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Duck Creek Flood Study

Final Report

Volume 2 - Maps

Prepared for Wollongong City Council

31 May 2019

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Document Control

Rev	Effective Date	Description of Revision	Prepared by:	Reviewed by:
0	27 May 2019	Stage 5 Report for Council Adoption	Luke Evans Emma Maratea	Rhys Thomson
1	31 May 2019	Final Flood Study for Council Adoption	Luke Evans Emma Maratea	Rhys Thomson

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Client Reference:

The report has been prepared and reviewed by suitably qualified persons. The scope of the report is based on the client brief and/or the Rhelm written fee proposal and assumes information provided by the client and sourced from other third parties is fit for purpose unless otherwise stated. The findings rely on a range of assumptions that are noted in the report.

Wollongong Council

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These are provided as an attachment to this report.

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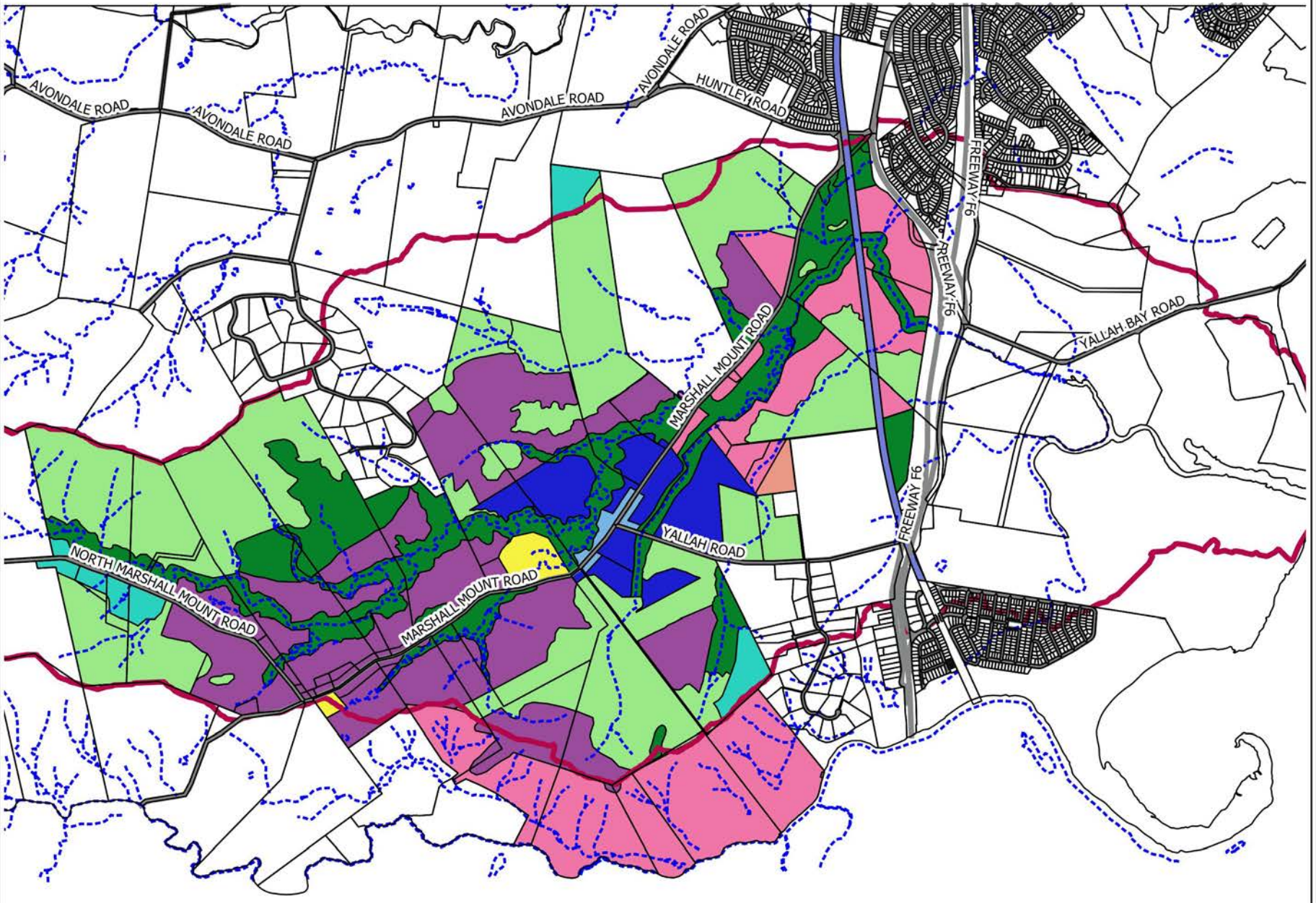
G701-D-4	1% AEP Flood Depth & WL - Design Scenario
G701-D-5	2% AEP Flood Depth & WL - Design Scenario
G701-D-6	10% AEP Flood Depth & WL - Design Scenario
G701-D-7	20% AEP Flood Depth & WL - Design Scenario
G701-R-1	PMF Flood Depth & WL - Risk Scenario
G701-R-2	0.2% AEP Flood Depth & WL - Risk Scenario
G701-R-3	0.5% AEP Flood Depth & WL - Risk Scenario
G701-R-4	1% AEP Flood Depth & WL - Risk Scenario
G701-R-5	2% AEP Flood Depth & WL - Risk Scenario
G701-R-6	10% AEP Flood Depth & WL - Risk Scenario
G701-R-7	20% AEP Flood Depth & WL - Risk Scenario
G702-D-1	PMF Velocity - Design Scenario
G702-D-2	0.2% AEP Velocity - Design Scenario
G702-D-3	0.5% AEP Velocity - Design Scenario
G702-D-4	1% AEP Velocity - Design Scenario
G702-D-5	2% AEP Velocity - Design Scenario
G702-D-6	10% AEP Velocity - Design Scenario
G702-D-7	20% AEP Velocity - Design Scenario

