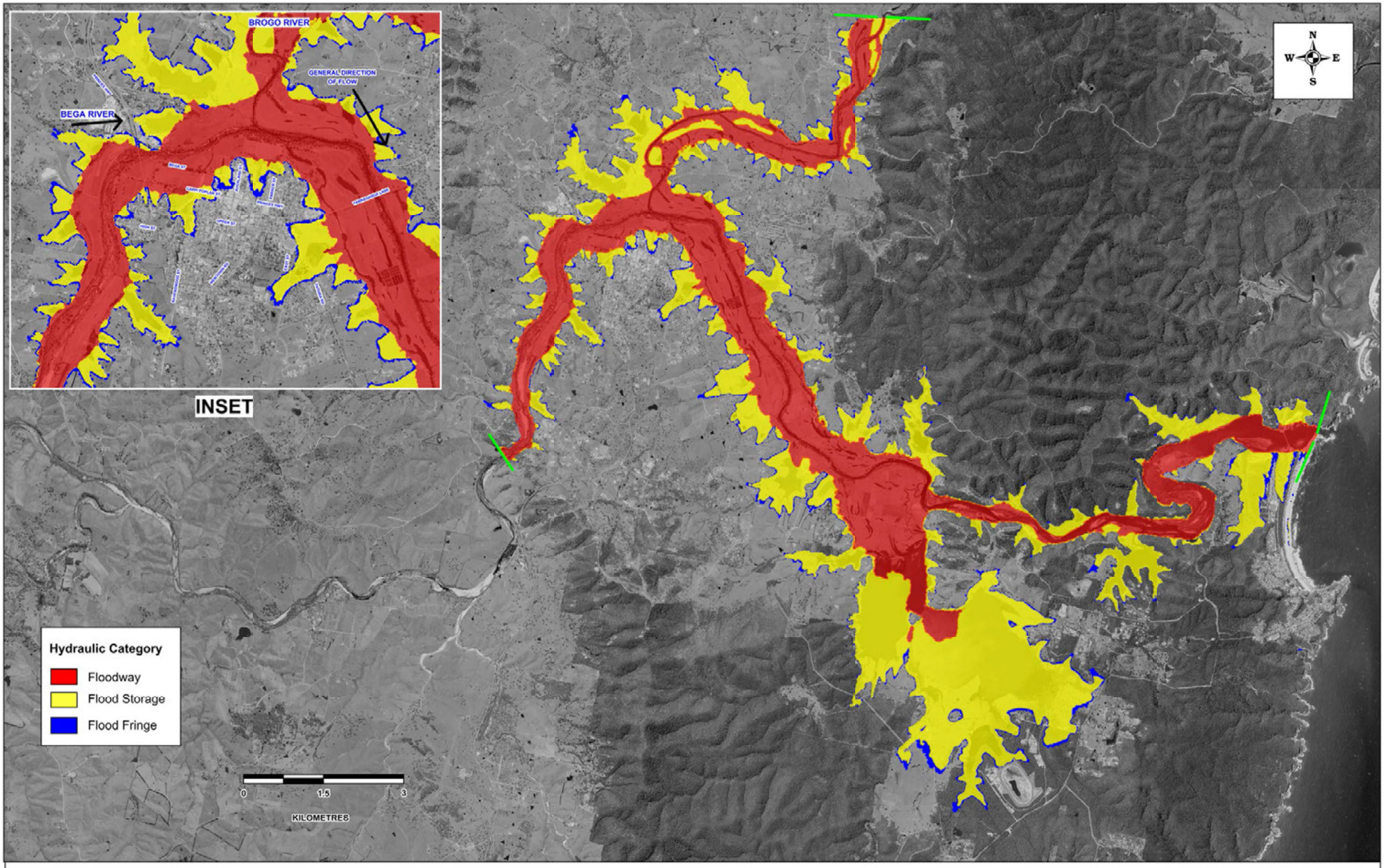
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1A
10% AEP Hydraulic Categorisation



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EXTENT OF MODELLING

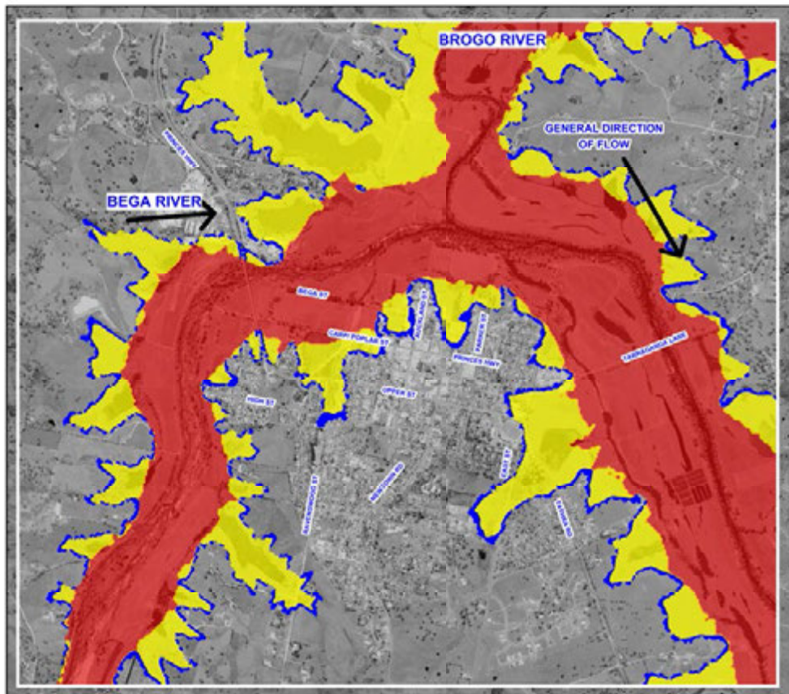
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1B

5% AEP Hydraulic Categorisation



INSET

N
W
E
S

Hydraulic Category
- Floodway
- Flood Storage
- Flood Fringe

0 1.5 3
KILOMETRES

EXTENT OF MODELLING

DISCLAIMER

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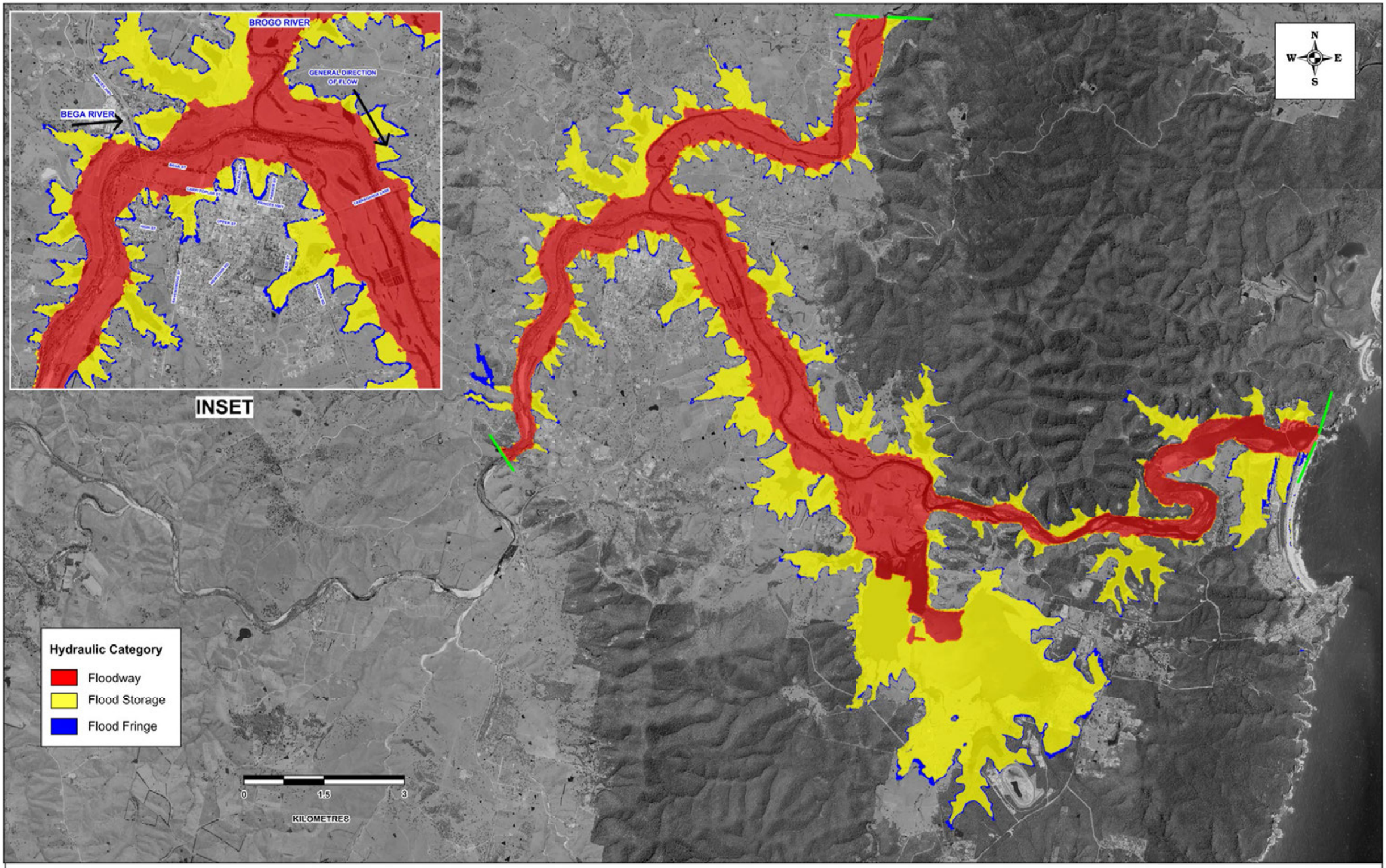
SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1C
2% AEP Hydraulic Categorisation



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EXTENT OF MODELLING

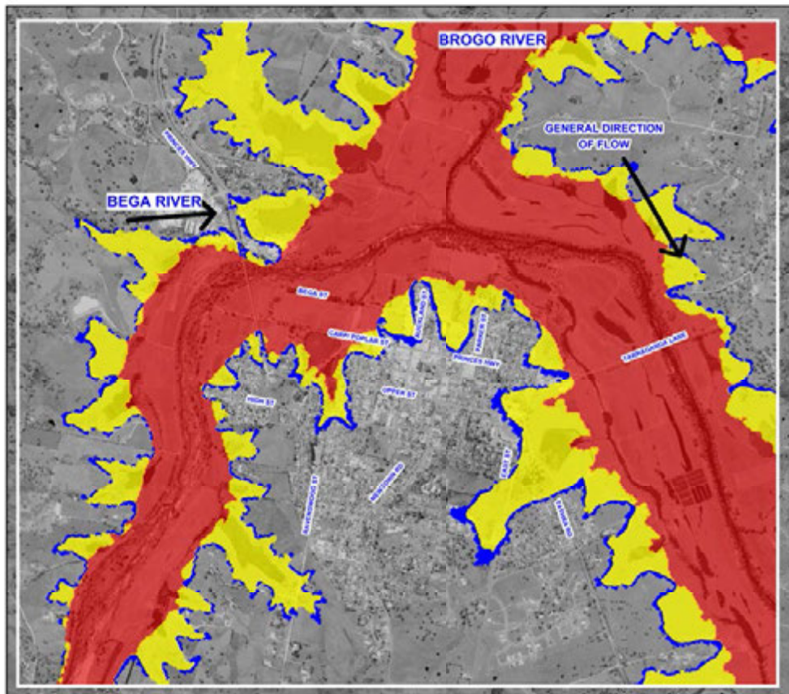
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1D

1% AEP Hydraulic Categorisation



INSET

N
W
E
S

Hydraulic Category
- Floodway
- Flood Storage
- Flood Fringe

0 1.5 3
KILOMETRES

EXTENT OF MODELLING

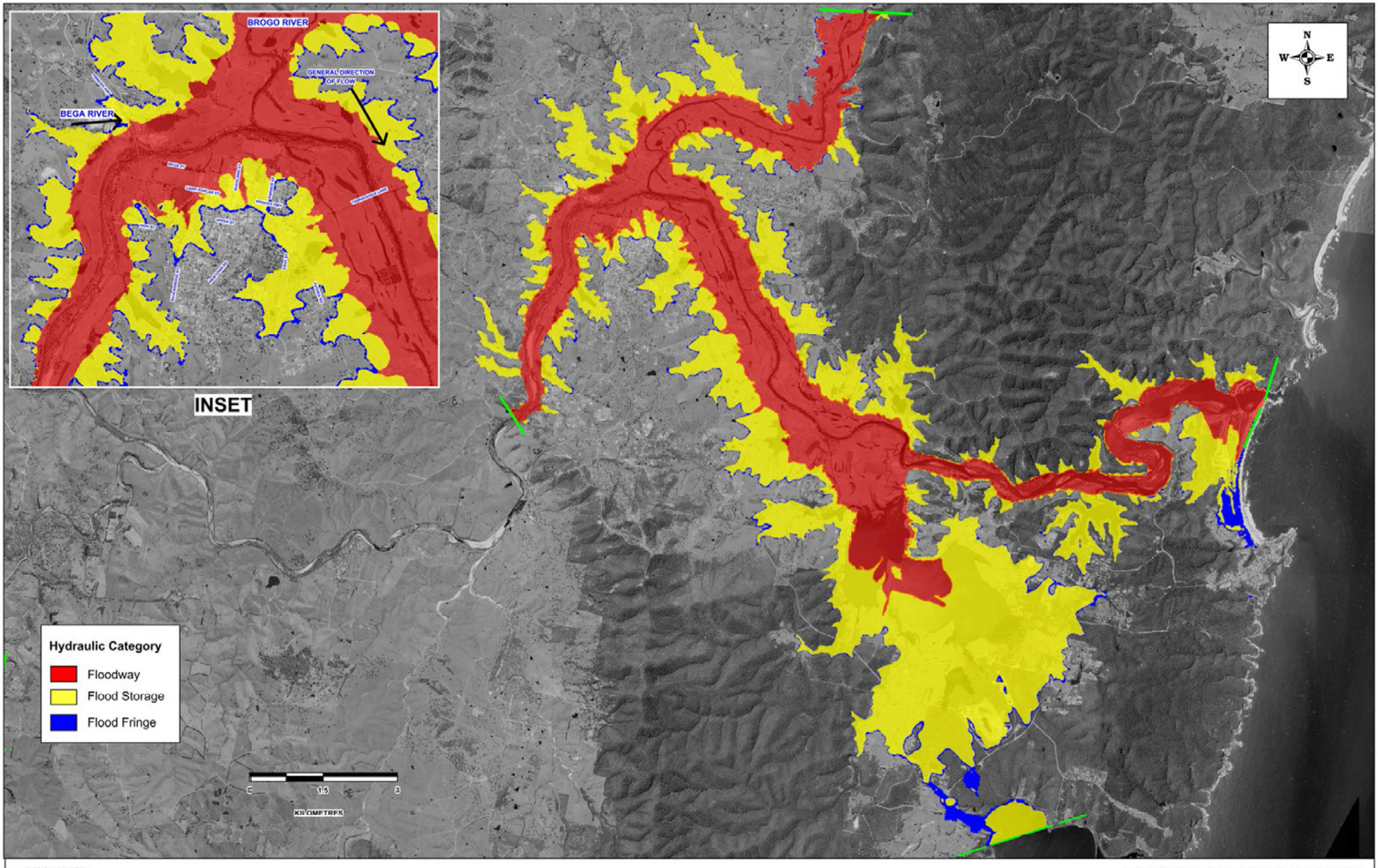
DISCLAIMER

The accuracy of flood extents and hydraulic parameters shown on this map is limited to the level of accuracy of the survey data and modelling software available for flood modelling. The flood extents and hydraulic parameters on the map are only an indication of potential flooding conditions throughout the catchment for modelled design storm event and may vary from real flooding conditions.

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1E
0.2% AEP Hydraulic Categorisation



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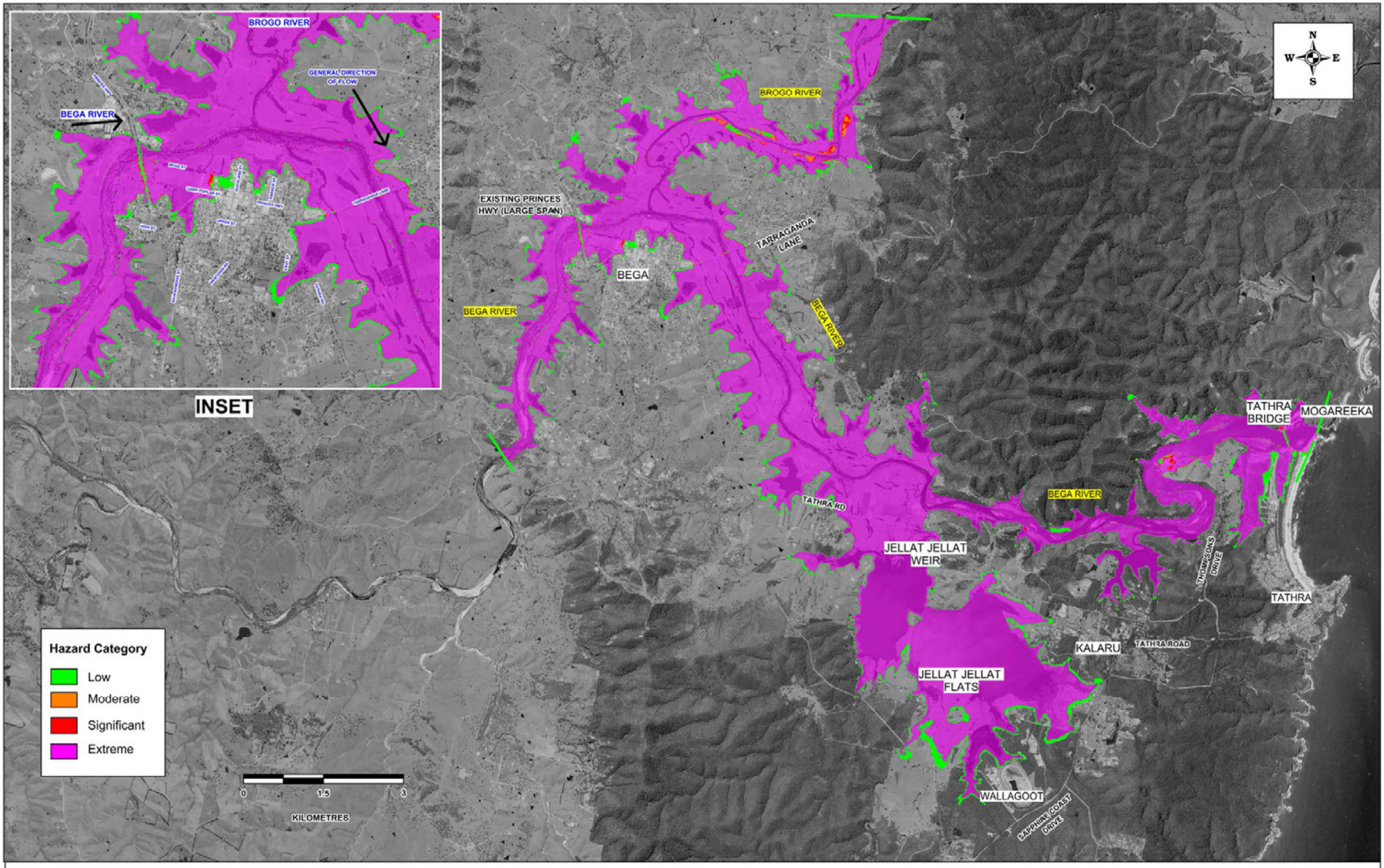
EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure G1F
PMF Hydraulic Categorisation



