APPENDIX A

Large Waterway Structure Photos

Provided by SGSC

Appendix Figure A. 1 Dyrings Road Bridge 1 – Stockyard Creek (1/2)

Appendix Figure A. 2 Dyrings Road Bridge 2 – Stockyard Creek (2/2)

Appendix Figure A. 3 Boundary Road culverts (upstream) – Stockyard Creek

Appendix Figure A. 4 Pedestrian bridge adjacent to Foster Primary School – Stockyard Creek

Appendix Figure A. 5 Pedestrian bridge adjacent to Scout Hall – Stockyard Creek

Appendix Figure A. 6 Bridge Street culvert crossing - Stockyard Creek

Appendix Figure A. 7 Pedestrian bridge at Pearl Park - Stockyard Creek

Appendix Figure A. 8 Gardiners Road Crossing - Stockyard Creek (1/2)

Appendix Figure A. 9 Gardiners Road Crossing - Stockyard Creek (2/2)

Appendix Figure A. 10 Elphicks Road culverts - Bennison Creek

Appendix Figure A. 11 Jacksons Road bridge - Bennison Creek

Appendix Figure A. 12 Ameys Track culverts - Bennison Creek

APPENDIX B

Great Southern Rail Trail Structure Photos

Provided by SGSC

Appendix Figure B. 1 Rail Trail Bridge – Bennison Creek (1/2)

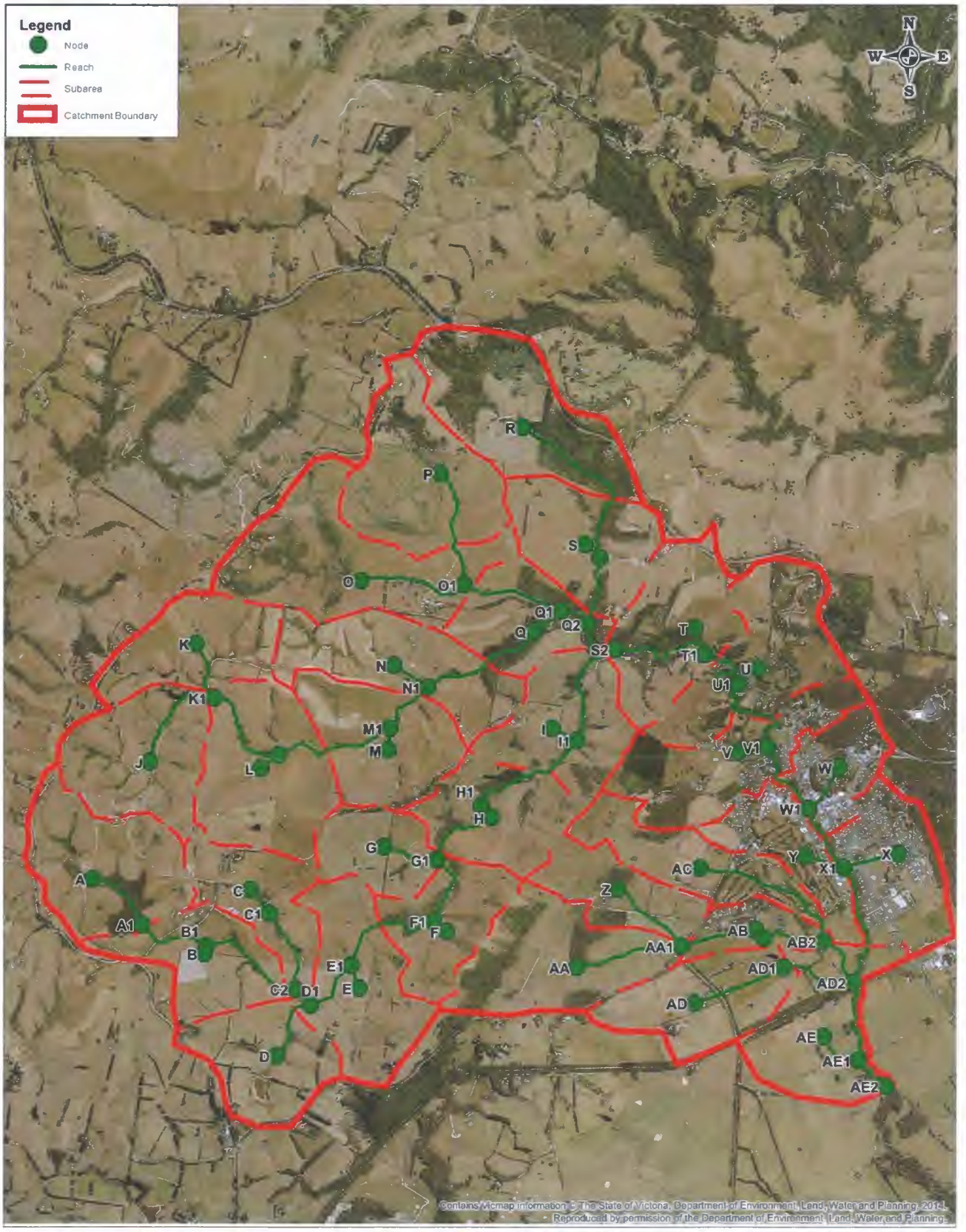
Appendix Figure B. 2 Rail Trail Bridge –Bennison Creek (2/2)

Appendix Figure B. 3 Rail Trail Bridge – Stockyard Creek (1/2)

Appendix Figure B. 4 Rail Trail Bridge – Stockyard Creek (2/2)

APPENDIX C

Stockyard Creek RORB Model Layout



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ENGENY

South Gippsland Shire Council

0 500 1000
Scale in metres (1:25,000 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

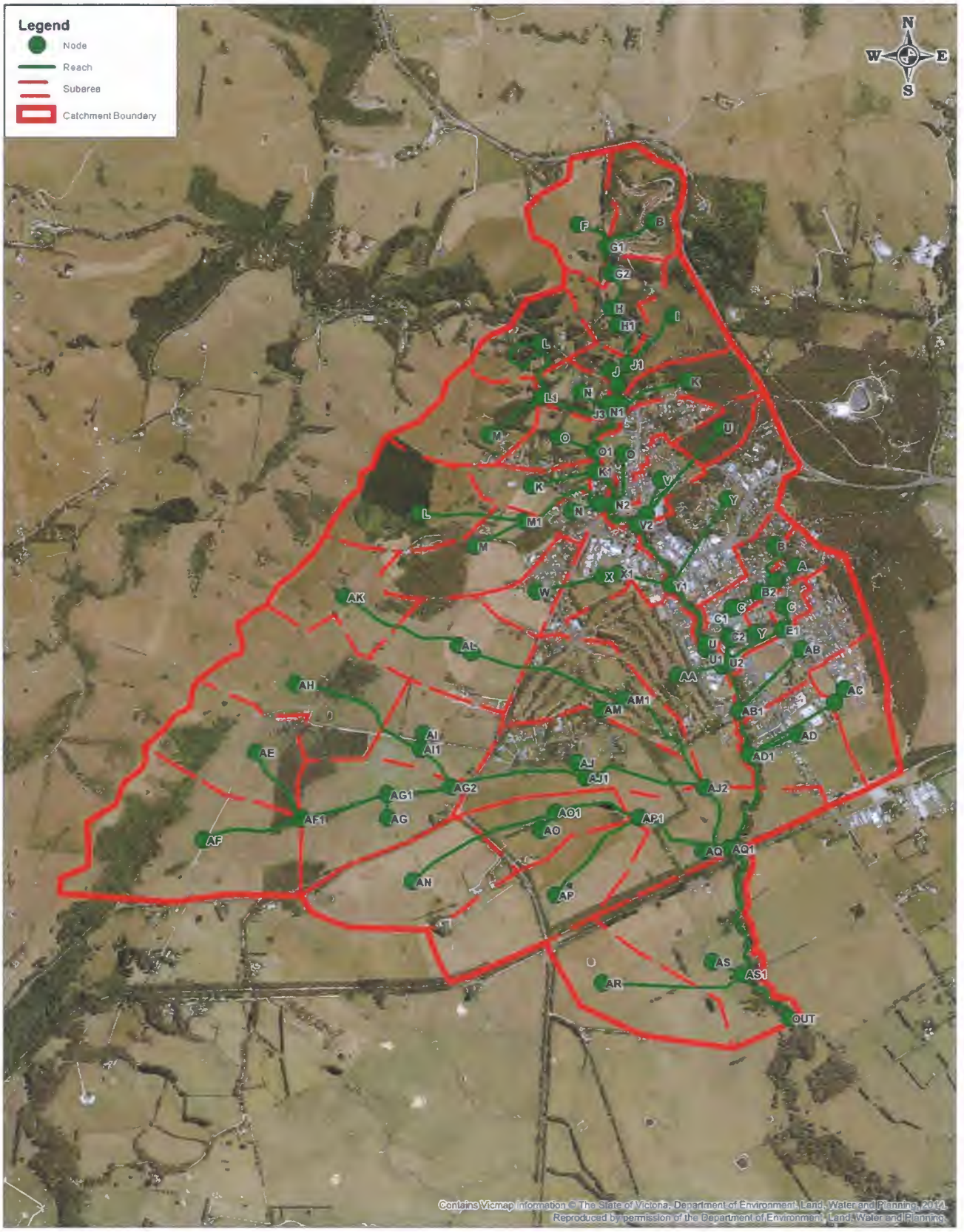
Foster Flood and Drainage Study

Stockyard Creek
RORB Model Layout

Job Number: V2025_001
Revision: 2
Drawn: DH
Checked: TC
Date: 29 August 2017

APPENDIX D

Foster Urban RORB Model Layout


Legend
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Subarea
Catchment Boundary
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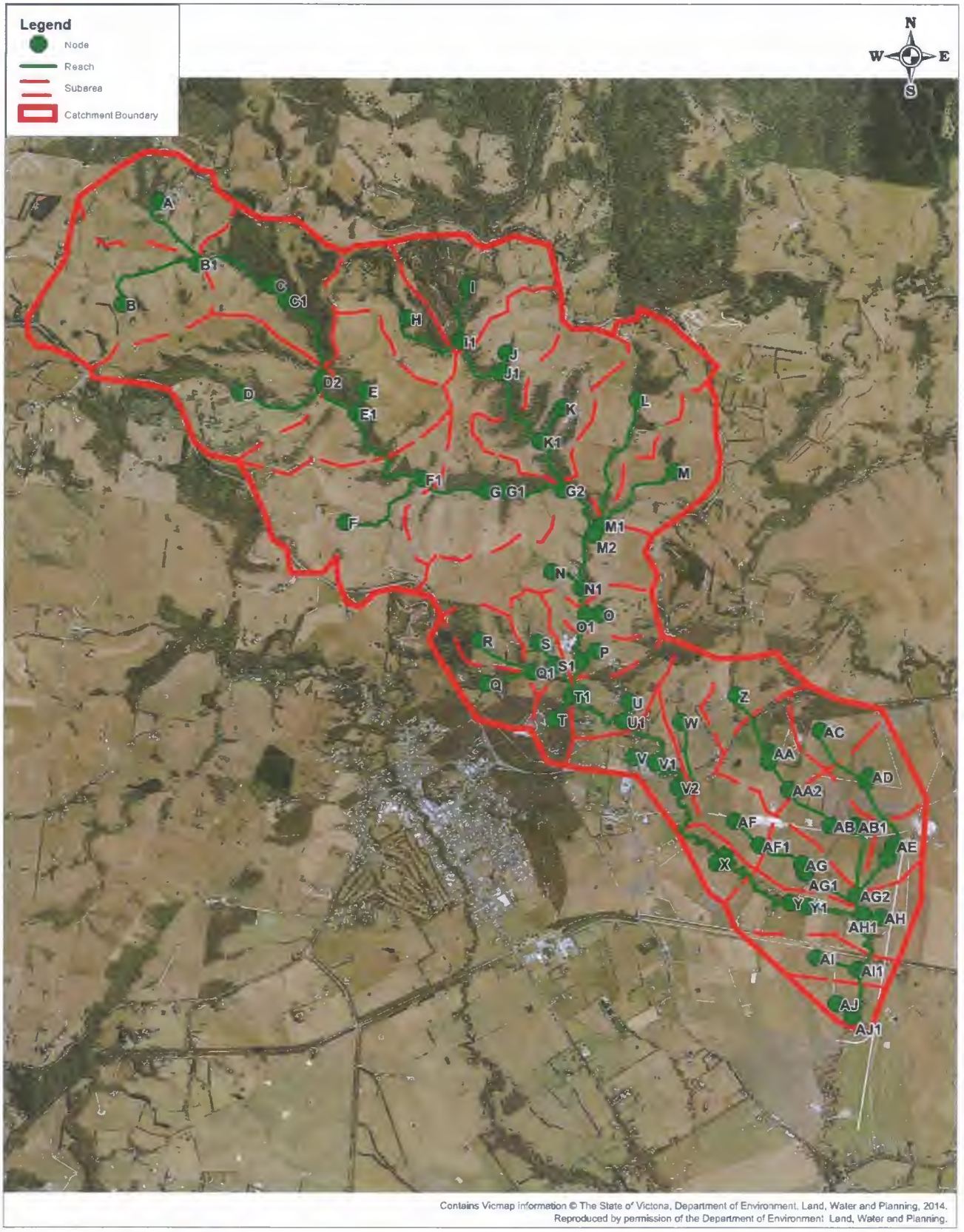
ENGENY
0
300
600
Scale in metres (1 15,000 @ A3)
Map Projection Universal Transverse Mercator
Horizontal Datum Geocentric Datum of Australia 1994 (GDA94)
Vertical Datum Australia Height Datum
Grid Map Grid of Australia Zone 55
Foster Flood and Drainage Study
Stockyard Creek Rainfall Excess
RORB Model Layout
Job Number V2025_001
Revision 1
Drawn DH
Checked NA
Date 1 September 2017

