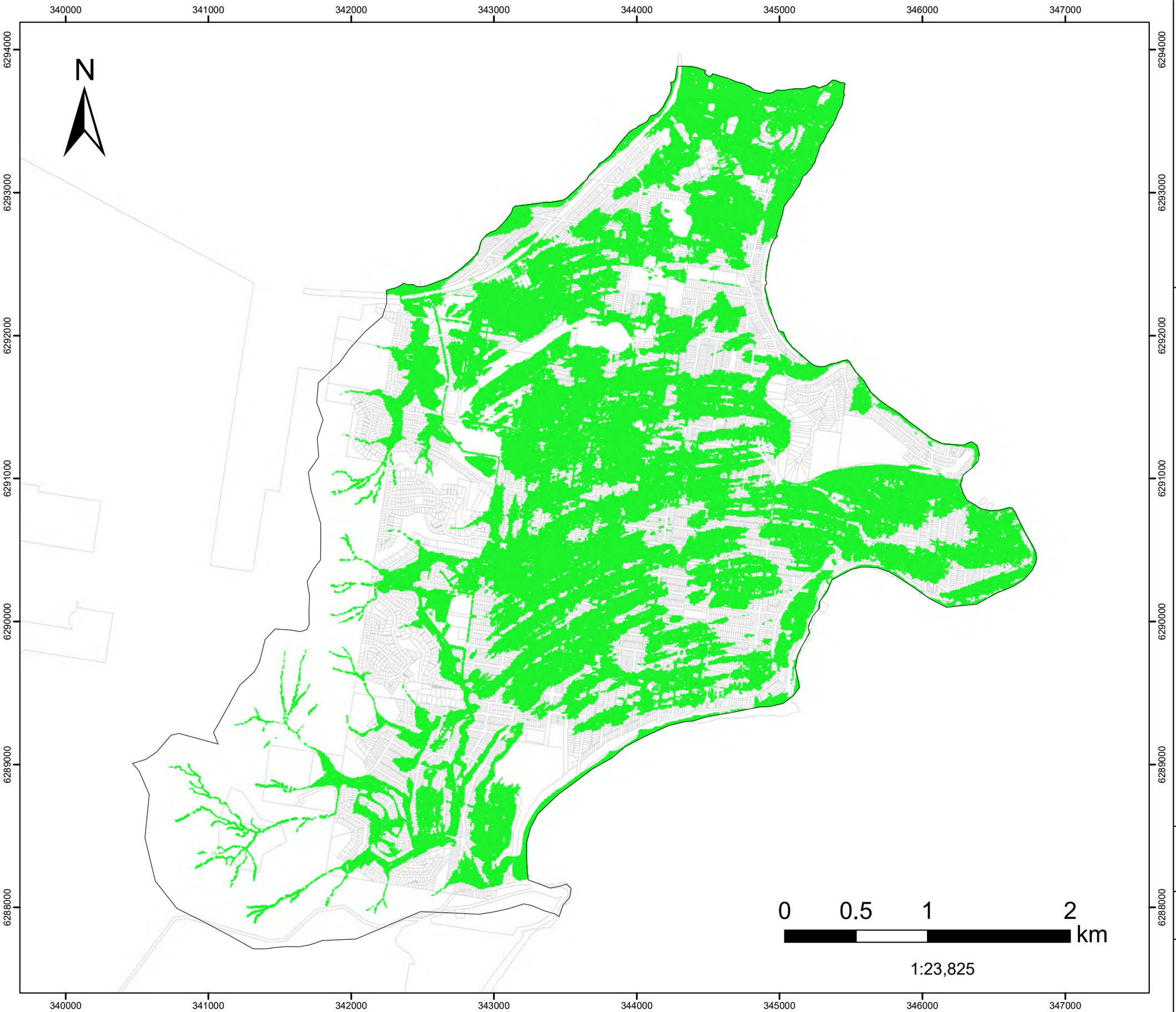

FIGURE J.1

1% AEP
+ 500mm freeboard

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

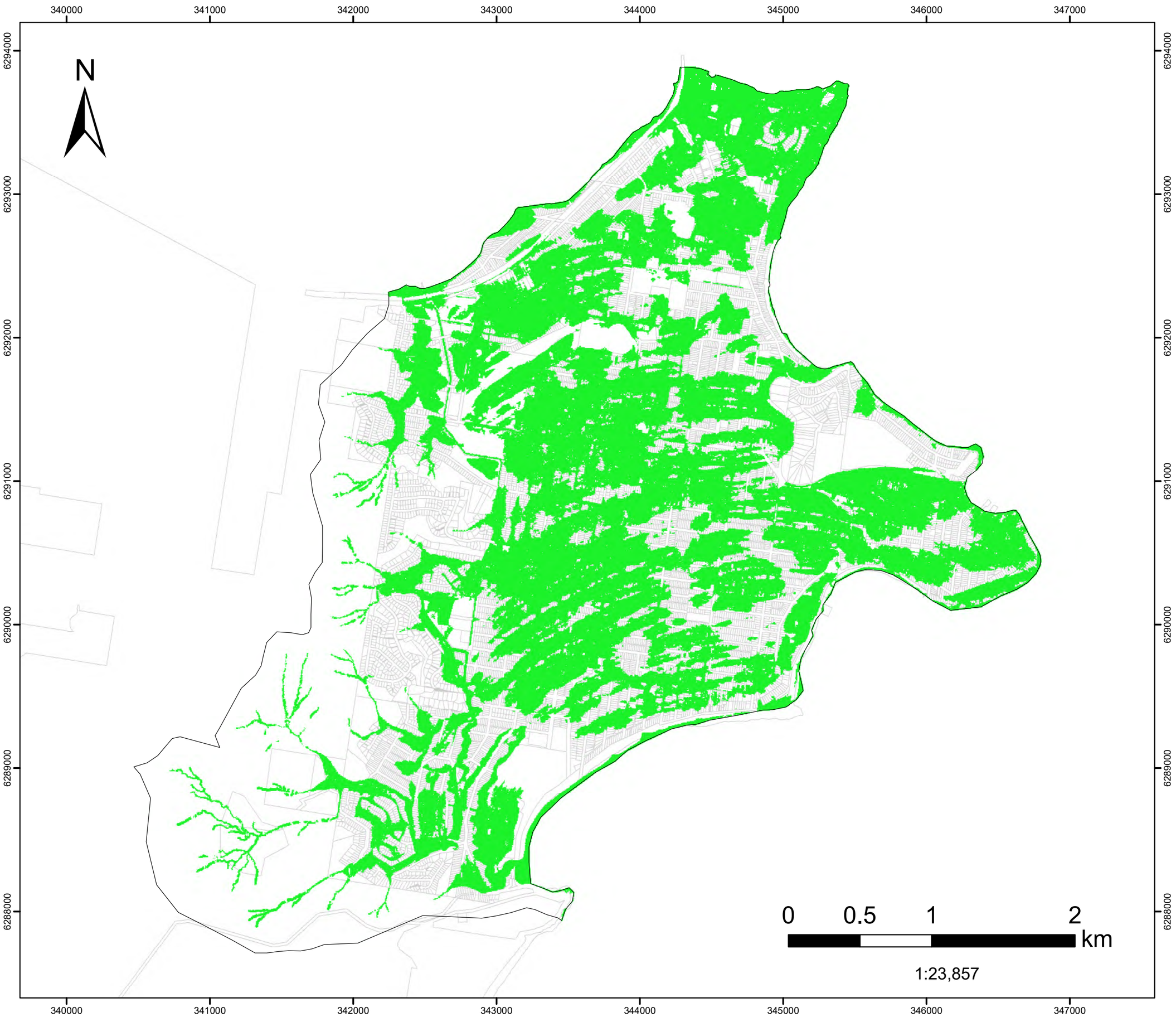

FIGURE J.2

1% AEP
+ 500mm freeboard
+ Sea Level Rise 0.2m

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

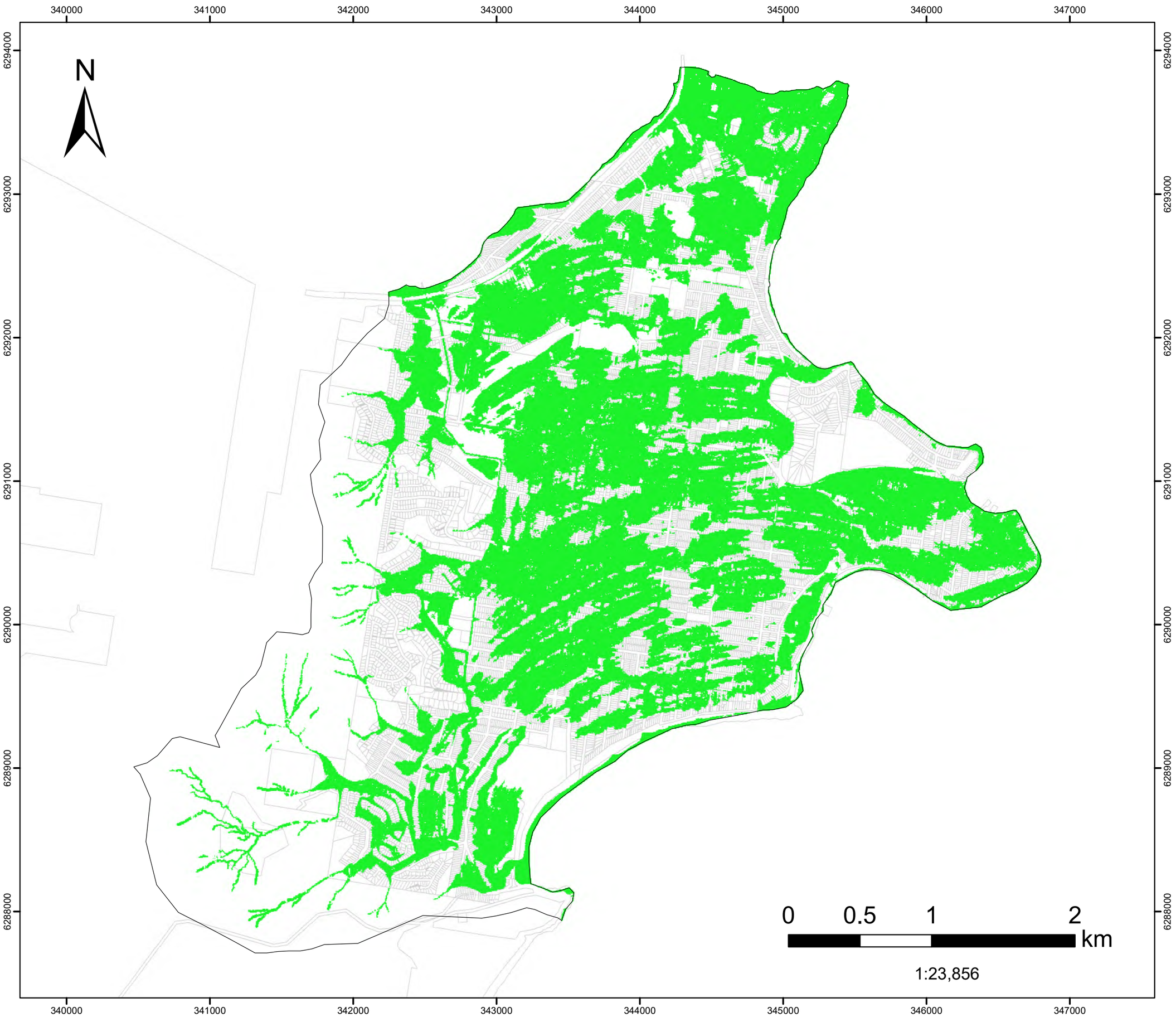

FIGURE J.3

1% AEP
+ 500mm freeboard
+ Sea Level Rise 0.39m

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

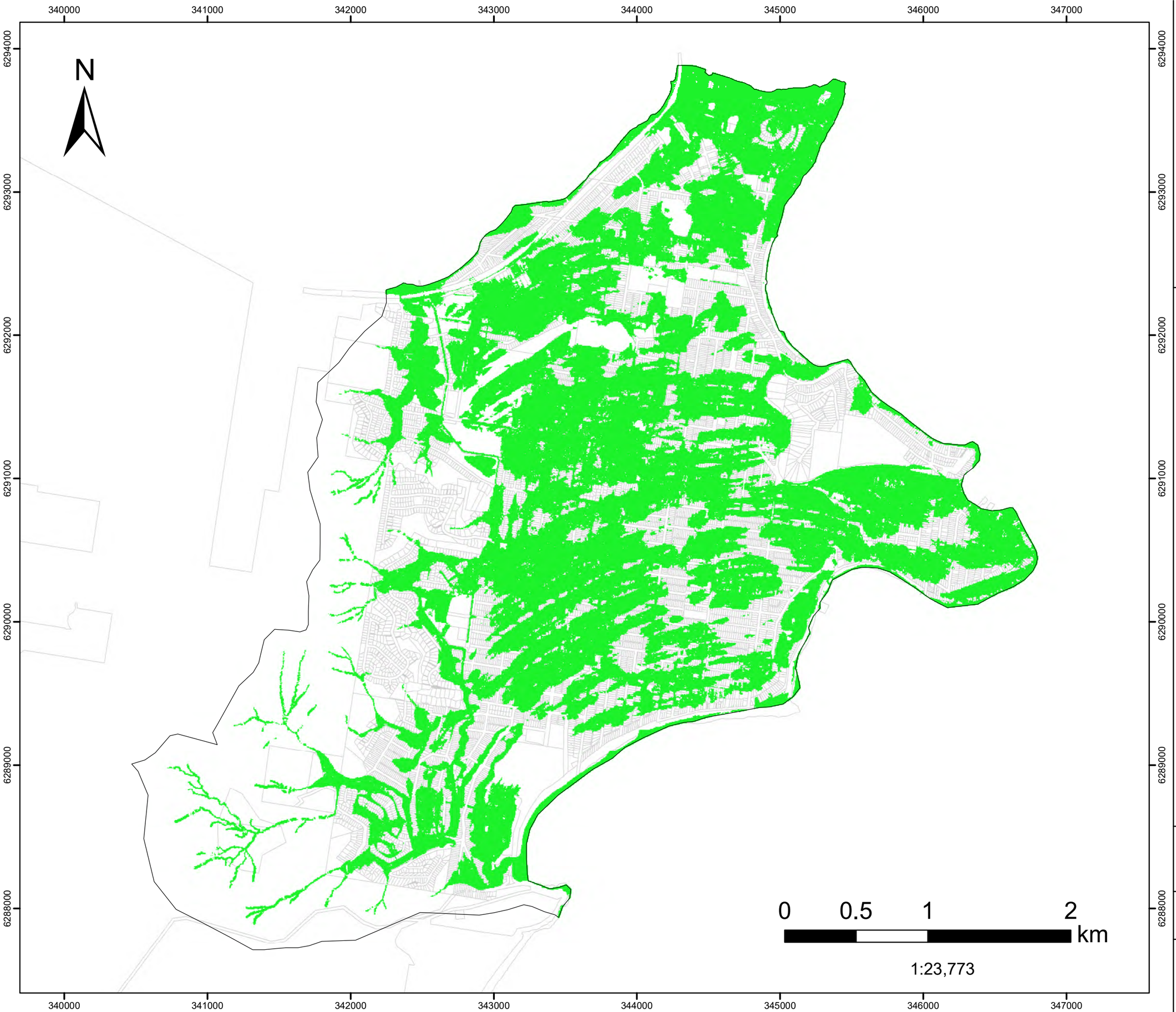

FIGURE J.4

1% AEP
+ 500mm freeboard
+ Sea Level Rise 0.74m

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

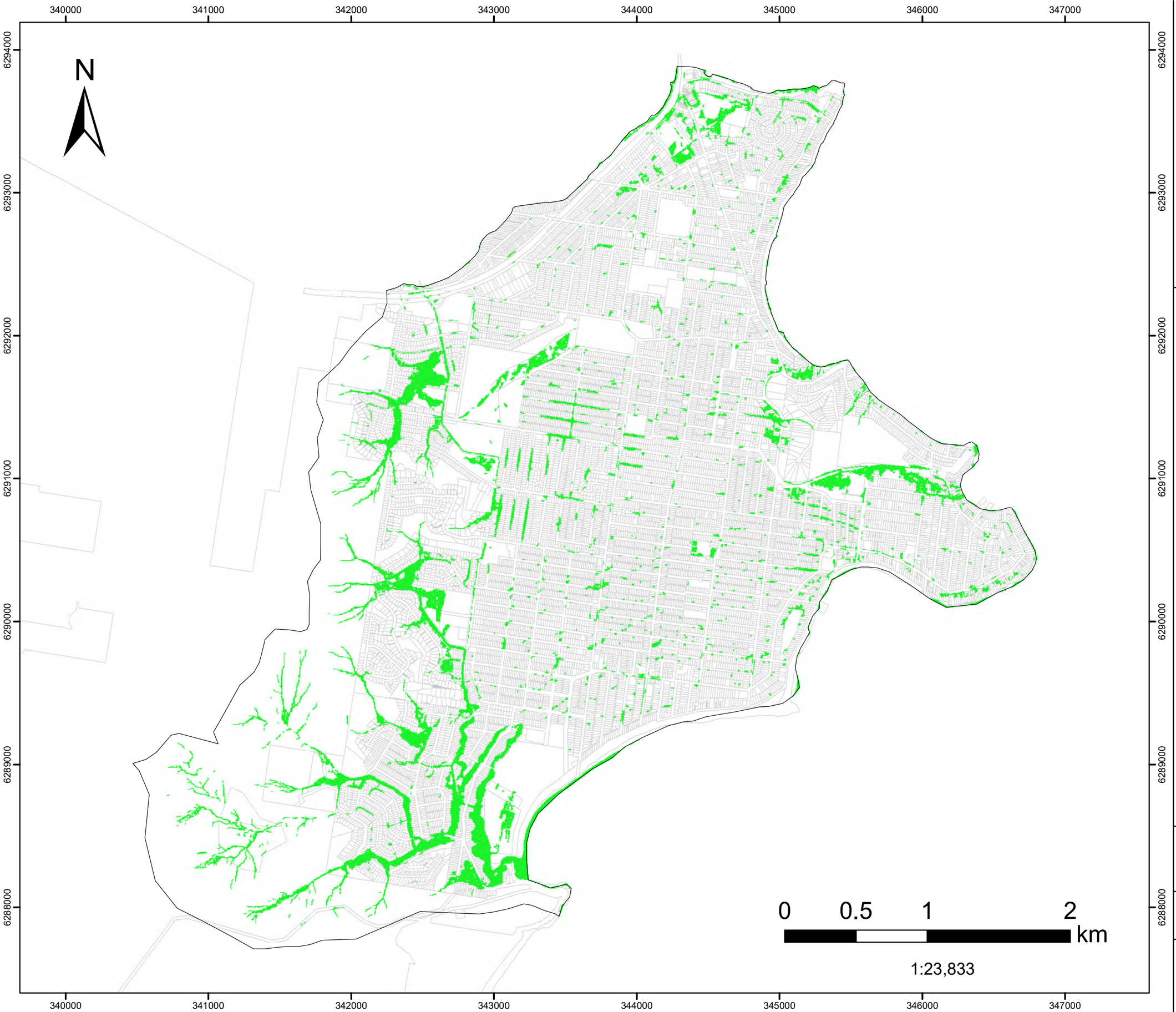

FIGURE J.5

1%AEP +30% Rainfall Intensity Increase

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

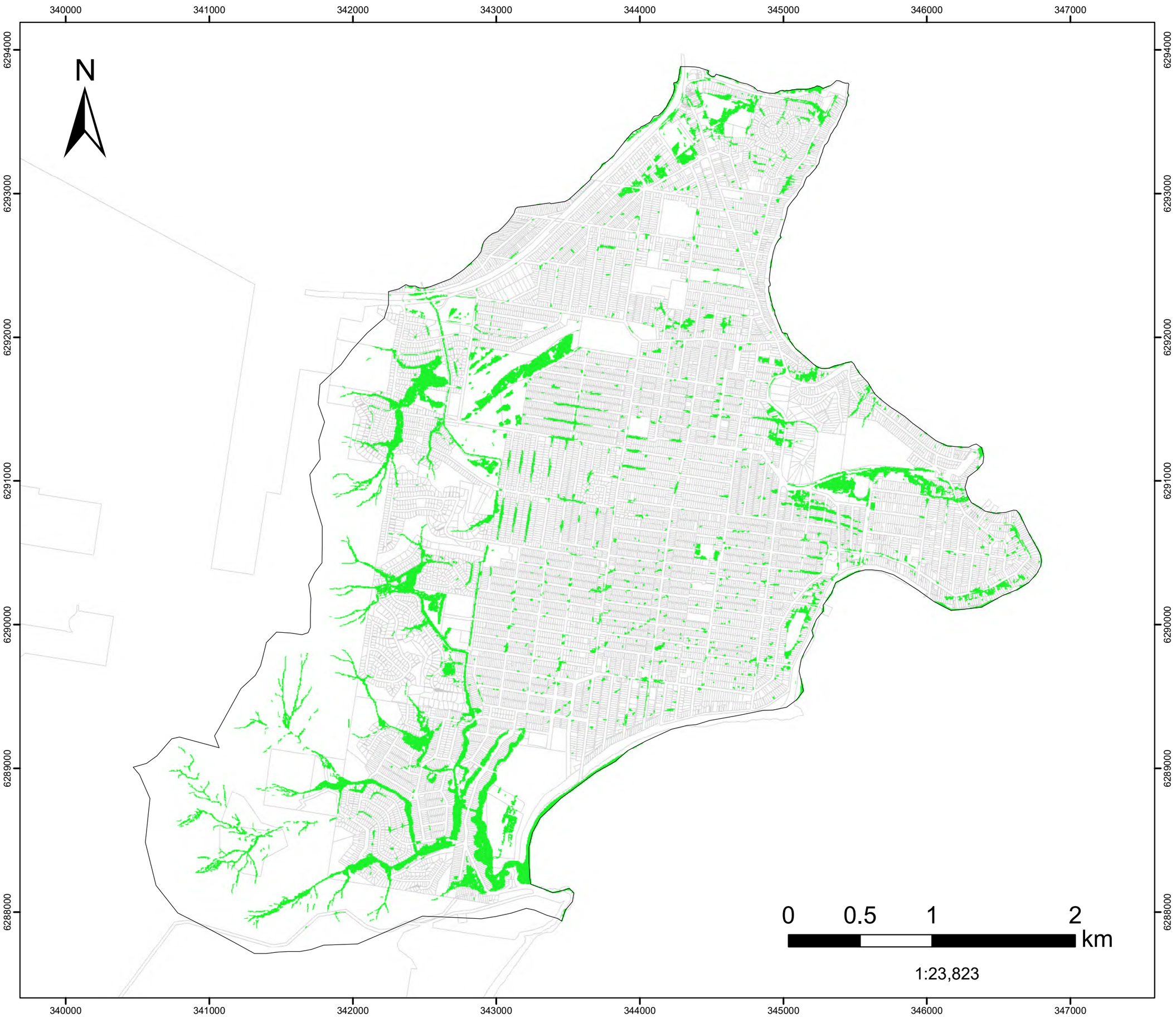

FIGURE J.6

0.5% AEP
Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

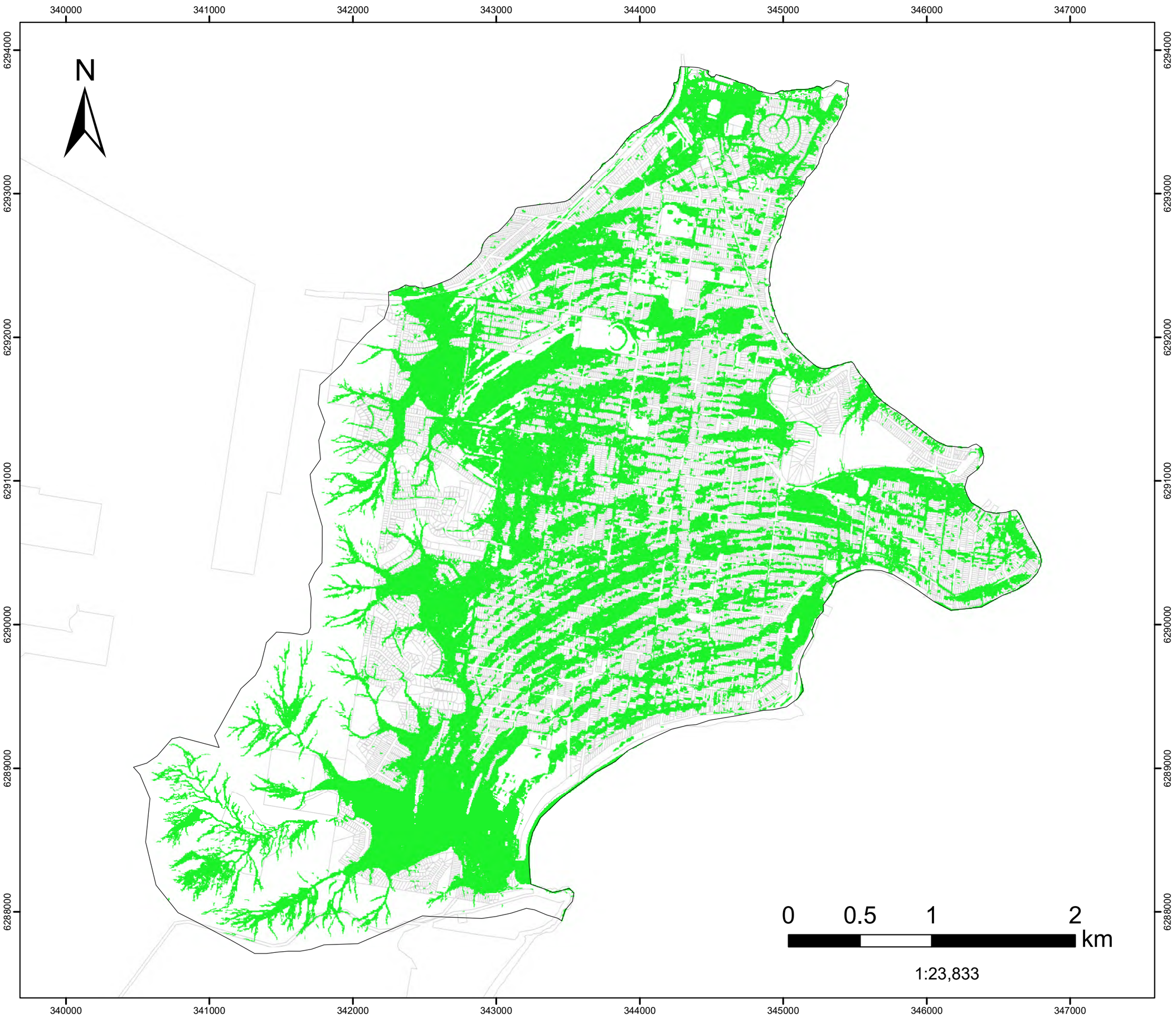

FIGURE J.7

PMF

Flood Planning Area

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Legend

Model Domain

Flood Planning Area

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Feb 2022
Project No	43803055

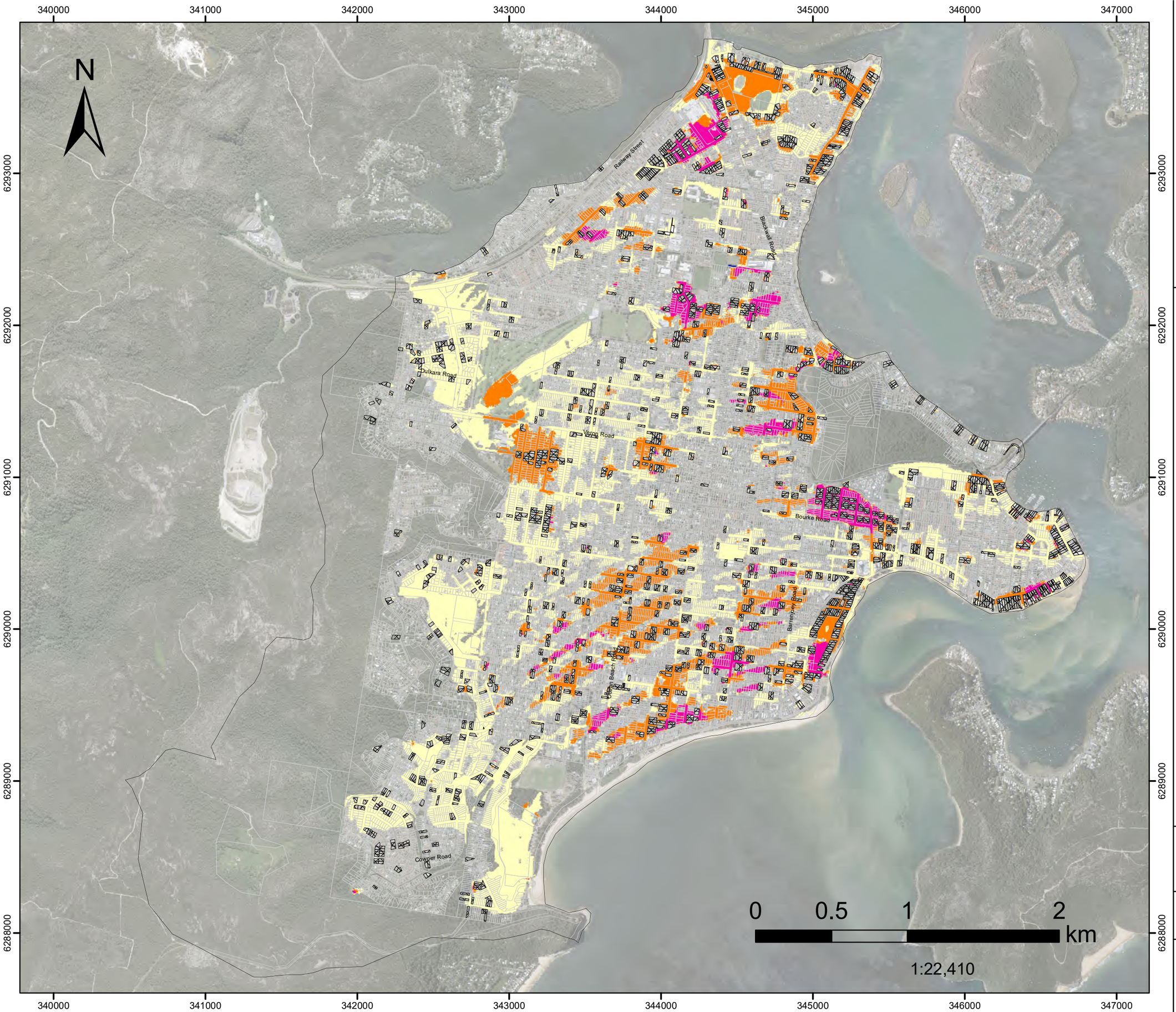

FIGURE K.1

PMF
Cumulative Impact Land Filling

Assessed for the critical duration 2hr

Model Domain

Raised lots

Flood Depth Difference (m)

- Below 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	07/07/2022
Project No	43803055

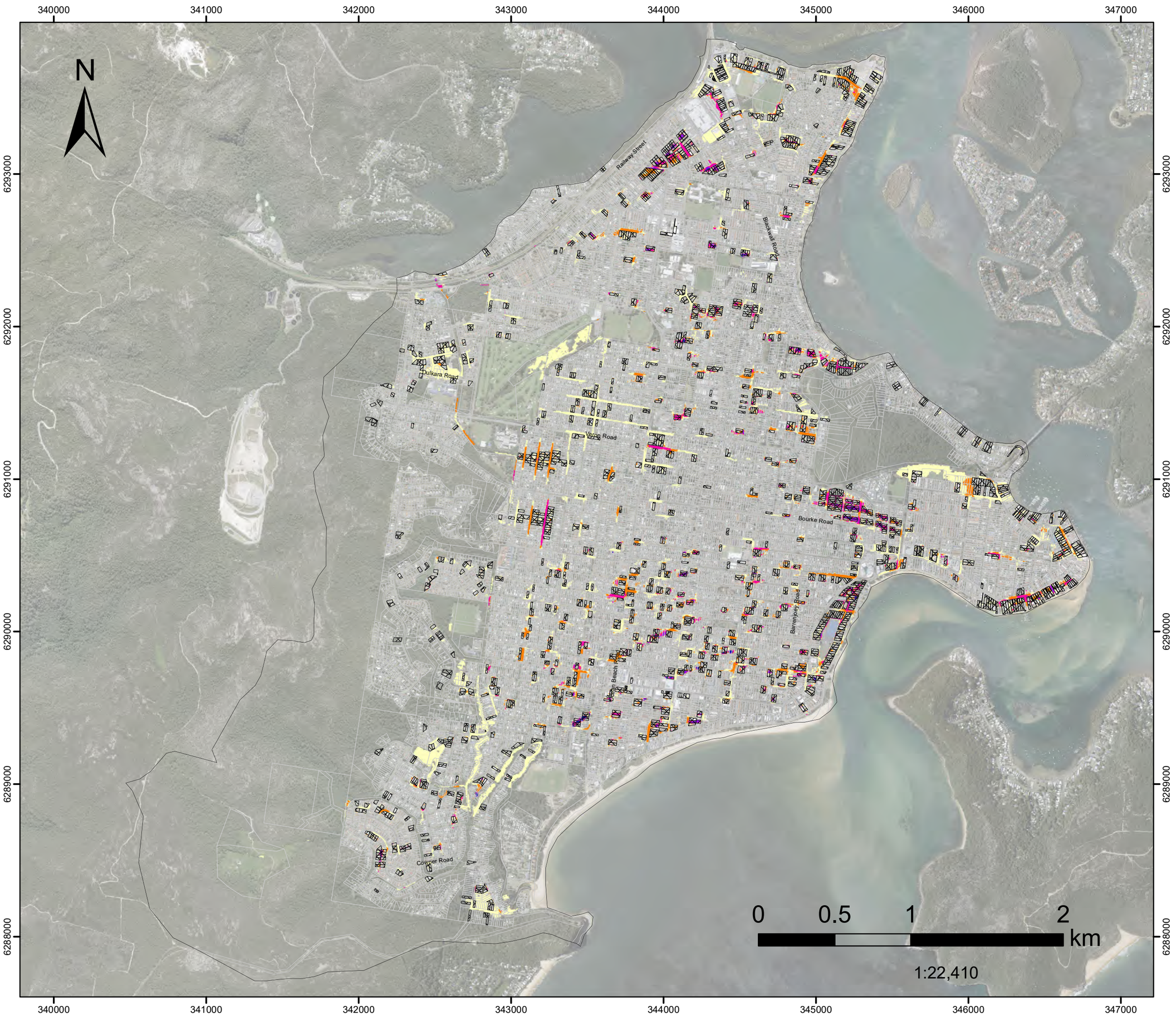

FIGURE K.2

1%AEP
Cumulative Impact Land Filling

Assessed for the critical duration 6hr

Model Domain

Raised lots

Flood Depth Difference (m)

- Below 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	07/07/2022
Project No	43803055

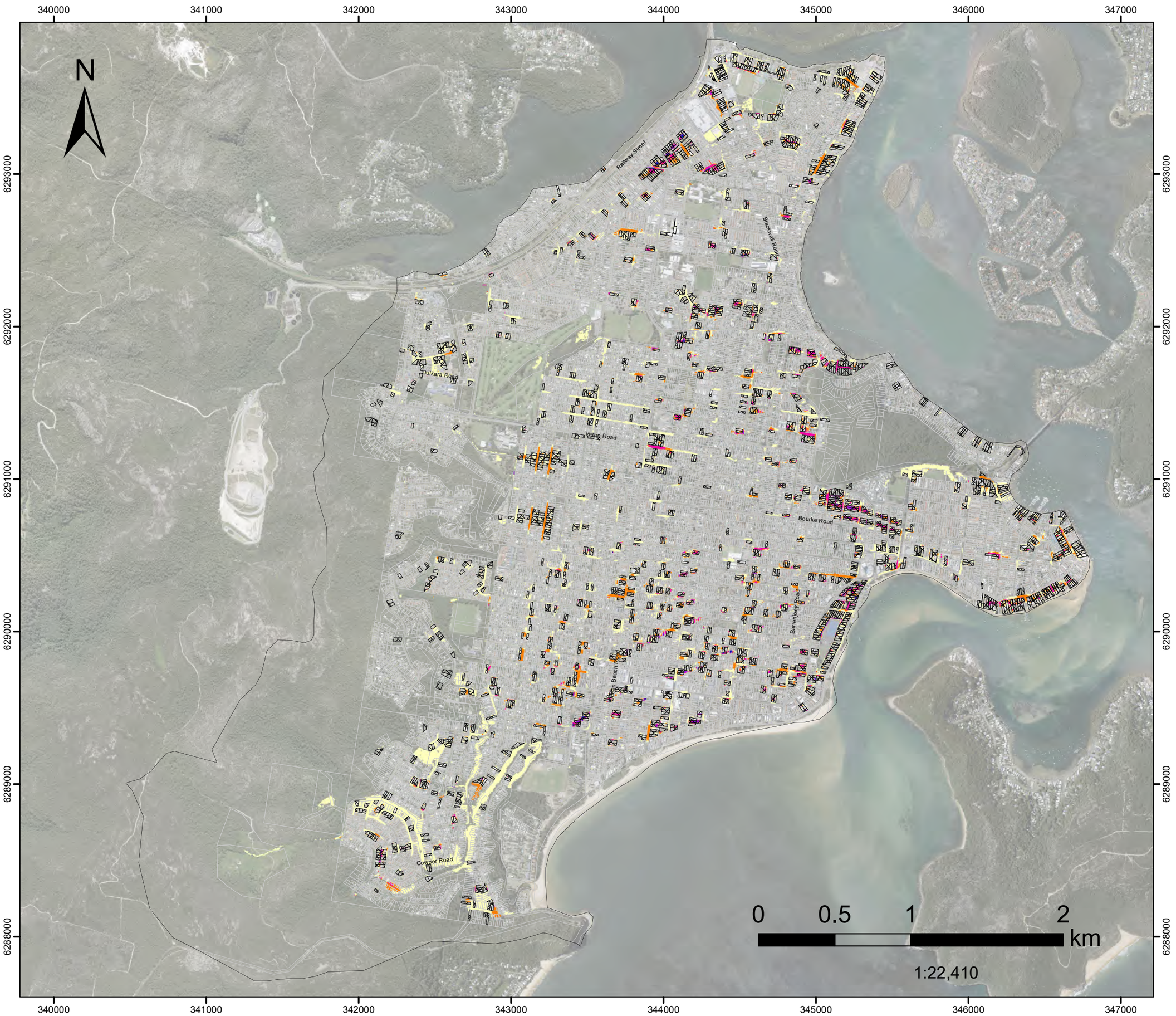

FIGURE K.3

5%AEP
Cumulative Impact Land Filling

Assessed for the critical duration 2hr

Model Domain

Raised lots

Flood Depth Difference (m)

- Below 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	07/07/2022
Project No	43803055

N
W E
S

Figure L.0

Preliminary Flood Modification Measures

Legend

- Cadastre
- Existing Drainage Network
- Preliminary Options, approximate extent

1% AEP Flood Depths (m)

- 0 - 0.1
- 0.1 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- 1.2 - 1.4
- > 1.4

Scale : 1:20,000@A3
Date : 19 March 2021
Revision : A
Created by : JRF
Coordinate System : MGA 56

Rhelm

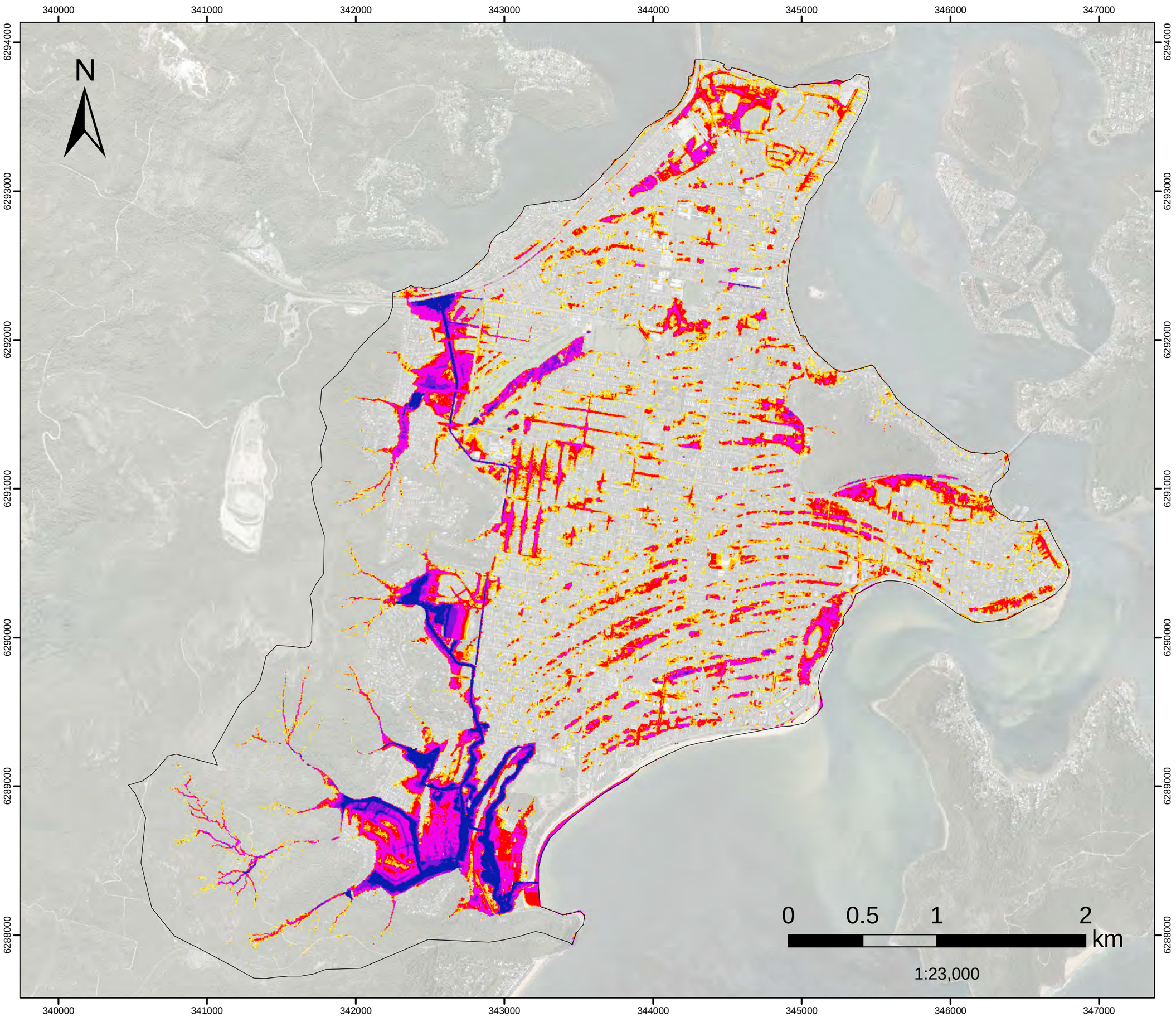

FIGURE L.1
PMF FM01
Woy Woy CBD
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

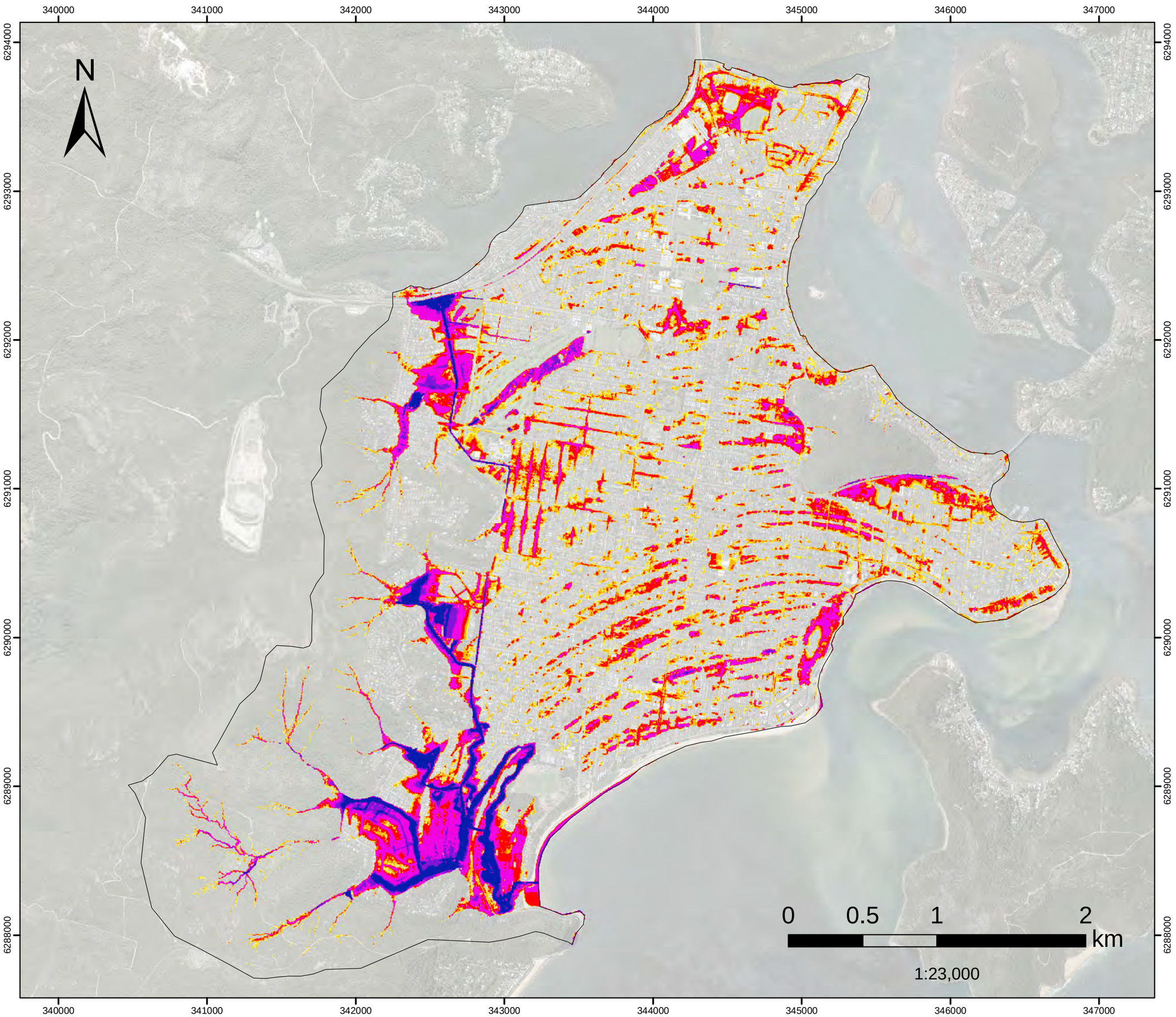

FIGURE L.2
PMF FM02
Dulkala Rd to Karingal Cl
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

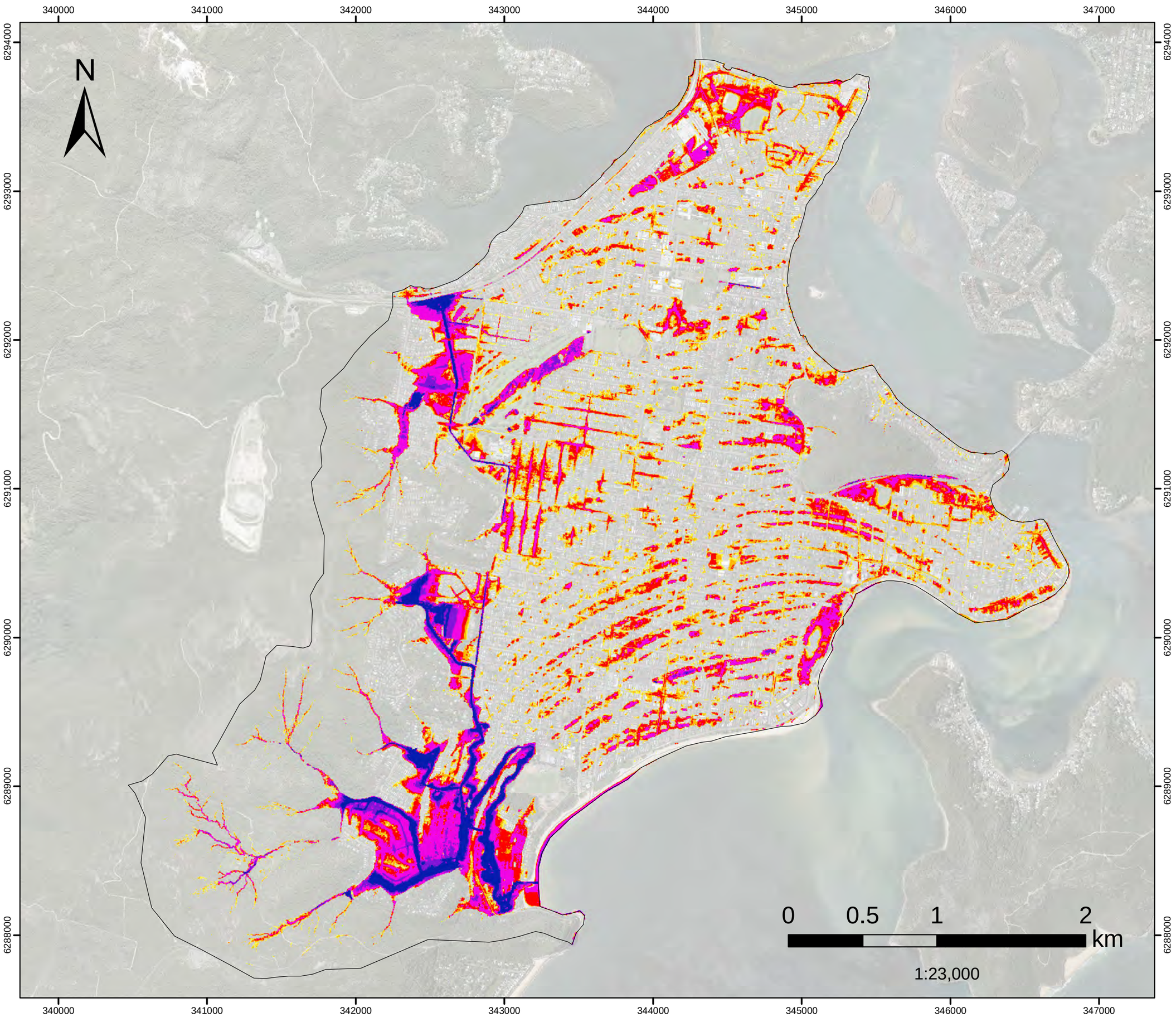

FIGURE L.3

PMF FM03

Infiltration Devices

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

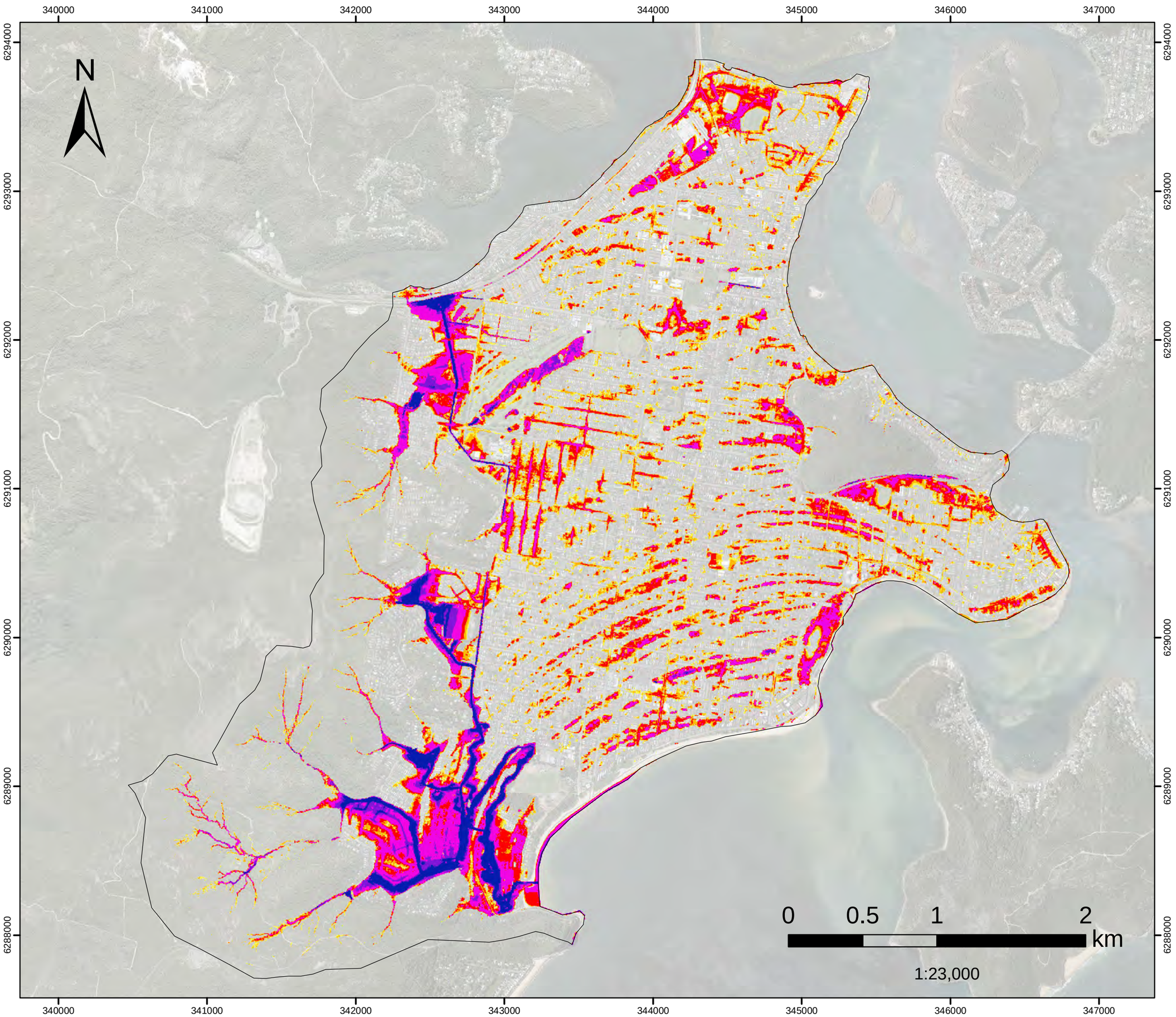

FIGURE L.4
PMF FM05
Greenhaven Dr
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

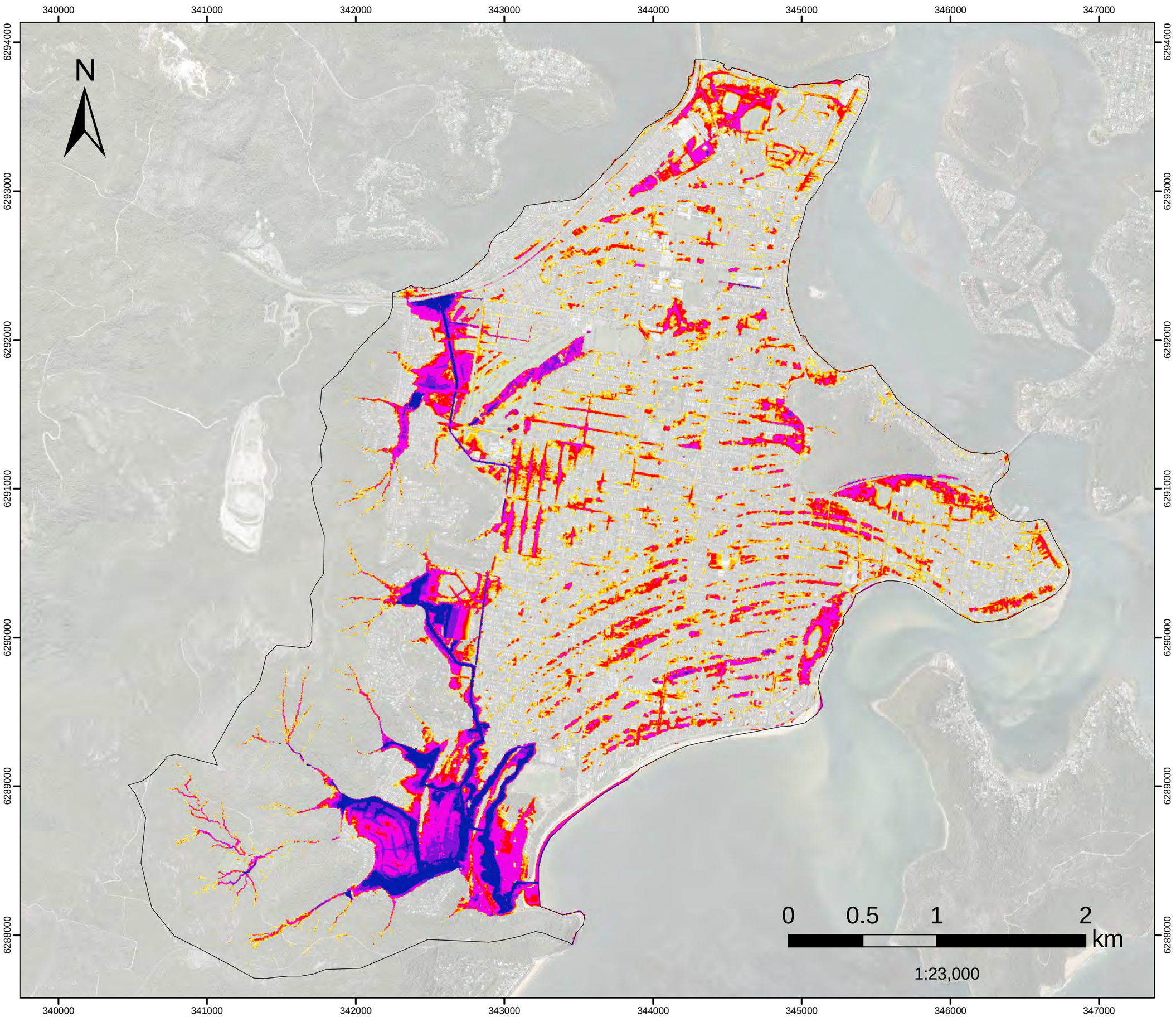

FIGURE L.5
PMF FM06A
Kahibah Ck System maintenance Work
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)
No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

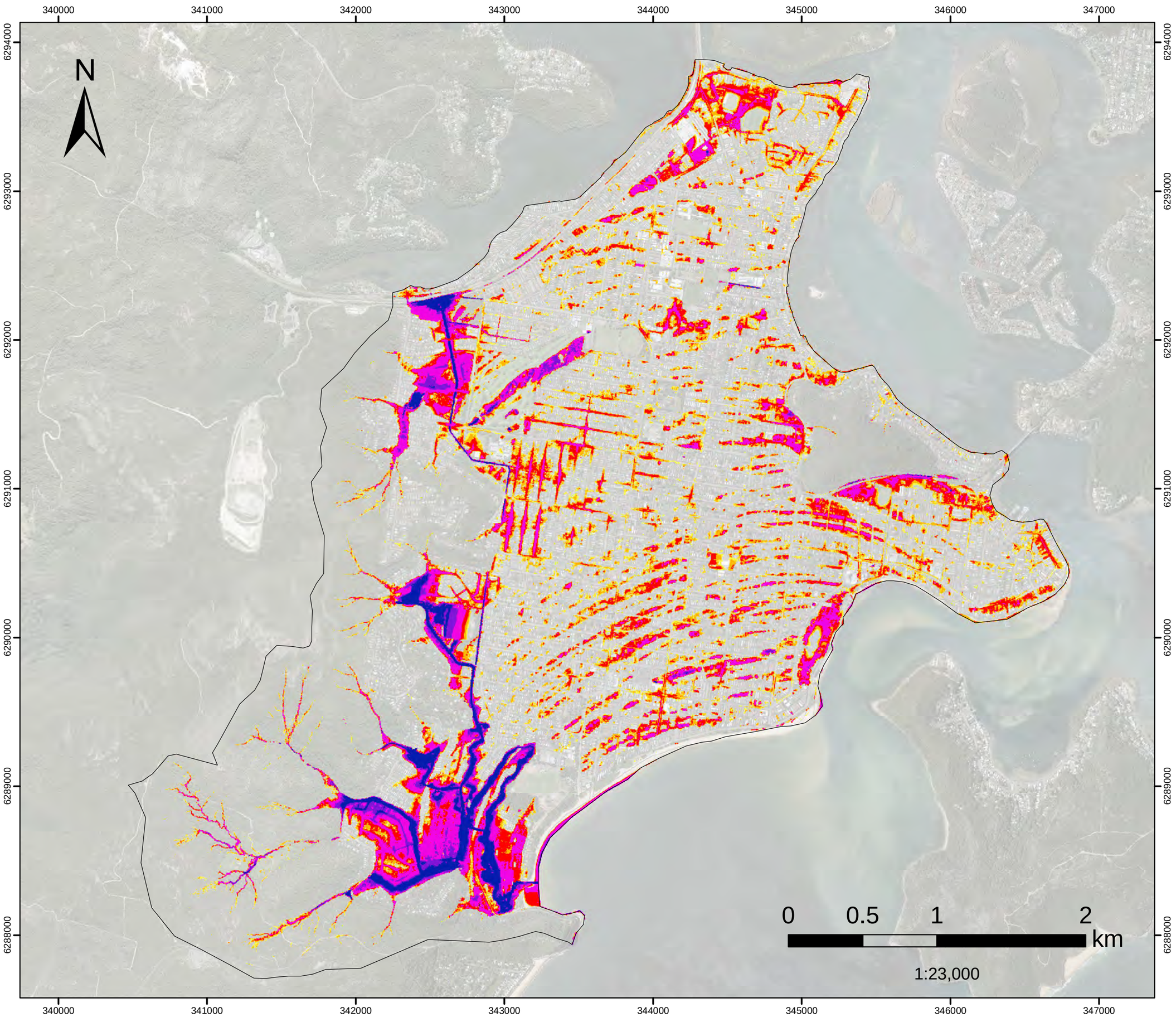

FIGURE L.6
PMF FM08
Palmtree Grove Detention Basin
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)
No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

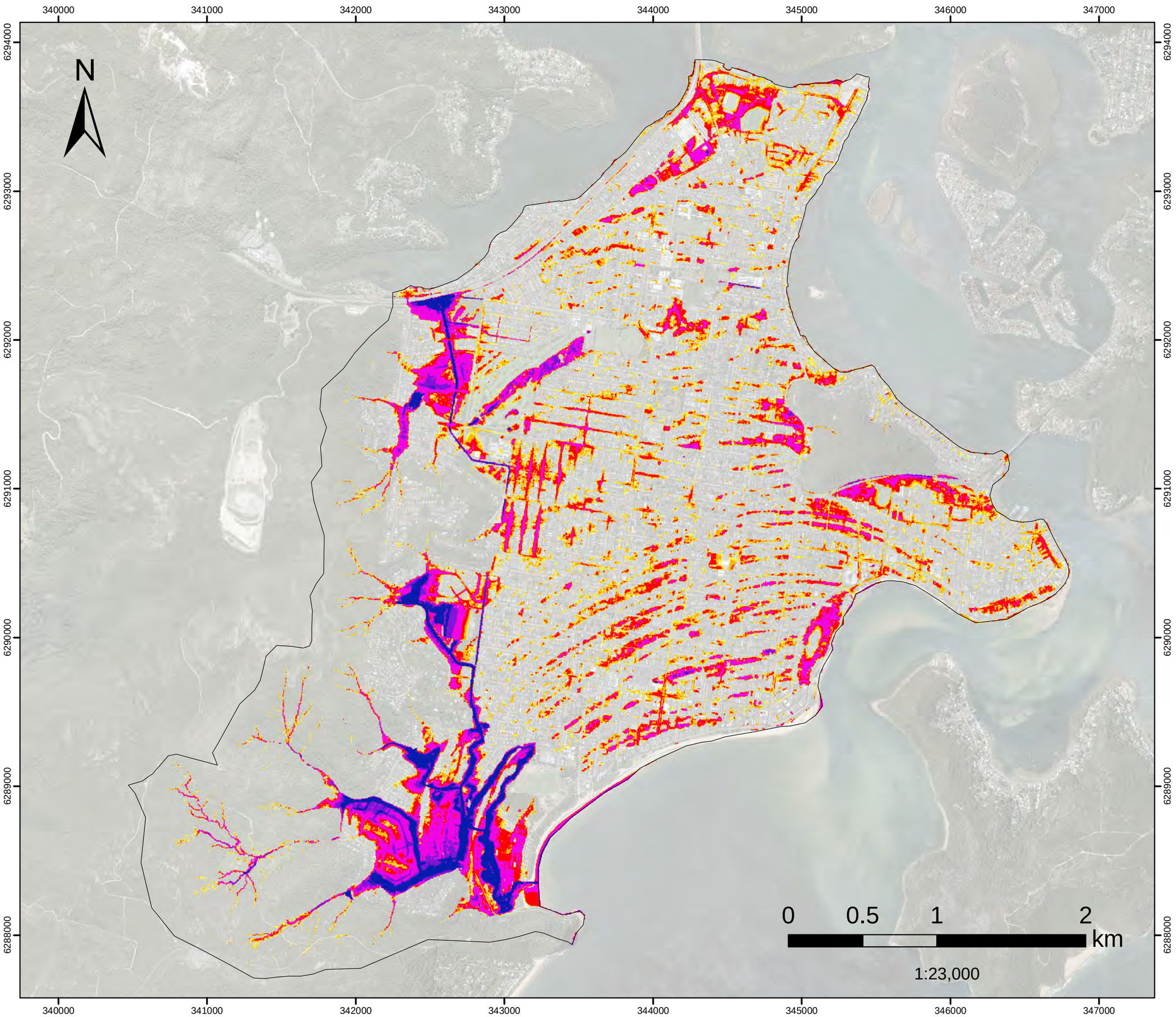

FIGURE L.7

PMF FM10

Neera Rd

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

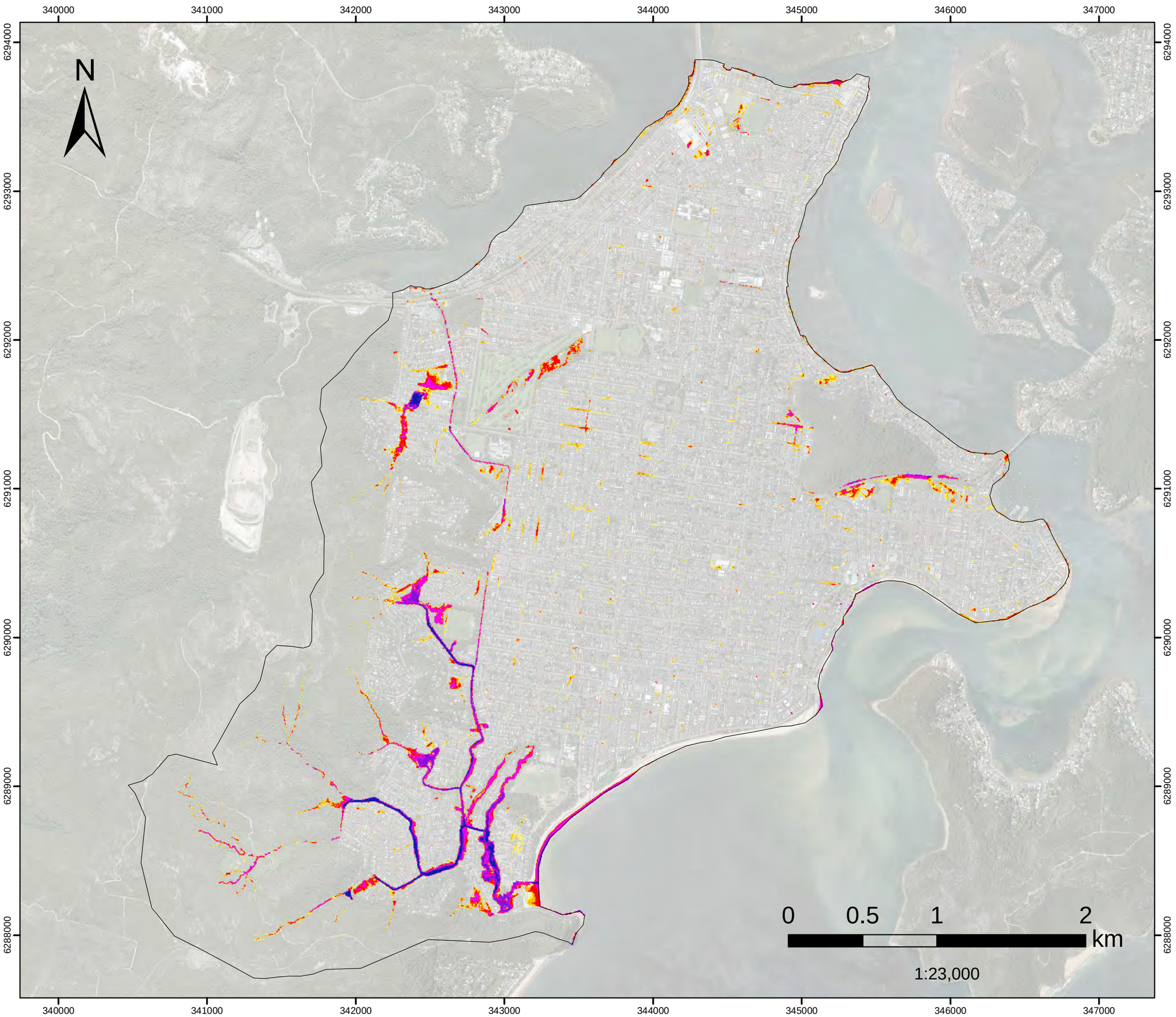

FIGURE L.8
1%AEP FM01
Woy Woy CBD
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

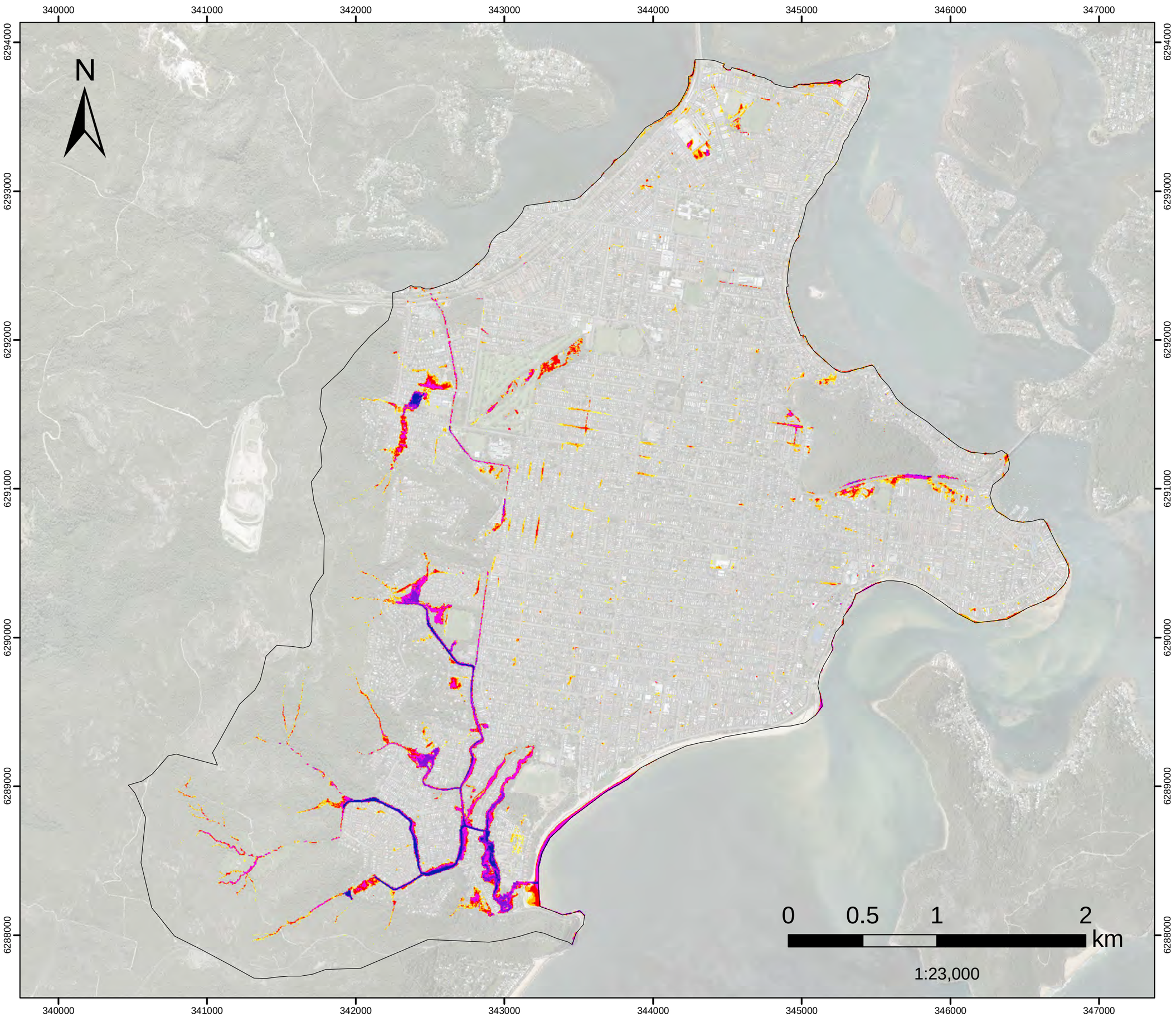

FIGURE L.9

1%AEP FM02

Dulkala Rd to Karingal Cl

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

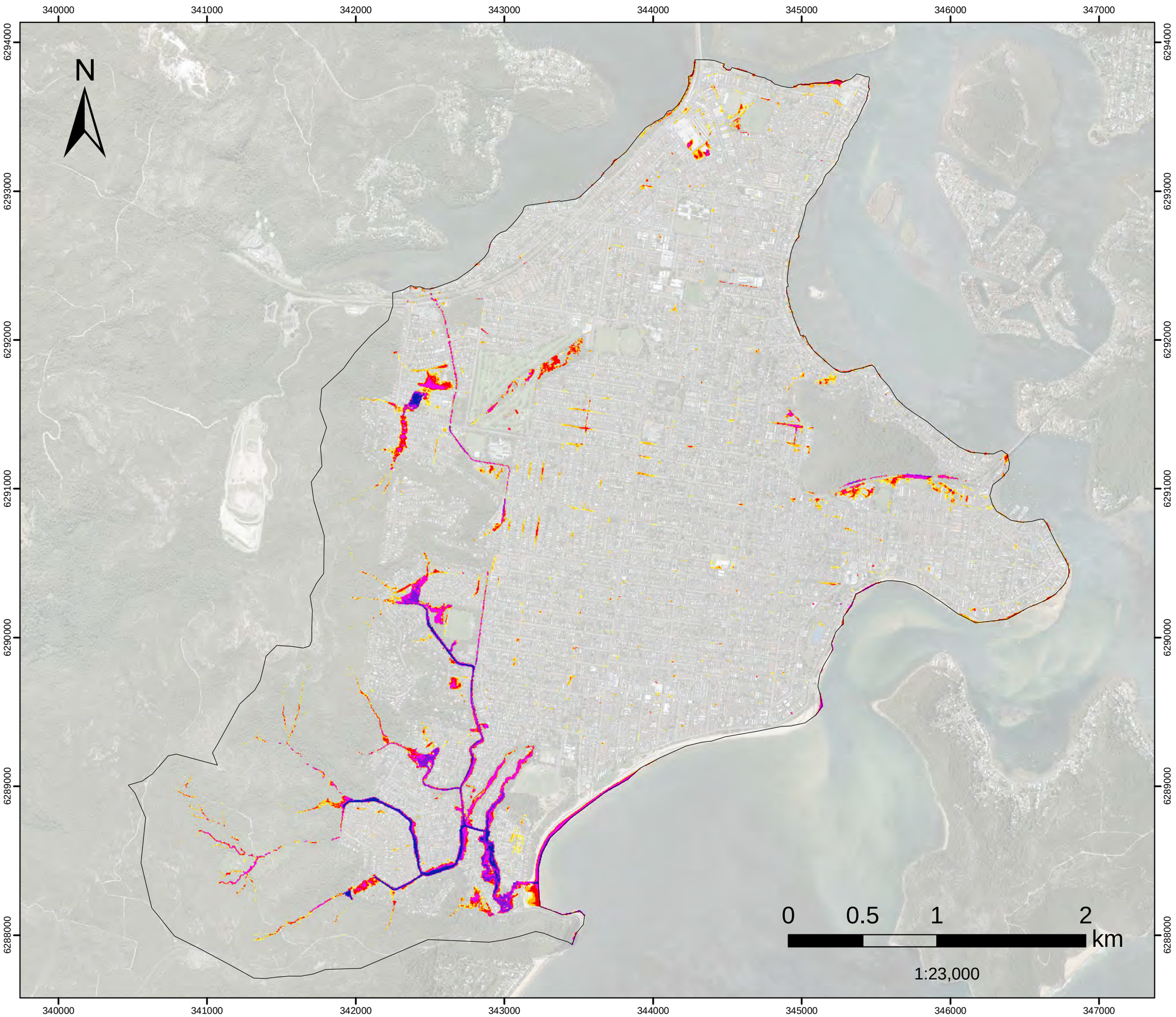

FIGURE L.10
1%AEP FM03

Infiltration Devices
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

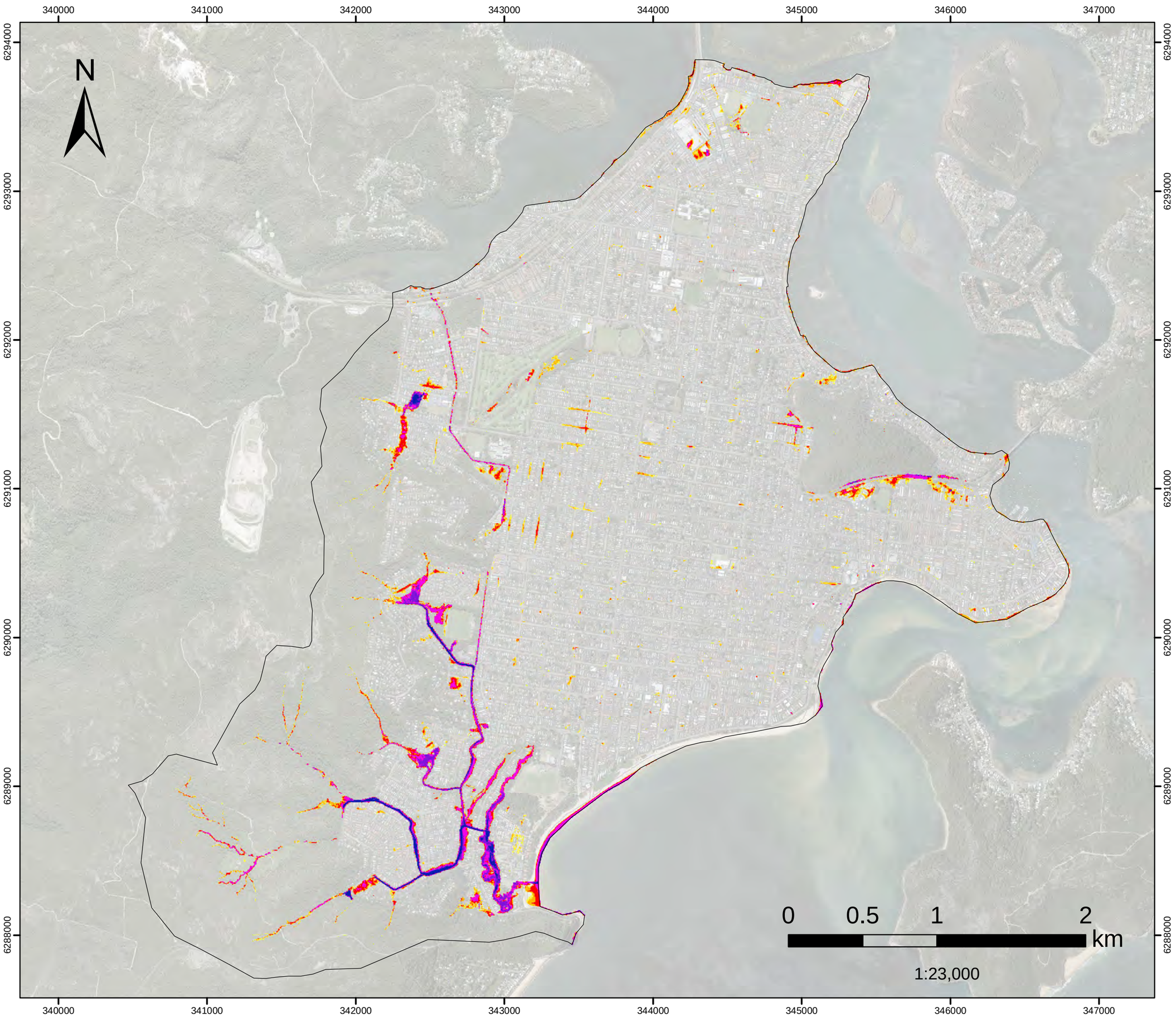

FIGURE L.11
1%AEP FM04

Groundwater pumping and

Everglades drainage update work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