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EXTENT OF MODELLING

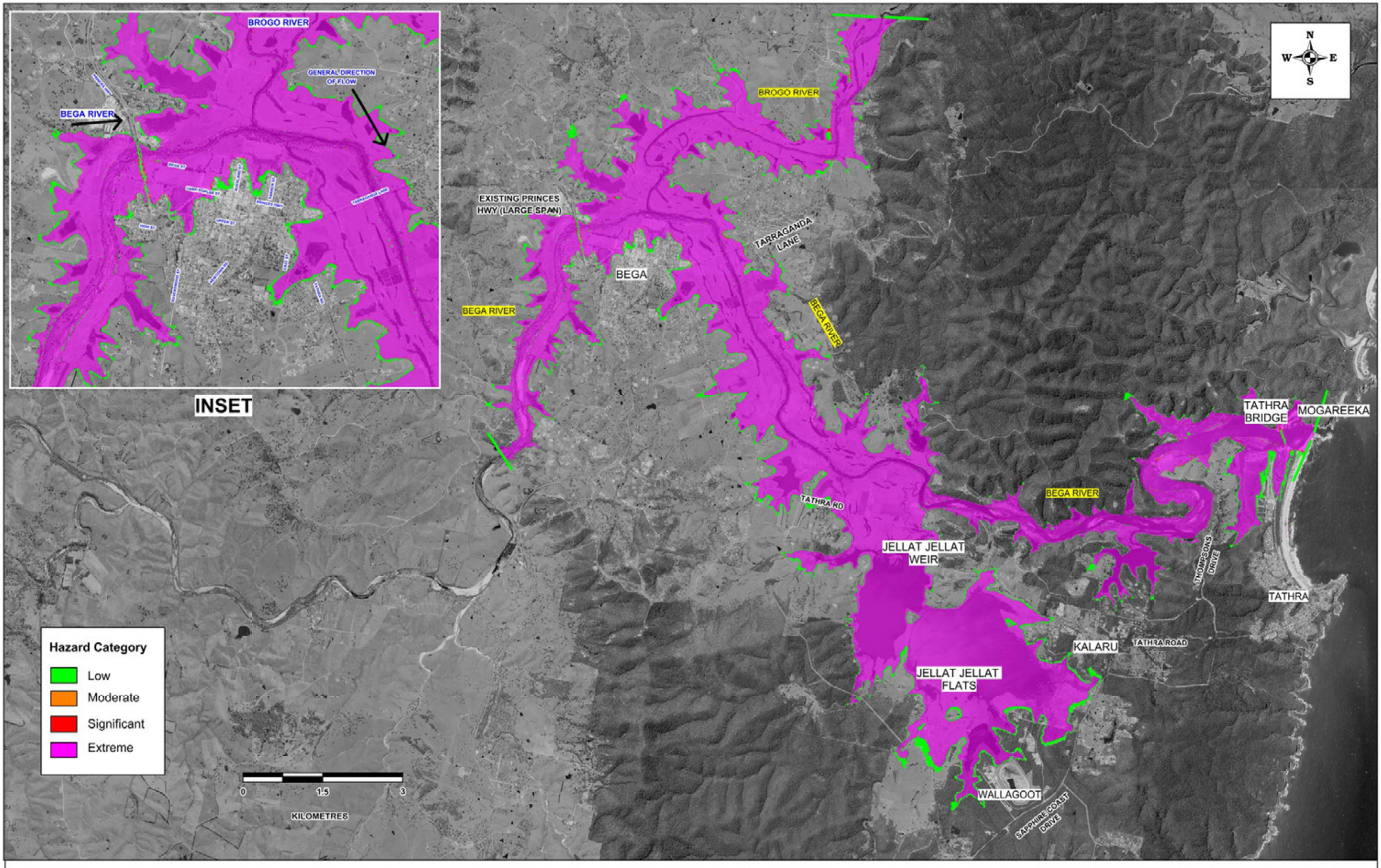
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2A

10% AEP Provisional Flow Hazard



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EXTENT OF MODELLING

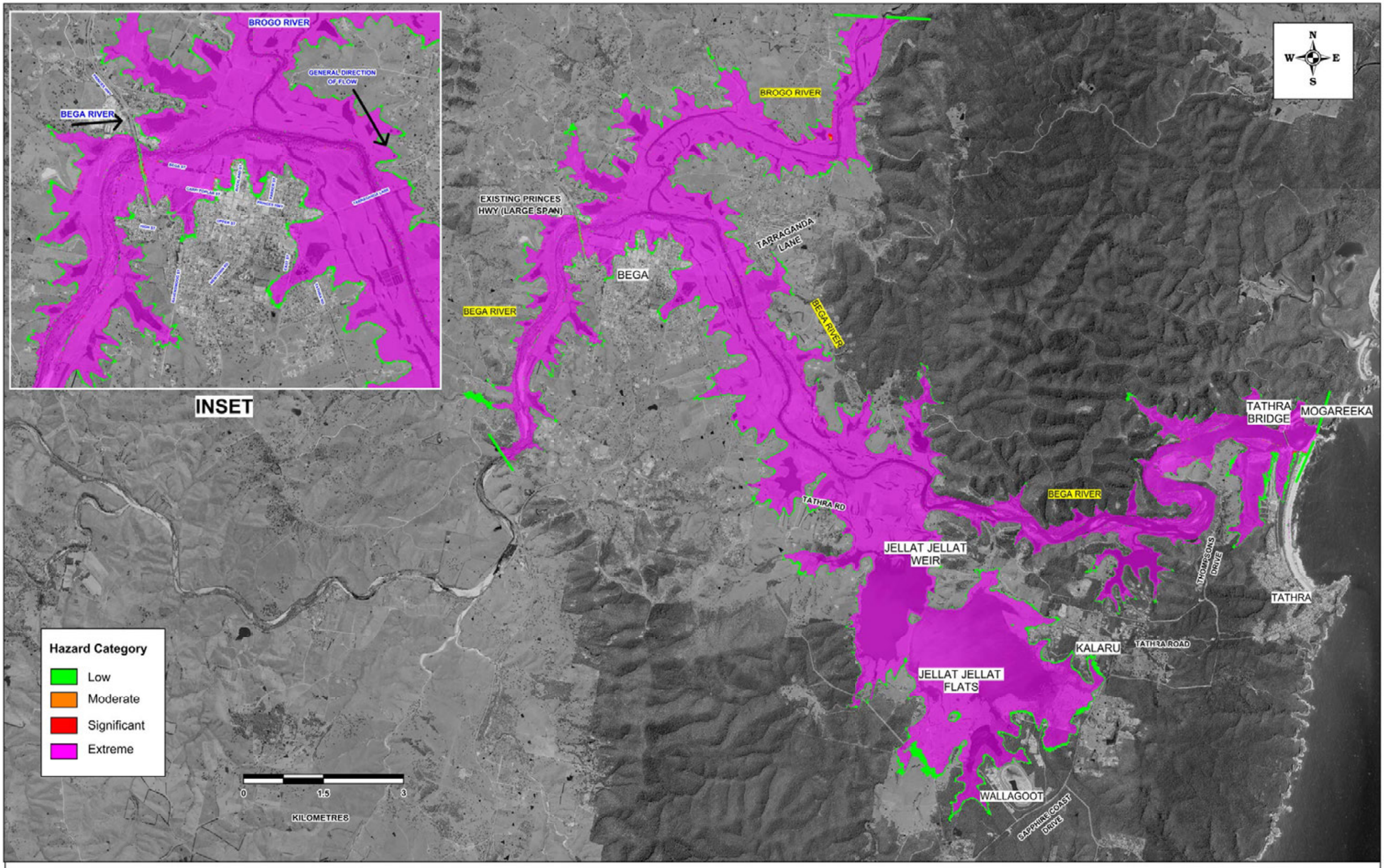
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2B

5% AEP Provisional Flow Hazard



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EXTENT OF MODELLING

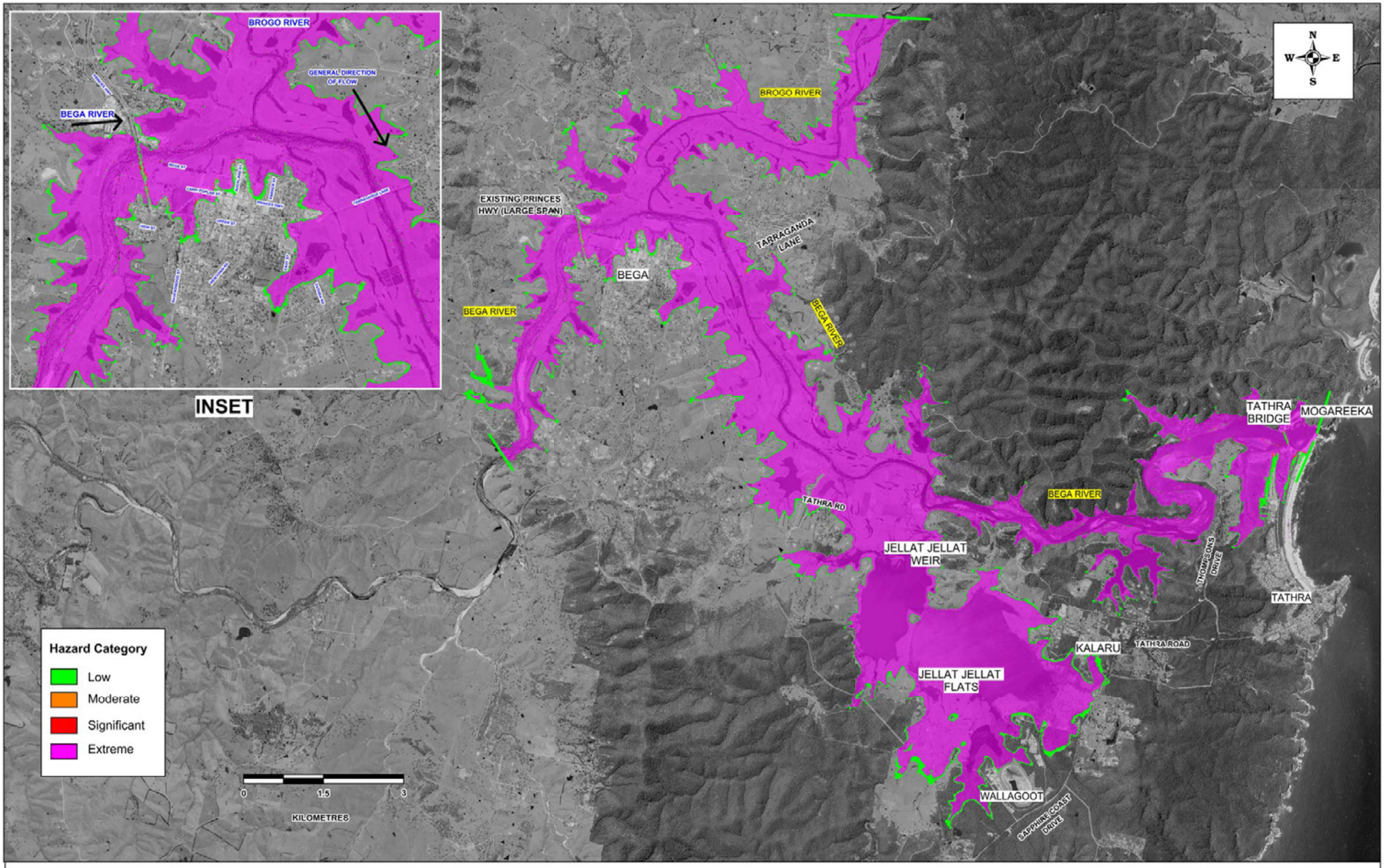
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2C

2% AEP Provisional Flow Hazard



DISCLAIMER

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EXTENT OF MODELLING

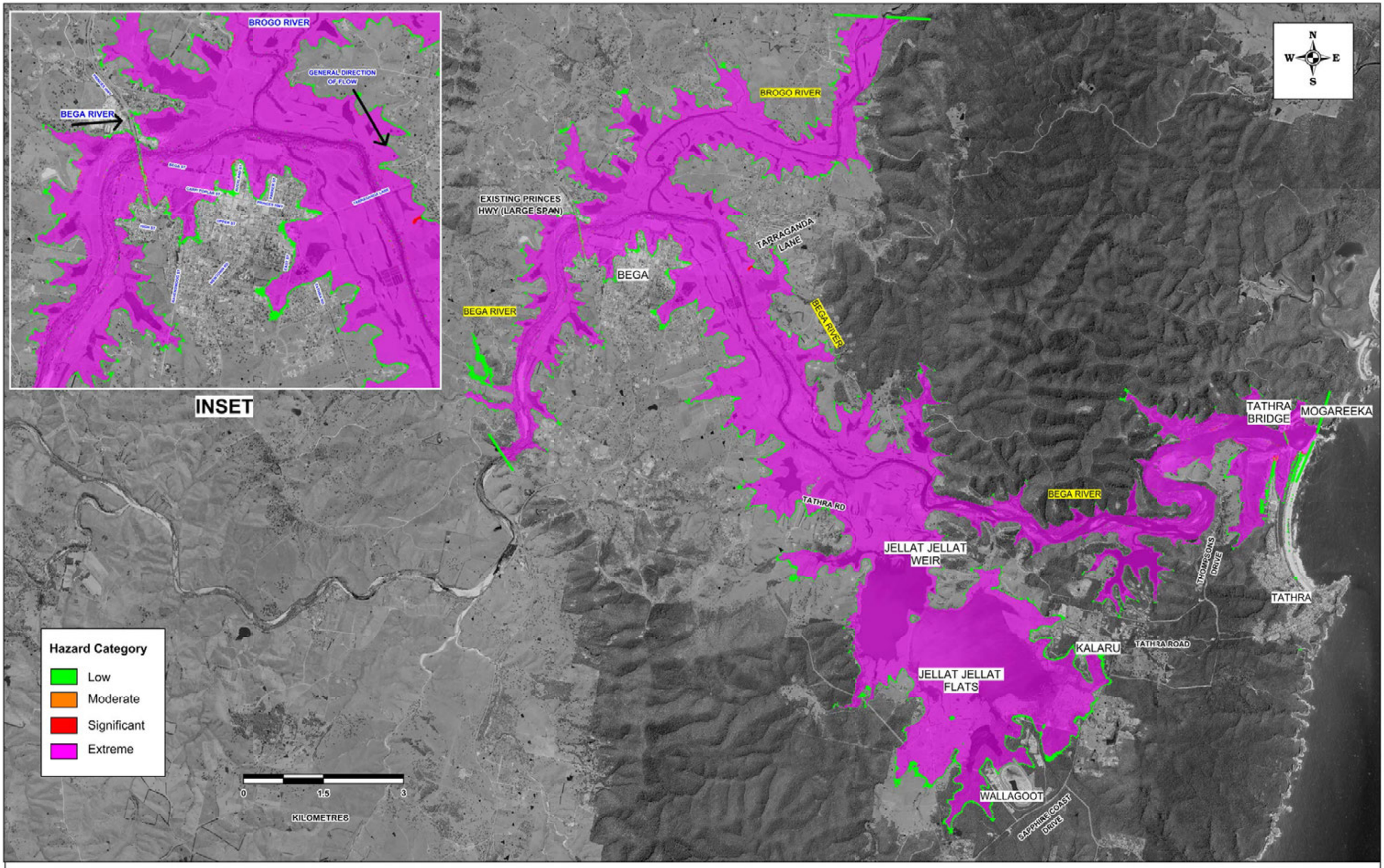
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2D

1% AEP Provisional Flow Hazard



DISCLAIMER

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EXTENT OF MODELLING

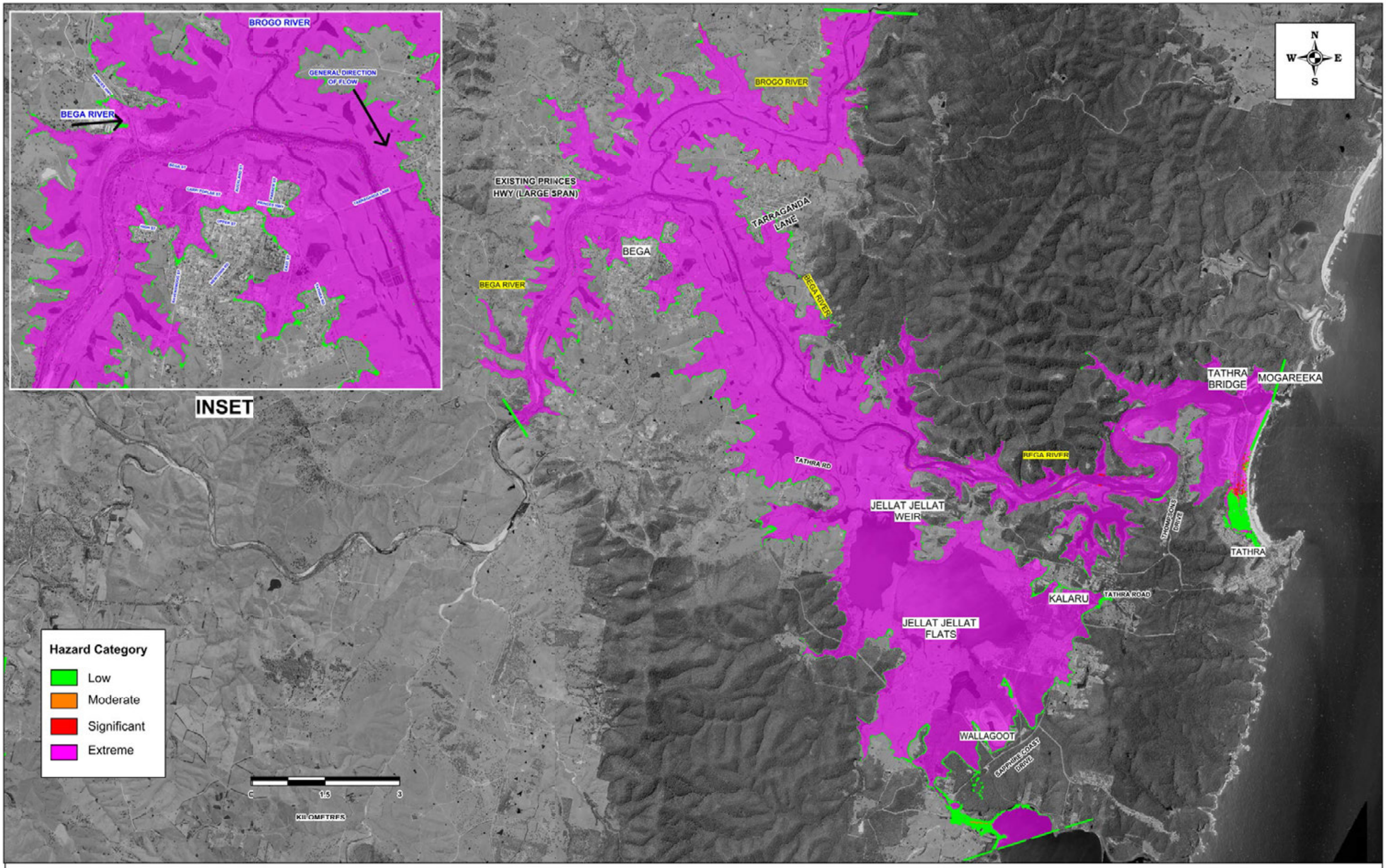
SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2E