APPENDIX E

Bennison Creek RORB Model Layout



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South Gippsland Shire Council

0 500 1000
Scale in metres (1:25,000 @ A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood and Drainage Study

Bennison Creek
RORB Model Layout

Job Number: V2025_001
Revision: 2
Drawn: DH
Checked: SC
Date: 29 August 2017

APPENDIX F

Stockyard Creek Impervious Fractions

Name	Area (km²)	Impervious Fraction
A	0.97	0.066
B	0.666	0.066
C	0.617	0.062
D	0.696	0.072
E	0.903	0.066
F	0.618	0.053
G	0.473	0.075
H	0.712	0.052
I	0.786	0.053
J	0.89	0.055
K	0.718	0.067
L	1.055	0.053
M	0.829	0.06
N	0.903	0.061
O	1.295	0.071
P	1.06	0.061
Q	0.625	0.08
R	1.139	0.099
S	0.788	0.054
T	0.85	0.075
U	0.964	0.101
V	0.873	0.293
W	0.449	0.497

Name	Area (km²)	Impervious Fraction
X	0.755	0.486
Y	0.516	0.401
Z	0.519	0.106
AA	1.001	0.079
AB	0.288	0.327
AC	0.658	0.223
AD	0.731	0.223
AE	0.848	0.214

APPENDIX G

Bennison Creek Impervious Fractions

Name	Area (km²)	Impervious Fraction
A	0.715	0.085
B	1.075	0.092
C	0.905	0.063
D	1.233	0.077
E	1.017	0.054
F	1.28	0.086
G	0.841	0.05
H	0.559	0.061
I	0.733	0.063
J	0.595	0.054
K	0.757	0.056
L	0.864	0.059
M	0.598	0.068
N	0.985	0.061
O	0.267	0.052
P	0.255	0.076
Q	0.328	0.134
R	0.241	0.05
S	0.218	0.086
T	0.196	0.085
U	0.357	0.187
V	0.456	0.166
W	0.36	0.133

X	0.198	0.05
Y	0.346	0.054
Z	0.33	0.116
AA	0.422	0.083
AB	0.375	0.05
AC	0.306	0.109
AD	0.363	0.05
AE	0.22	0.05
AF	0.301	0.058
AG	0.276	0.05
AH	0.295	0.06
AI	0.321	0.123
AJ	0.182	0.05

APPENDIX H

Stockyard Creek 2016 IFD Rainfall Intensities

Duration	Rainfall Intensity (mm/hr)				
	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP
10 min	57.96	69.00	80.40	96.00	108.60
15 min	47.20	56.00	65.20	78.00	88.40
20 min	40.50	48.30	56.10	67.20	76.20
25 min	35.76	42.72	49.92	59.76	67.92
45 min	25.73	30.93	36.13	43.60	49.47
1 hour	21.80	26.20	30.70	37.10	42.10
1.5 hour	17.13	20.60	24.27	29.33	33.40
2 hour	14.40	17.35	20.40	24.70	28.15
3 hour	11.23	13.53	15.93	19.30	22.03
4.5 hour	8.73	10.49	12.33	14.96	17.16
6 hour	7.28	8.73	10.25	12.45	14.30
9 hour	5.62	6.73	7.89	9.60	11.07
12 hour	4.68	5.58	6.54	7.97	9.25
18 hour	3.59	4.28	5.02	6.11	7.11
24 hour	2.97	3.54	4.16	5.08	5.92
36 hour	2.26	2.70	3.19	3.92	4.56
48 hour	1.85	2.23	2.63	3.23	3.77
72 hour	1.39	1.67	1.97	2.44	2.83

APPENDIX I

Bennison Creek 2016 IFD Rainfall Intensities

Duration	Rainfall Intensity (mm/hr)				
	20 % AEP	10 % AEP	5 % AEP	2 % AEP	1 % AEP
10 min	58.38	69.60	81.00	96.60	109.80
15 min	47.60	56.40	66.00	78.80	89.20
20 min	40.80	48.60	56.70	67.80	77.10
25 min	36.00	43.20	50.16	60.24	68.40
45 min	25.87	31.07	36.40	43.87	49.73
1 hour	21.90	26.30	30.90	37.30	42.40
1.5 hour	17.20	20.67	24.33	29.47	33.53
2 hour	14.45	17.40	20.50	24.85	28.30
3 hour	11.27	13.57	15.97	19.40	22.17
4.5 hour	8.76	10.53	12.40	15.07	17.27
6 hour	7.32	8.78	10.32	12.55	14.43
9 hour	5.66	6.78	7.96	9.69	11.22
12 hour	4.70	5.63	6.61	8.06	9.33
18 hour	3.62	4.33	5.08	6.22	7.22
24 hour	2.99	3.58	4.21	5.17	6.00
36 hour	2.28	2.74	3.22	3.97	4.61
48 hour	1.88	2.25	2.67	3.29	3.81
72 hour	1.40	1.69	2.00	2.47	2.88

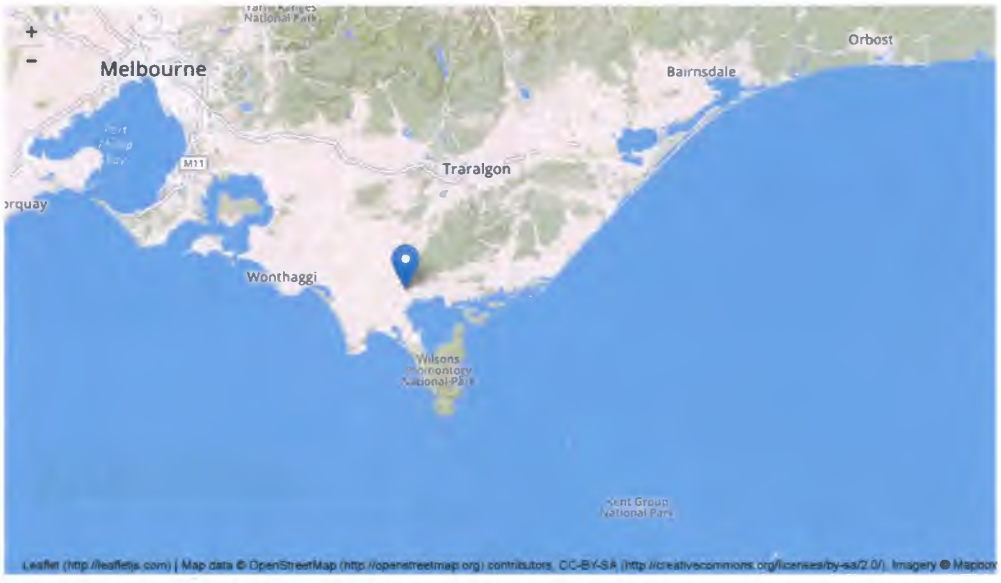
APPENDIX J

AR&R 2016 Data Hub Outputs

Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	146.191
Latitude	-38.654
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Temporal Patterns	show
Areal Temporal Patterns	show
Interim Climate Change Factors	show



Region Information

Data Category	Region
River Region	South Gippsland
ARF Parameters	Southern Temperate
Temporal Patterns	Southern Slopes (Vic/NSW)

Data

River Region

division	South East Coast (Victoria)
rivregnum	4
River Region	South Gippsland

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v1

ARF Parameters

Long Duration ARF

$$ARF = Min\left\{1, \left[1 - a\left(Area^{b} - c\log_{10}Duration\right)Duration^{-d} + eArea^{f}Duration^{g}\left(0.3 + \log_{10}AEP\right) + h10^{iArea\frac{Duration}{1440}}\left(0.3 + \log_{10}AEP\right)\right]\right\}$$

Zone	a	b	c	d	e	f	g	h	i
Southern Temperate	0.158	0.276	0.372	0.315	0.000141	0.41	0.15	0.01	-0.0027

Short Duration ARF

$$ARF = Min\left[1, 1 - 0.287\left(Area^{0.265} - 0.439\log_{10}(Duration)\right).Duration^{-0.36} + 2.26 \text{ x } 10^{-3} \text{ x } Area^{0.226}.Duration^{0.125}\left(0.3 + \log_{10}(AEP)\right) + 0.0141 \text{ x } Area^{0.213} \text{ x } 10^{-0.021\frac{(Duration-180)^2}{1440}}\left(0.3 + \log_{10}(AEP)\right)\right]$$

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v1

Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are NOT FOR USE in urban areas

Storm Initial Losses (mm)	20.0
Storm Continuing Losses (mm/h)	4.5

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v1

Temporal Patterns | Download (.zip) (./temporal_patterns/tp/SSmainland.zip)

code	SSmainland
Label	Southern Slopes (Vic/NSW)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

Areal Temporal Patterns | Download (.zip) (./temporal_patterns/areal/Areal_SSmainland.zip)

code	SSmainland
arealabel	Southern Slopes (Vic/NSW)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

BOM IFD Depths

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-38.65406507&longitude=146.1906927&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

Median Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	1.6 (0.102)	1.6 (0.075)	1.6 (0.063)	1.7 (0.054)	1.4 (0.038)	1.2 (0.029)
90 (1.5)	2.2 (0.12)	2.0 (0.079)	1.9 (0.062)	1.8 (0.05)	1.8 (0.04)	1.7 (0.035)
120 (2.0)	1.6 (0.075)	2.2 (0.077)	2.6 (0.076)	3.0 (0.074)	1.7 (0.034)	0.7 (0.012)
180 (3.0)	1.9 (0.076)	2.4 (0.072)	2.8 (0.069)	3.1 (0.066)	3.7 (0.064)	4.2 (0.063)
360 (6.0)	1.0 (0.033)	3.0 (0.068)	4.2 (0.081)	5.4 (0.088)	8.0 (0.107)	9.9 (0.115)
720 (12.0)	0.3 (0.008)	2.8 (0.05)	4.5 (0.067)	6.1 (0.077)	7.9 (0.082)	9.3 (0.084)
1080 (18.0)	0.0 (0.0)	0.9 (0.013)	1.4 (0.019)	2.0 (0.022)	3.1 (0.028)	3.9 (0.03)
1440 (24.0)	0.0 (0.0)	0.2 (0.003)	0.4 (0.004)	0.5 (0.005)	1.1 (0.009)	1.6 (0.011)
2160 (36.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.2 (0.002)	0.4 (0.002)
2880 (48.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
4320 (72.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

10% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
90 (1.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
120 (2.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
180 (3.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
360 (6.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
720 (12.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
1080 (18.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
1440 (24.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
2160 (36.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
2880 (48.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
4320 (72.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

25% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
90 (1.5)	0.1 (0.004)	0.0 (0.002)	0.0 (0.001)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
120 (2.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
180 (3.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
360 (6.0)	0.0 (0.0)	0.0 (0.001)	0.0 (0.001)	0.1 (0.001)	0.0 (0.0)	0.0 (0.0)
720 (12.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
1080 (18.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
1440 (24.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
2160 (36.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
2880 (48.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
4320 (72.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

75% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	7.8 (0.496)	8.8 (0.402)	9.4 (0.358)	10.0 (0.324)	10.8 (0.291)	11.4 (0.271)
90 (1.5)	9.7 (0.521)	12.3 (0.479)	14.0 (0.454)	15.7 (0.432)	14.1 (0.32)	12.8 (0.256)
120 (2.0)	12.4 (0.597)	15.4 (0.534)	17.4 (0.5)	19.2 (0.471)	16.4 (0.332)	14.3 (0.254)
180 (3.0)	11.6 (0.475)	12.9 (0.383)	13.8 (0.34)	14.6 (0.306)	18.9 (0.326)	22.1 (0.334)
360 (6.0)	7.8 (0.243)	15.4 (0.353)	20.5 (0.392)	25.4 (0.413)	30.8 (0.412)	34.9 (0.406)
720 (12.0)	4.7 (0.113)	10.9 (0.195)	15.1 (0.225)	19.0 (0.243)	22.2 (0.232)	24.6 (0.223)
1080 (18.0)	3.6 (0.075)	8.3 (0.129)	11.5 (0.149)	14.5 (0.16)	18.2 (0.164)	20.9 (0.163)
1440 (24.0)	0.6 (0.012)	3.3 (0.046)	5.0 (0.059)	6.7 (0.067)	11.0 (0.09)	14.3 (0.1)
2160 (36.0)	0.9 (0.014)	2.3 (0.029)	3.3 (0.034)	4.3 (0.037)	9.6 (0.068)	13.5 (0.082)
2880 (48.0)	0.0 (0.0)	0.6 (0.006)	0.9 (0.009)	1.3 (0.01)	2.9 (0.018)	4.0 (0.022)
4320 (72.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.5 (0.003)	0.8 (0.004)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