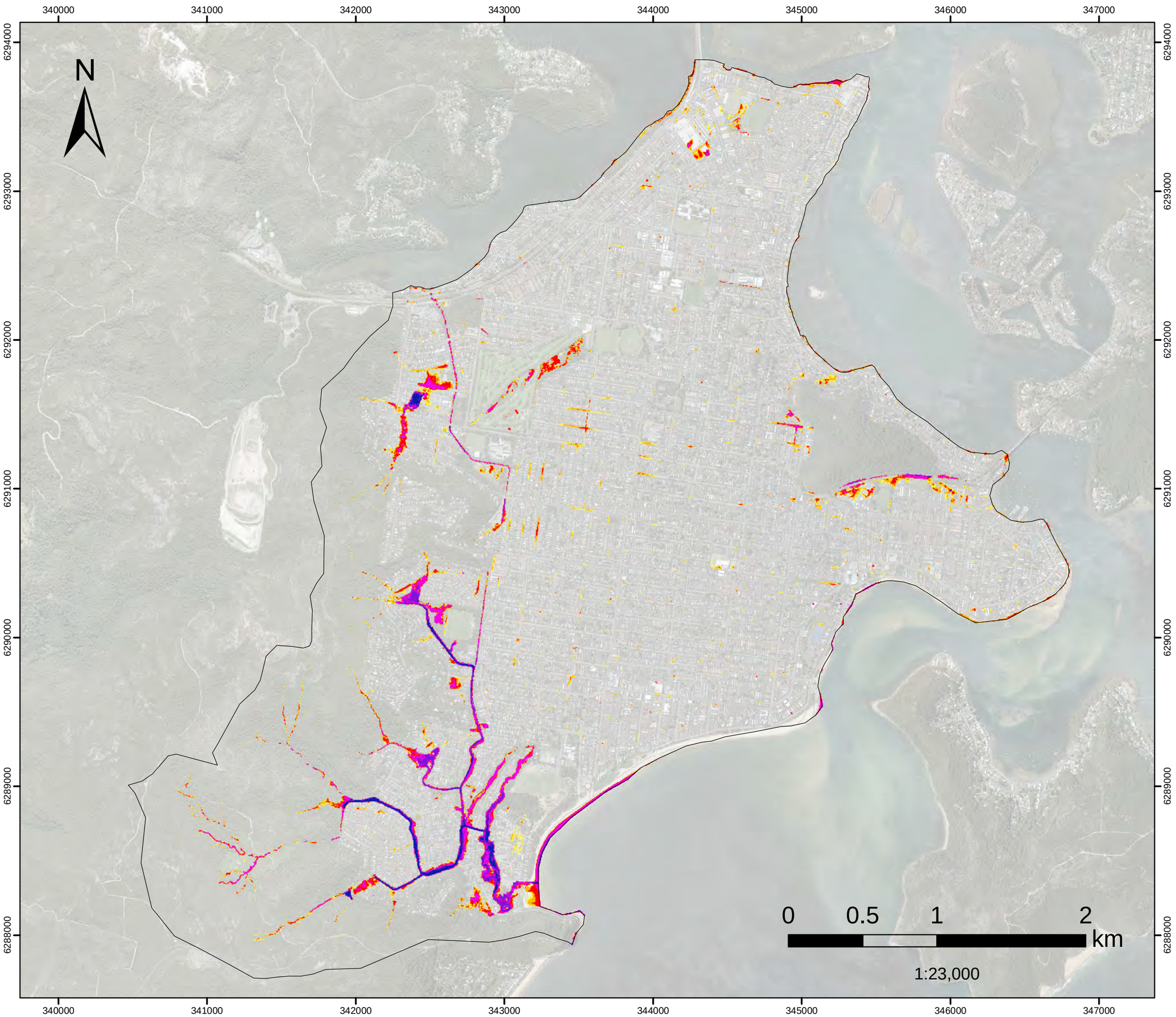

FIGURE L.12
1%AEP FM05

Greenhaven Dr
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

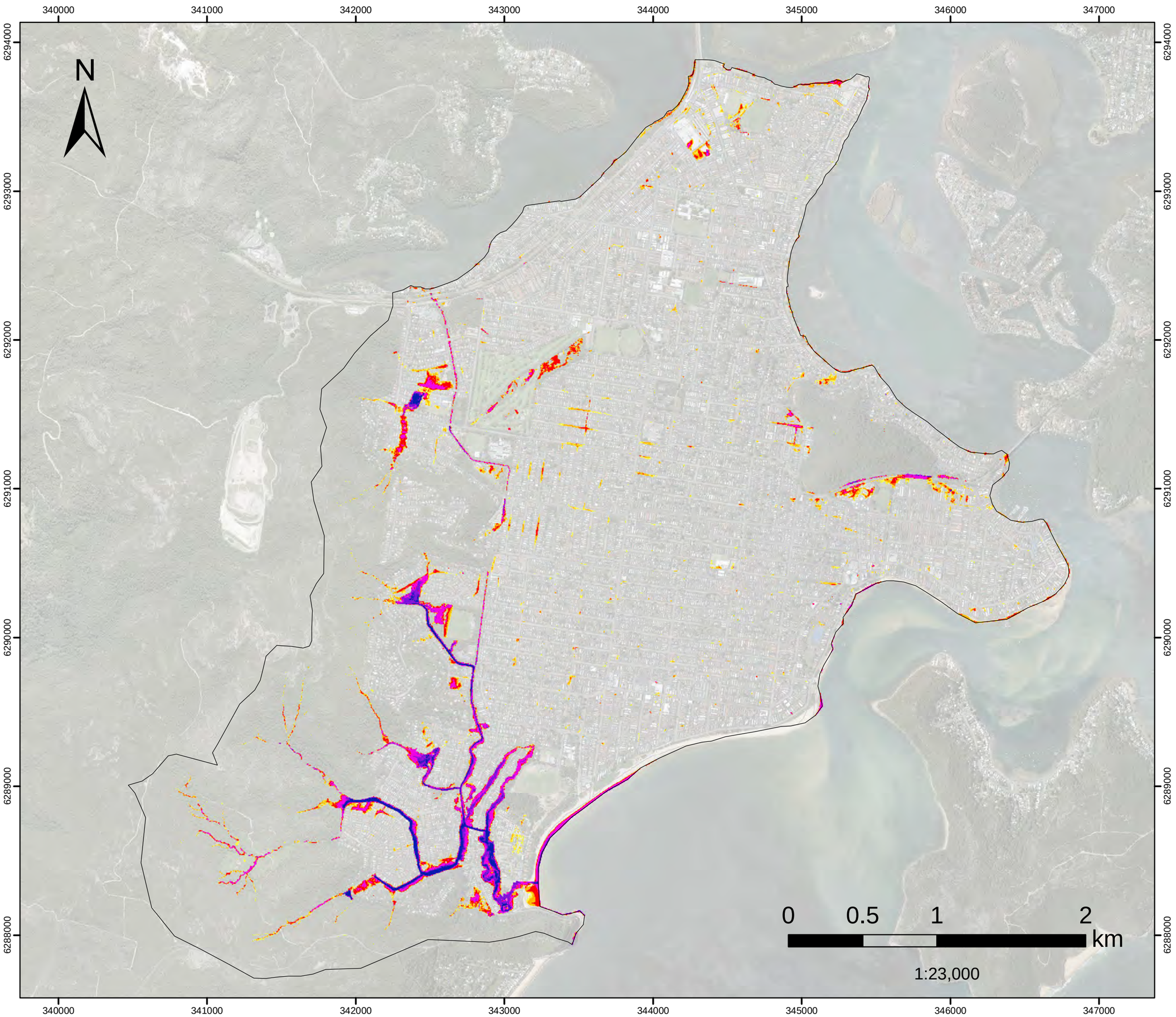

FIGURE L.13
1%AEP FM06A

Kahibah Ck system

maintenance work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

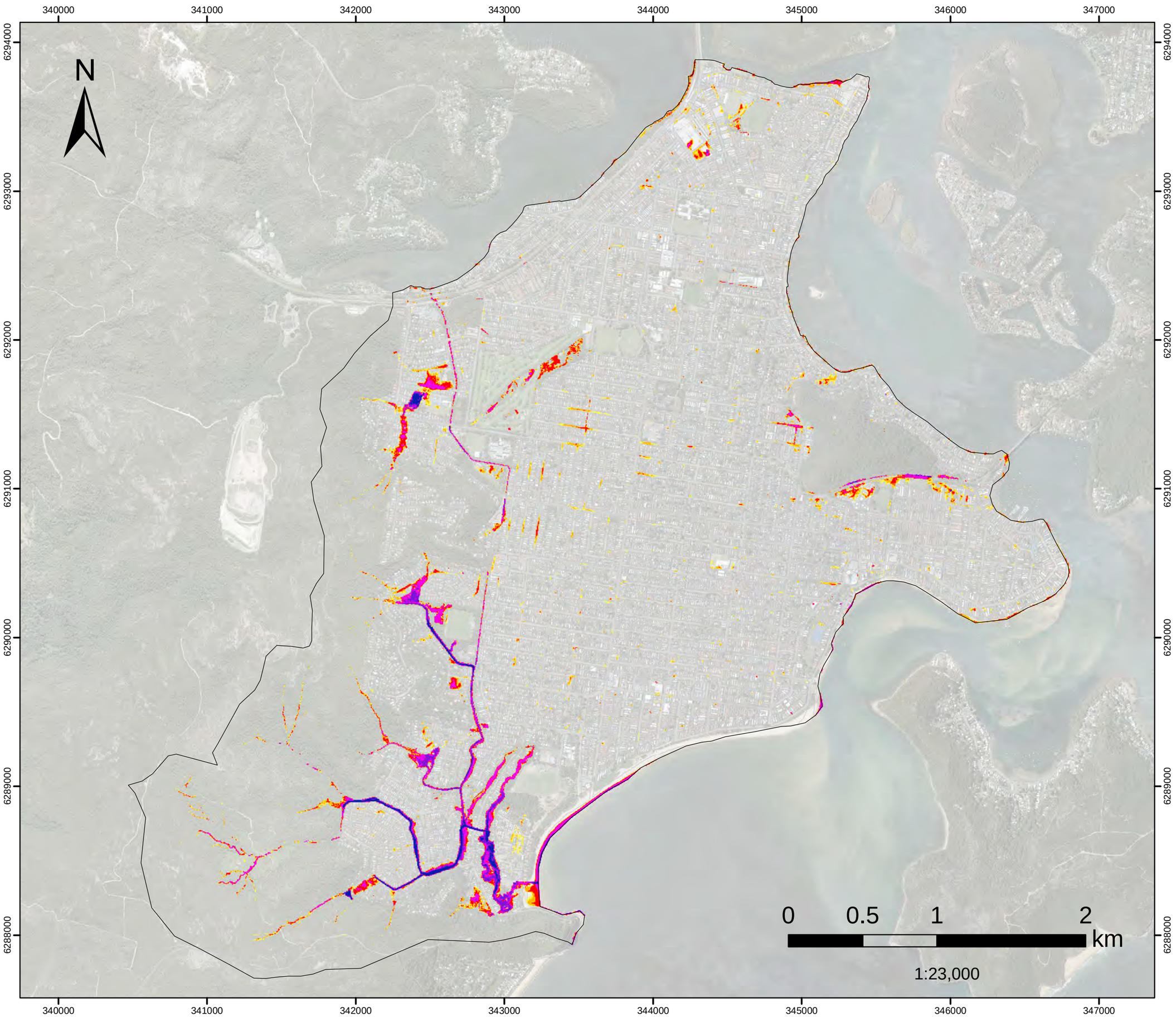

FIGURE L.14
1%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

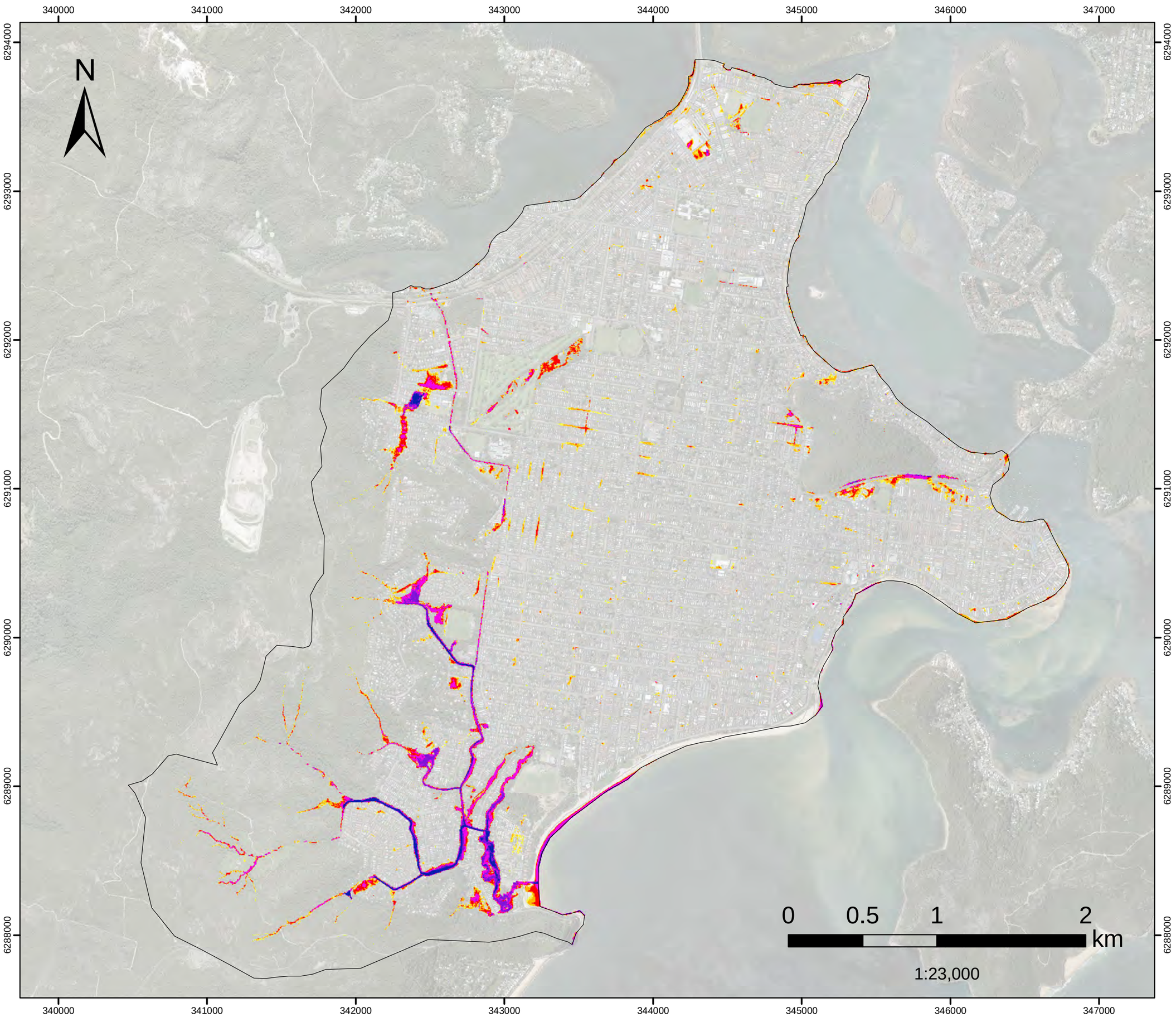

FIGURE L.15
1%AEP FM08

Palmtree Grove Detention Basin

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

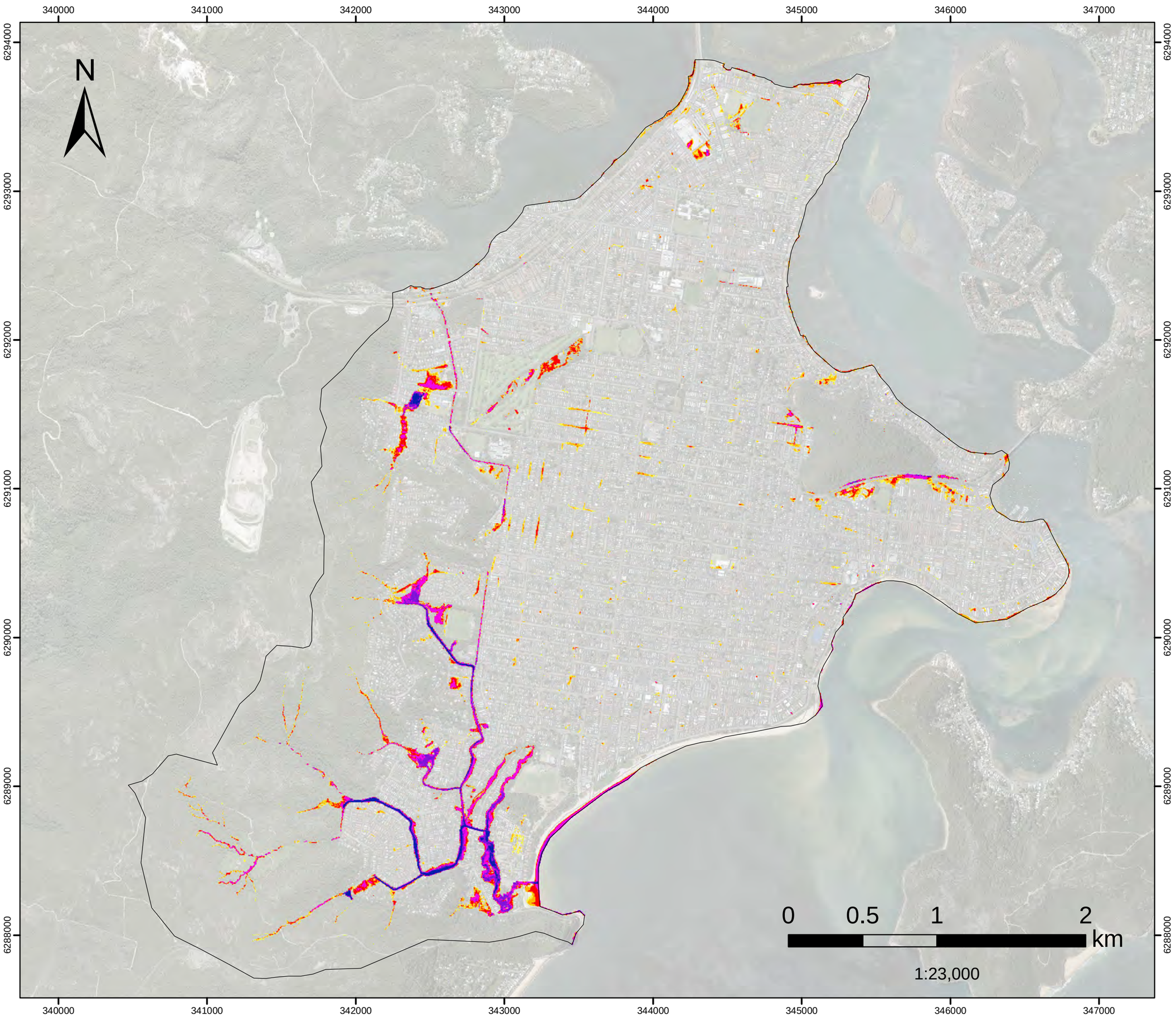

FIGURE L.16
1%AEP FM09

Wilks Av and McManus Cl

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

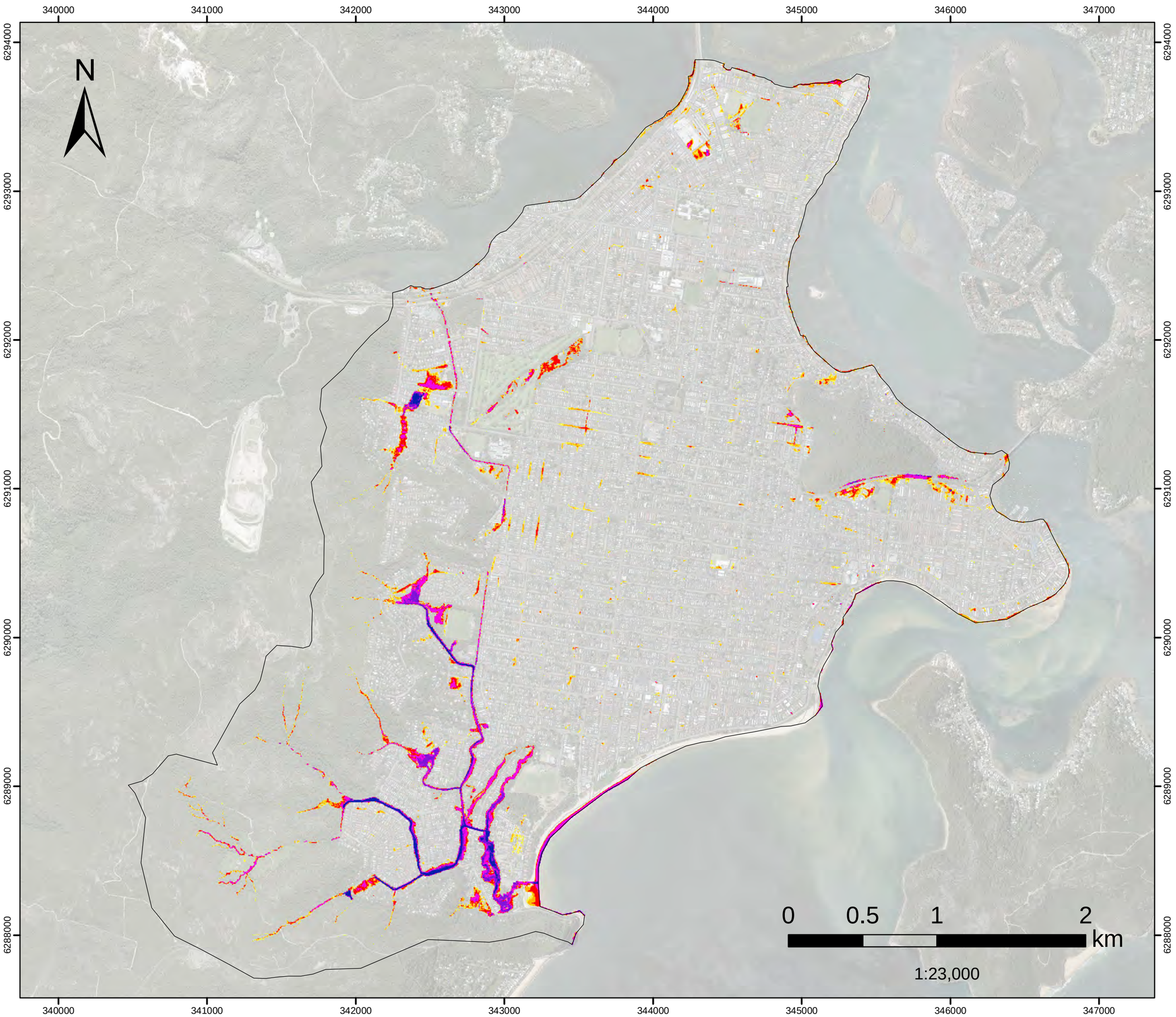

FIGURE L.17
1%AEP FM10
Neera Rd
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

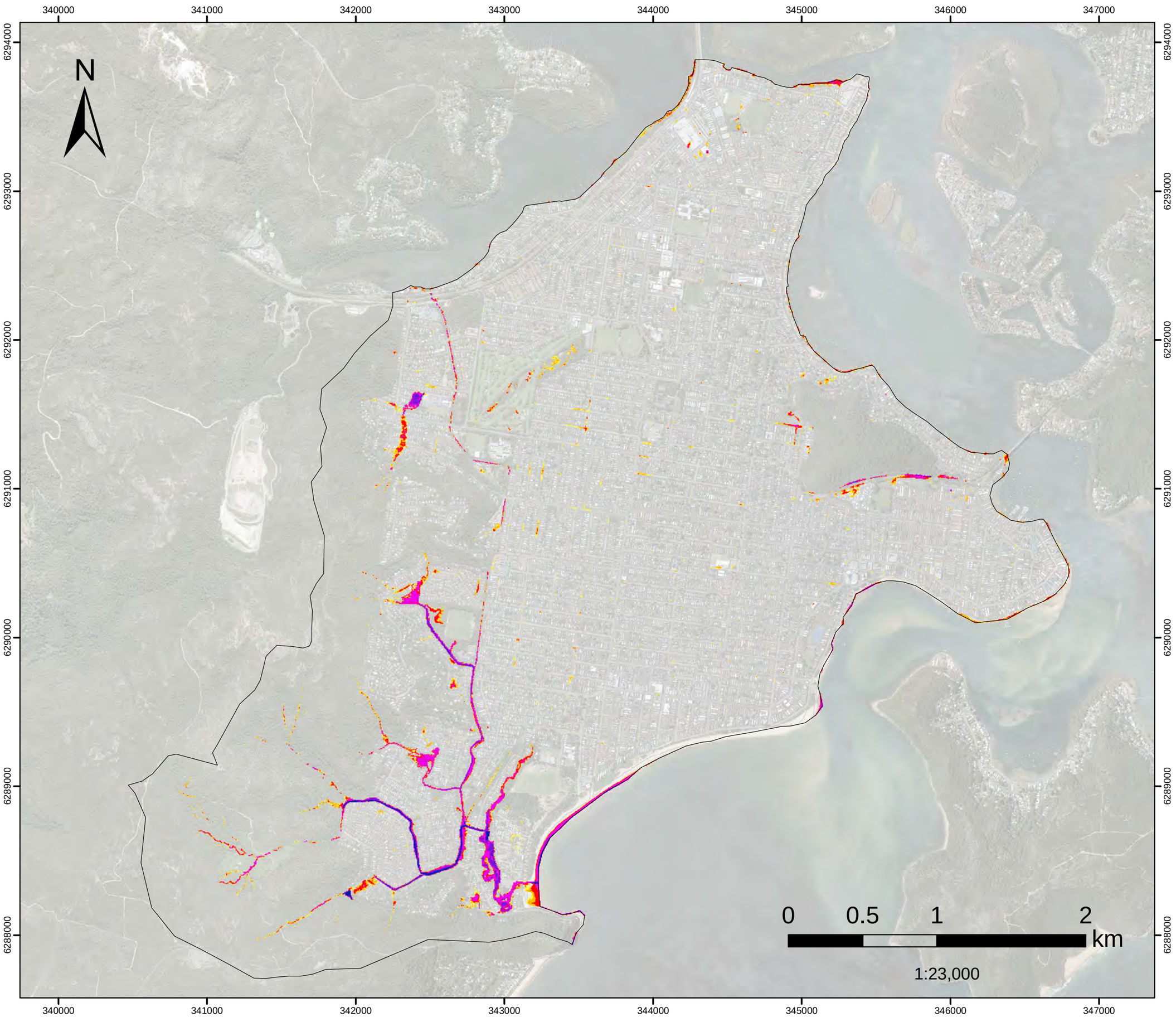

FIGURE L.18
10%AEP FM01

Woy Woy CBD
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

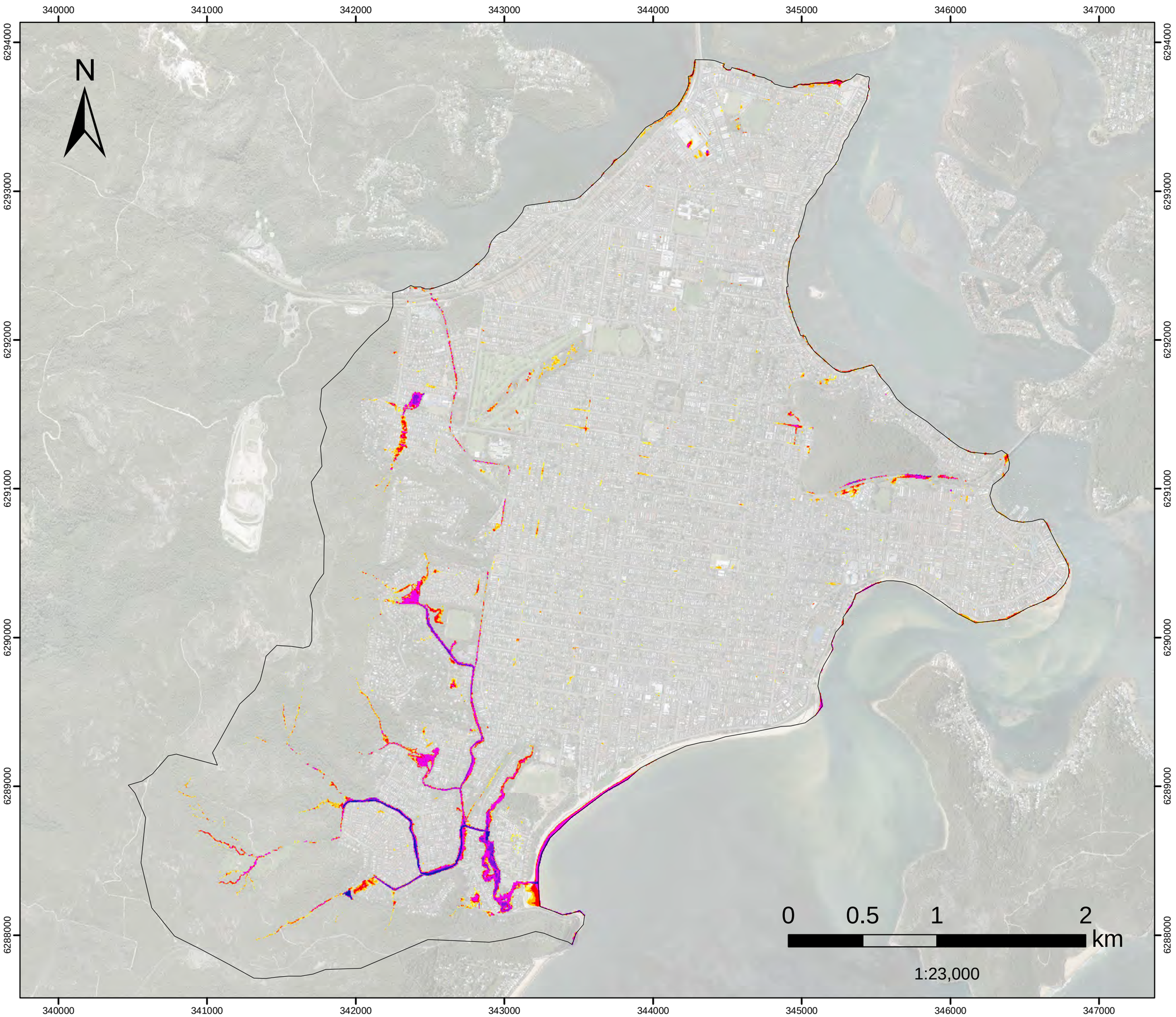

FIGURE L.19
10%AEP FM02

Dulkala Rd to Karingal Cl

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

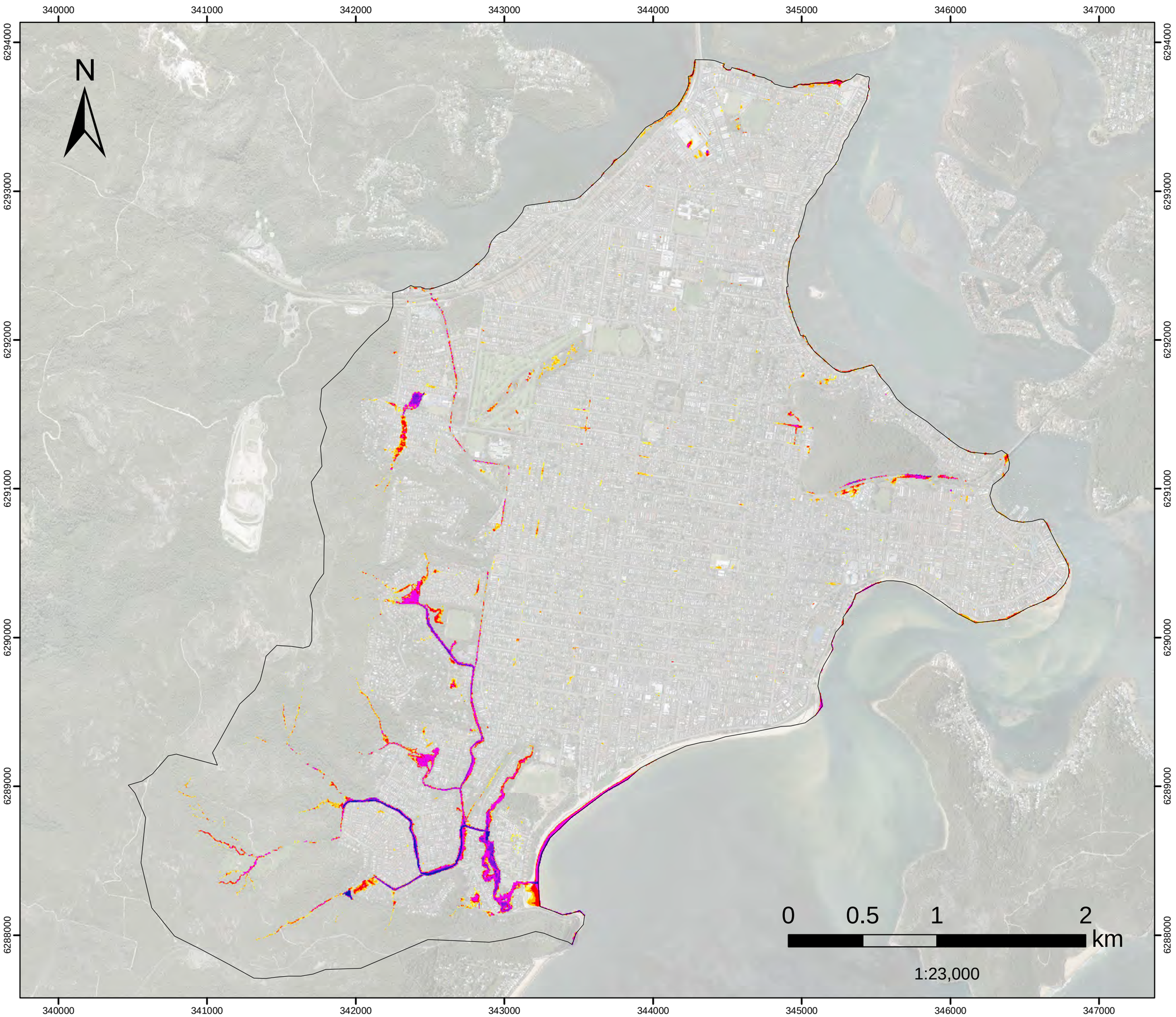

FIGURE L.20
10%AEP FM03

Infiltration Devices
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

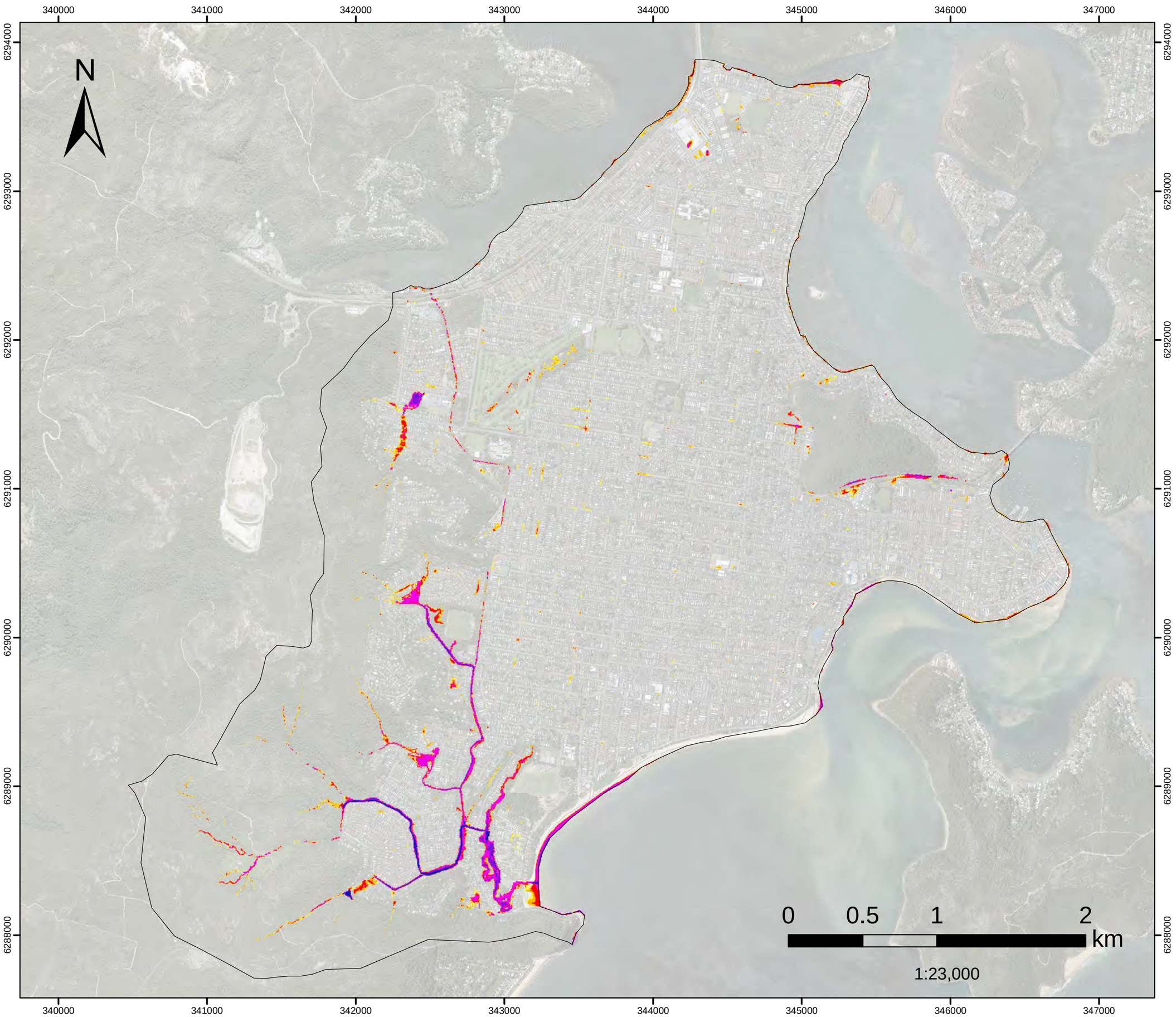

FIGURE L.21
10%AEP FM05

Greenhaven Dr

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

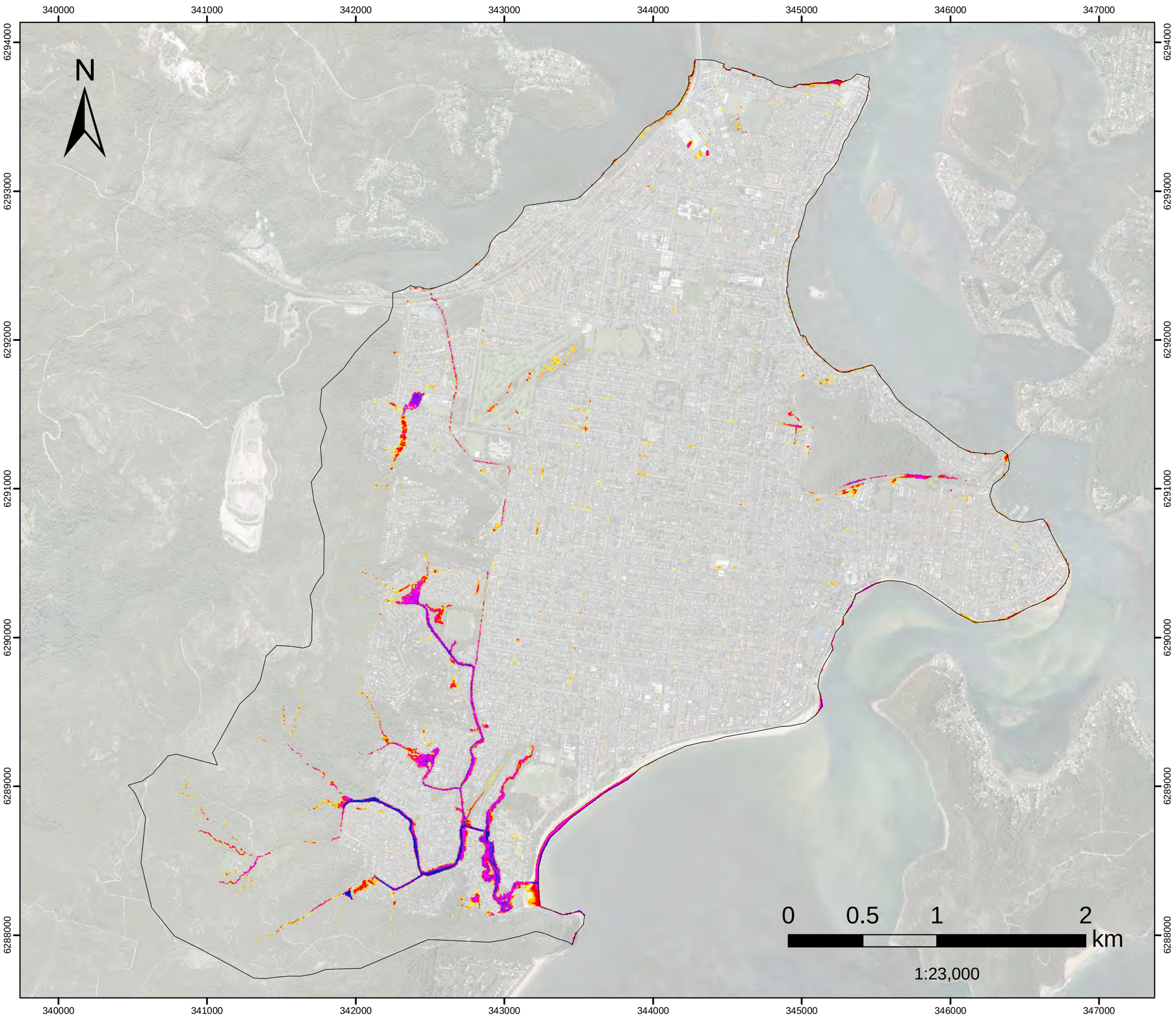

FIGURE L.22
10%AEP FM06A

Kahibah Ck system maintenance work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

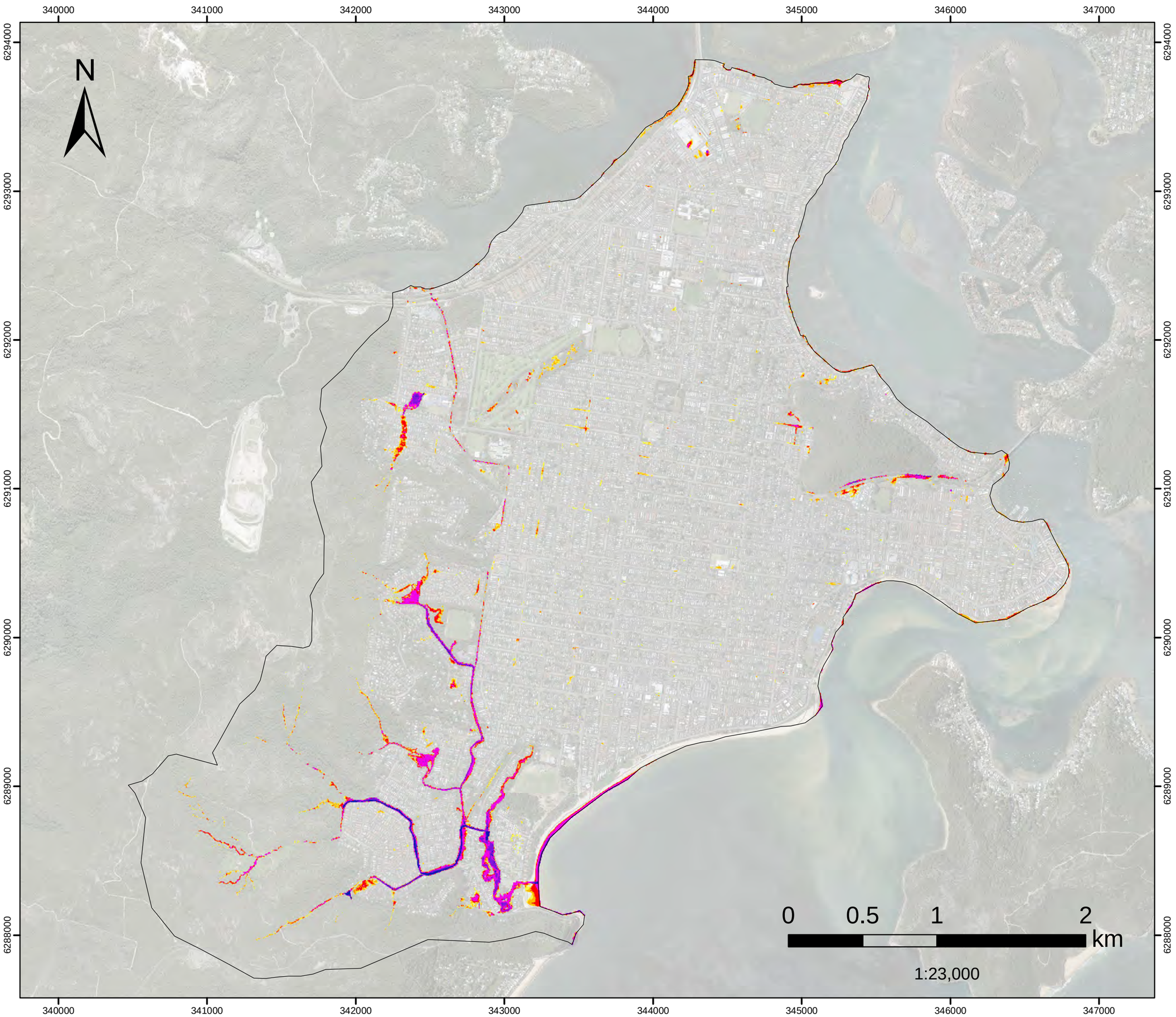

FIGURE L.23
10%AEP FM08

Palmtree Grove Detention Basin

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

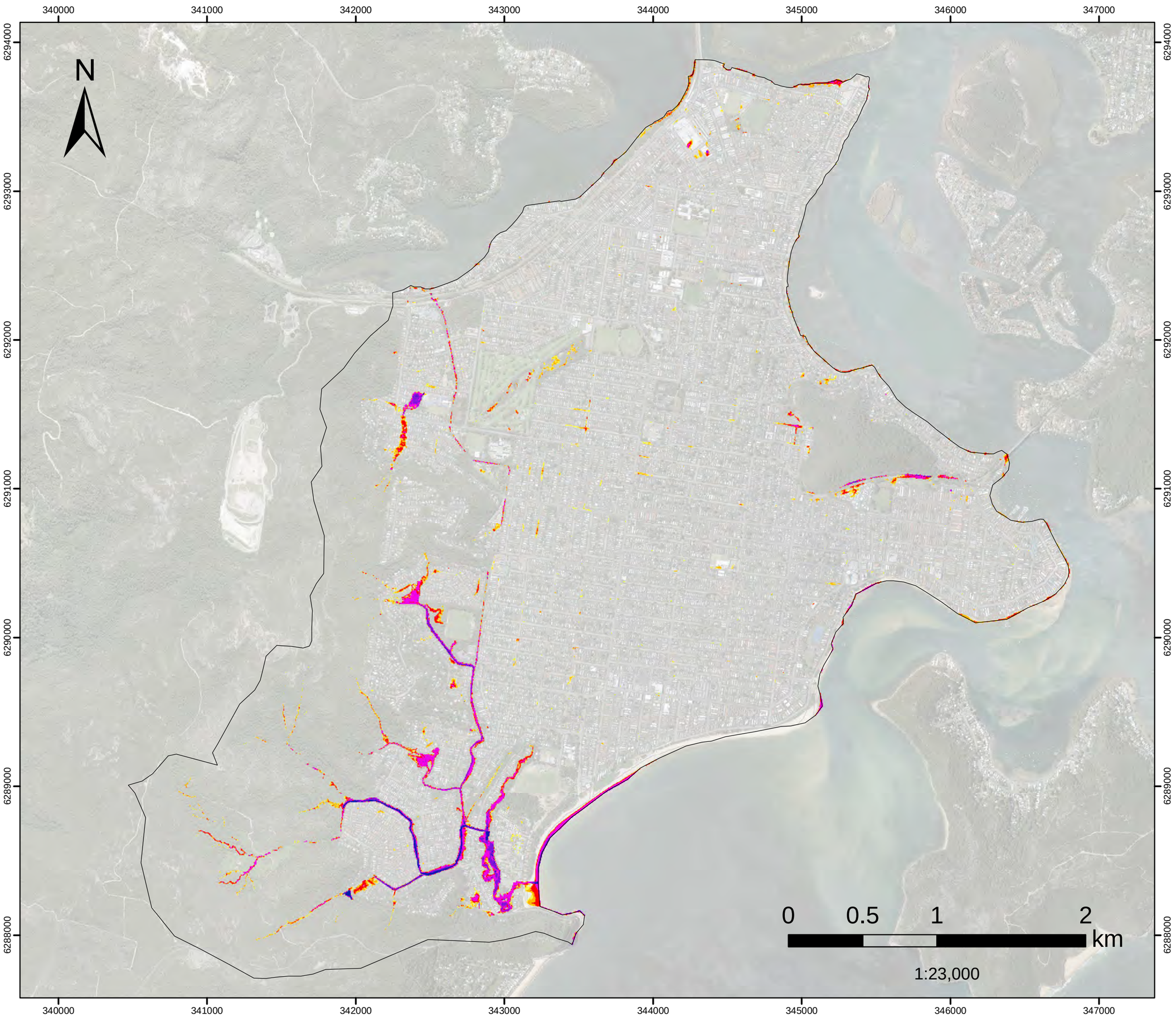

FIGURE L.24
10%AEP FM10
Neera Rd
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

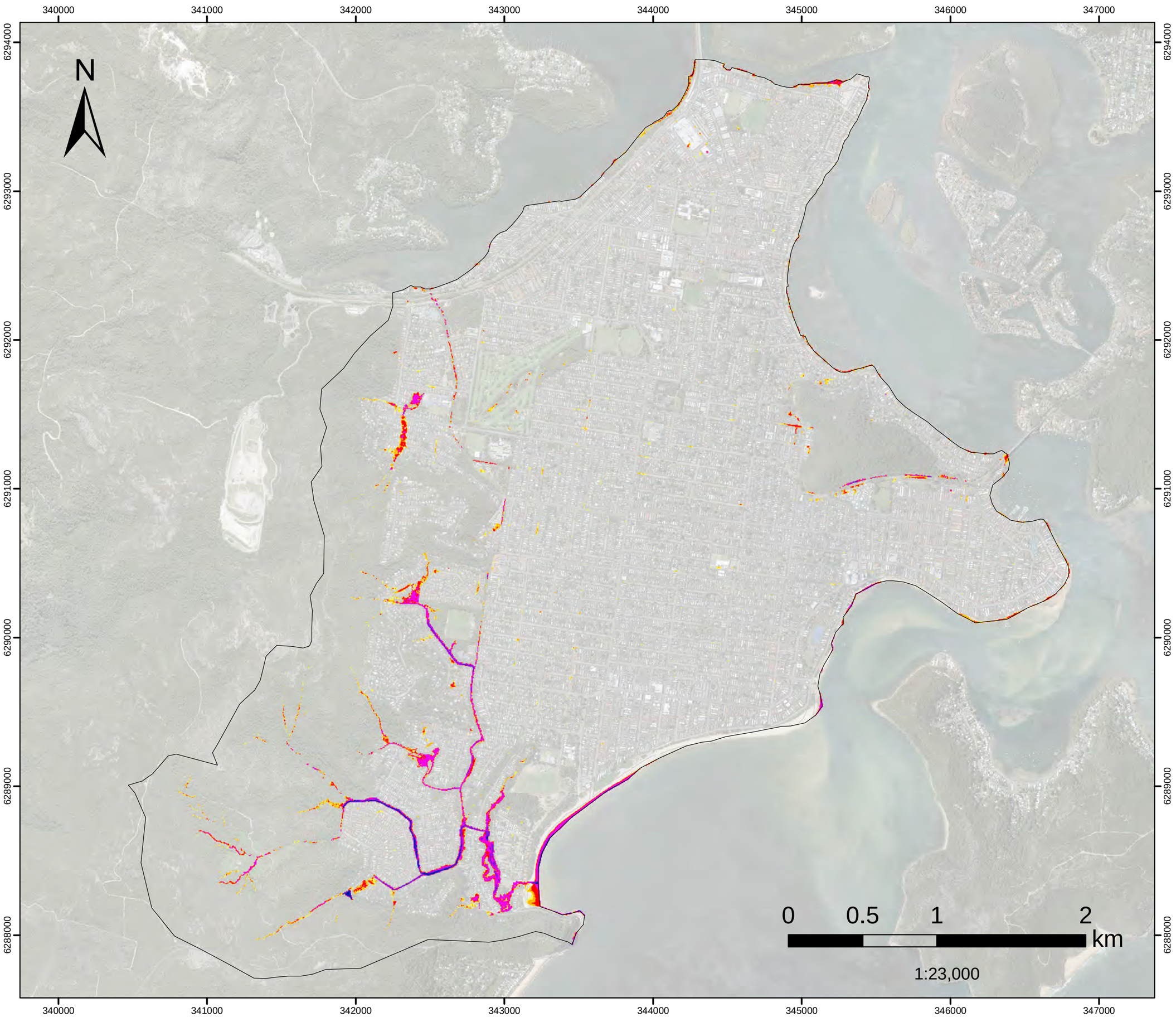

FIGURE L.25
20%AEP FM01

Woy Woy CBD
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

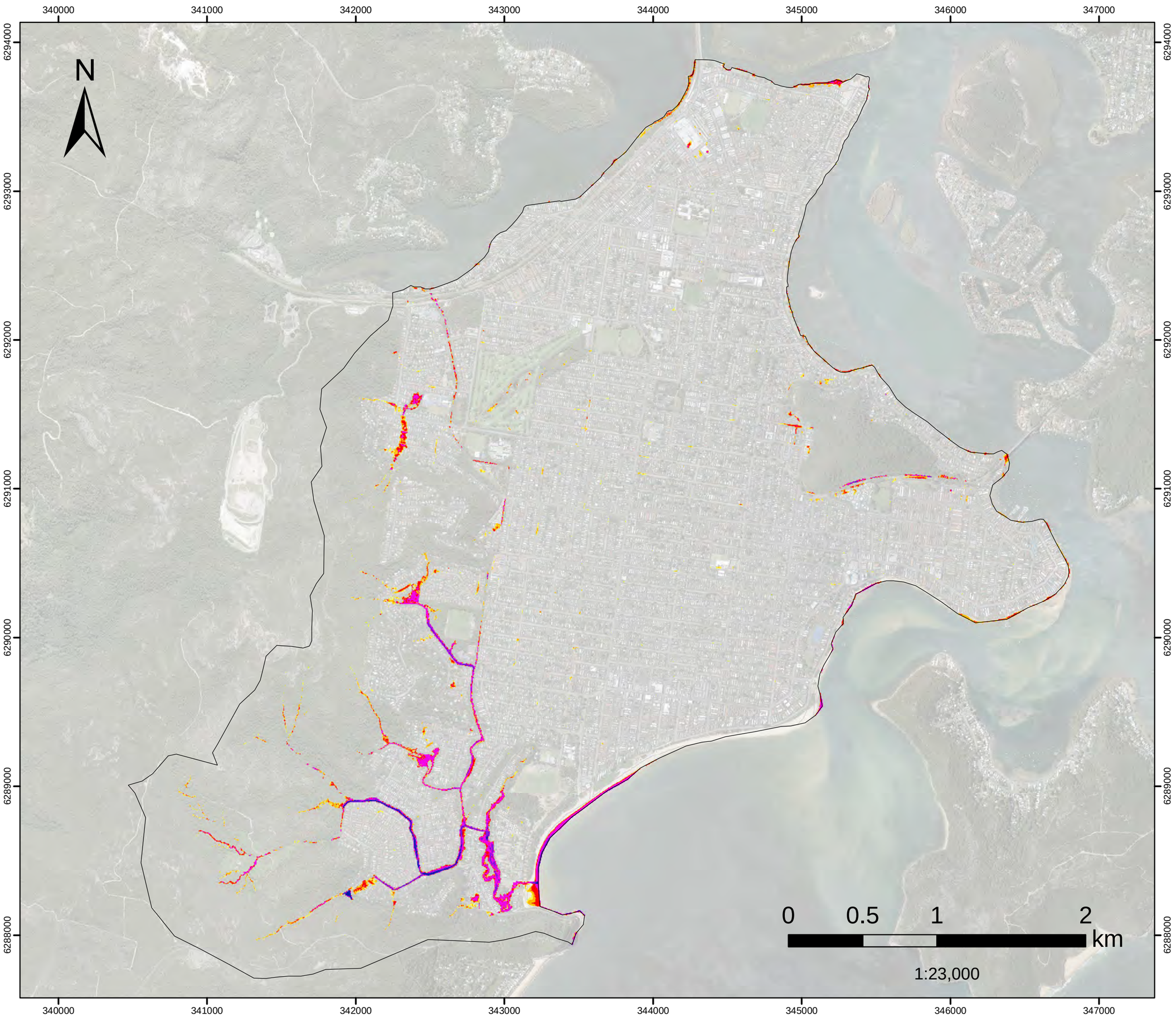

FIGURE L.26

20%AEP FM02

Dulkala Rd to Karingal Cl

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

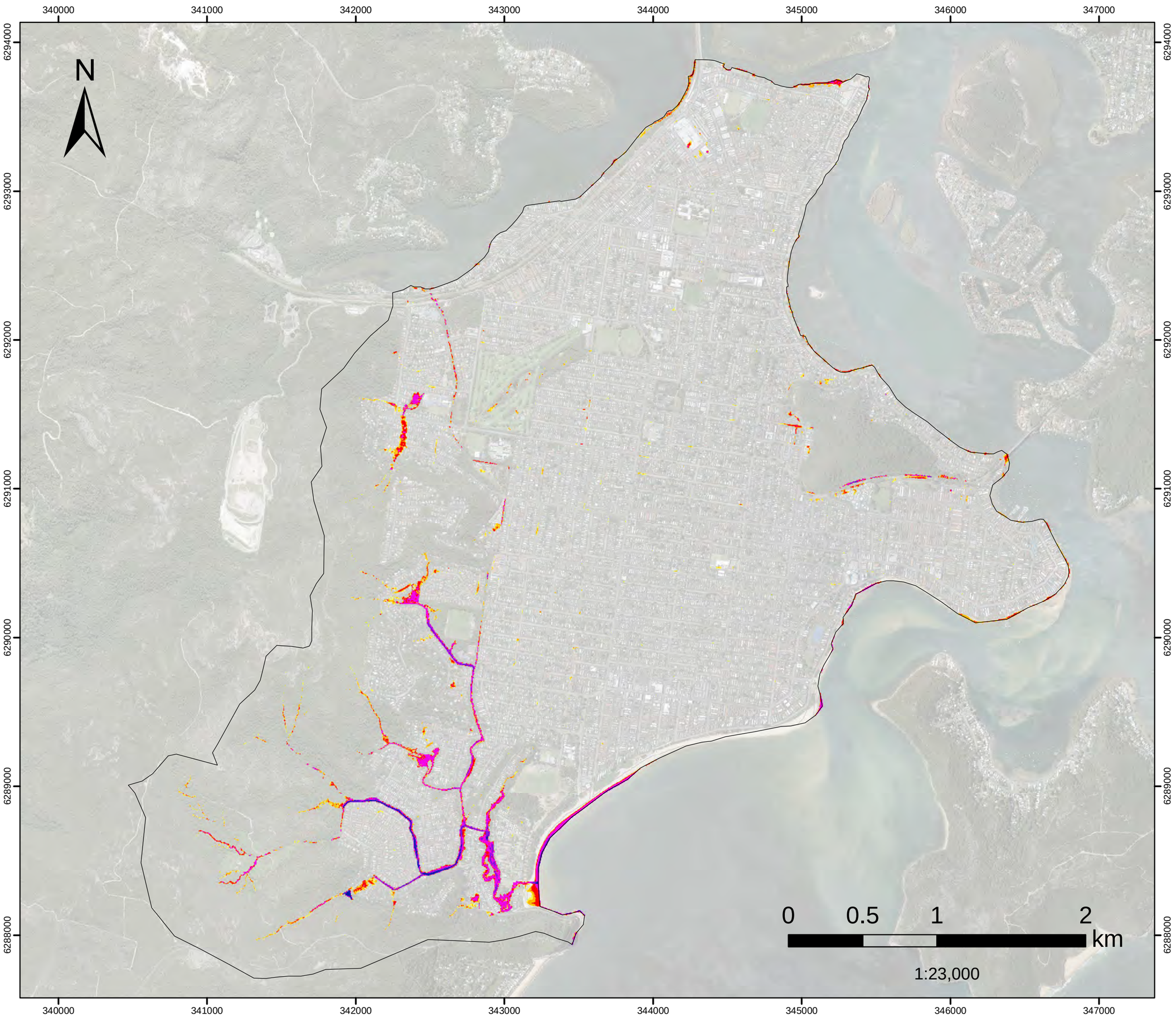

FIGURE L.27
20%AEP FM03

Infiltration Devices
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

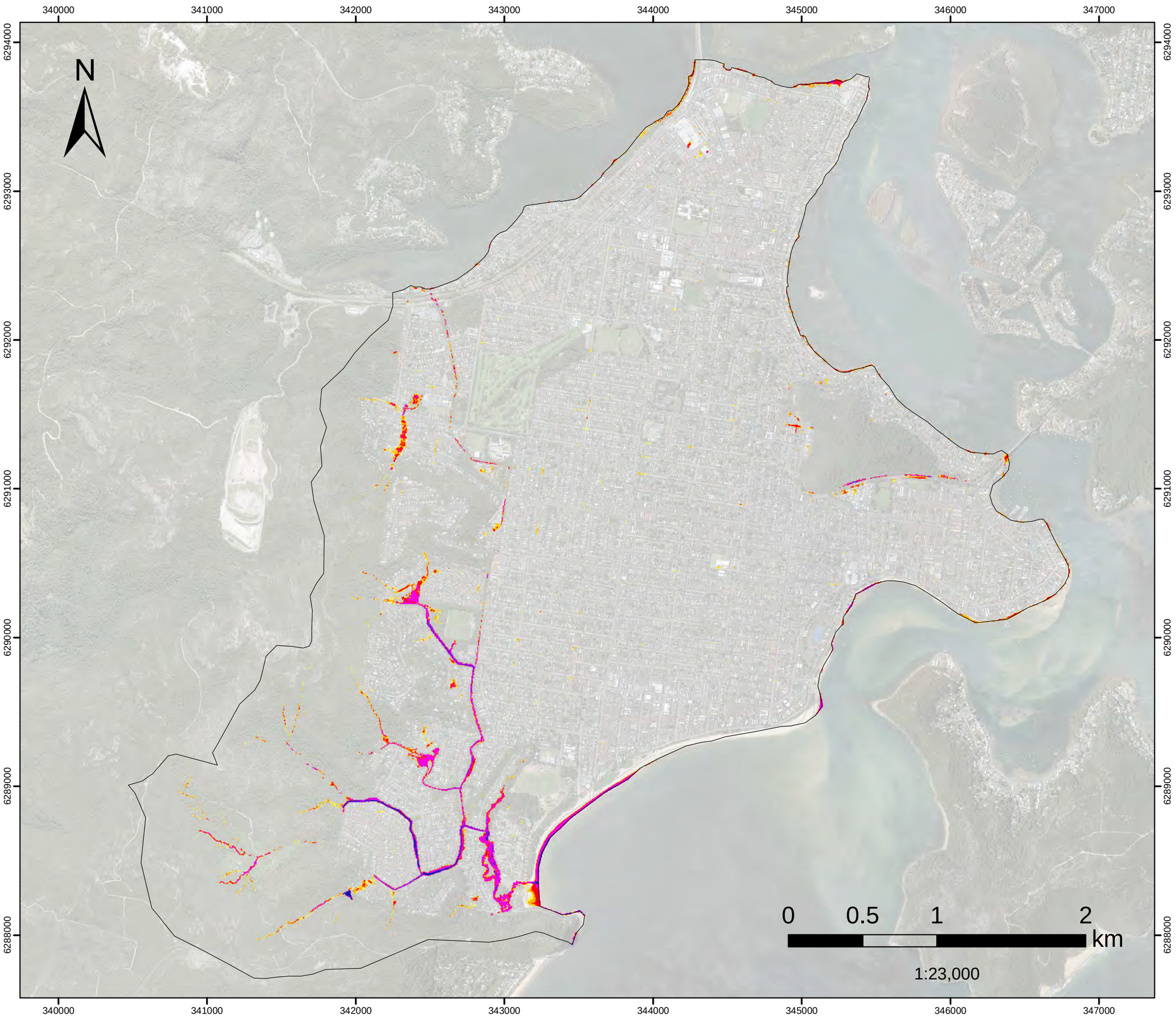

FIGURE L.28
20%AEP FM04

Groundwater pumping and Everglades drainage update work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

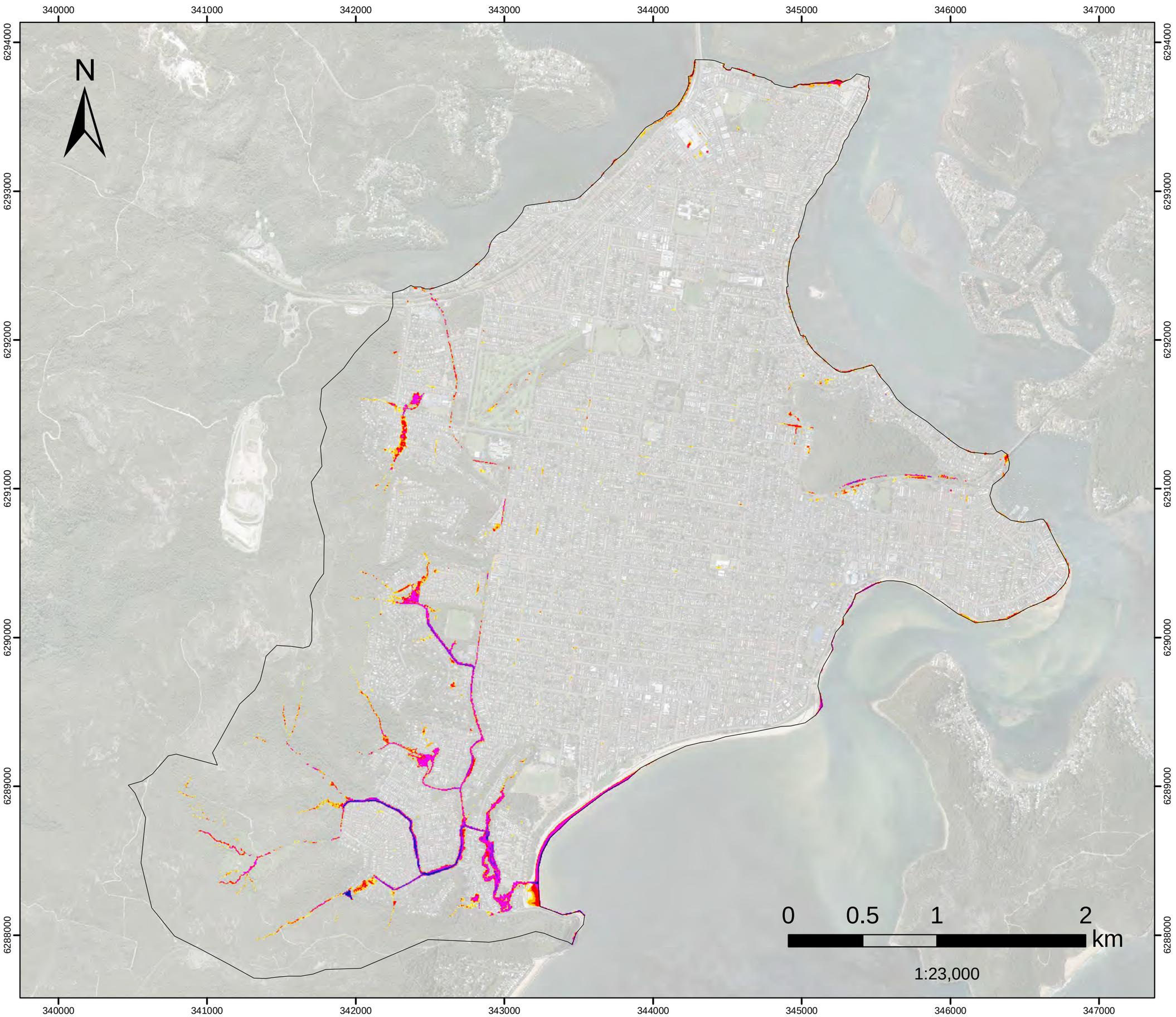

FIGURE L.29
20%AEP FM05

Greenhaven Dr

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

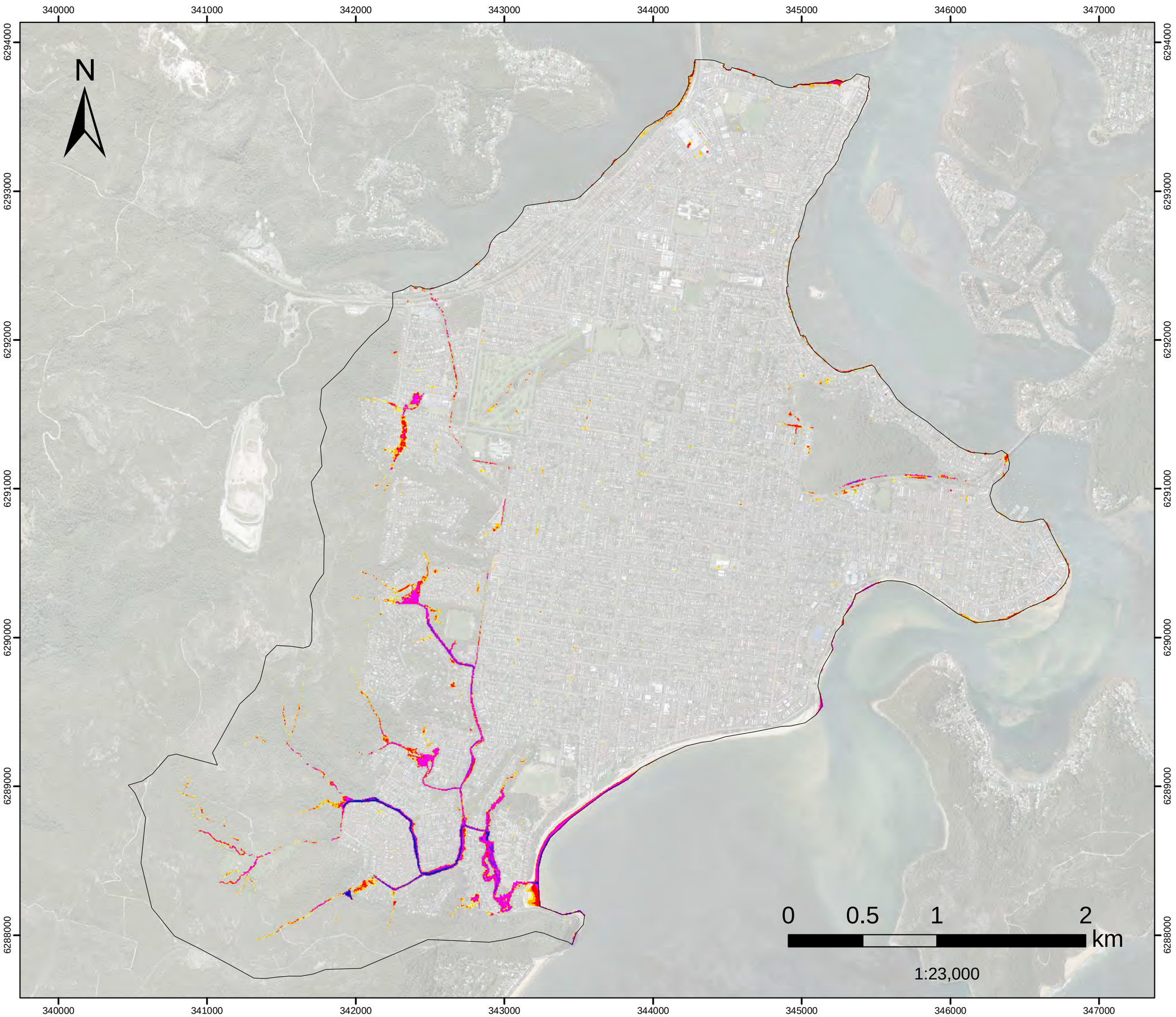

FIGURE L.30
20%AEP FM06A

Kahibah Ck system maintenance work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