0.2% AEP Provisional Flow Hazard



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EXTENT OF MODELLING

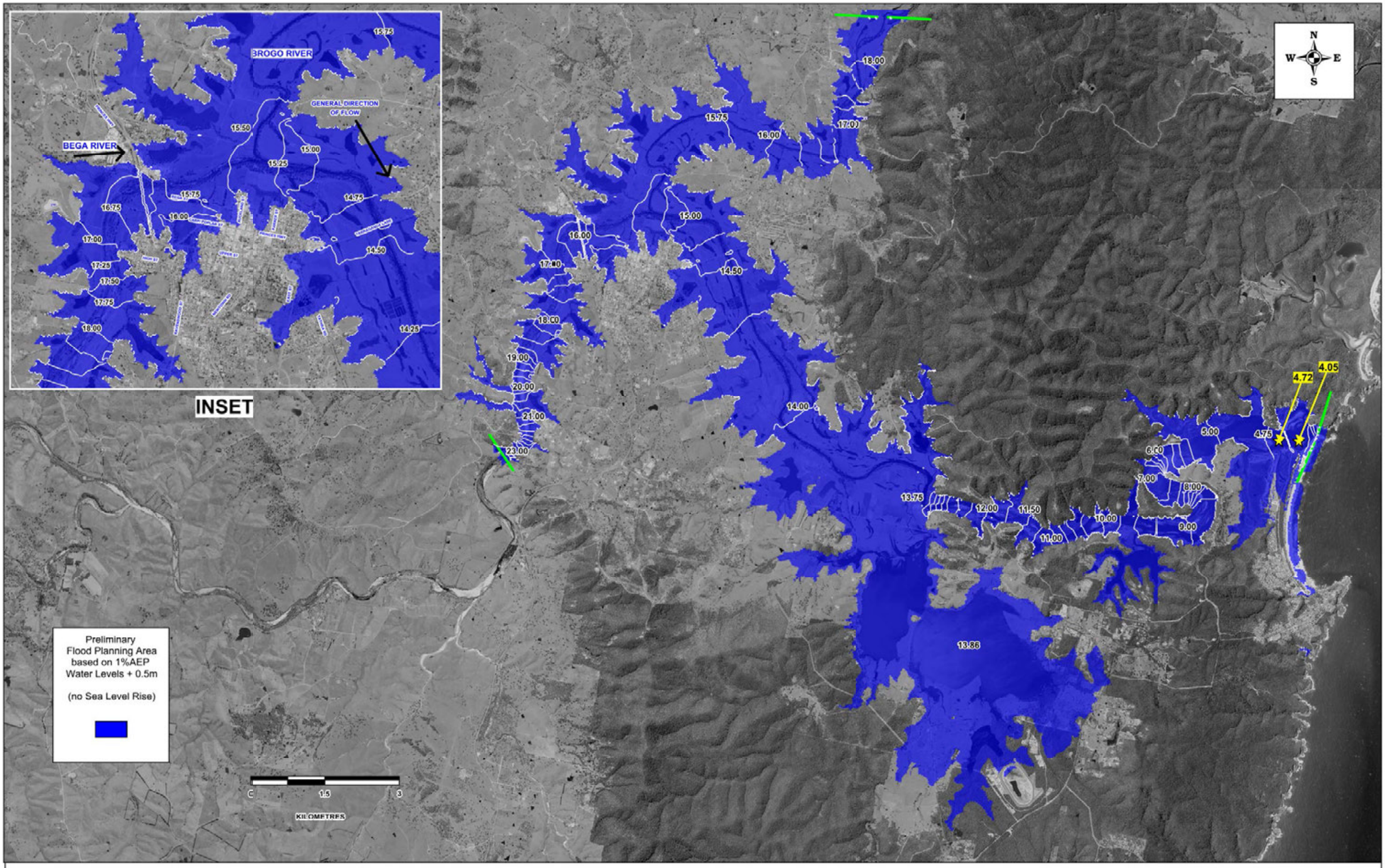
SMEC

BEGA VALLEY SHIRE COUNCIL
BEGA AND BROGO RIVERS FLOOD STUDY

Figure G2F
PMF Provisional Flow Hazard

APPENDIX H – IMPACT OF SEA LEVEL RISE ON PRELIMARY FLOOD PLANNING LEVELS

Figure H1 – Preliminary Flood Planning Levels under Existing Sea Levels (1% AEP + 0.5m freeboard)
Figure H2 – Preliminary Flood Planning Levels under 2050 Sea Level Rise Projections (0.4m SLR)
Figure H3 – Preliminary Flood Planning Levels under 2100 Sea Level Rise Projections (0.9m SLR)



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EXTENT OF MODELLING

SMEC

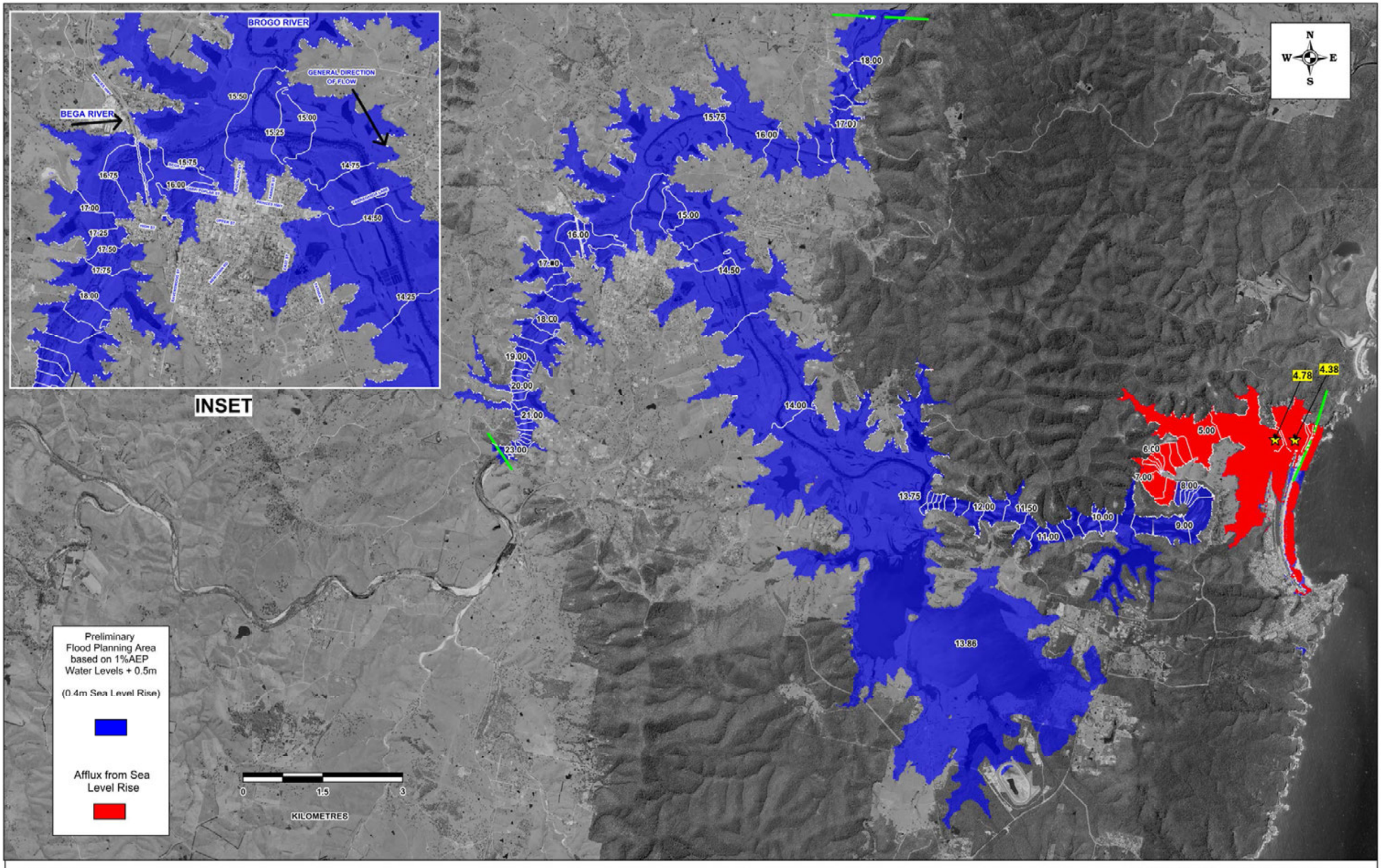
BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure H1

Preliminary Flood Planning Levels

Existing Sea Levels (1% AEP +0.5m freeboard)



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EXTENT OF MODELLING

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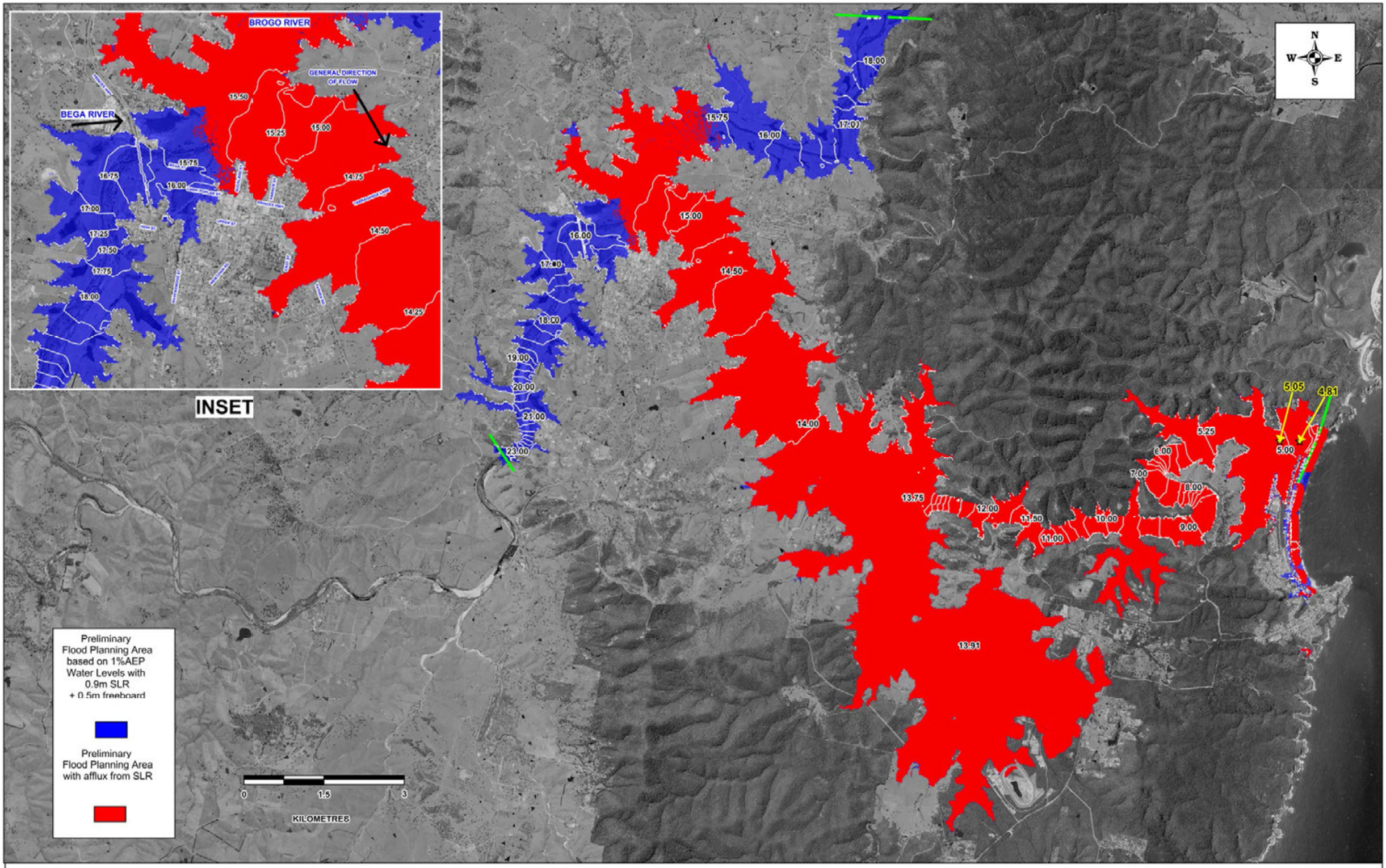
BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure H2

Preliminary Flood Planning Levels

2050 Sea Level Rise (1% AEP +0.4m SLR + 0.5m freeboard)



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EXTENT OF MODELLING

SMEC

BEGA VALLEY SHIRE COUNCIL

BEGA AND BROGO RIVERS FLOOD STUDY

Figure H3

Preliminary Flood Planning Levels

2100 Sea Level Rise (1% AEP +0.9m SLR + 0.5m freeboard)

APPENDIX I – LIDAR SURVEY METADATA

08-2463 Bega Coastal DEMs

This HDD contains:

1. Digital elevation model (Folder: ASCII XYZ)

   Projection: MGA Zone 55
   Grid cell size: 1m

   Format: E N H (Easting Northing Height)
   Tile size: 2km x 2km
   Number of tiles: 317

2: Coverage (Folder: AOI)

   Format: MapInfo tab, Esri shape file

3: Tile definition (Folder: Tile Def)

   Format: Mapinfo tab, Esri shape file

   Tiles are numbered as follows:
   Easting 1-18 from 746000 (1) to 780000 (18)
   Northing A-AZ from 5872000 (A) to 5974000 (AZ)

   Coordinates represent the south west corner of the tile.

DEMs were produced by Terranean Mapping Technologies from LiDAR data flown at 800m asl, at a point density of approximately 1.5 points per square metre, between January and March, 2008.

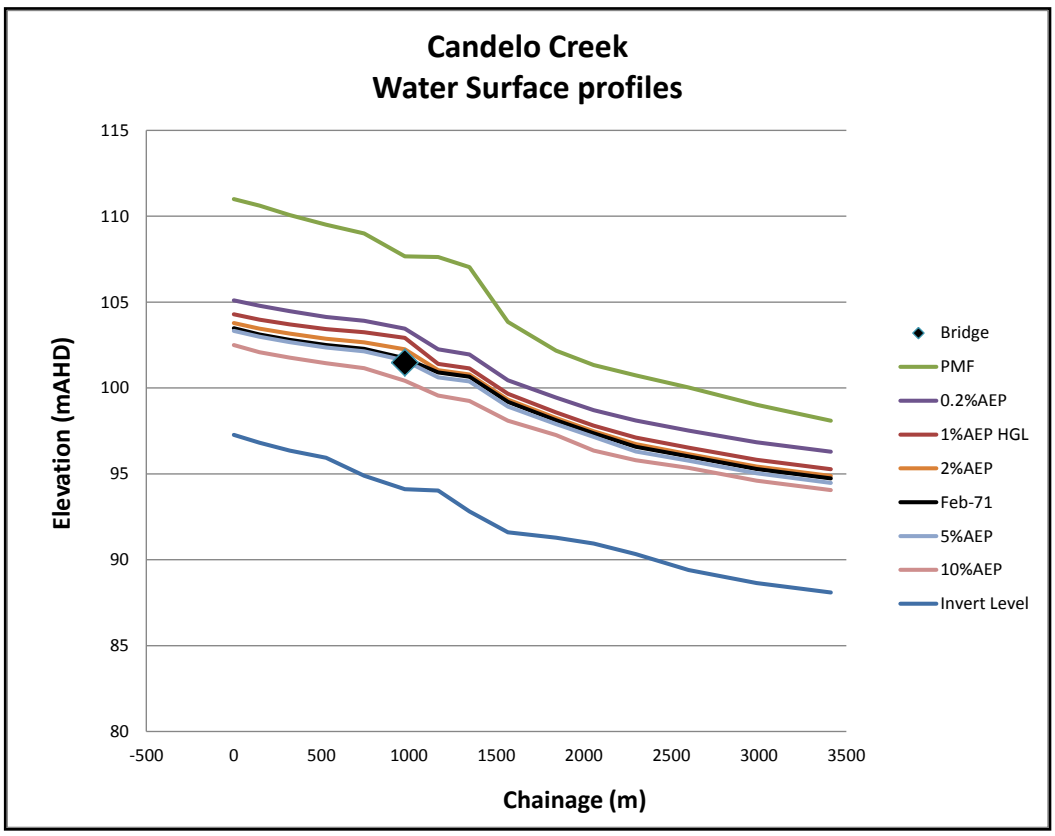
The RMSE for well defined points in open terrain has been estimated, by comparison of 49 ground points with the DEM, to be 0.165m.
The accuracy at the 95% confidence level is 0.33m.