G704-R-1	PMF Sensitivity - Roughness up 20% - Risk
G704-R-2	1% AEP Sensitivity - Roughness up 20% - Risk
G704-R-3	PMF Sensitivity - Roughness down 20% - Risk
G704-R-4	1% AEP Sensitivity - Roughness down 20% - Risk
G704-R-5	PMF Sensitivity - Flow up 20% - Risk
G704-R-6	1% AEP Sensitivity - Flow up 20% - Risk
G704-R-7	PMF Sensitivity - Flow down 20% - Risk
G704-R-8	1% AEP Sensitivity - Flow down 20% - Risk
G704-R-11	1% AEP Blockage - Risk Scenario less Unblocked
G704-R-12	1% AEP Blockage - Risk Scenario less Design Scenario
G704-R-13	1% AEP Blockage - Risk Scenario less Old Blockage Policy
G705-D-1	PMF CC - 2050 - Design
G705-D-2	1% AEP CC - 2050 - Design
G705-D-3	PMF CC - 2100 - Design
G705-D-4	1% AEP CC - 2100 - Design
G705-R-1	PMF CC - 2050 - Risk
G705-R-2	1% AEP CC - 2050 - Risk
G705-R-3	PMF CC - 2100 - Risk
G705-R-4	1% AEP CC - 2100 - Risk
G706-D-1	PMF Flood Depth & WL - Design Scenario - Future
G706-D-4	1% AEP Flood Depth & WL - Design Scenario - Future
G706-D-7	20% AEP Flood Depth & WL - Design Scenario - Future
G706-R-1	PMF Flood Depth & WL – Risk Scenario - Future
G706-R-4	1% AEP Flood Depth & WL - Risk Scenario - Future
G706-R-7	20% AEP Flood Depth & WL - Risk Scenario - Future
G707-D-1	PMF Water Level Difference - Design Scenario – Future
G707-D-4	1% AEP Water Level Difference - Design Scenario - Future
G707-D-7	20% AEP Water Level Difference - Design Scenario - Future
G707-R-1	PMF Water Level Difference – Risk Scenario - Future
G707-R-4	1% AEP Water Level Difference - Risk Scenario - Future
G707-R-7	20% AEP Water Level Difference - Risk Scenario - Future

G708-U-1	Low Tailwater Velocity Impacts
G801-D-1	PMF Flood Hazard - Design
G801-D-2	1% AEP Flood Hazard - Design
G801-R-1	PMF Flood Hazard - Risk
G801-R-2	1% AEP Flood Hazard - Risk
G802-D-1	PMF Flood Function - Design
G802-D-2	1% AEP Flood Function - Design
G802-R-1	PMF Flood Function - Risk
G802-R-2	1% AEP Flood Function - Risk
G901-R-1	Flood Planning Area - Risk Scenario
G902-D-1	Emergency Response Classification - Risk
G902-R-1	Emergency Response Classification - Risk
G903-R-1	Road/ Rail Overtopping - PMF
G903-R-2	Road/ Rail Overtopping - 1% AEP



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Map G201
West Dapto Release
Draft Structure Plan

Legend

Draft Structure Plan

- B4
- E2
- E3
- E4
- IN2
- R2
- R3
- RE1
- RU2
- SP2
- Watercourse
- Roads
- Cadastre

200 0 200 400 600 m

Scale : 1:30000@A4
Date : 6 September 2017
Revision : A
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm

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Map G301
Collected Survey

Legend

Catchment - Duck Creek

Surveyed Cross Sections

0.5 0 0.5 1 1.5 km

Scale : 1:55,000@A4
Date : 30 November 2018
Revision : B
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm

PT No	EASTING	NORTHING	RL	Ground Lev	Location	Confidence
A	297033.61	6177171.46	4.21		25m downstream of Princes Highway Bridge. Right Bank Duck Creek	High - Aligns with other debris
B	296988.11	6177161.06	5.14		15m upstream of water pipe crossing. Right Bank	Low-Difficult to determine location of flattened grass.
C	296950.85	6177191.17	5.81		~35m down stream of motorway bridge	Medium
D	296951.24	6177205.79	5.57		30m down stream of motorway bridge near creek bank.	Medium
E	295965.21	6177260.03	10.5	10.16	Mount Marshall Road, Yallah. Upstream of northern bridge on left bank	Medium
F	295981.69	6177248.96	9.91	9.27	Mount Marshall Road, Yallah downstream of northern bridge on left bank	Medium
H	295935.86	6177180.38	10.48	9.86	Mount Marshall Road, Yallah. Downstream of southern bridge on right bank	Medium/low
G	295921.62	6177187.9	10.6	9.21	Mount Marshall Road, Yallah Upstream of southern bridge on right bank	Medium/low
I	295743.7	6177250.64	11.55	10.43	TAFE entrance Road- Downstream of Duck Ck bridge on right bank	High - No debris on upslope wire
J	295710.05	6177250.88	10.58		TAFE entrance Road - upstream of Duck Ck bridge on left bank	Low-Difficult to determine location of flattened lantana.
K	295723.04	6177298.2	12.96	11.8	Downstream of TAFE dam.	medium
L	295495.34	6177068.77	12.04	11.41	Centre of ephemeral tributary. ~70m upstream of junction with Duck Ck	Medium/low

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Map G302
March 2017
Surveyed Flood Marks

Legend

- Surveyed Debris Marks
- Cadastre
- Watercourse
- Catchment - Duck Creek

100 0 100 200 300 m

Scale : 1:10000@A4
Date : 1 February 2018
Revision : A
Created by : RST
Coordinate System : Map Grid of Australia 94

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ID	Level
10	10.7
11	10.9
12	10.3
13	11
14	11.5
15	11.1
16	17.8
17	17.7
18	20.4
19	20.5
20	21.9
21	12.5
22	24
23	25
24	25.2
25	36.5
26	38
5	4.5
6	5.5
7	5.7
8	8.4
9	8.4

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Map G303
March 2011
Flood Marks

Legend

- Flood Marks
- Cadastre
- Watercourse
- Catchment - Duck Creek

200 0 200 400 600 m

Scale : 1:20000@A4
Date : 10 February 2018
Revision : B
Created by : RST
Coordinate System : Map Grid of Australia 94

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Map G304
1978 & 1984
Flood Marks

Legend

- 1984 Flood Marks
- 1978 Flood Marks
- Catchment - Duck Creek
- Watercourse
- Cadastre

Floor Mark Levels in m AHD

300 0 300 600 900 m

Scale : 1:30000@A4
Date : 10 February 2018
Revision : A
Created by : RST
Coordinate System : Map Grid of Australia 94

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Map G305
Rainfall Gauge Data

Legend

- MHL Pluvio Gauges
- SWC Rain Gauges

BOM Rain Gauges

- Daily
- Pluvio
- Catchment - Duck Creek

1 0 1 2 3 4 km

Scale : 1:200000@A4
Date : 7 January 2019
Revision : D
Created by : RST
Coordinate System : Map Grid of Australia 94