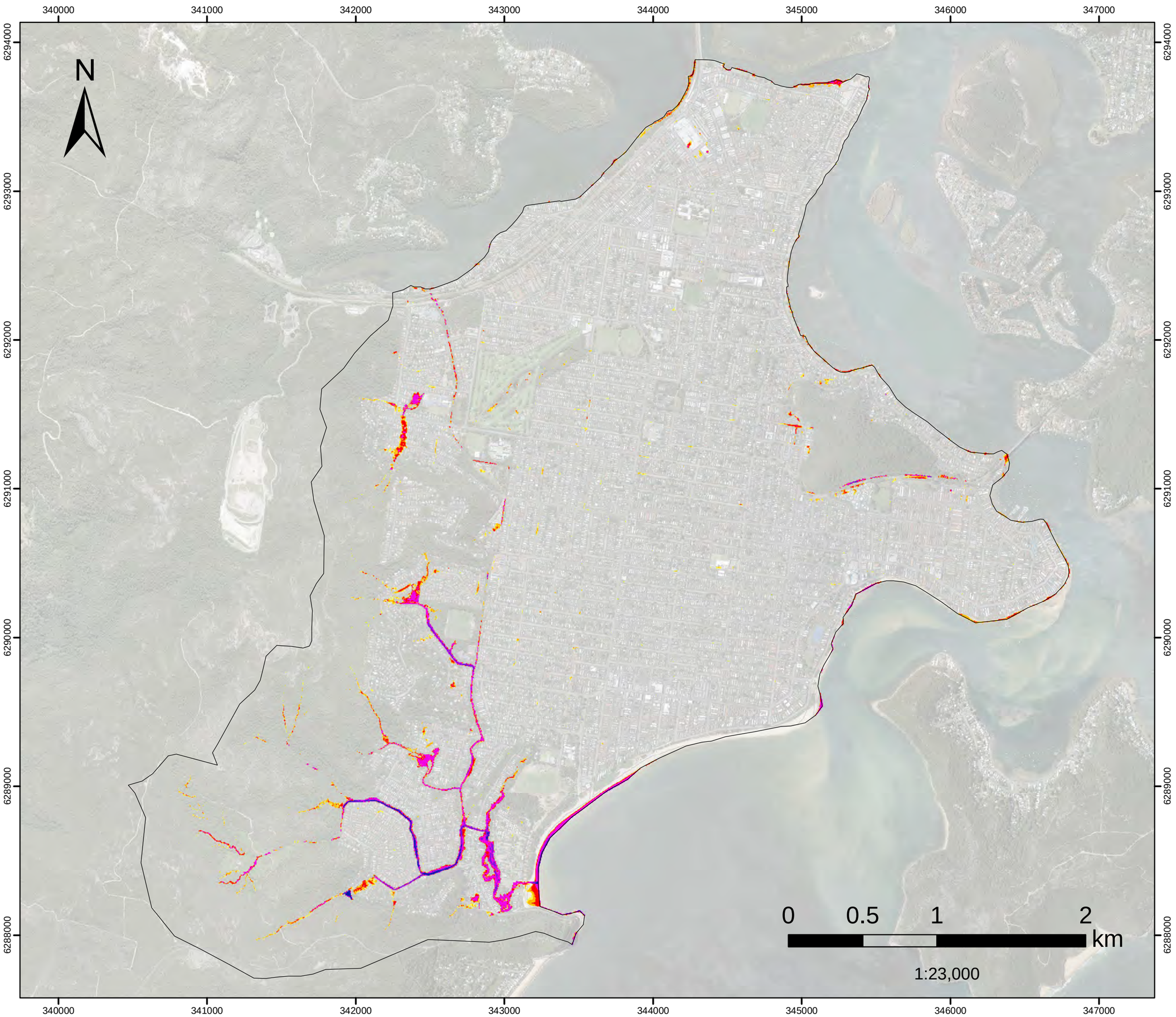

FIGURE L.31
20%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

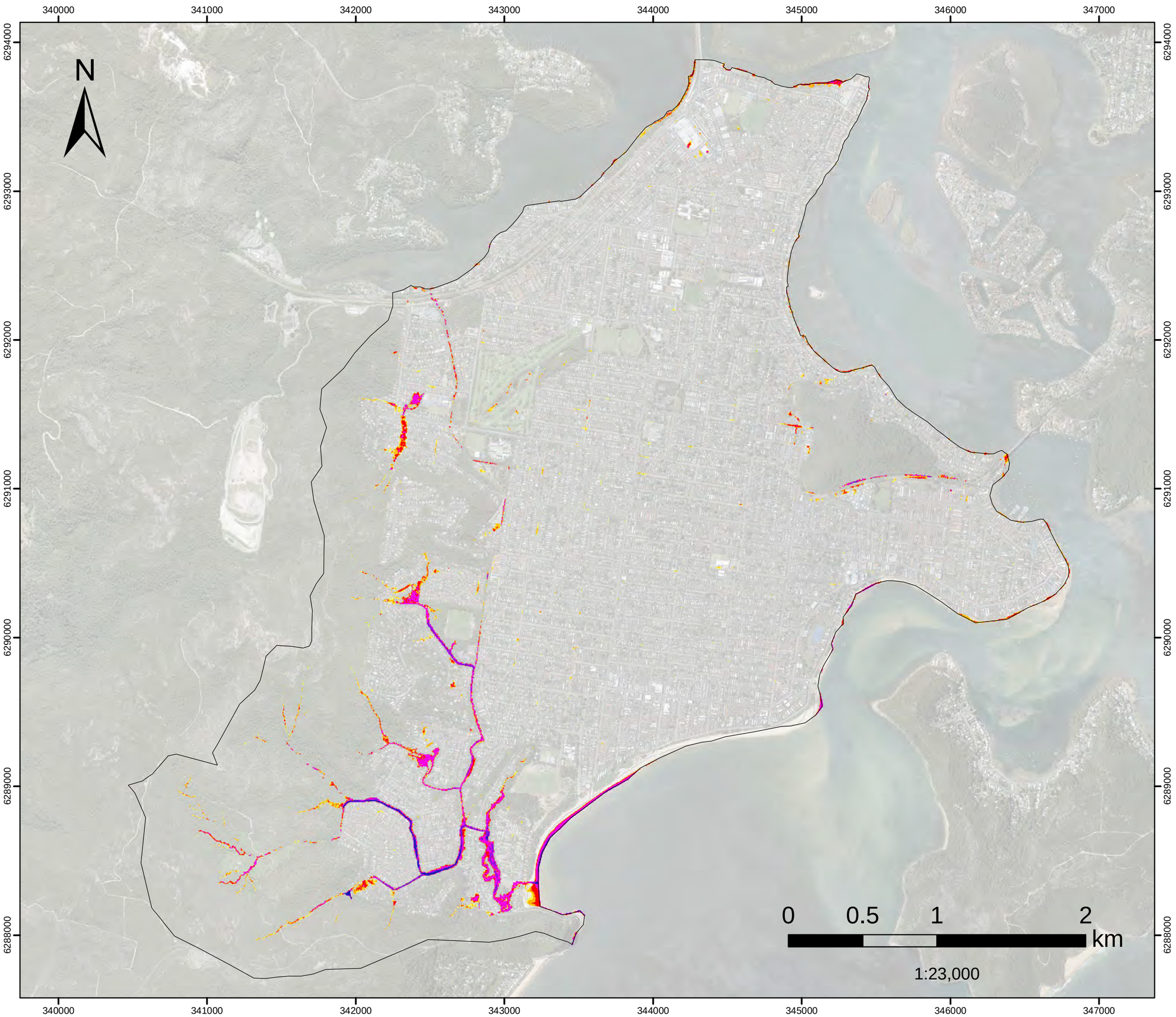

FIGURE L.32
20%AEP FM08

Palmtree Grove Detention Basin

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

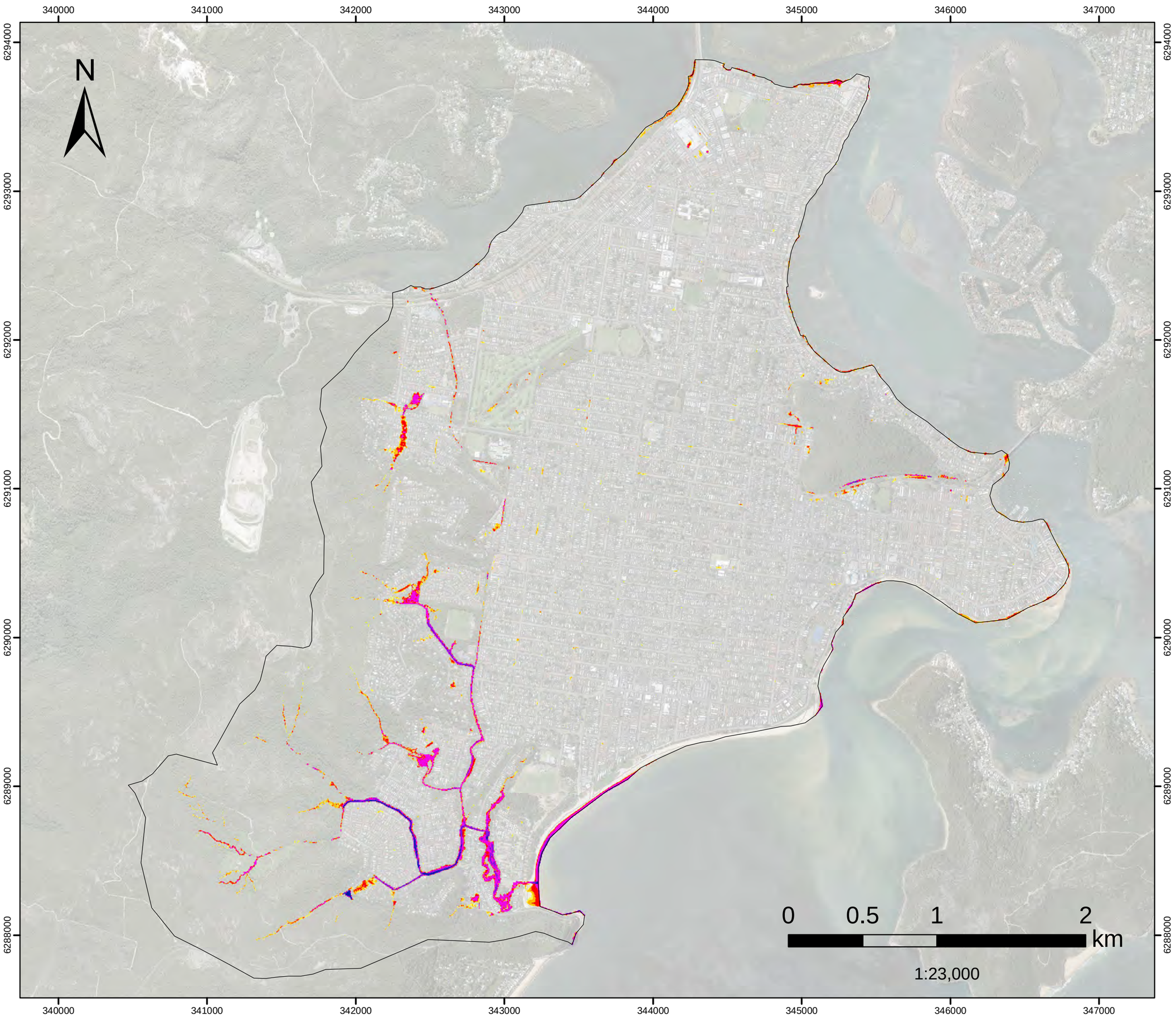

FIGURE L.33
20%AEP FM09
Wilks Av and McManus Cl
Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

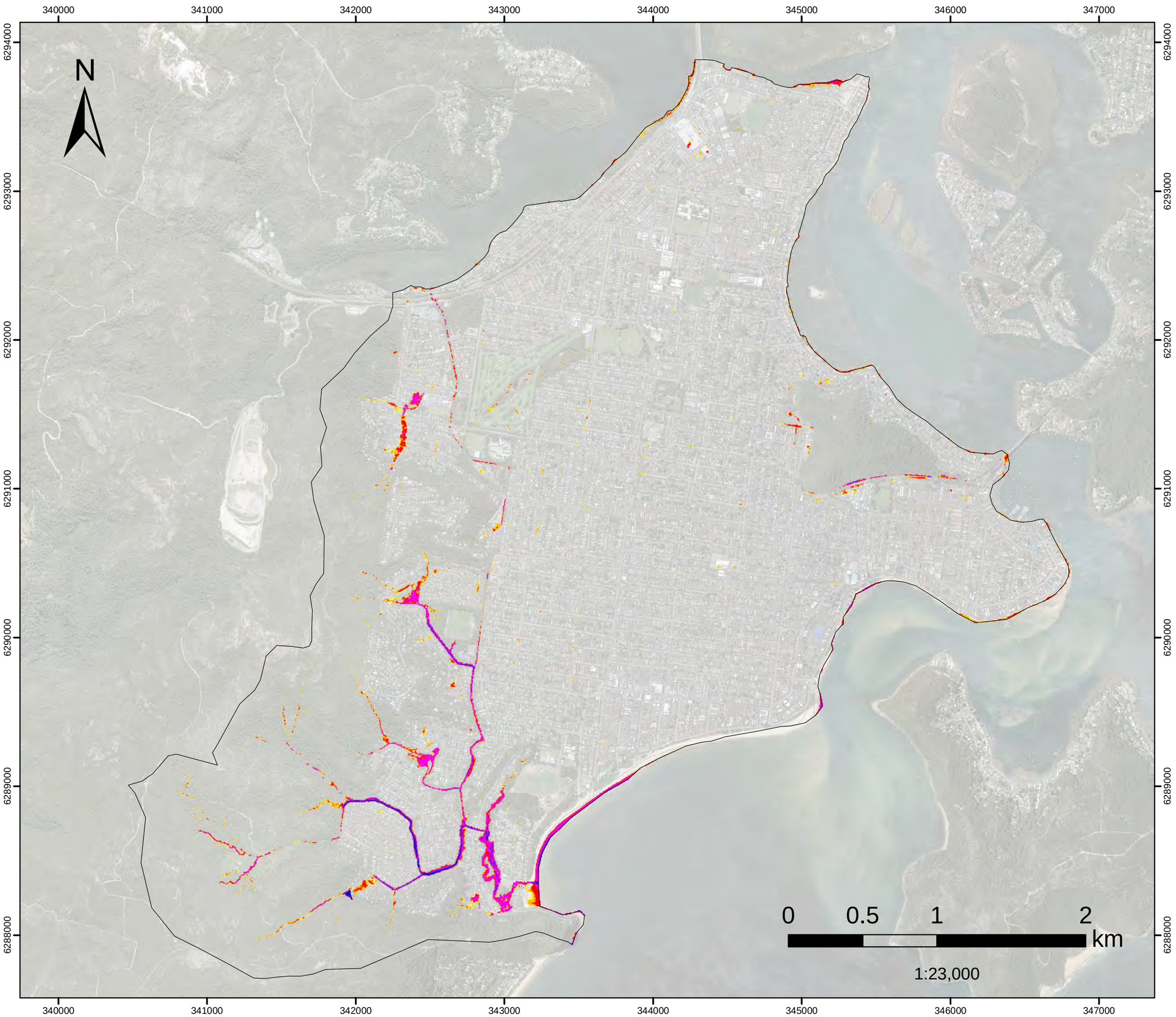

FIGURE L.34
20%AEP FM10

Neera Rd

Flood Depth

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Flood Depth (m)

- < 0.15
- 0.16- 0.2
- 0.21 - 0.3
- 0.31 - 0.5
- 0.51 - 1
- 1.1 - 1.5
- >1.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

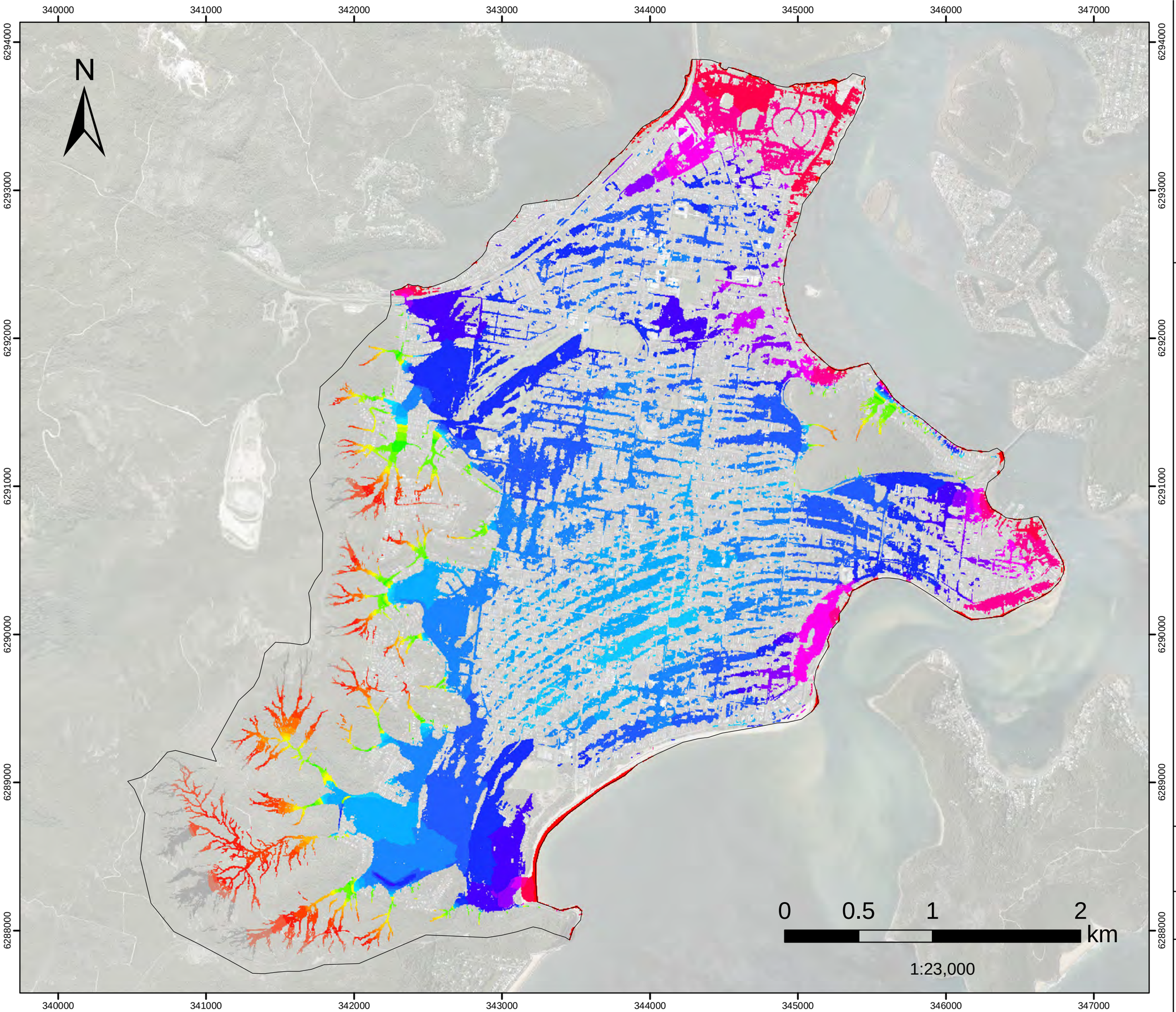

FIGURE L.35
PMF FM01
Woy Woy CBD
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

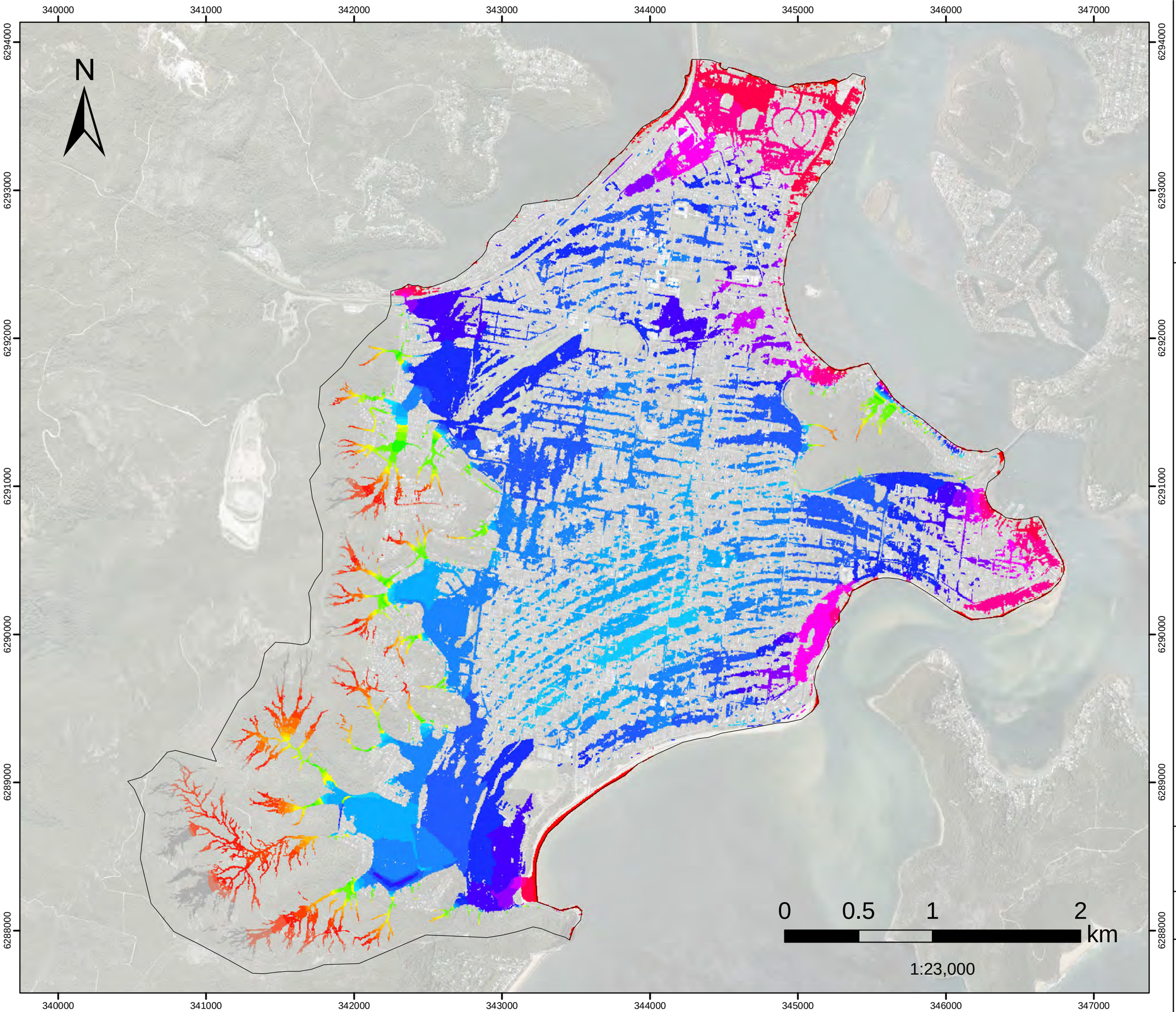

FIGURE L.36
PMF FM02

Dulkala Rd to Karingal Cl
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

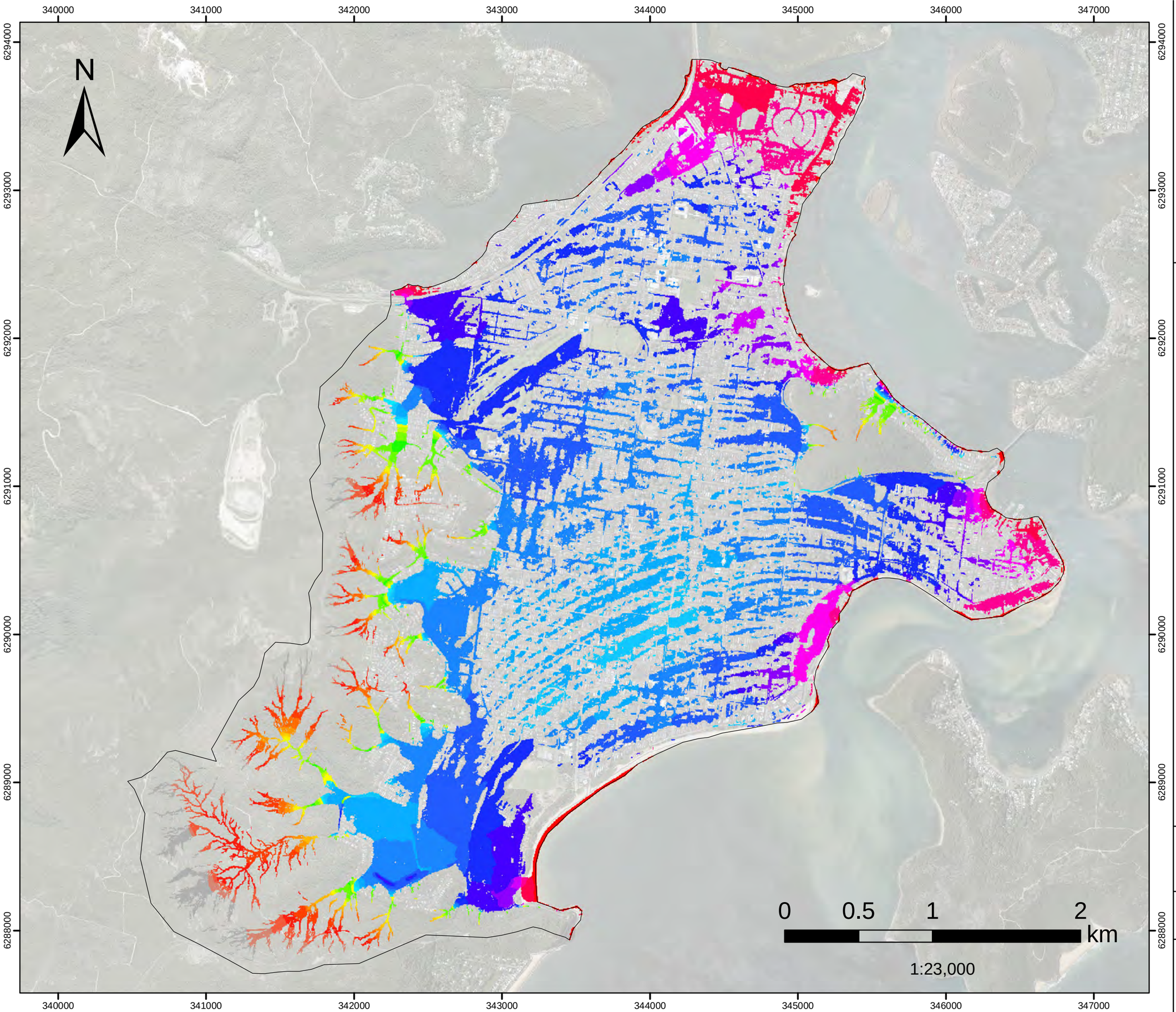

FIGURE L.37
PMF FM03

Infiltration Devices

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

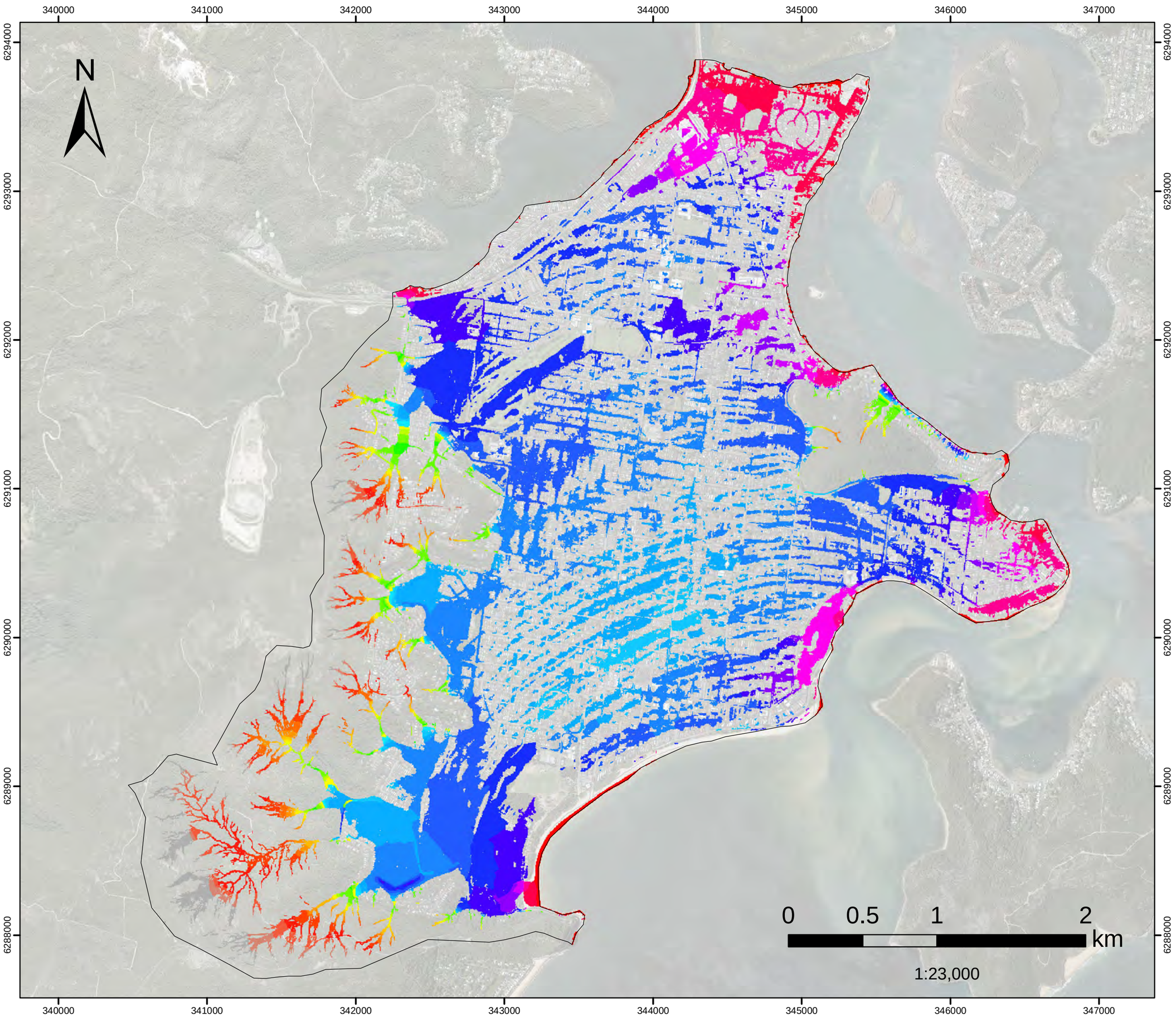

FIGURE L.38
PMF FM05
Greenhaven Dr
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

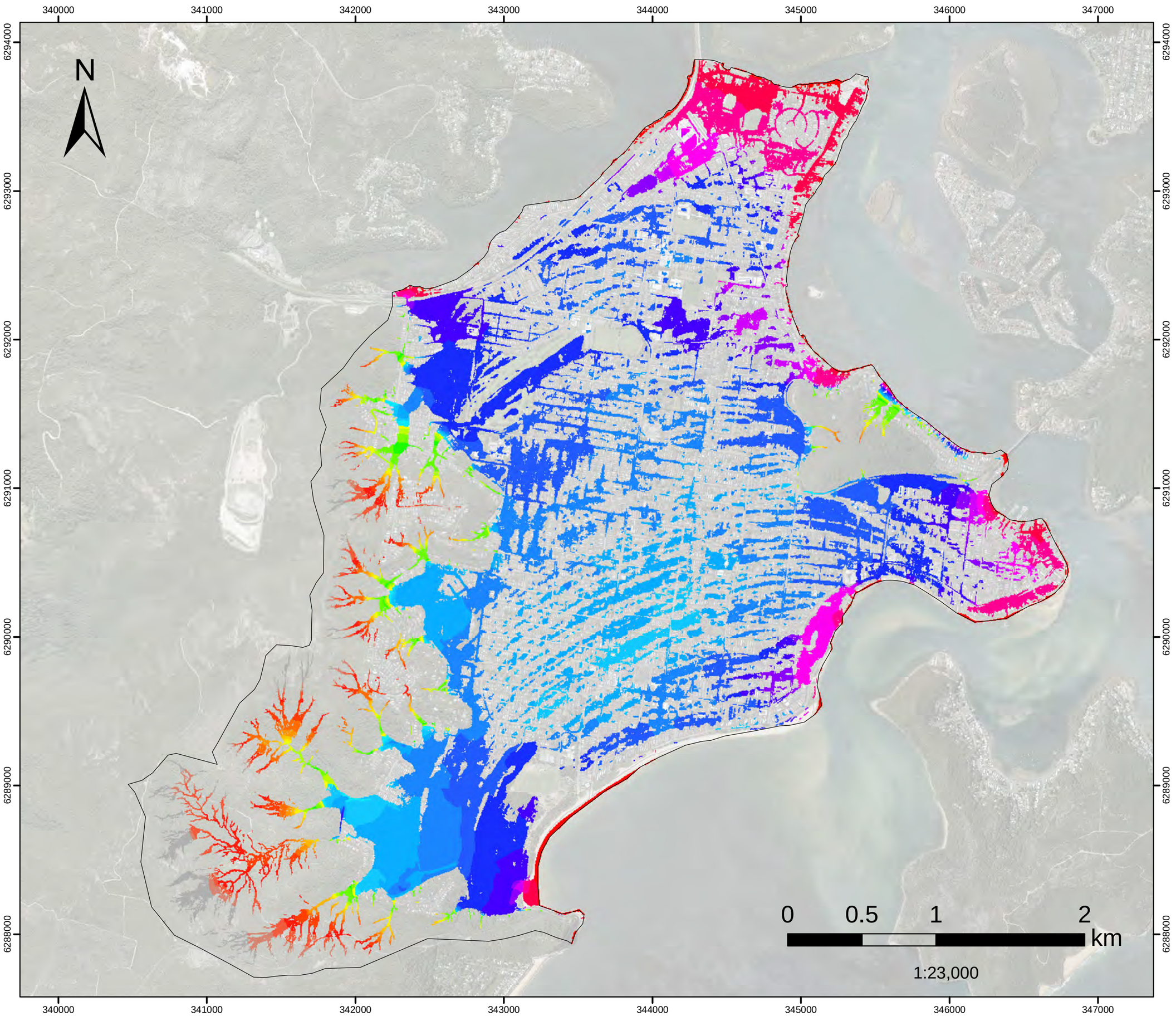

FIGURE L.39
PMF FM06A

Kahibah Ck system maintenance work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

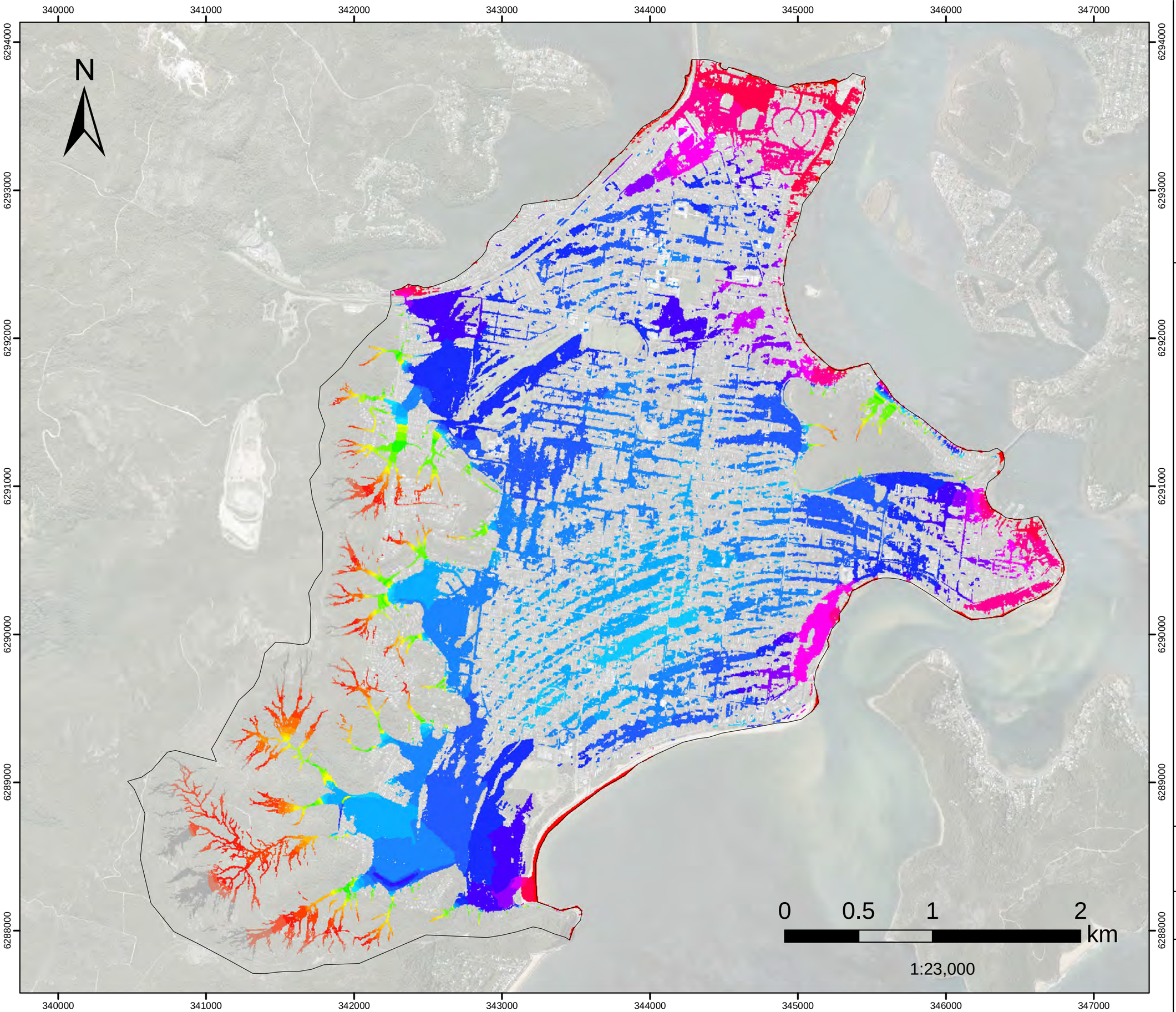

FIGURE L.40
PMF FM08

Palmtree Grove Detention Basin

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

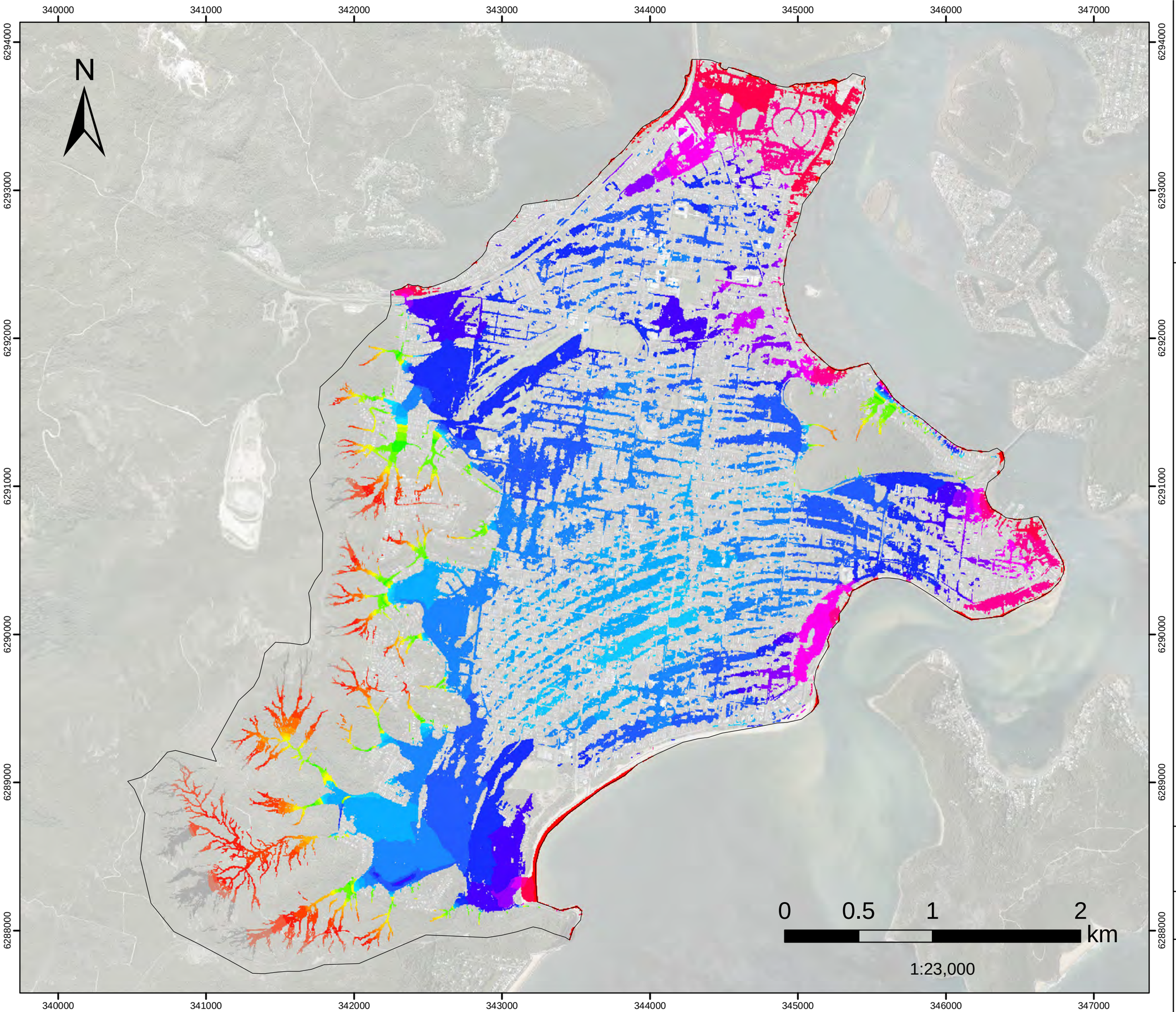

FIGURE L.41
PMF FM10

Neera Rd

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 2hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

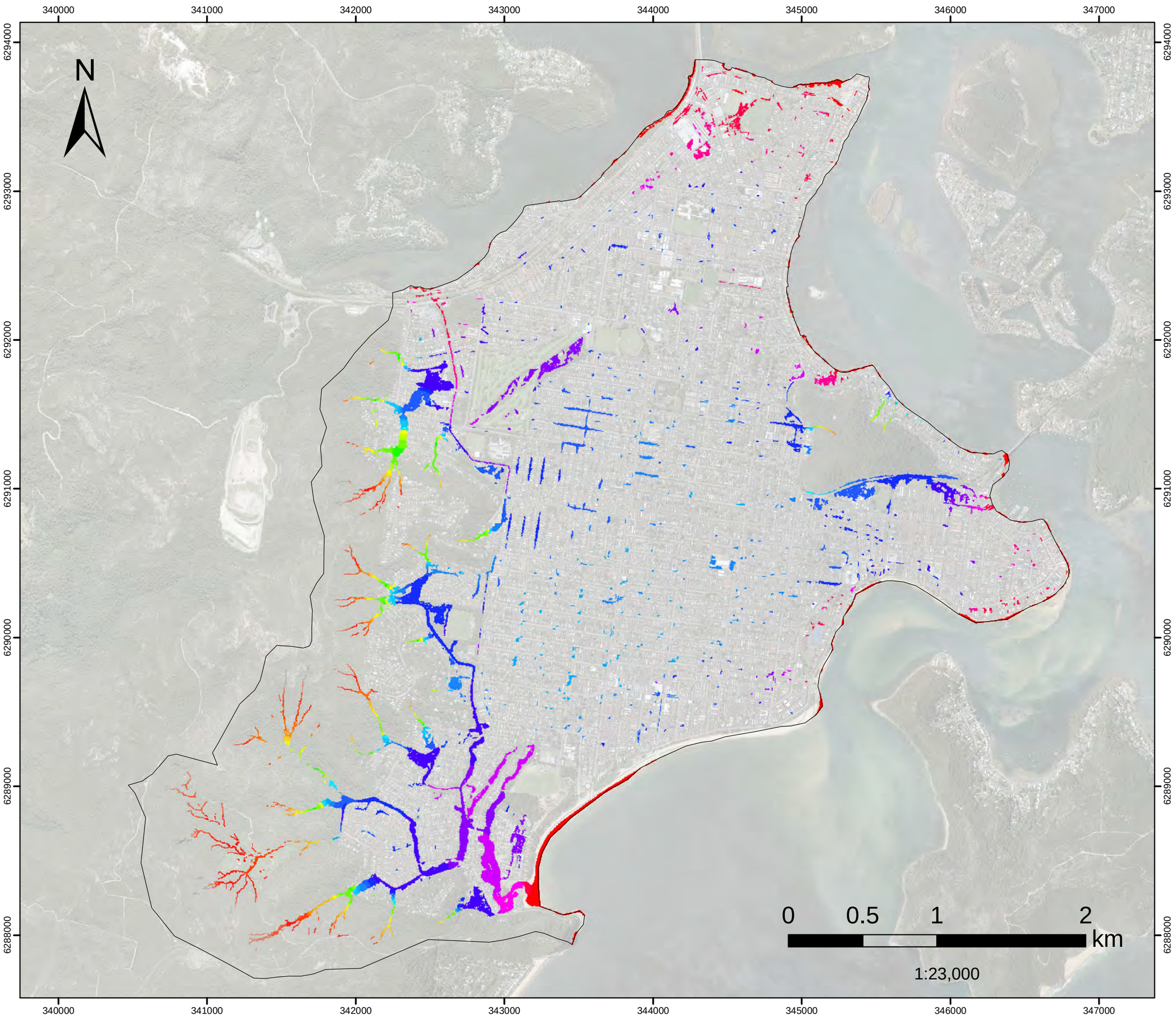

FIGURE L.42
1%AEP FM01

Woy Woy CBD

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

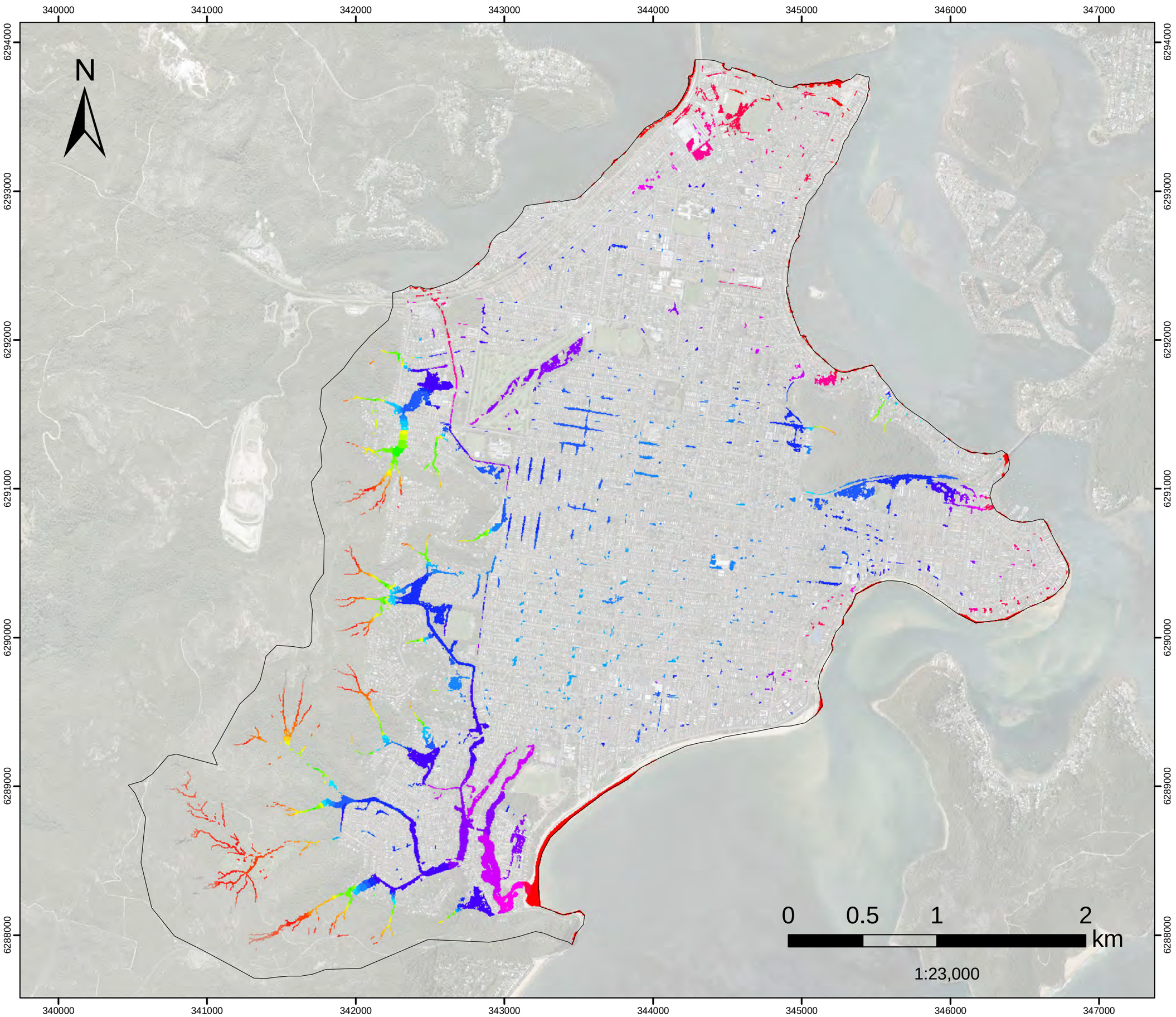

FIGURE L.43
1%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

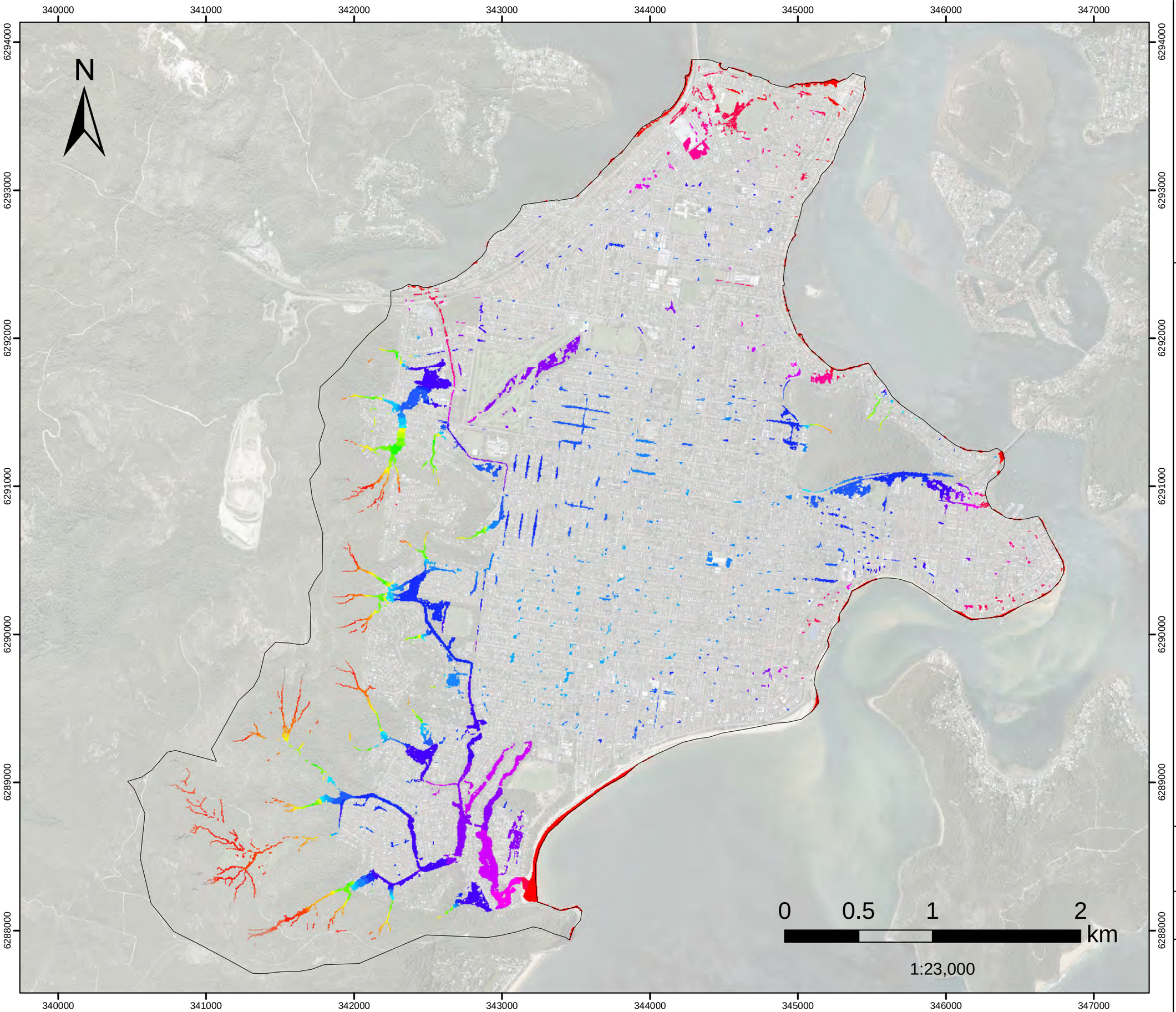

FIGURE L.44
1%AEP FM03

Infiltration Devices

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

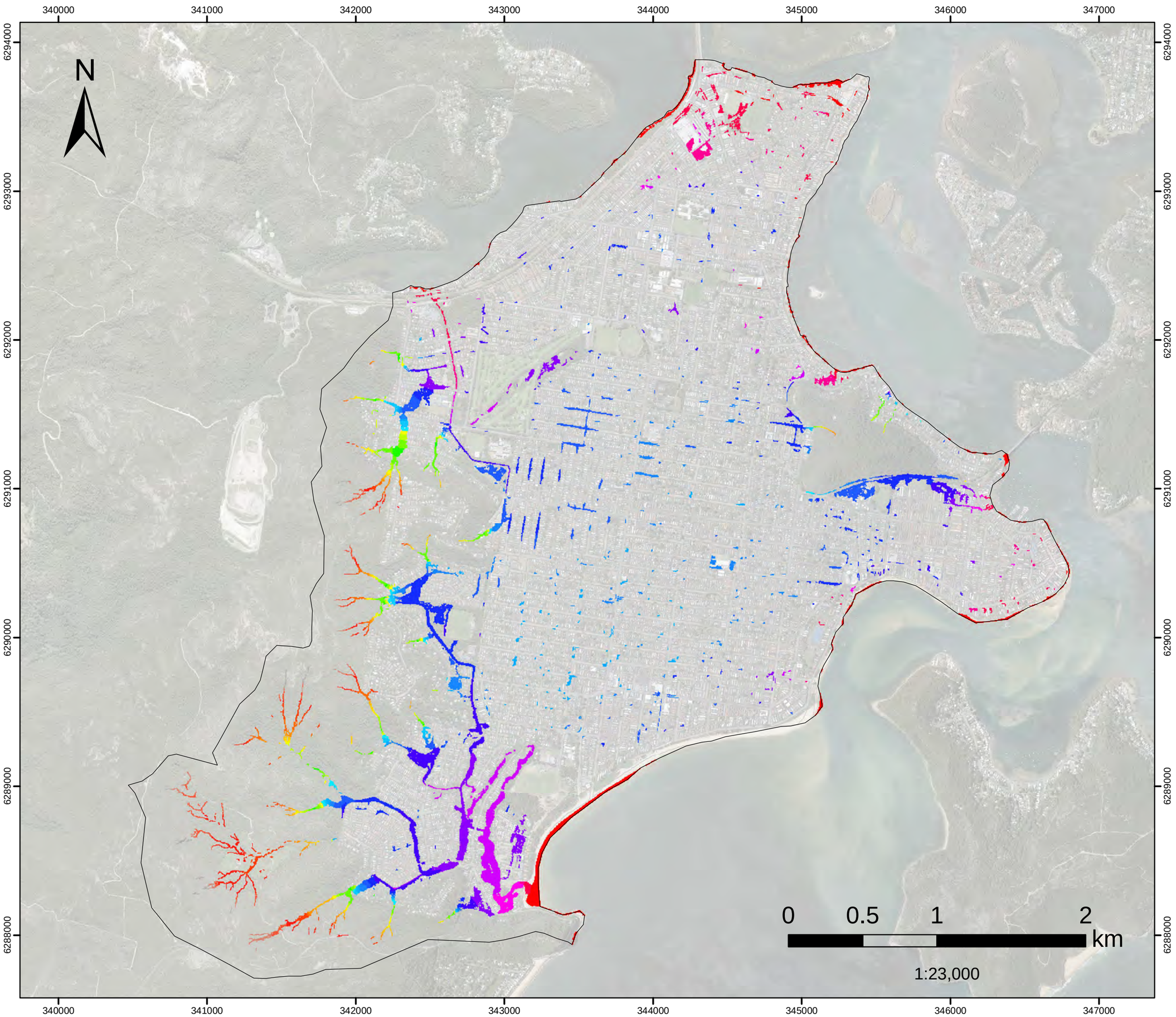

FIGURE L.45
1%AEP FM04

Groundwater pumping and Everglades drainage update work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

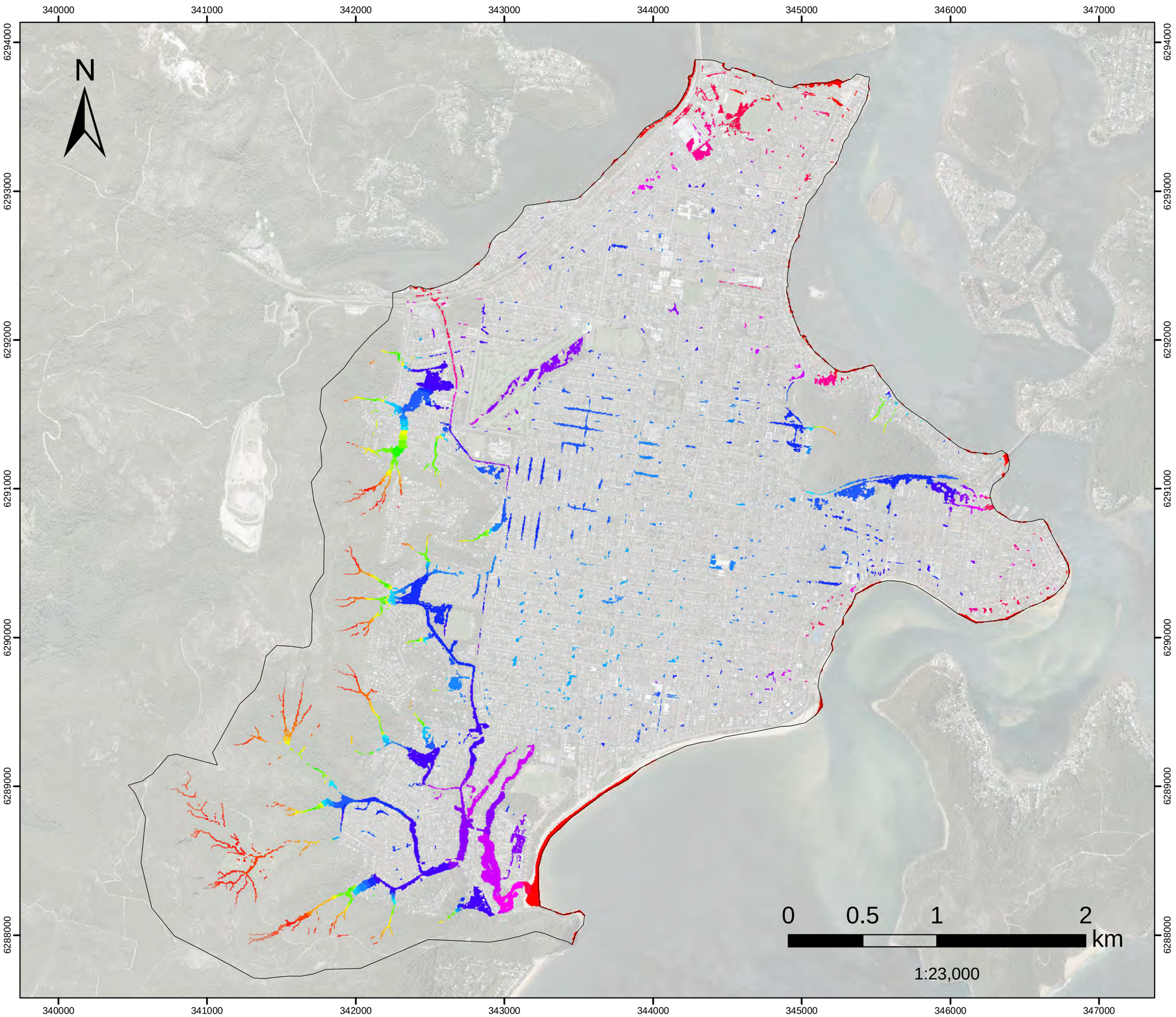

FIGURE L.46
1%AEP FM05

Greenhaven Dr

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

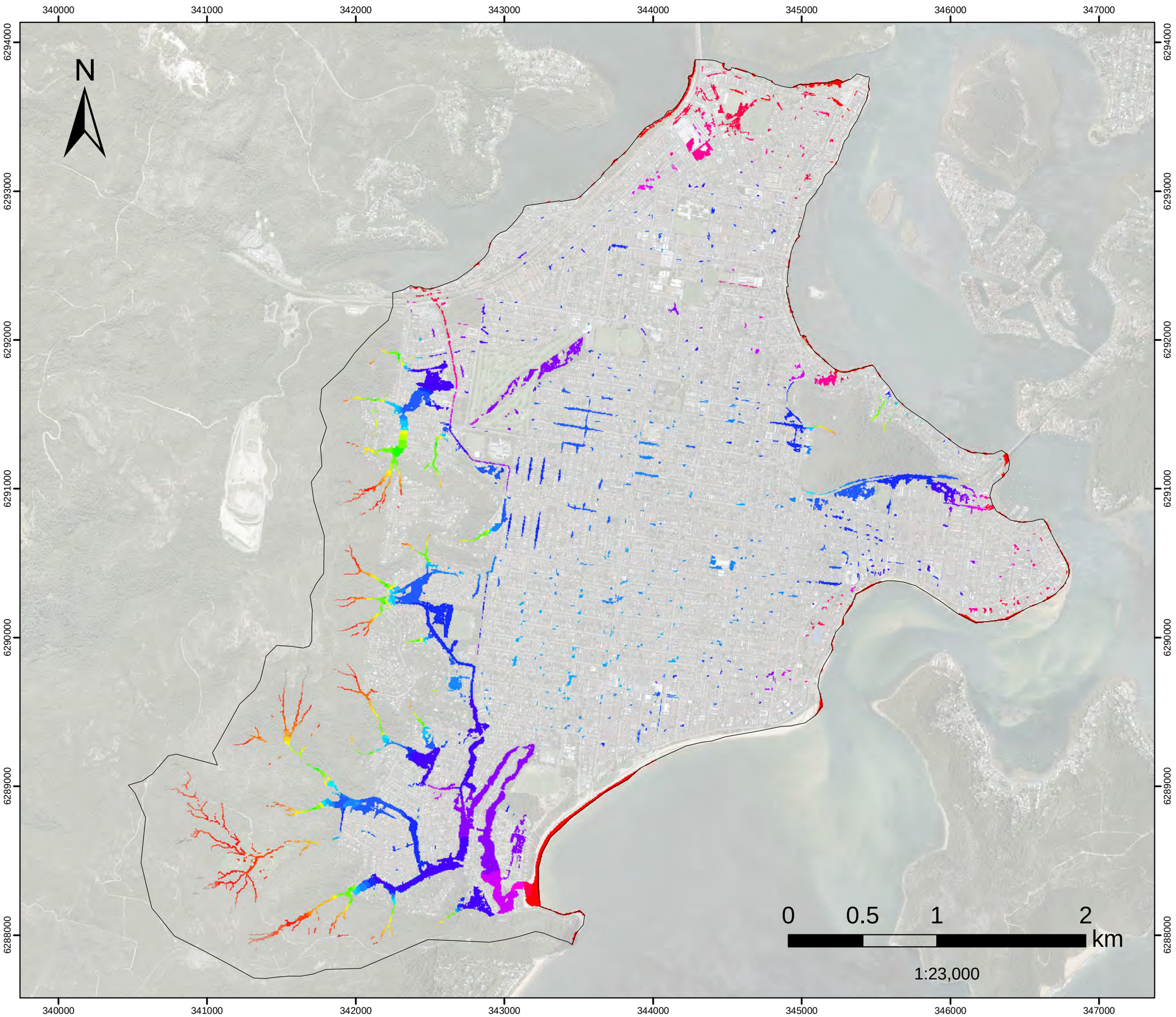

FIGURE L.47
1%AEP FM06A

Kahibah Ck system maintenance work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

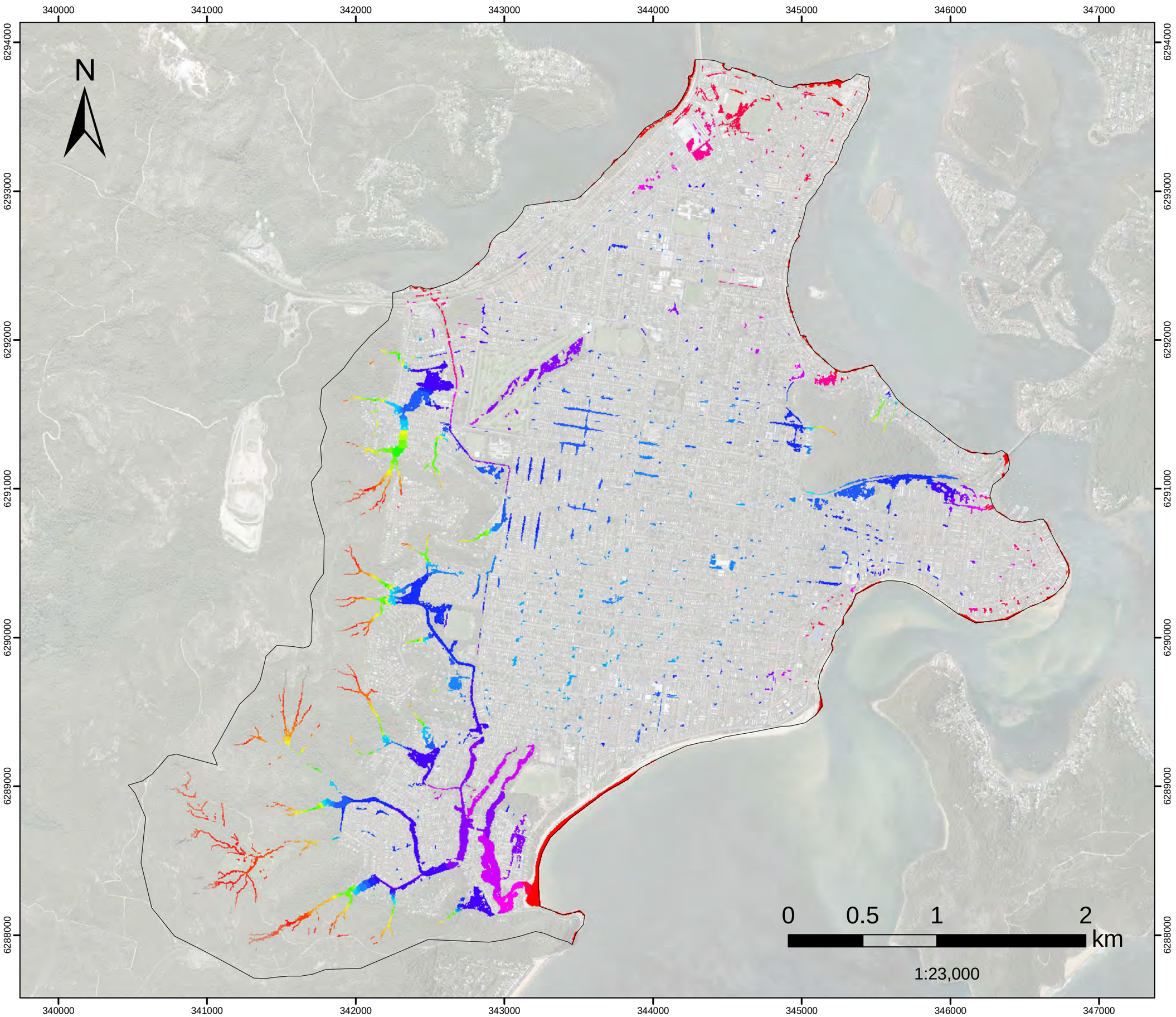

FIGURE L.48
1%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

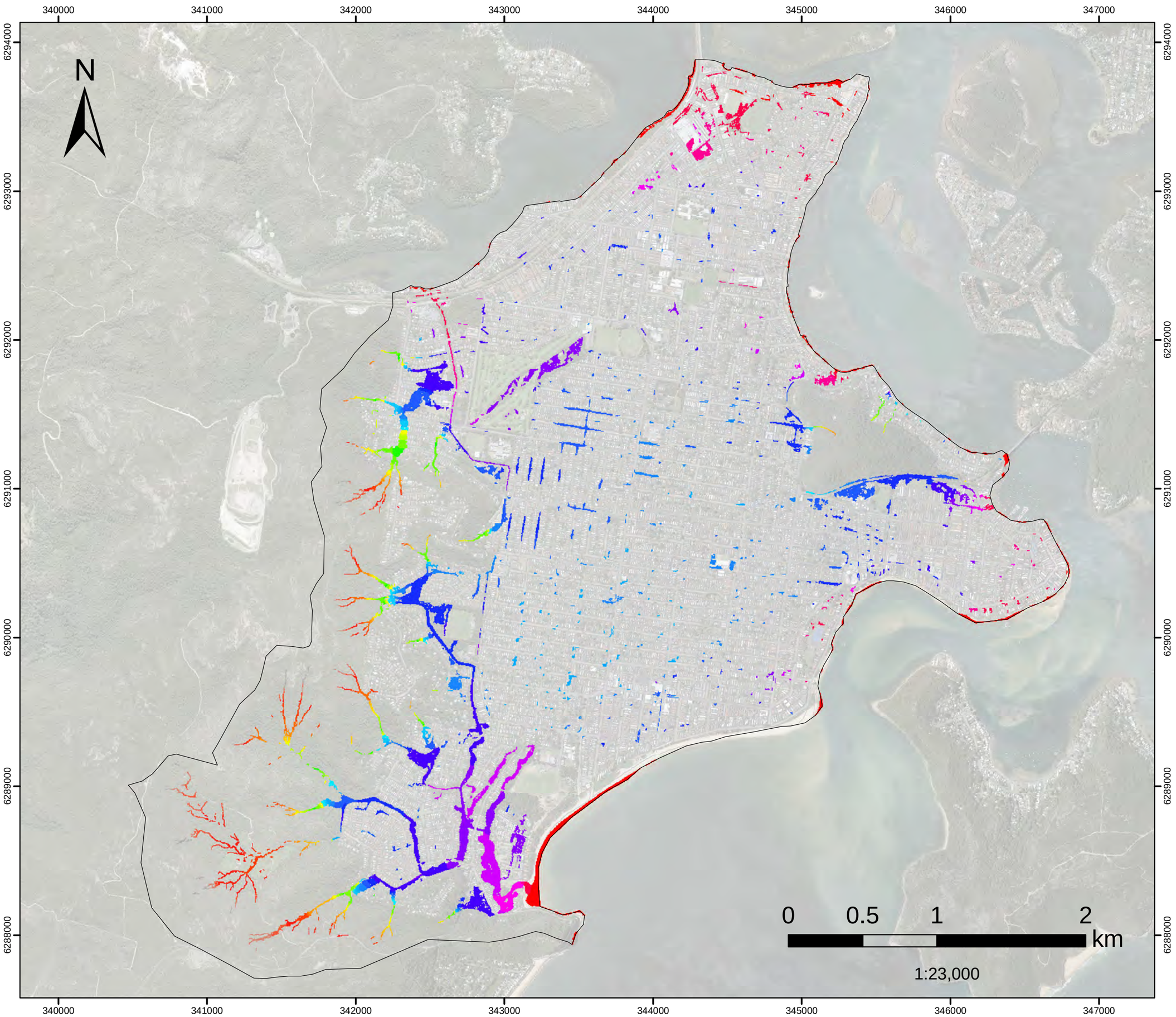

FIGURE L.49
1%AEP FM08
Palmtree Grove Detention Basin
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