Contact: Terranean Mapping Technologies
Phone: 07 3257 1011
Email: info@terranean.com.au

APPENDIX J – CANDELO CREEK RESULTS

Chainage (m)	Invert Level (mAHD)	Water Level (mAHD)					
		10%AEP	5%AEP	2%AEP	1%AEP	0.2%AEP	PMF
0	97.27	102.50	103.32	103.78	104.29	105.11	111.00
147	96.82	102.08	102.98	103.45	103.98	104.78	110.62
318	96.36	101.76	102.67	103.16	103.71	104.48	110.07
527	95.94	101.45	102.36	102.87	103.43	104.14	109.51
744	94.89	101.16	102.14	102.66	103.25	103.92	109.00
978	94.11	100.42	101.60	102.25	102.92	103.45	107.67
1168	94.03	99.56	100.62	101.04	101.40	102.26	107.62
1346	92.81	99.25	100.39	100.79	101.14	101.96	107.04
1567	91.60	98.10	98.91	99.32	99.66	100.45	103.85
1841	91.29	97.26	97.90	98.25	98.57	99.44	102.18
2056	90.95	96.36	97.15	97.49	97.81	98.71	101.34
2297	90.33	95.80	96.31	96.73	97.11	98.11	100.74
2599	89.40	95.36	95.77	96.15	96.53	97.52	100.03
2987	88.65	94.60	95.03	95.43	95.82	96.85	99.03
3412	88.10	94.05	94.48	94.88	95.27	96.29	98.10
0	104.65	105.39	105.45	105.50	105.56	105.75	110.64
101	102.75	103.50	103.57	103.67	104.00	104.76	110.63
218	101.01	101.98	103.32	103.43	103.96	104.76	110.62

**Immediately Upstream of Bridge*



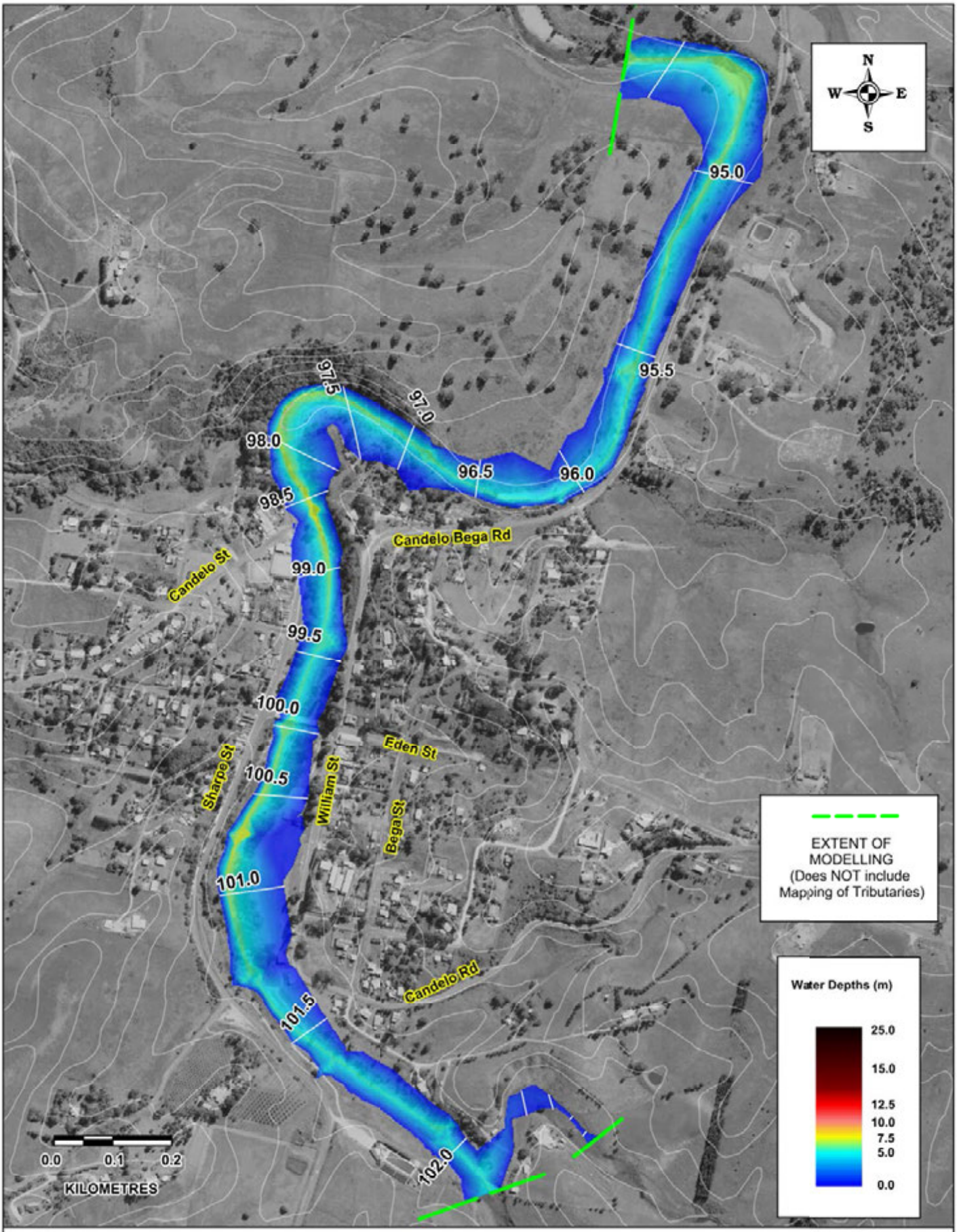
APPENDIX K – CANDELO CREEK MAPS

Figure K1A - 10%AEP Flood Depths and Levels
Figure K1B - 5% AEP Flood Depths and Levels
Figure K1C - 2% AEP Flood Depths and Levels
Figure K1D - 1% AEP Flood Depths and Levels
Figure K1E - 0.2% AEP Flood Depths and Levels
Figure K1F - Probable Maximum Flood (PMF) Flood Depths and Levels

Figure K2A - 10% AEP Water Velocities
Figure K2B - 5% AEP Water Velocities
Figure K2C - 2% AEP Water Velocities
Figure K2D - 1% AEP Water Velocities
Figure K2E - 0.2% AEP Water Velocities
Figure K2F - Probable Maximum Flood (PMF) Water Velocities

Figure K3A - 10% AEP Hydraulic Categories
Figure K3B - 5% AEP Hydraulic Categories
Figure K3C - 2% AEP Hydraulic Categories
Figure K3D - 1% AEP Hydraulic Categories
Figure K3E - 0.2% AEP Hydraulic Categories
Figure K3F - Probable Maximum Flood (PMF) Hydraulic Categories

Figure K4A - 10% AEP Flow Hazard
Figure K4B - 5% AEP Flow Hazard
Figure K4C - 2% AEP Flow Hazard
Figure K4D - 1% AEP Flow Hazard
Figure K4E - 0.2% AEP Flow Hazard
Figure K4F - Probable Maximum Flood (PMF) Flow Hazard



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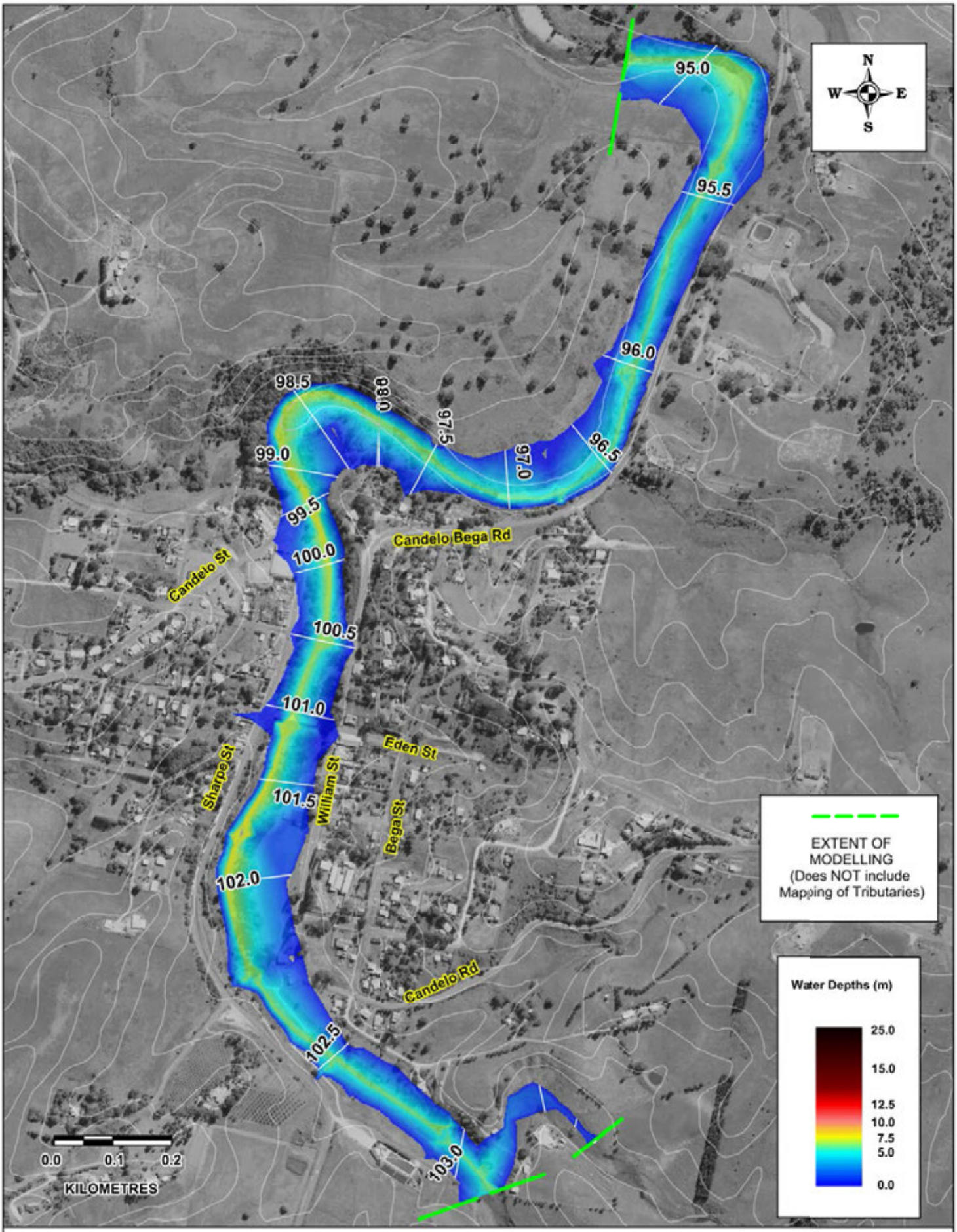
SMEC

BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K1A
10% AEP Flood Depths and Levels



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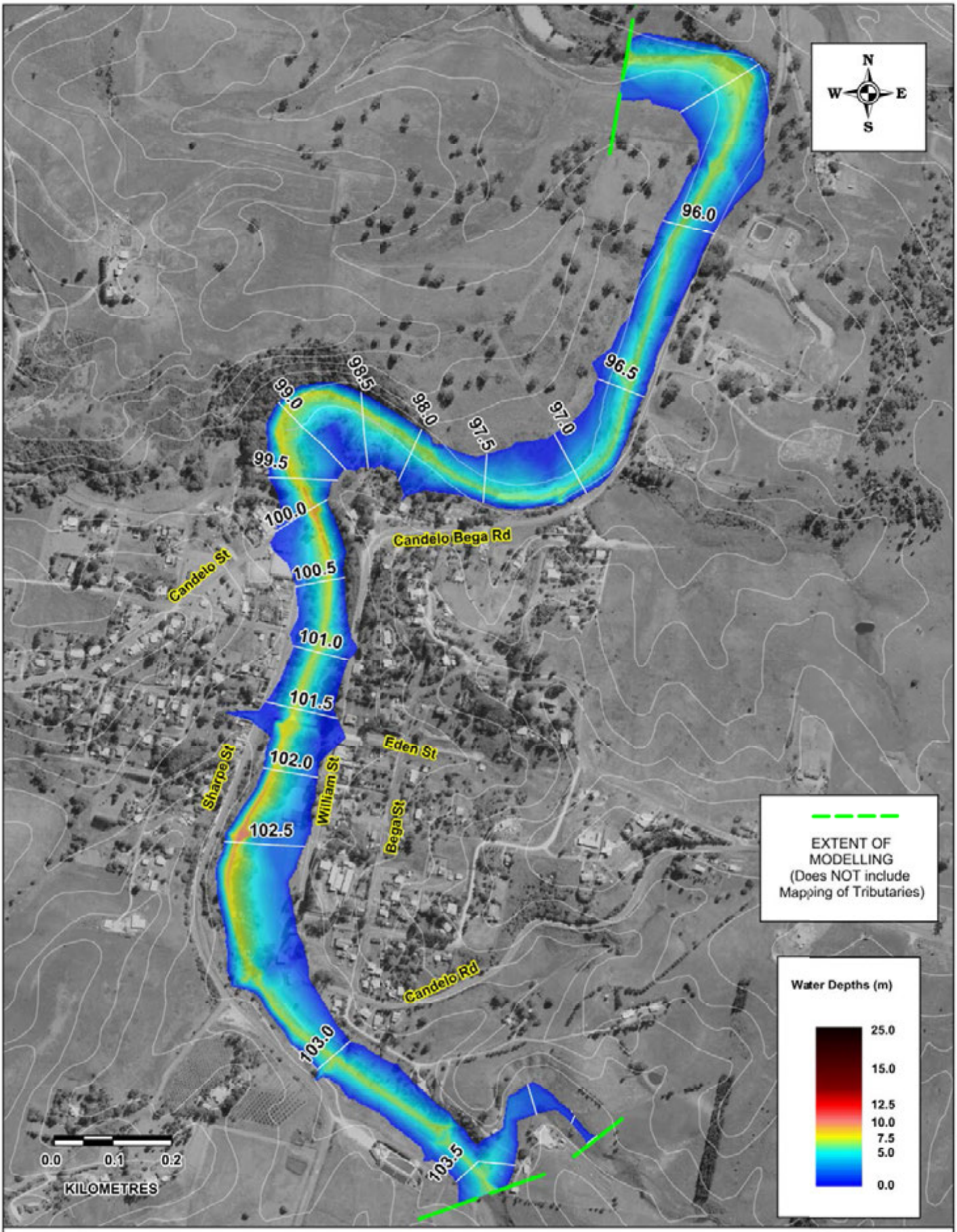
CANDELO

Figure K1B

5% AEP Flood Depths and Levels



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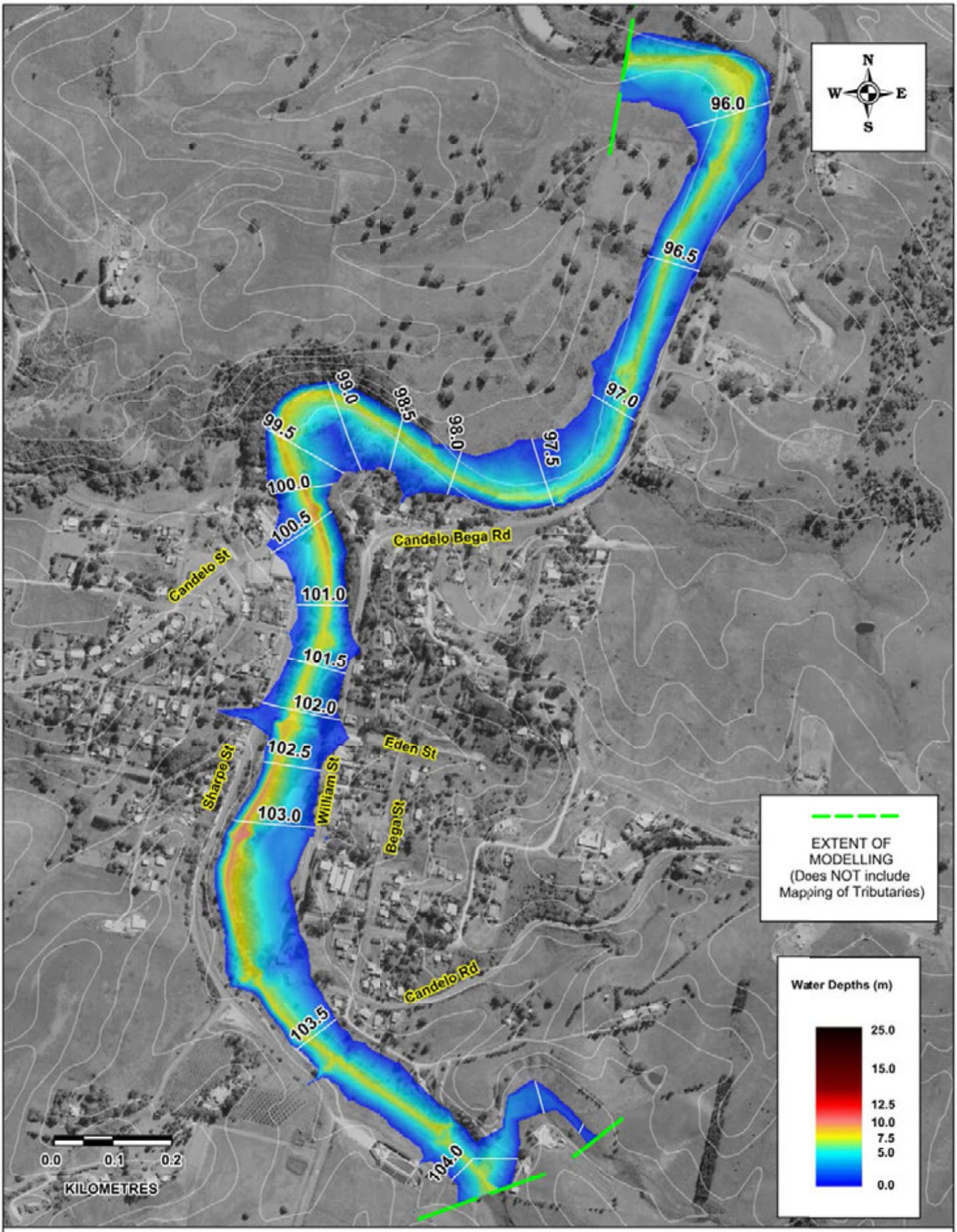
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K1C