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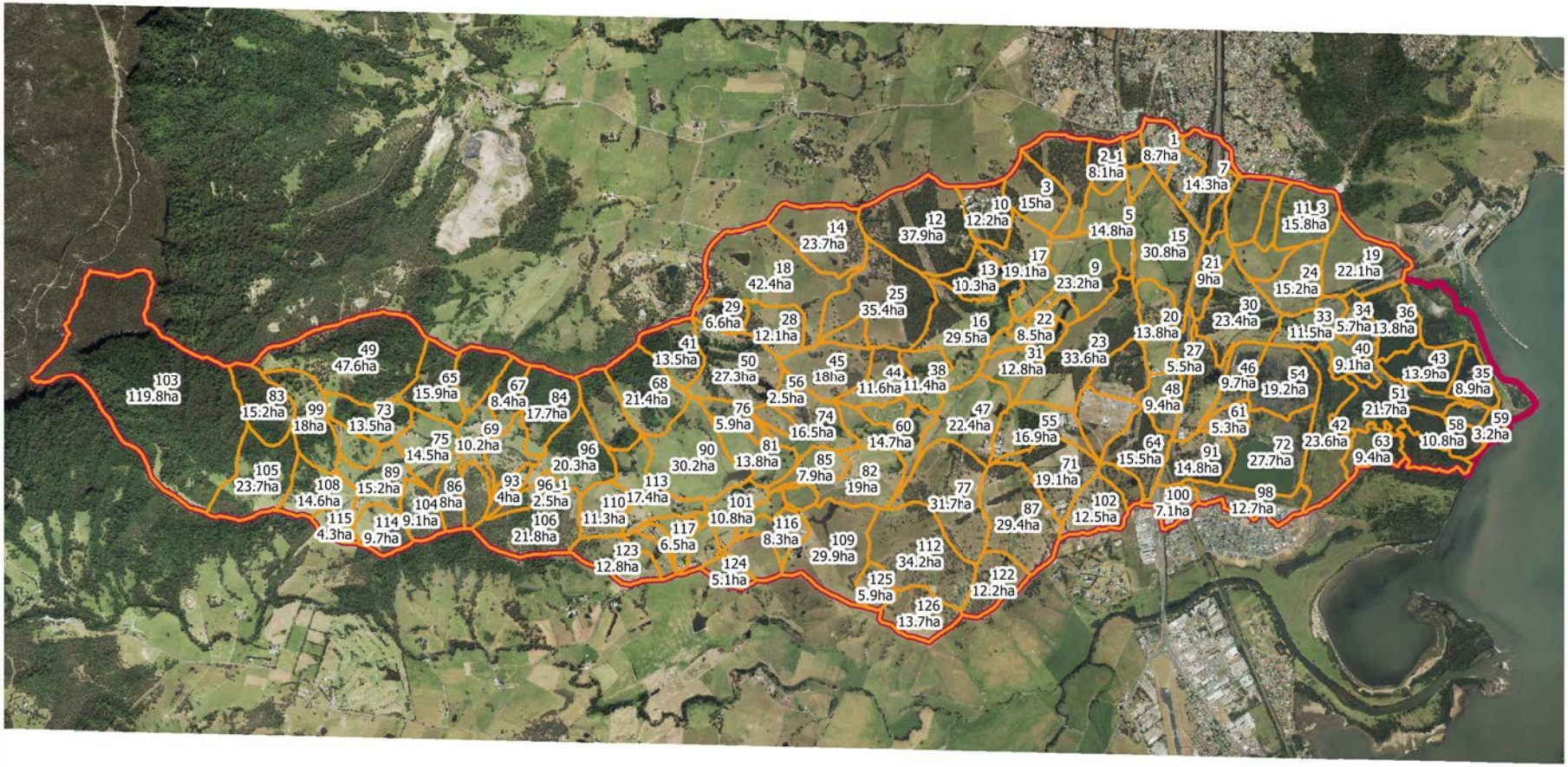