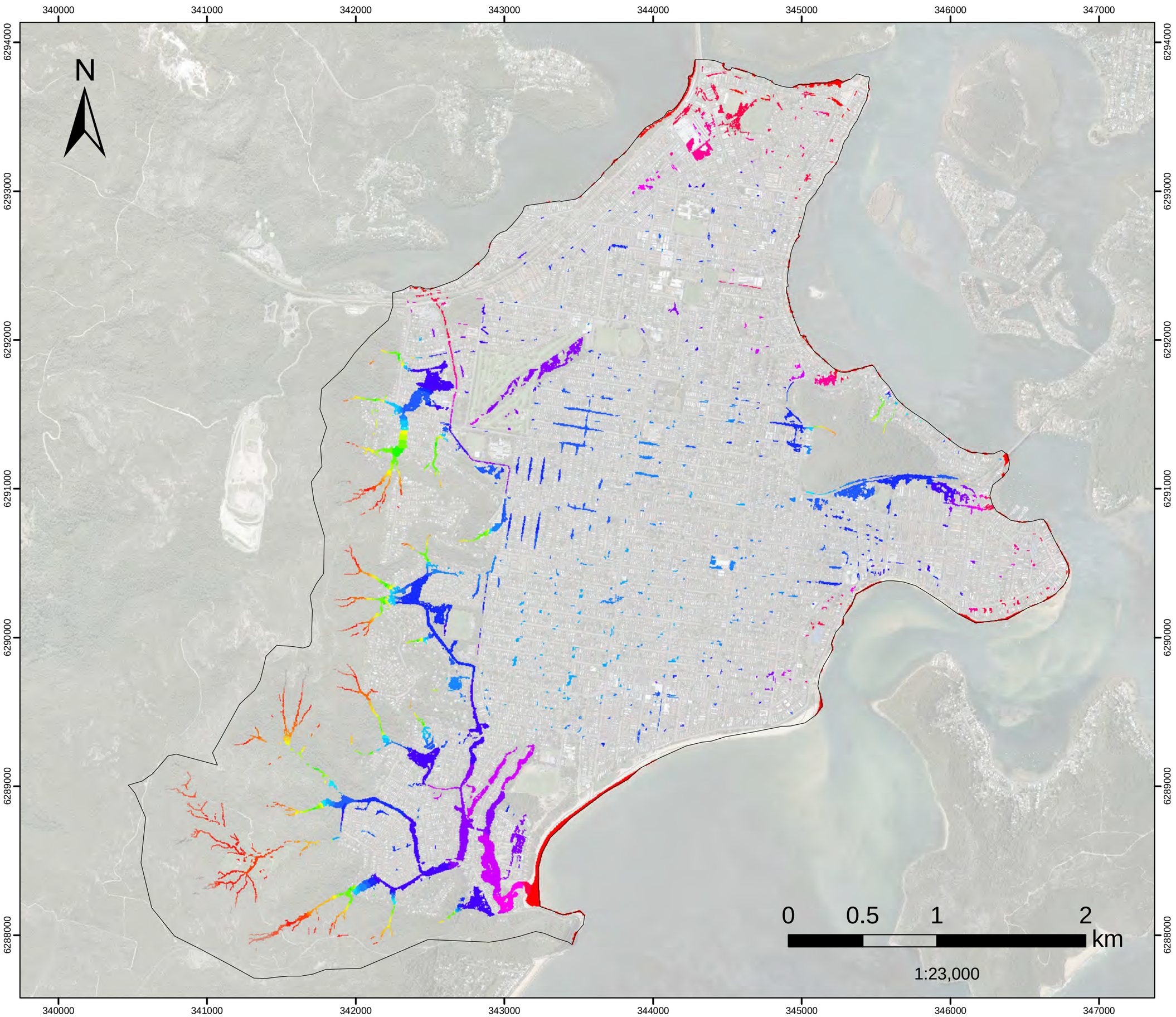

FIGURE L.50
1%AEP FM09

Wilks Av and McManus Cl

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

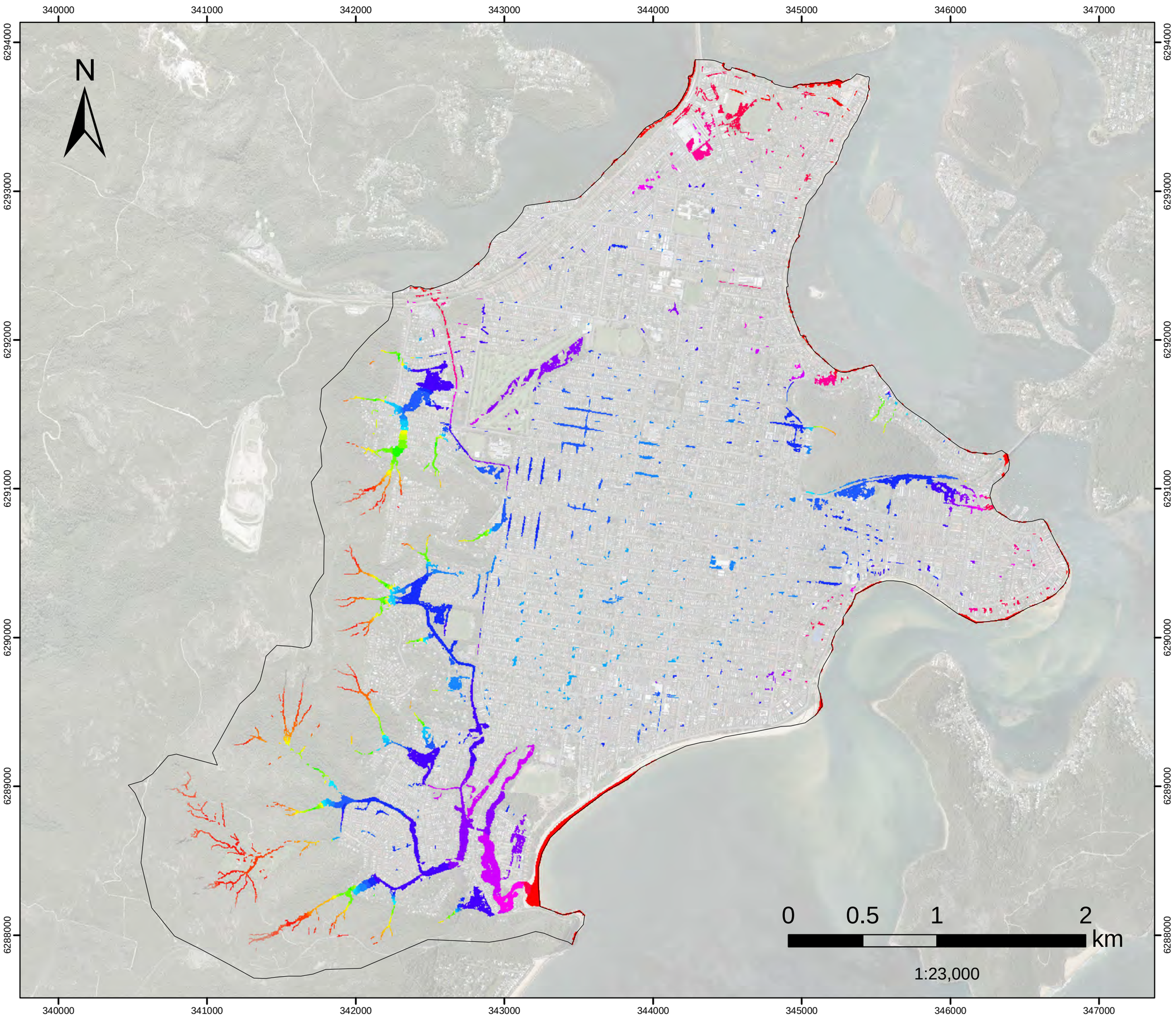

FIGURE L.51
1%AEP FM10

Neera Rd

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 6hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

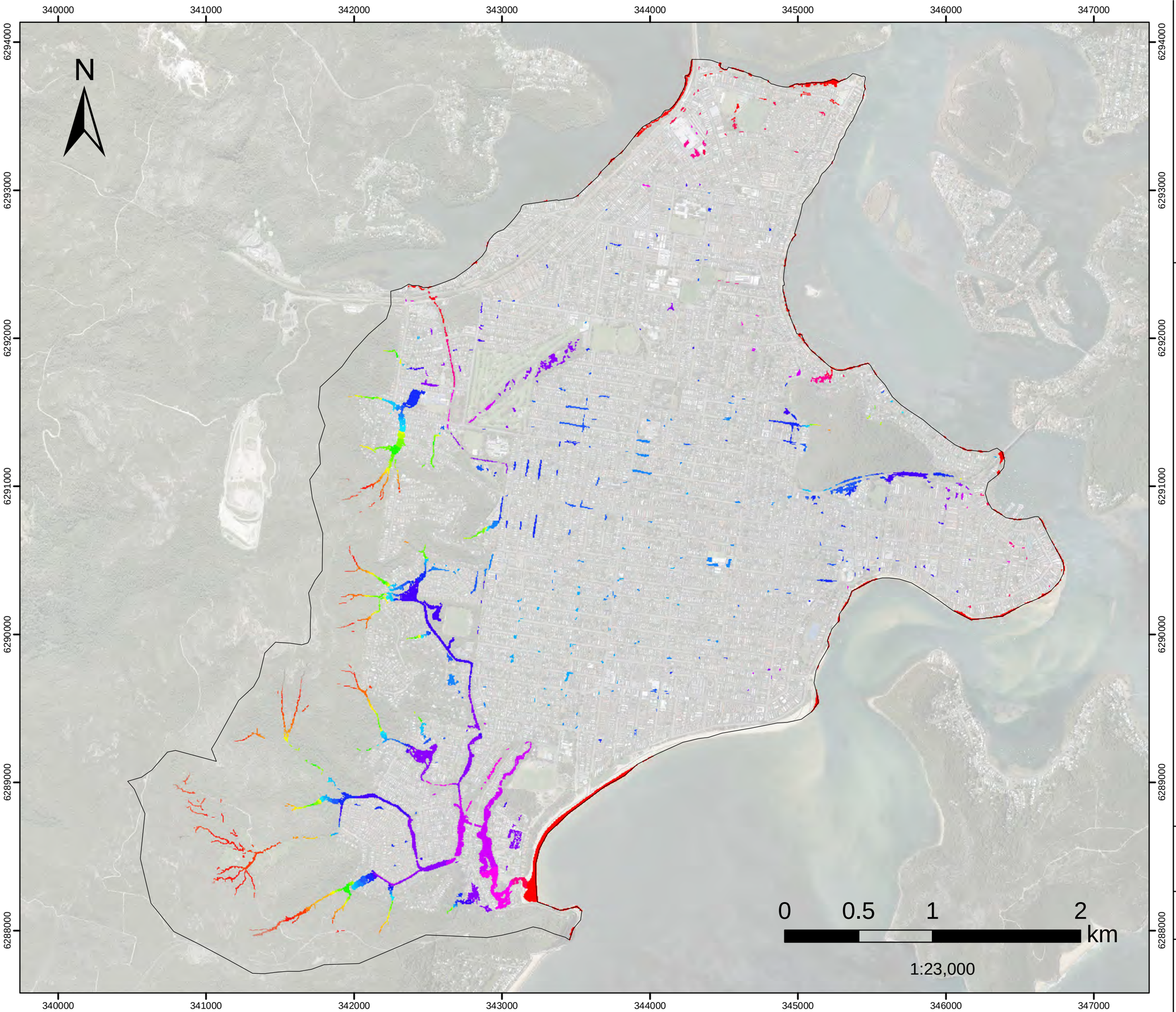

FIGURE L.52
10%AEP FM01

Woy Woy CBD

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

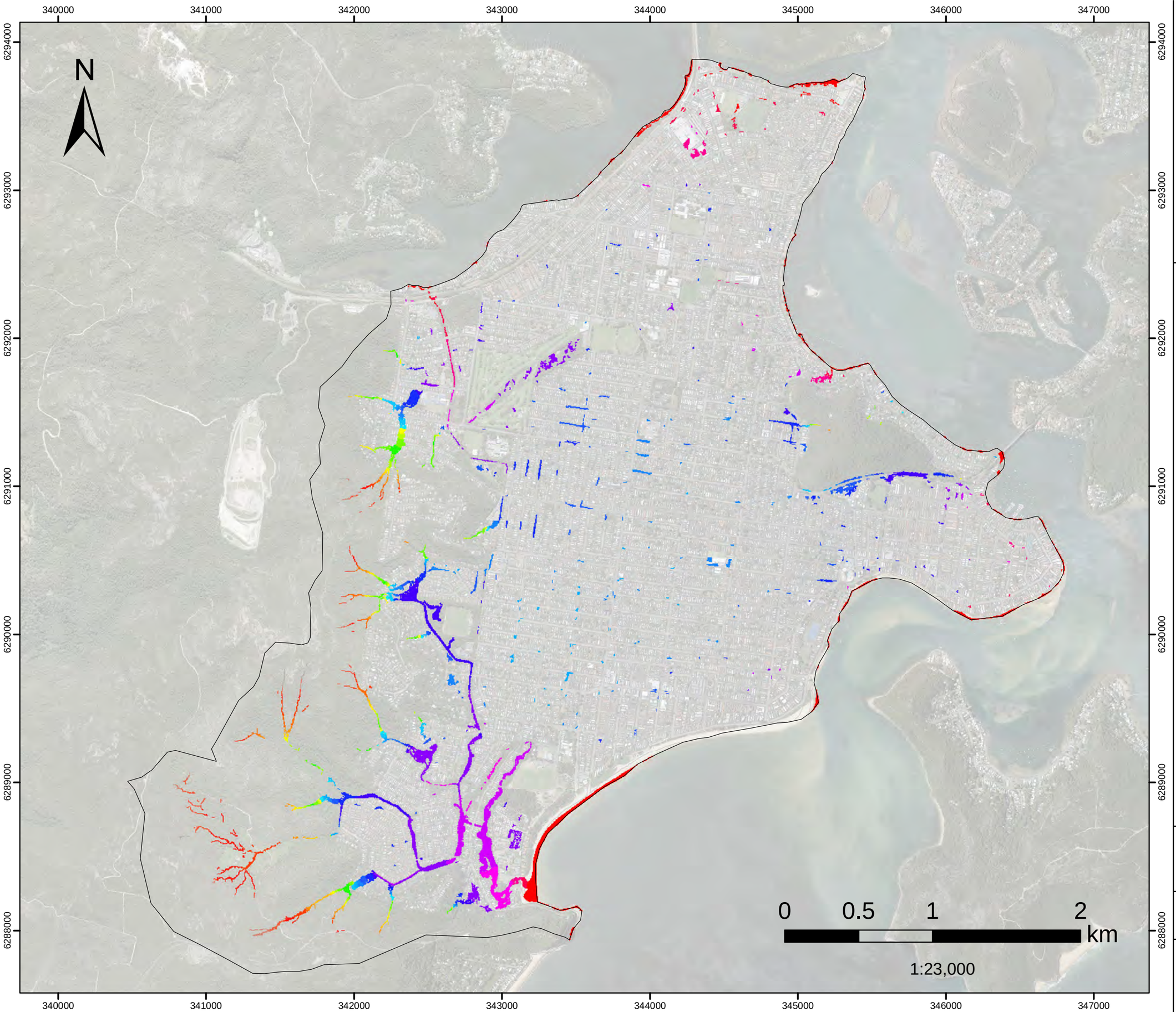

FIGURE L.53
10%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

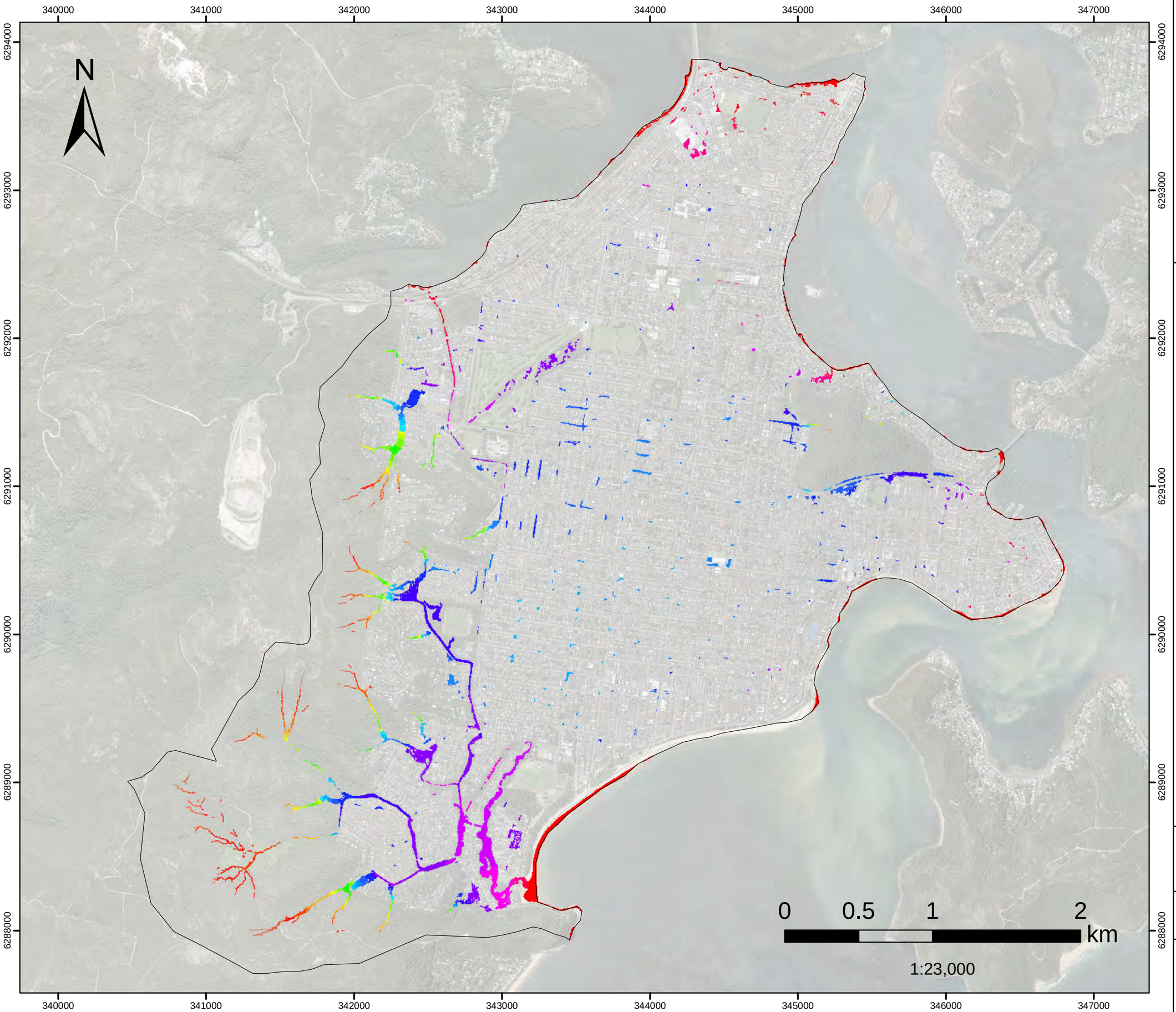

FIGURE L.54
10%AEP FM03

Infiltration Devices

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

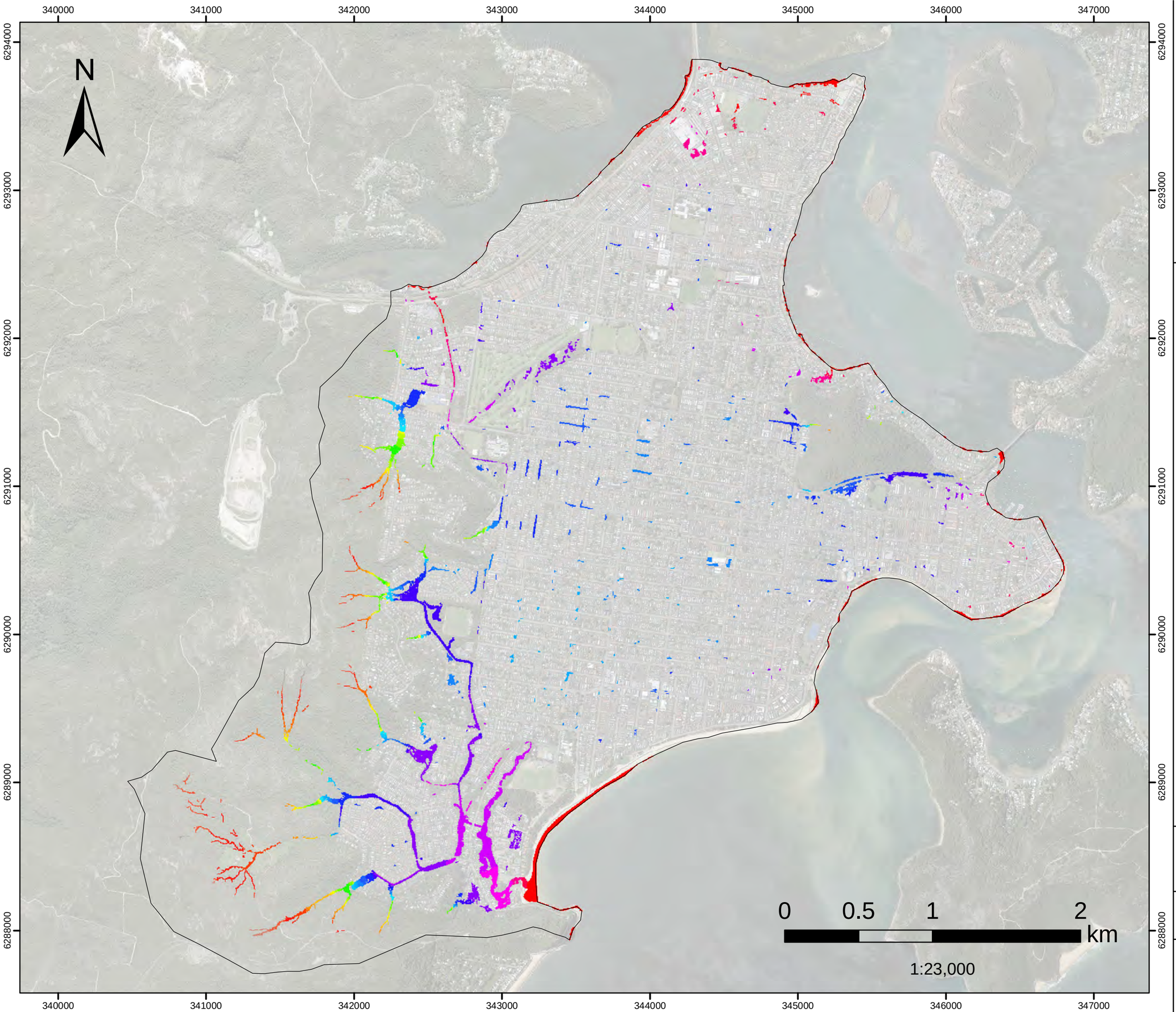

FIGURE L.55
10%AEP FM05

Greenhaven Dr

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

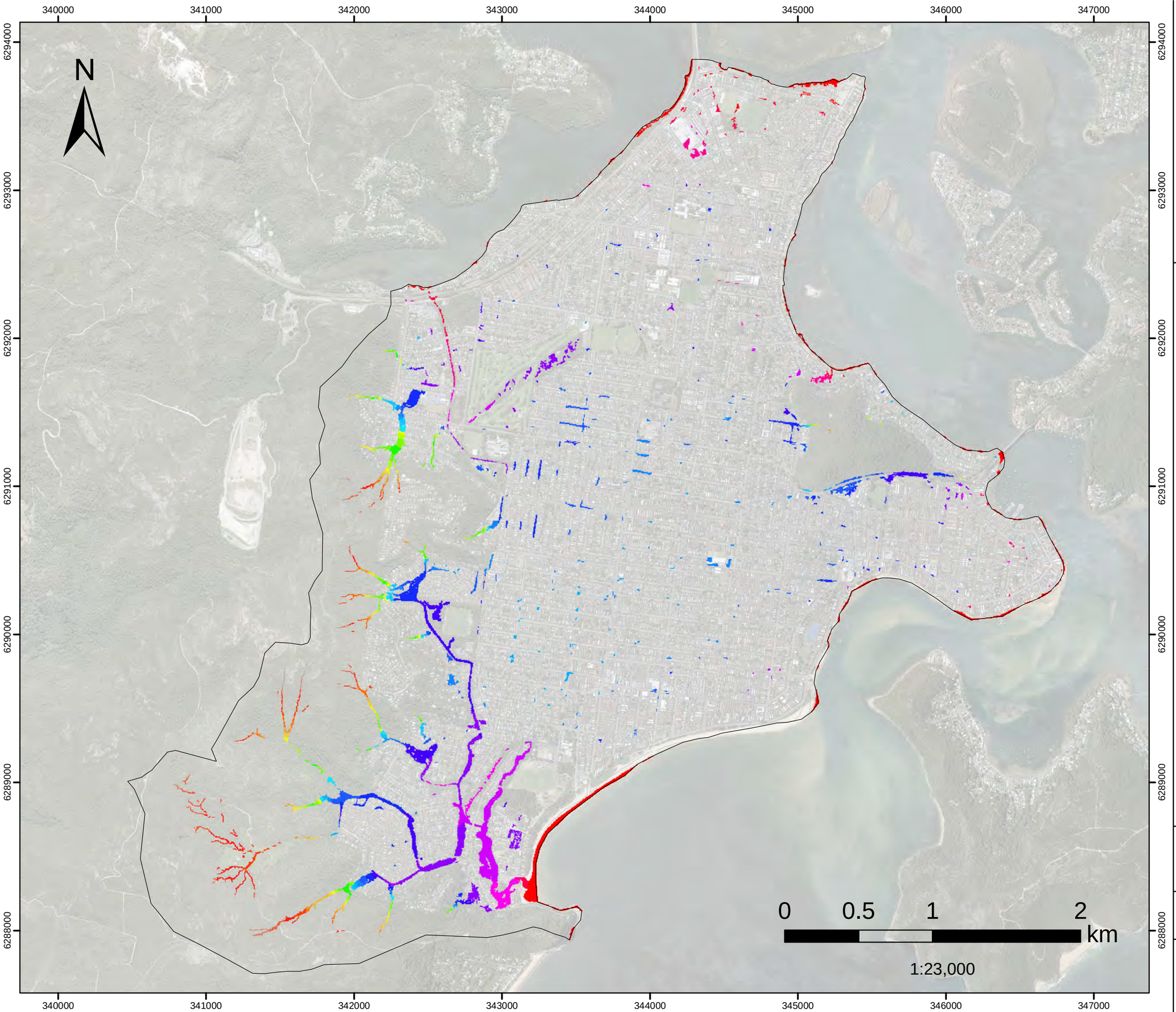

FIGURE L.56
10%AEP FM06A

Kahibah Ck system maintenance work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

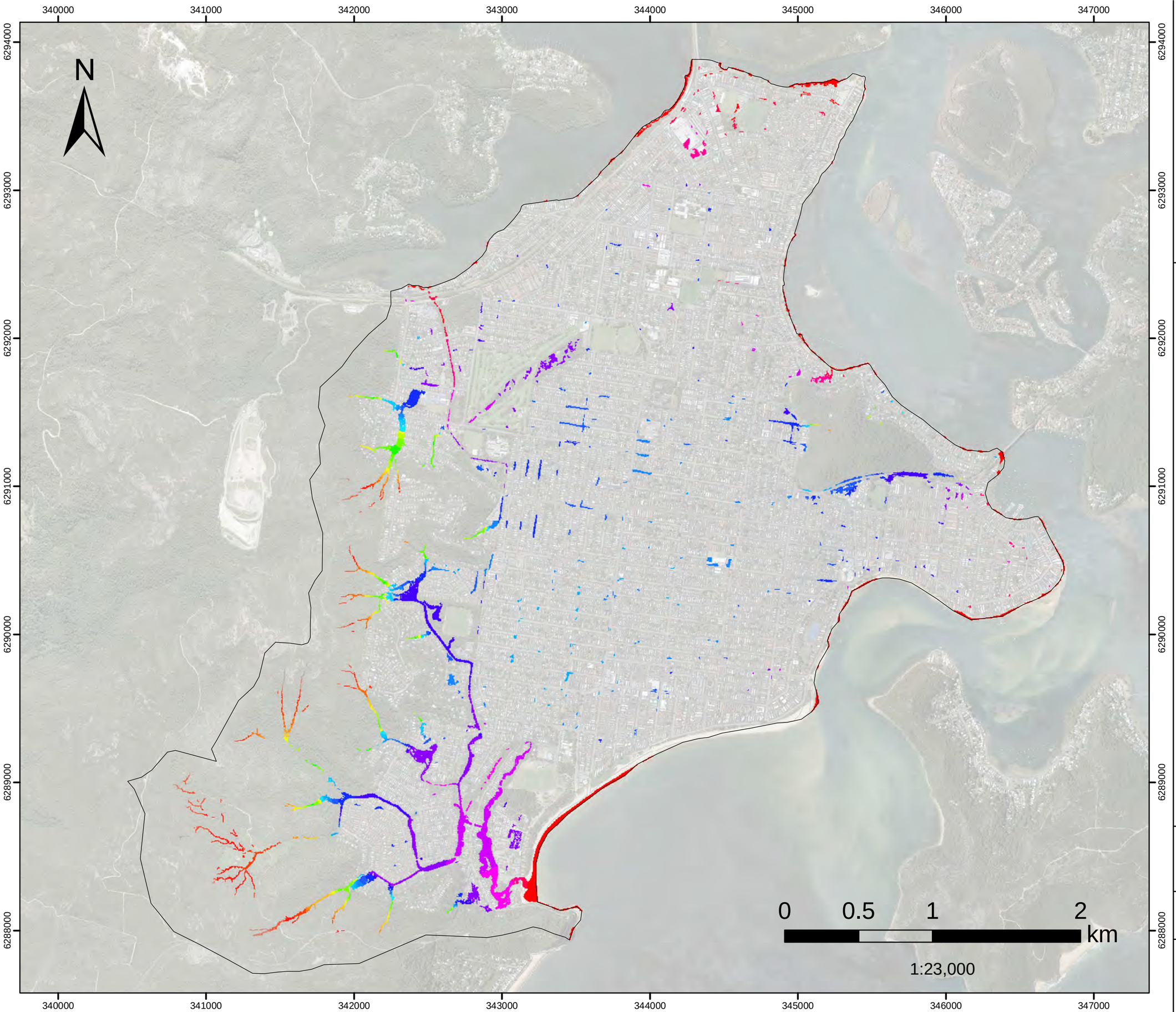

FIGURE L.57
10%AEP FM08

Palmtree Grove Detention Basin

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

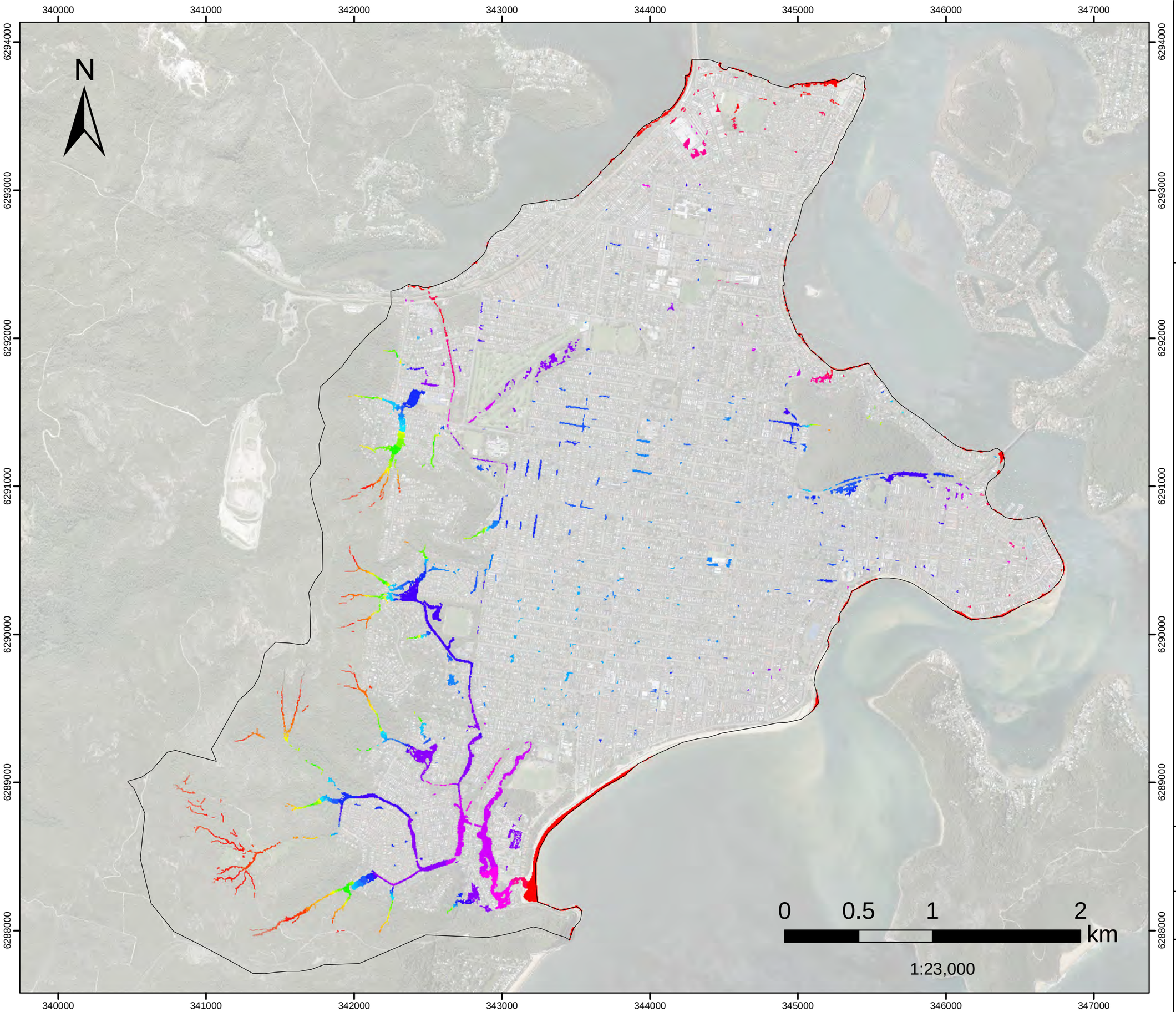

FIGURE L.58
10%AEP FM10

Neera Rd

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 3hrs

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

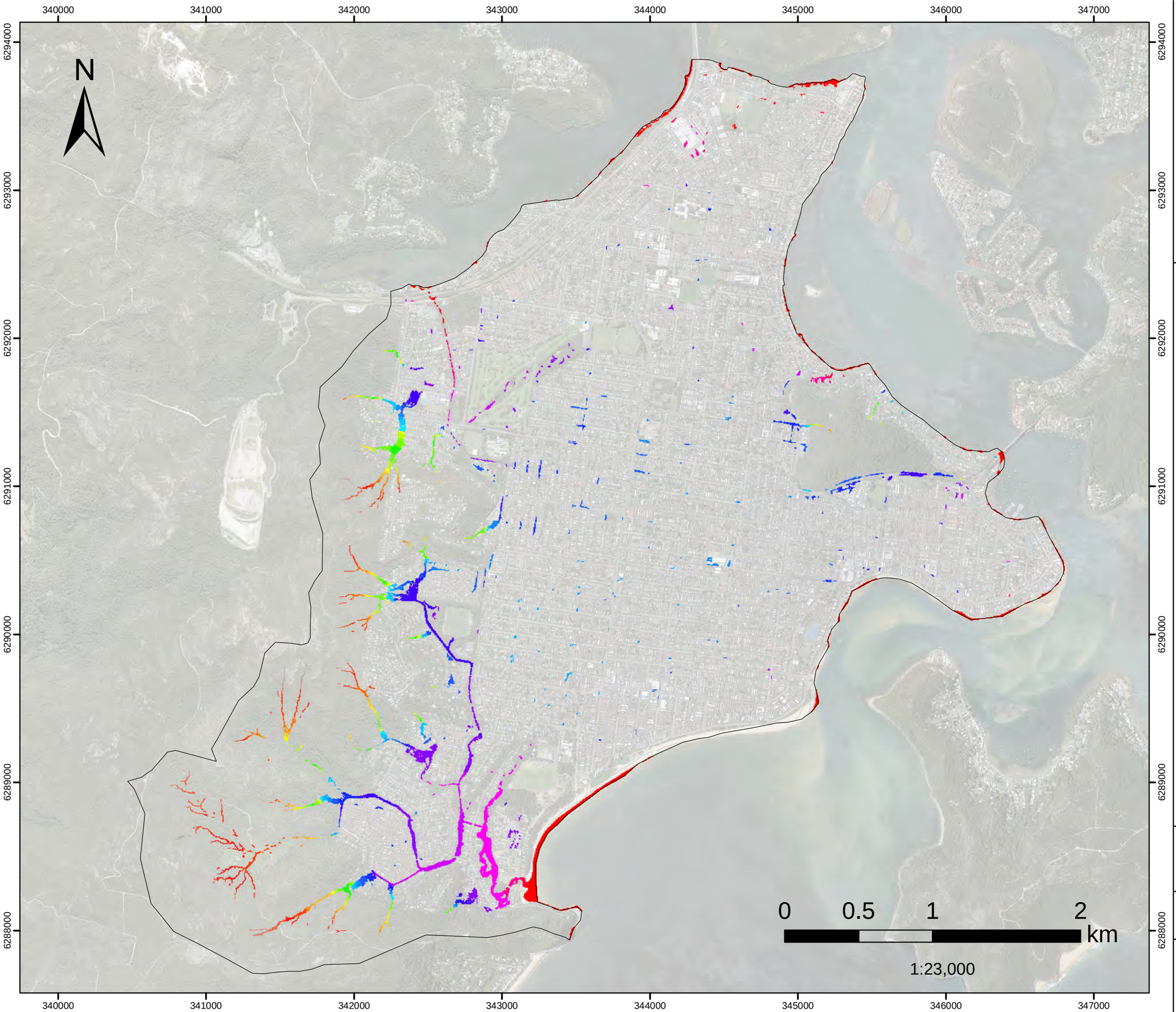

FIGURE L.59
20%AEP FM01

Woy Woy CBD

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

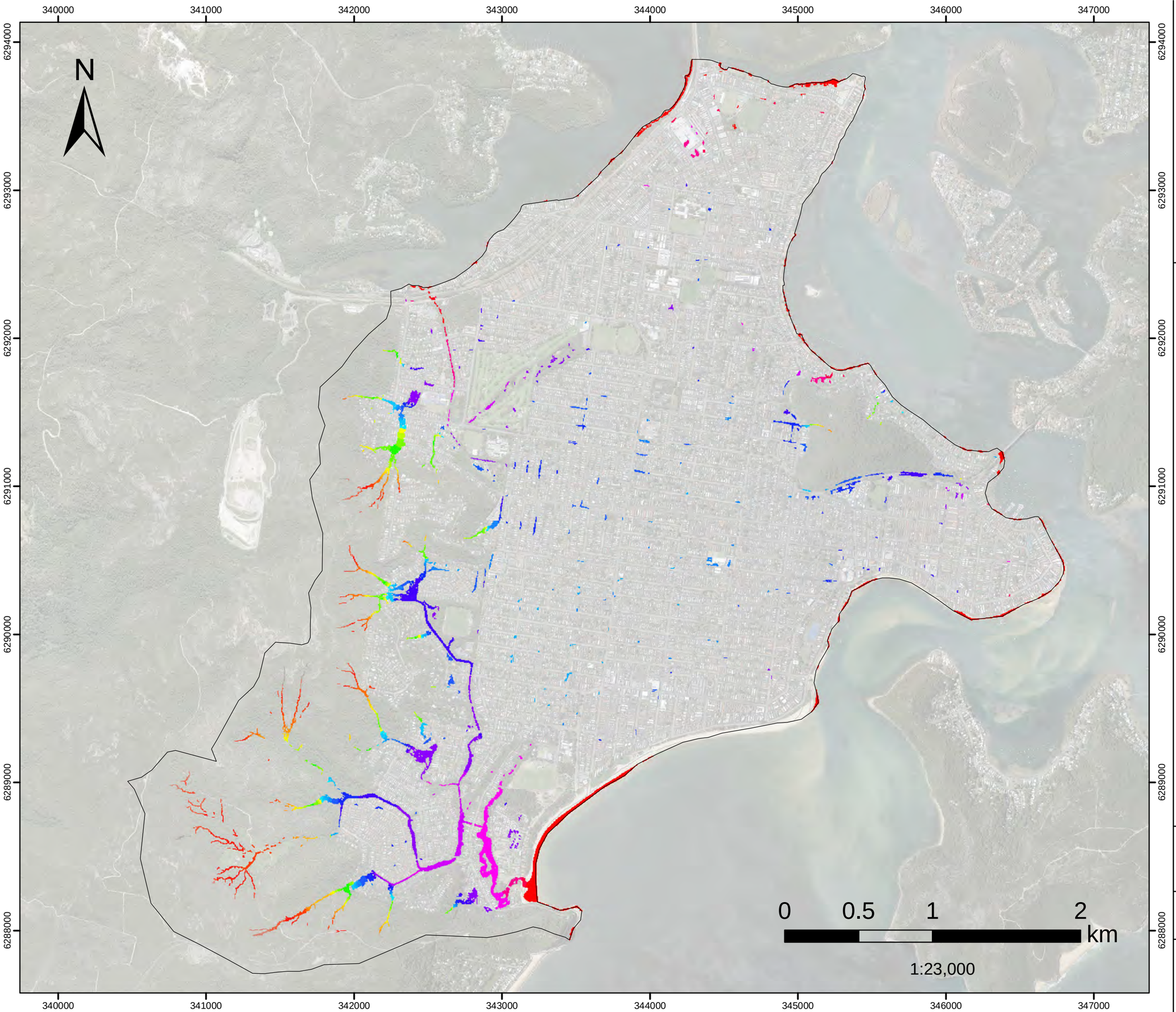

FIGURE L.60
20%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

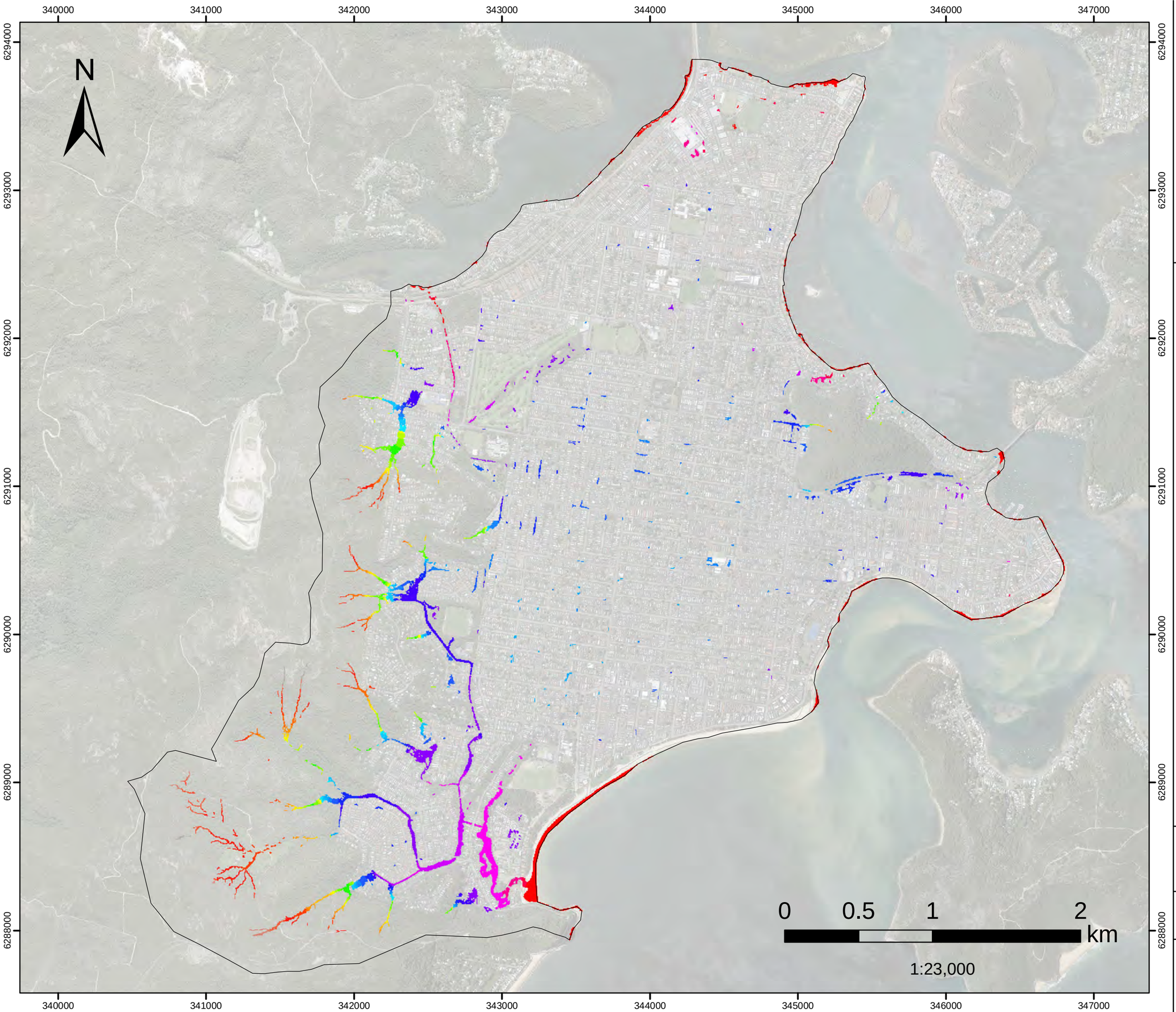

FIGURE L.61
20%AEP FM03

Infiltration Devices

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

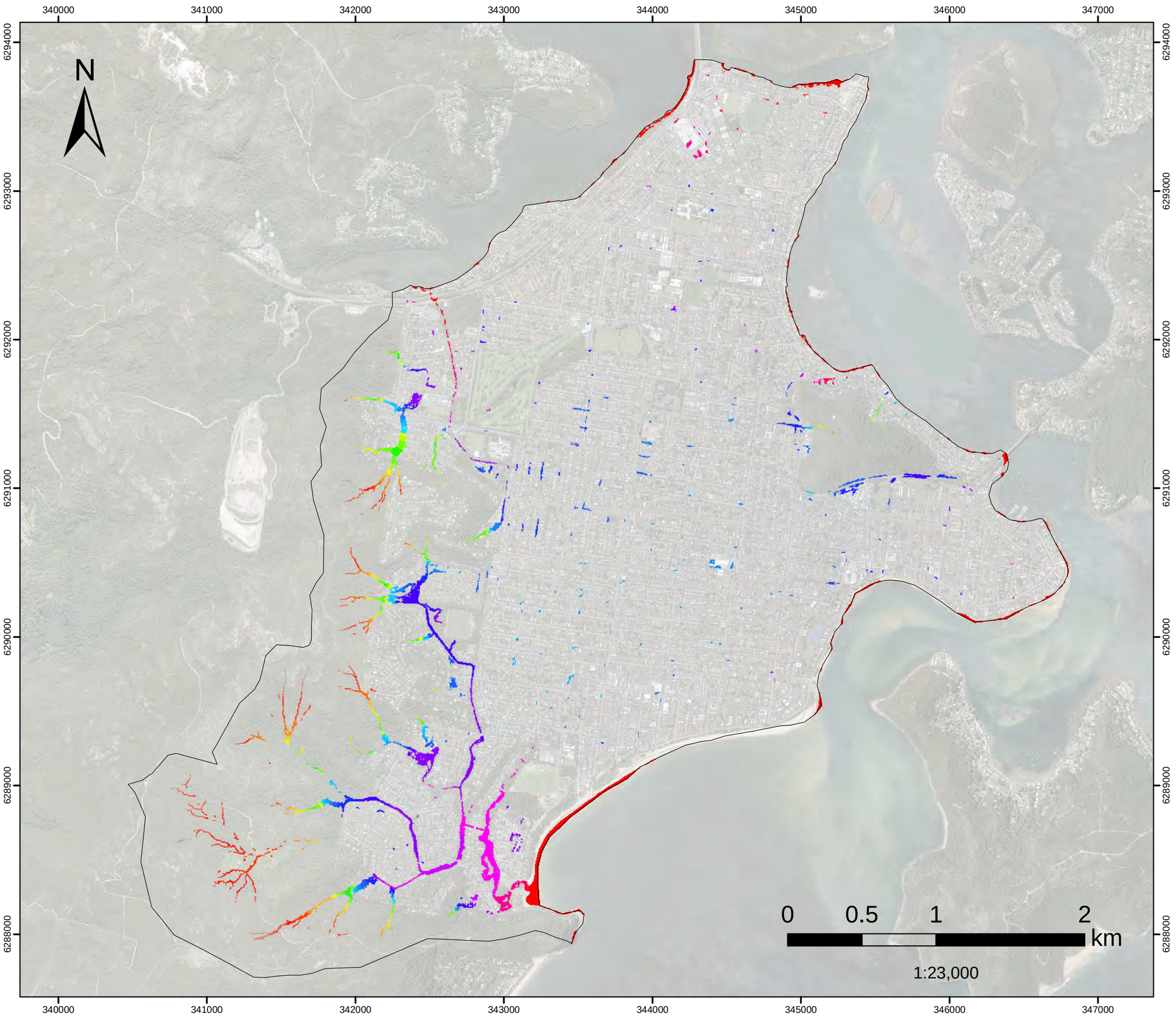

FIGURE L.62
20%AEP FM04

Groundwater pumping and Everglades drainage update work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

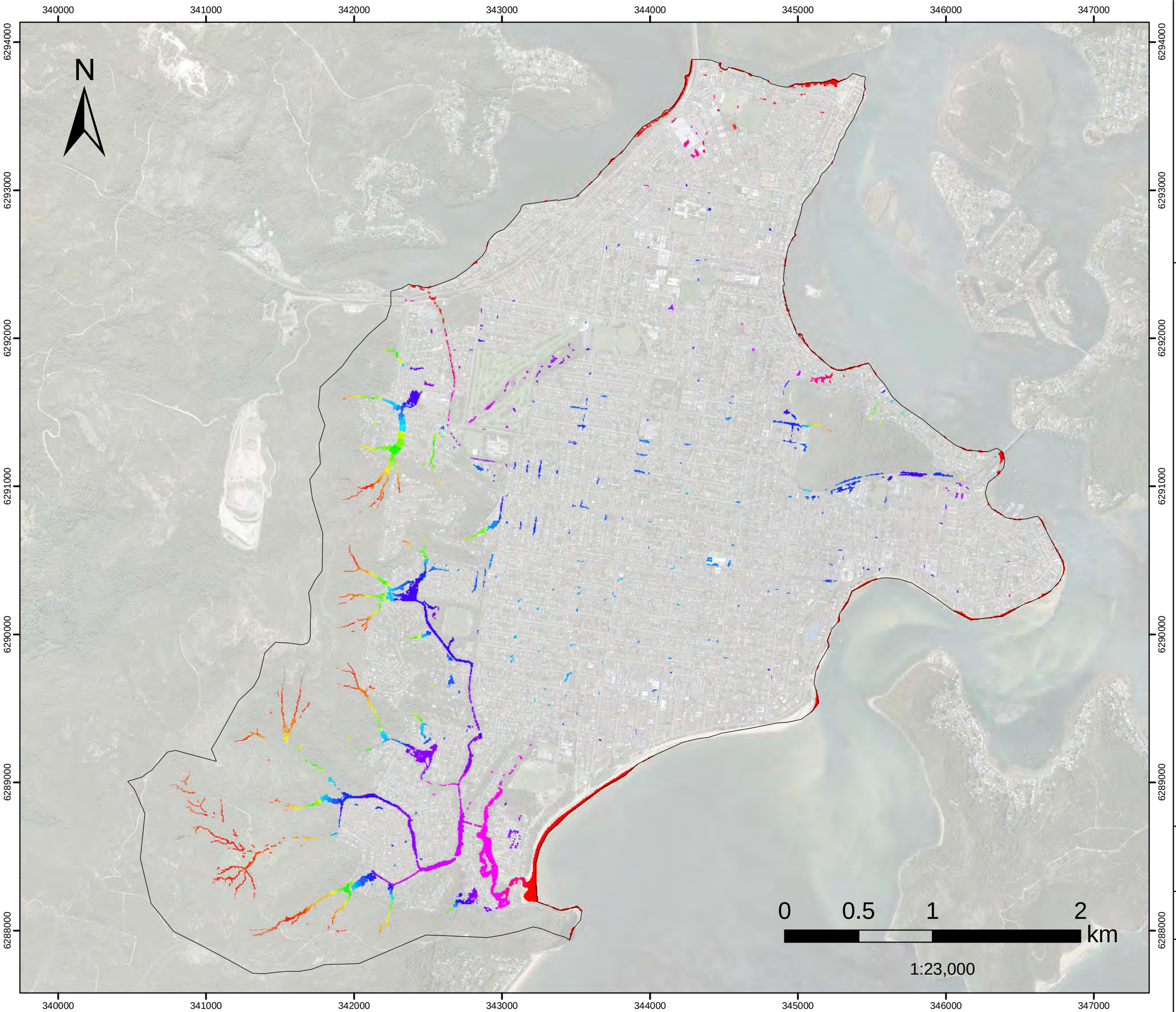

FIGURE L.63
20%AEP FM05
Greenhaven Dr
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

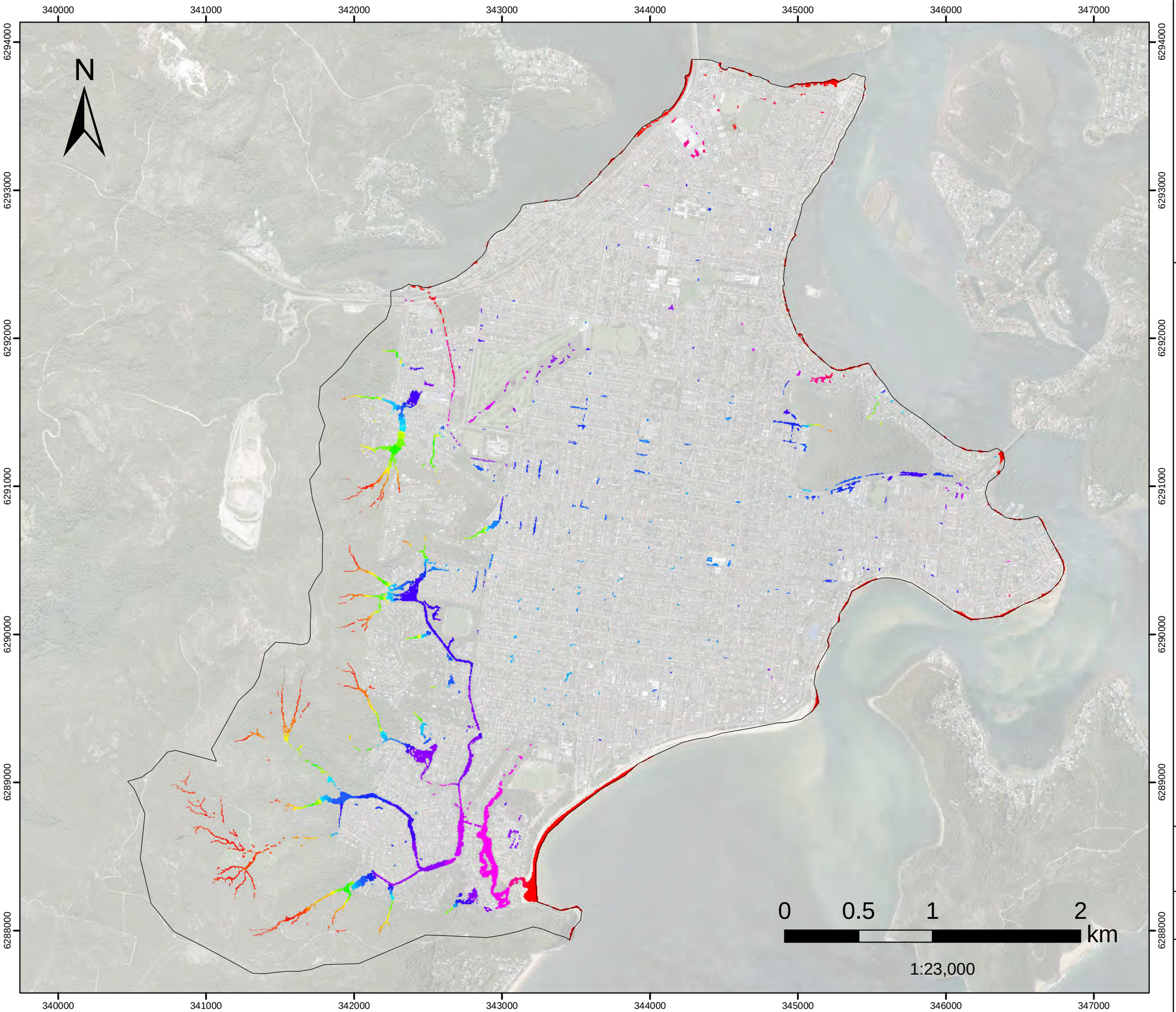

FIGURE L.64
20%AEP FM06A
Kahibah Ck system maintenance work
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

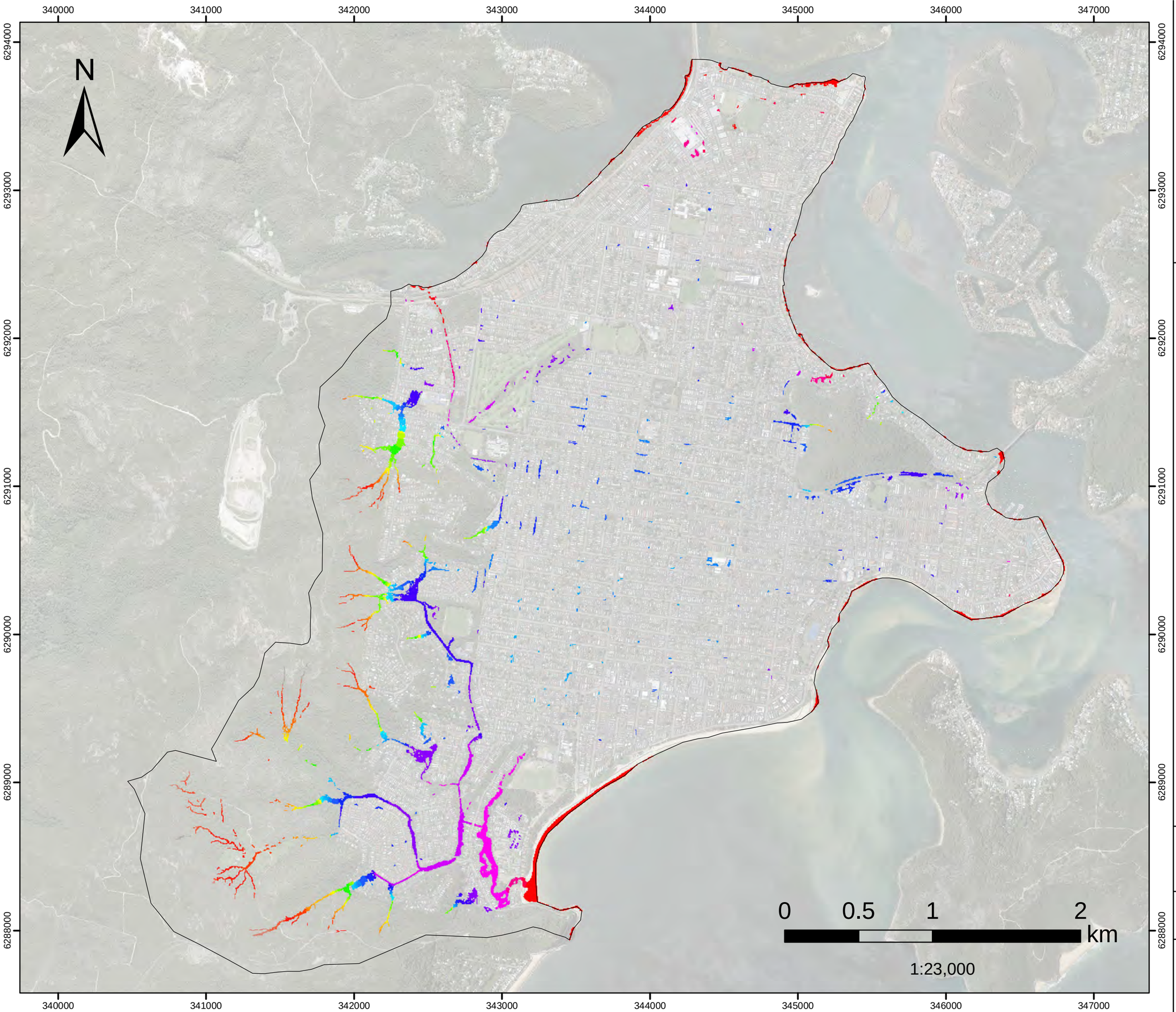

FIGURE L.65
20%AEP FM06B

Further improvement of the Kahibah Creek system

maintenance work

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

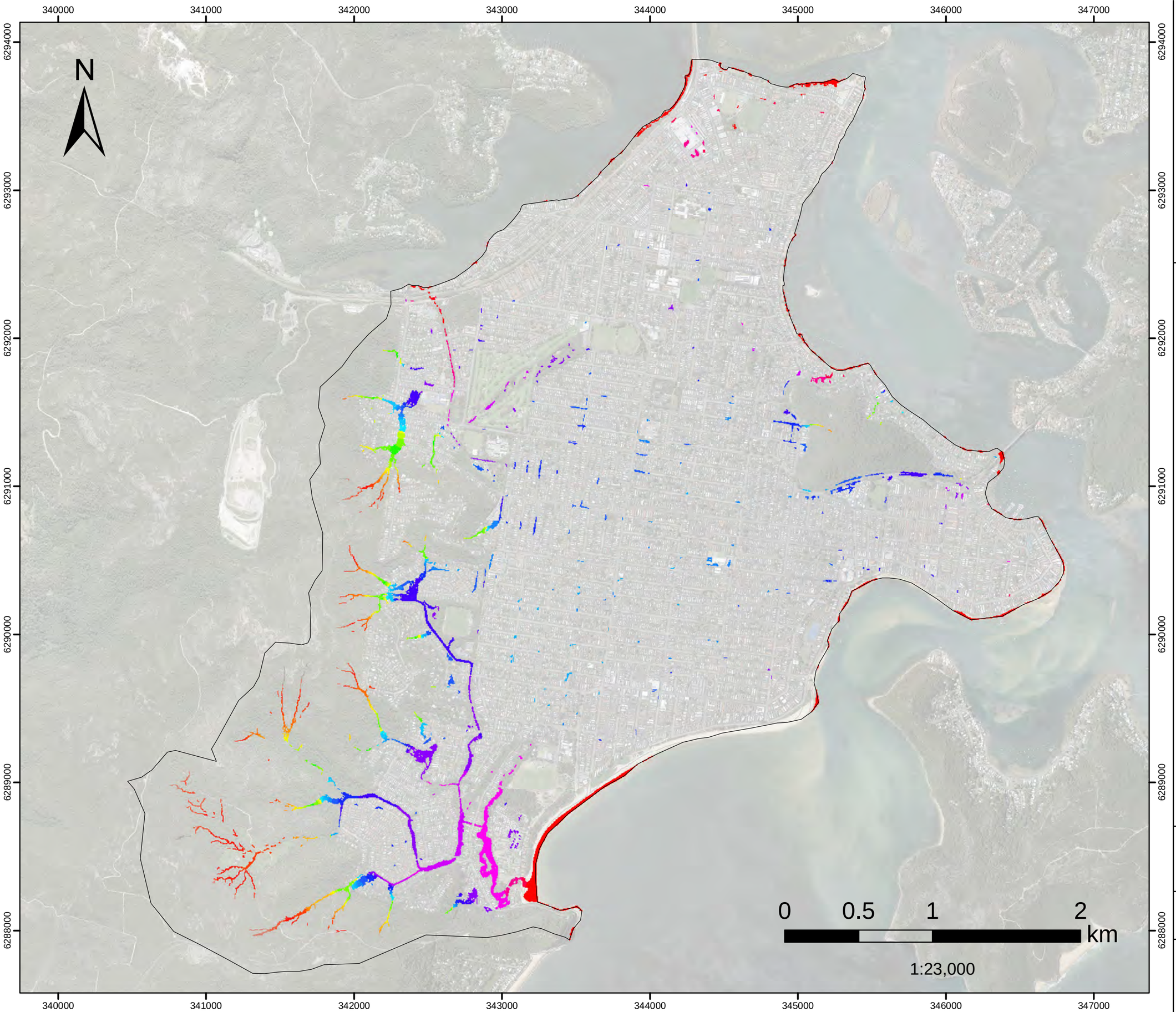

FIGURE L.66
20%AEP FM08
Palmtree Grove Detention Basin
Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

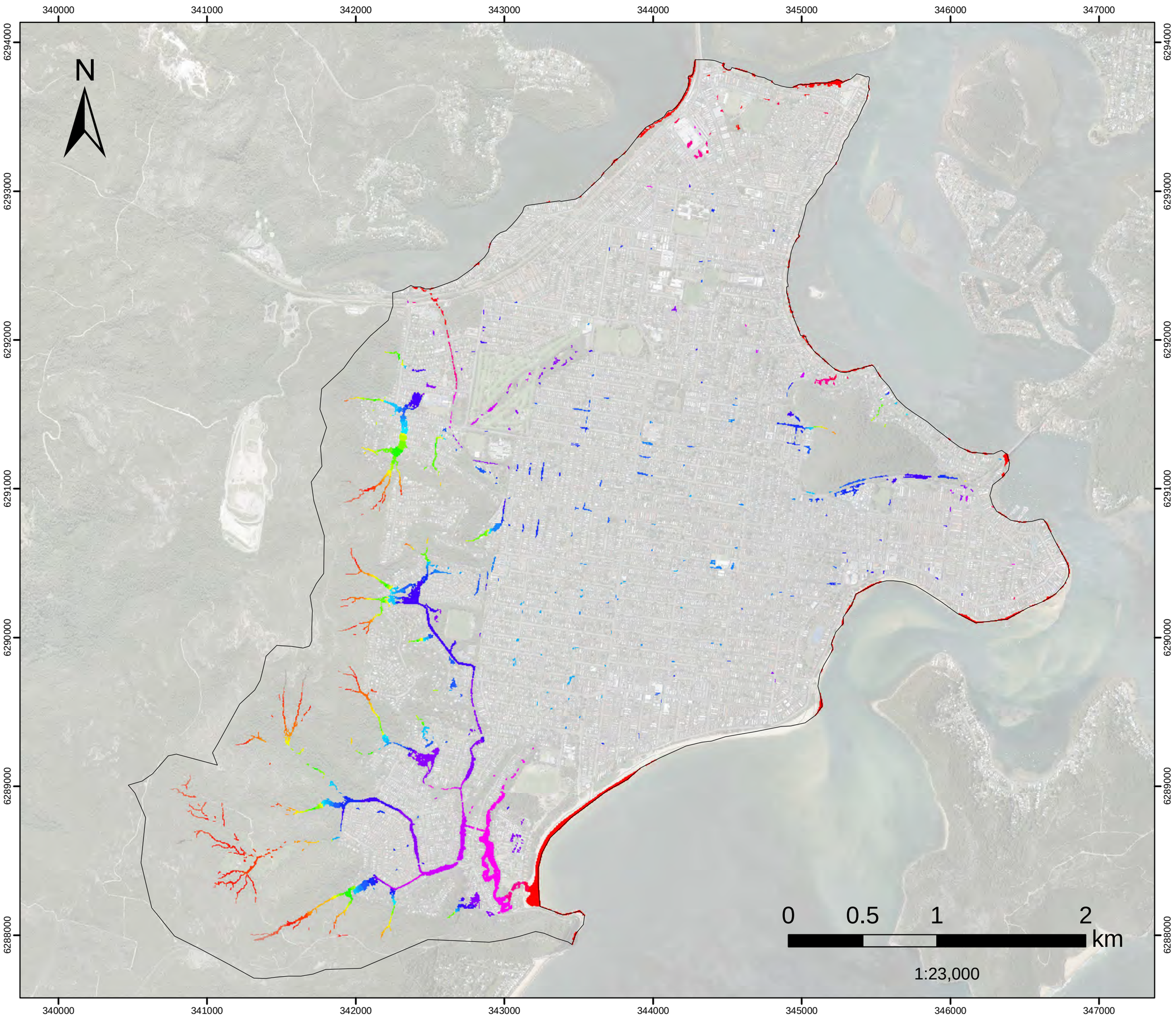

FIGURE L.67
20%AEP FM09

Wilks Av and McManus Cl

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

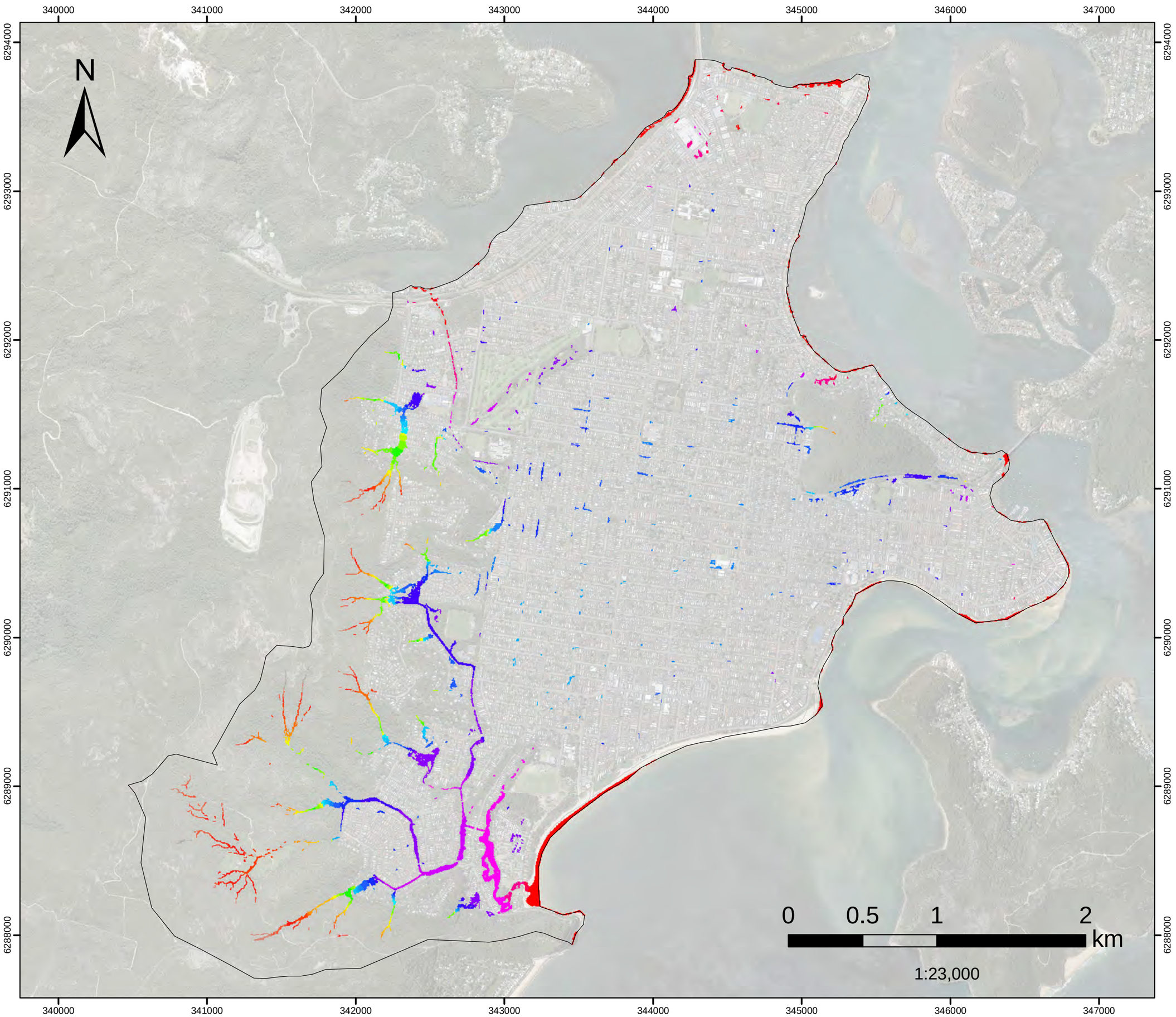

FIGURE L.68
20%AEP FM10

Neera Rd

Flood Level

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.
Assessed for the critical duration 1hr

Model Domain

Flood Level (mAHD)

- 0.7 - 1
- 1.1 - 1.5
- 1.6 - 2
- 2.1 - 2.5
- 2.6 - 3
- 3.1 - 3.5
- 3.6 - 4
- 4.1 - 4.5
- 4.6 - 5
- 5.1 - 5.5
- 5.6 - 6
- 6.1 - 6.5
- 6.6 - 7
- 7.1 - 7.5
- 7.6 - 8
- 8.1 - 9
- 9.1 - 10
- 10.1 - 20
- 20.1 - 30
- 30.1 - 40
- 40.1 - 50
- 50.1 - 60
- 60.1 - 70
- 70.1 - 80
- 80.1 - 90
- 90.1 - 100
- 100.1 - 110
- 110.1 - 120
- 120.1 - 130
- 130.1 - 140