2% AEP Flood Depths and Levels



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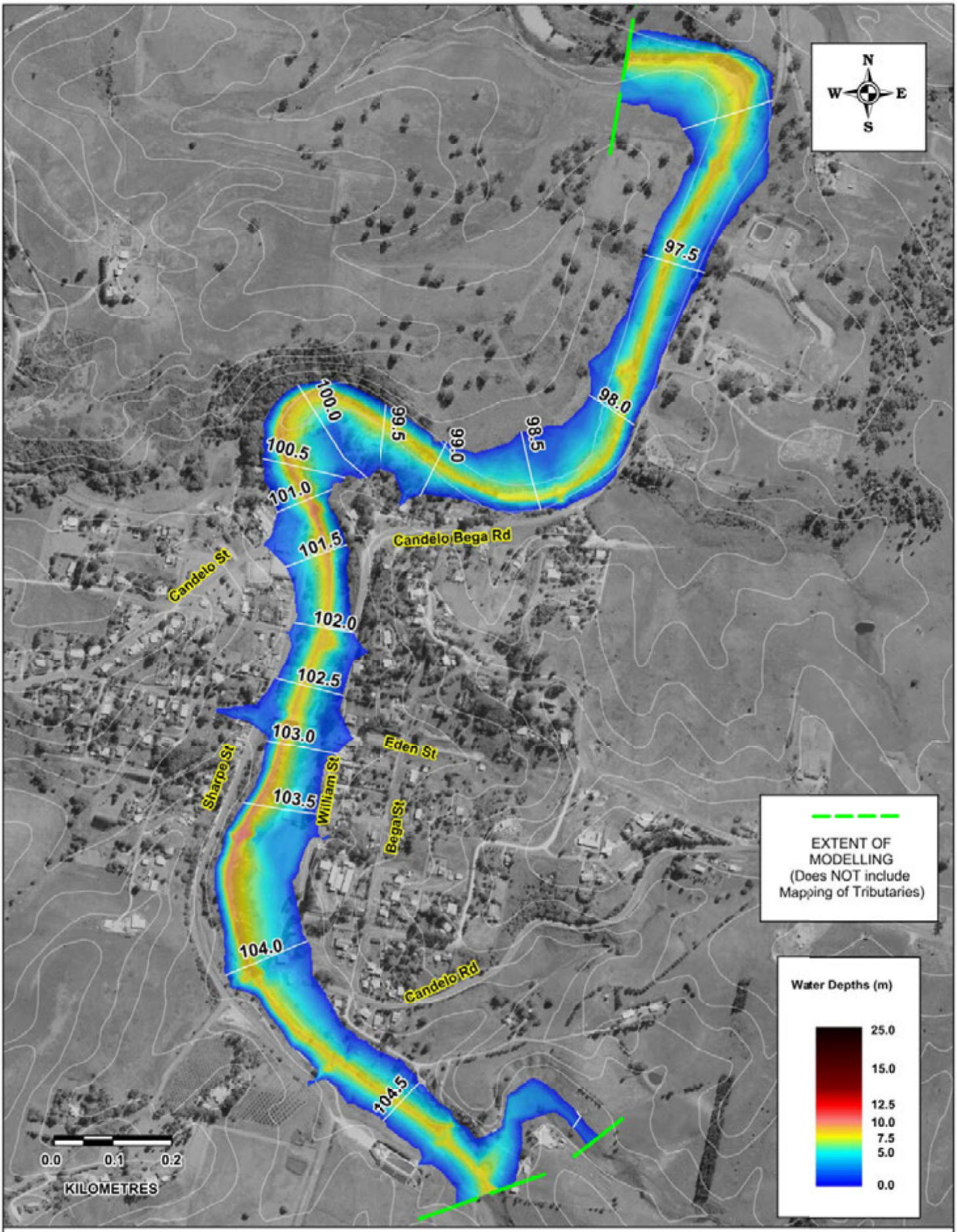
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K1D
1% AEP Flood Depths and Levels



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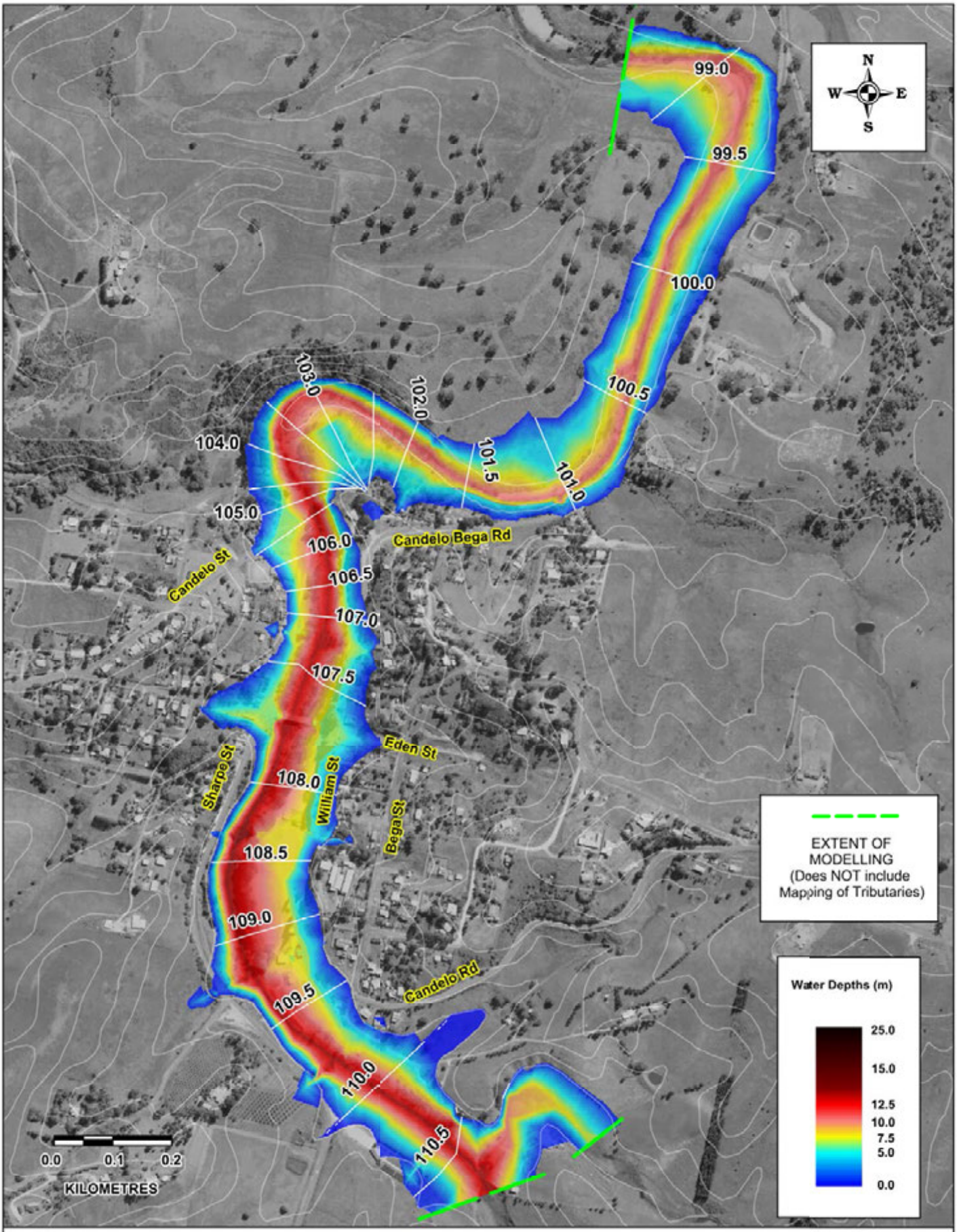
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K1E
0.2% AEP Flood Depths and Levels



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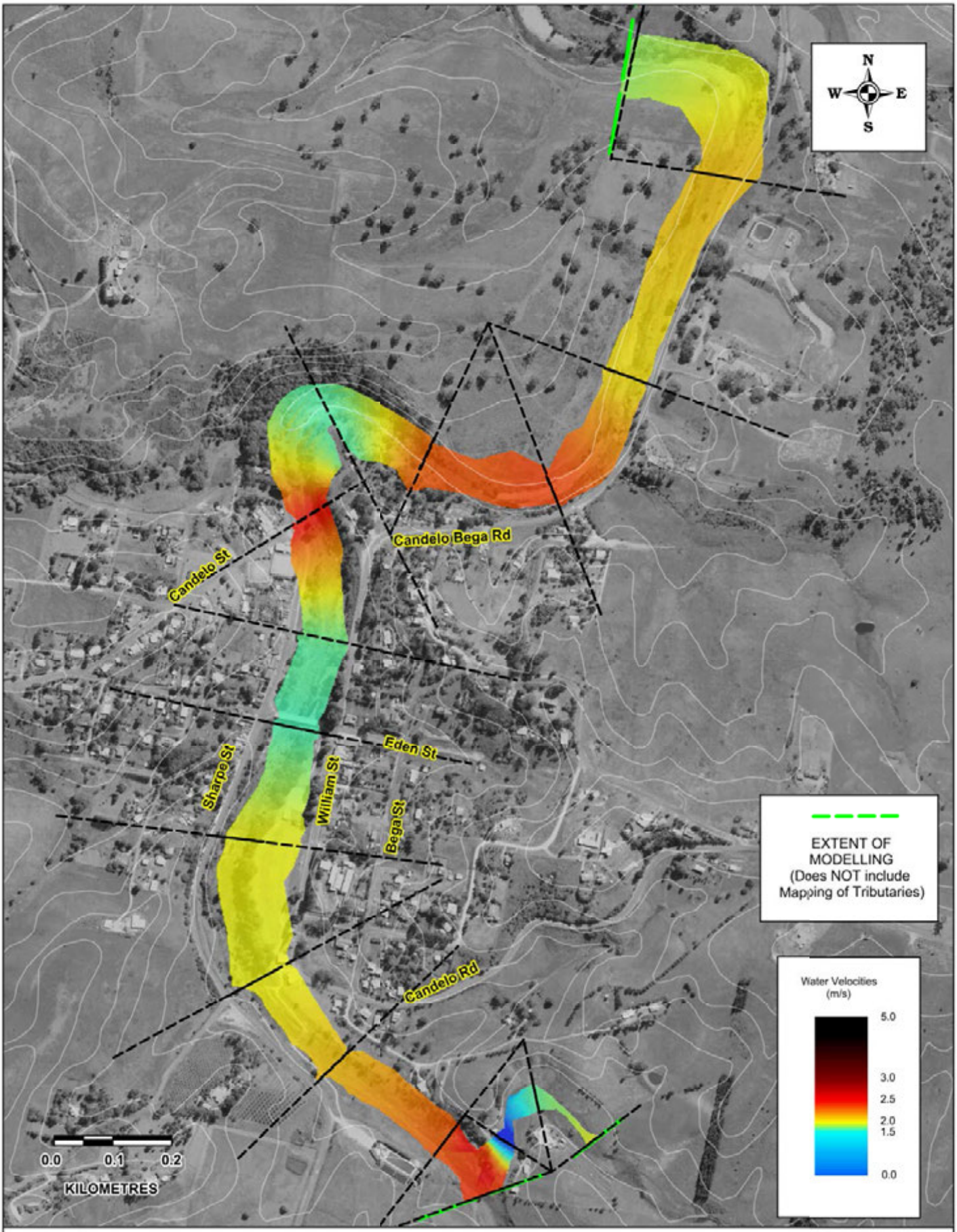
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K1F
PMF Flood Depths and Levels



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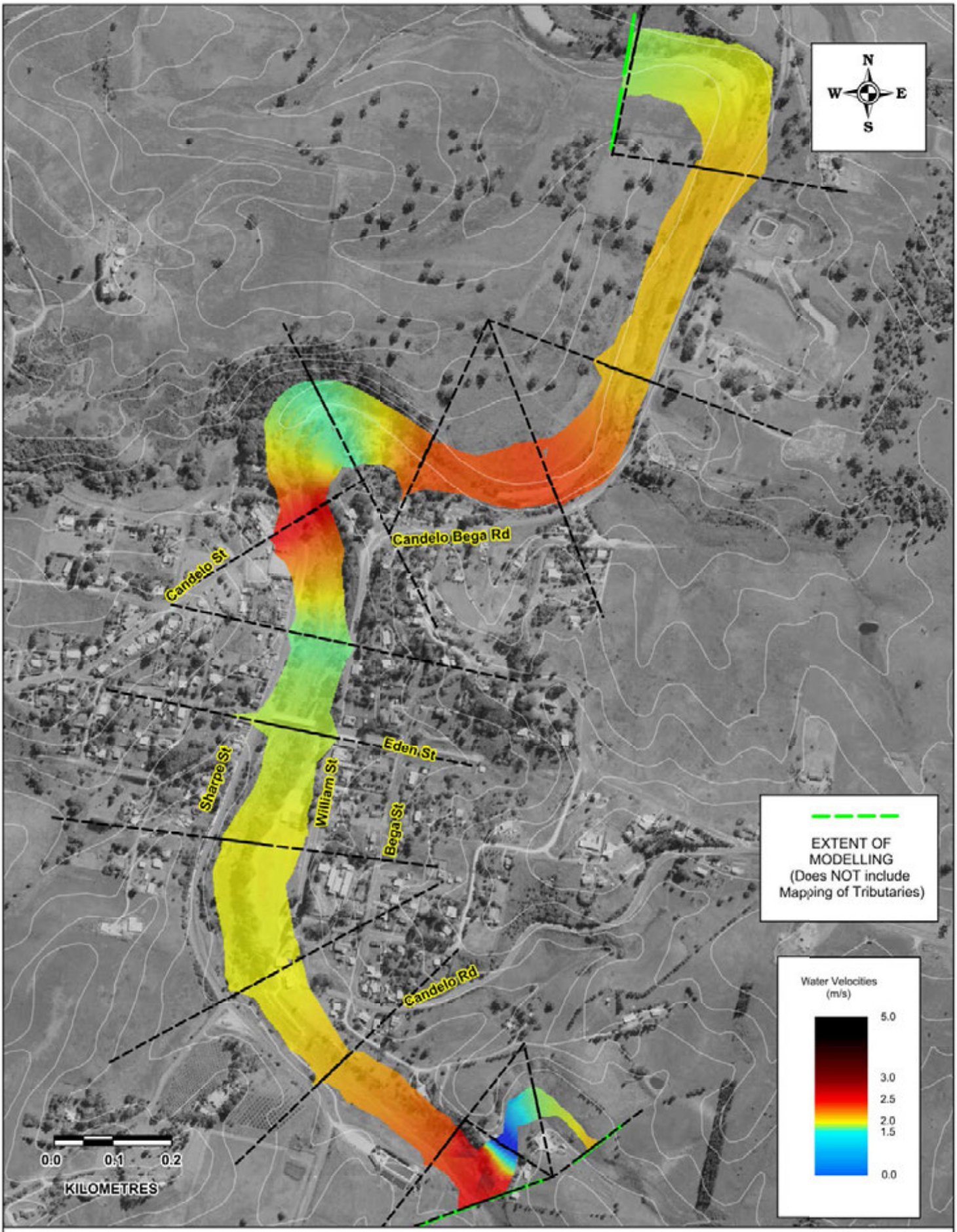
SMEC

BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2A
10% AEP Water Velocities



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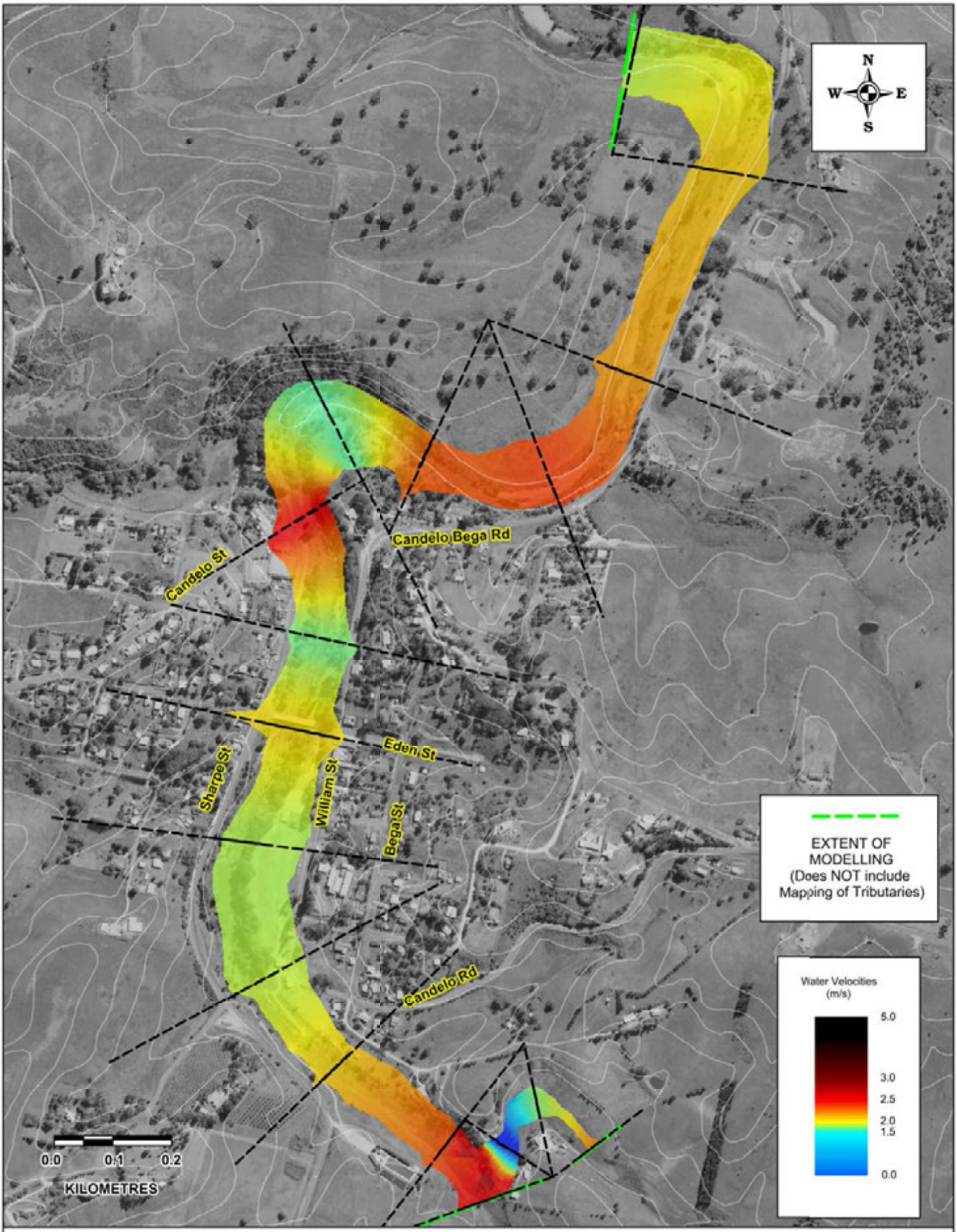
SMEC

BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2B
5% AEP Water Velocities



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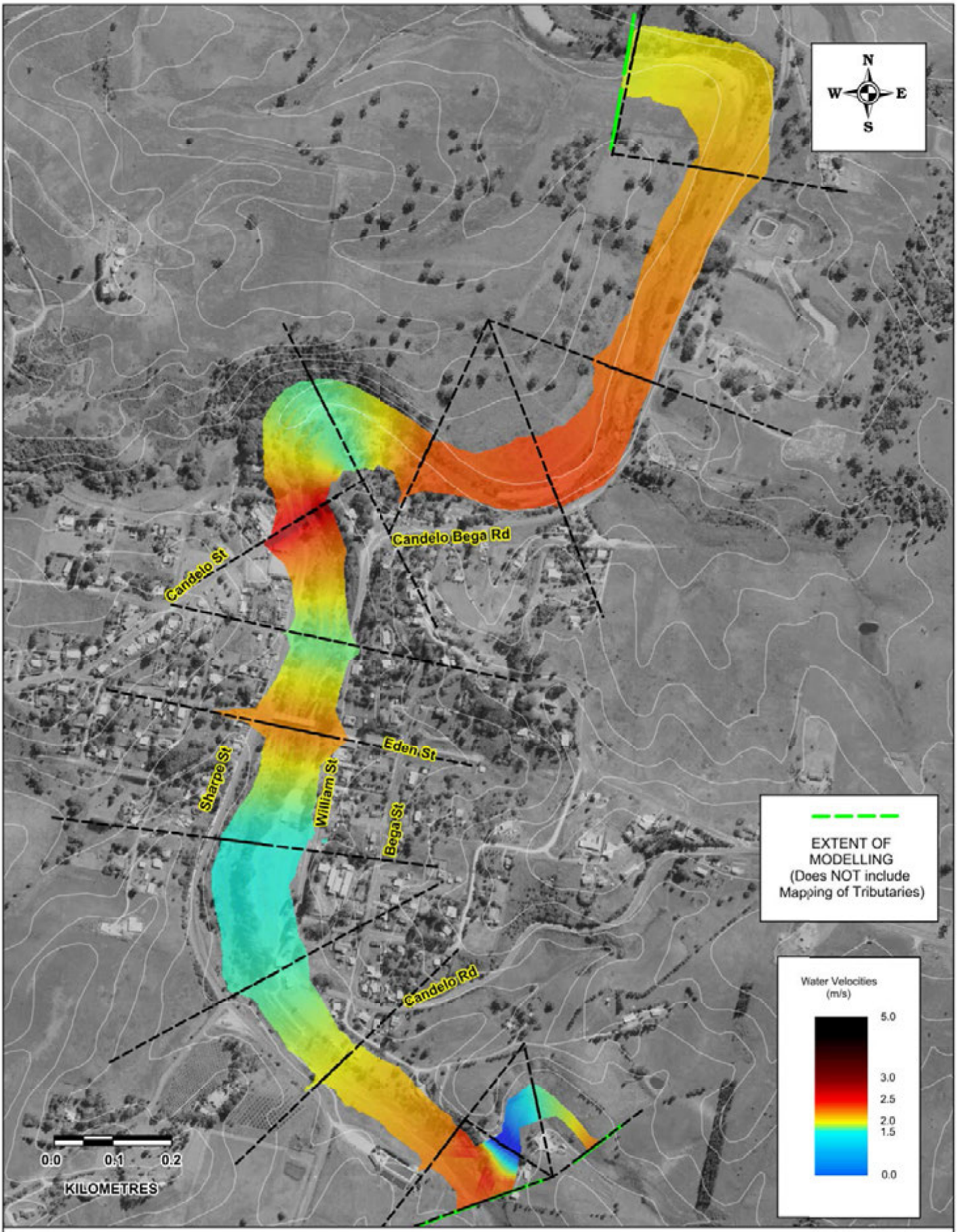
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2C
2% AEP Water Velocities



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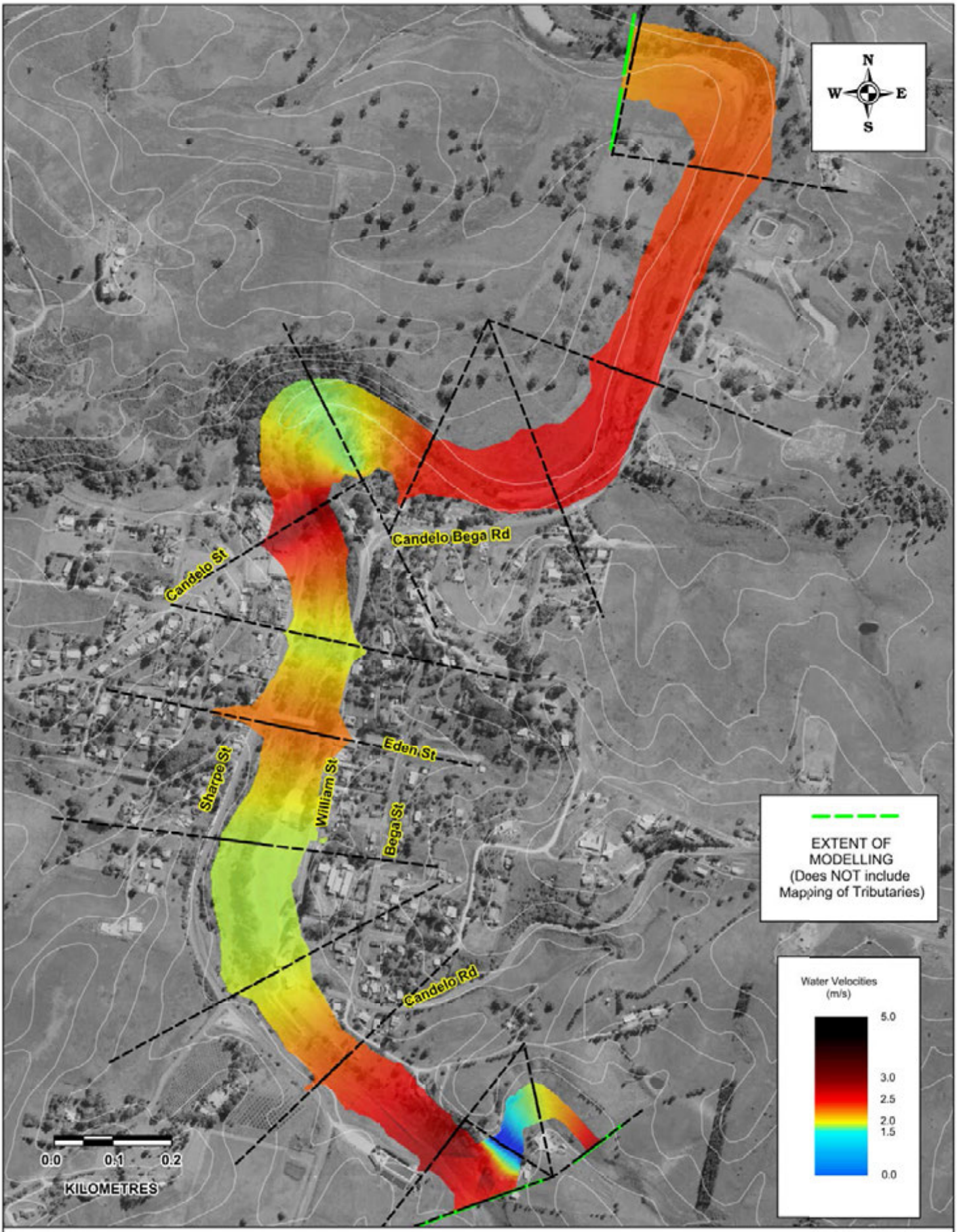
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2D
1% AEP Water Velocities



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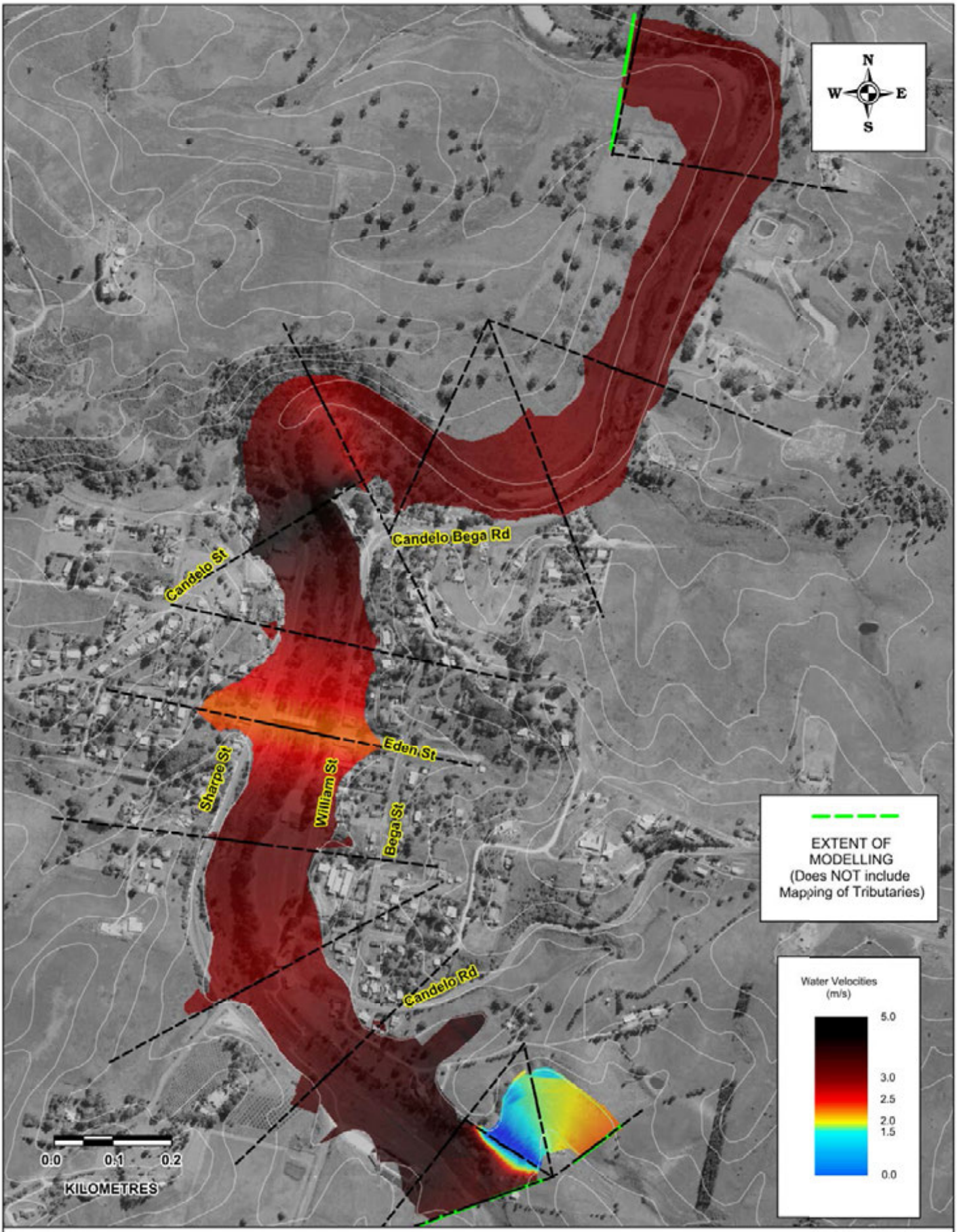
SMEC

BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2E
0.2% AEP Water Velocities



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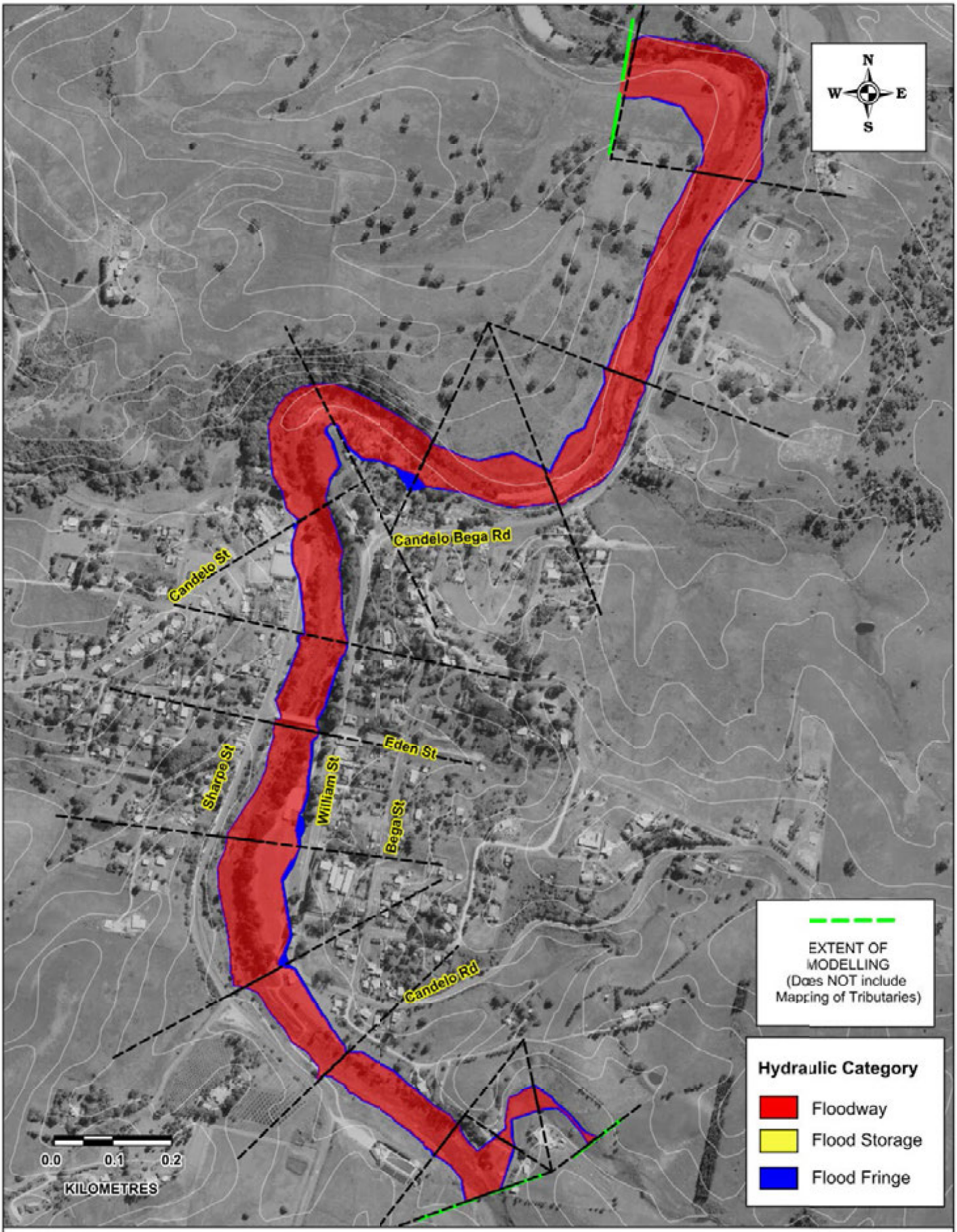
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K2F
PMF Water Velocities



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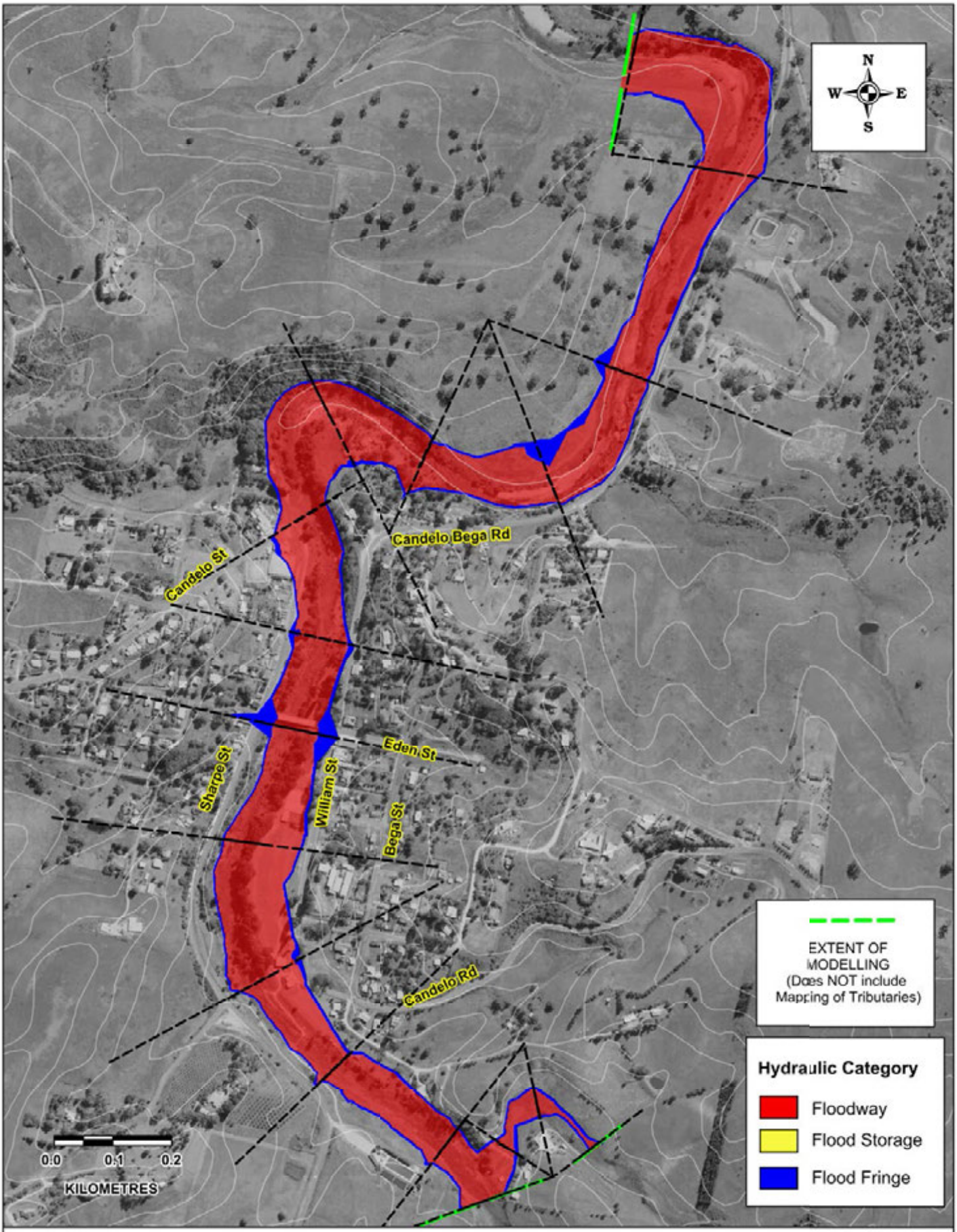
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K3A
10% AEP Hydraulic Categorisation