Map G501
Sub-Catchments

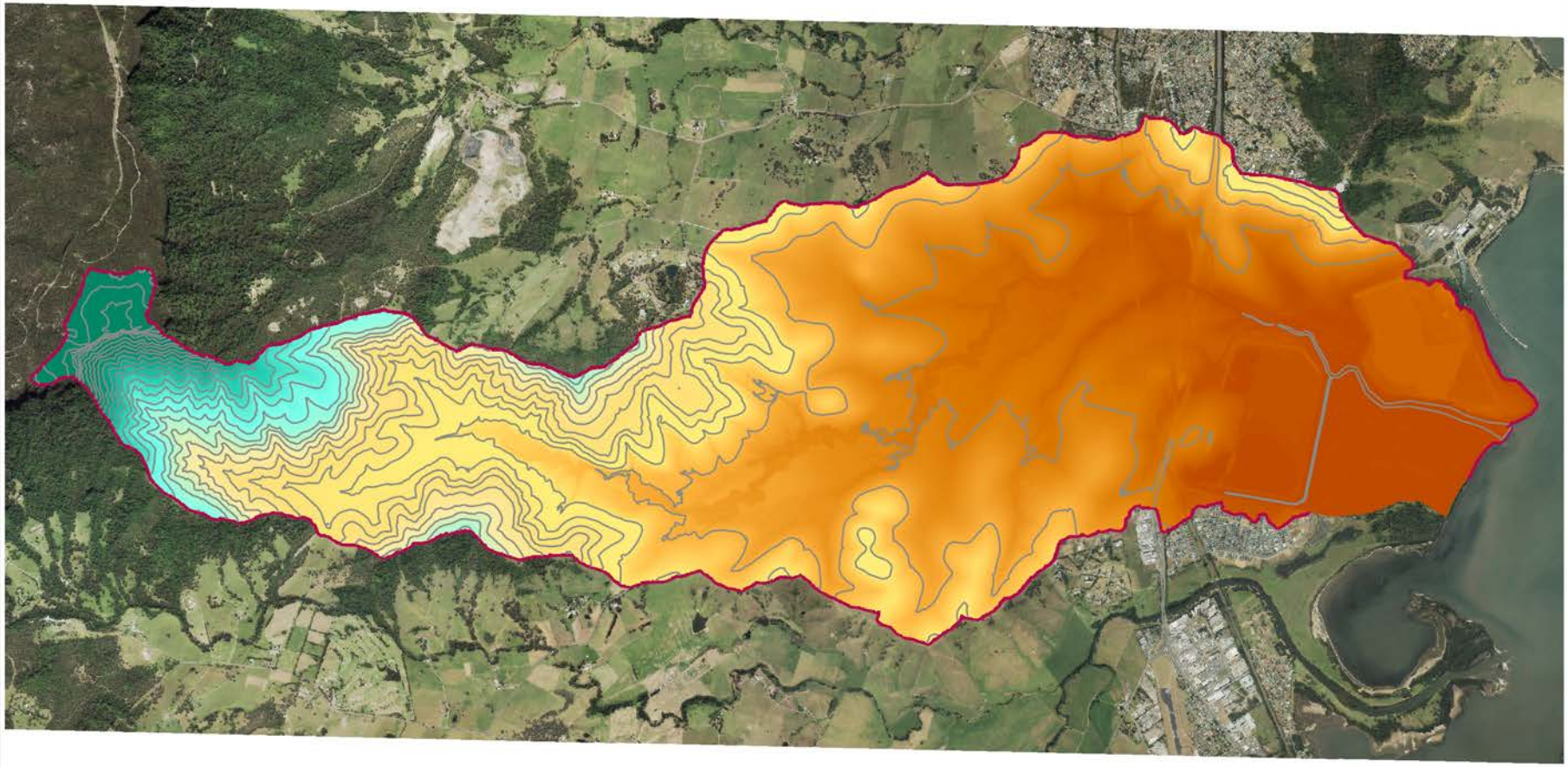
Legend

- Catchment - Duck Creek
- Sub-Catchments (ID, area)

500 0 500 1000 1500 km

Scale : 1:55,000@A4
Date : 7 January 2019
Revision : B
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm



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Map G502
DEM

Legend

Catchment - Duck Creek

Elevation (mAHD)

- 1
- 50
- 100
- 200
- 400

Contours (20m)

500 0 500 1000 1500 km

Scale : 1:55,000@A4
Date : 13 February 2018
Revision : A
Created by : LRE
Coordinate System : Map Grid of Australia 94