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

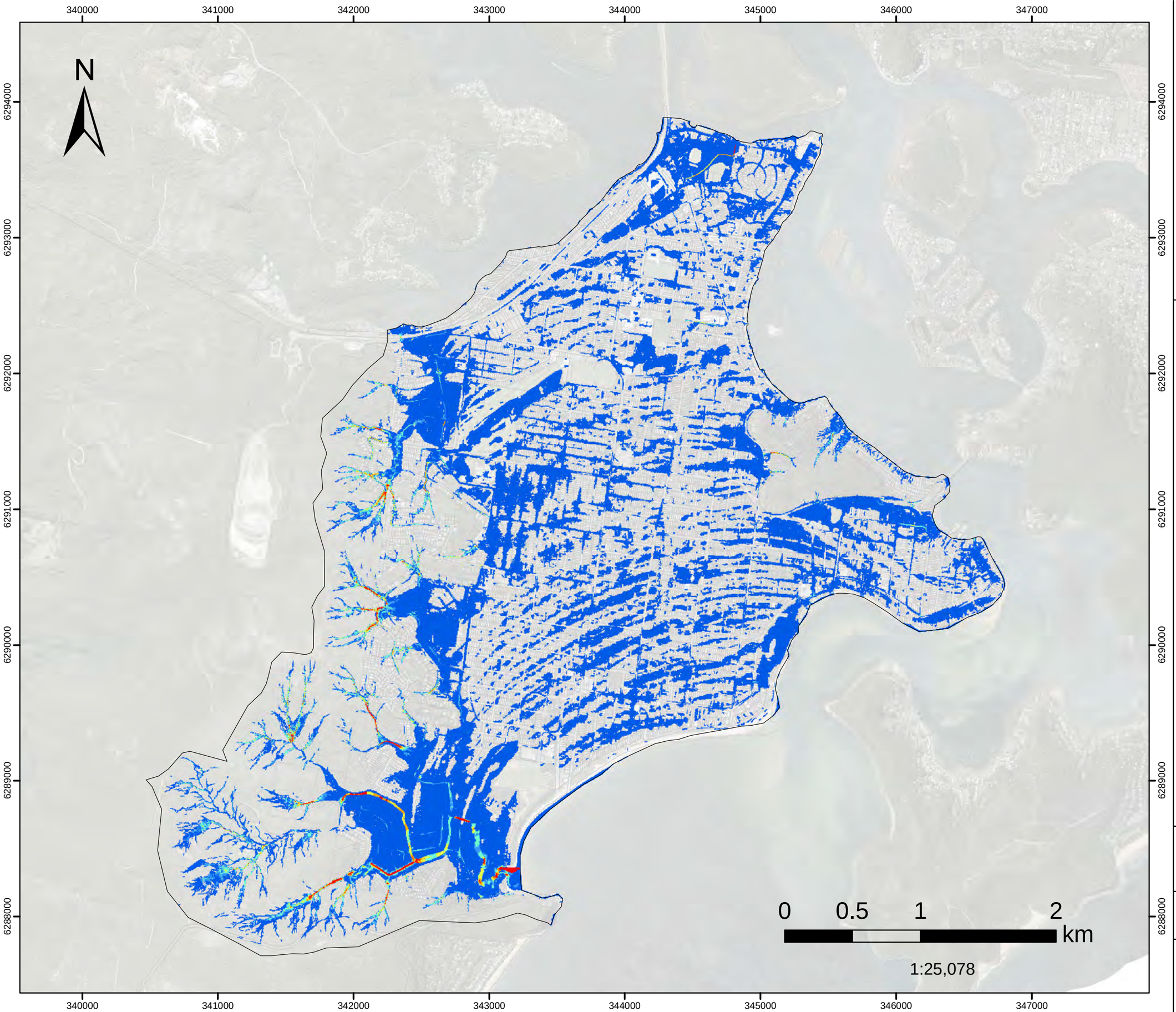

FIGURE L.69

PMF FM01

Woy Woy CBD

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

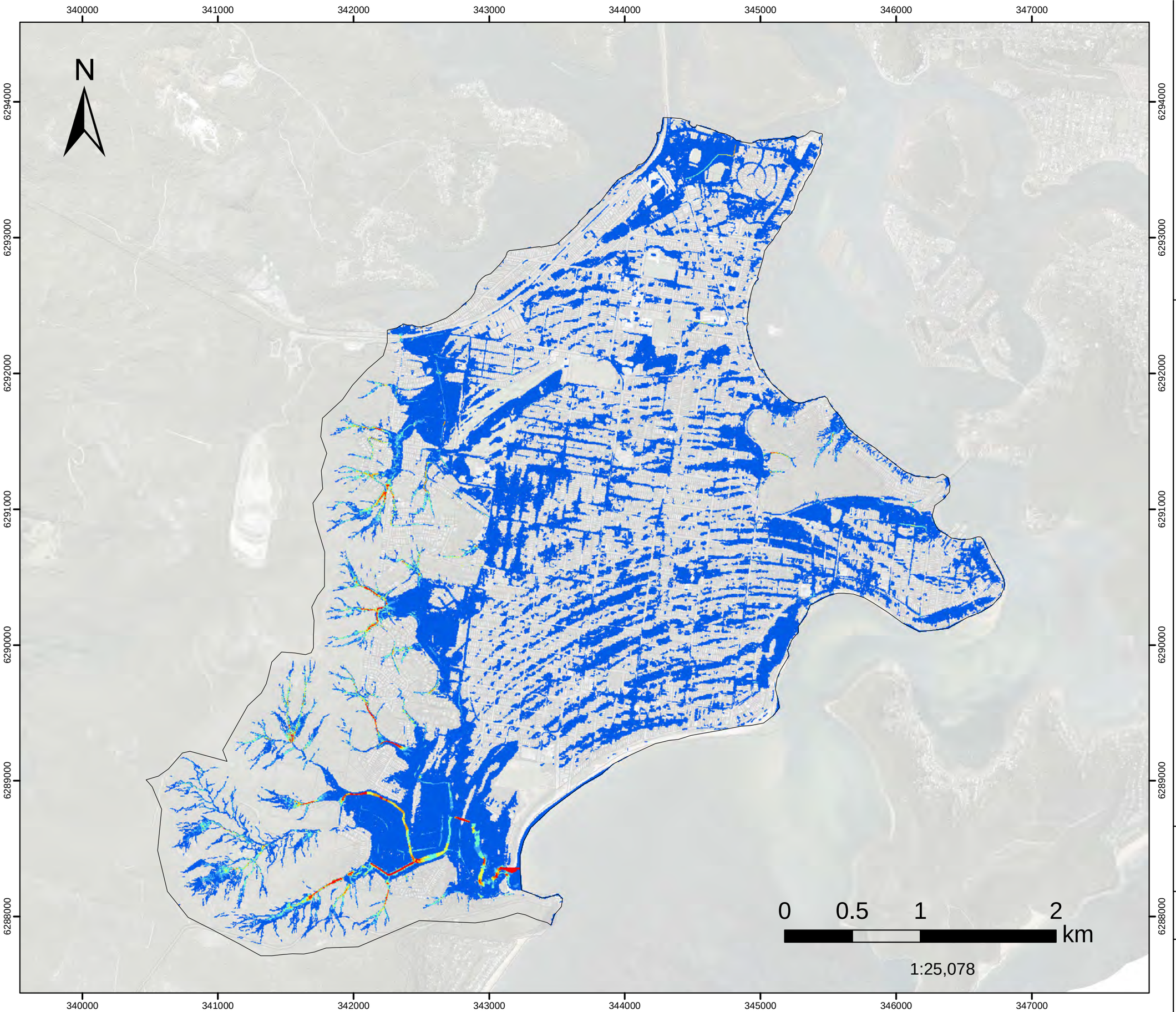

FIGURE L.70

PMF FM02

Dulkala Rd to Karingal Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

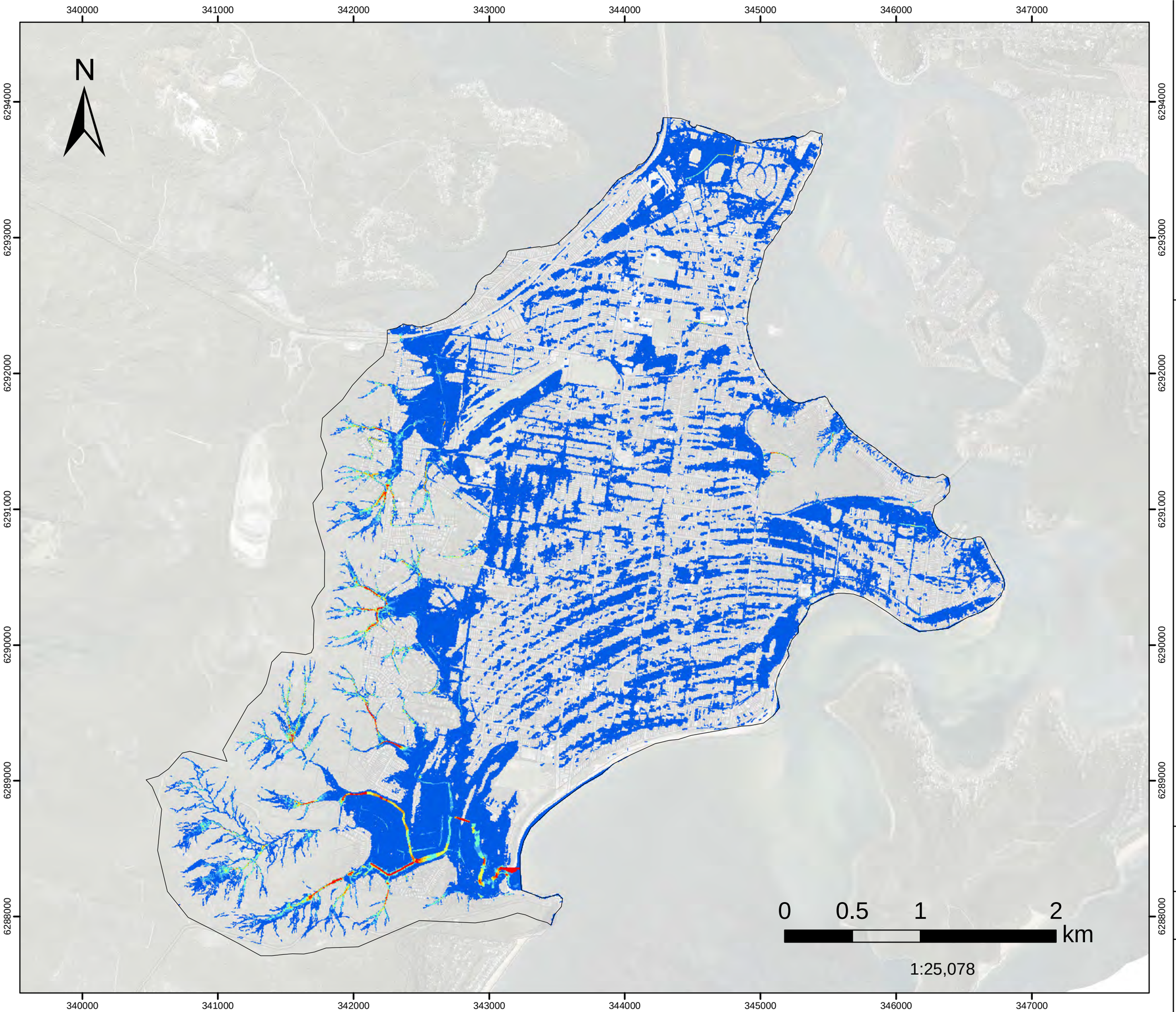

FIGURE L.71

PMF FM03

Infiltration Devices

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

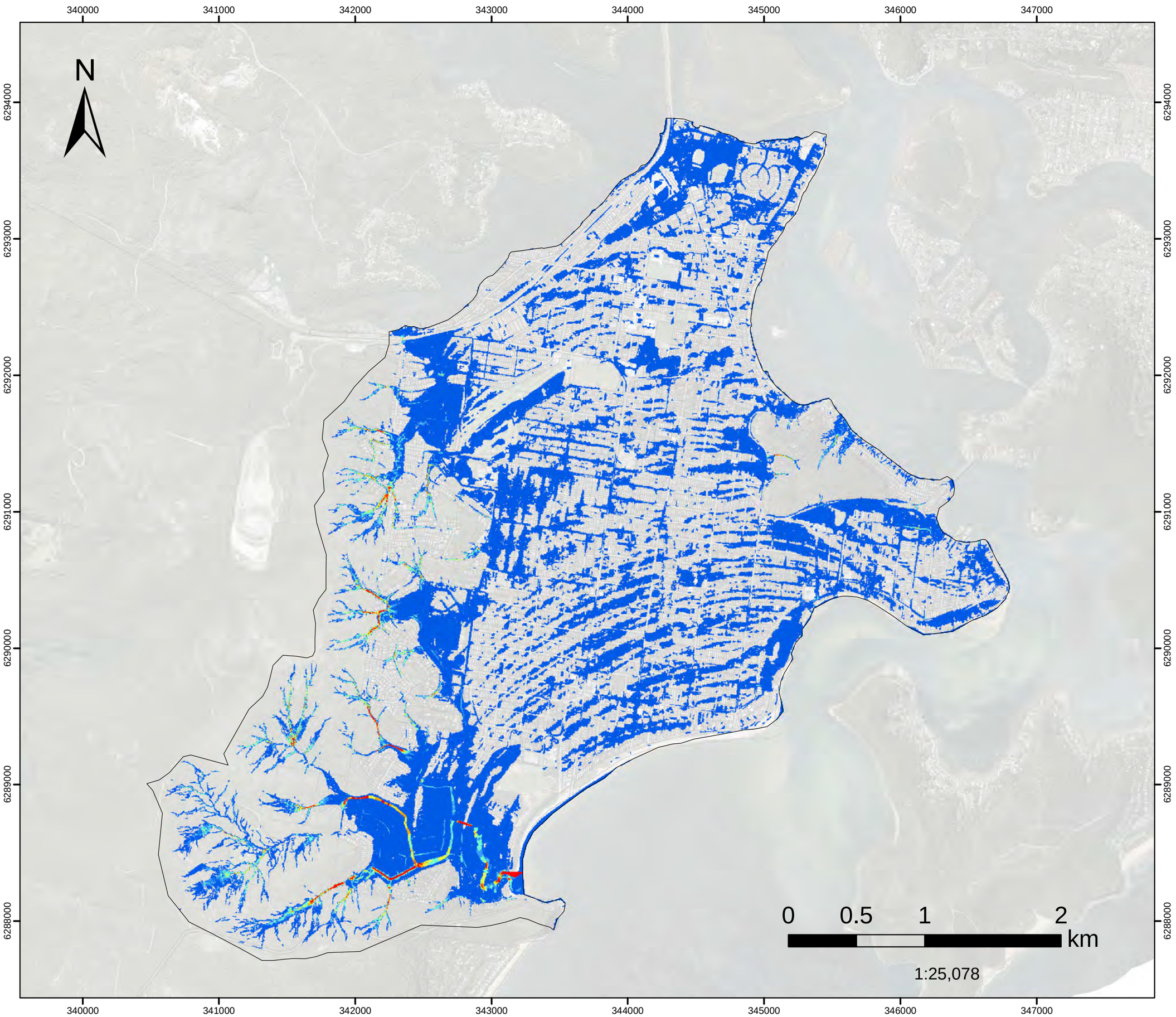

FIGURE L.72

PMF FM05

Greenhaven Dr

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

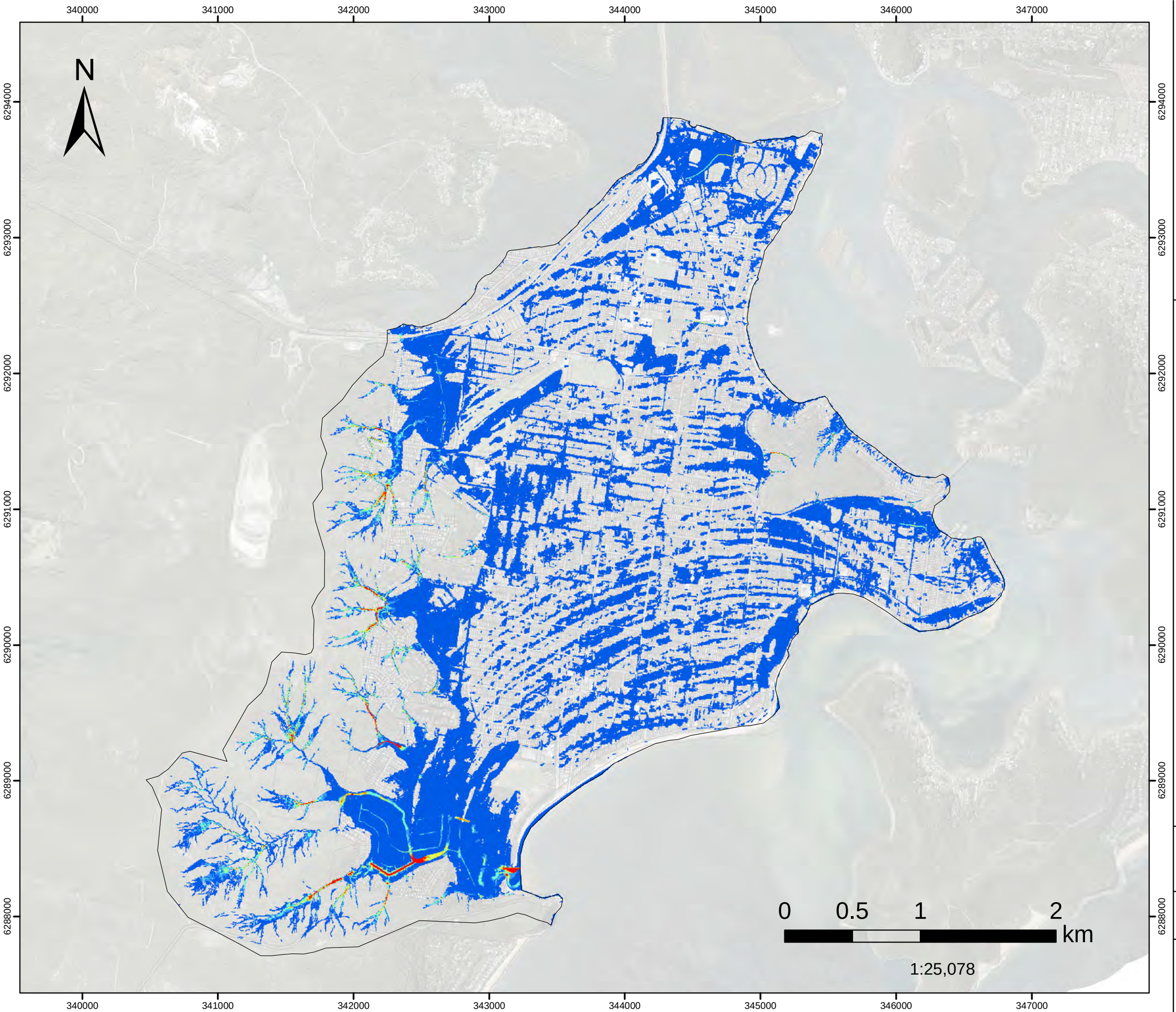

FIGURE L.73

PMF FM06A

Kahibah Ck system maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

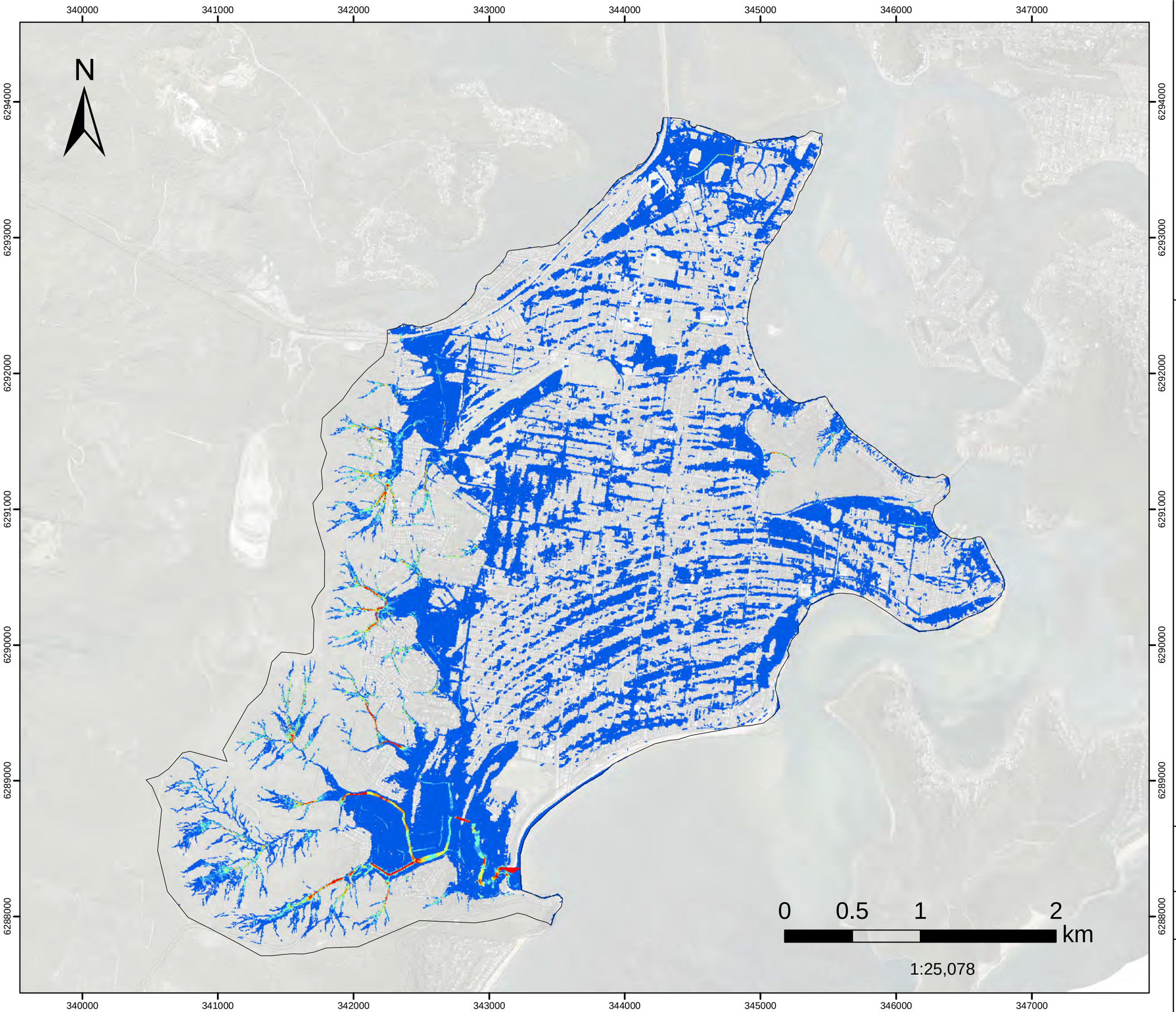

FIGURE L.74

PMF FM08

Palmtree Grove Detention Basin

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

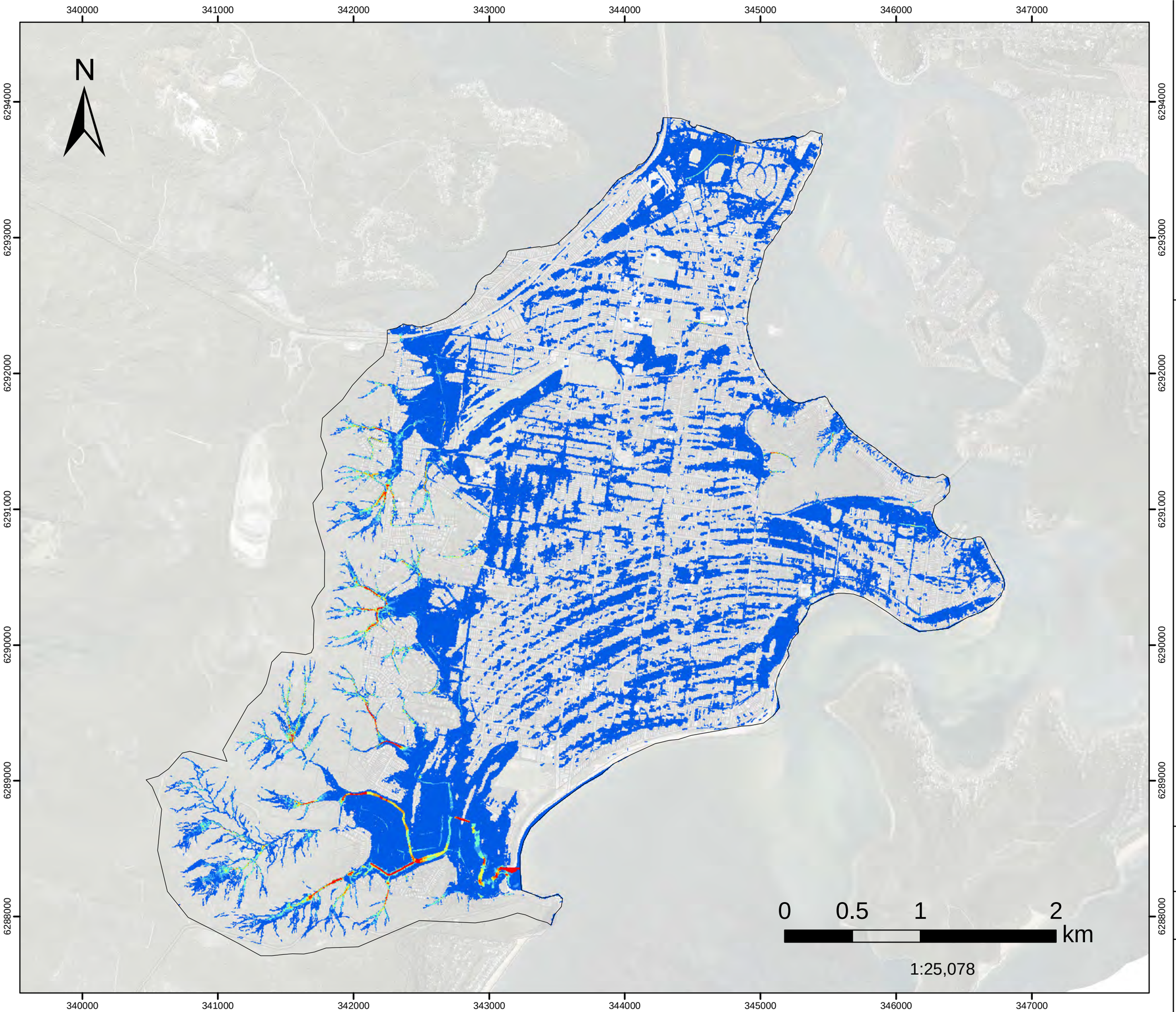

FIGURE L.75

PMF FM10

Neera Rd

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 2hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

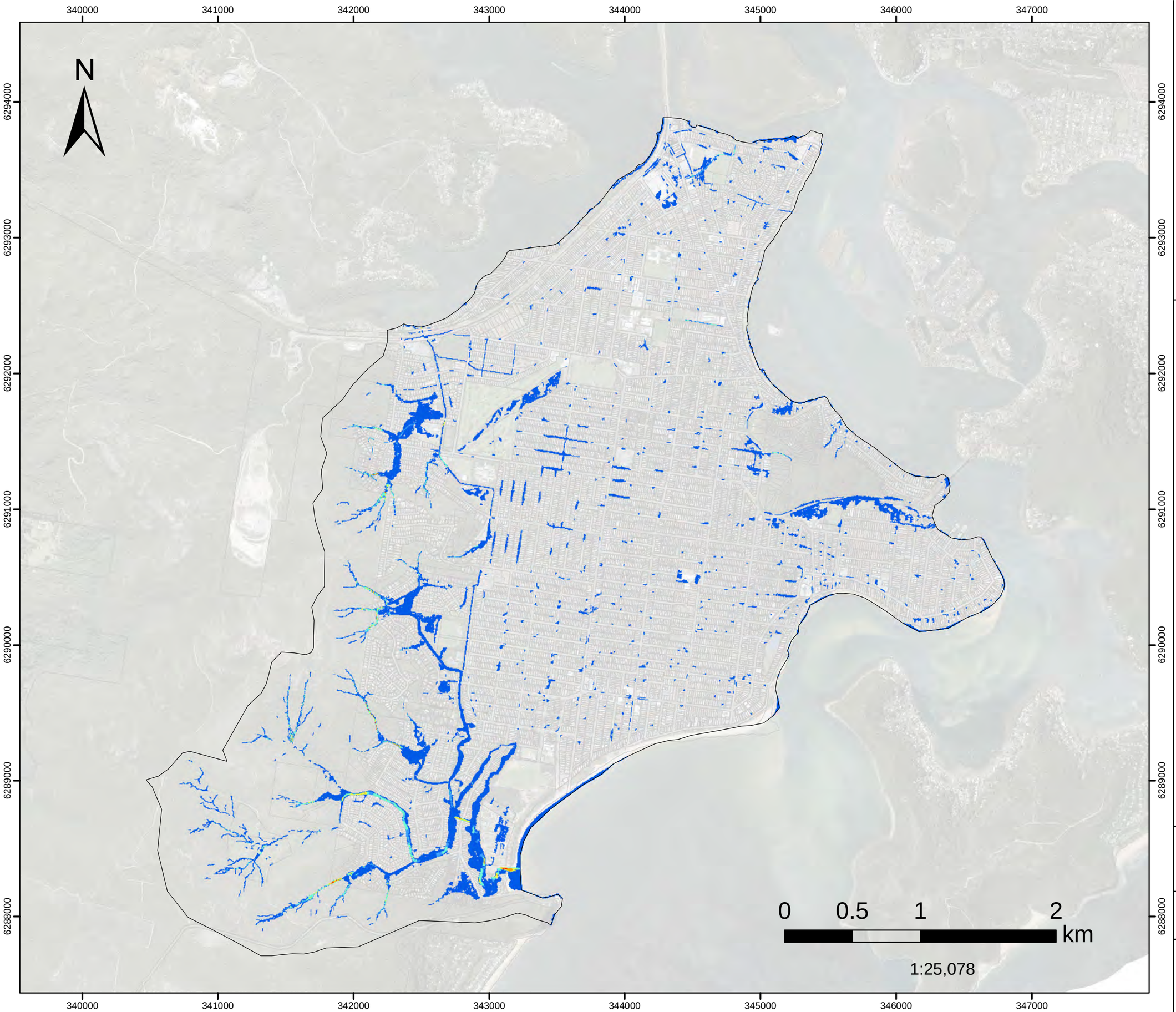

FIGURE L.76

1%AEP FM01

Woy Woy CBD

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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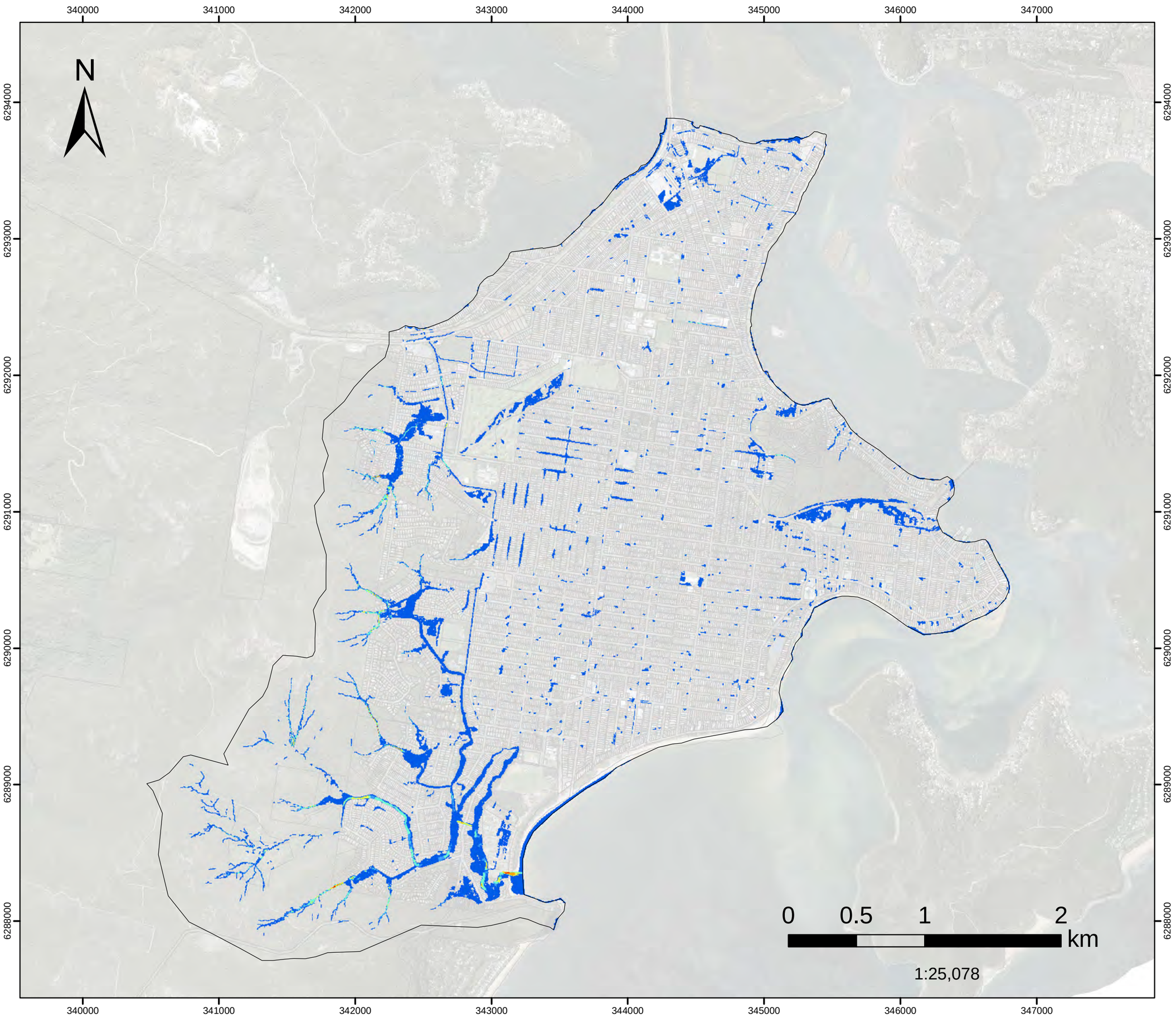

FIGURE L.77

1%AEP FM02

Dulkala Rd to Karingal Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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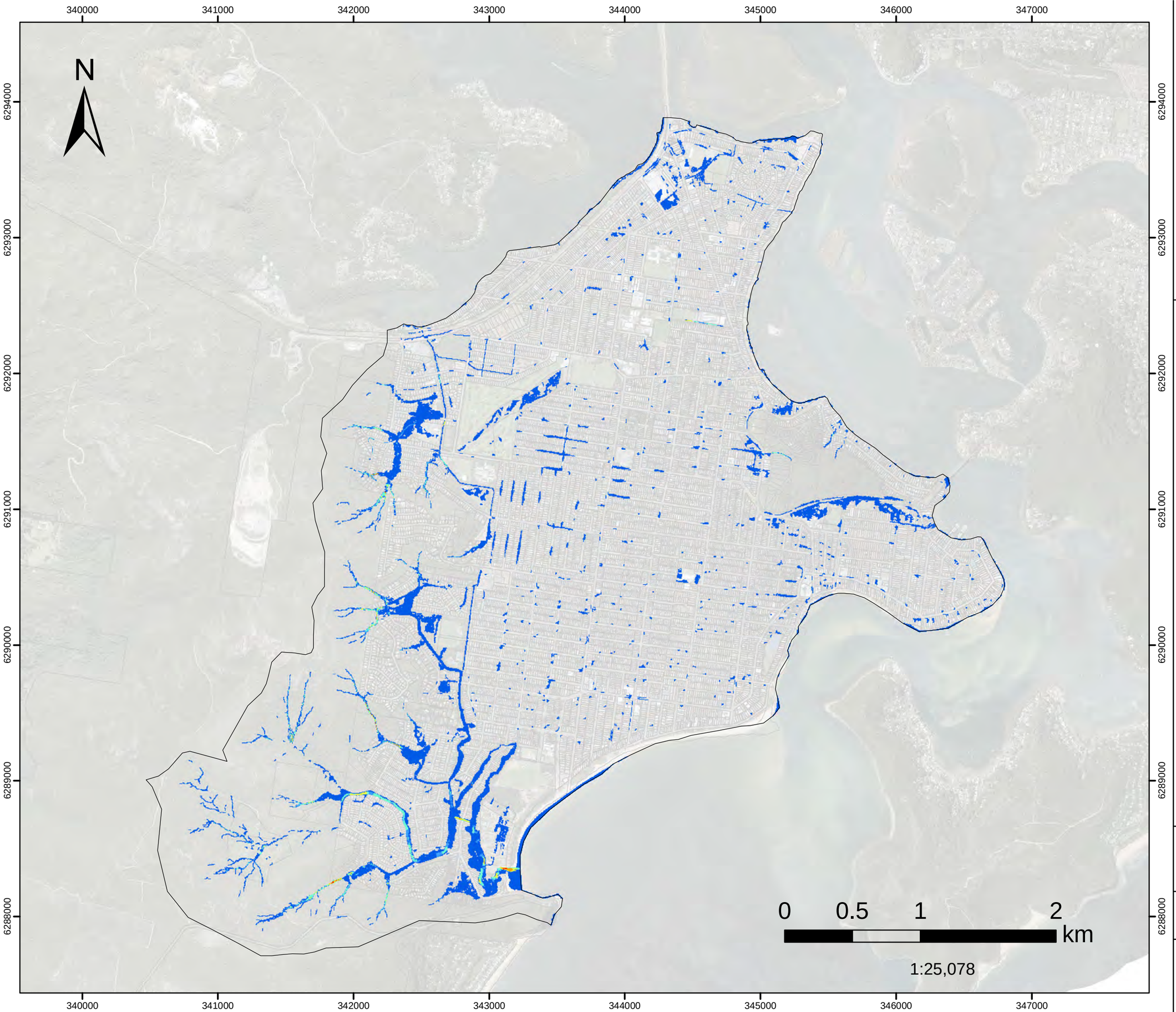

FIGURE L.78

1%AEP FM03

Infiltration Devices

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

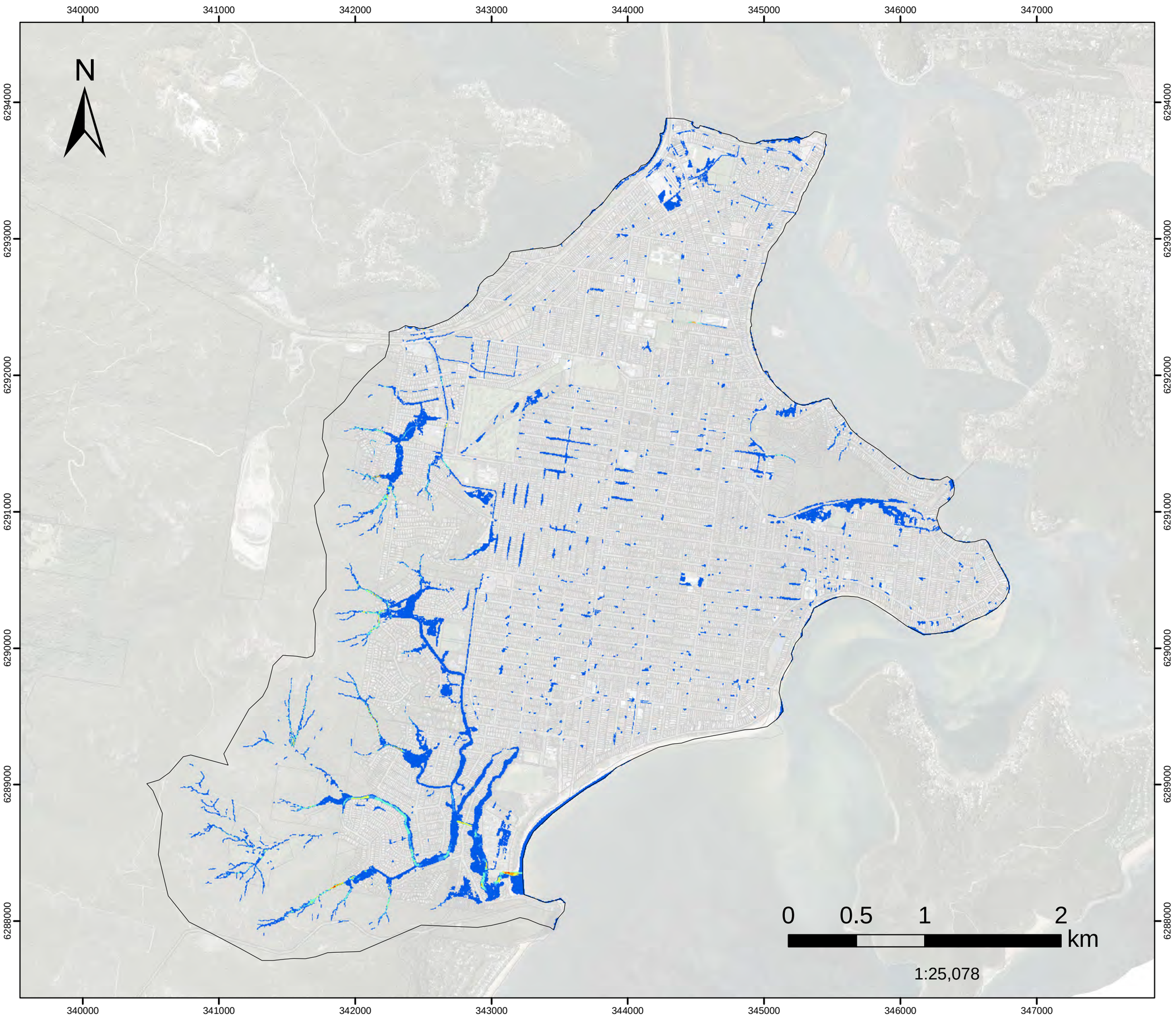

FIGURE L.79

1%AEP FM04

Groundwater pumping and Everglades drainage update work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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Project No	43803055

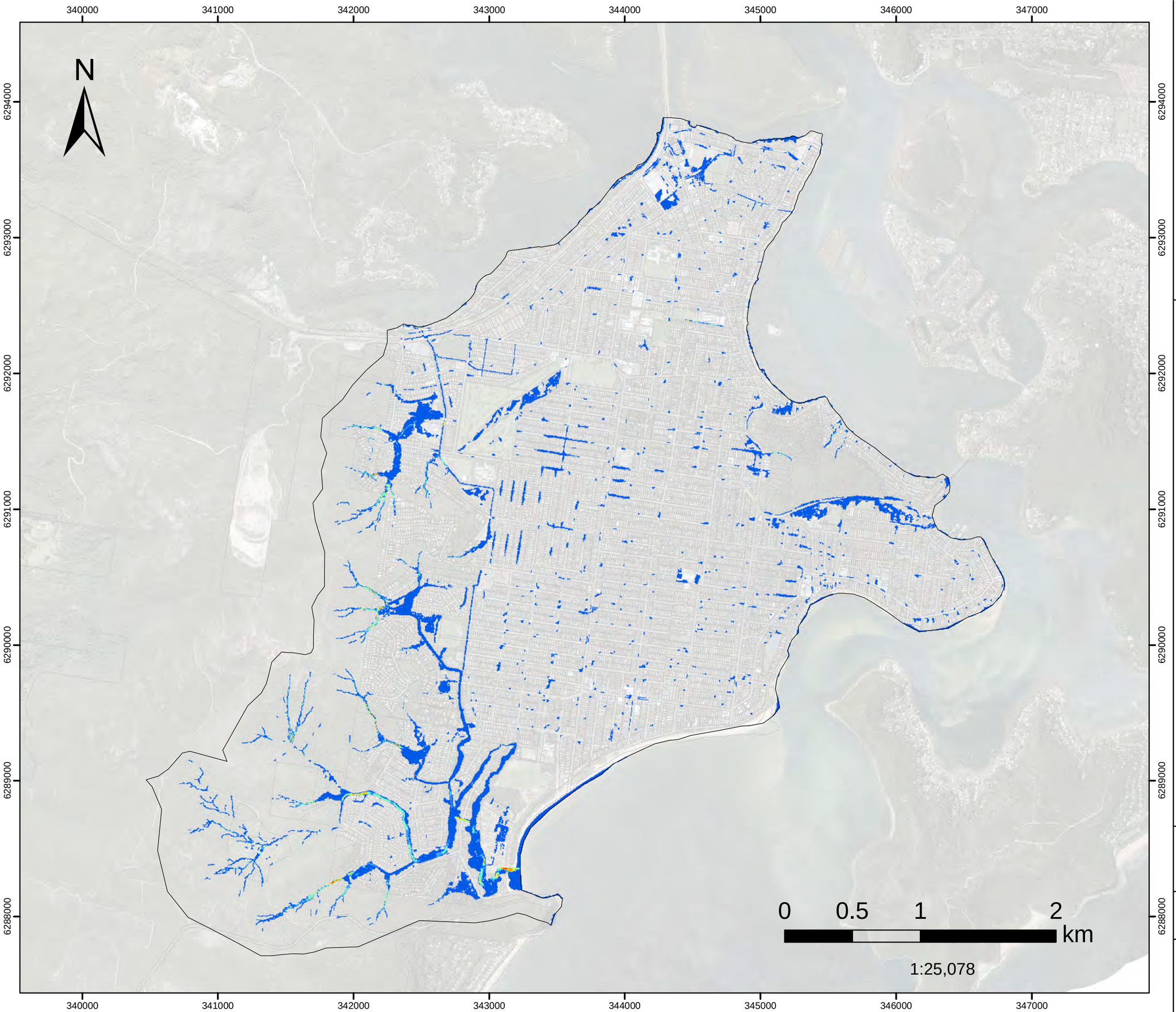

FIGURE L.80

1%AEP FM05

Greenhaven Dr

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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Project No	43803055

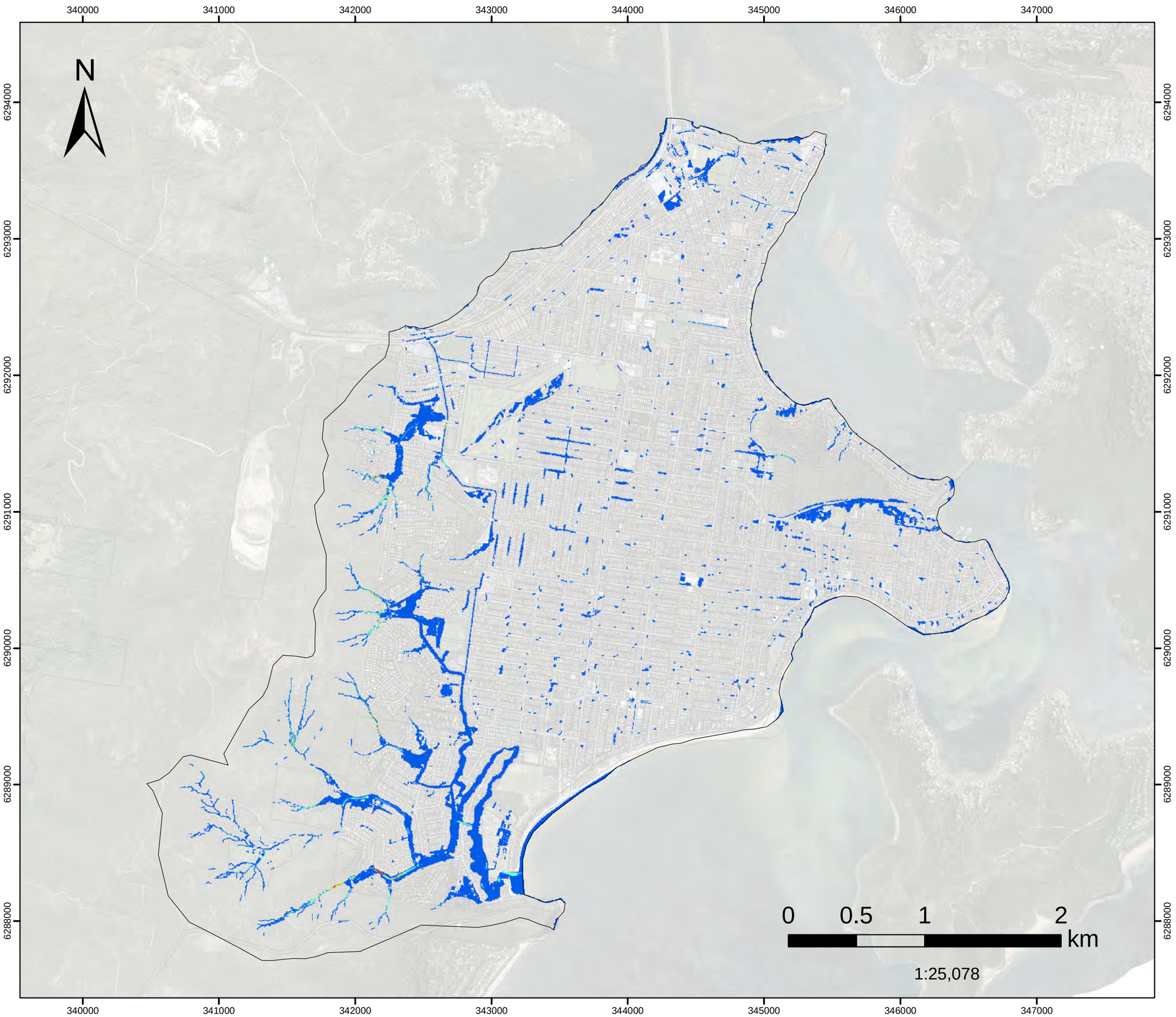

FIGURE L.81

1%AEP FM06A

Kahibah Ck system maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
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Date	1 Aug 2021
Project No	43803055

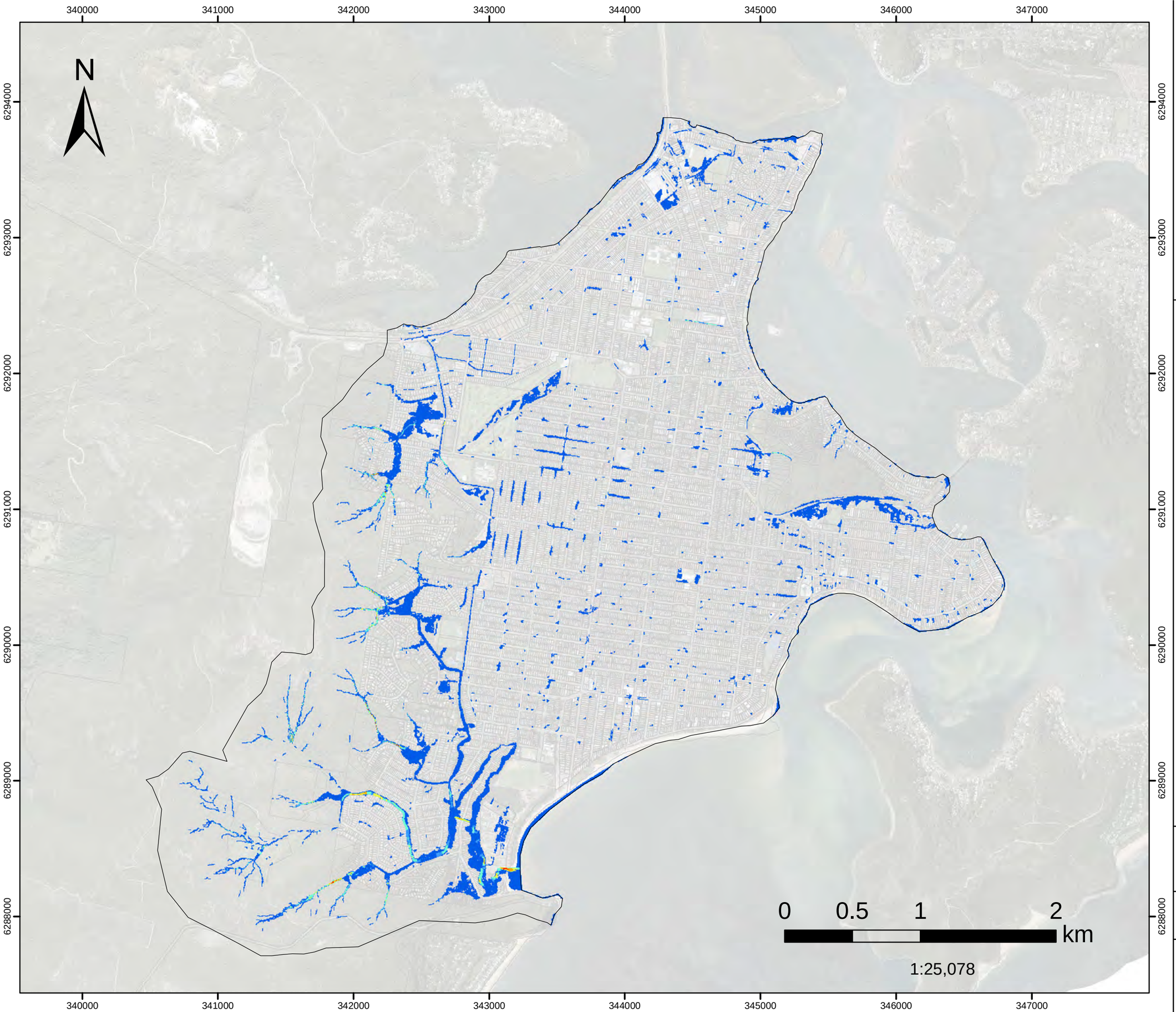

FIGURE L.82

1%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

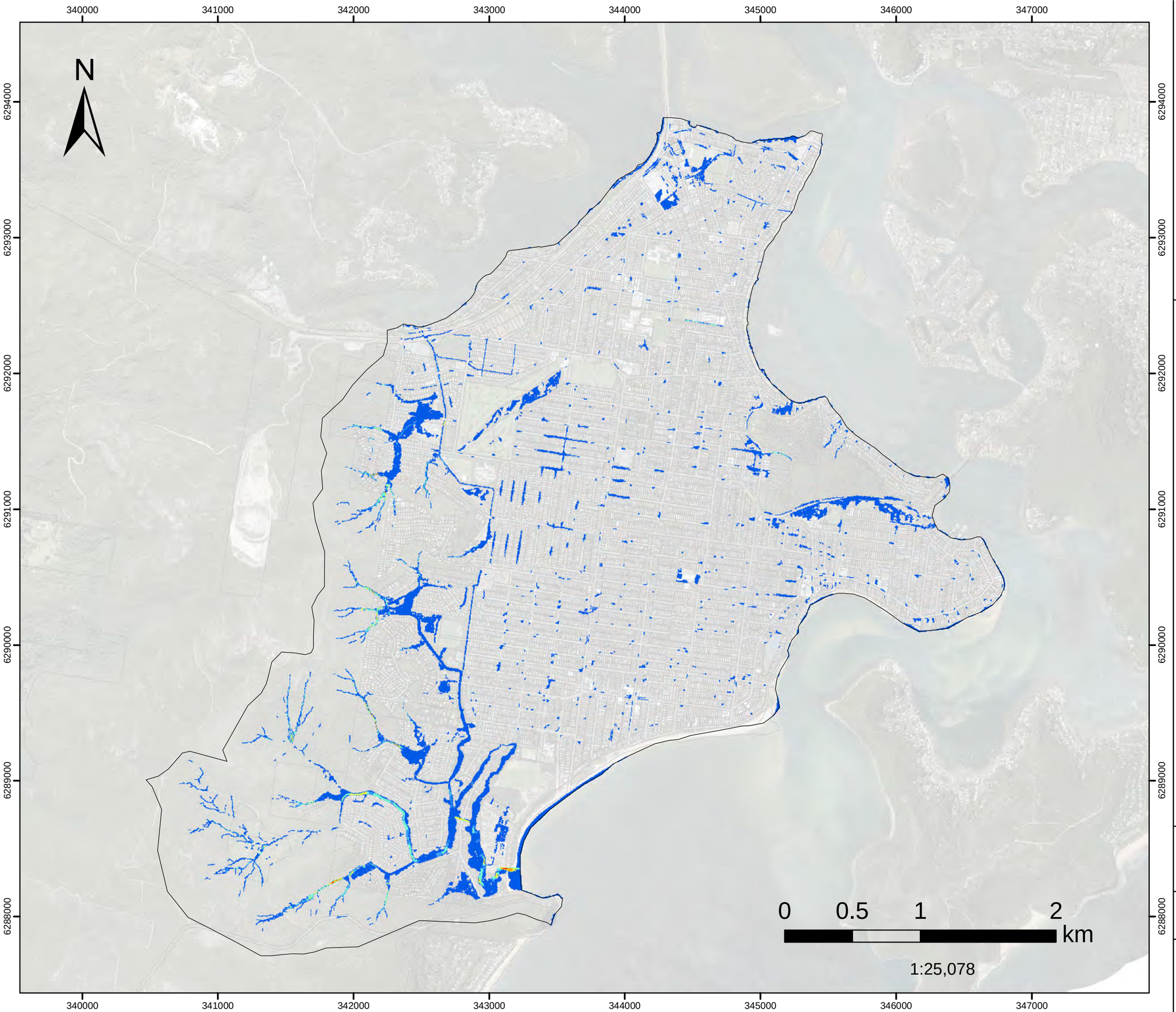

FIGURE L.83

1%AEP FM08

Palmtree Grove Detention Basin

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

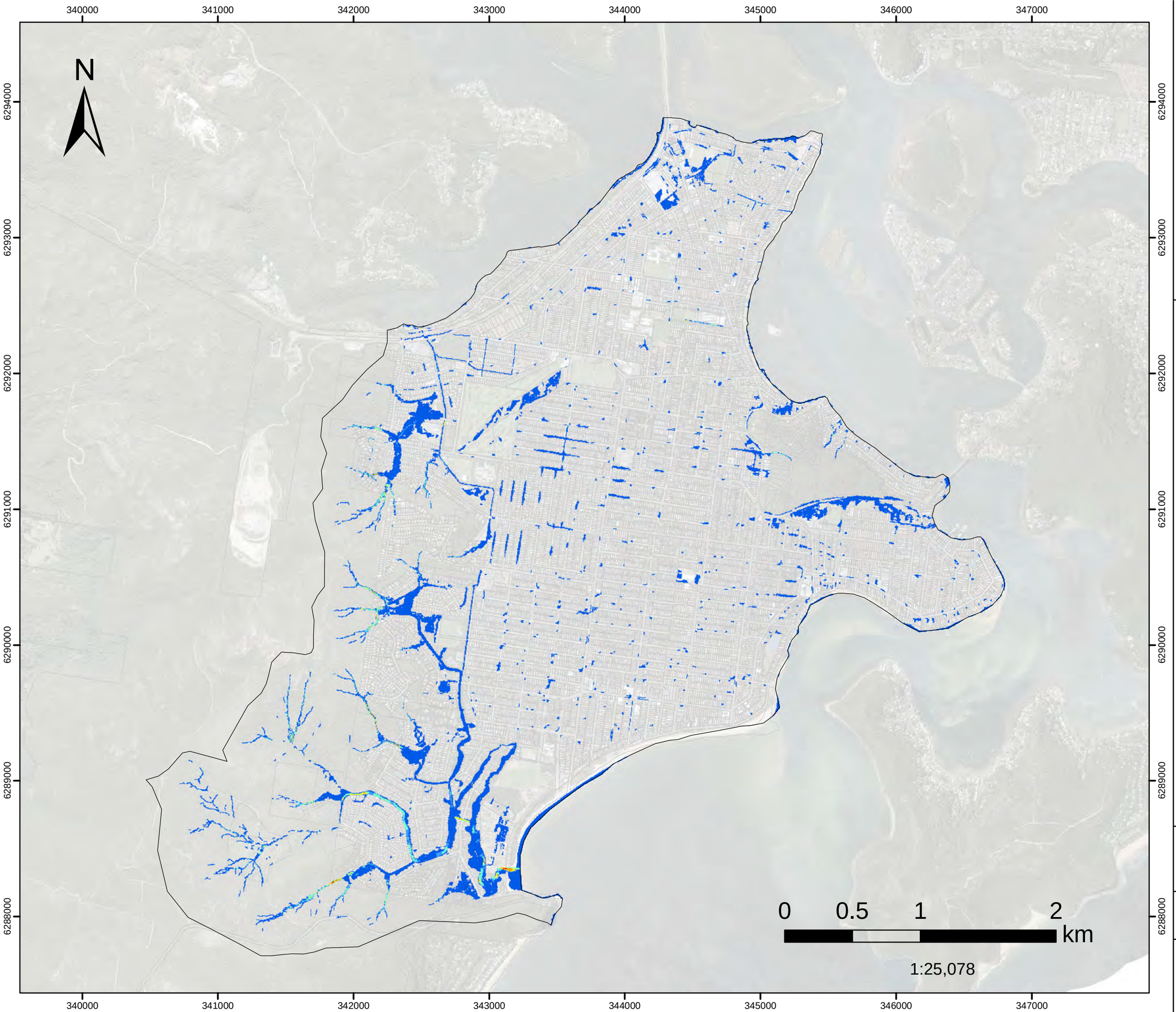

FIGURE L.84

1%AEP FM09

Wilks Av and McManus Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

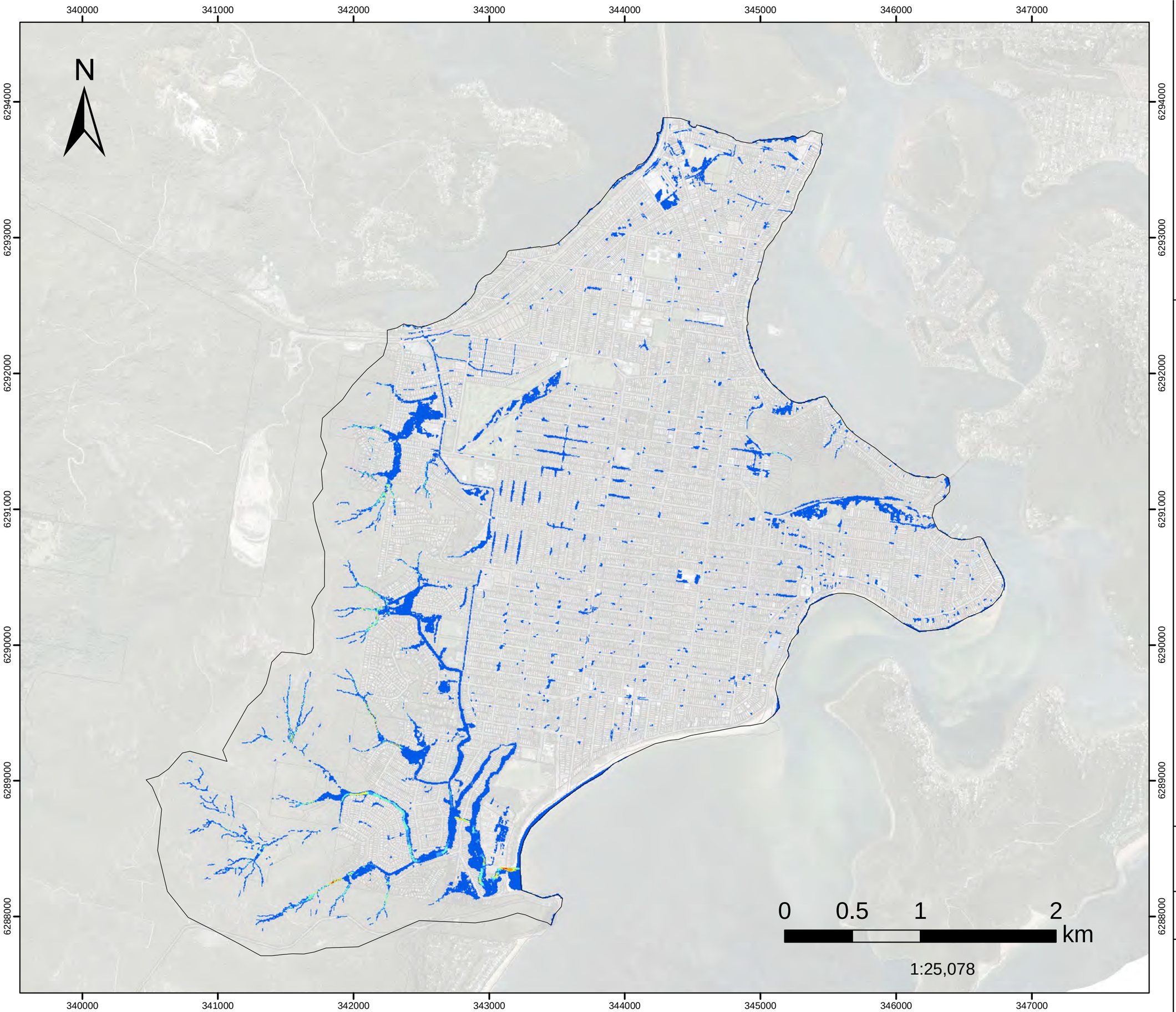

FIGURE L.85

1%AEP FM10

Neera Rd

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 6hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