90% Preburst Depths

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	26.5 (1.681)	27.8 (1.277)	28.7 (1.096)	29.5 (0.961)	29.3 (0.79)	29.1 (0.691)
90 (1.5)	23.8 (1.282)	27.9 (1.084)	30.6 (0.988)	33.2 (0.911)	33.1 (0.752)	33.0 (0.659)
120 (2.0)	29.5 (1.416)	32.1 (1.115)	33.9 (0.976)	35.6 (0.87)	39.4 (0.797)	42.3 (0.75)
180 (3.0)	30.4 (1.243)	33.5 (0.994)	35.6 (0.877)	37.6 (0.787)	41.1 (0.709)	43.7 (0.66)
360 (6.0)	19.6 (0.615)	30.9 (0.706)	38.3 (0.731)	45.5 (0.739)	56.9 (0.762)	65.5 (0.763)
720 (12.0)	22.4 (0.541)	28.7 (0.513)	32.9 (0.492)	37.0 (0.471)	46.3 (0.484)	53.2 (0.481)
1080 (18.0)	17.3 (0.361)	20.6 (0.319)	22.8 (0.295)	24.9 (0.275)	31.8 (0.288)	36.9 (0.289)
1440 (24.0)	14.1 (0.266)	19.6 (0.275)	23.2 (0.273)	26.7 (0.267)	33.6 (0.274)	38.7 (0.273)
2160 (36.0)	7.5 (0.123)	10.5 (0.129)	12.4 (0.128)	14.3 (0.125)	25.7 (0.182)	34.3 (0.209)
2880 (48.0)	3.4 (0.052)	6.7 (0.075)	8.8 (0.083)	10.9 (0.087)	21.2 (0.137)	29.0 (0.16)
4320 (72.0)	3.9 (0.052)	3.5 (0.035)	3.3 (0.027)	3.1 (0.022)	14.0 (0.08)	22.2 (0.109)

Layer Info

Time Accessed	25 August 2017 02:15PM
Version	2016_v2

APPENDIX K

Stockyard Creek GSDM Calculation Sheet

LOCATION INFORMATION					
Catchment	Stockyard Creek		Area	24.21	km^2
State	Victoria		Duration Limit	6	hrs
Latitude : $38^{o65'}$ S			Longitude : $146^{o17'}$ E		
Portion of Area Considered:					
Smooth , S =	0	(0.0 - 1.0)	Rough , R =	1	(0.0 - 1.0)

ELEVATION ADJUSTMENT FACTOR (EAF)		
Adjustment for Elevation (-0.05 per 300 m above 1500 m)		
EAF =	1	(0.85 - 1.00)

MOISTURE ADJUSTMENT FACTOR (MAF)		
MAF =	0.55	(0.40 - 1.00)

PMP VALUES (mm)

Duration (hours)	Initial Depth - Smooth (D_S)	Initial Depth - Rough (D_R)	PMP Estimate = (D_SxS + D_RxR) x MAF x EAF	Rounded PMP Estimate (nearest 10 mm)
0.25		195	107.25	**110**
0.5		290	159.5	**160**
0.75		370	203.5	**200**
1		435	239.25	**240**
1.5		498	273.9	**270**
2		650	357.5	**360**
2.5		720	396	**400**
3		785	431.75	**430**
4		895	492.25	**490**
5		985	541.75	**540**
6		1050	577.5	**580**

APPENDIX L

Bennison Creek GSDM Calculation Sheet

LOCATION INFORMATION					
Catchment	Bennison Creek		Area	18.77	km²
State	Victoria		Duration Limit	6	hrs
Latitude : 38°64' S			Longitude : 146°21' E		
Portion of Area Considered:					
Smooth , S =	0	(0.0 - 1.0)	Rough , R =	1	(0.0 - 1.0)

ELEVATION ADJUSTMENT FACTOR (EAF)		
Adjustment for Elevation (-0.05 per 300 m above 1500 m)		
EAF =	1	(0.85 - 1.00)

MOISTURE ADJUSTMENT FACTOR (MAF)		
MAF =	0.55	(0.40 - 1.00)

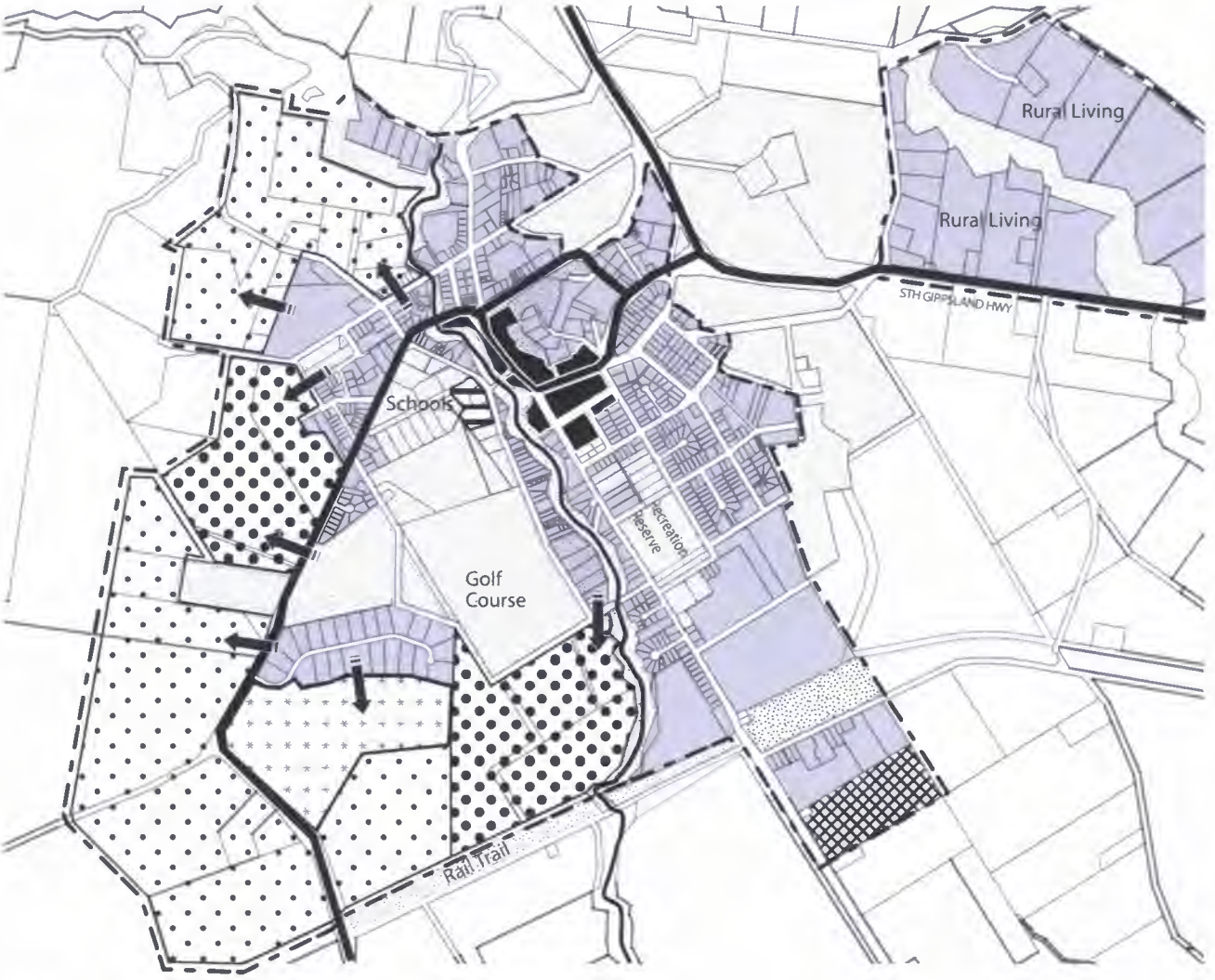
PMP VALUES (mm)

Duration (hours)	Initial Depth - Smooth (D_S)	Initial Depth - Rough (D_R)	PMP Estimate = (D_SxS + D_RxR) x MAF x EAF	Rounded PMP Estimate (nearest 10 mm)
0.25		202	111.1	**110**
0.5		297	163.35	**160**
0.75		380	209	**210**
1		445	244.75	**240**
1.5		510	280.5	**280**
2		667	366.85	**370**
2.5		736	404.8	**400**
3		805	442.75	**440**
4		916	503.8	**500**
5		1010	555.5	**560**
6		1075	591.25	**590**

APPENDIX M

Foster Framework Plan

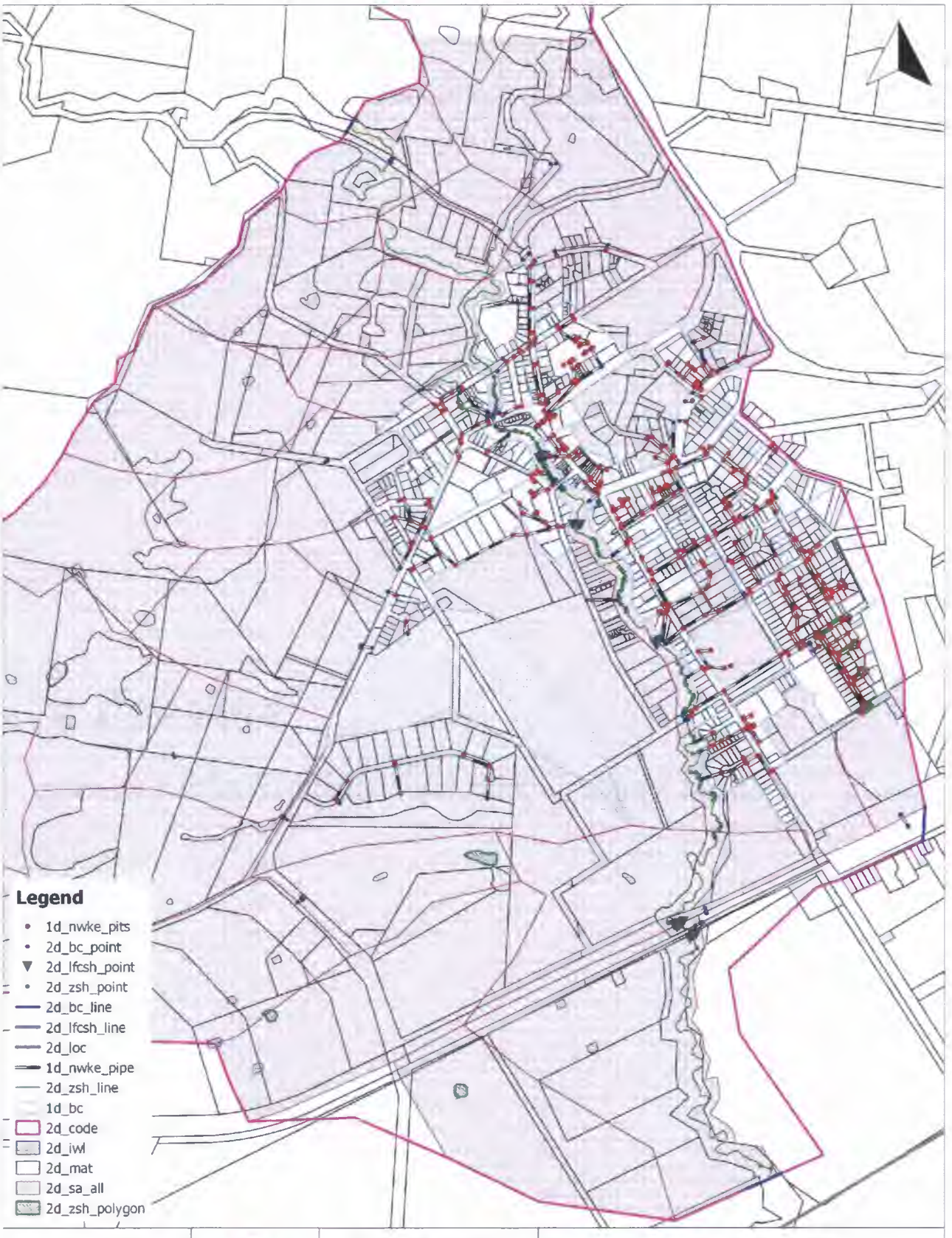
Foster Framework Plan



Note: Where Township Boundary line does not accord with a lot boundary or road, the line is indicative and zone boundaries may vary depending on site specific requirements