Rhelm

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Map G503
Culverts & Bridges

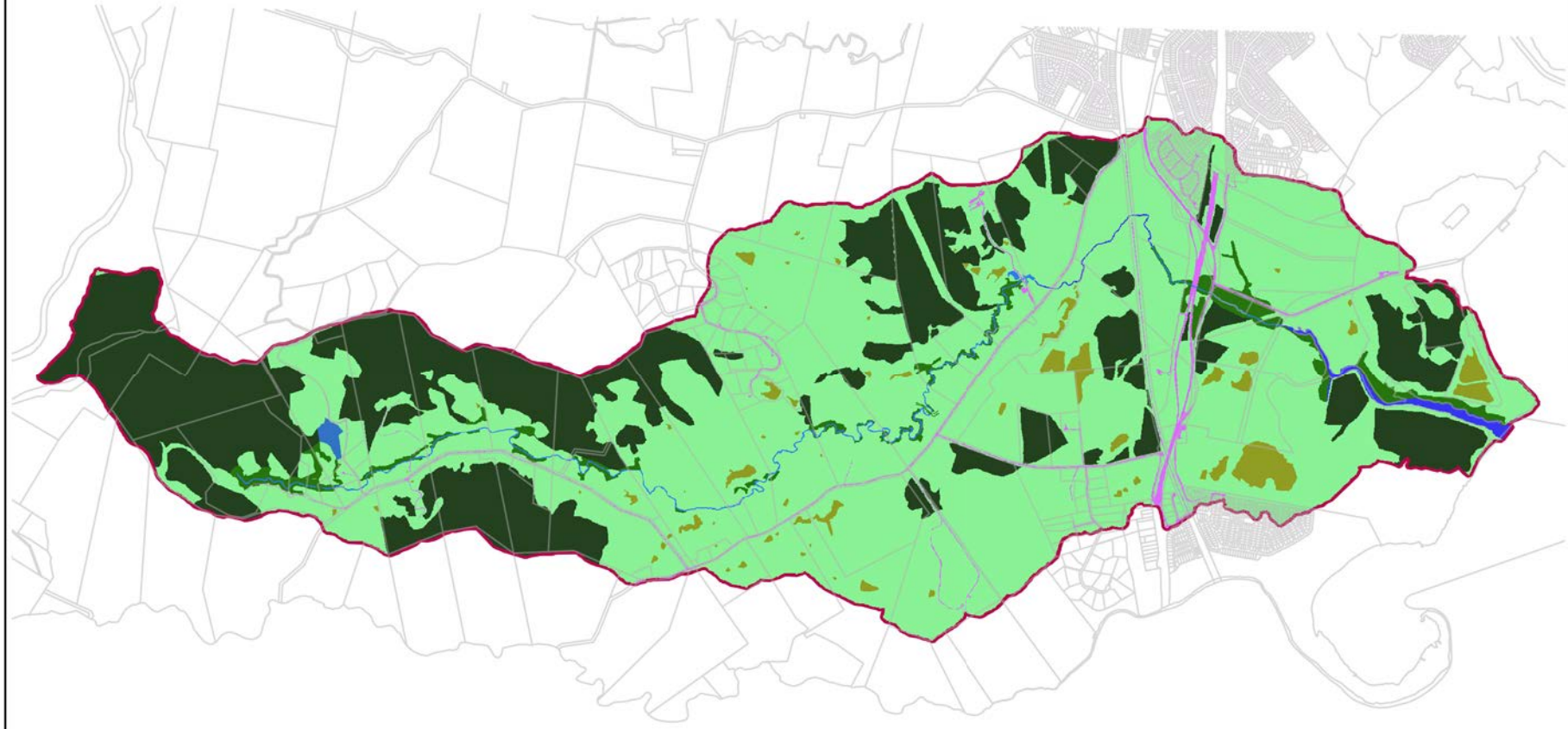
Legend

- Catchment - Duck Creek
- Culverts
- Bridges

250 0 250 500 750 km

Scale : 1:55,000@A4
Date : 13 February 2018
Revision : A
Created by : LRE
Coordinate System : Map Grid of Australia 94

Rhelm



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Map G504
Roughness Zones

Legend

- Catchment - Duck Creek
- Cadastre

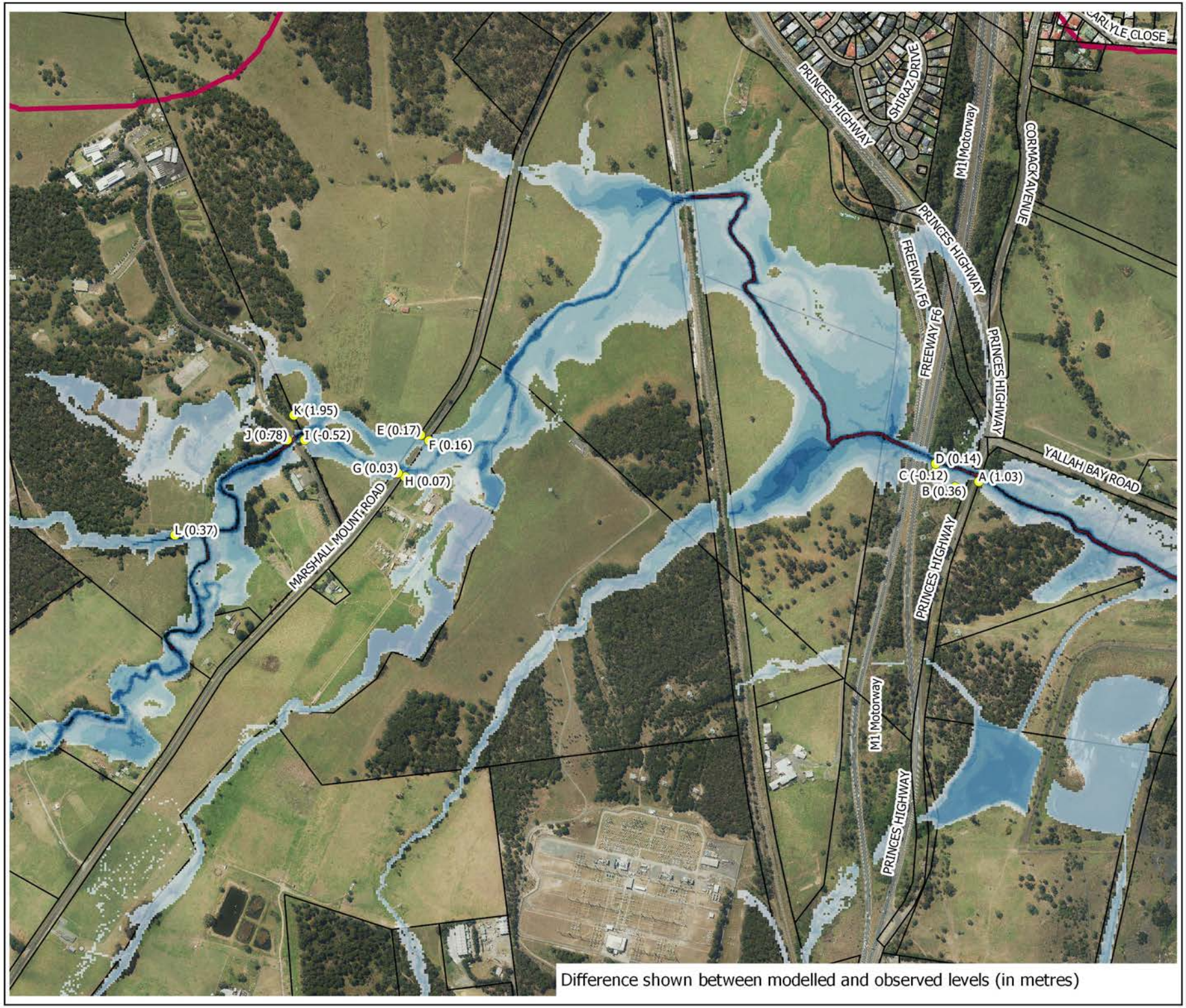
Roughness Zones

- Pasture / Grass
- Roads / Pavement
- Heavy Vegetation
- Ponds / Dams
- Duck Creek DS
- Riparian Vegatation
- Medium Vegetation