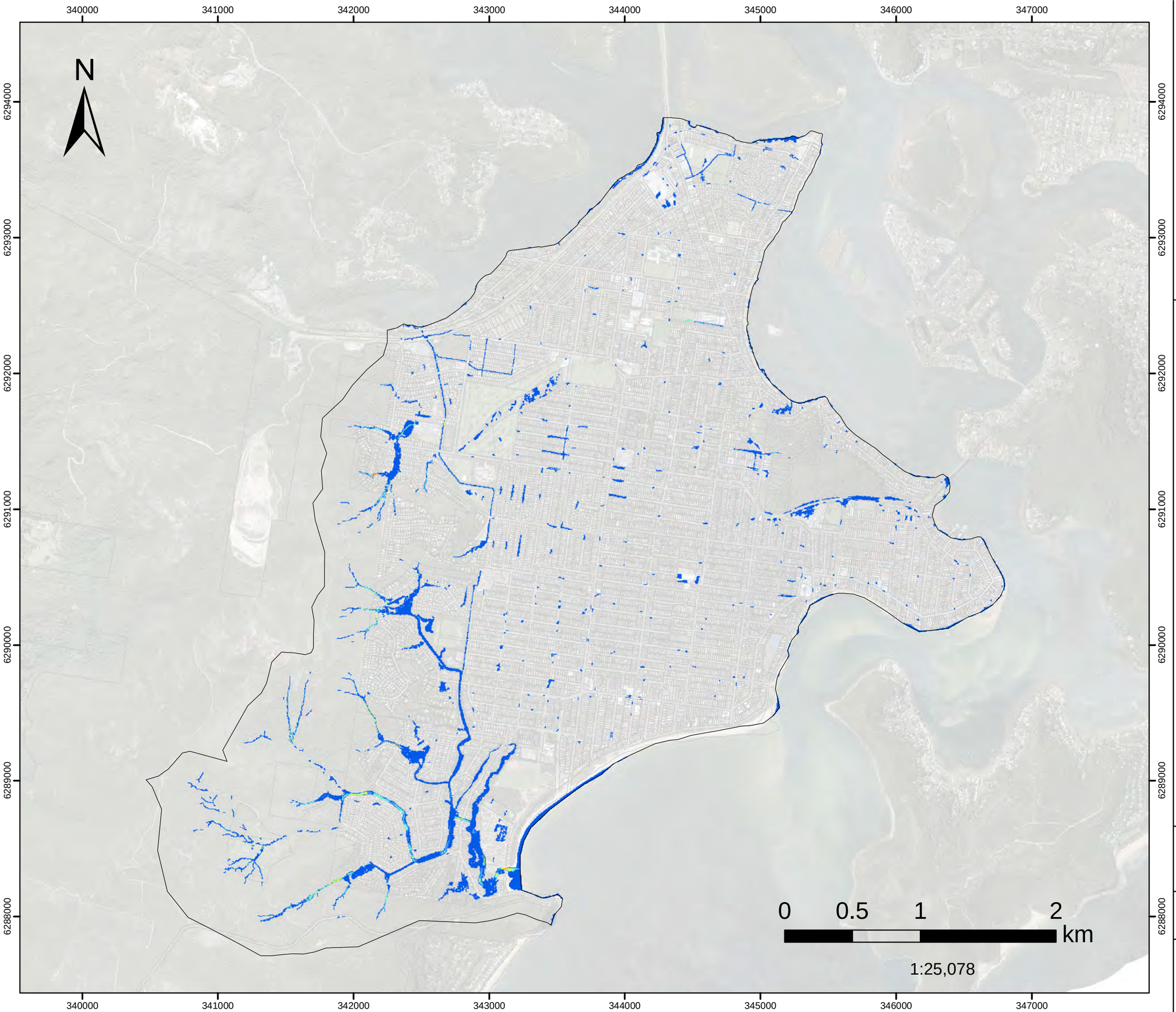

FIGURE L.86

10%AEP FM01

Woy Woy CBD

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

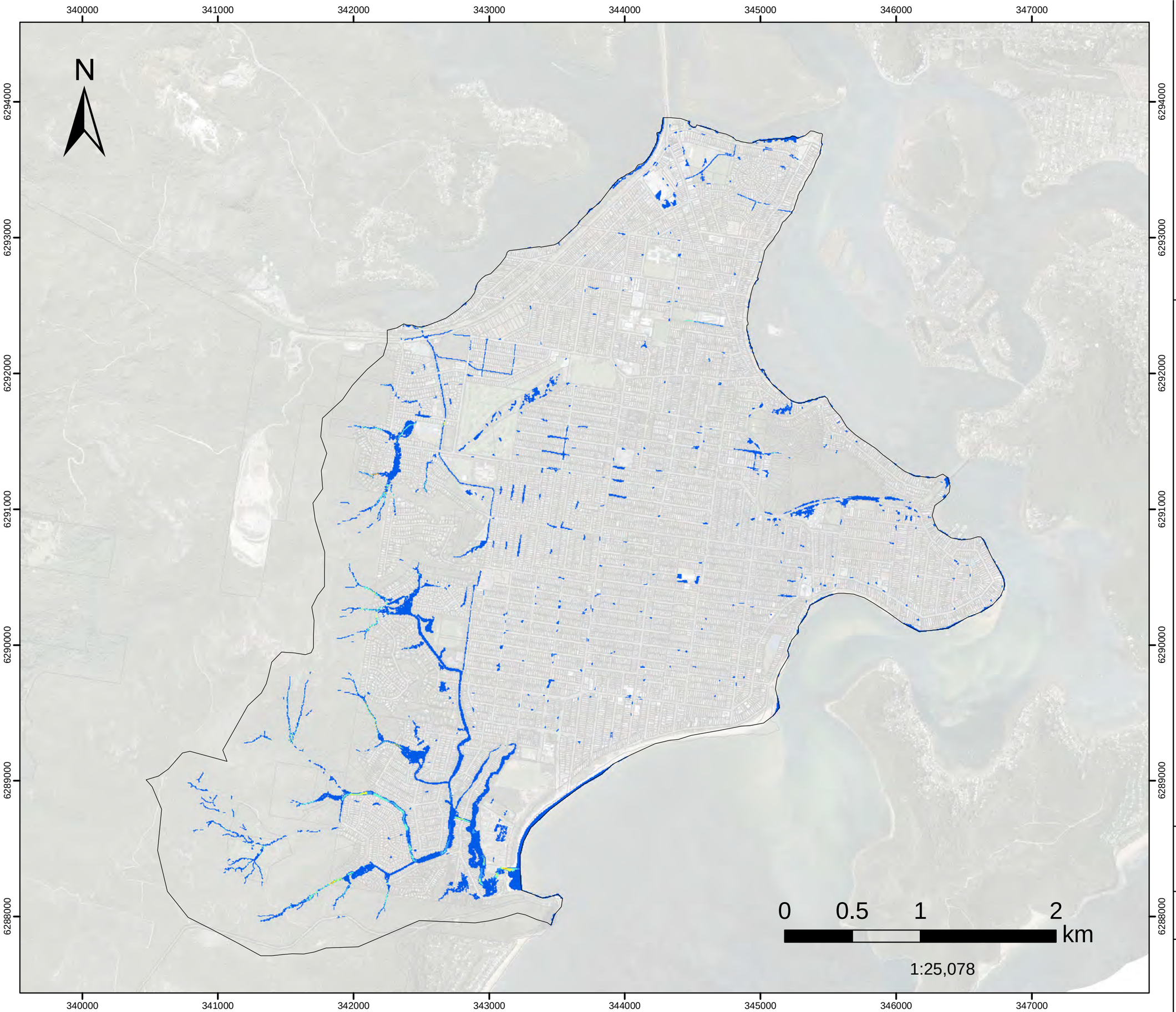

FIGURE L.87

10%AEP FM02

Dulkala Rd to Karingal Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

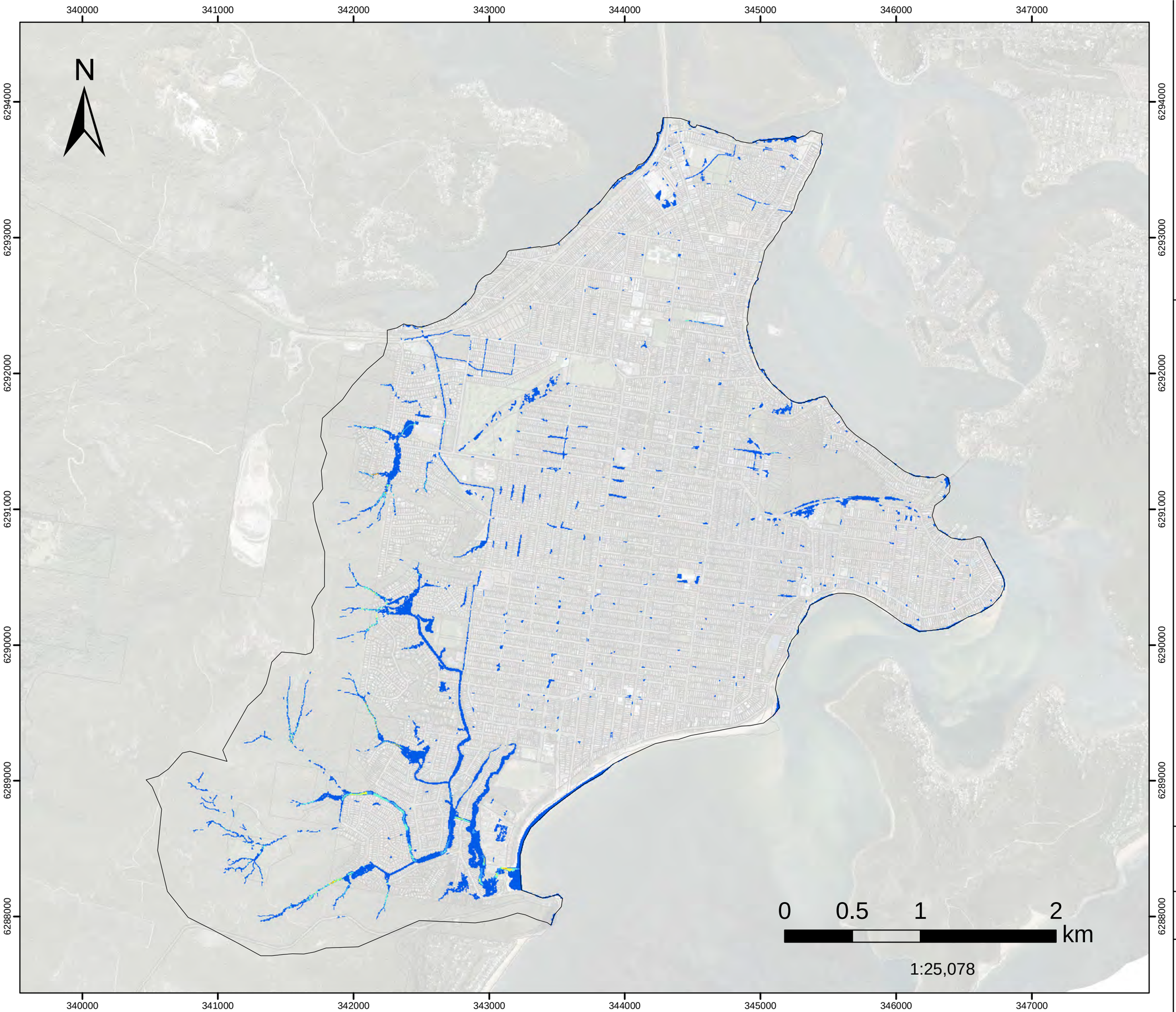

FIGURE L.88

10%AEP FM03

Infiltration Devices

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

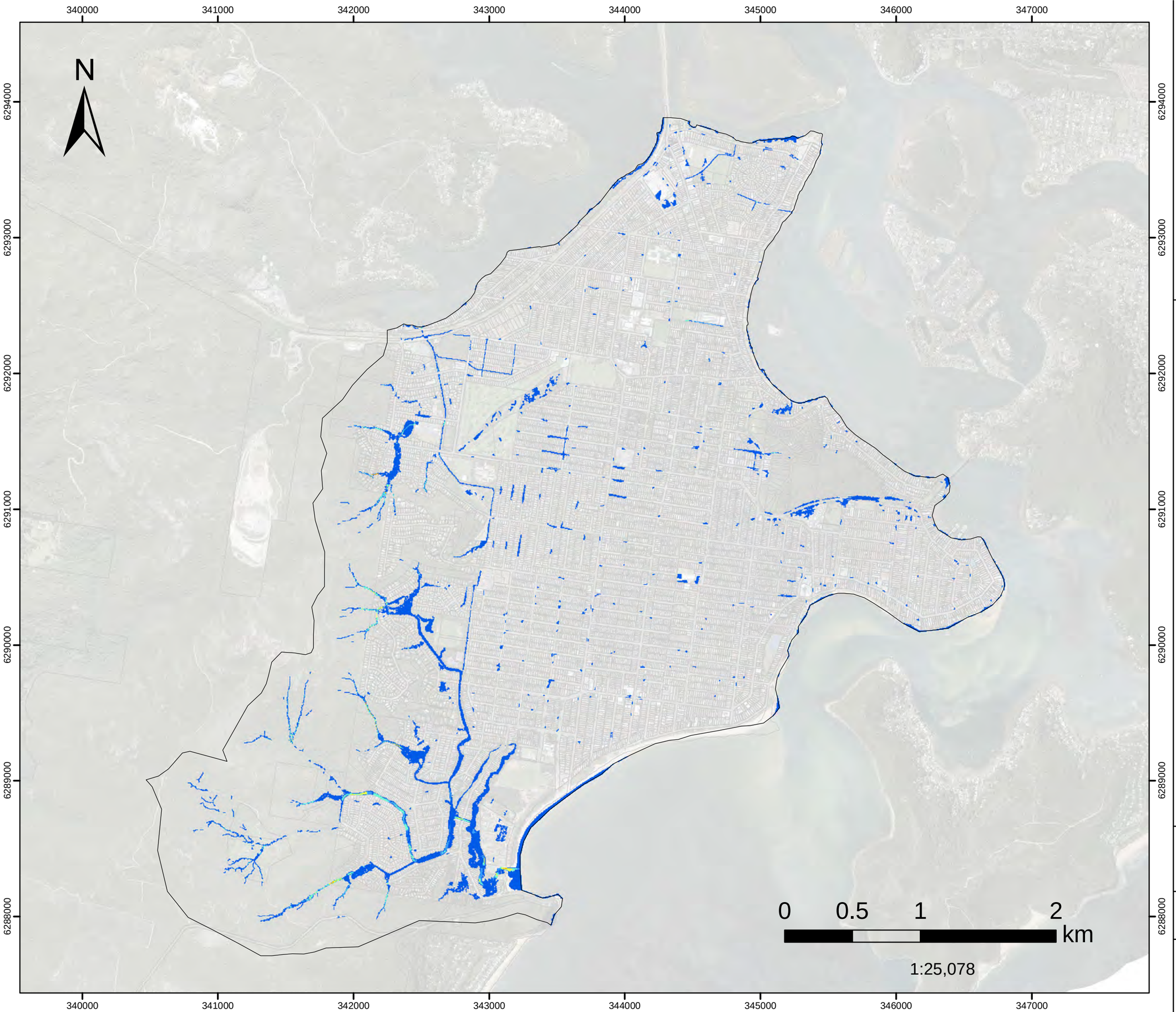

FIGURE L.89

10%AEP FM05

Greenhaven Dr

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

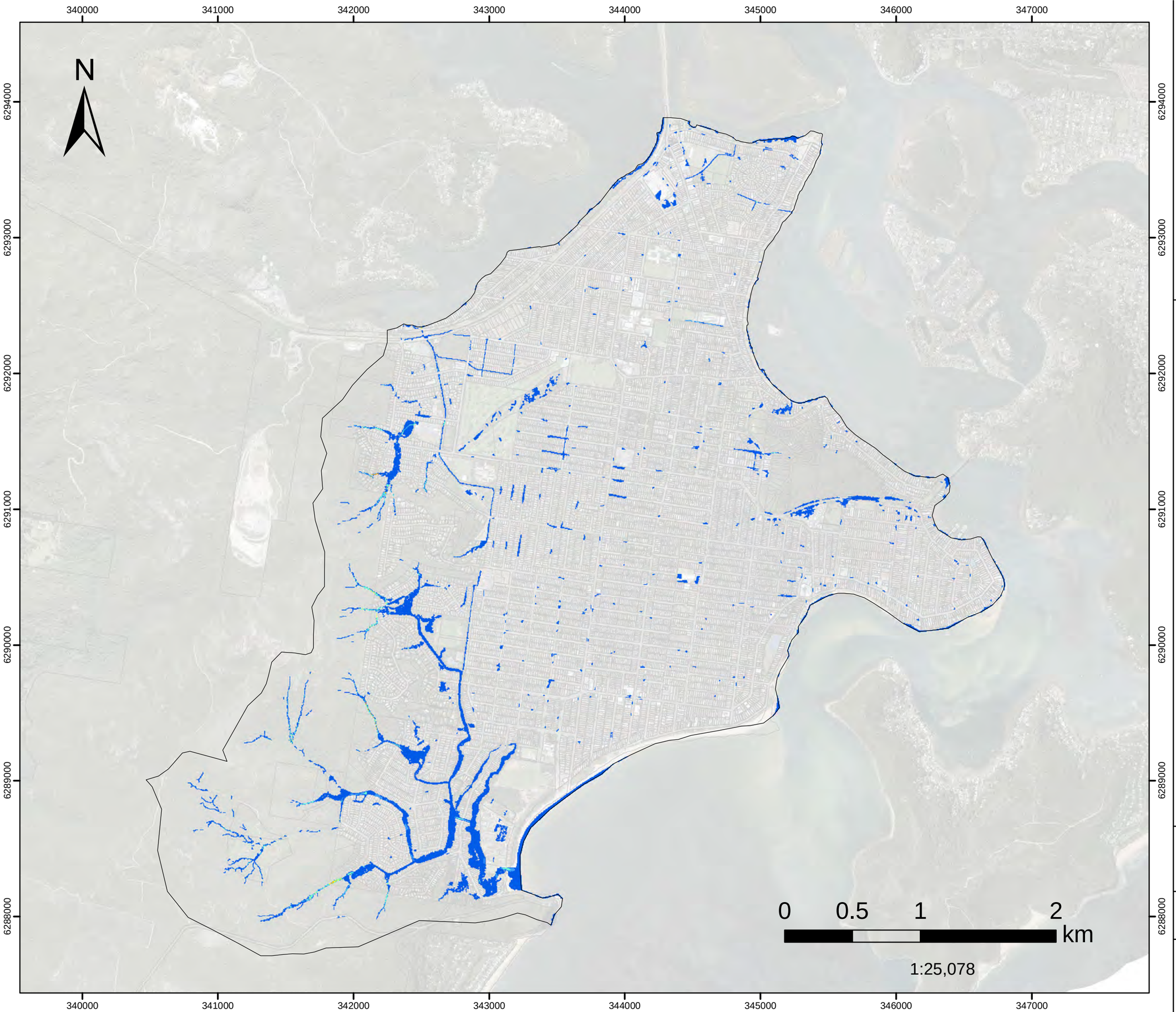

FIGURE L.90

10%AEP FM06A

Kahibah Ck system maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

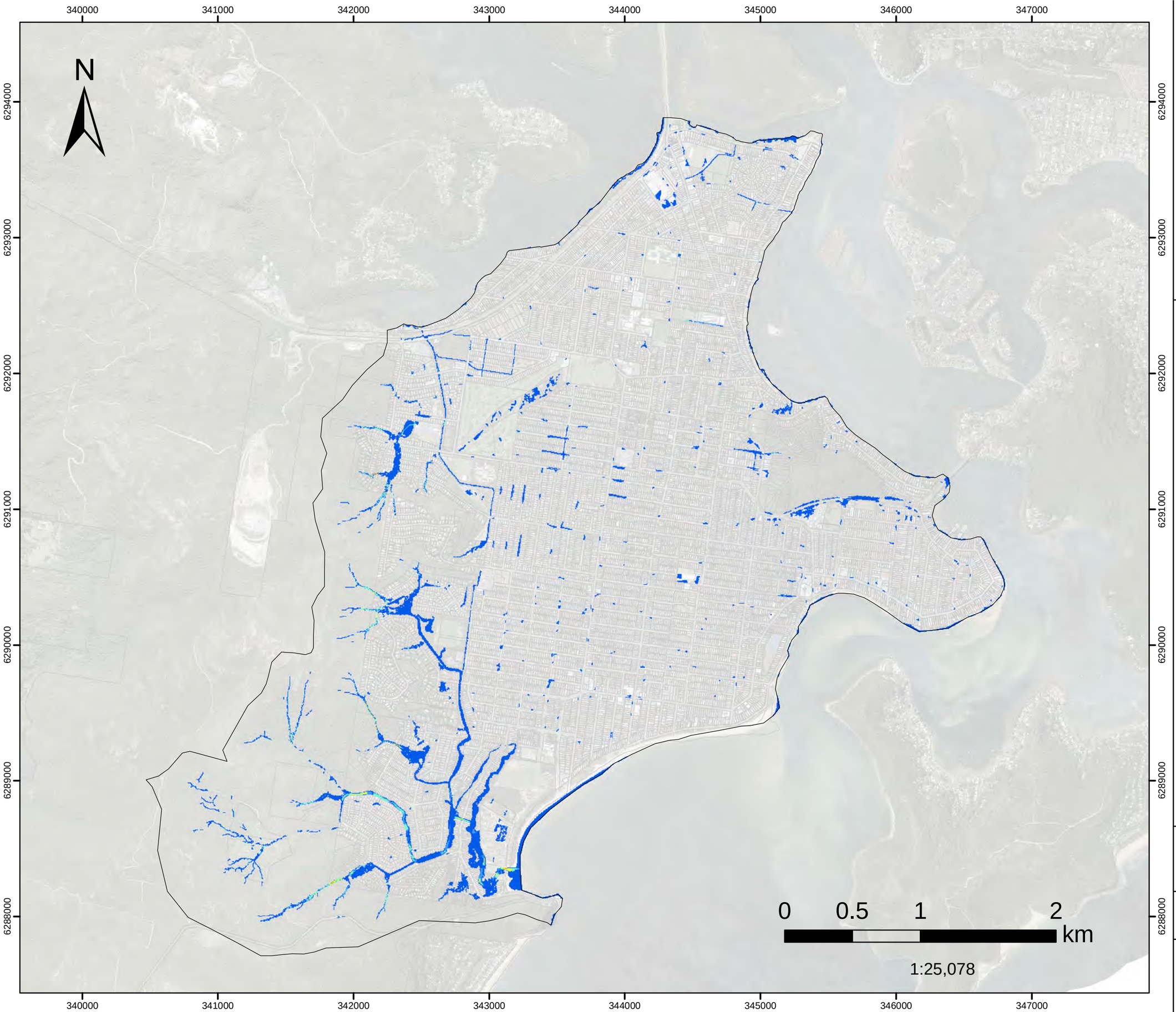

FIGURE L.91

10%AEP FM08

Palmtree Grove Detention Basin

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

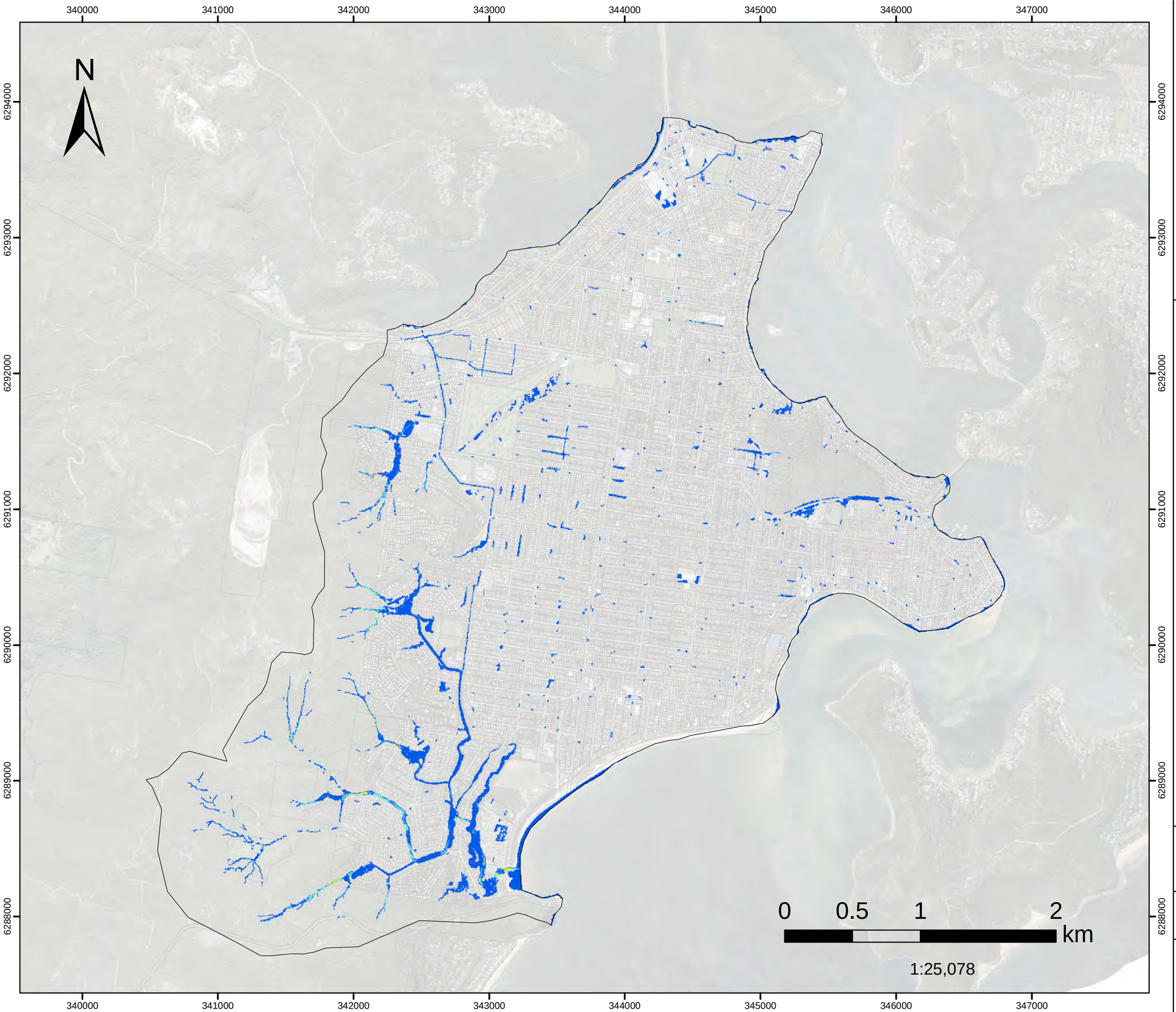

FIGURE L.92

10%AEP FM10

Neera Rd

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 3hrs

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

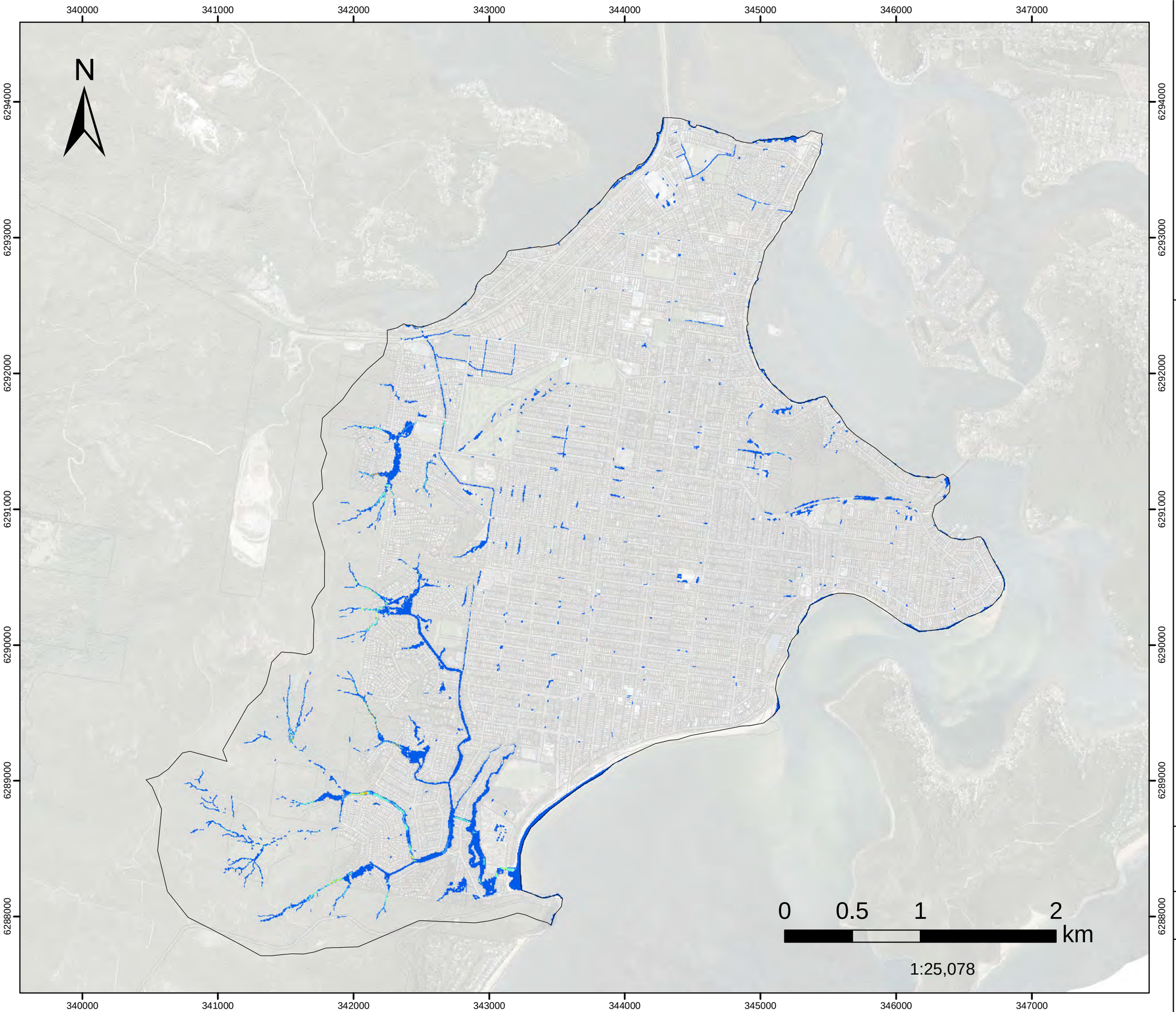

FIGURE L.93

20%AEP FM01

Woy Woy CBD

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

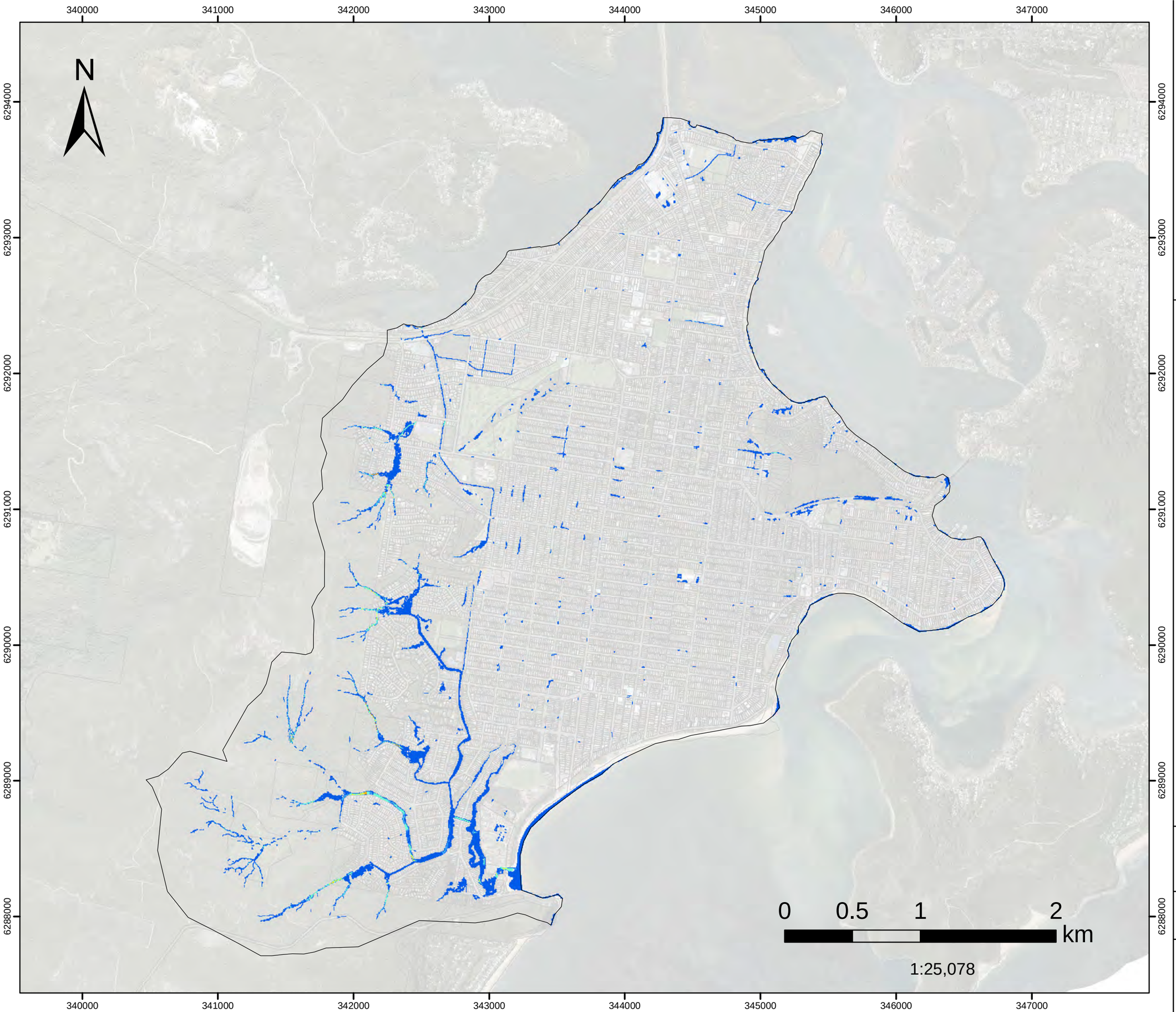

FIGURE L.94

20%AEP FM02

Dulkala Rd to Karingal Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

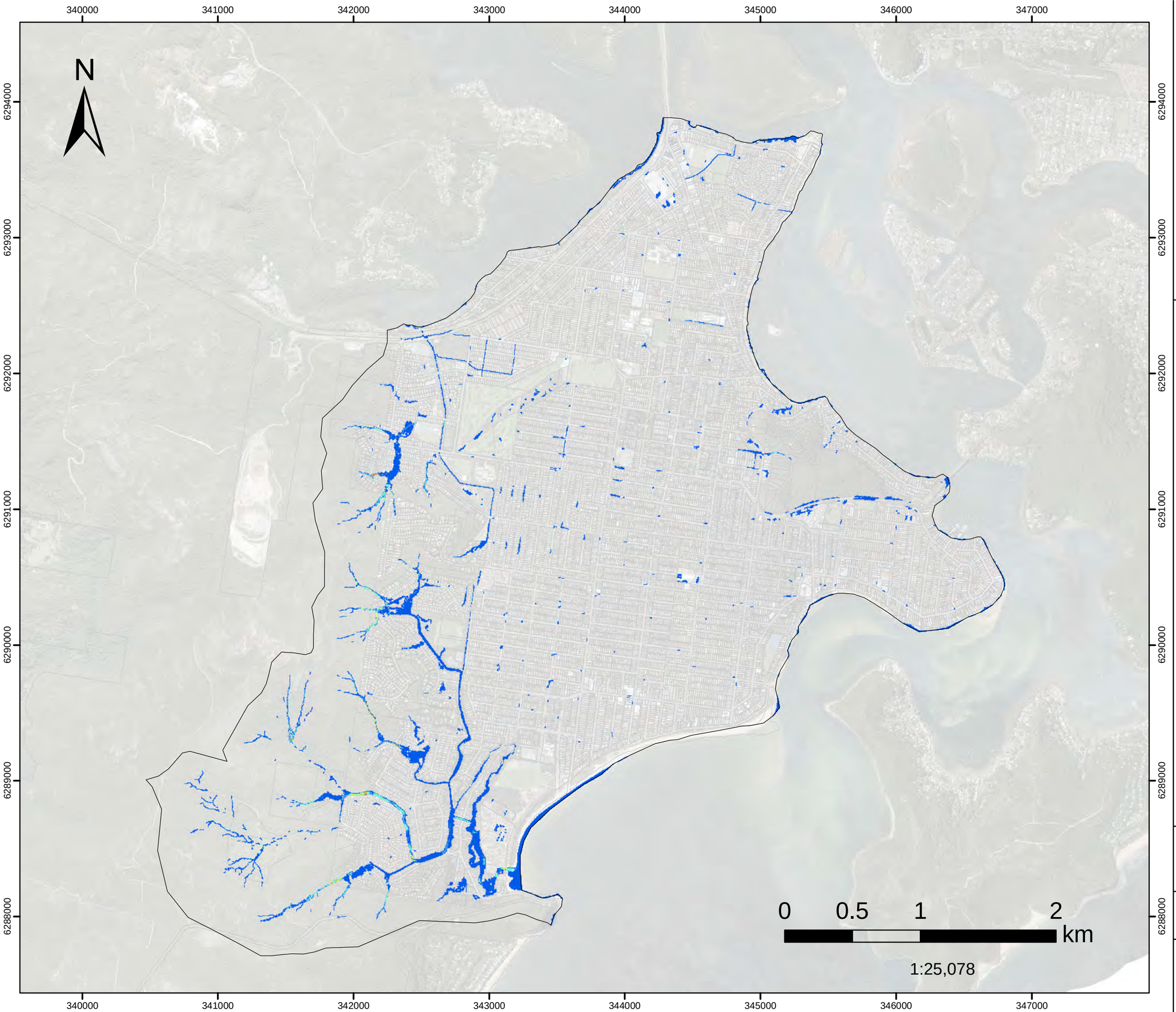

FIGURE L.95

20%AEP FM03

Infiltration Devices

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

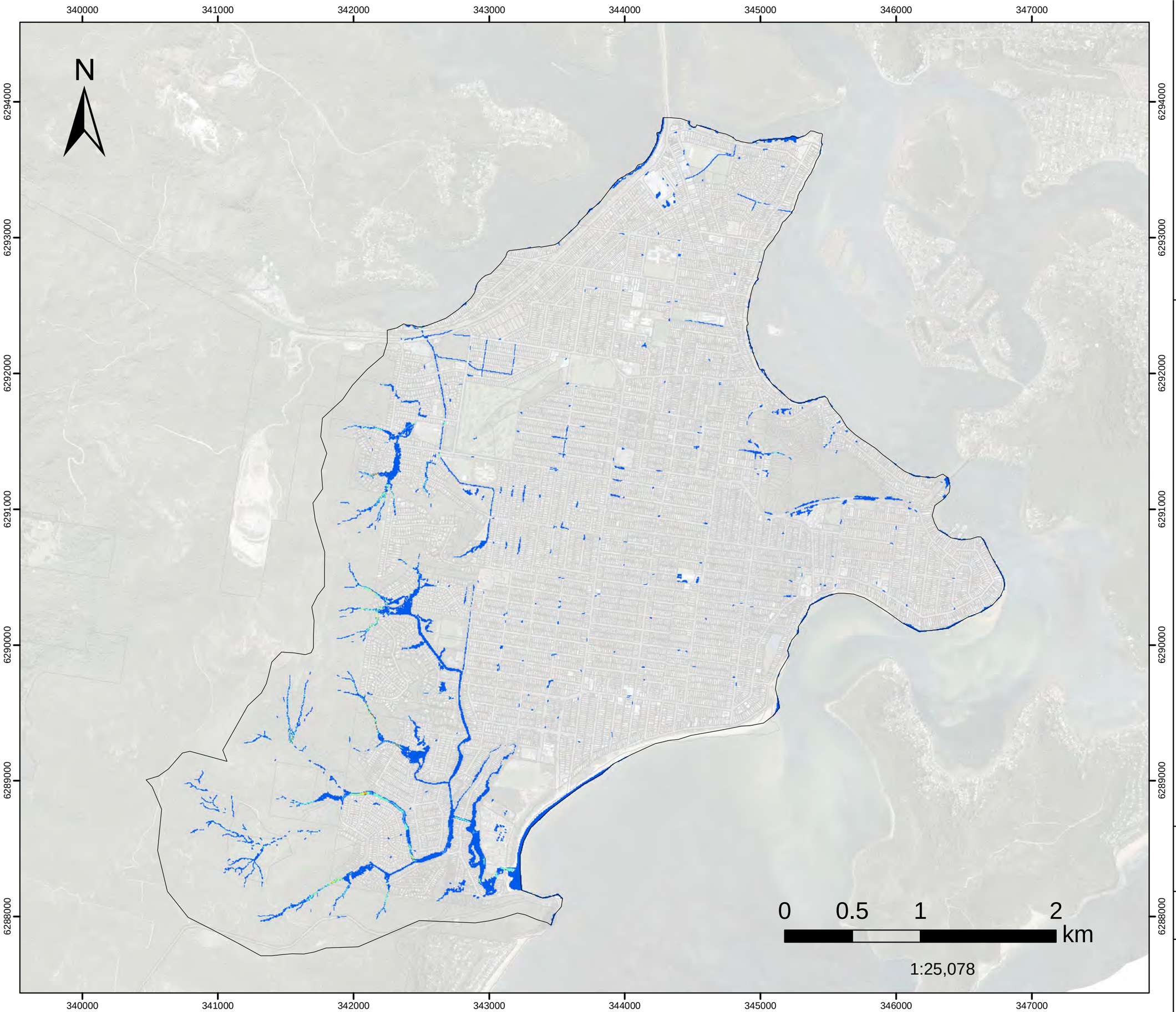

FIGURE L.96

20%AEP FM04

Groundwater pumping and Everglades drainage update work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

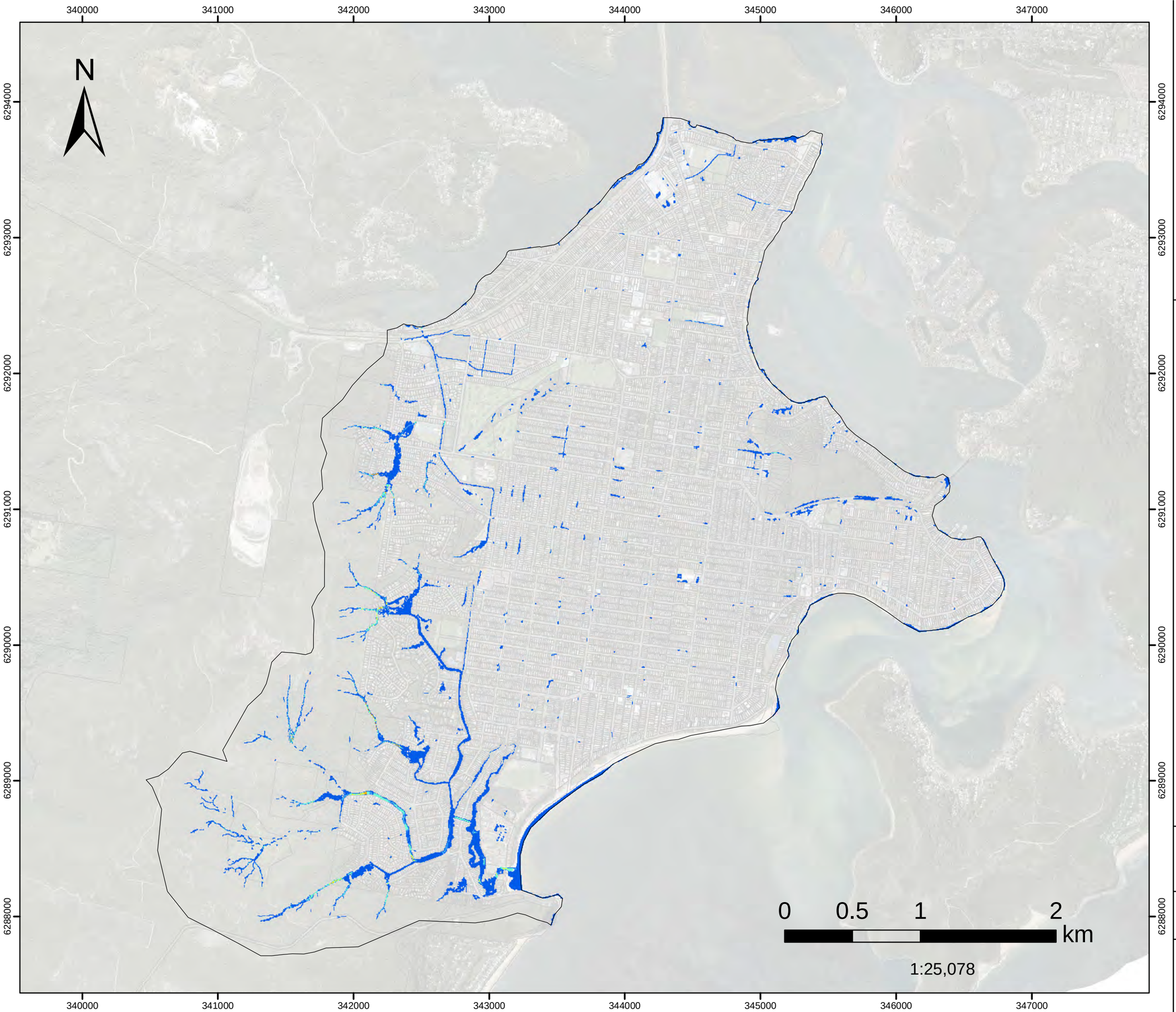

FIGURE L.97

20%AEP FM05

Greenhaven Dr

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

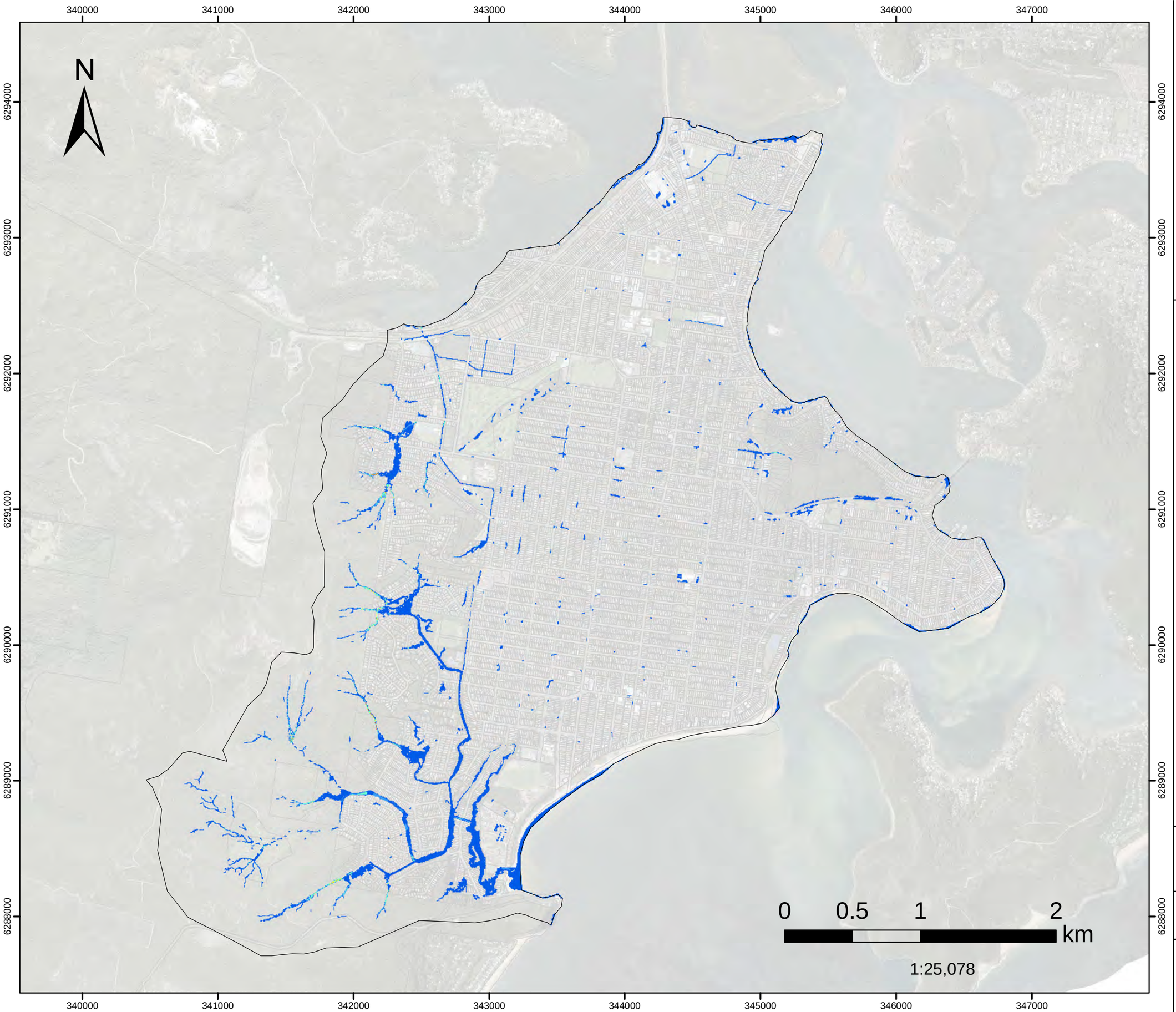

FIGURE L.98

20%AEP FM06A

Kahibah Ck system maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

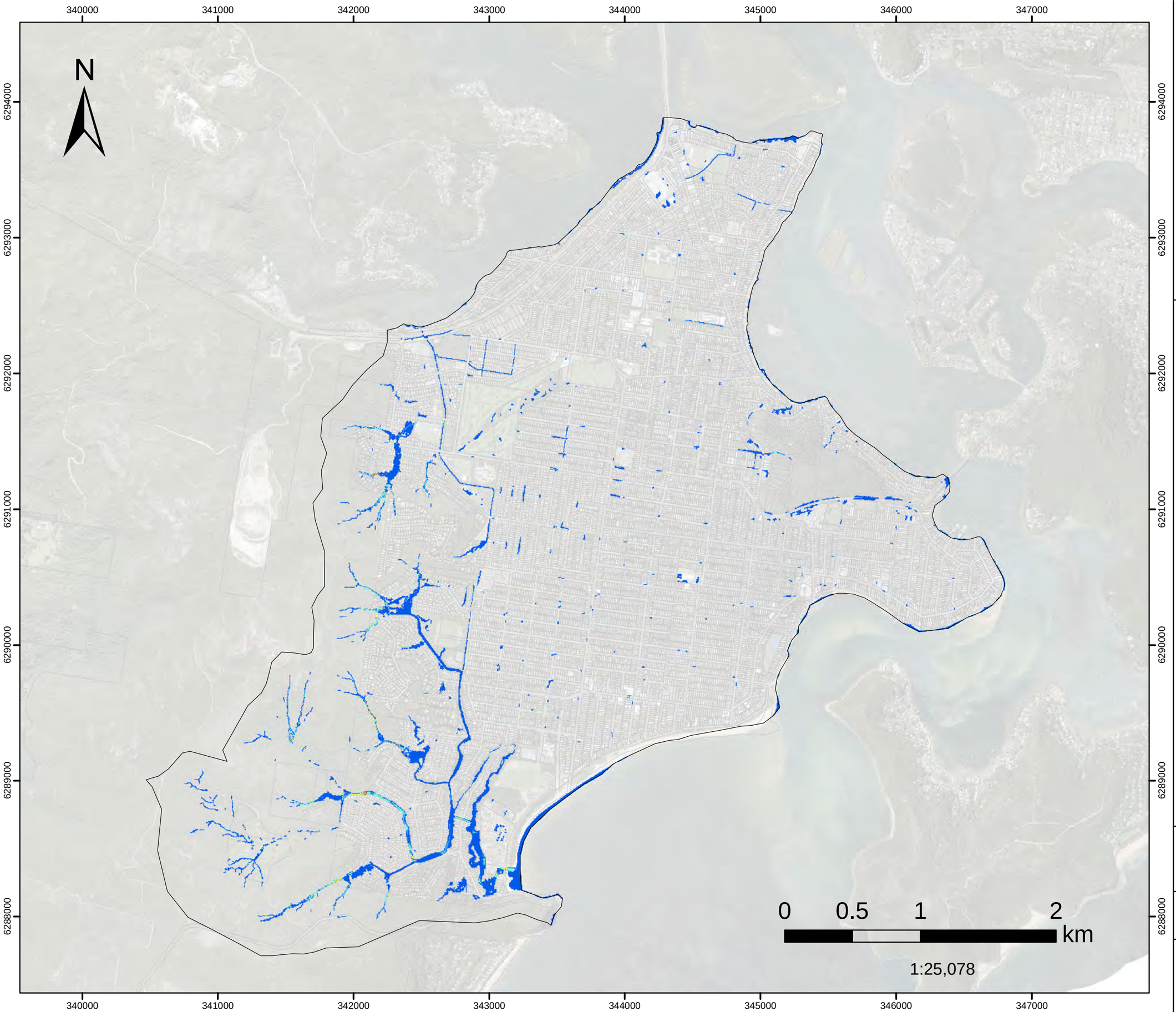

FIGURE L.99

20%AEP FM06B

Further improvement of the Kahibah Creek system

maintenance work

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

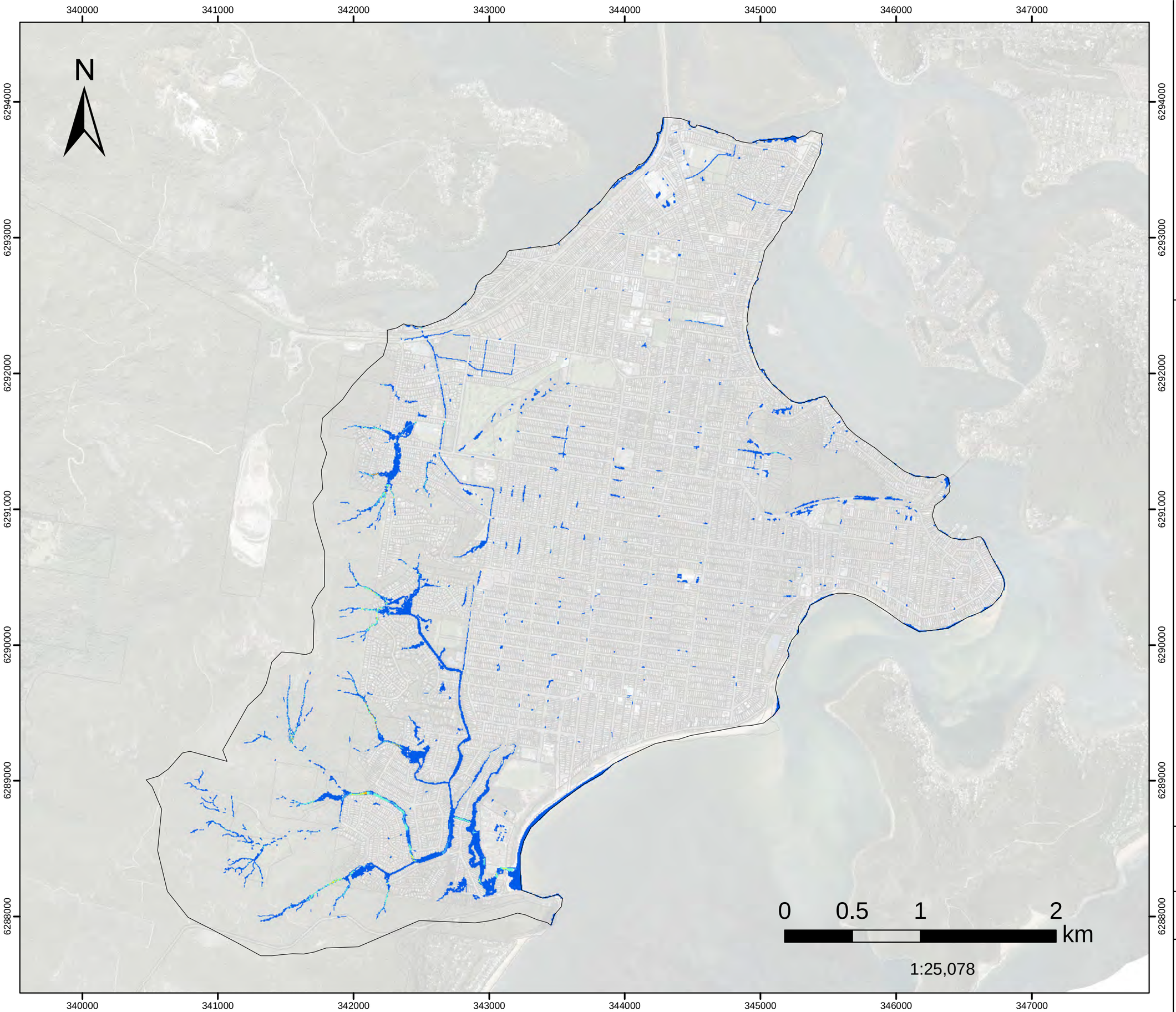

FIGURE L.100

20%AEP FM08

Palmtree Grove Detention Basin

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

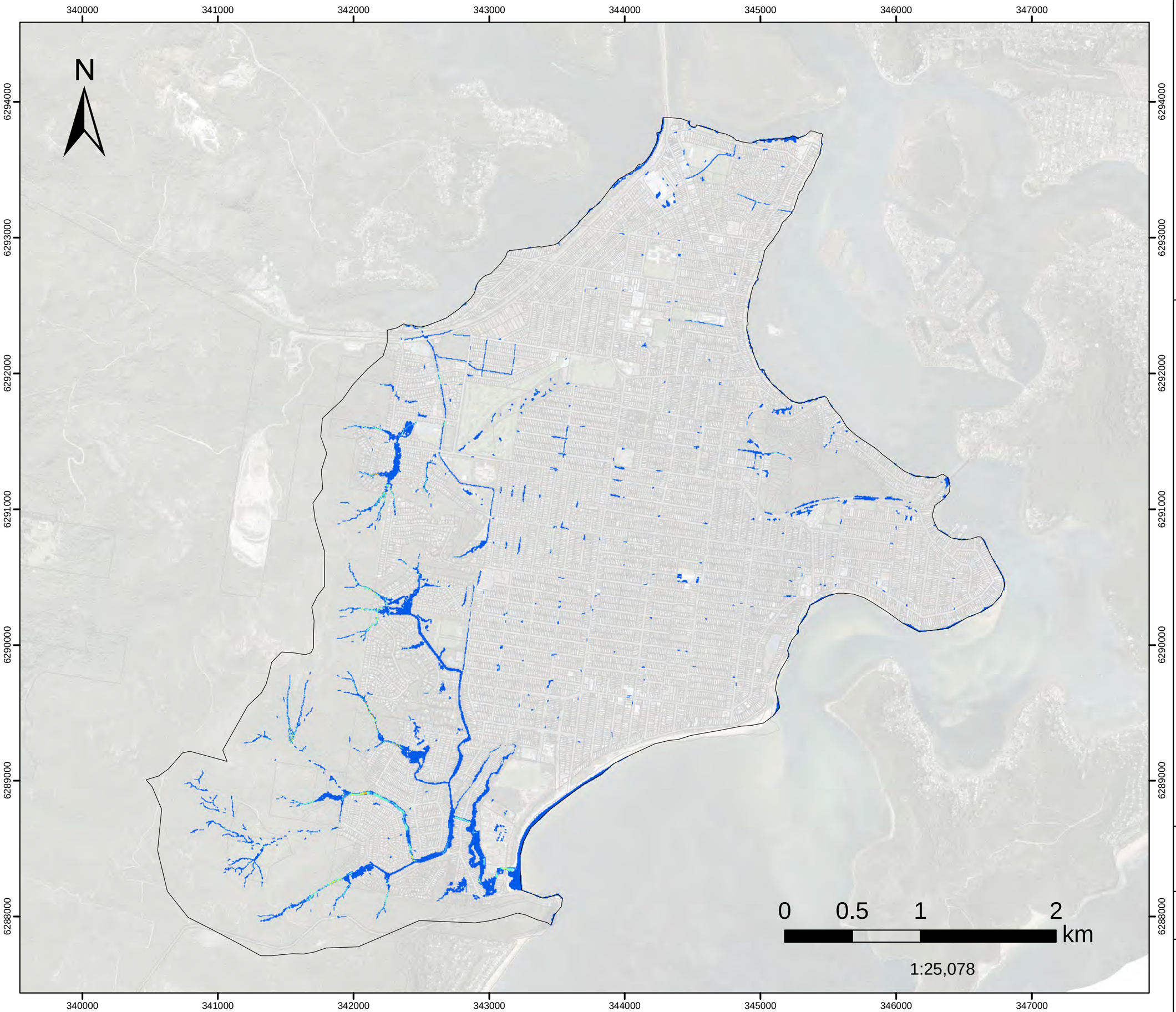

FIGURE L.101

20%AEP FM09

Wilks Av and McManus Cl

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2. Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
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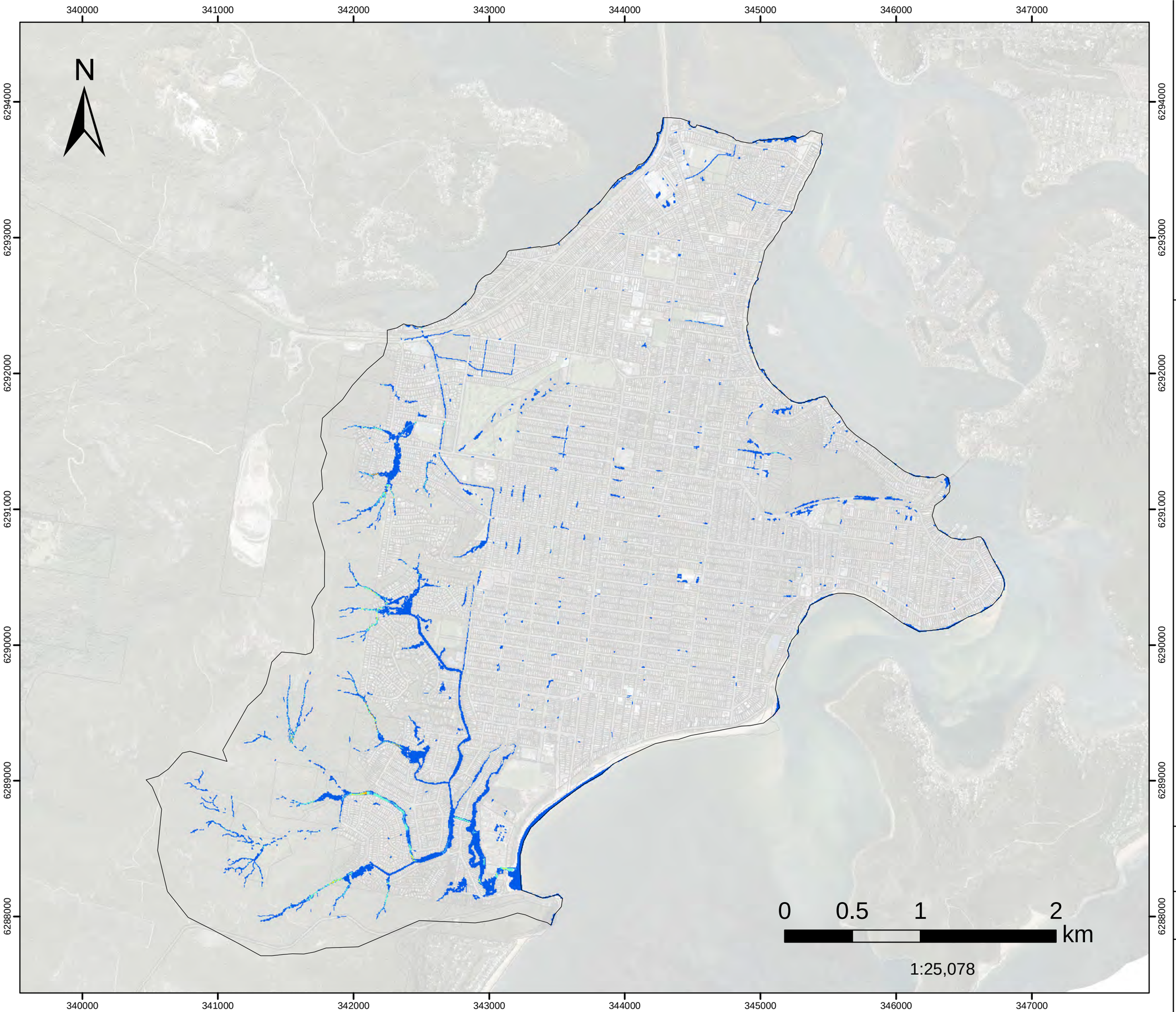

FIGURE L.102

20%AEP FM10

Neera Rd

Peak Velocity

Filtered with
Depth>0.10m, OR
Velocity>2m/s, OR
(Depth>0.05m AND VxD>0.025m2/s)

No puddles less than 100m2.

Assessed for the critical duration 1hr

Model Domain

Velocity (m/s)

- Below 0.75
- 0.76 - 1
- 1.01 - 1.5
- 1.51 - 2
- 2.01 - 2.5
- Above 2.5

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
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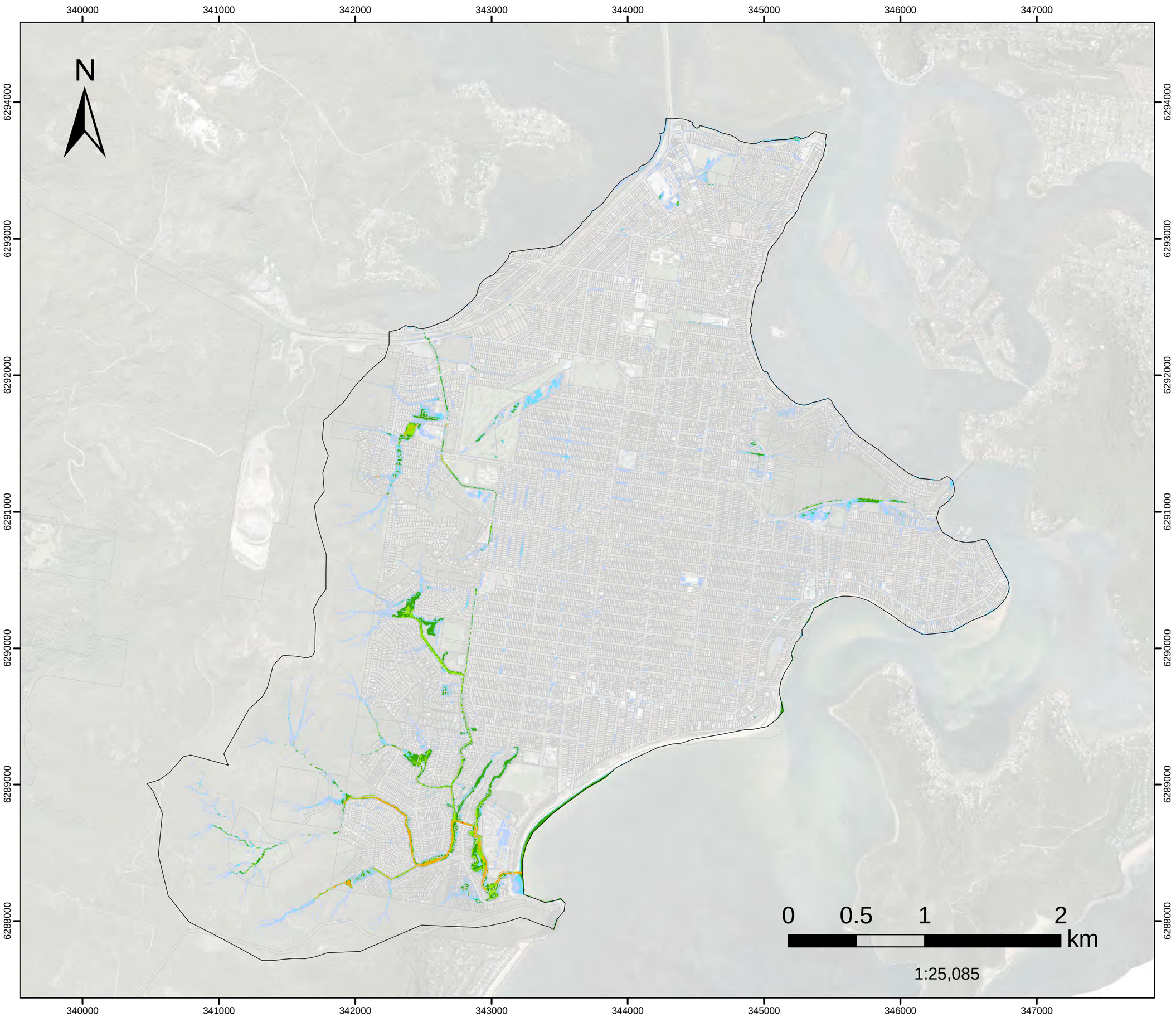

FIGURE L.103

1%AEP FM01

Woy Woy CBD
Hazard Classification

Assessed for the critical duration 6hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

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Date	1 Aug 2021
Project No	43803055

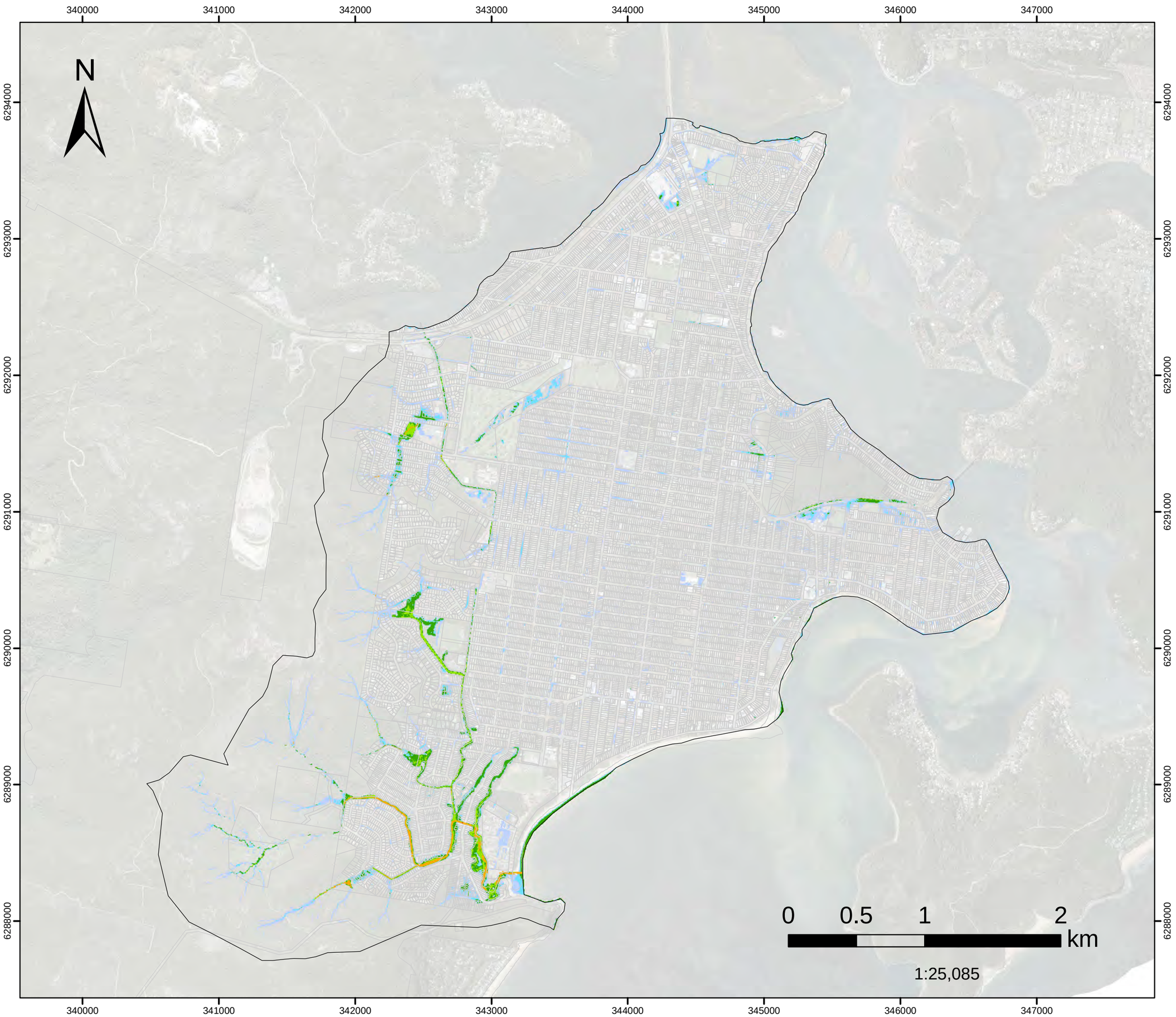

FIGURE L.104

1%AEP FM02

Dulkala Rd to Karingal Cl Hazard Classification

Assessed for the critical duration 6hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

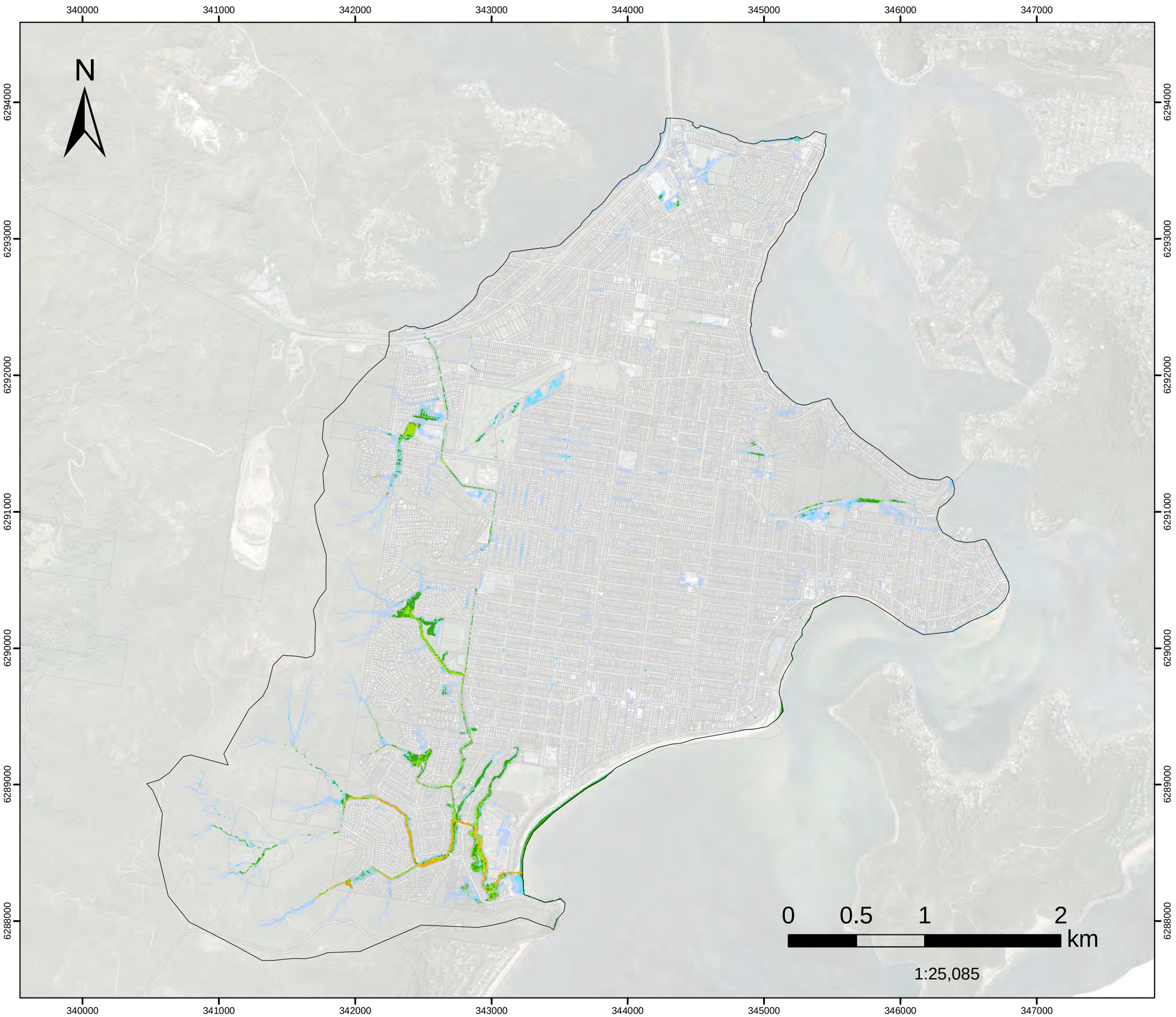

FIGURE L.105

1%AEP FM03

Infiltration Devices Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

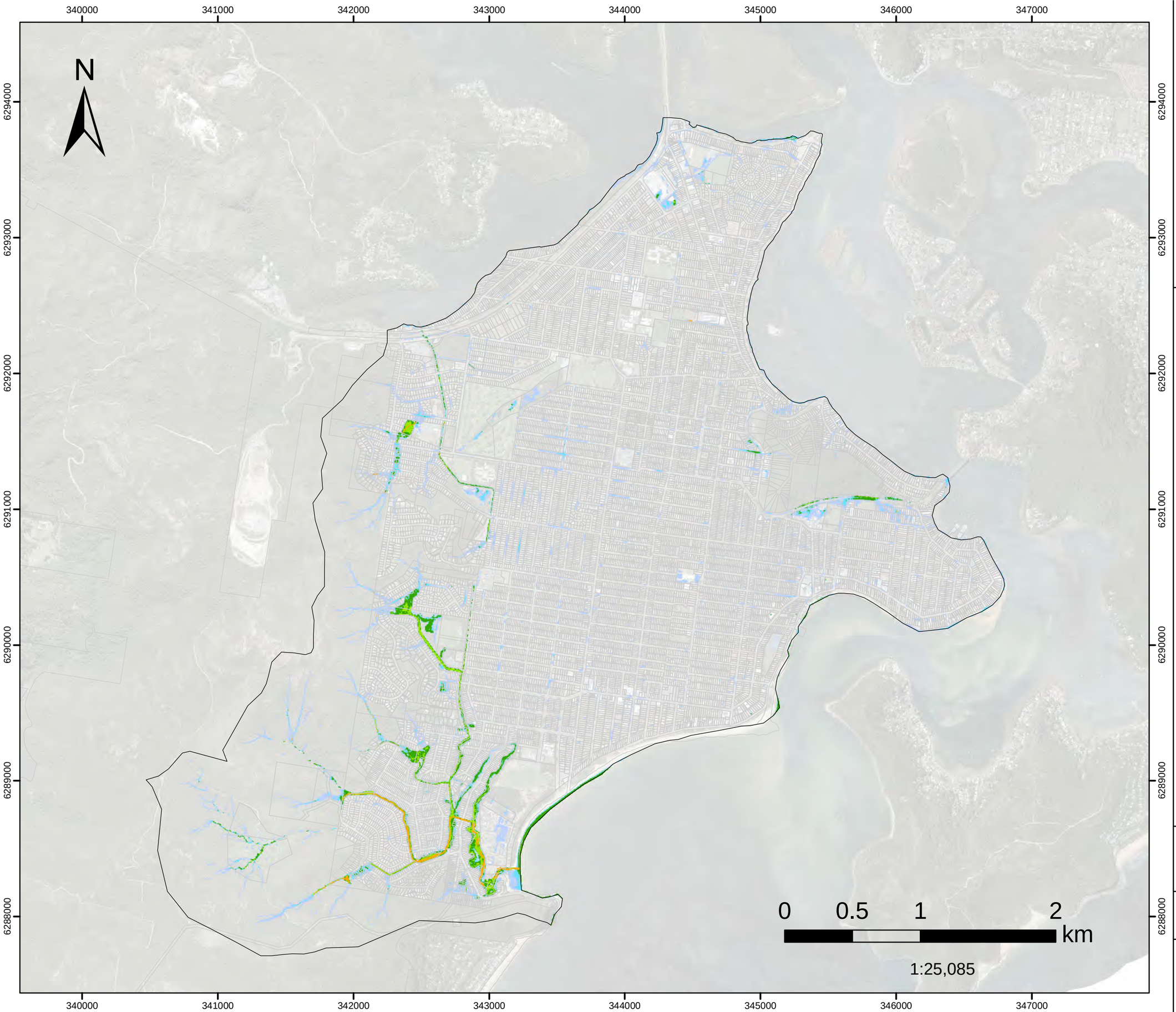

FIGURE L.106

1%AEP FM04

Groundwater pumping and Everglades drainage update work

Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

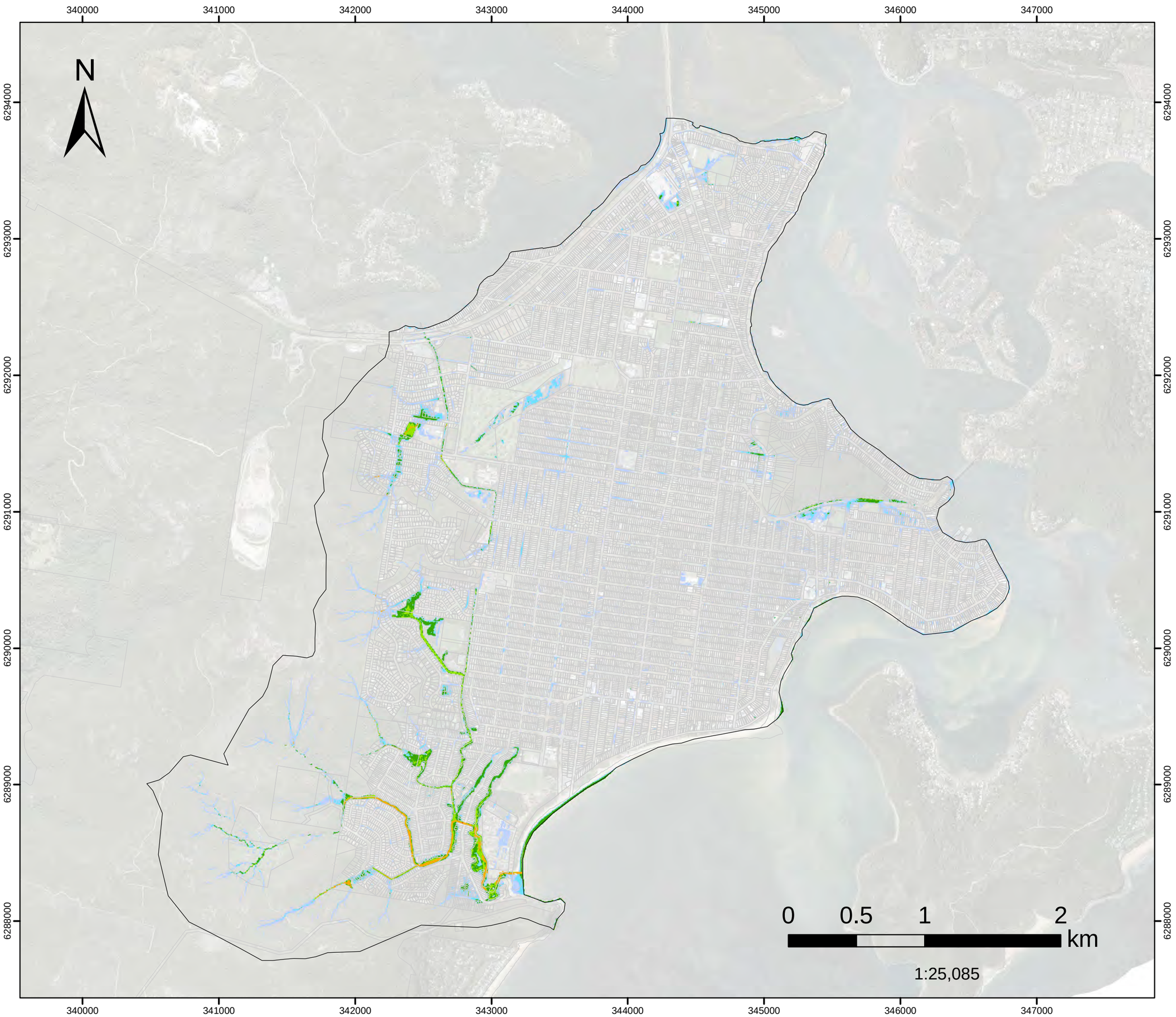

FIGURE L.107

1%AEP FM05

Greenhaven Dr
Hazard Classification

Assessed for the critical duration 6hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

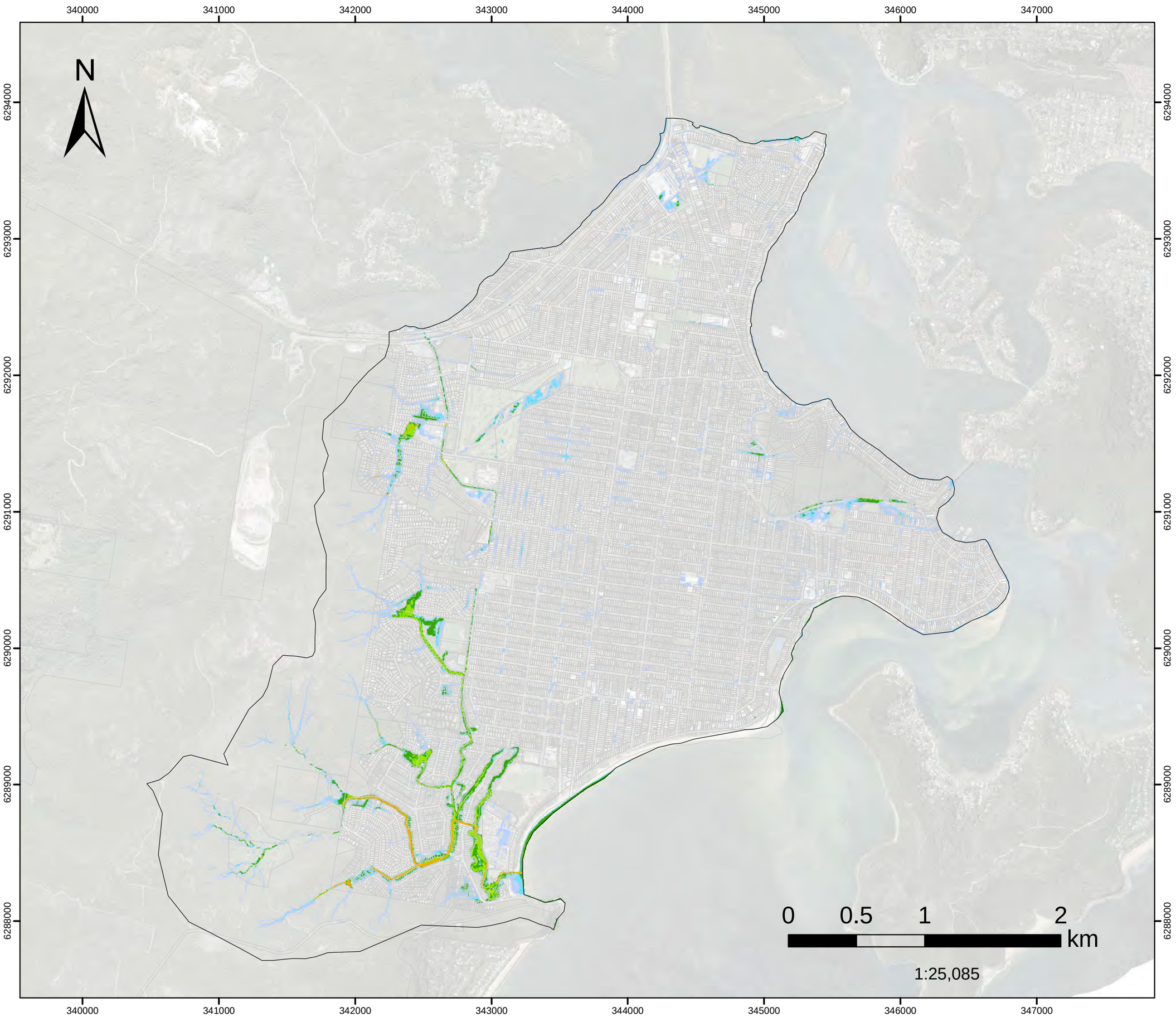

FIGURE L.108

1%AEP FM06A

Kahibah Ck system maintenance work

Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

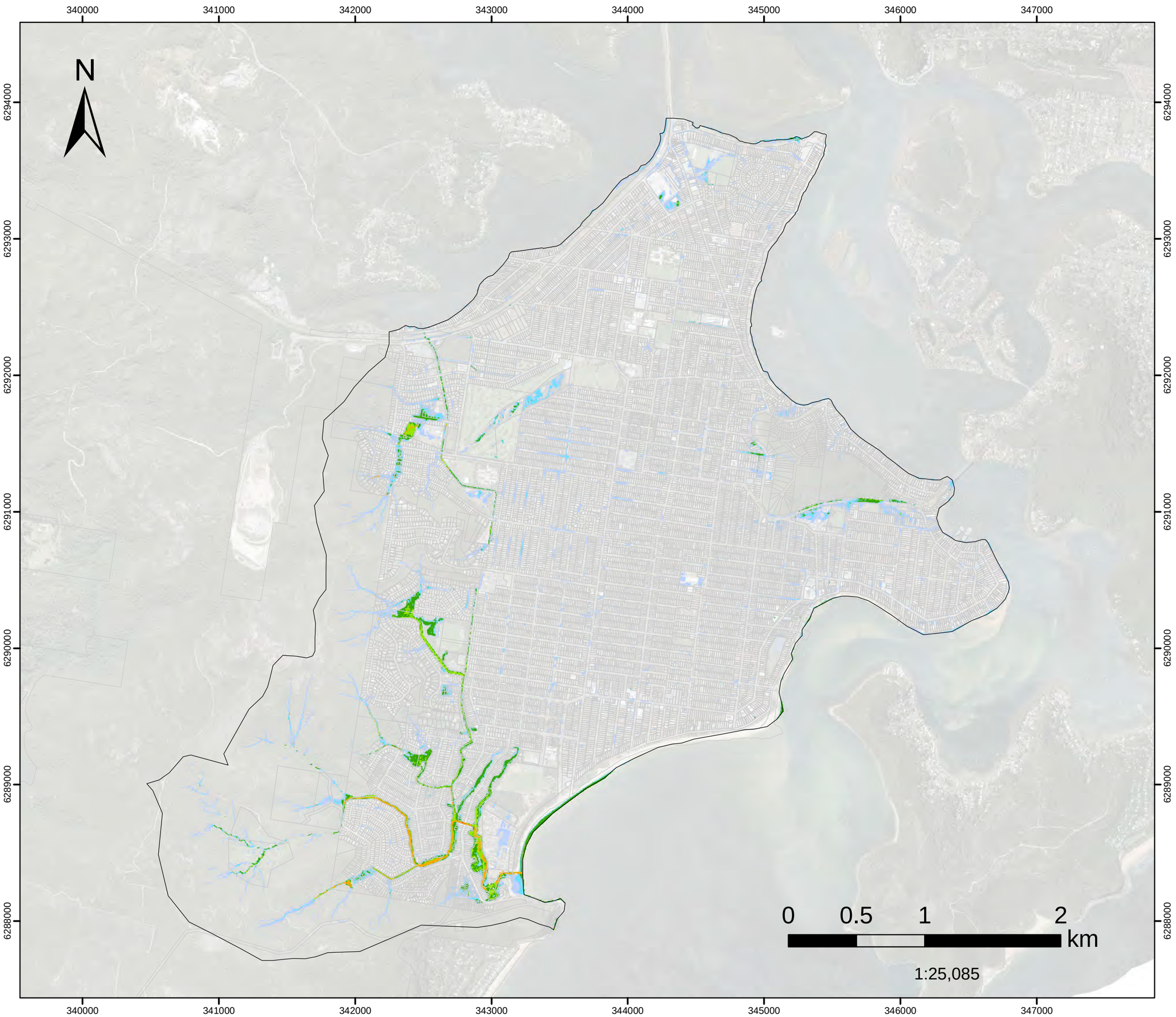

FIGURE L.109

1%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

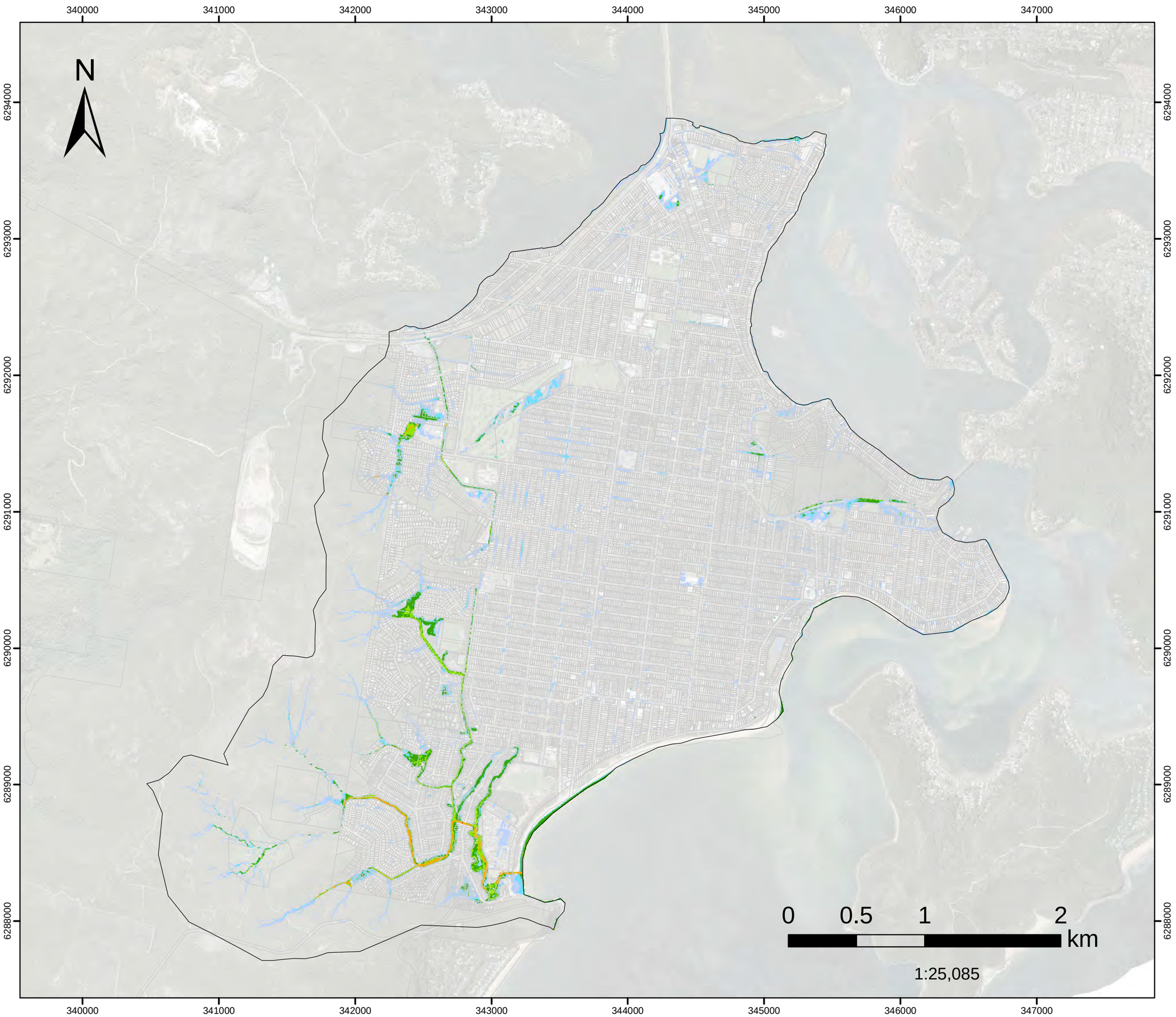

FIGURE L.110

1%AEP FM08

Palmtree Grove Detention Basin Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