APPENDIX N

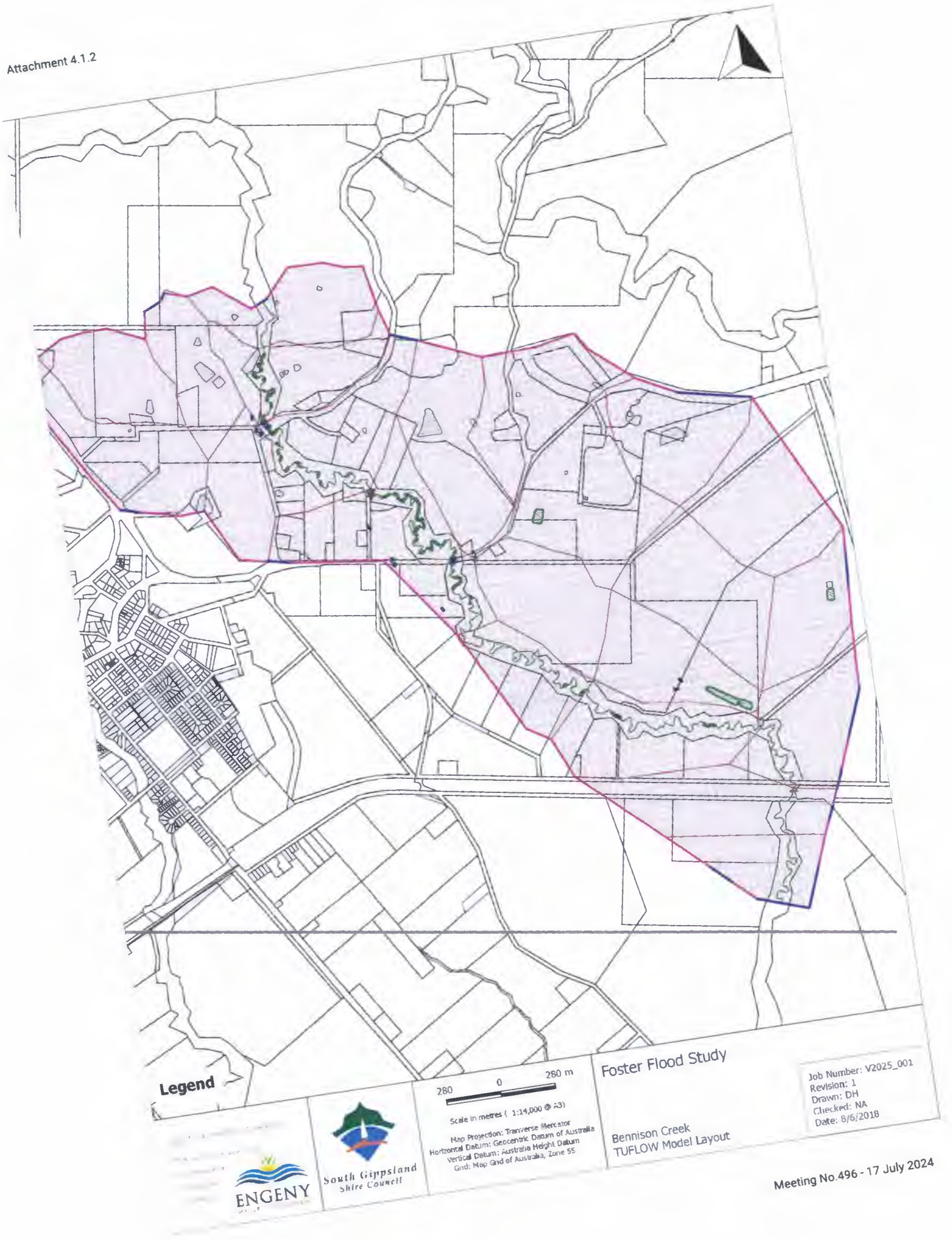
Stockyard Creek Hydraulic Model Layout


Legend
1d_nwke_pits
2d_bc_point
2d_lfcsh_point
2d_zsh_point
2d_bc_line
2d_lfcsh_line
2d_loc
1d_nwke_pipe
2d_zsh_line
1d_bc
2d_code
2d_iwl
2d_mat
2d_sa_all
2d_zsh_polygon
200 0 200 m
Scale in metres (1:10,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Stockyard Creek
TUFLOW Model Layout
Job Number: V2025_001
Revision: 1
Drawn: DH
Checked: NA
Date: 8/6/2018

APPENDIX O

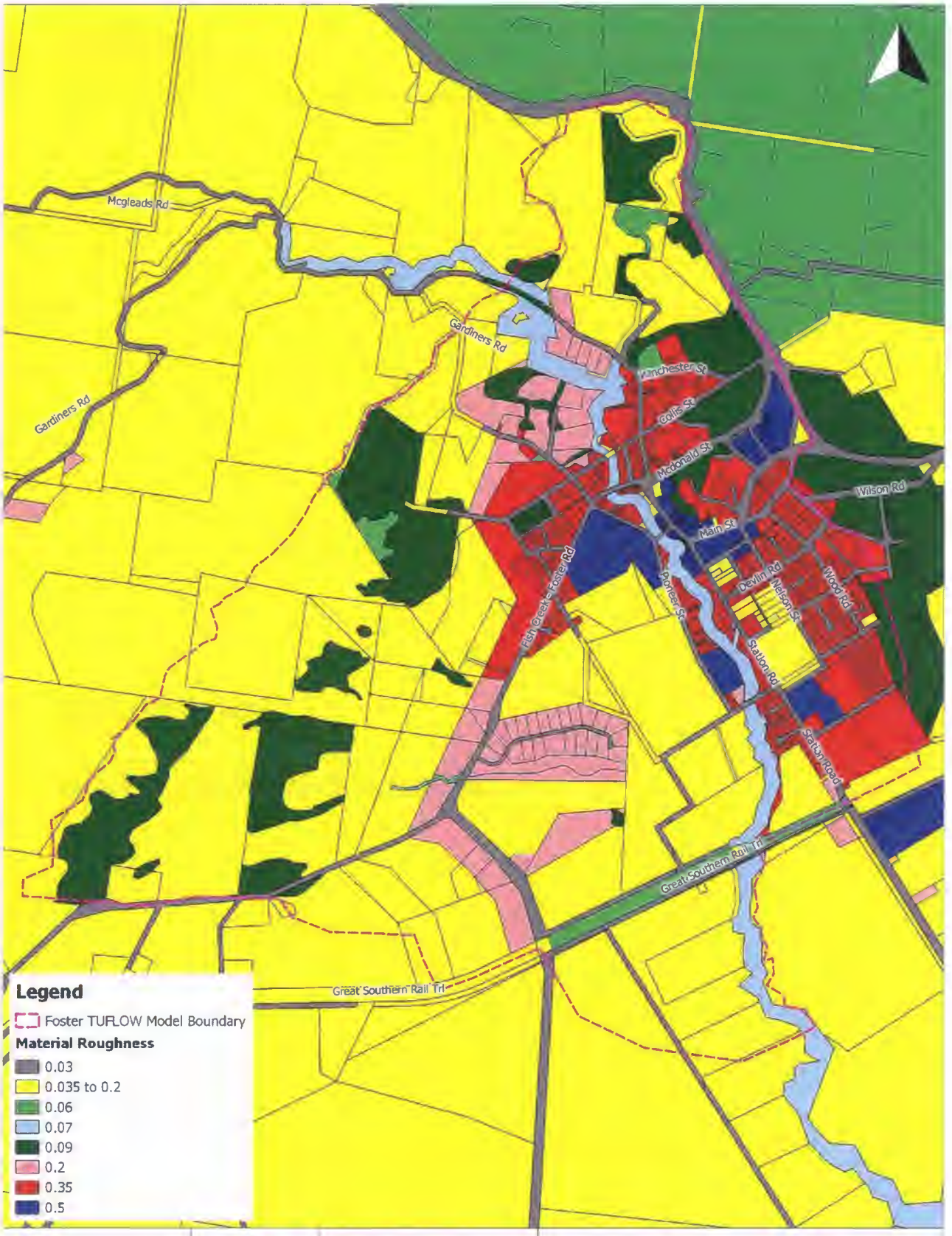
Bennison Creek Hydraulic Model Layout

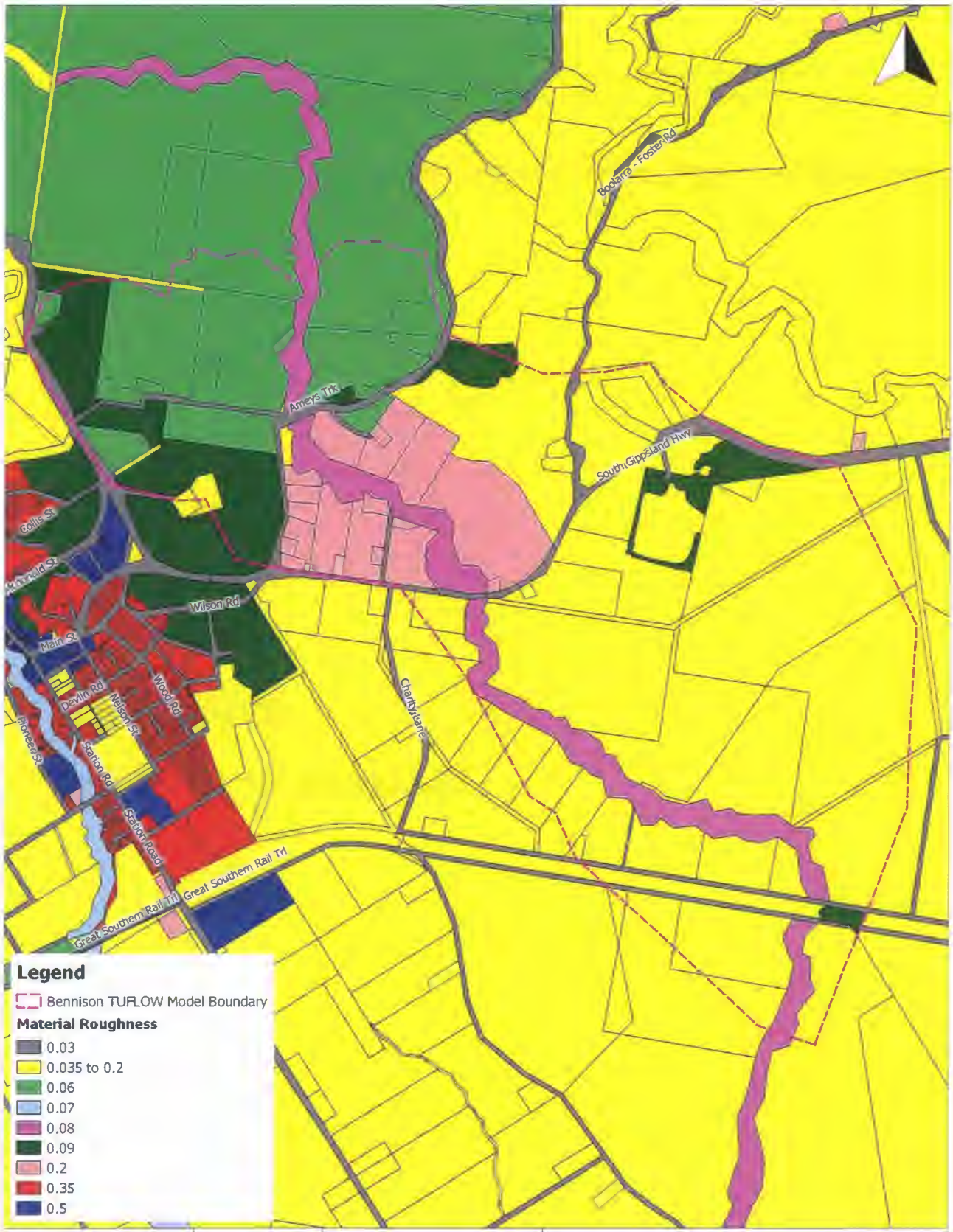
Attachment 4.1.2



APPENDIX P

Material Roughness Maps


Mcgleads Rd
Gardiners Rd
Gardiners Rd
Manchester St
Collis St
McDonald St
Wilson Rd
Main St
Devlin Rd
Nelson St
Wood Rd
Pioneer St
Fish Creek - Foster Rd
Station Rd
Station Road
Great Southern Rail Trl
Great Southern Rail Trl
Legend
Foster TUFLOW Model Boundary
Material Roughness
0.03
0.035 to 0.2
0.06
0.07
0.09
0.2
0.35
0.5
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Material Roughness
Stockyard Creek Model
Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NA
Date: 7/6/2018



ENGENY

South Gippsland Shire Council

300 0 300 m

Scale in metres (1:15,000 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Material Roughness
Bennison Creek Model

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NA
Date: 7/6/2018

APPENDIX Q

Residents Flood Photos

TOCKYARD CREEK AT END OF BOYD COURT
OSTER. MORNING AFTER JUNE 2016 FLOOD
LREADY GONE DOWN AFTER HIGH THE NIGHT
EFORE. THESE PLANTS WERE ENTIRELY
UBMERGED. NOTE SILT LEFT BEHIND.

GRAY TRENERY 2/5 BOYD COURT. FOSTER.

STOCKYARD CREEK AT THE END OF
BOYD COURT, FOSTER. MORNING ~~AT~~ FLOOD
JUNE 2016 ALREADY GOING AFTER DOWN.

GRAY TRENERY 2/5 BOYD CRT. FOSTER.

STOCKYARD CREEK AT END OF BOYD COURT MORNING AFTER JUNE 2016 FLOOD. ALREADY GOING DOWN.