600 0 600 1200 1800 km

Scale : 1:55,000@A4
Date : 7 January 2018
Revision : B
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm



Difference shown between modelled and observed levels (in metres)

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Map G601
March 2017
Calibration

Legend

- Cadastre
- Catchment - Duck Creek
- Flood Marks

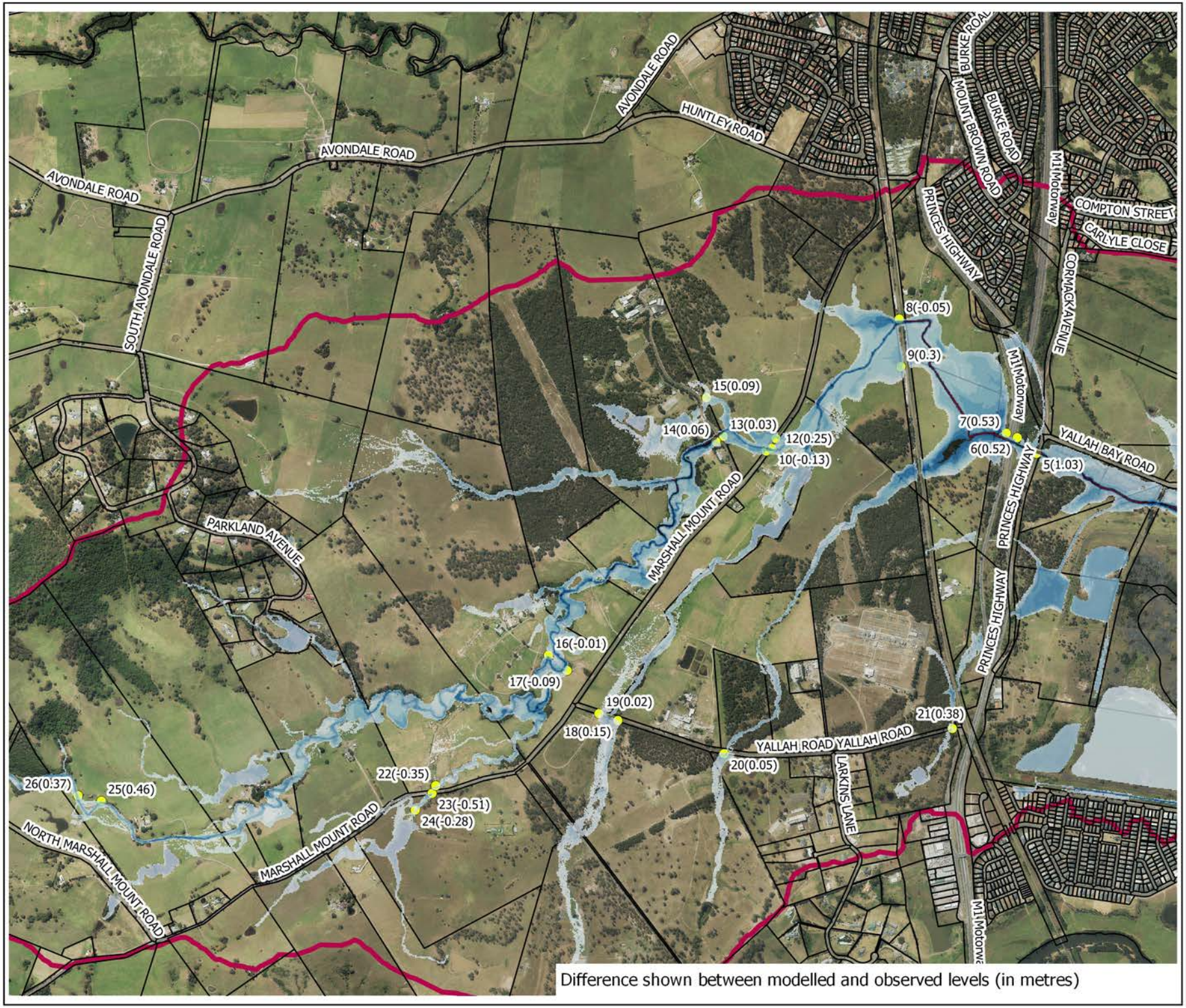
DC18_2017_010_d_Max

- <= 0.01
- 0.01 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- > 3.5

100 0 100 200 300 m

Scale : 1:10000@A4
Date : 10 February 2018
Revision : A
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm



Difference shown between modelled and observed levels (in metres)

N

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Map G602
March 2011
Calibration

Legend

- Cadastre
- Catchment - Duck Creek
- Flood Marks

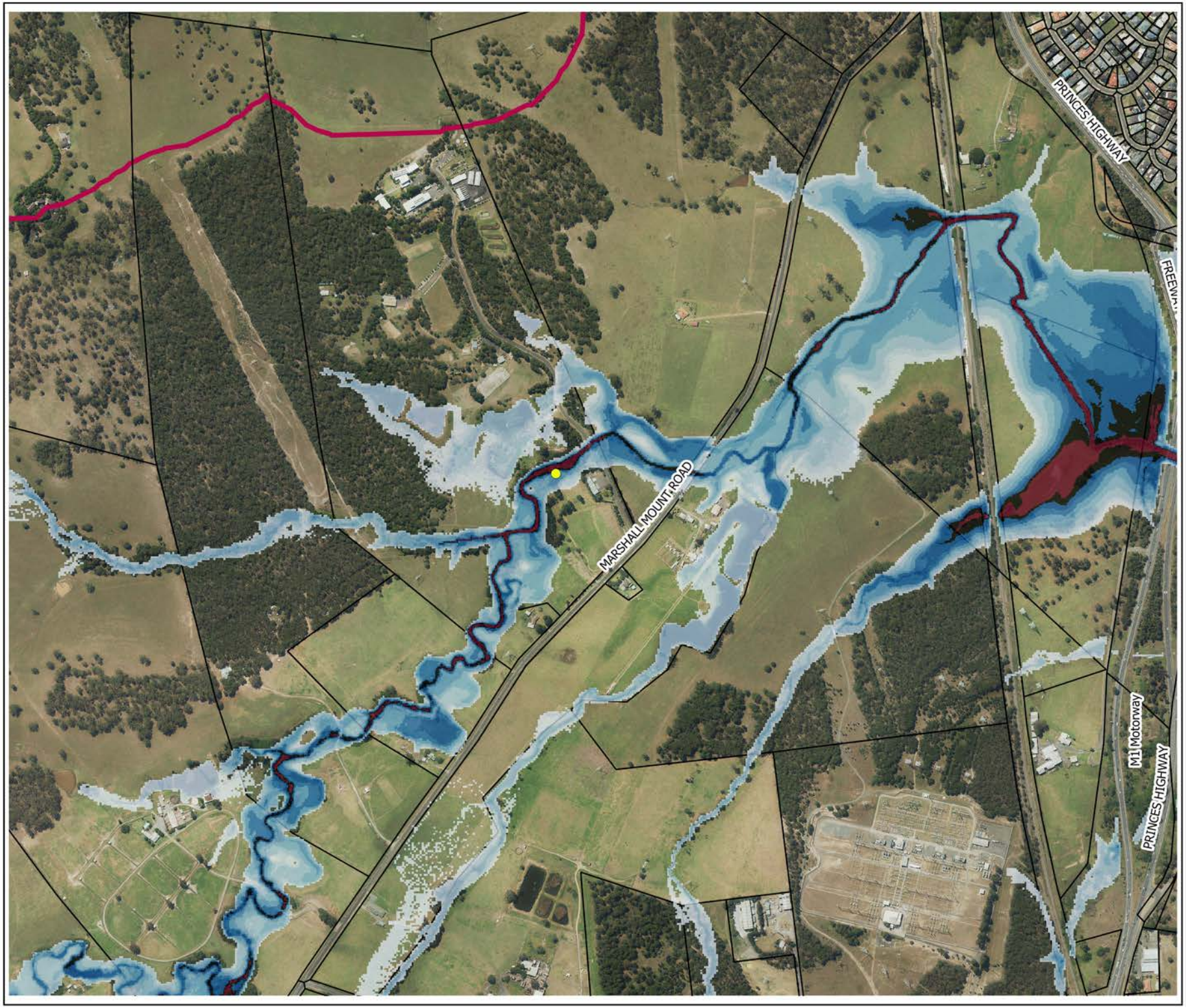
Flood Depth (m)

- <= 0.01
- 0.01 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- > 3.5

150 0 150 300 450 m

Scale : 1:20000@A4
Date : 29 November 2018
Revision : C
Created by : RST
Coordinate System : Map Grid of Australia 94

Rhelm



N
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Map G603
February 1984
Calibration

Legend

- Cadastre
- Catchment - Duck Creek
- Observed Level

Peak Depth (m)

- <= 0.01
- 0.01 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- 3 - 3.5
- > 3.5

100 0 100 200 300 m

Scale : 1:10000@A4
Date : 15 February 2018
Revision : A
Created by : RST
Coordinate System : Map Grid of Australia 94

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