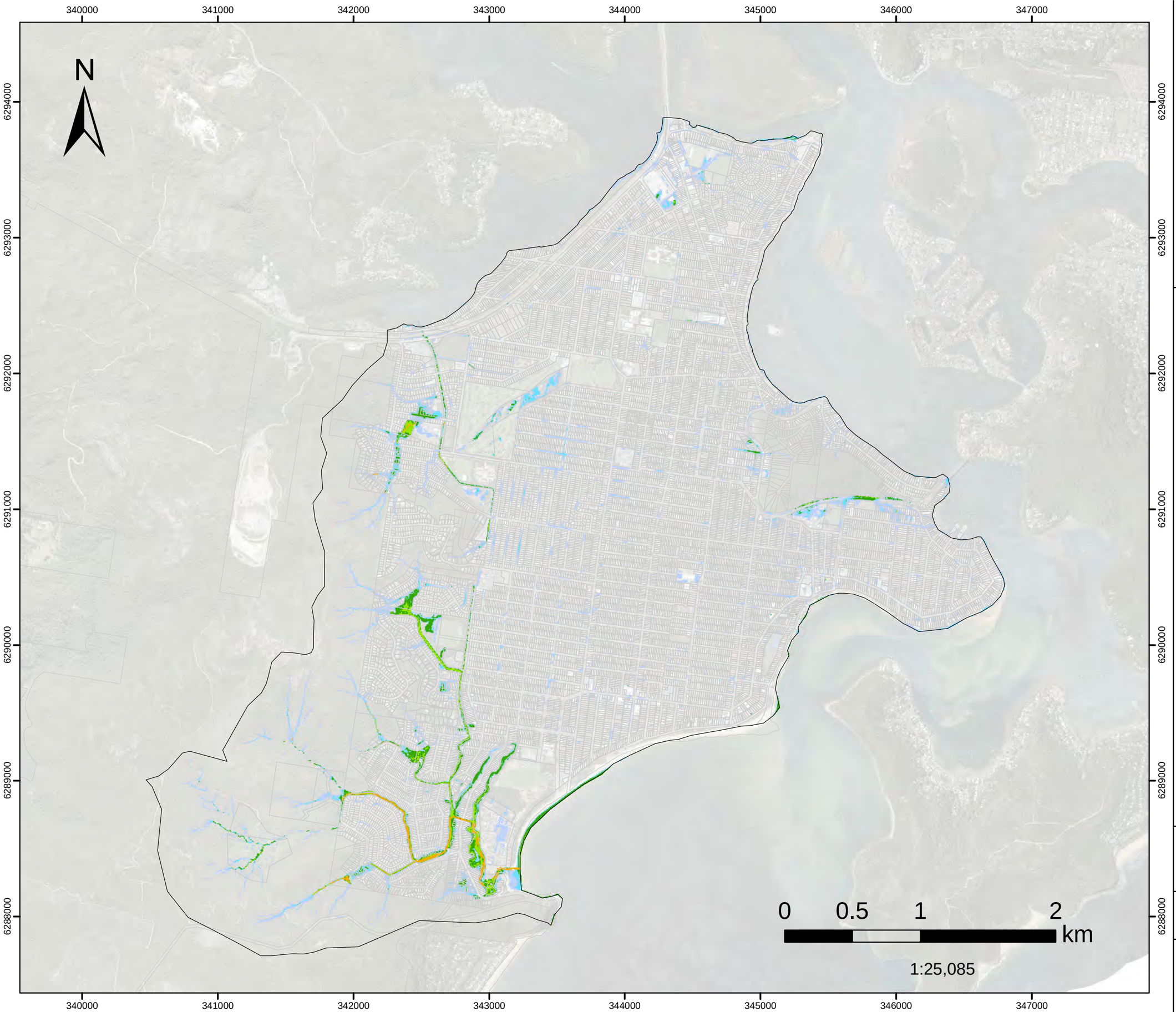

FIGURE L.111

1%AEP FM09

Wilks Av and McManus Cl Hazard Classification

Assessed for the critical duration 6hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

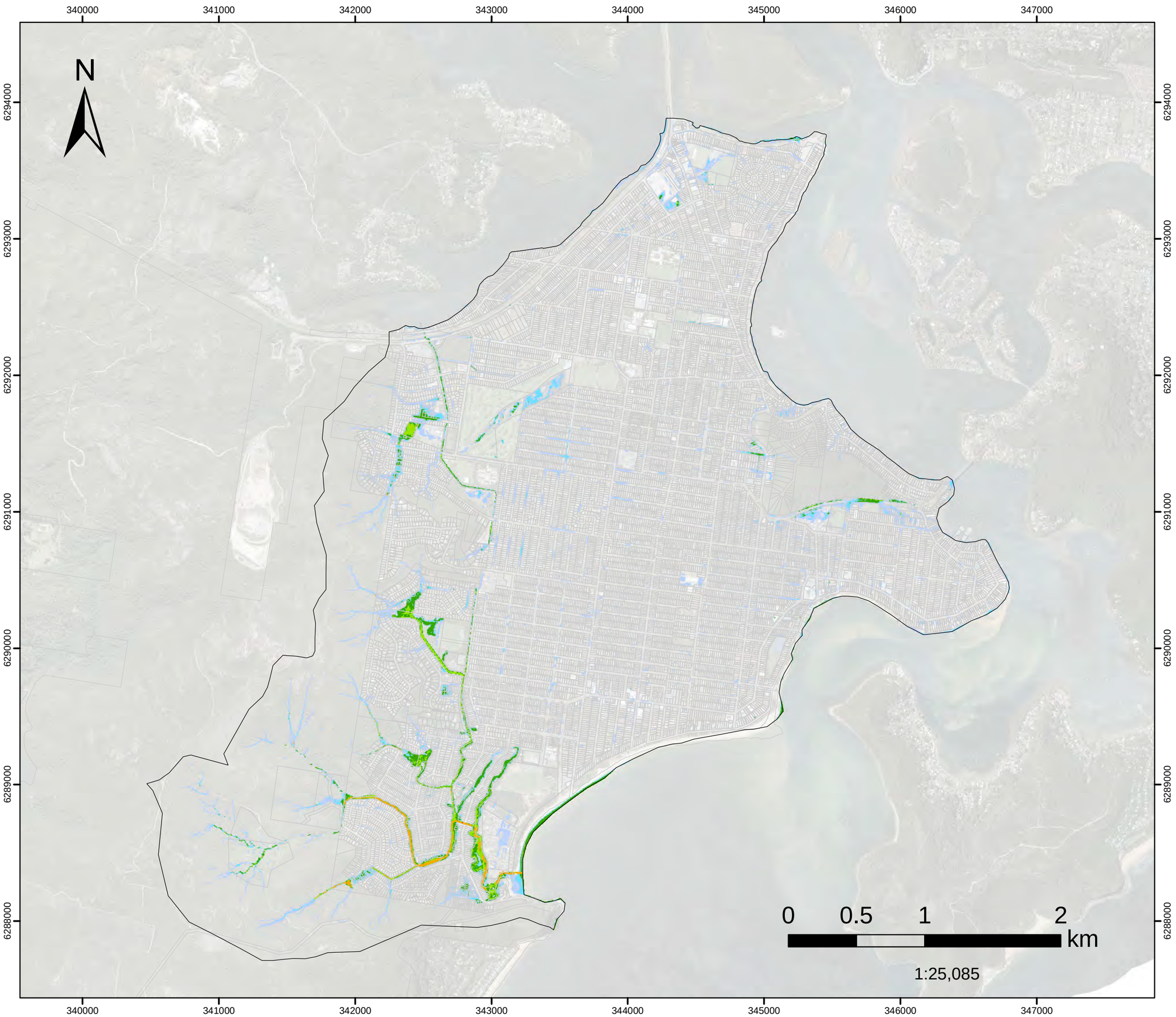

FIGURE L.112

1%AEP FM10

Neera Rd
Hazard Classification

Assessed for the critical duration 6hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

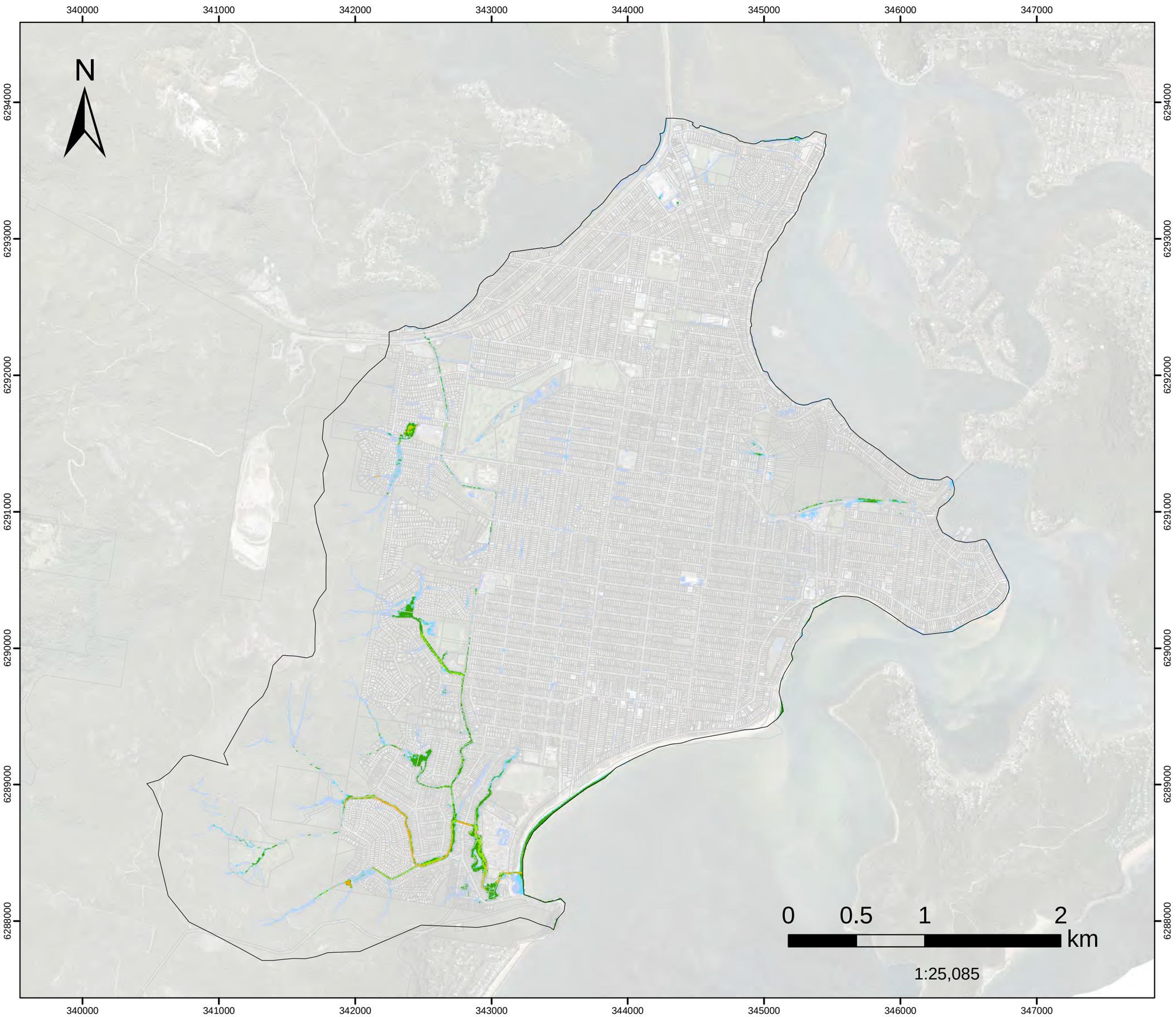

FIGURE L.113

10%AEP FM01

Woy Woy CBD
Hazard Classification

Assessed for the critical duration 3hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

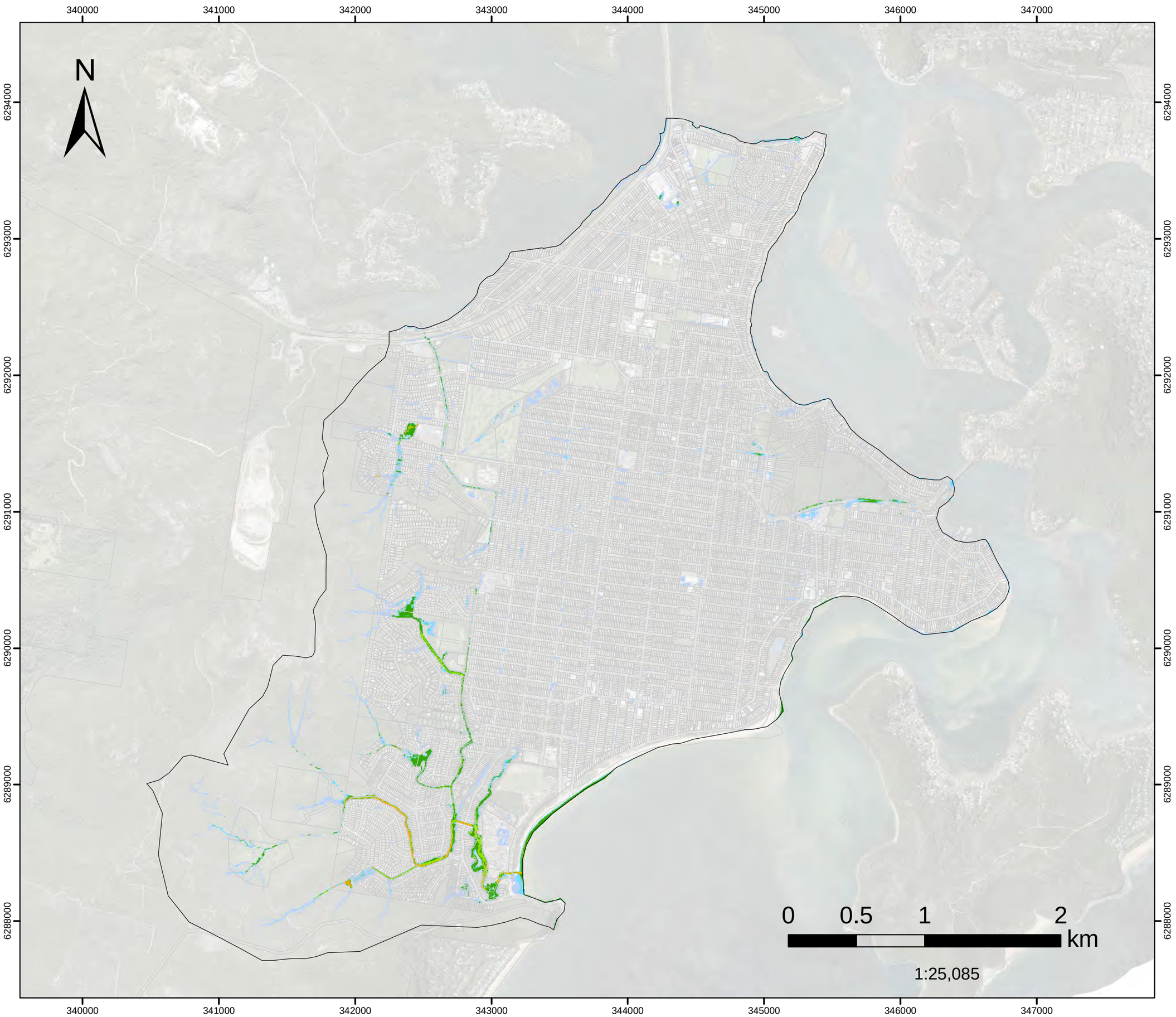

FIGURE L.114

10%AEP FM02

Dulkala Rd to Karingal Cl Hazard Classification

Assessed for the critical duration 3hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

DHI

Version	FINAL
Date	1 Aug 2021
Project No	43803055

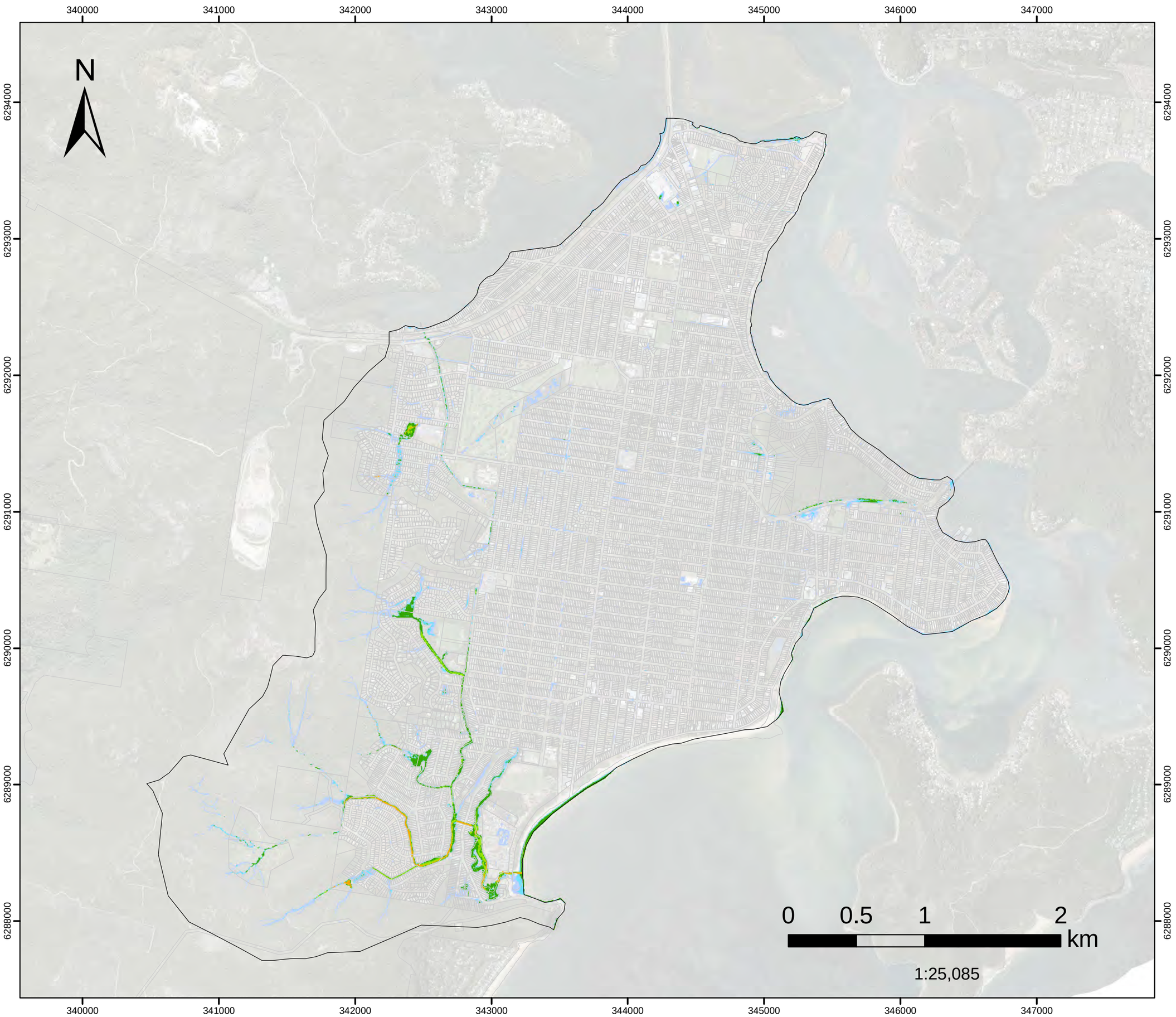

FIGURE L.115

10%AEP FM03

Infiltration Devices Hazard Classification

Assessed for the critical duration 3hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

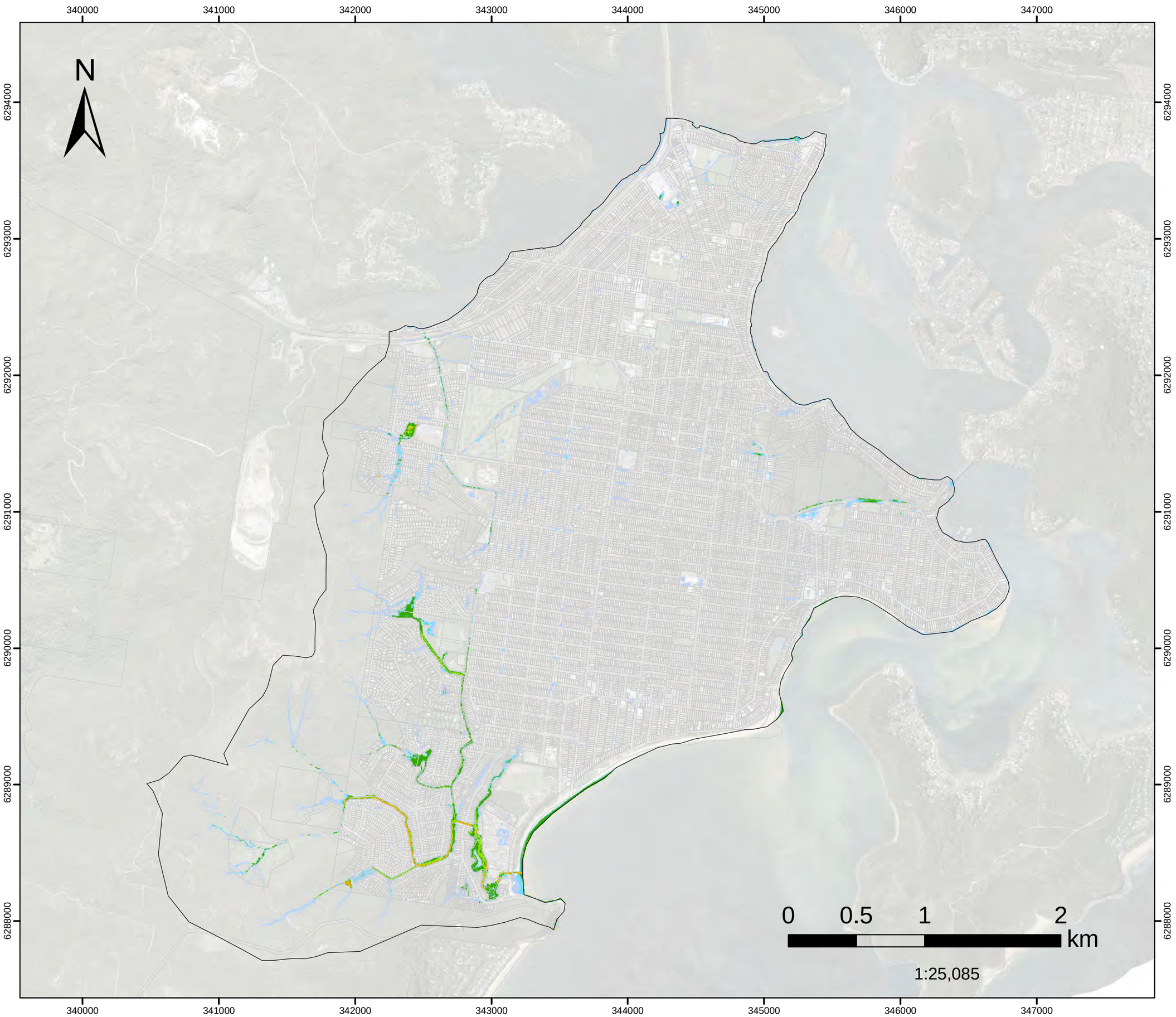

FIGURE L.116

10%AEP FM05

Greenhaven Dr
Hazard Classification

Assessed for the critical duration 3hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

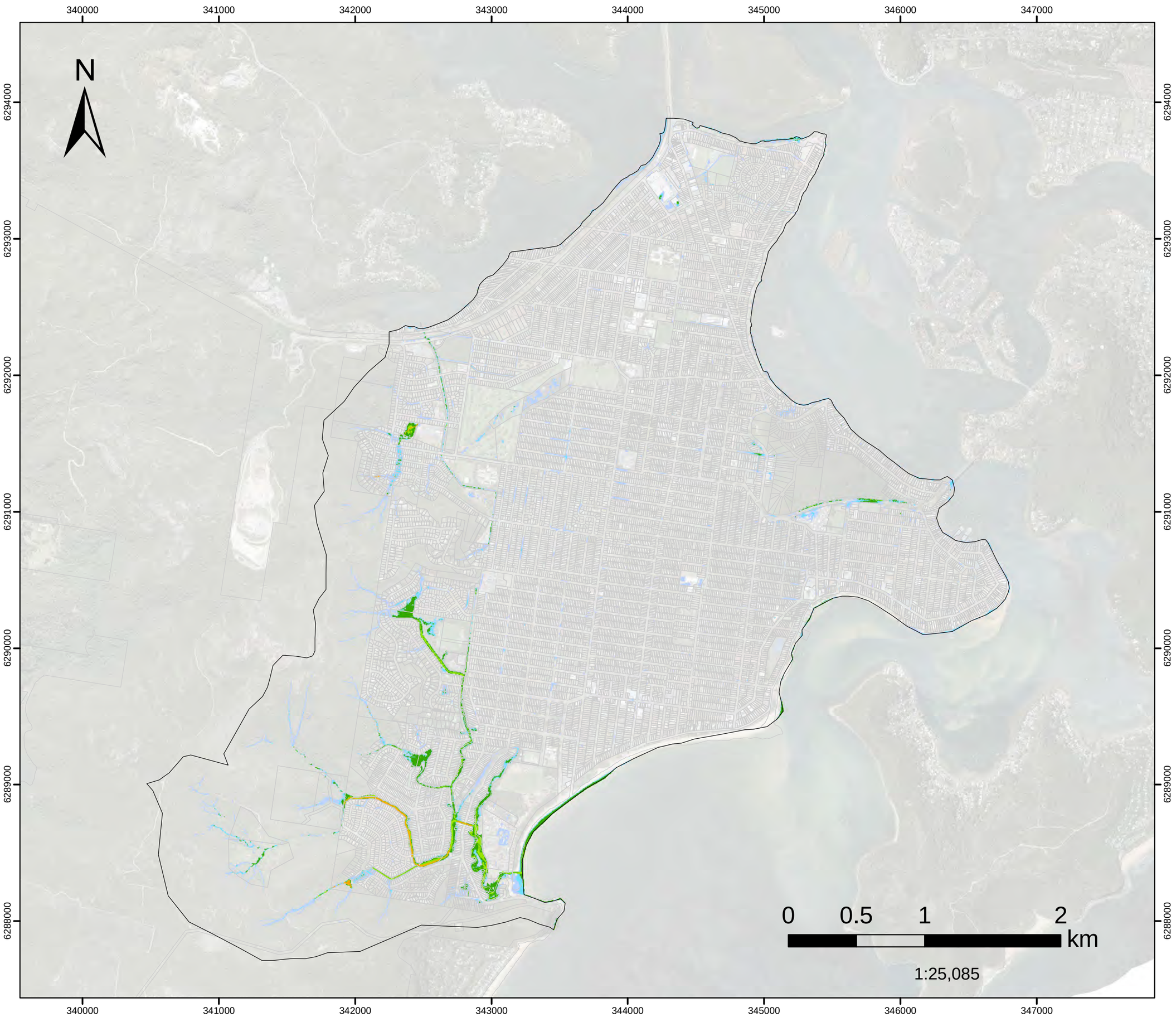

FIGURE L.117

10%AEP FM06A

Kahibah Ck system maintenance work

Hazard Classification

Assessed for the critical duration 3hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

DHI

Version	FINAL
Date	1 Aug 2021
Project No	43803055

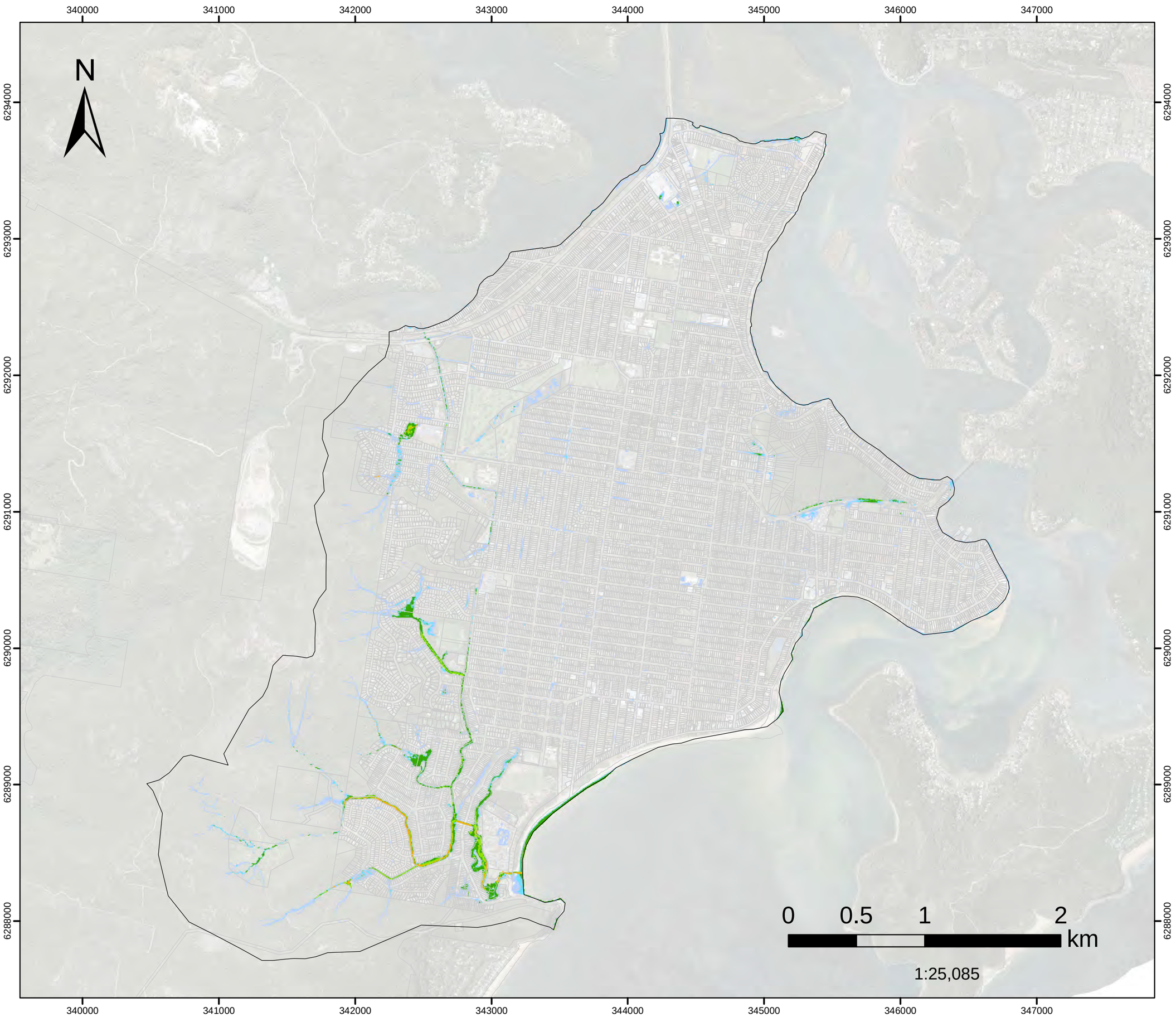

FIGURE L.118

10%AEP FM08

Palmtree Grove Detention Basin Hazard Classification

Assessed for the critical duration 3hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

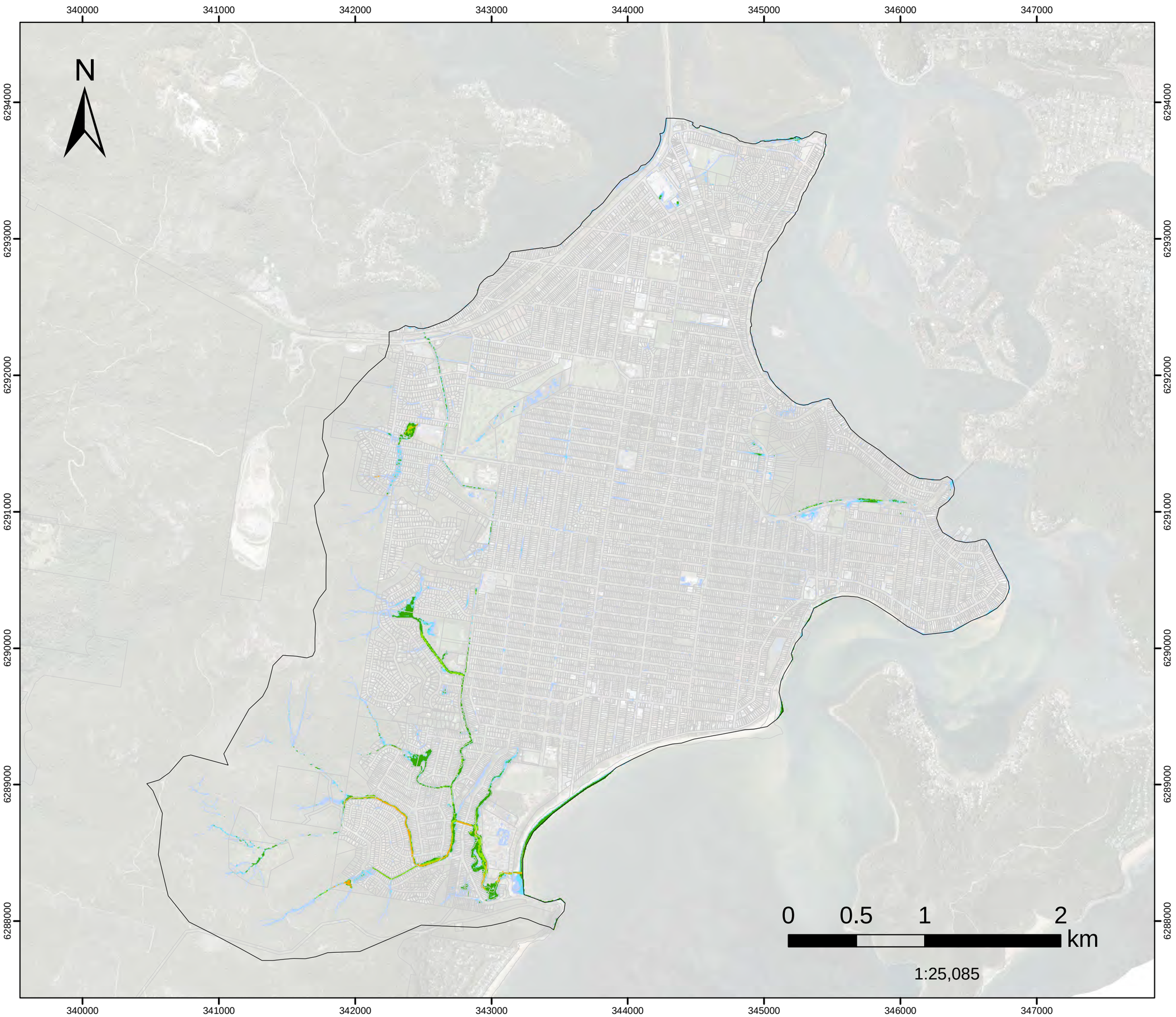

FIGURE L.119

10%AEP FM10

Neera Rd
Hazard Classification

Assessed for the critical duration 3hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

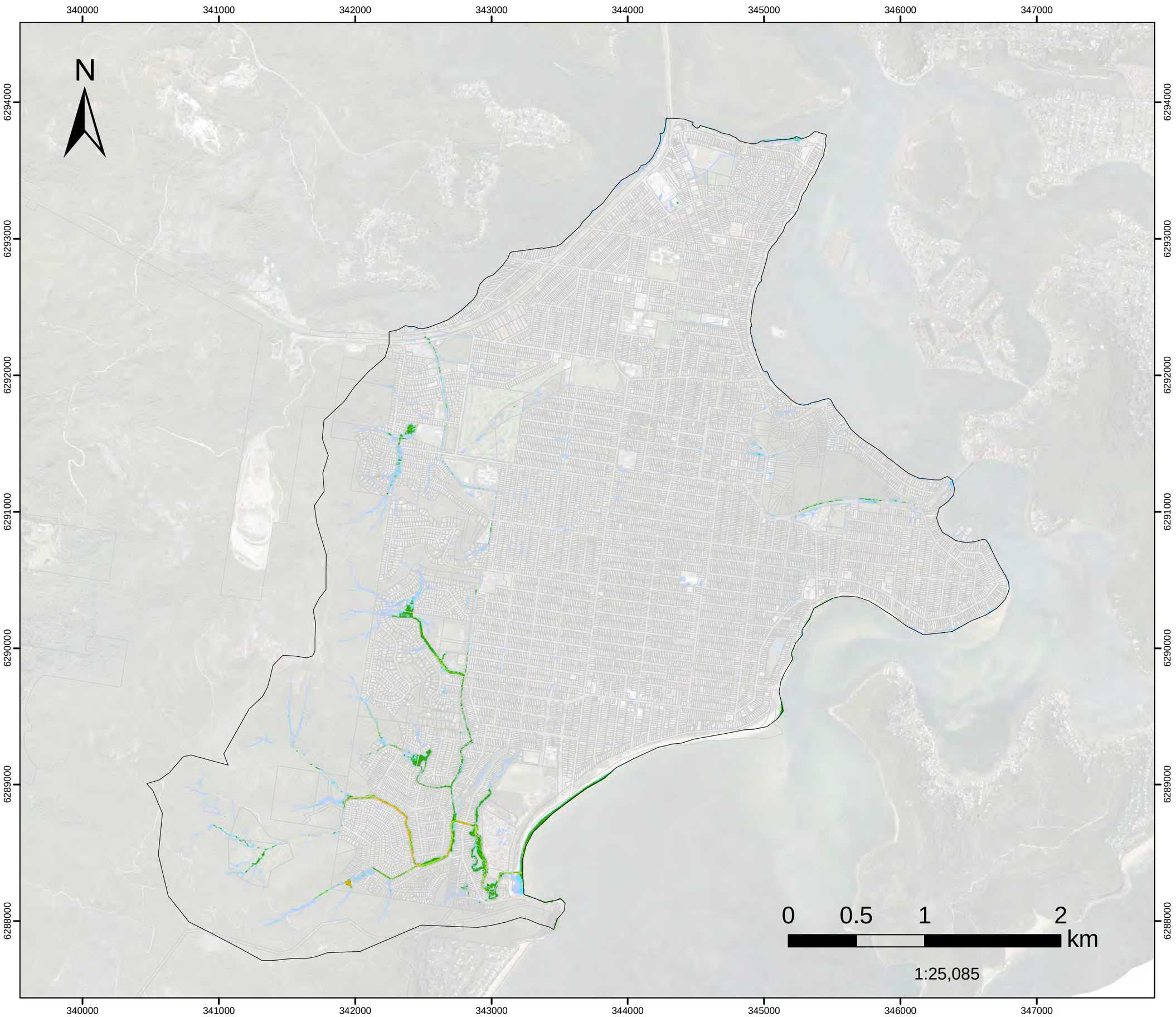

FIGURE L.120

20%AEP FM01

Woy Woy CBD
Hazard Classification

Assessed for the critical duration 1hr

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

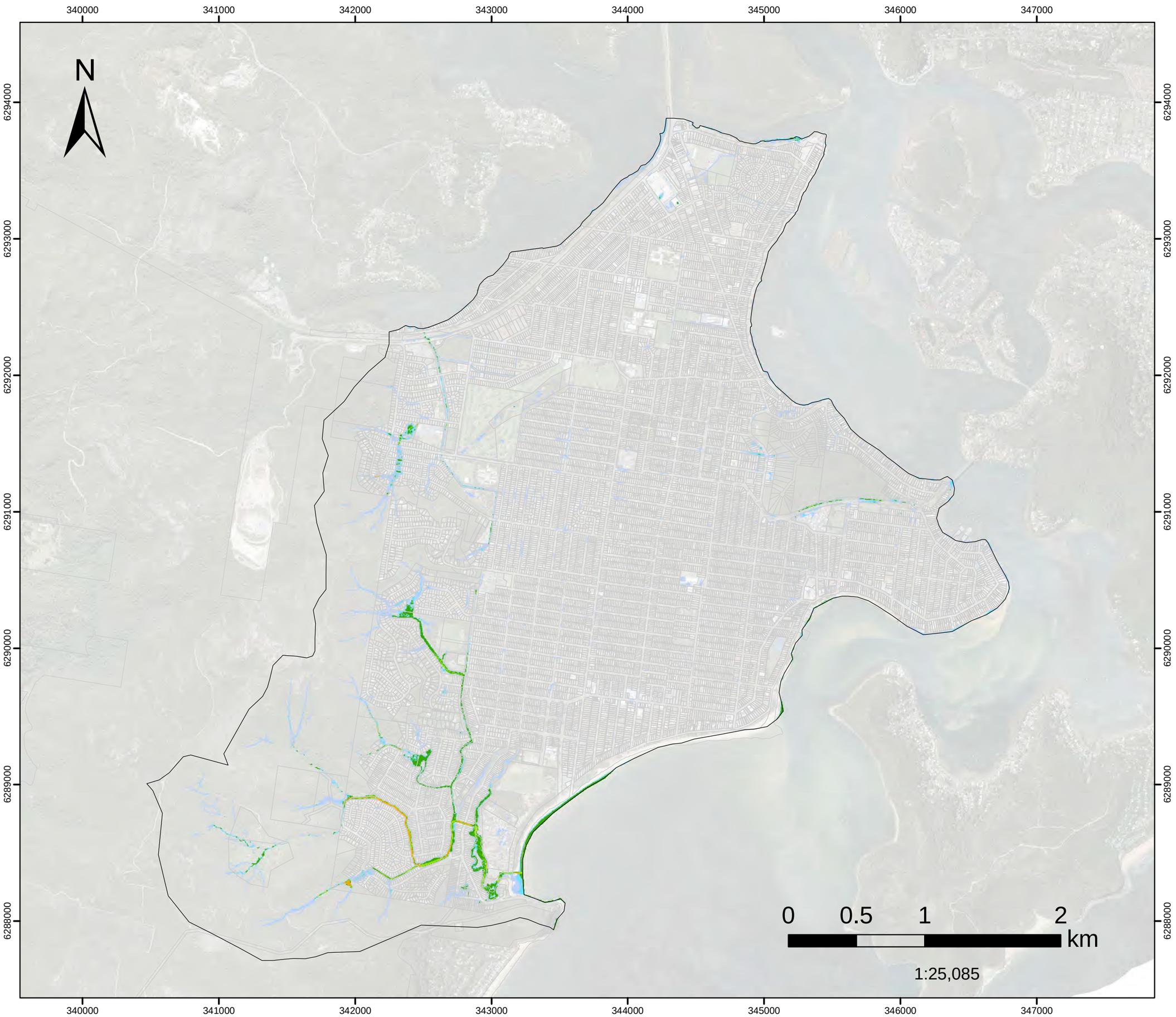

FIGURE L.121

20%AEP FM02

Dulkala Rd to Karingal Cl Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

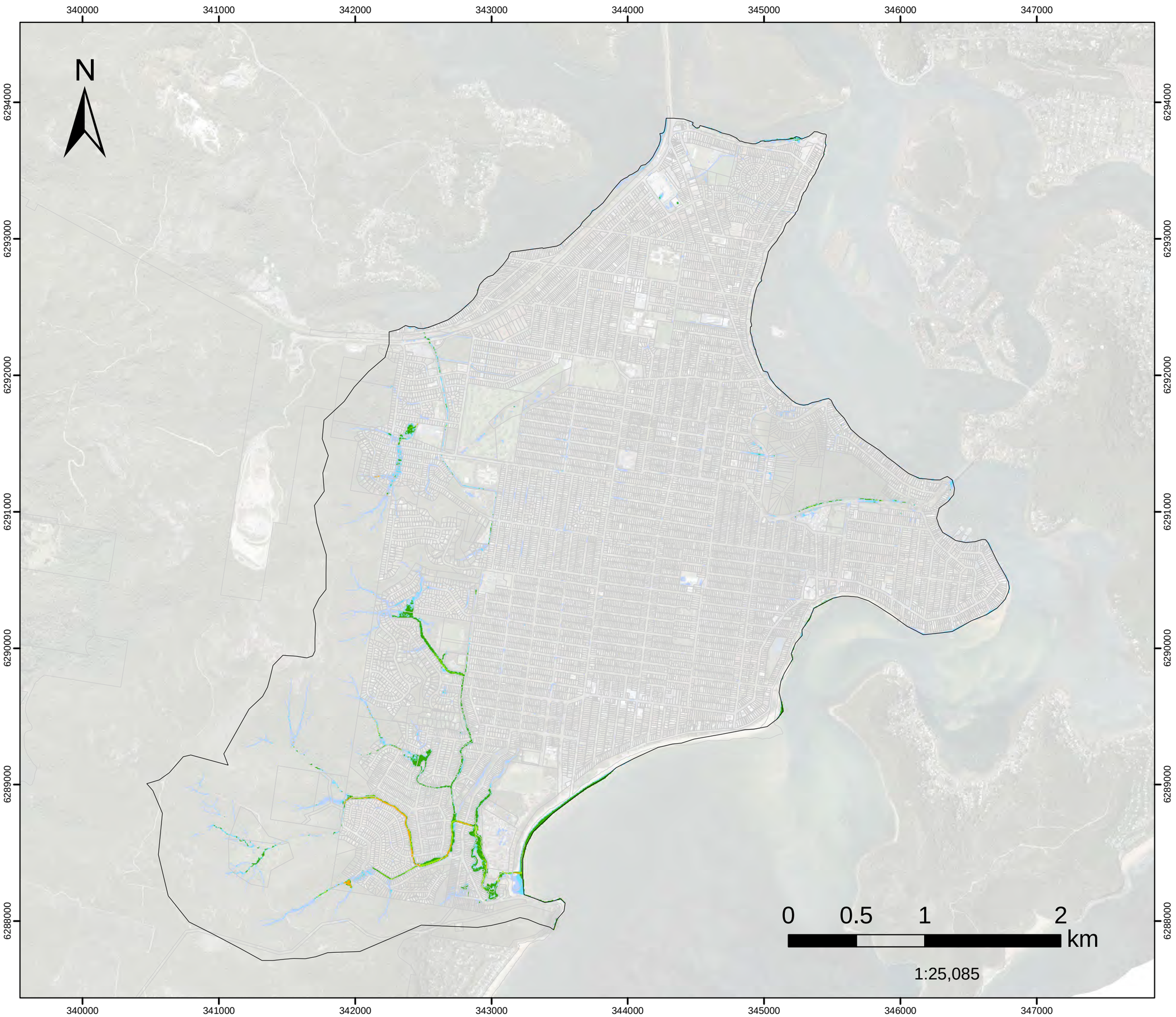

FIGURE L.122

20%AEP FM03

Infiltration Devices Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

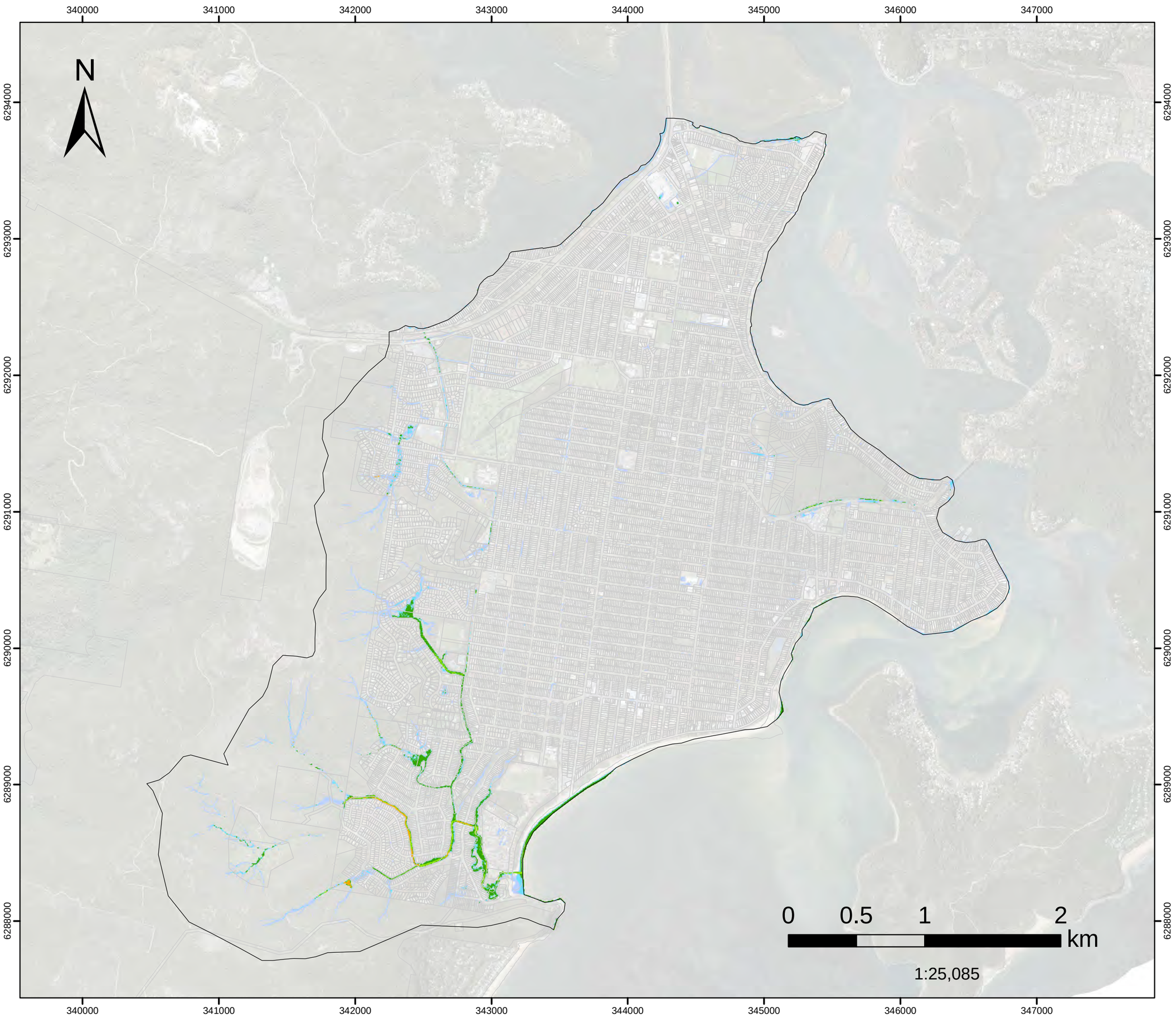

FIGURE L.123

20%AEP FM04

Groundwater pumping and Everglades drainage update work

Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

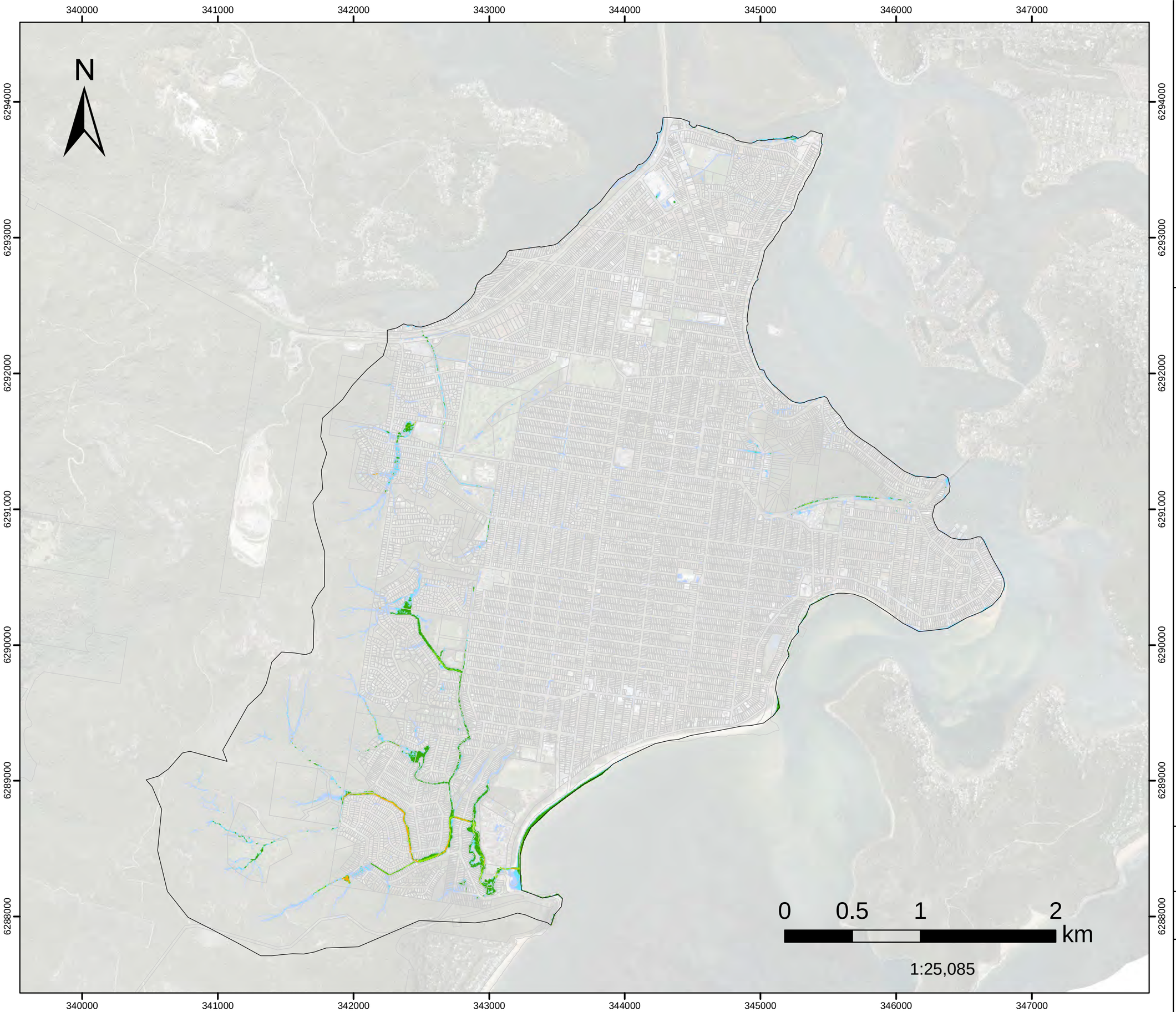

FIGURE L.124

20%AEP FM05

Greenhaven Dr
Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

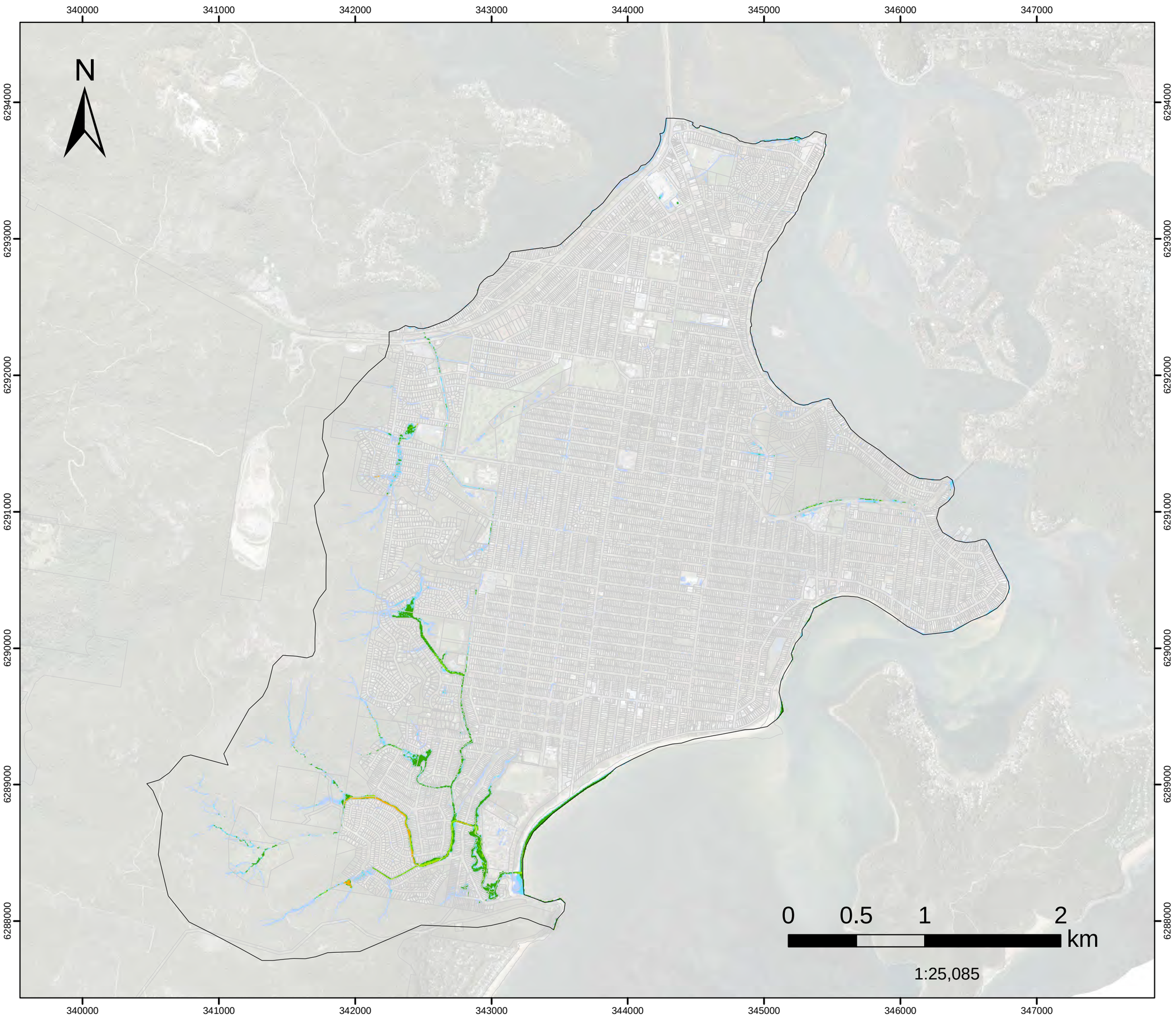

FIGURE L.125

20%AEP FM06A

Kahibah Ck system maintenance work

Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

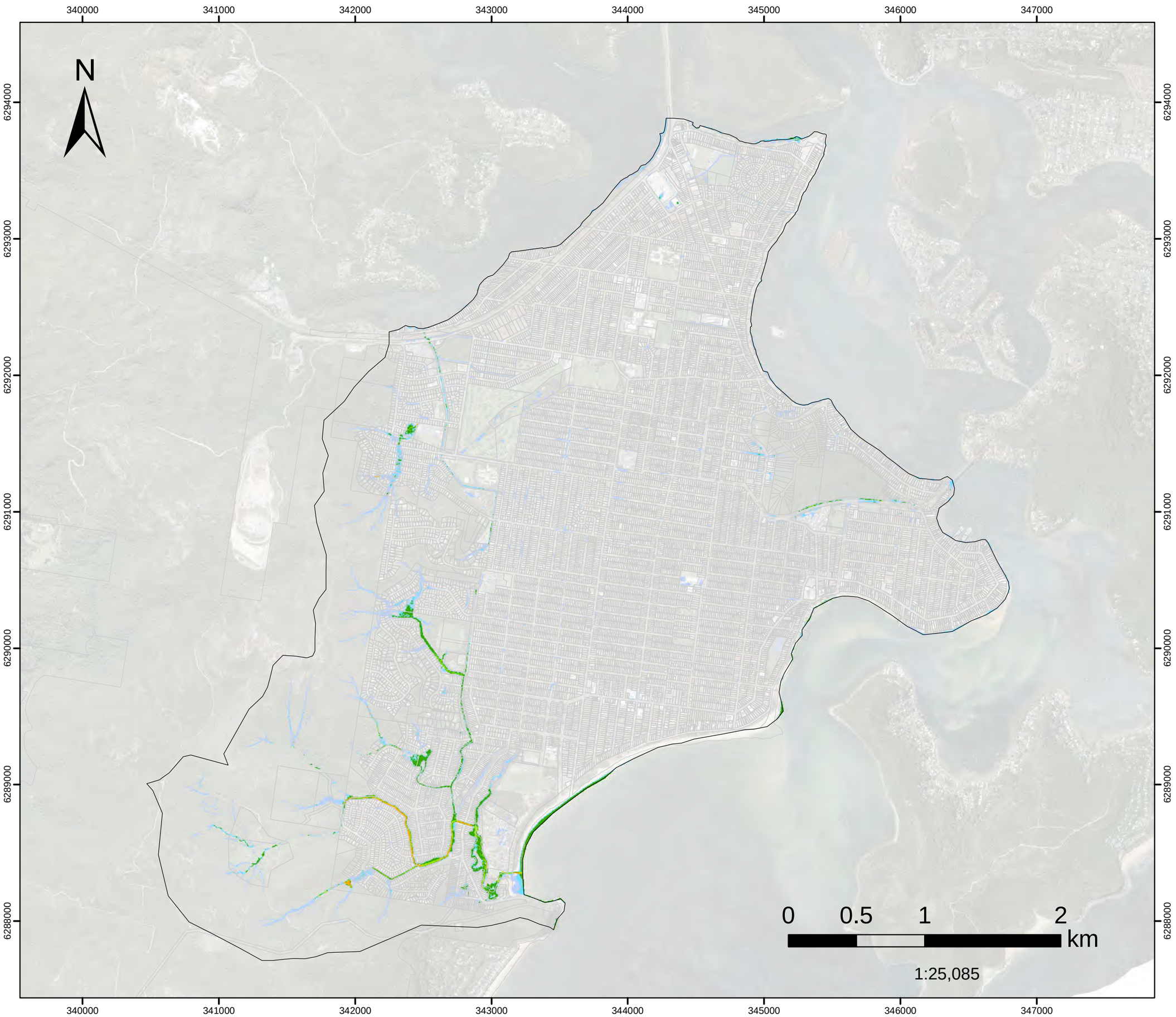

FIGURE L.126

20%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

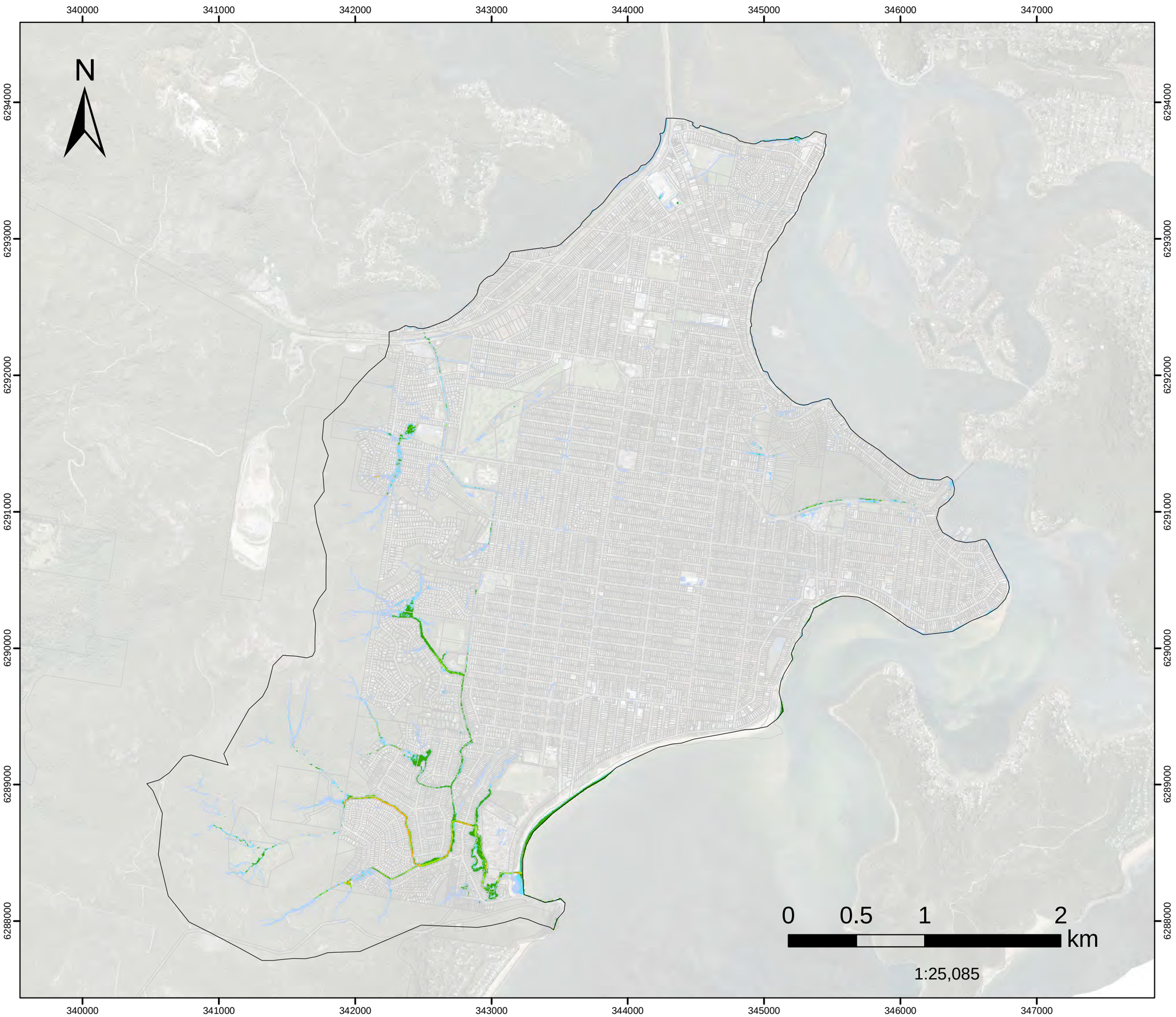

FIGURE L.127

20%AEP FM08

Palmtree Grove Detention Basin Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

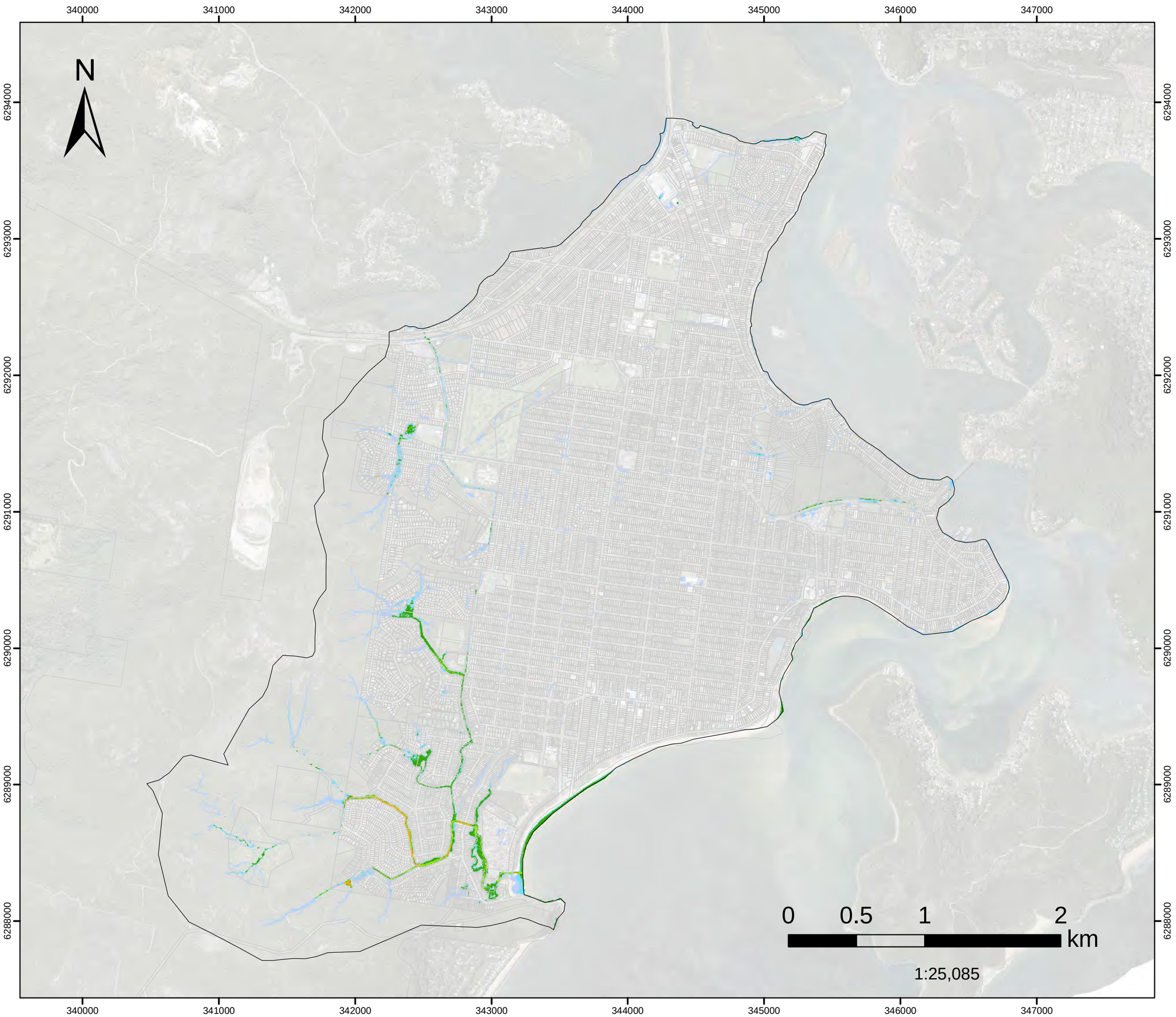

FIGURE L.128

20%AEP FM09

Wilks Av and McManus Cl Hazard Classification

Assessed for the critical duration 1hr

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

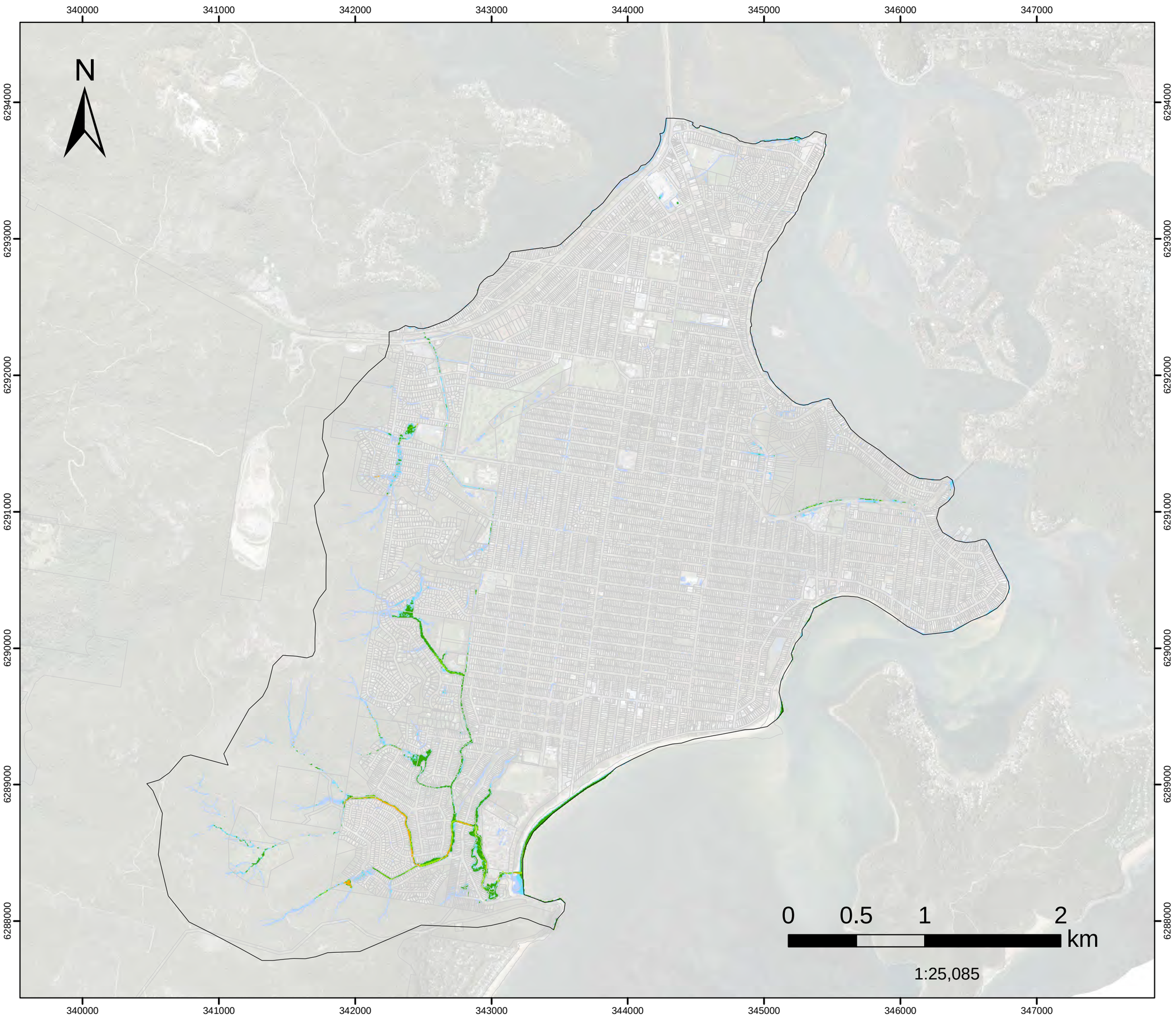

FIGURE L.129

20%AEP FM10

Neera Rd
Hazard Classification

Assessed for the critical duration 1hr

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

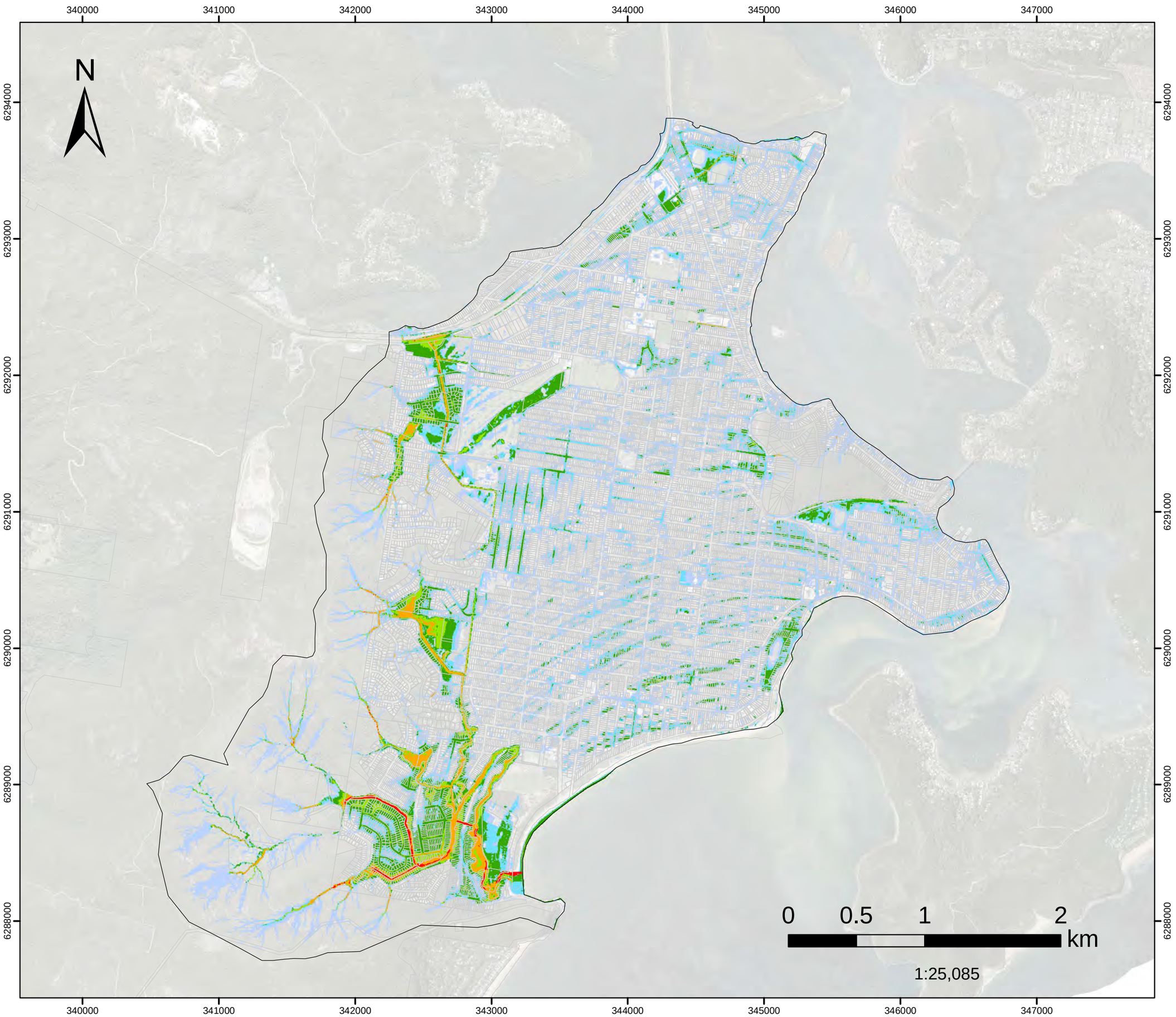

FIGURE L.130

PMF FM01

Woy Woy CBD
Hazard Classification

Assessed for the critical duration 2hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