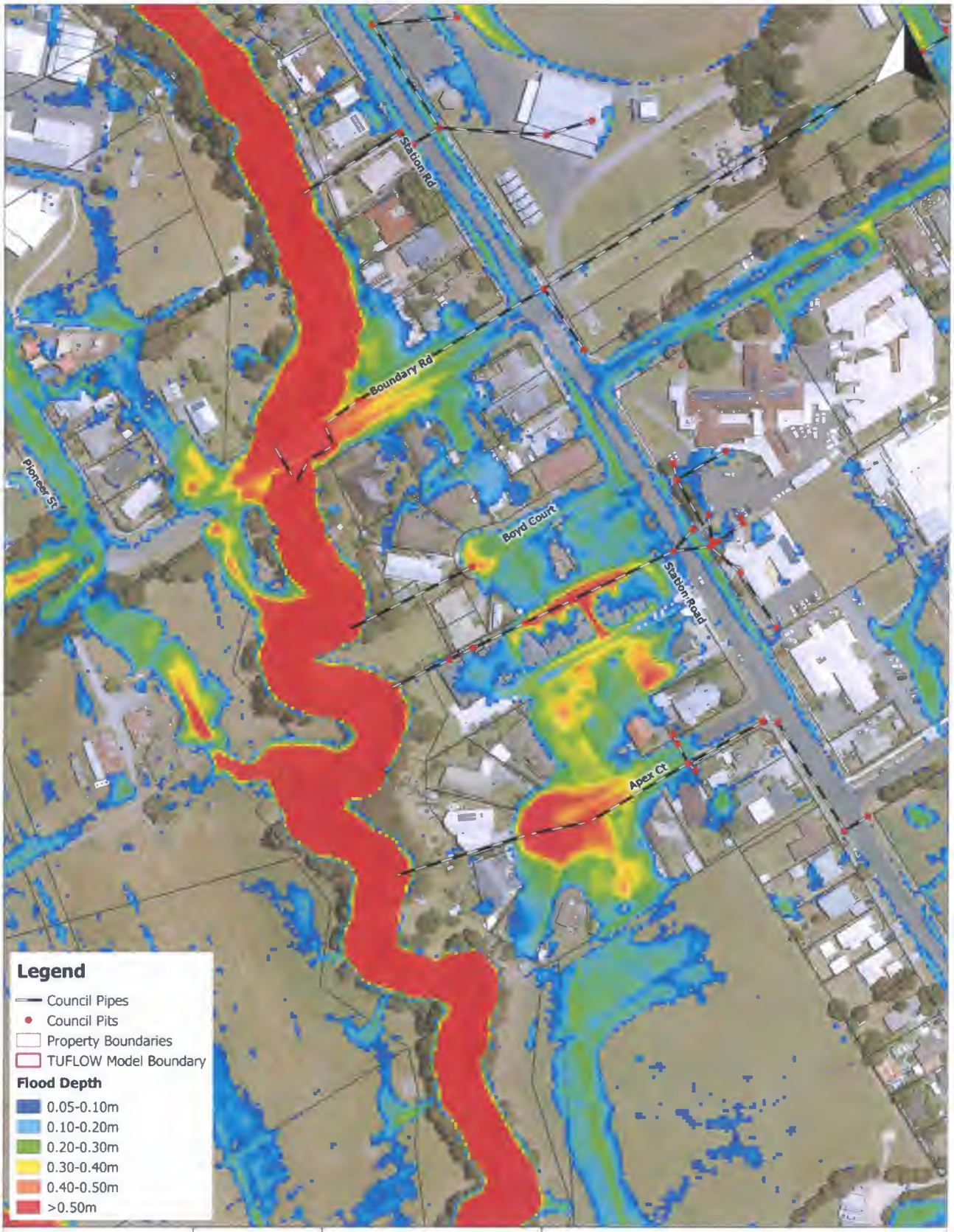
GRAY TRENERY 2/5 BOYD CRT. FOSTER.

STOCKYARD CREEK AT END OF BOYD COURT FOSTER. MORNING AFTER JUNE 2016 FLOOD. ALREADY GOING DOWN. NOTE HOW HIGH NIGHT BEFORE.

GRAY TRENERY 2/5 BOYD CRT. FOSTER.

APPENDIX R

2 % AEP Maximum Flood Depth at Boundary Road with Blockage



ENGENY

South Gippsland Shire Council

30 0 30 m

Scale in metres (1:1,500 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

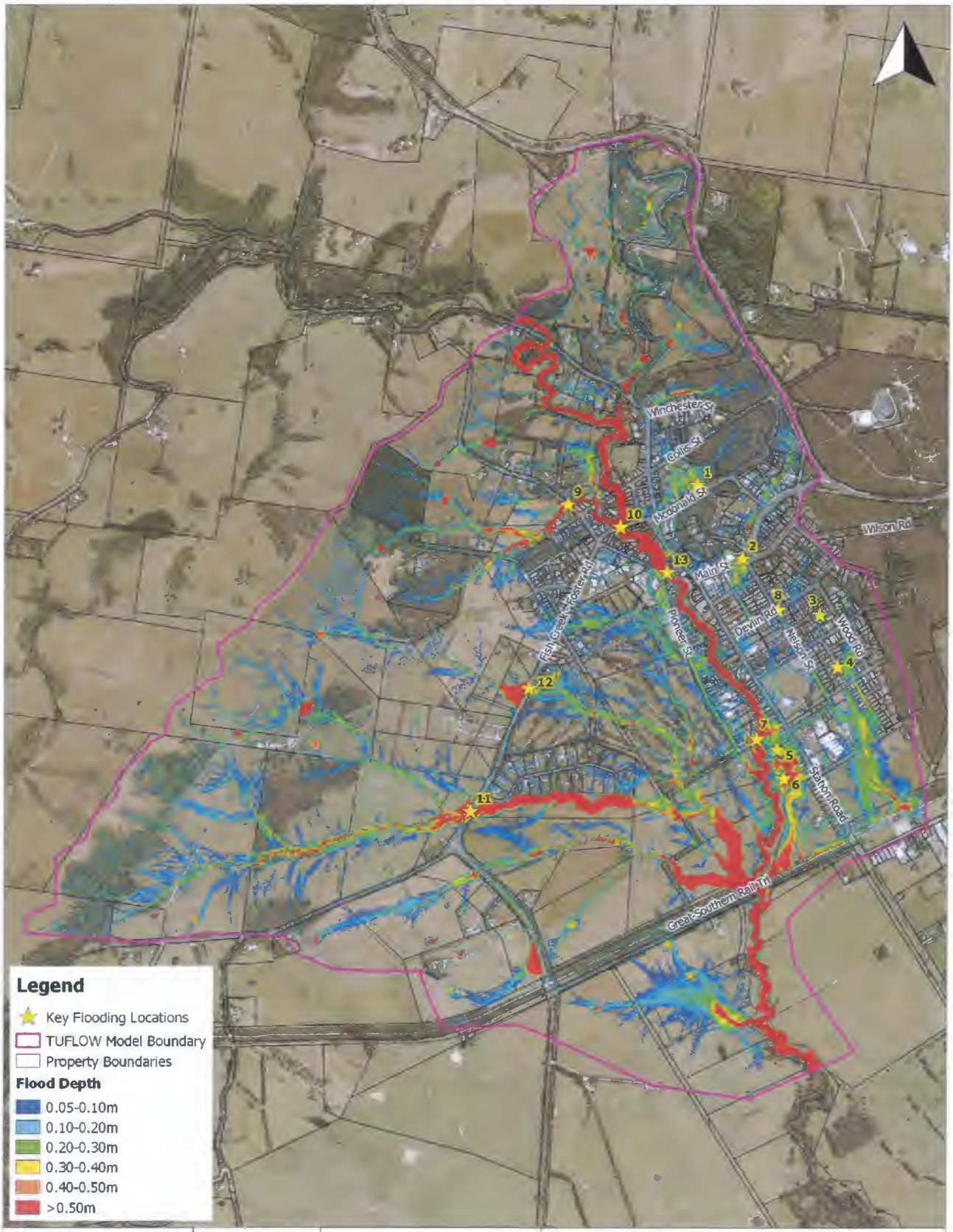
Foster Flood Study

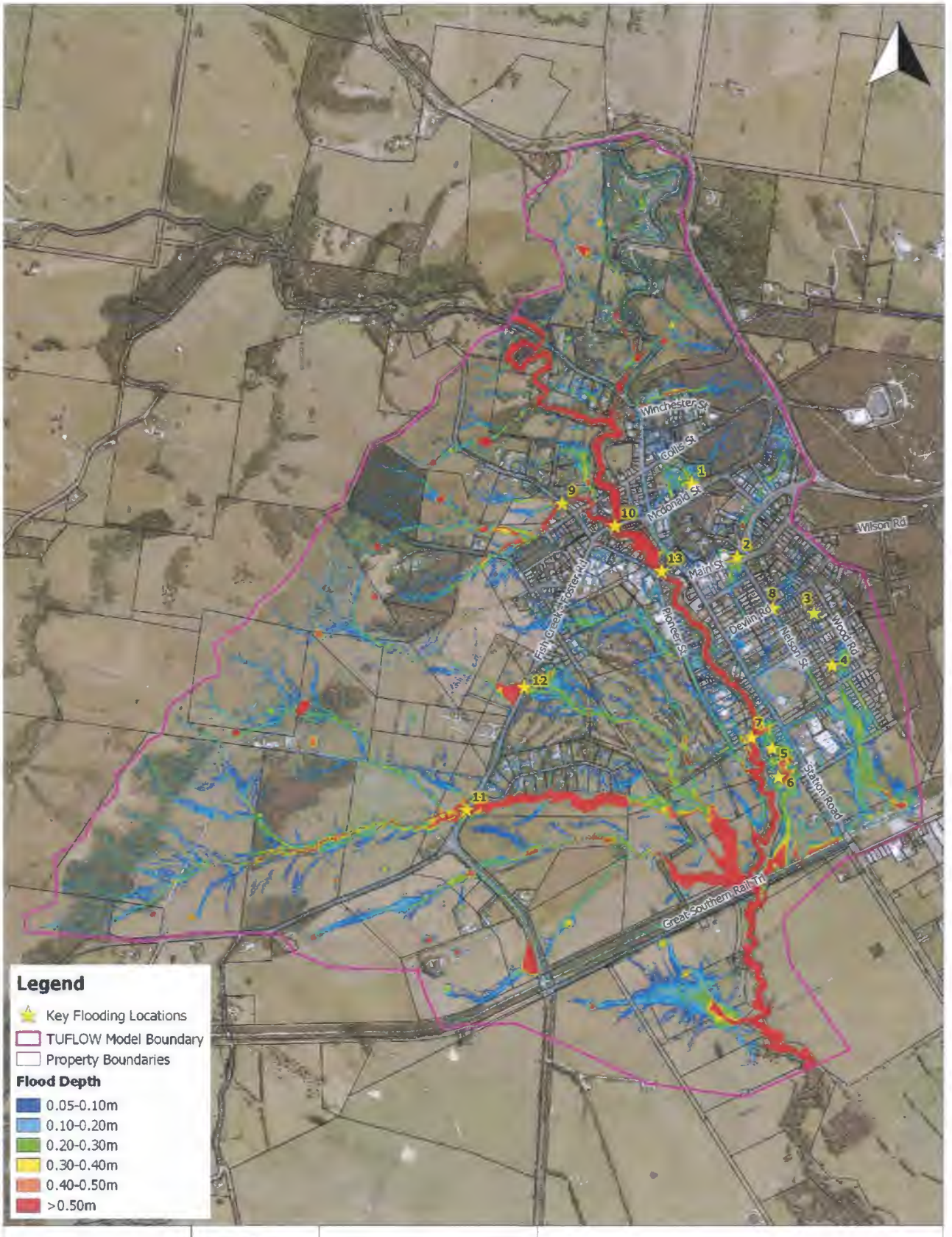
Foster - 2% AEP Maximum Flood Depth with 50% blockage at Boundary Road (Focus)

Job Number: V2025_001
Revision: 1
Drawn: DH
Checked: NA
Date: 6/4/2018

APPENDIX S

Stockyard Creek Maximum Flood Depth Maps


Winchester St
Collis St
McDonald St
Wilson Rd
Main St
Devlin Rd
Nelson St
Wood Rd
Pioneer St
Fish Creek-Foster Rd
Station Road
Great Southern Rail Tr
1
2
3
4
5
6
7
8
9
10
11
12
13
Legend
Key Flooding Locations
TUFLOW Model Boundary
Property Boundaries
Flood Depth
0.05-0.10m
0.10-0.20m
0.20-0.30m
0.30-0.40m
0.40-0.50m
>0.50m
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Foster - 0.5% AEP Maximum Flood Depth (2030 Scenario)
Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25//2018