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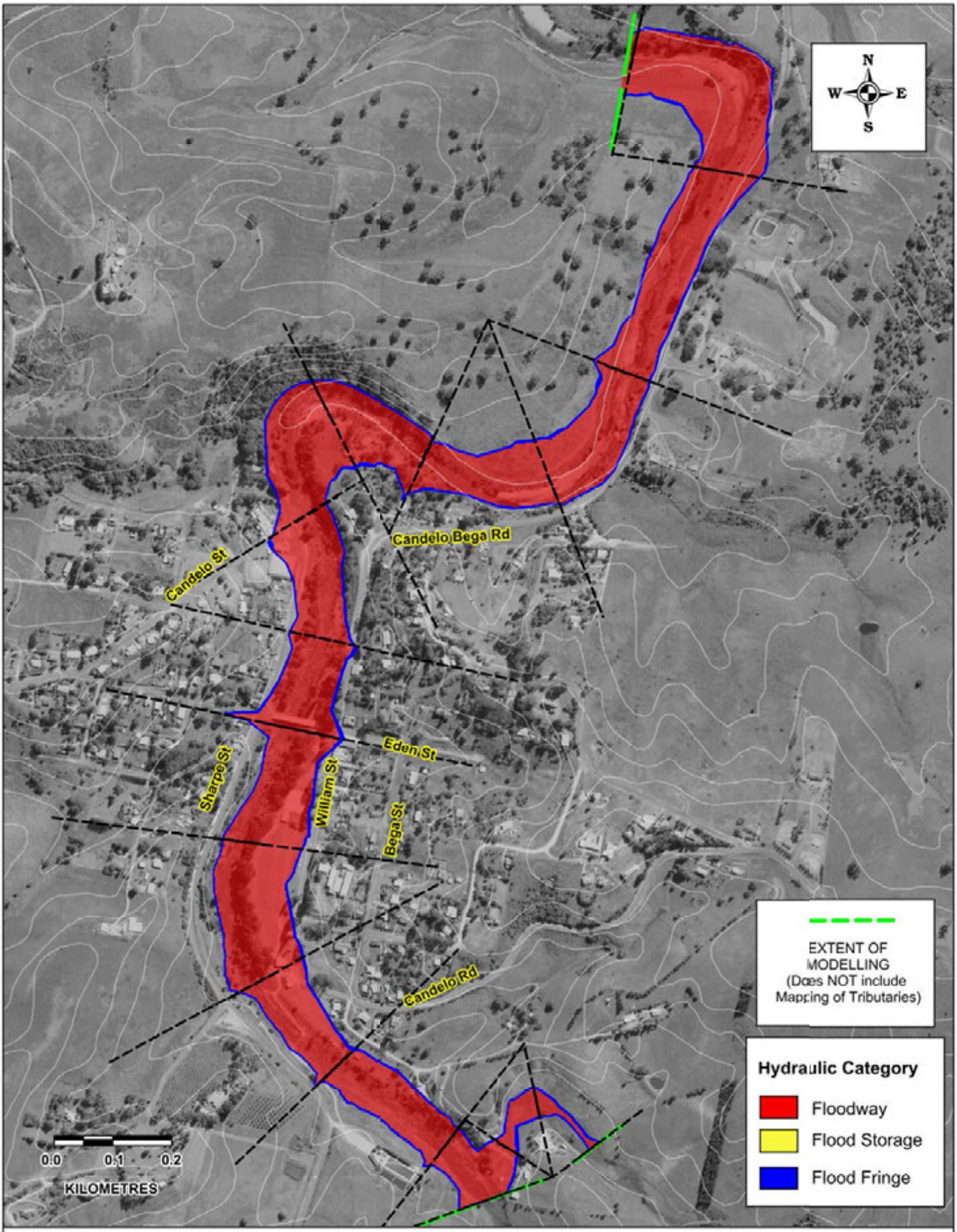
BEGA VALLEY SHIRE COUNCIL

CANDELO

Figure K3B
5% AEP Hydraulic Categorisation



DISCLAIMER

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Figure K3C

2% AEP Hydraulic Categorisation

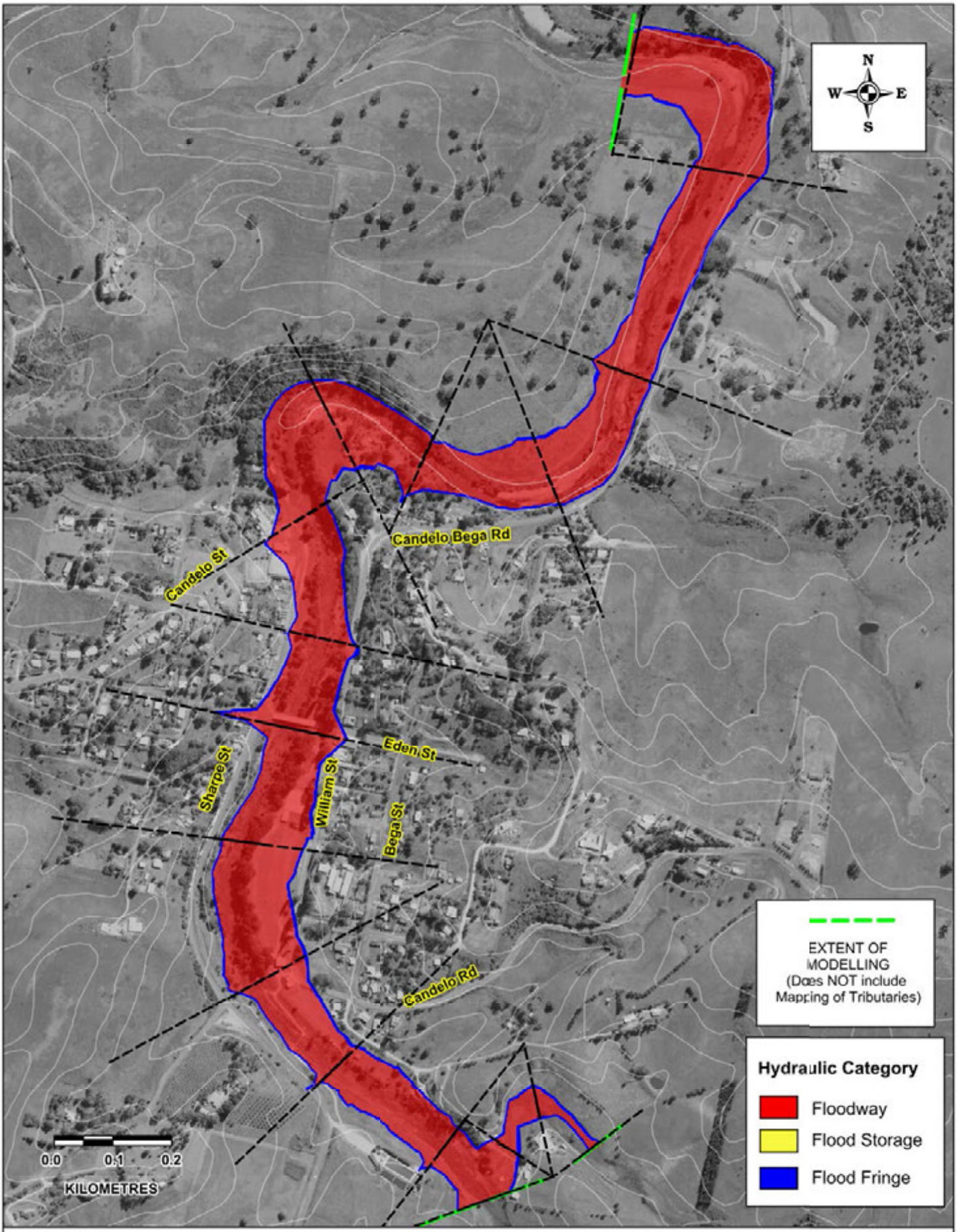

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Figure K3D
1% AEP Hydraulic Categorisation

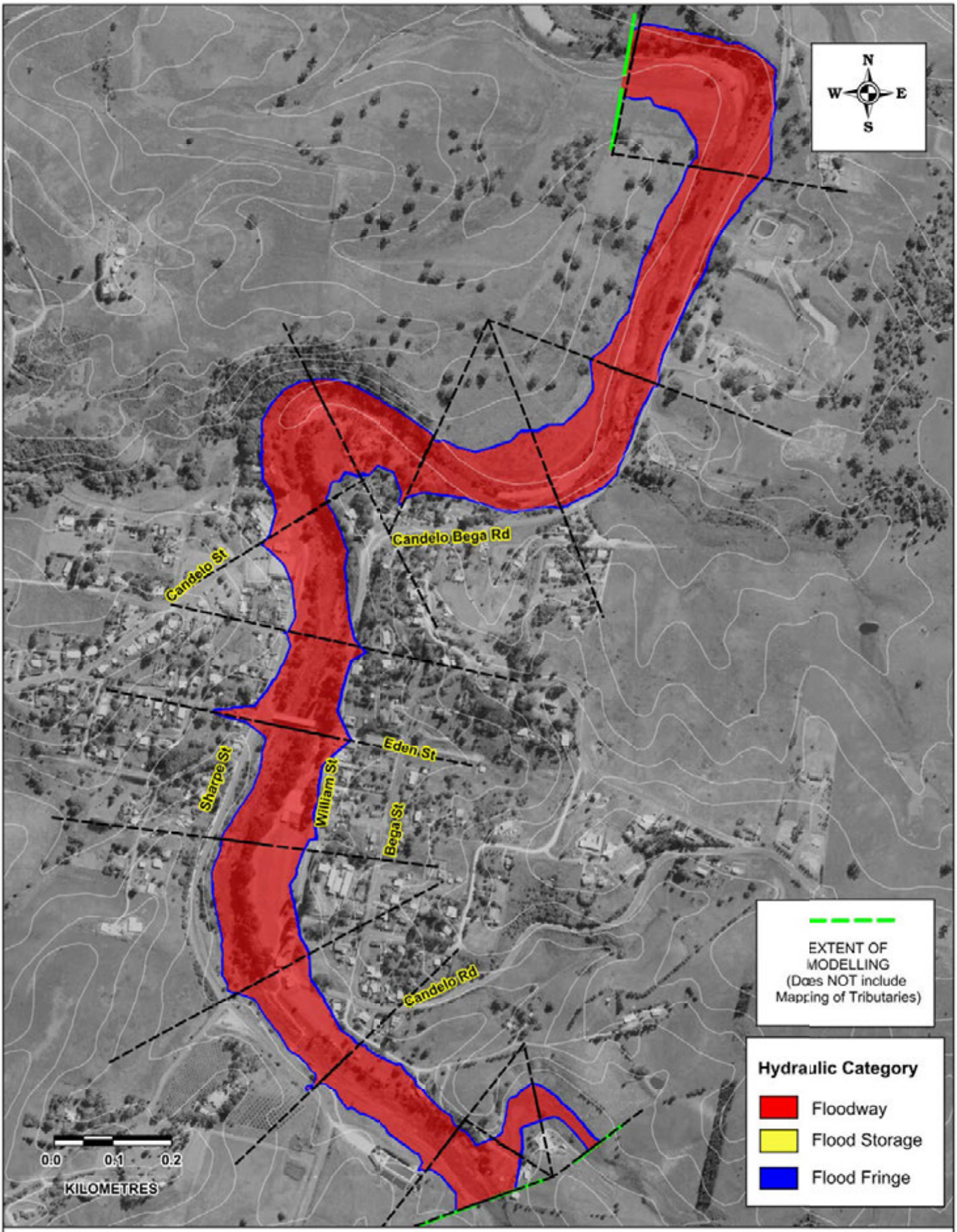

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Figure K3E
0.2% AEP Hydraulic Categorisation

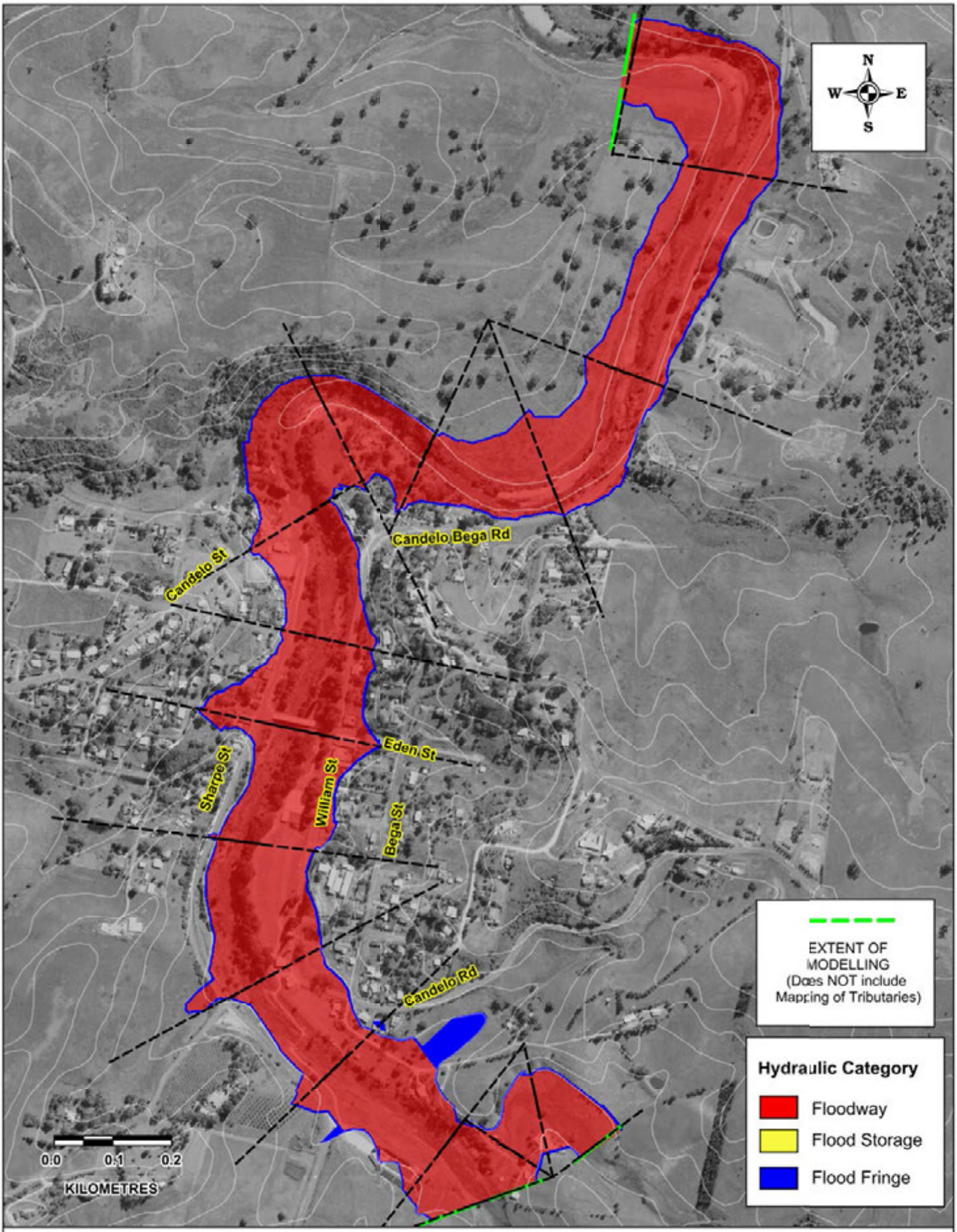

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Figure K3F
PMF Hydraulic Categorisation

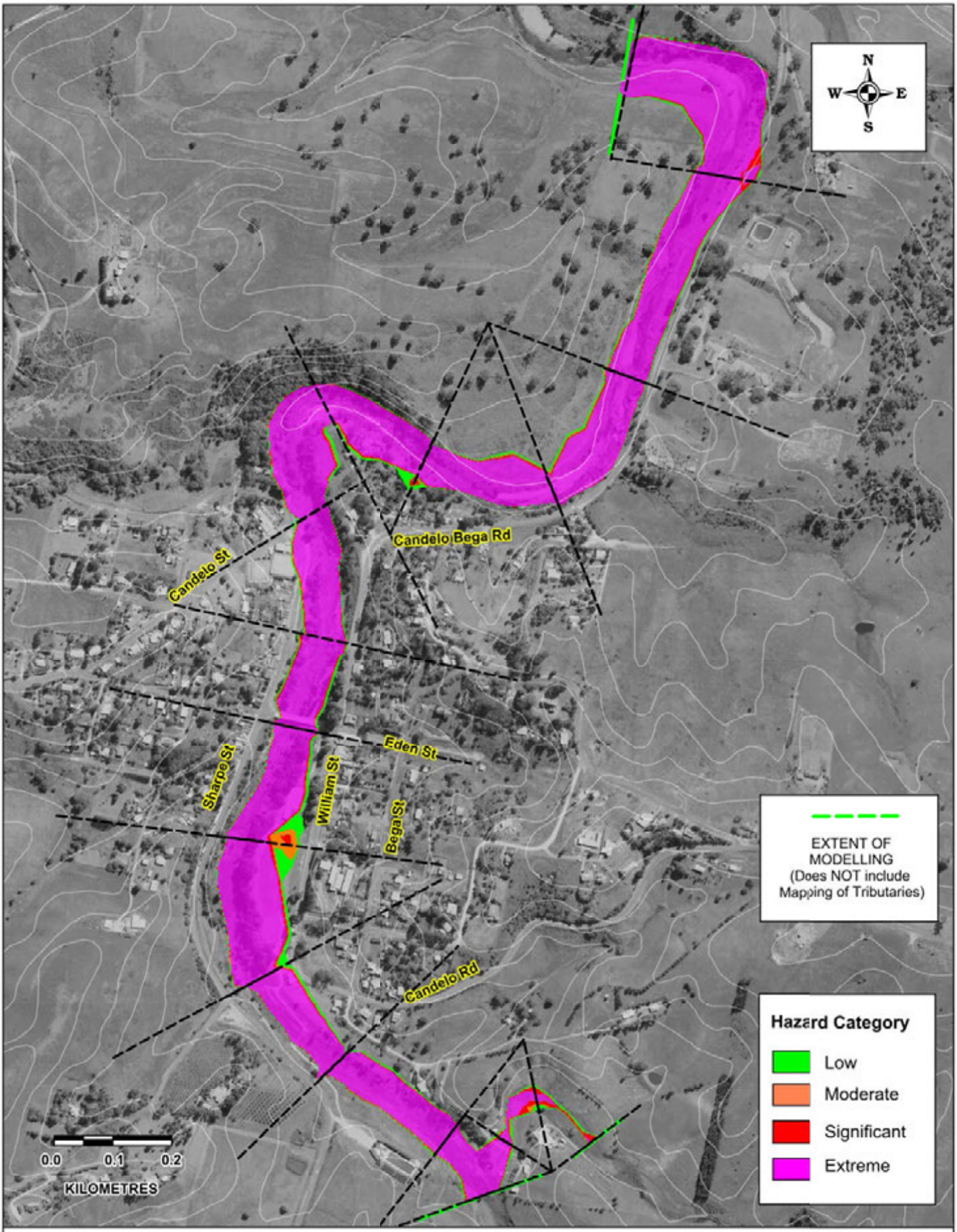

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Figure K4A
10% AEP Provisional Flow Hazard