ENGENY

South Gippsland Shire Council

280 0 280 m

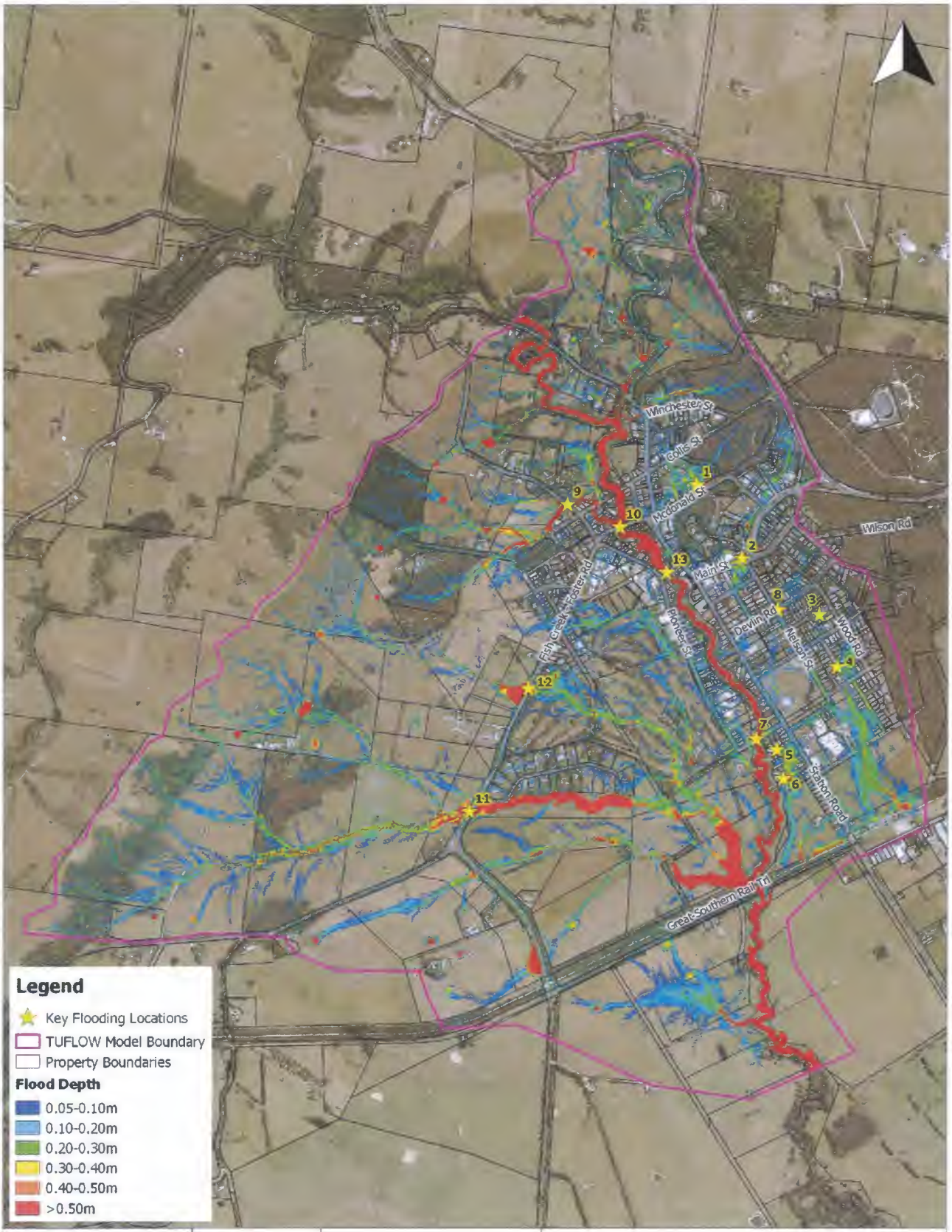
Scale in metres (1:14,000 @ A3)

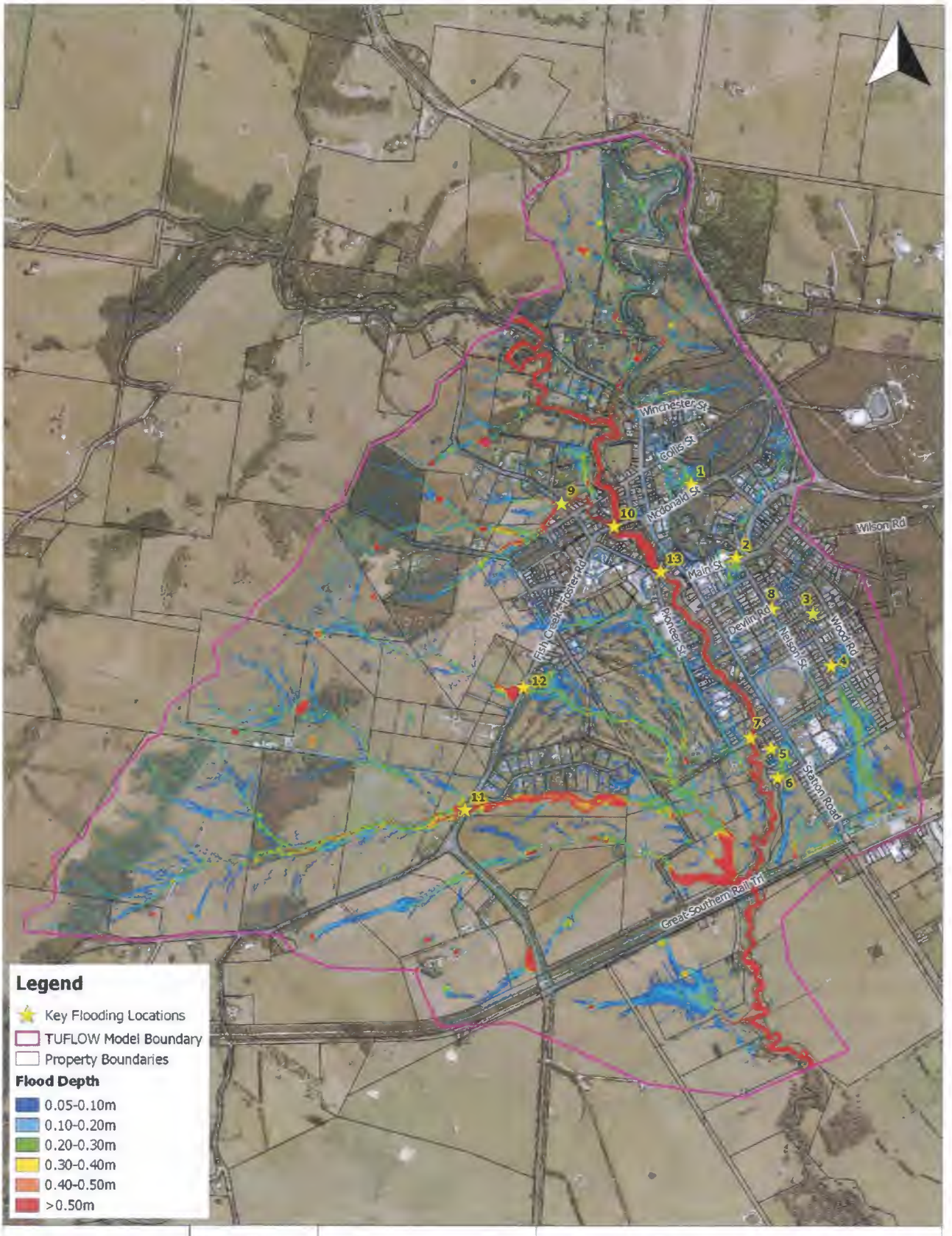
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

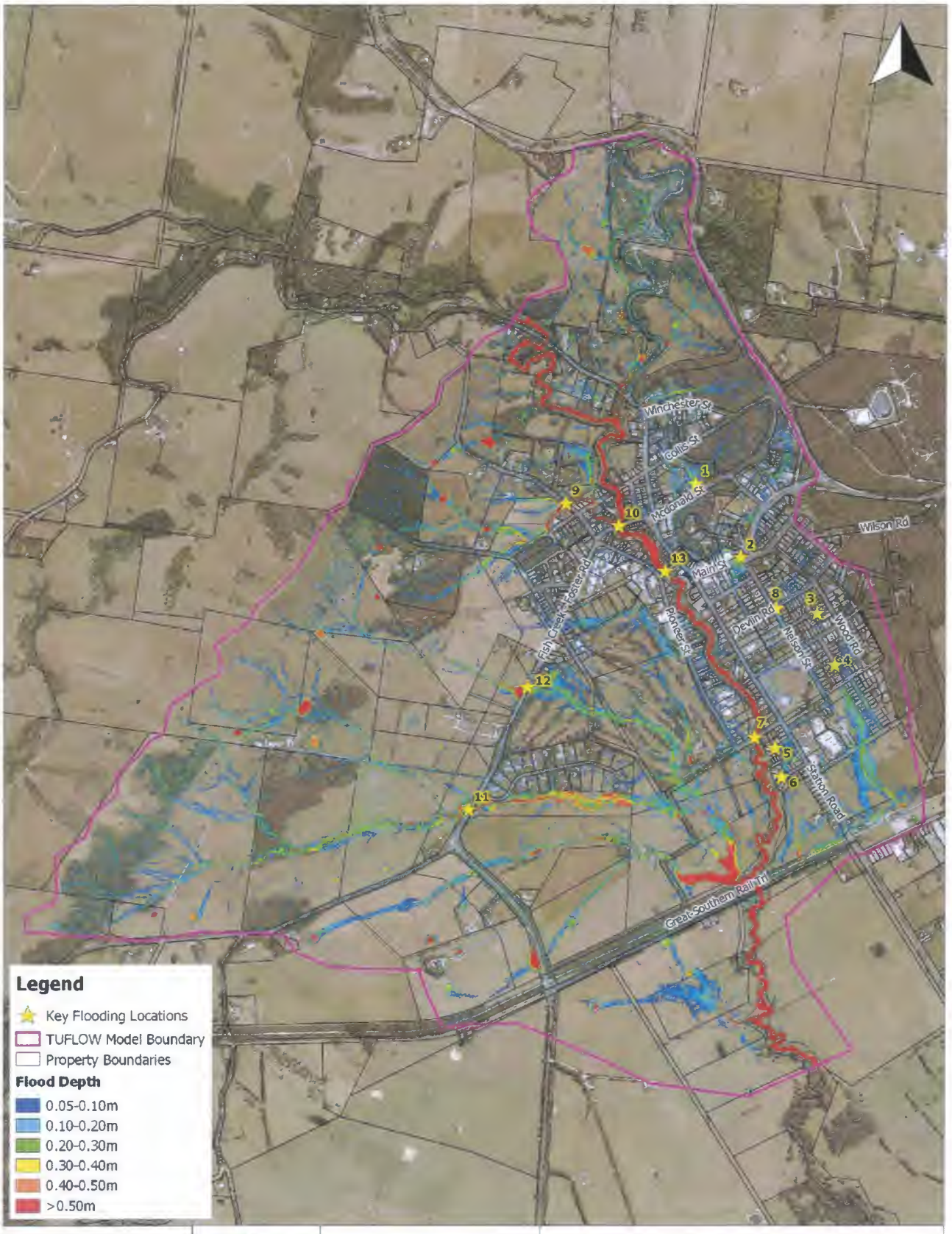
Foster Flood Study

Foster - 1% AEP Maximum Flood Depth (2030 Scenario)

Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018


Winchester St
Collie St
McDonald St
Wilson Rd
Main St
Fish Creek-Foster Rd
Pioneer St
Devlin Rd
Nelson St
Wood Rd
Station Road
Great Southern Rail Tr
1
2
3
4
5
6
7
8
9
10
11
12
13
Legend
Key Flooding Locations
TUFLOW Model Boundary
Property Boundaries
Flood Depth
0.05-0.10m
0.10-0.20m
0.20-0.30m
0.30-0.40m
0.40-0.50m
>0.50m
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Foster - 2% AEP Maximum Flood Depth (2030 Scenario)
Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018


Winchester St
Collis St
McDonald St
Wilson Rd
Main St
Fish Creek-Foster Rd
Pioneer St
Devlin Rd
Nelson St
Wood Rd
Station Road
Great Southern Rail Trl
1
2
3
4
5
6
7
8
9
10
11
12
13
Legend
Key Flooding Locations
TUFLOW Model Boundary
Property Boundaries
Flood Depth
0.05-0.10m
0.10-0.20m
0.20-0.30m
0.30-0.40m
0.40-0.50m
>0.50m
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Foster - 5% AEP Maximum Flood Depth (2030 Scenario)
Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018



ENGENY

South Gippsland Shire Council

280 0 280 m

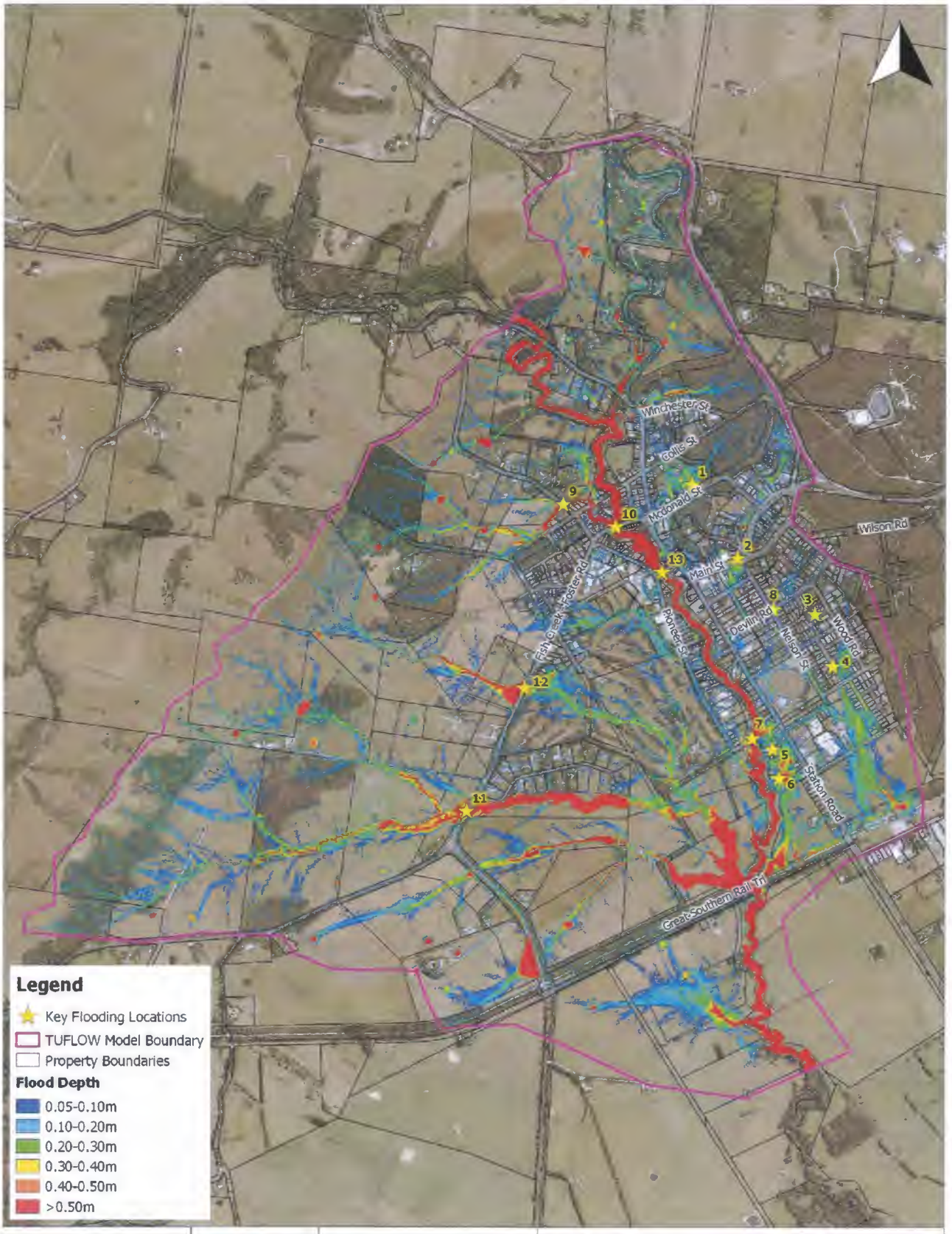
Scale in metres (1:14,000 @ A3)

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Foster - 10% AEP Maximum Flood Depth (2030 Scenario)

Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018



ENGENY

South Gippsland Shire Council

280 0 280 m

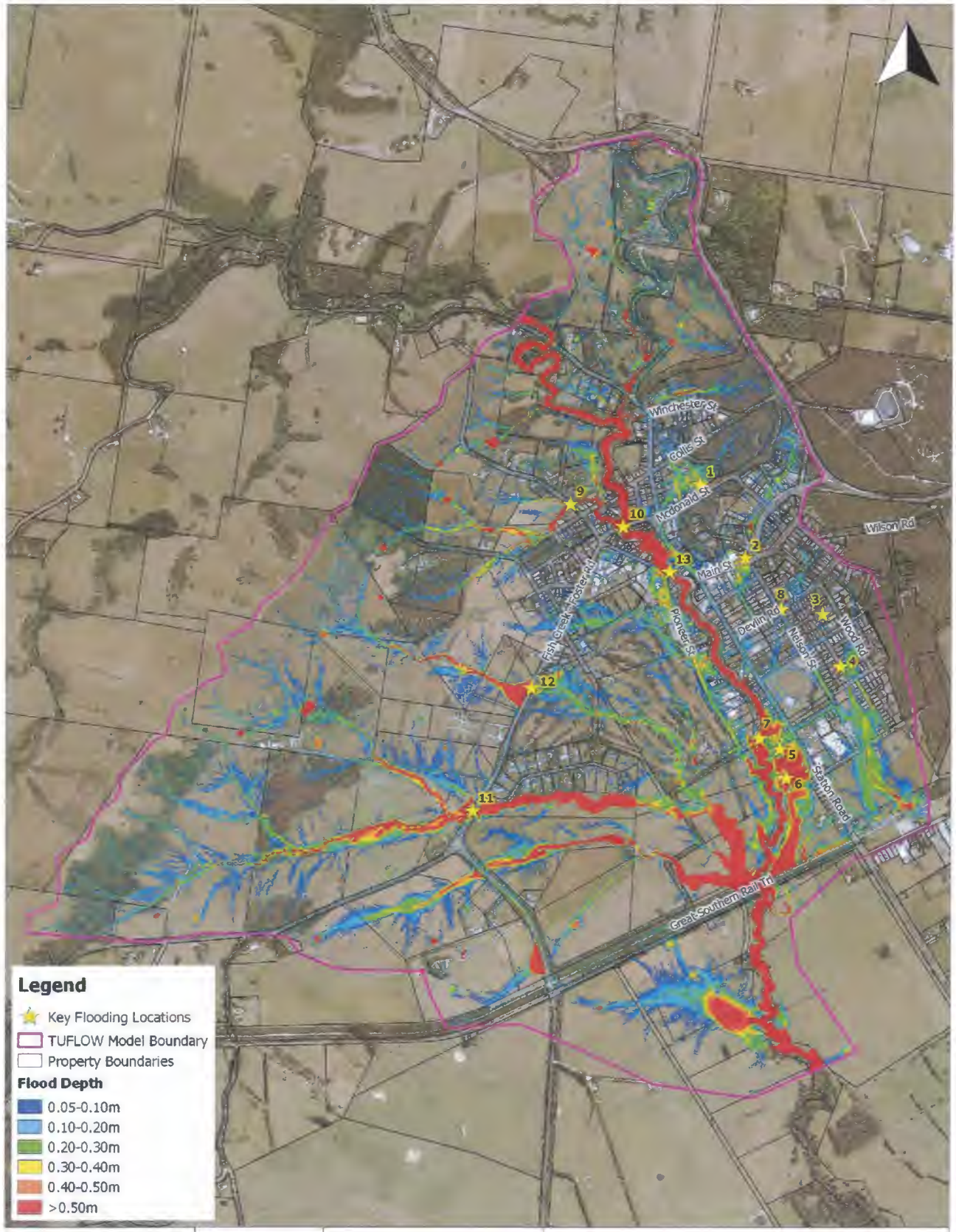
Scale in metres (1:14,000 @ A3)

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Foster - 1% AEP Maximum Flood Depth (2050 Scenario)

Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018


Winchester St
Collis St
Mcdonald St
Wilson Rd
Main St
Devlin Rd
Pioneer St
Nelson St
Wood Rd
Fish Creek-Foster Rd
Station Road
Great Southern Rail Tr
1
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3
4
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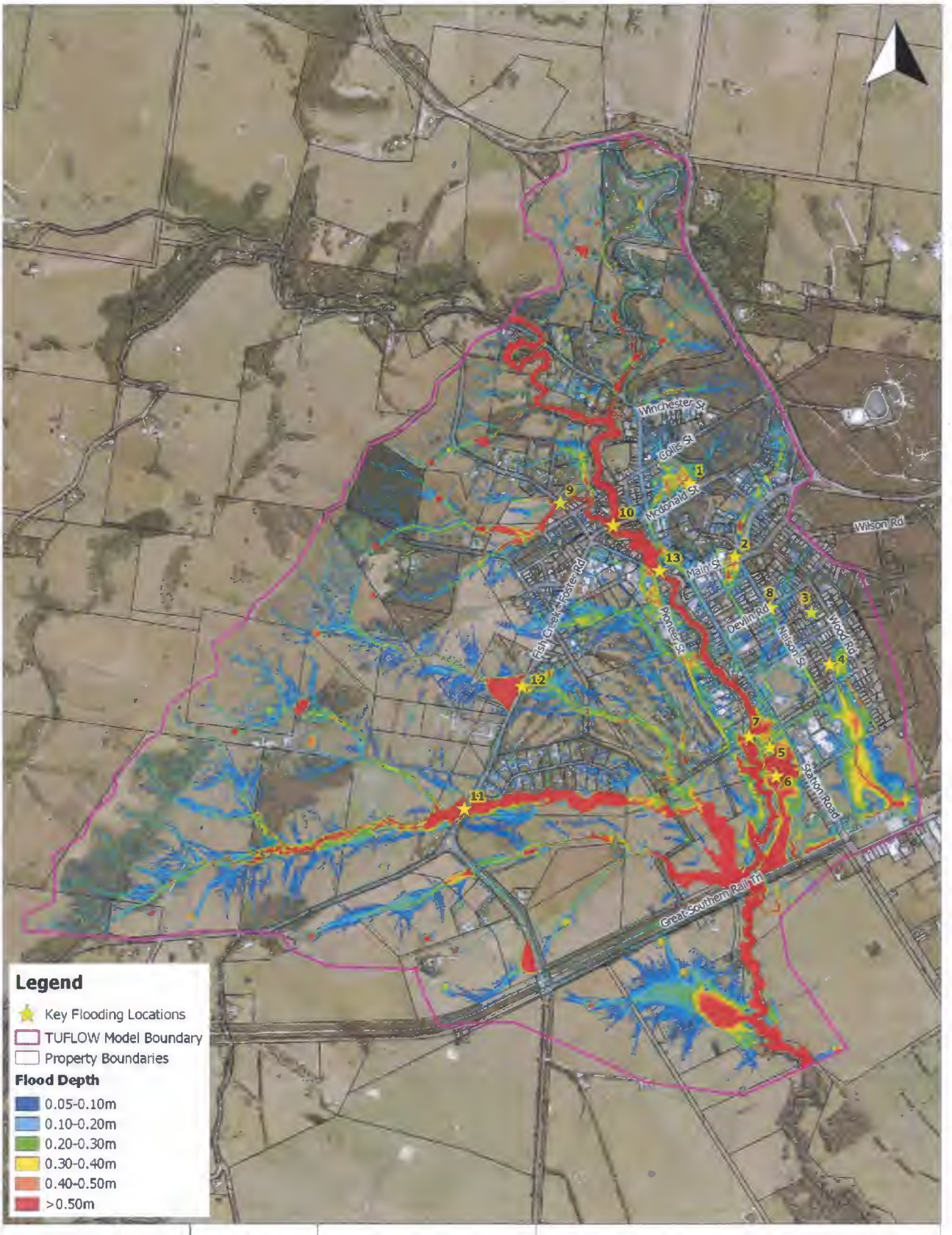
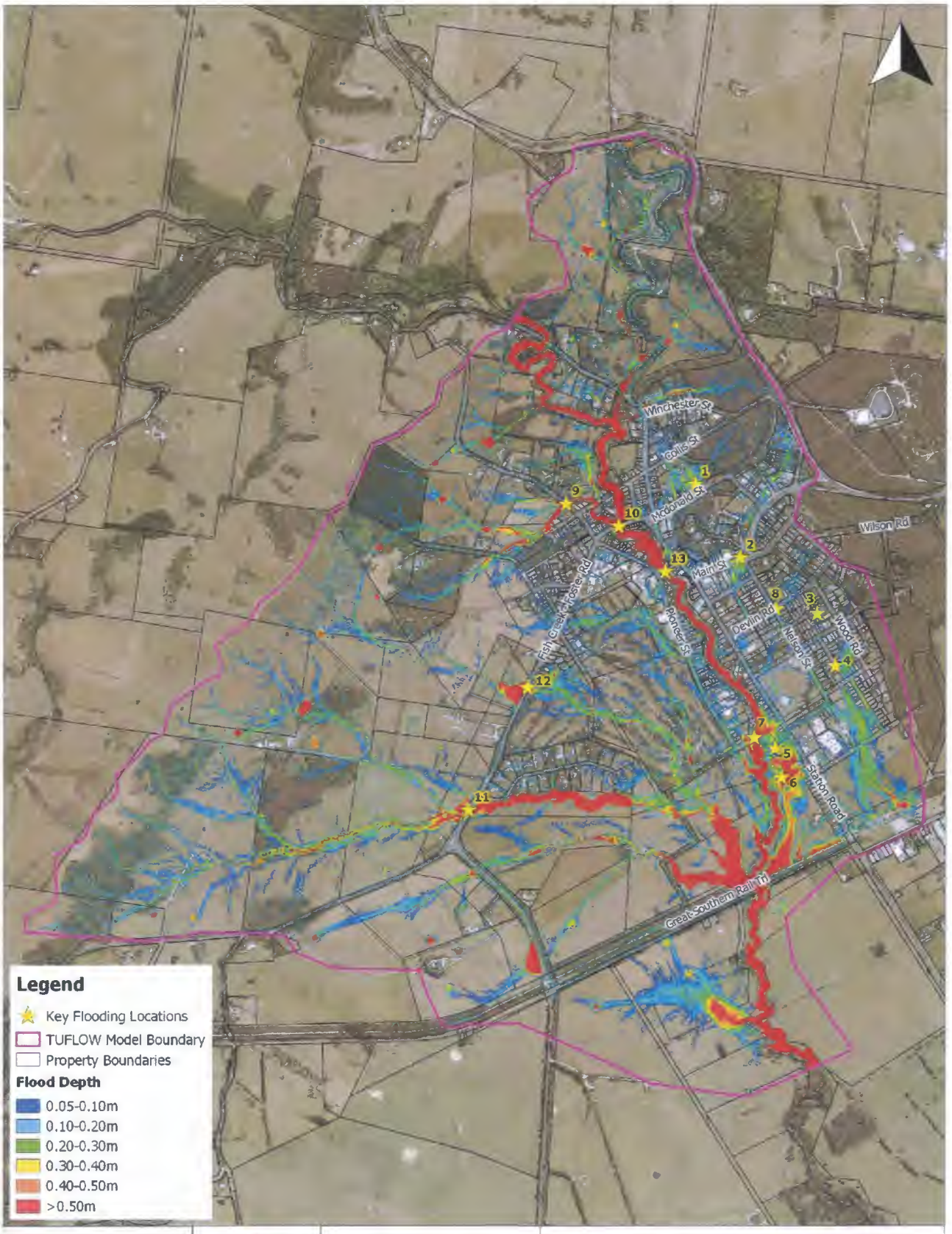
6
7
8
9
10
11
12
13
Legend
Key Flooding Locations
TUFLOW Model Boundary
Property Boundaries
Flood Depth
0.05-0.10m
0.10-0.20m
0.20-0.30m
0.30-0.40m
0.40-0.50m
>0.50m
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Foster - 1% AEP Maximum Flood Depth (2100 CC Scenario)
Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018