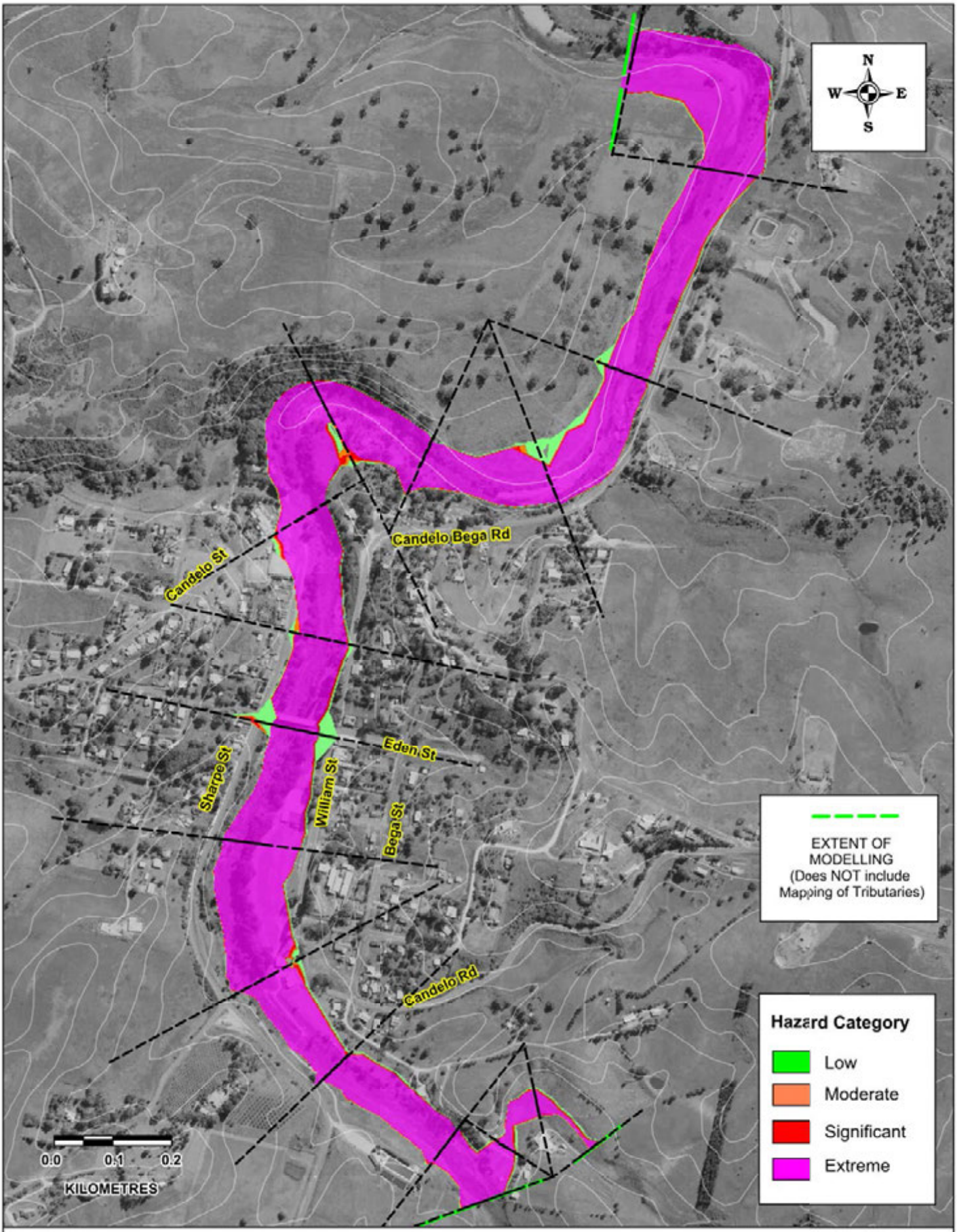

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Figure K4B
5% AEP Provisional Flow Hazard

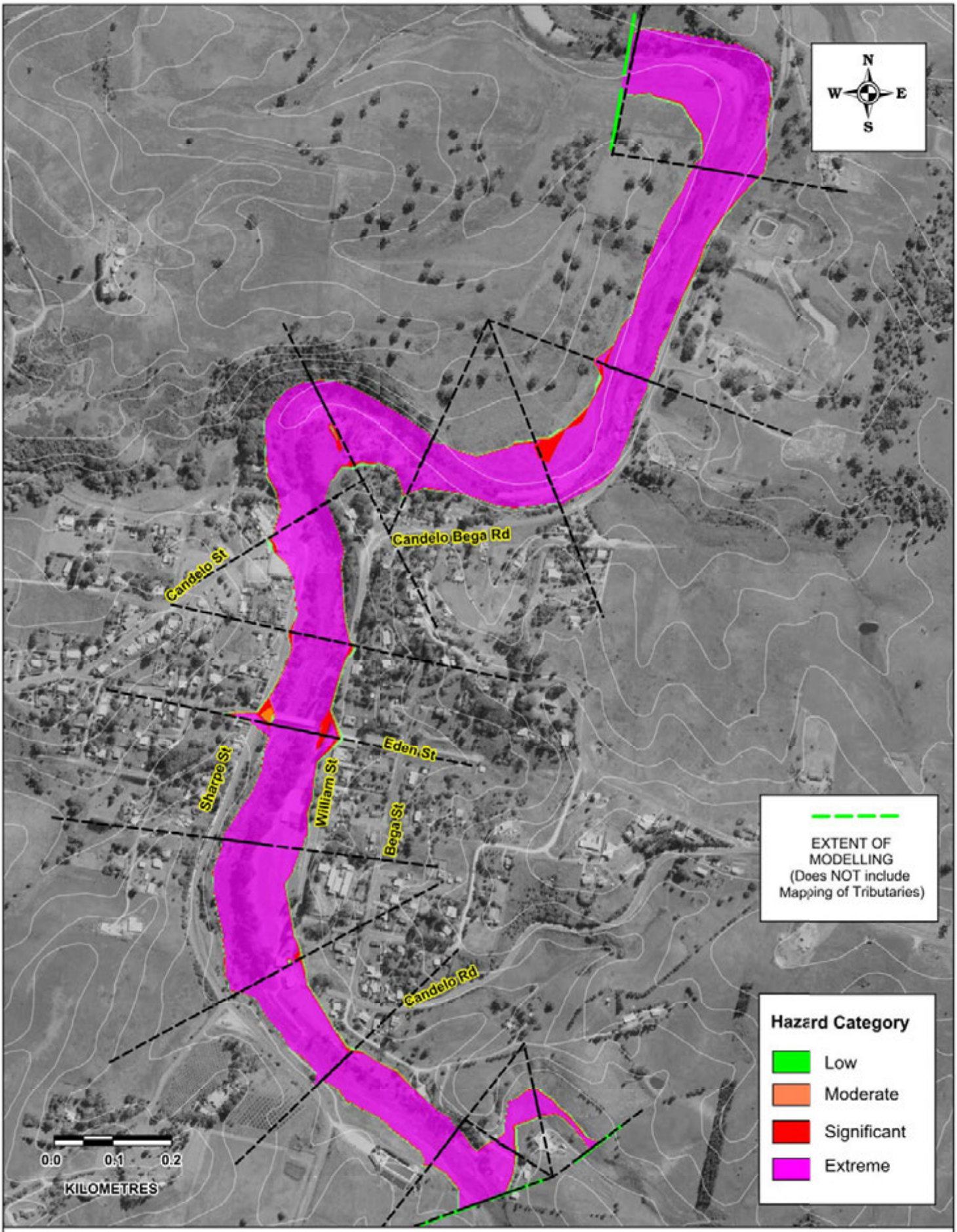

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Figure K4C
2% AEP Provisional Flow Hazard

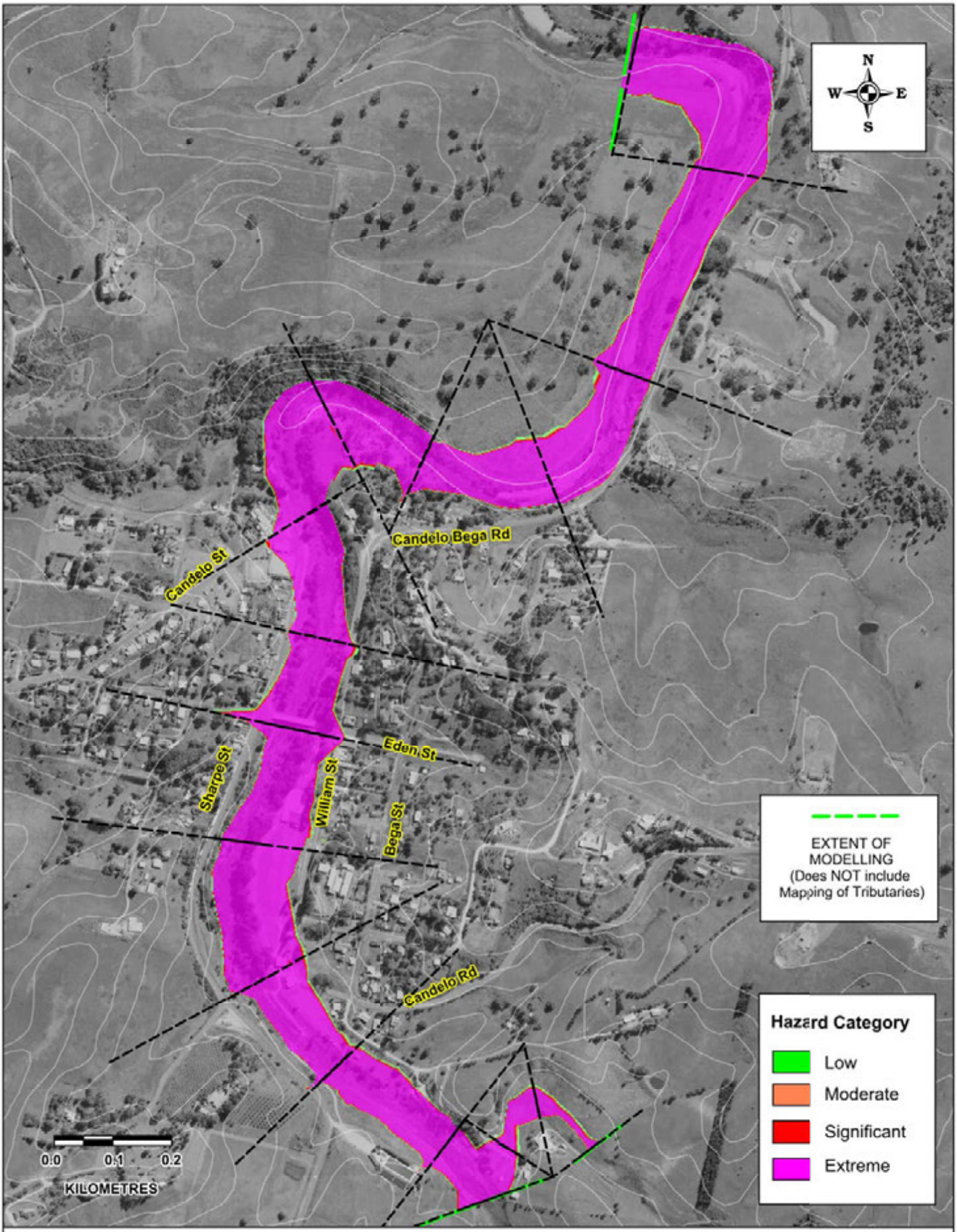

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Figure K4D
1% AEP Provisional Flow Hazard

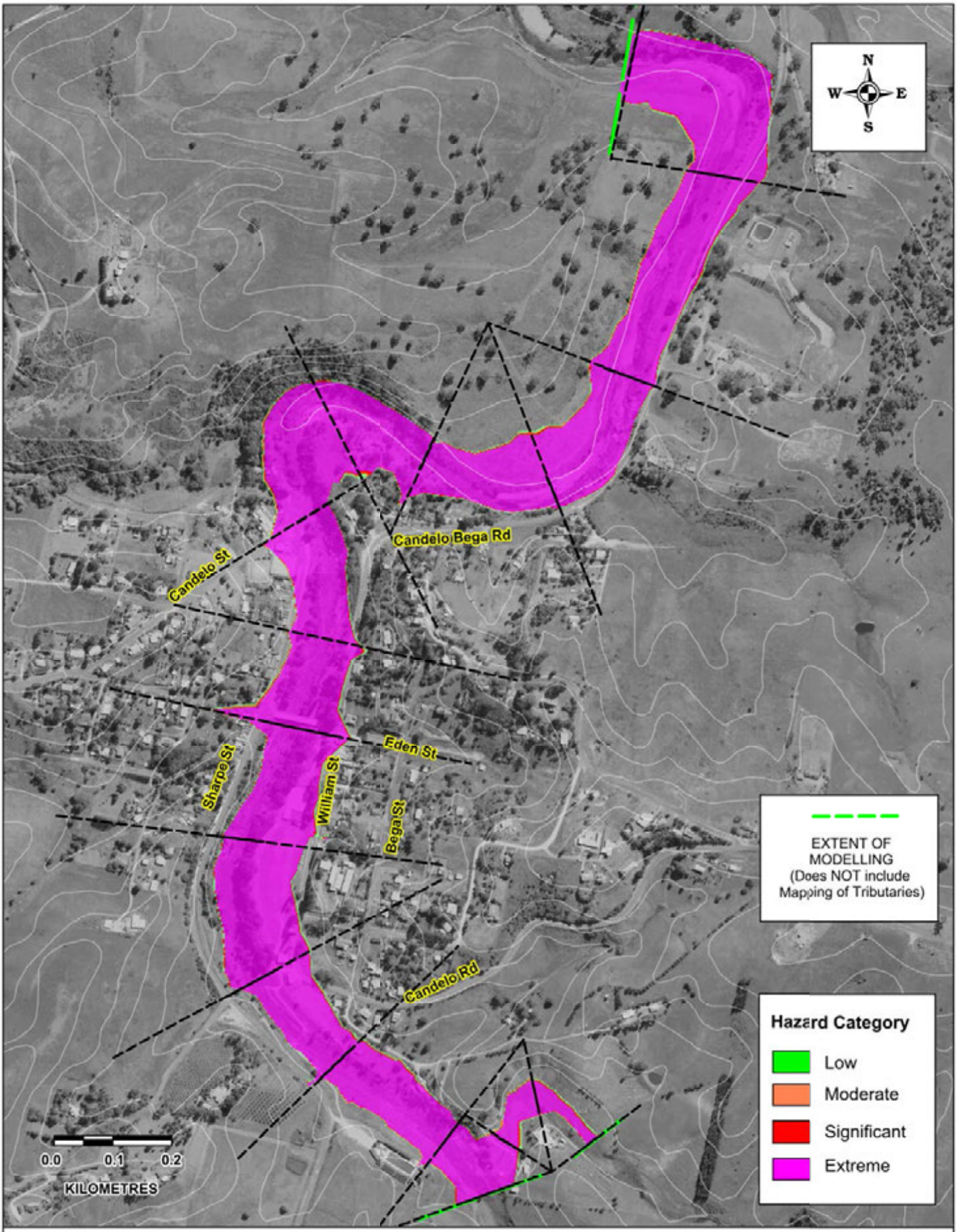

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Figure K4E
0.2% AEP Provisional Flow Hazard

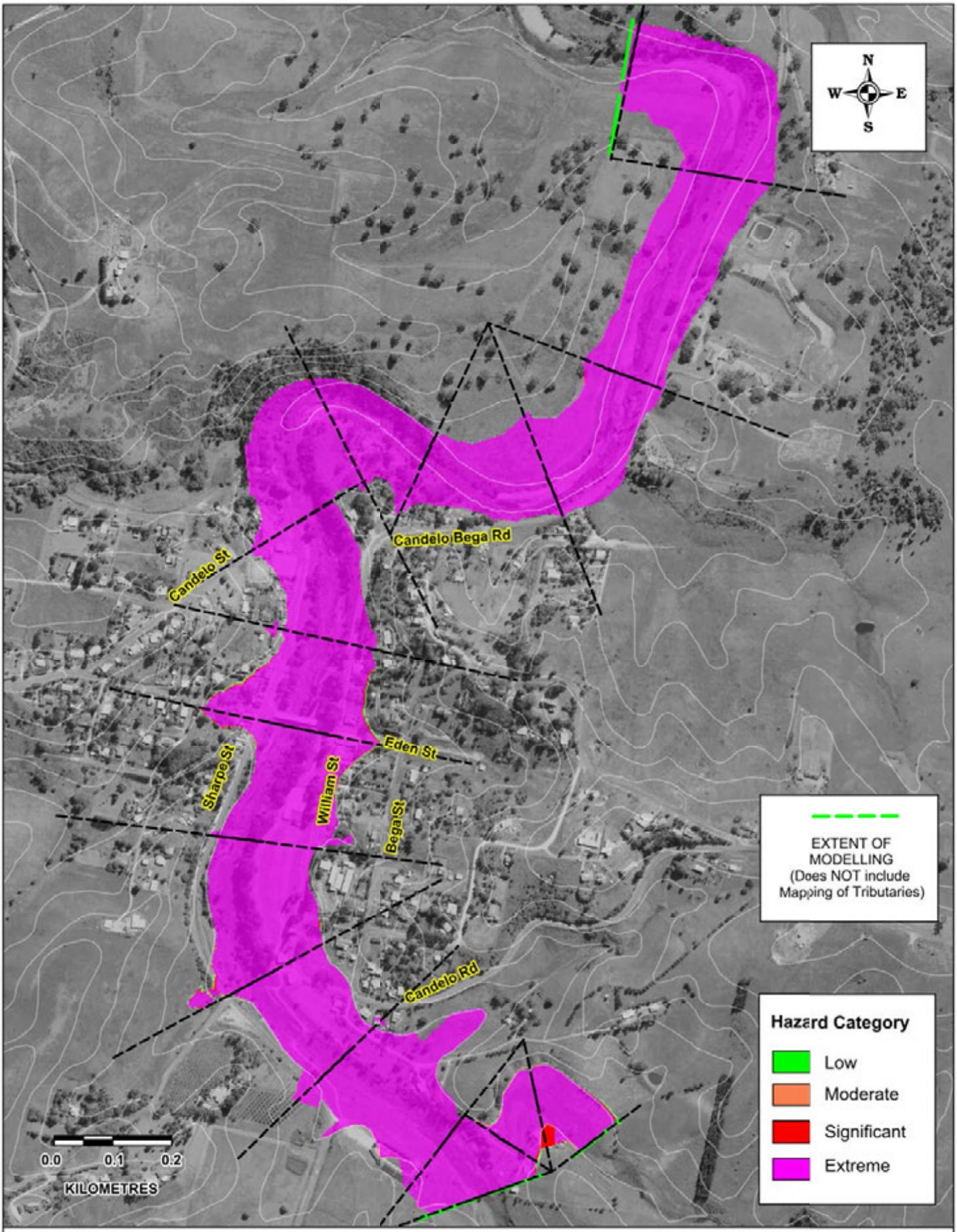

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Figure K4F
PMF Provisional Flow Hazard