Winchester St
Collis St
McDonald St
Wilson Rd
Main St
Devlin Rd
Nelson St
Pioneer St
Fish Creek-Foster Rd
Station Road
Great Southern Rail Tr
1
2
3
4
5
6
7
8
9
10
11
12
13
Legend
Key Flooding Locations
TUFLOW Model Boundary
Property Boundaries
Flood Depth
0.05-0.10m
0.10-0.20m
0.20-0.30m
0.30-0.40m
0.40-0.50m
>0.50m
280 0 280 m
Scale in metres (1:14,000 @ A3)
Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55
ENGENY
South Gippsland Shire Council
Foster Flood Study
Foster - 1% AEP Maximum Flood Depth (2030 Bushfire Scenario)
Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018



ENGENY

South Gippsland Shire Council

280 0 280 m

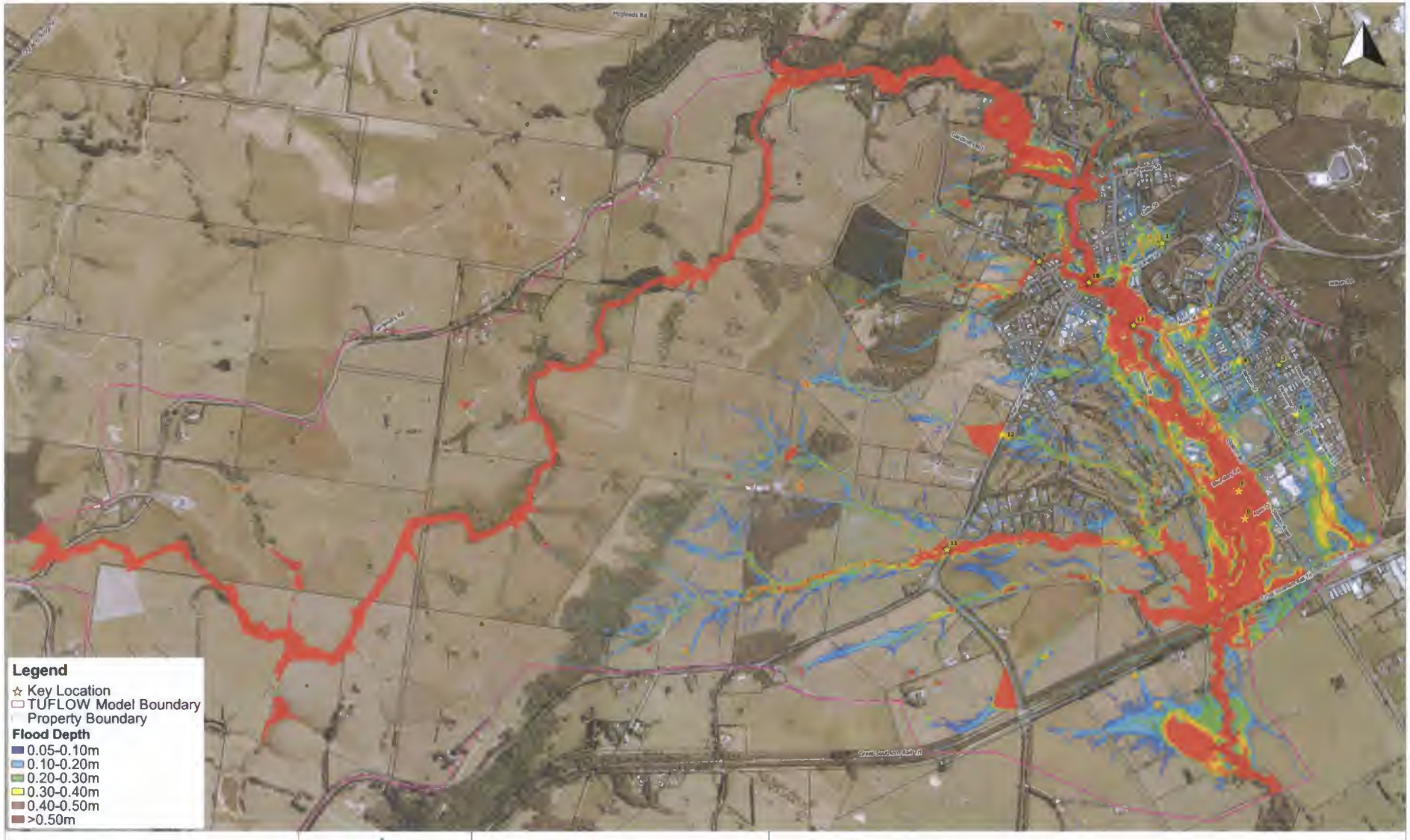
Scale in metres (1:14,000 @ A3)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Foster - 1% AEP Maximum Flood Depth (High Manning's Scenario)

Job Number: V2025_001
Revision: 3
Drawn: DH
Checked: NA
Date: 25/7/2018



Level 34, Tenancy 5, 360 Elizabeth St, Melbourne VIC 3000
PO Box 12192, A'Beckett St VIC 8006
www.engeny.com.au
P 03 9888 6978
F 03 9830 2601
E melb@engeny.com.au

ENGENY WATER MANAGEMENT

South Gippsland Shire Council

100 0 100 200 m

Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Wet Day Flood Failure Max Flood Depth

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 27/9/2018

Level 34, Tenancy 5, 360 Elizabeth St Melbourne VIC 3000

PO Box 12192, A'Beckett St VIC 8006

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P: 03 9888 6978
F: 03 9830 2601

E: melb@engeny.com.au

ENGENY
WATER MANAGEMENT

South Gippsland
Shire Council

100 0 100 200 m

Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Wet Day Flood No Failure Max Flood Depth

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 27/9/2018

Level 34, Tenancy 5, 360 Elizabeth St Melbourne VIC 3000

PO Box 12192, A'Beckett St VIC 8006

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E. melb@engeny.com.au

ENGENY WATER

South Gippsland Shire Council

100 0 100 200 m

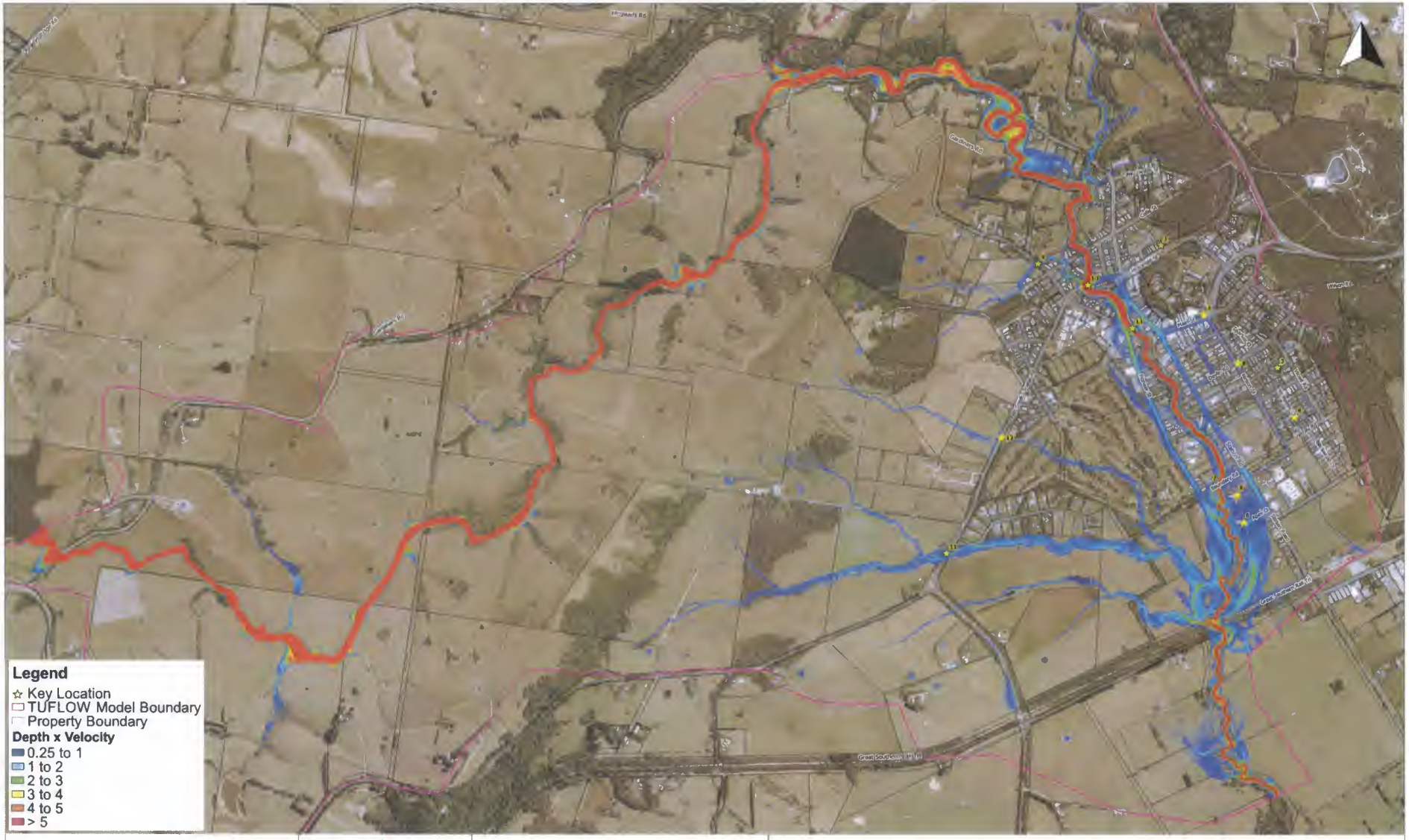
Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Sunny Day Flood Failure Max Flood Depth

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 31/8/2018



Level 34 Tenancy 5, 360 Elizabeth St Melbourne VIC 3000

PO Box 12192, A'Beckett St VIC 8006

www.engeny.com.au

P 03 9888 6978
F 03 9830 2601

E. melb@engeny.com.au

ENGENY
WATER MANAGEMENT

South Gippsland
Shire Council

100 0 100 200 m

Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Wet Day Flood Failure Max Flood Depth x Velocity

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 27/9/2018

Level 34 Tenancy 5, 360 Elizabeth St Melbourne VIC 3000

PO Box 12192, A'Beckett St VIC 8006

www.engeny.com.au

P 03 9888 6978
F 03 9830 2601

E melb@engeny.com.au

ENGENY
WATER MANAGEMENT

South Gippsland
Shire Council

100 0 100 200 m

Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Wet Day Flood No Failure Max Flood Depth x Velocity

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 27/9/2018

Level 34 Tenancy 5 360 Elizabeth St Melbourne VIC 3000
PO Box 12192, A'Beckett St VIC 8006
www.engeny.com.au
P 03 9888 6978
F 03 9830 2601
E melb@engeny.com.au

ENGENY
WATER MANAGEMENT

South Gippsland Shire Council

100 0 100 200 m

Scale in metres (1:7,500 @ A1)

Map Projection: Tranverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Vertical Datum: Australia Height Datum
Grid: Map Grid of Australia, Zone 55

Foster Flood Study

Couper Dam Consequence Assessment
Sunny Day Flood Failure Max Flood Depth x Velocity

Job Number: V2025_001
Revision: 0
Drawn: DH
Checked: NEA
Date: 31/8/2018