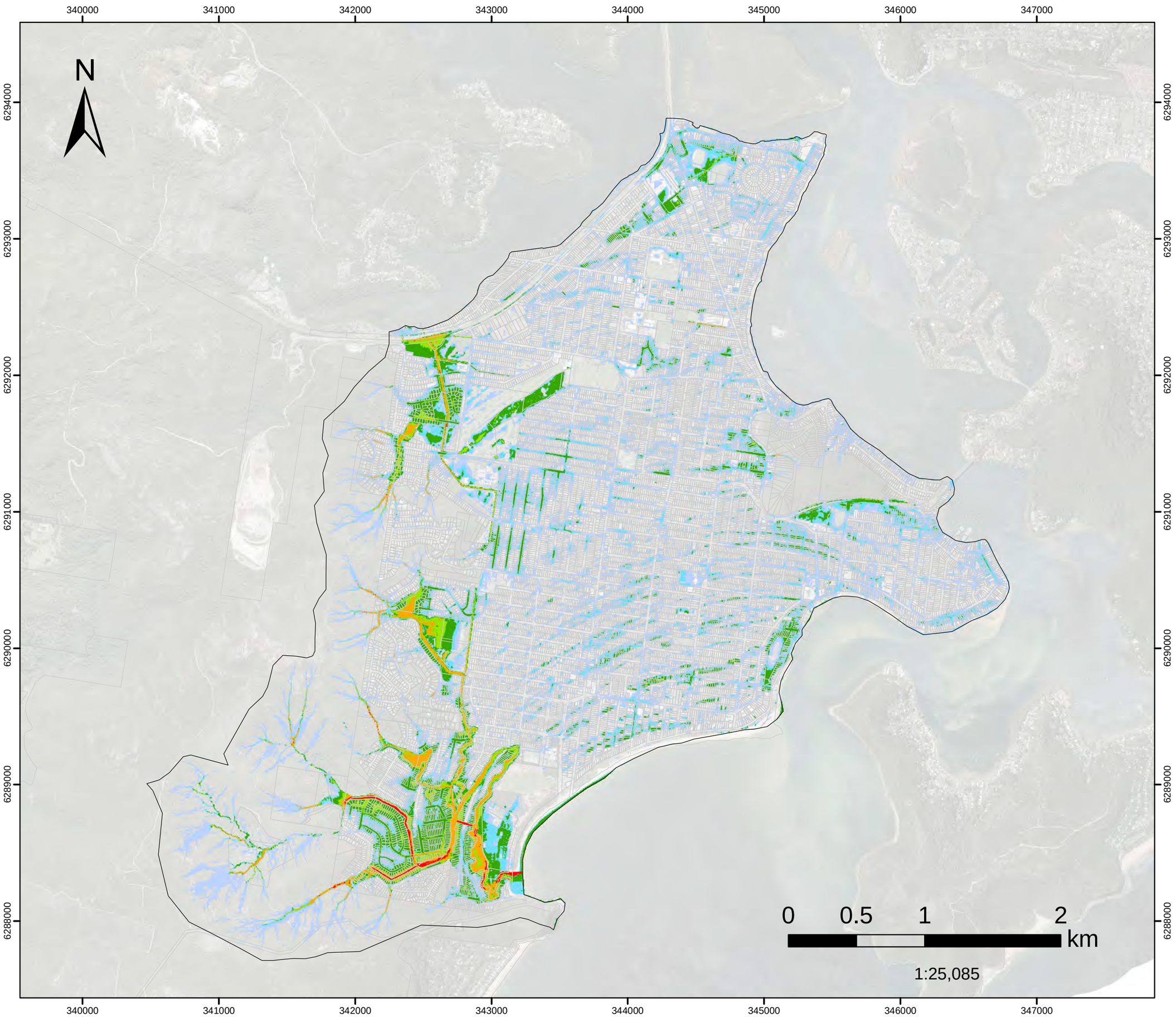

FIGURE L.131

PMF FM02

Dulkala Rd to Karingal Cl Hazard Classification

Assessed for the critical duration 2hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

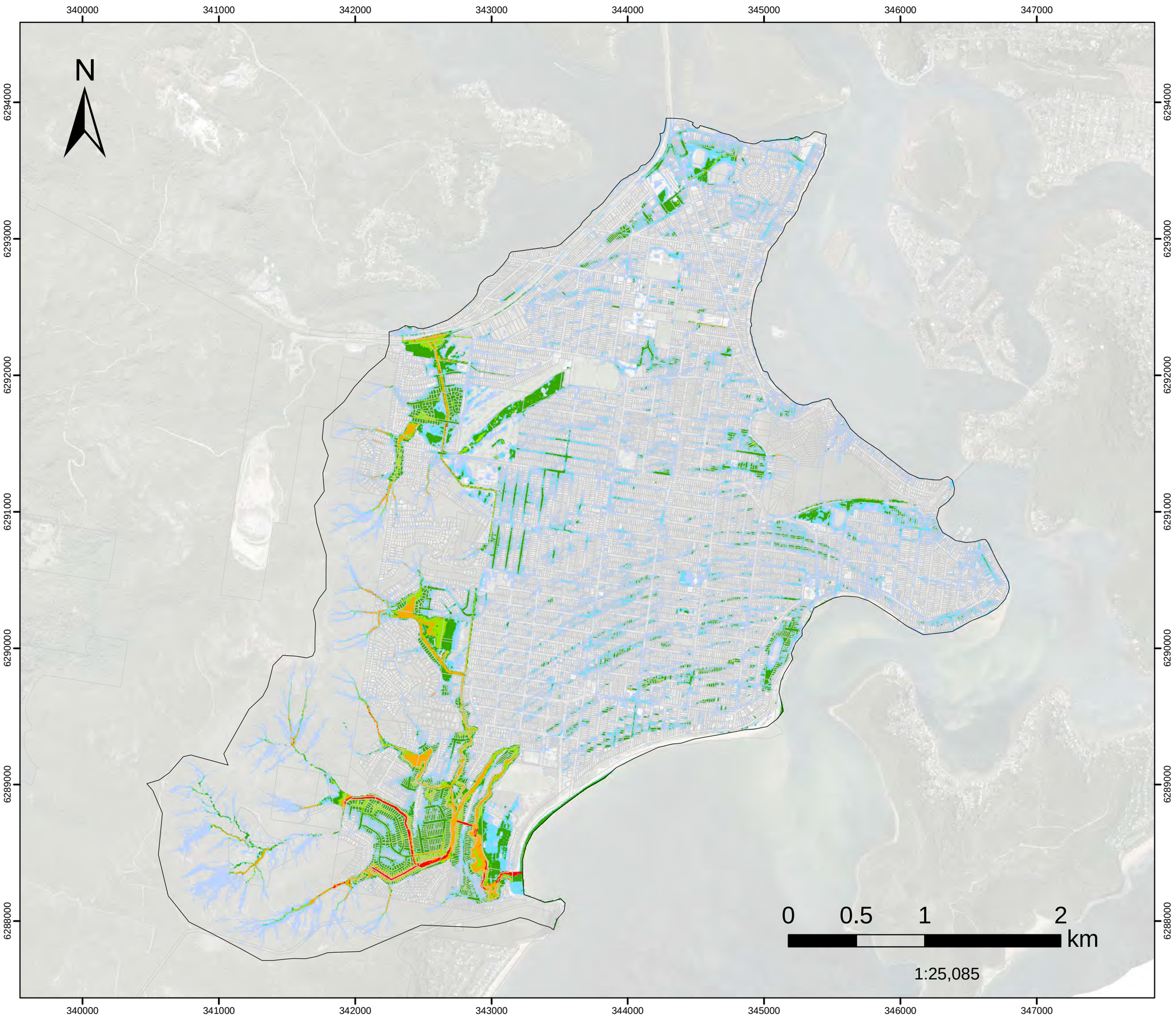

FIGURE L.132

PMF FM03

Infiltration Devices Hazard Classification

Assessed for the critical duration 2hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

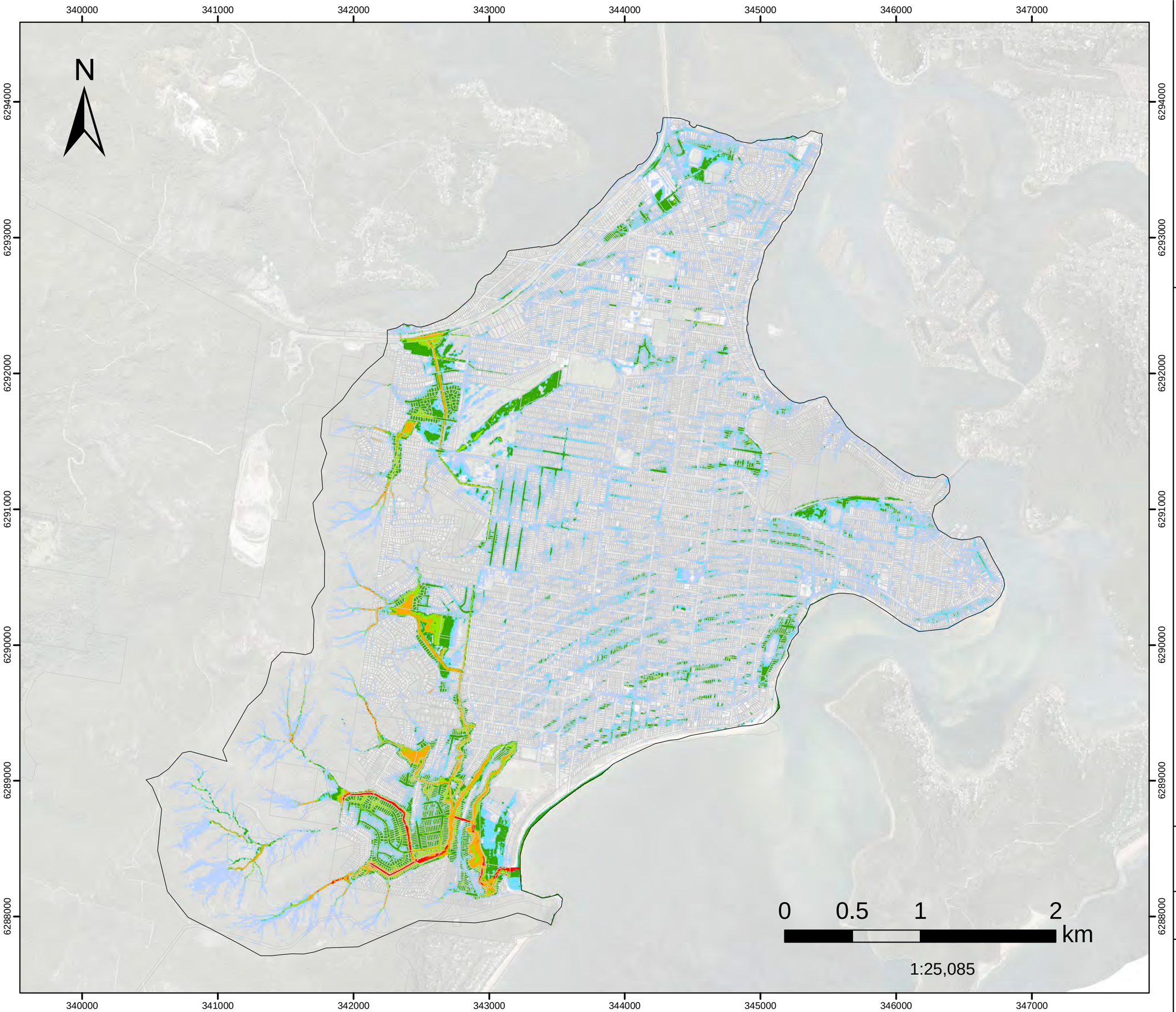

FIGURE L.133

PMF FM05

Greenhaven Dr
Hazard Classification

Assessed for the critical duration 2hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

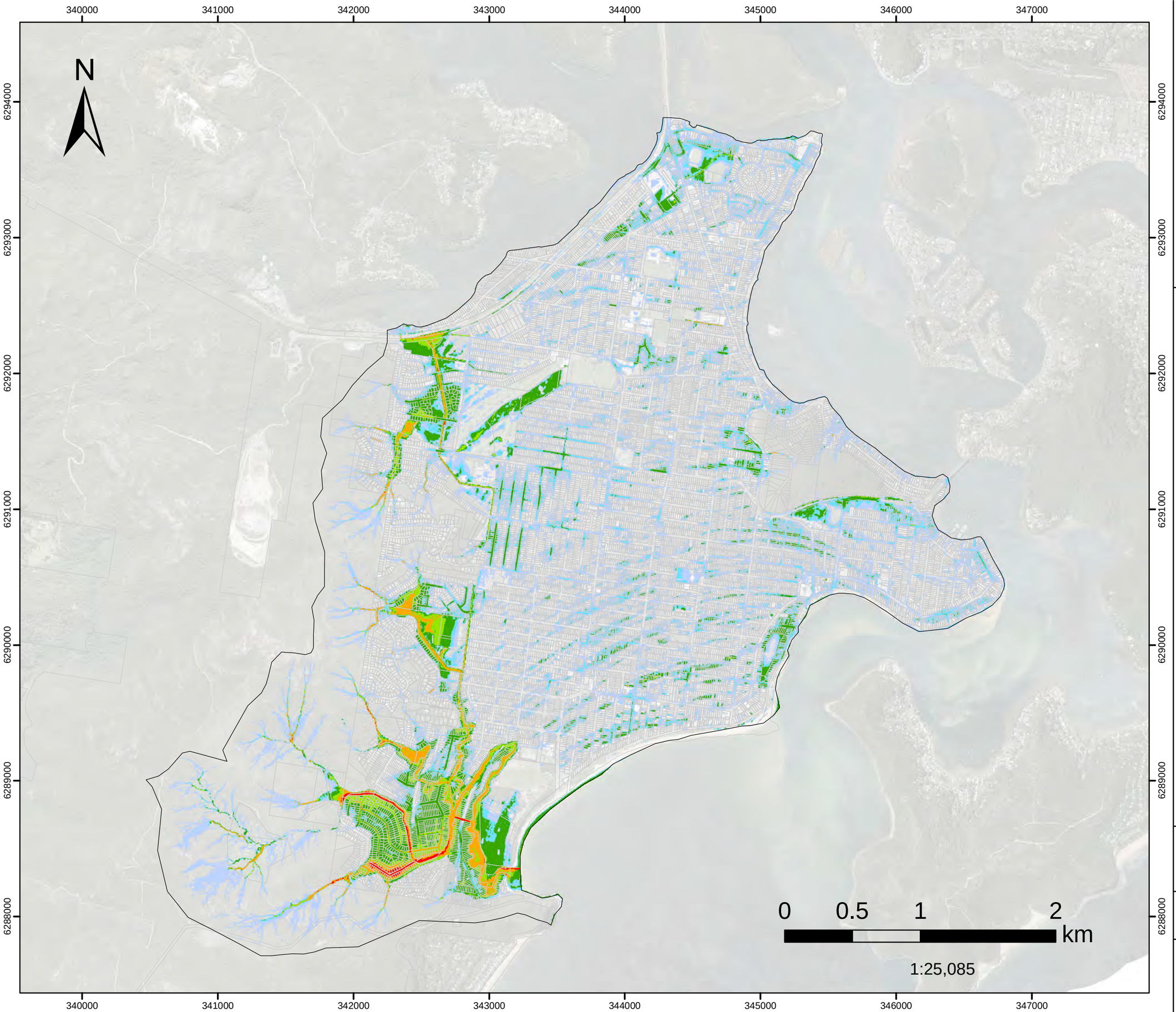

FIGURE L.134

PMF FM06A

Kahibah Ck system maintenance work

Hazard Classification

Assessed for the critical duration 2hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

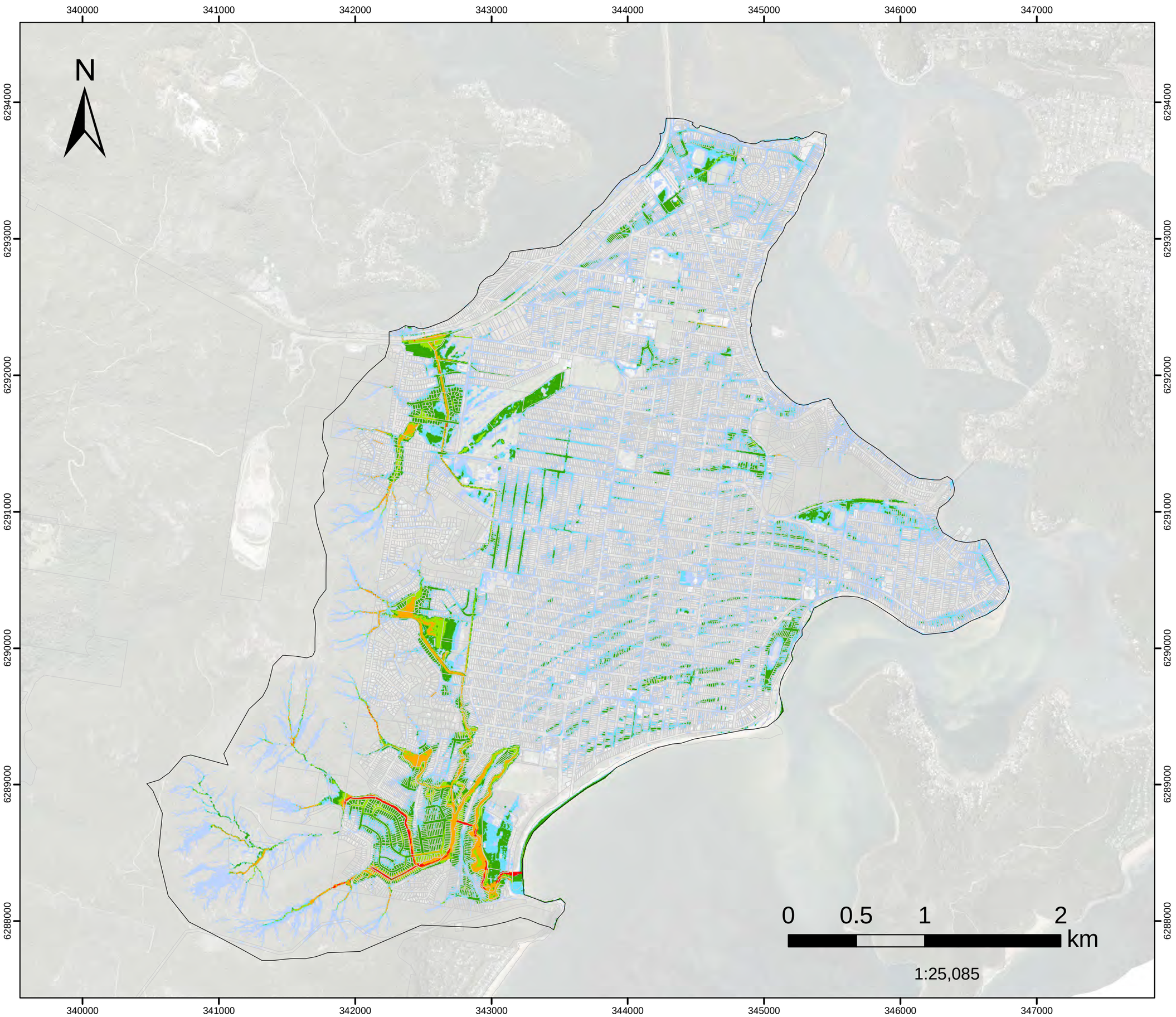

FIGURE L.135

PMF FM08

Palmtree Grove Detention Basin Hazard Classification

Assessed for the critical duration 2hrs

- Model Domain
- H1
- H2
- H3
- H4
- H5
- H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

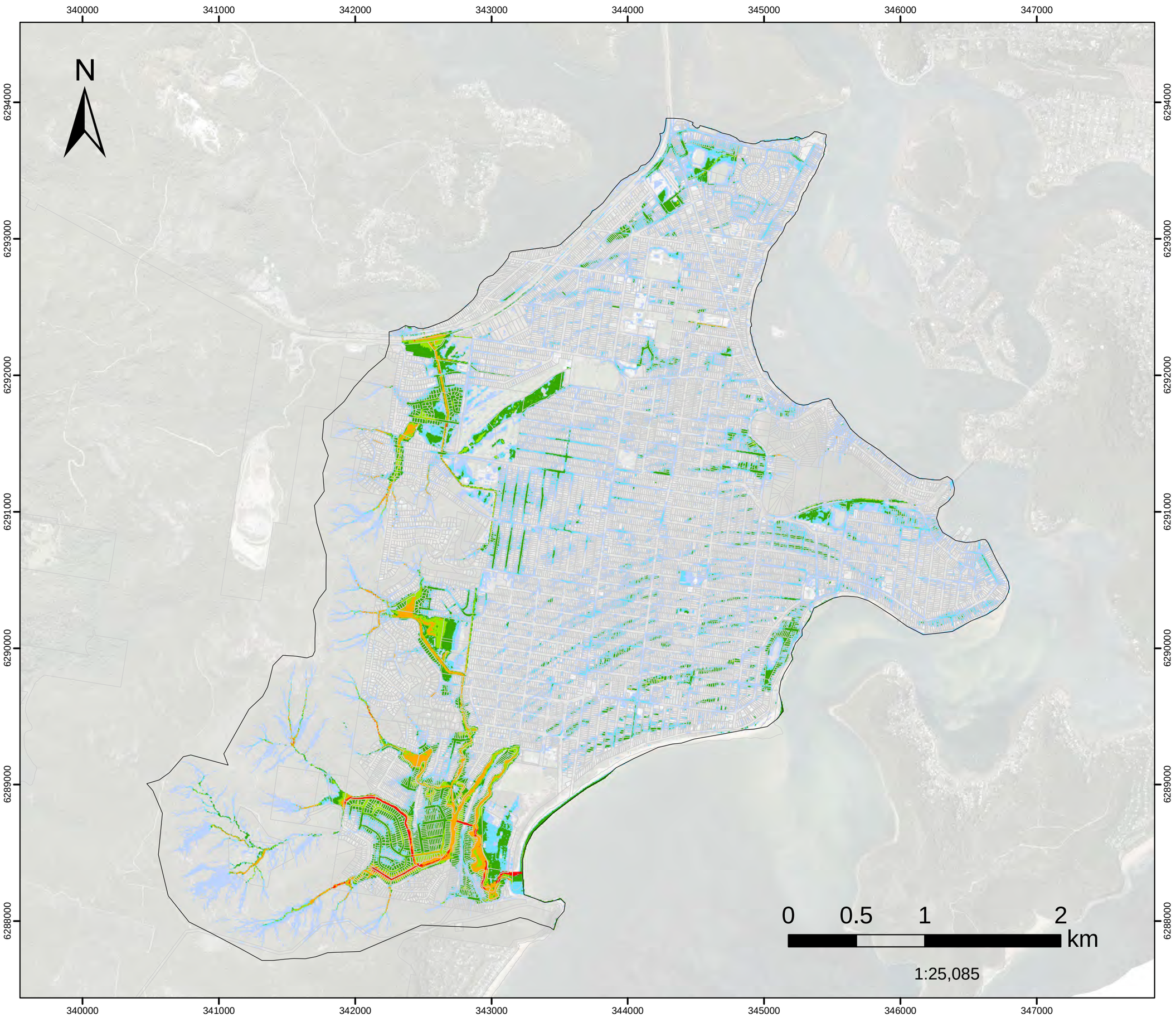

FIGURE L.136

PMF FM10

Neera Rd
Hazard Classification

Assessed for the critical duration 2hrs

Model Domain

H1

H2

H3

H4

H5

H6

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

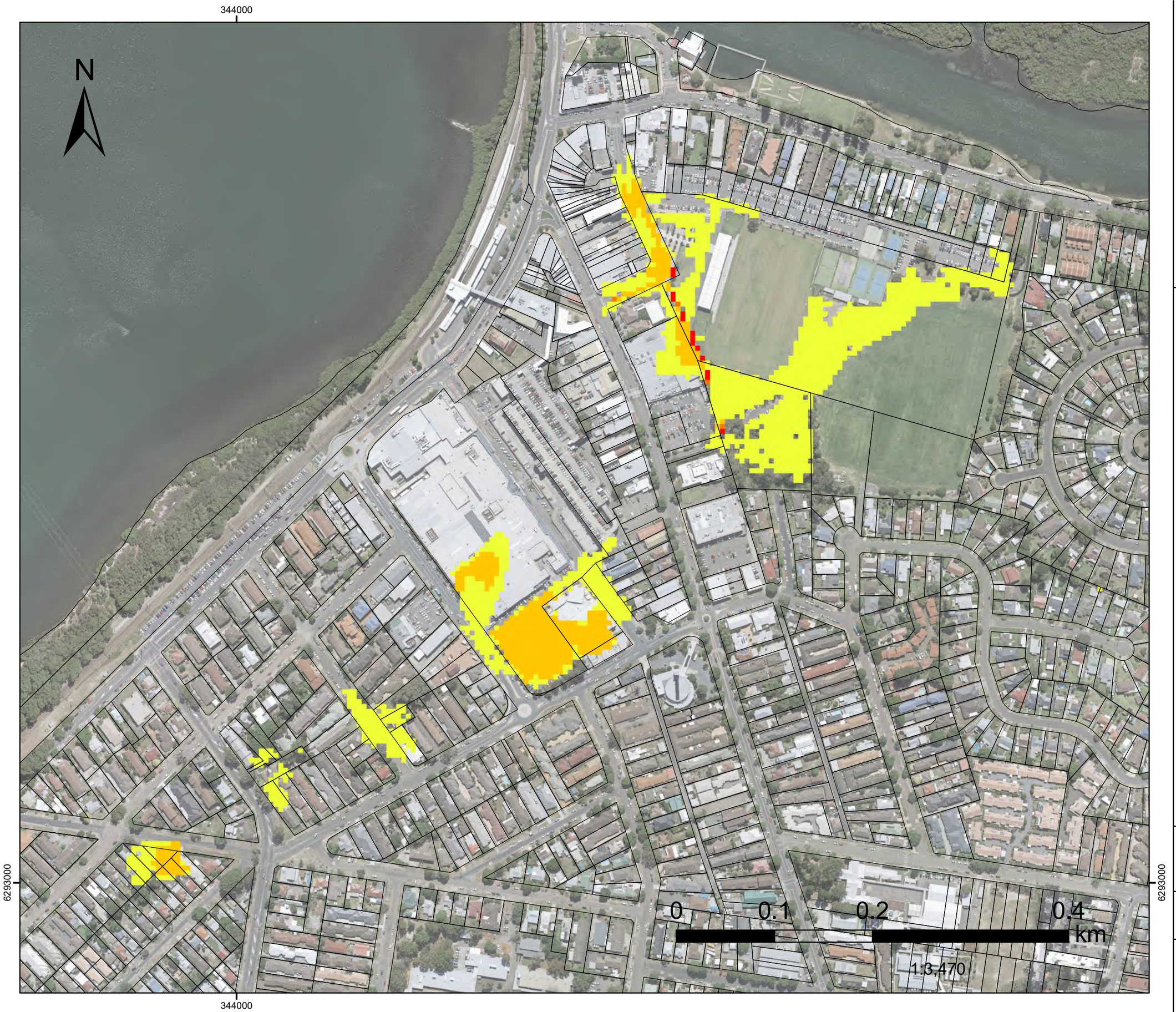

FIGURE L.137

1%AEP FM01

Woy Woy CBD

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.138

10%AEP FM01

Woy Woy CBD

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.139

20%AEP FM01

Woy Woy CBD

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

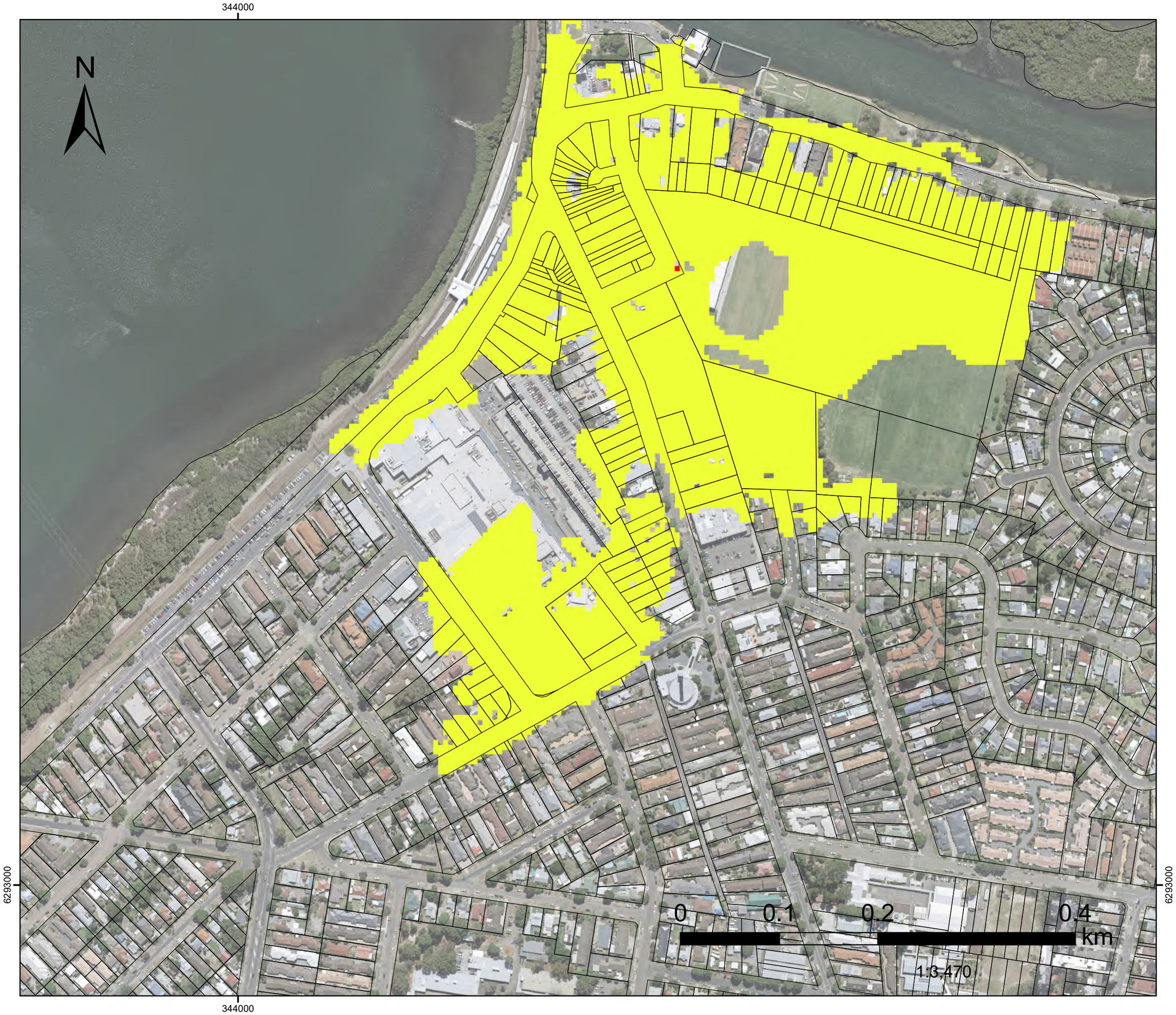

FIGURE L.140

PMF FM01

Woy Woy CBD

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

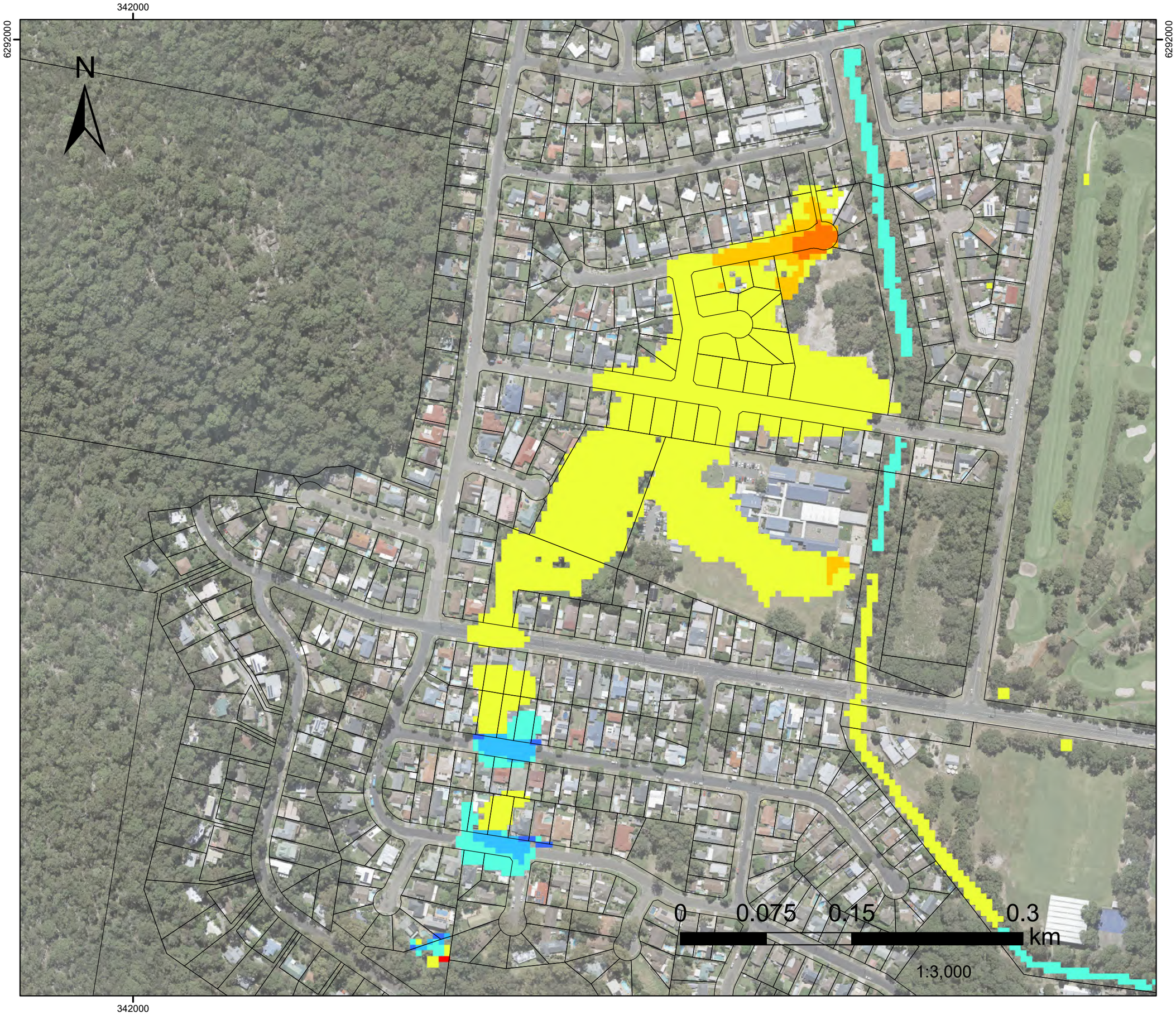

FIGURE L.141

1%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

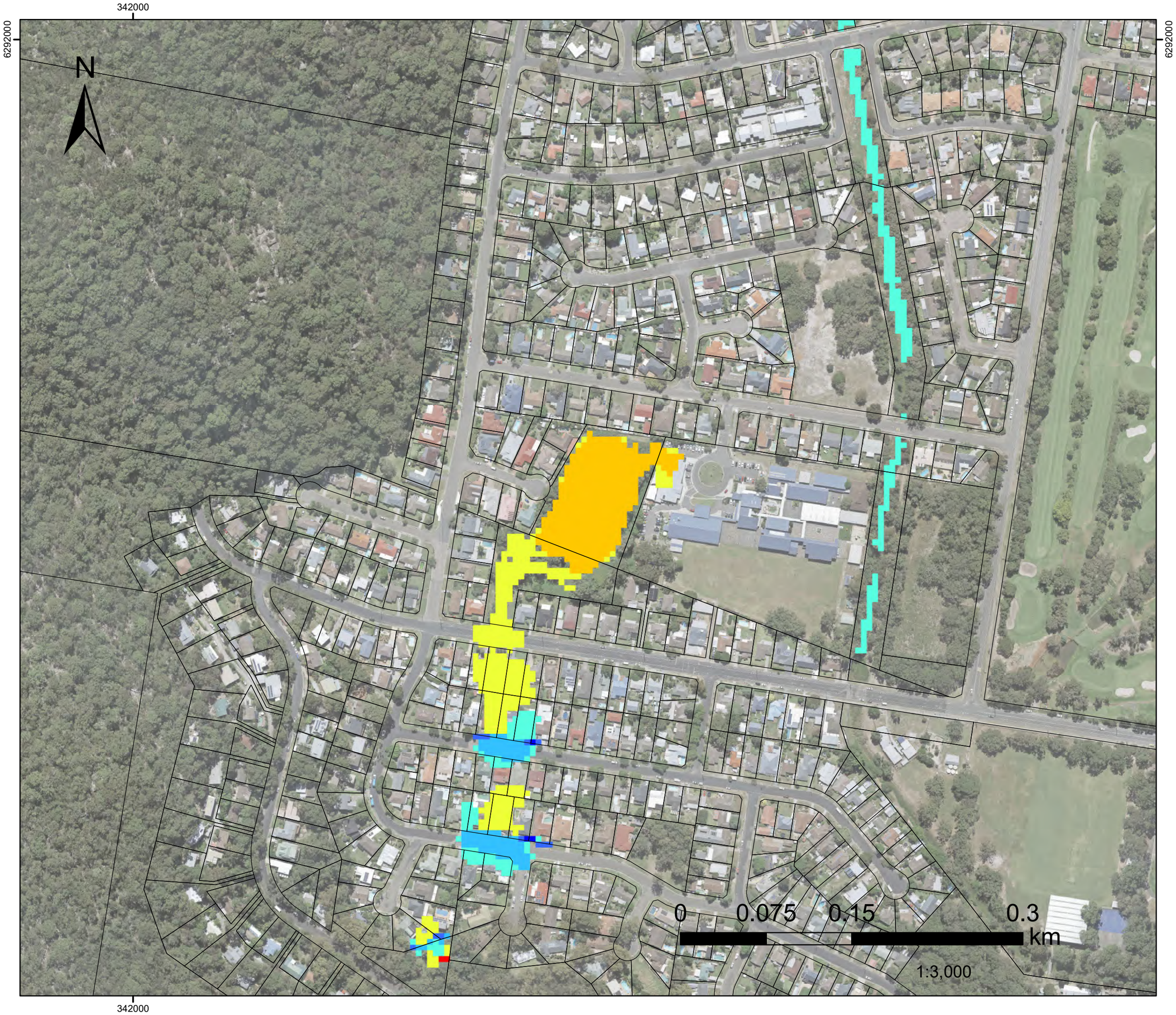

FIGURE L.142

10%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

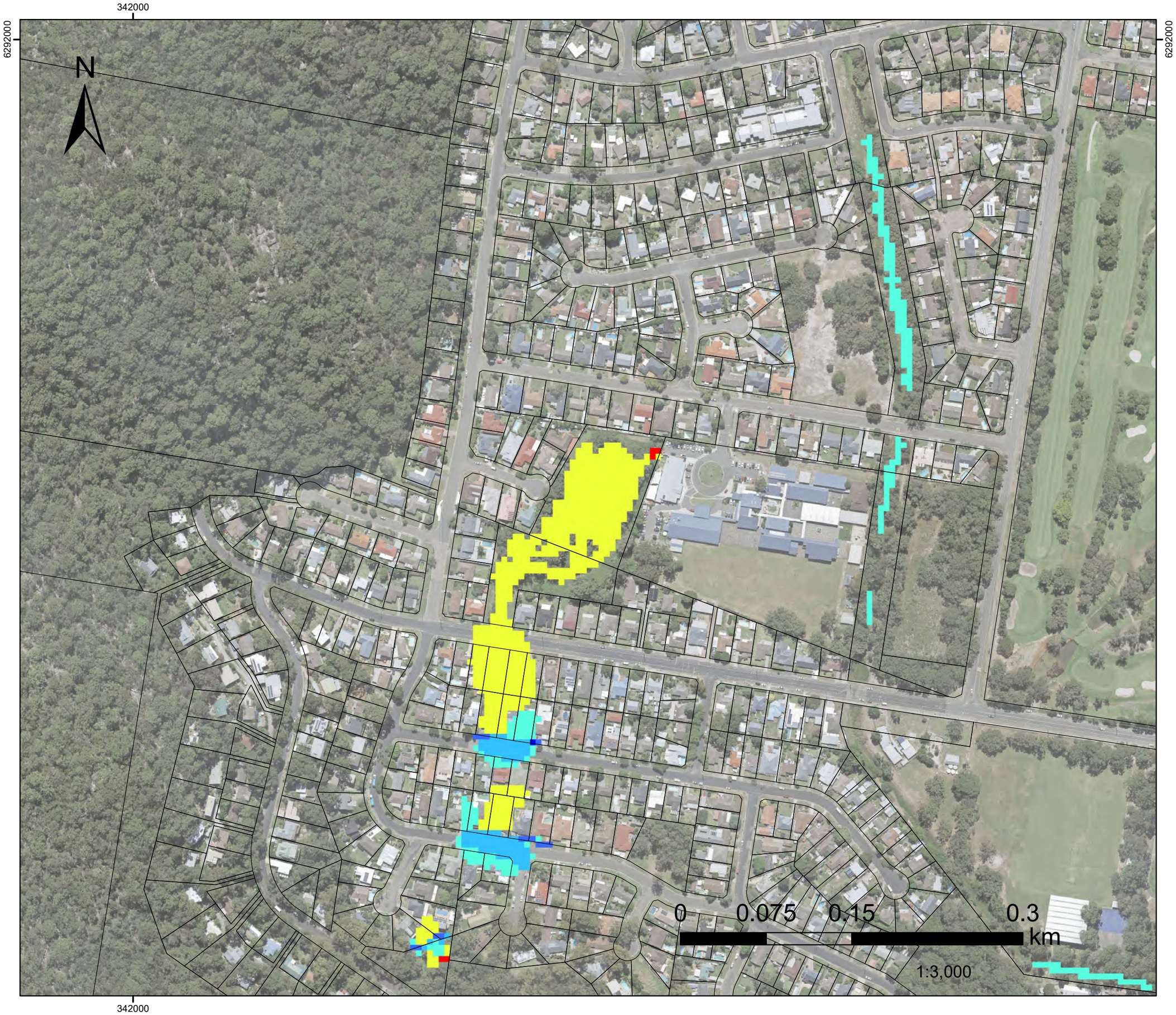

FIGURE L.143

20%AEP FM02

Dulkala Rd to Karingal Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.144

PMF FM02

Dulkala Rd to Karingal Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.145

1%AEP FM03

Infiltration Devices

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.146

10%AEP FM03

Infiltration Devices

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.147

20%AEP FM03

Infiltration Devices

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.148

PMF FM03

Infiltration Devices

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

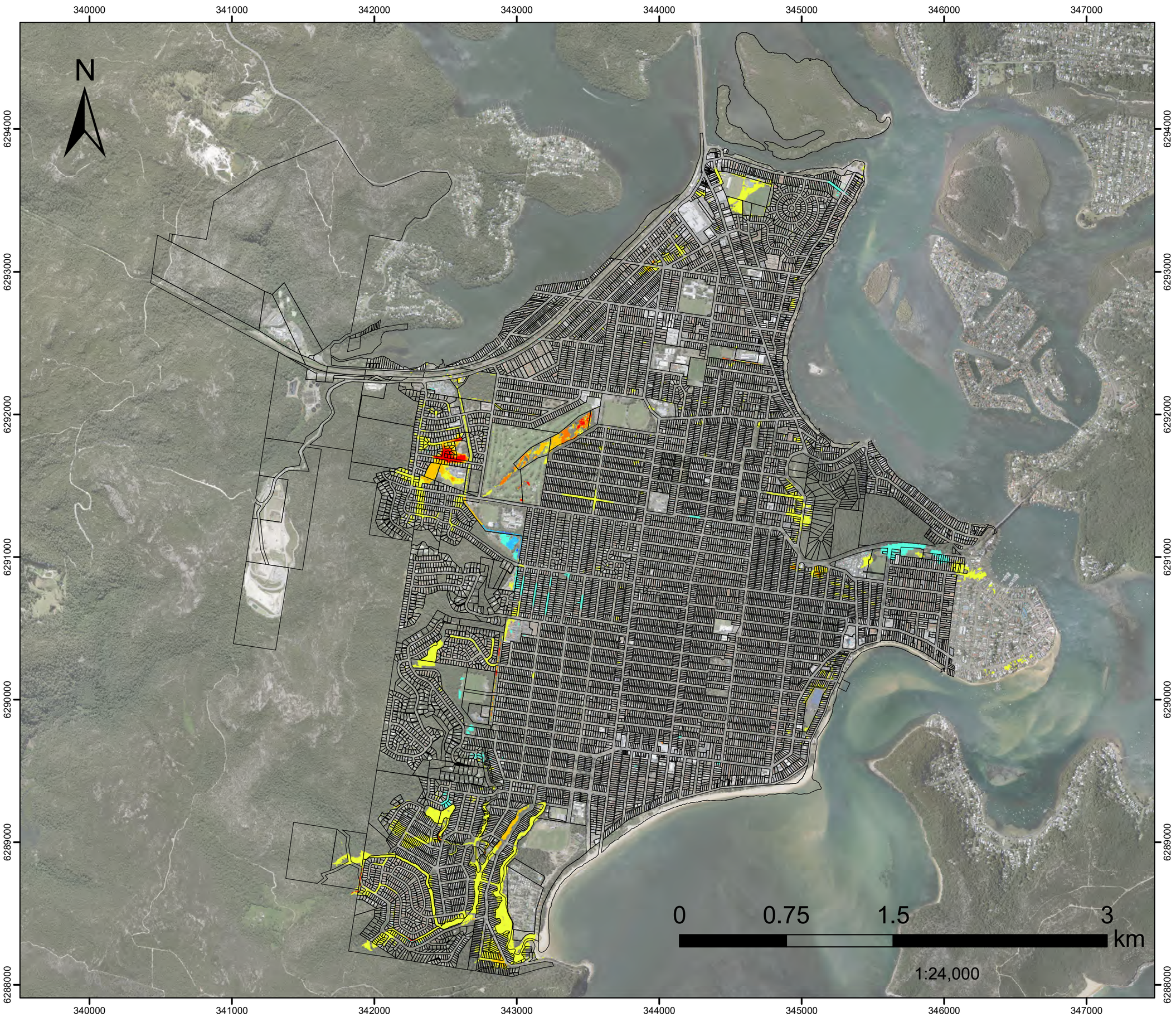

FIGURE L.149

1%AEP FM04

Groundwater pumping and Everglades drainage update work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.150

20%AEP FM04

Groundwater pumping and Everglades drainage update work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

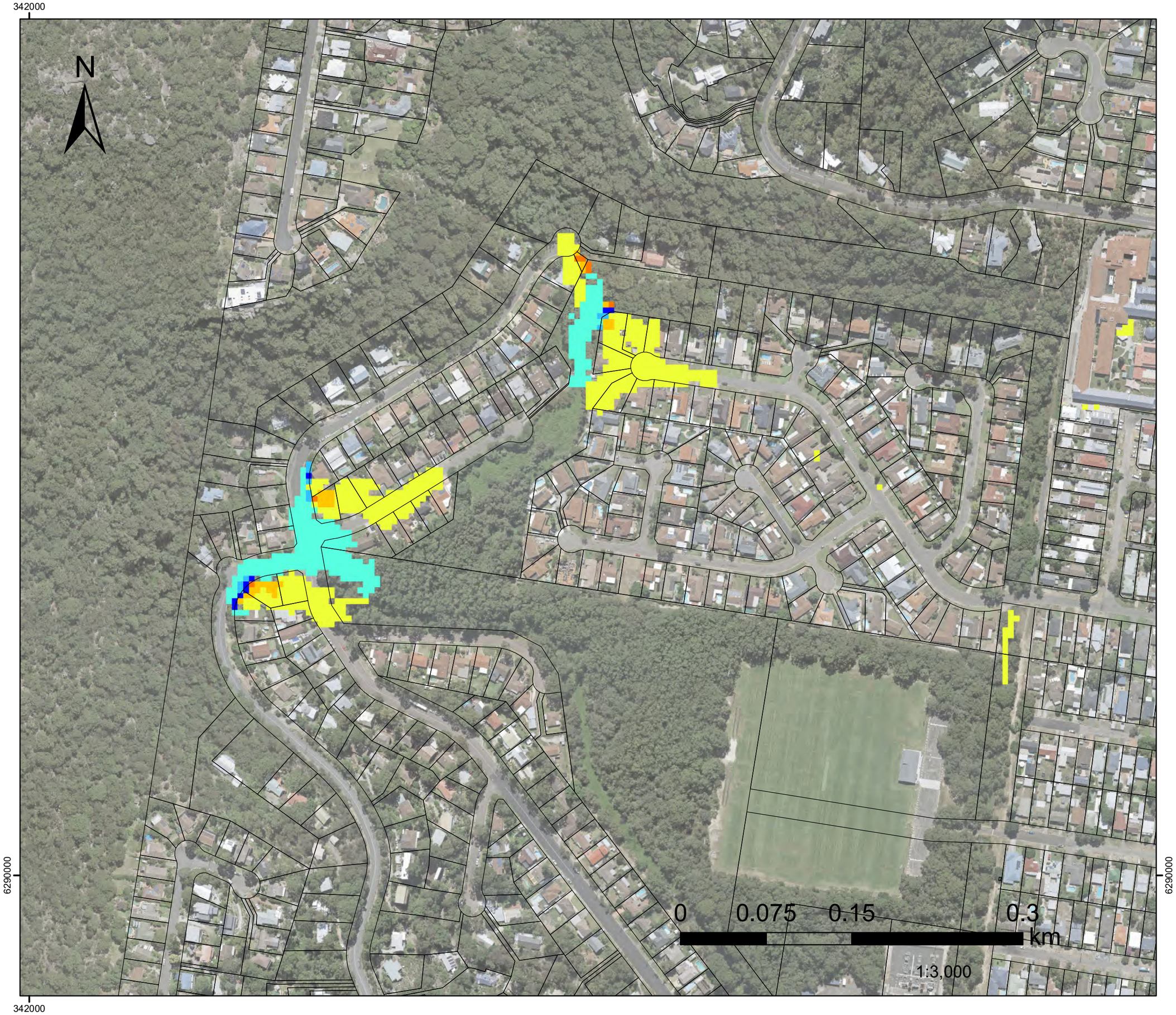

FIGURE L.151

1%AEP FM05

Greenhaven Dr

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.152

10%AEP FM05

Greenhaven Dr

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.153

20%AEP FM05

Greenhaven Dr

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

FIGURE L.154

PMF FM05

Greenhaven Dr

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

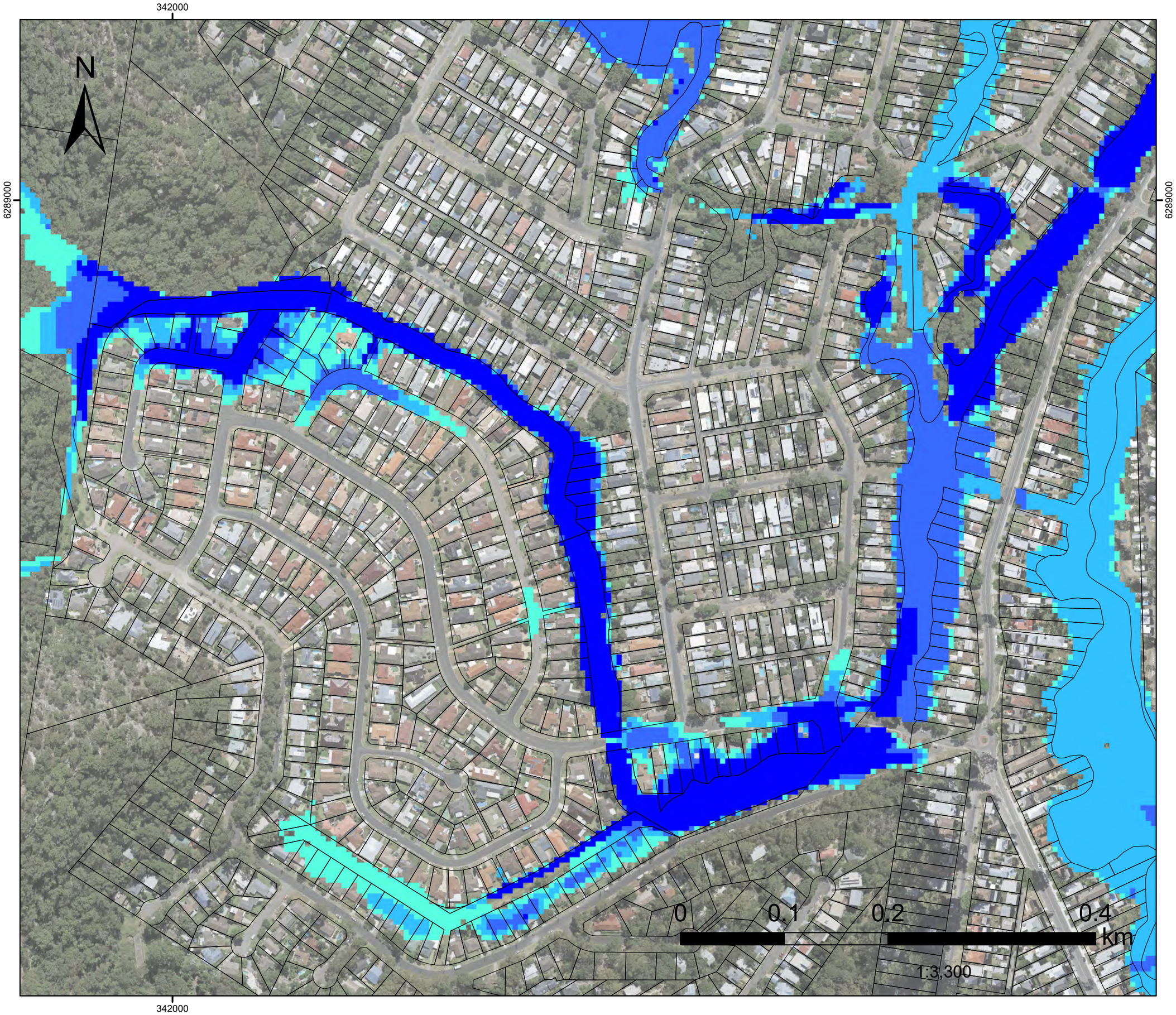

FIGURE L.155

1%AEP FM06A

Kahibah Ck system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

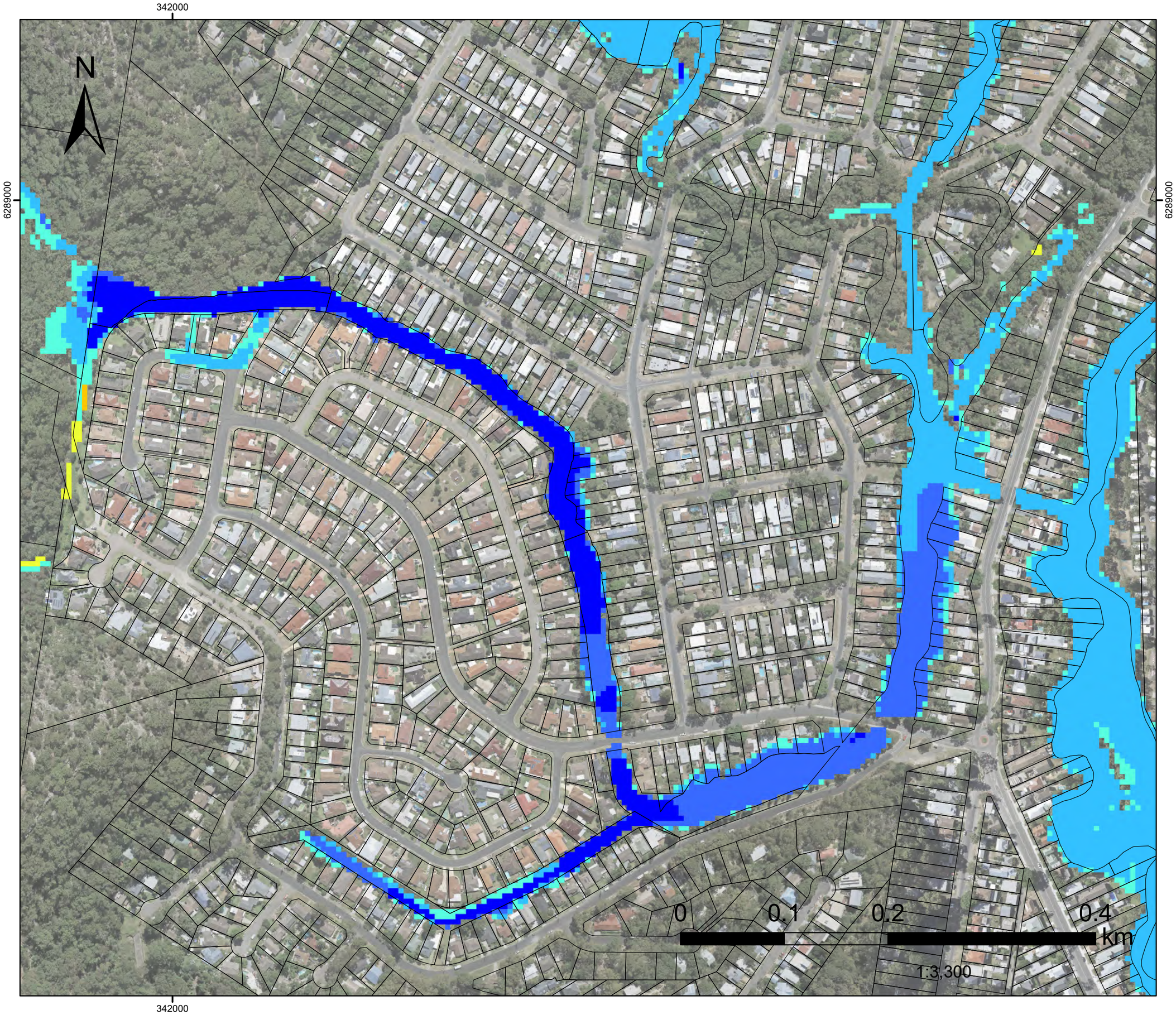

FIGURE L.156

10%AEP FM06A

Kahibah Ck system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

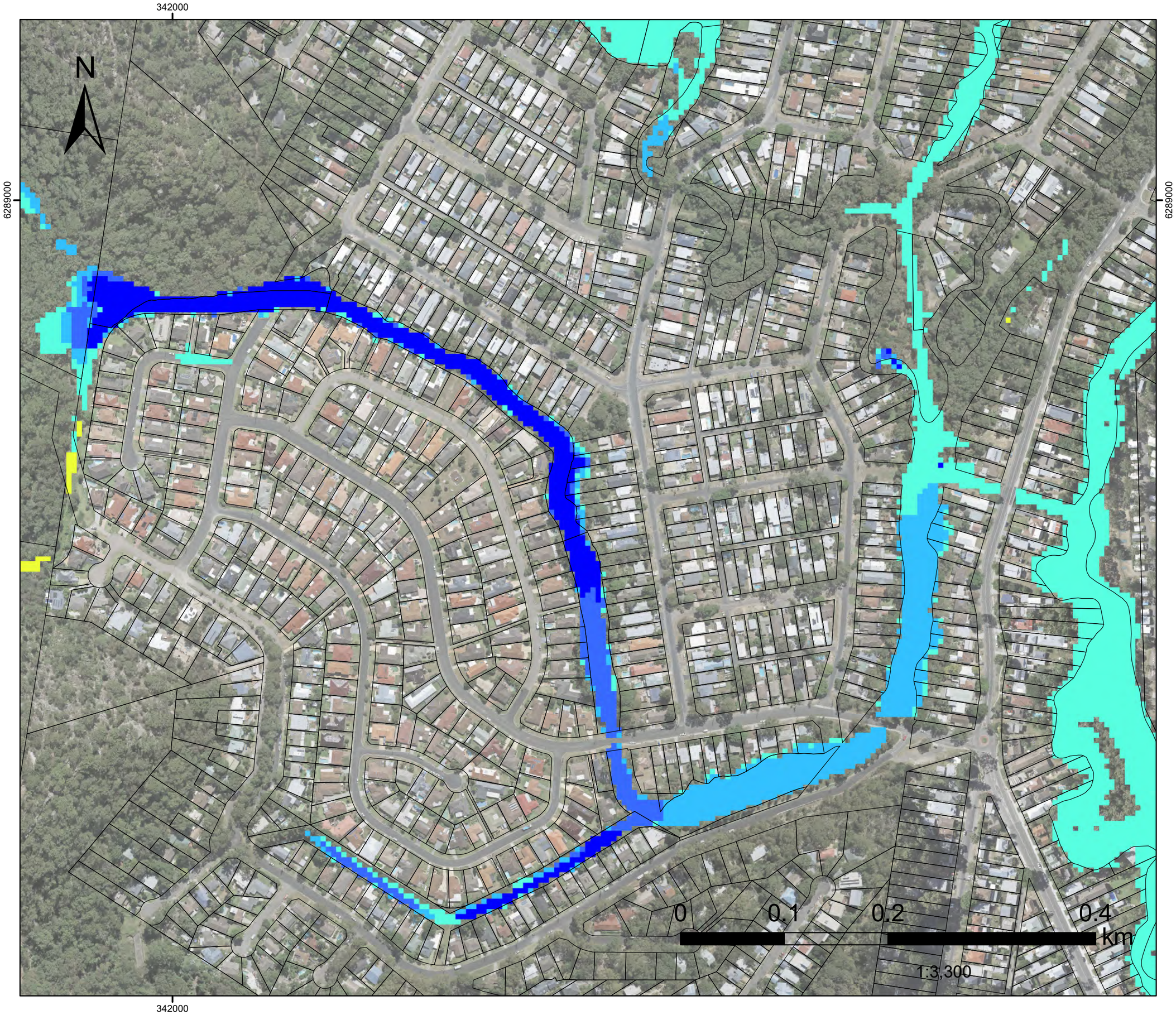

FIGURE L.157

20%AEP FM06A

Kahibah Ck system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

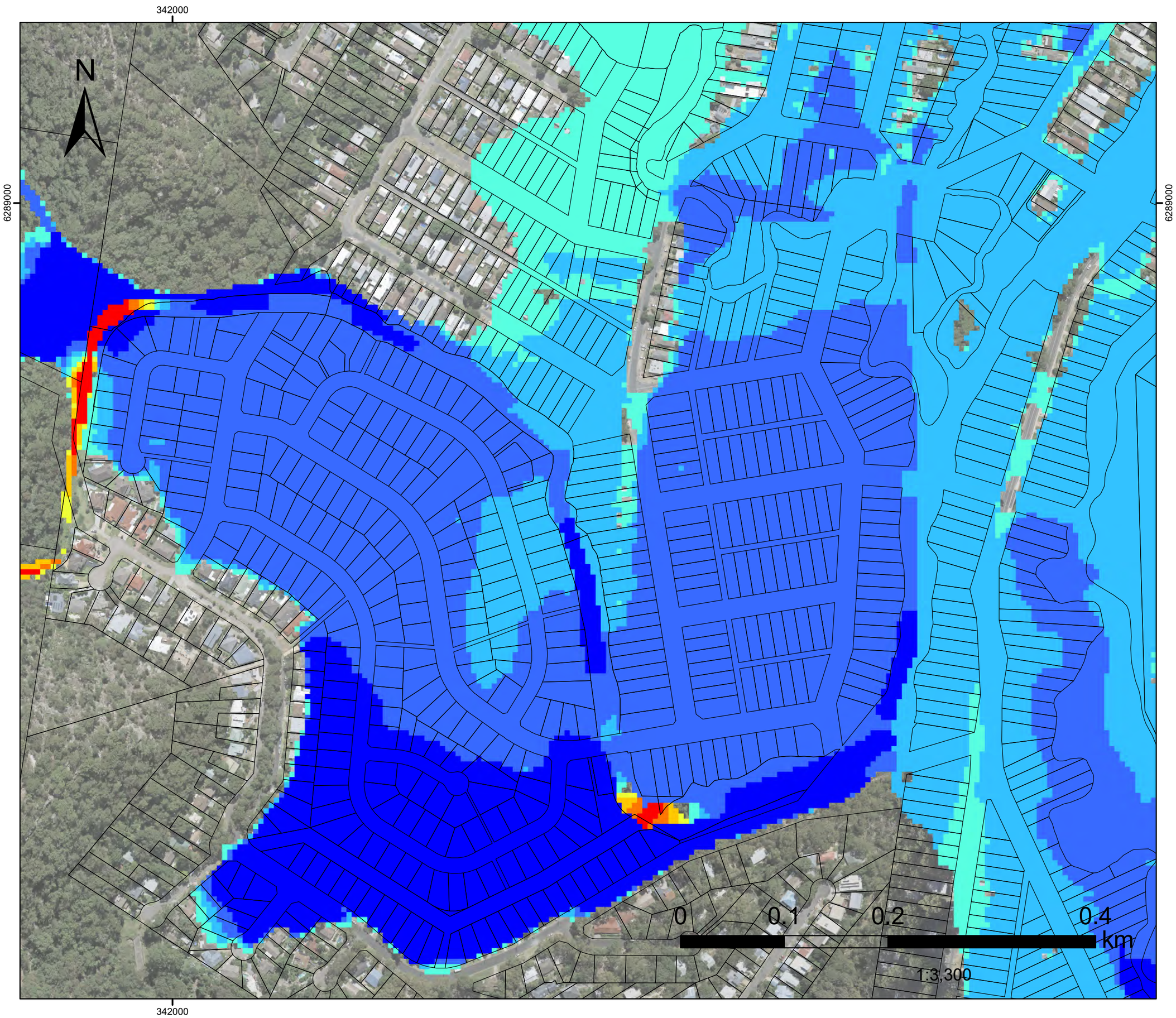

FIGURE L.158

PMF FM06A

Kahibah Ck system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

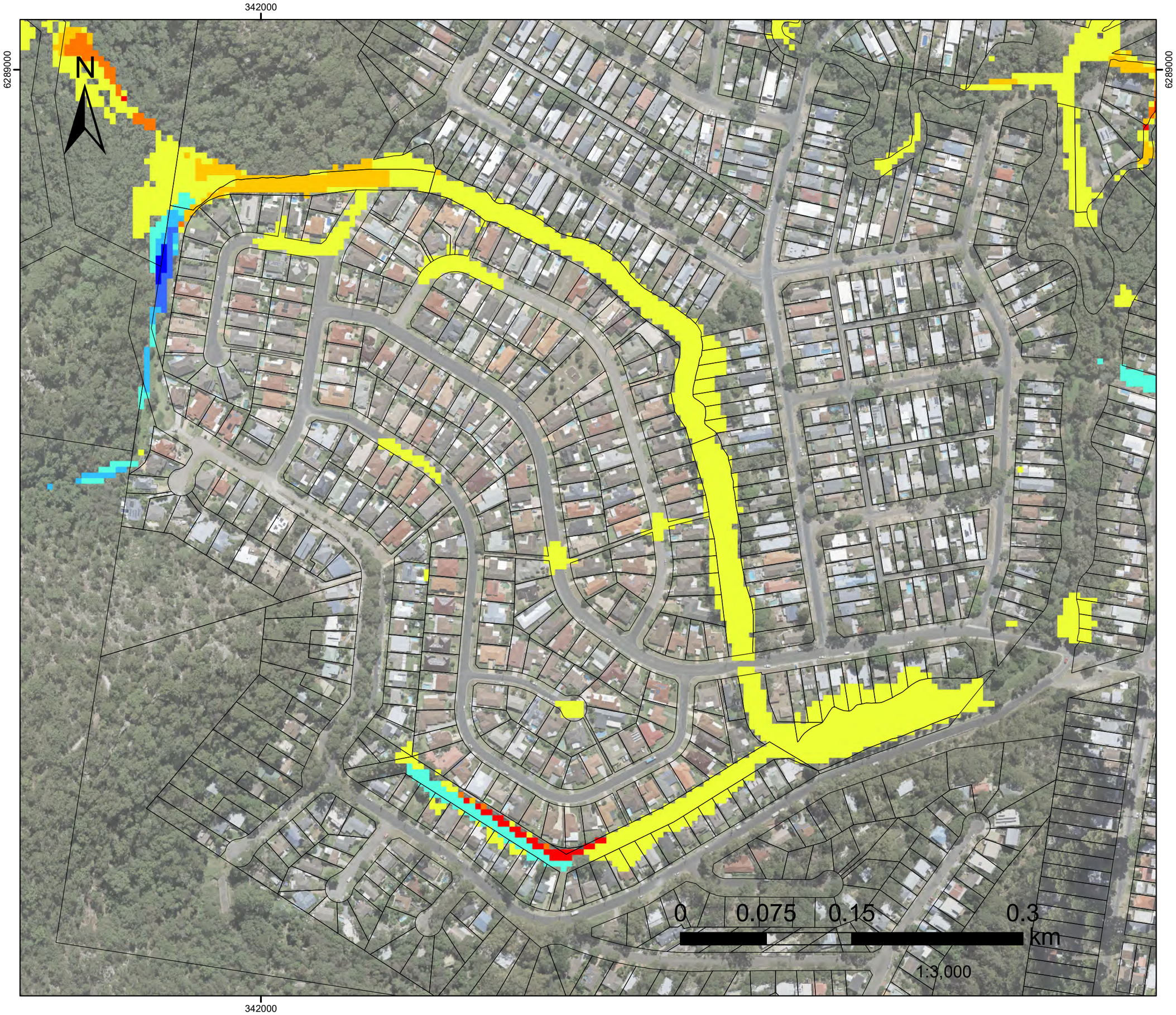

FIGURE L.159

1%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

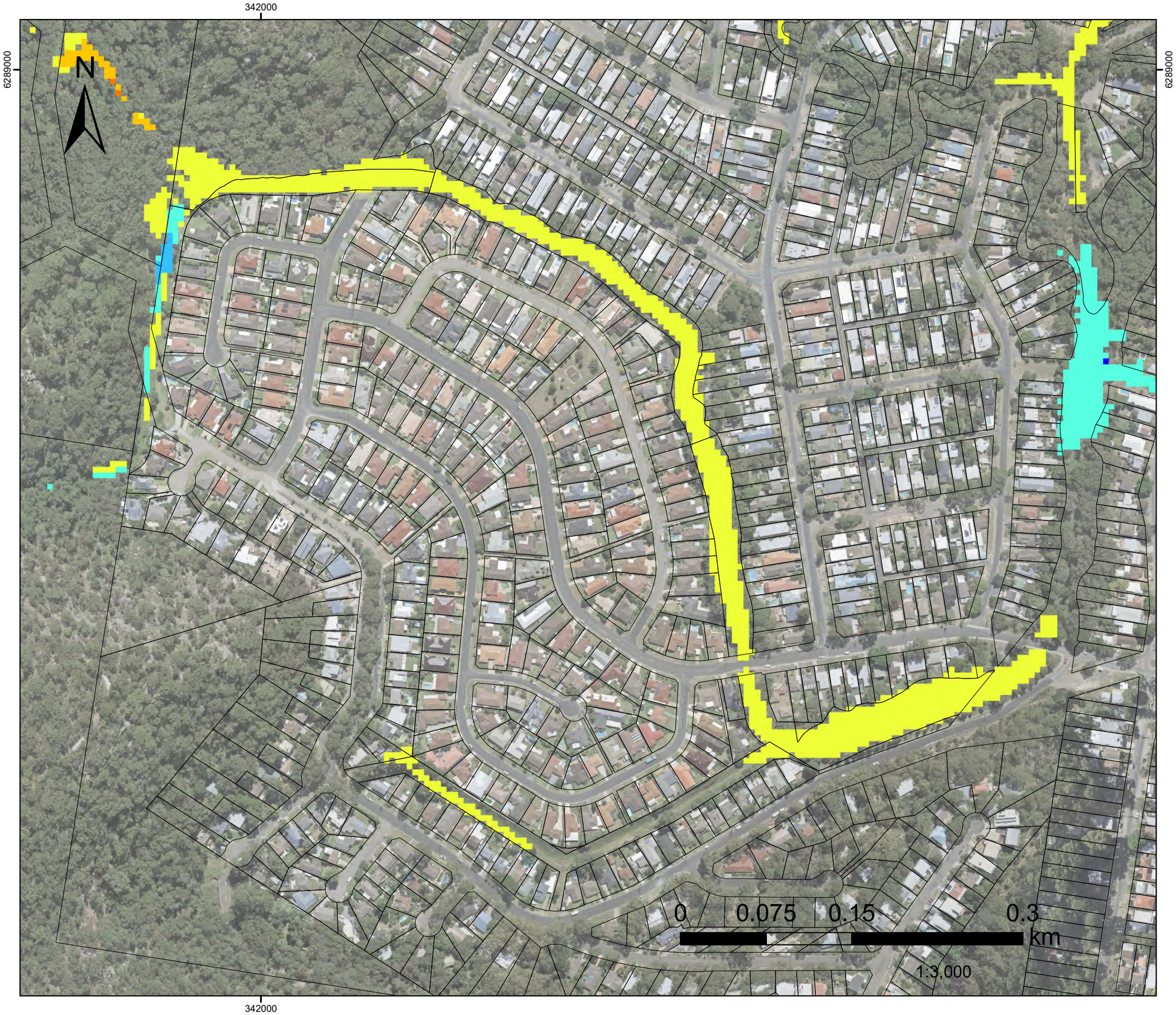

FIGURE L.160

20%AEP FM06B

Further improvement of the Kahibah Creek system maintenance work

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

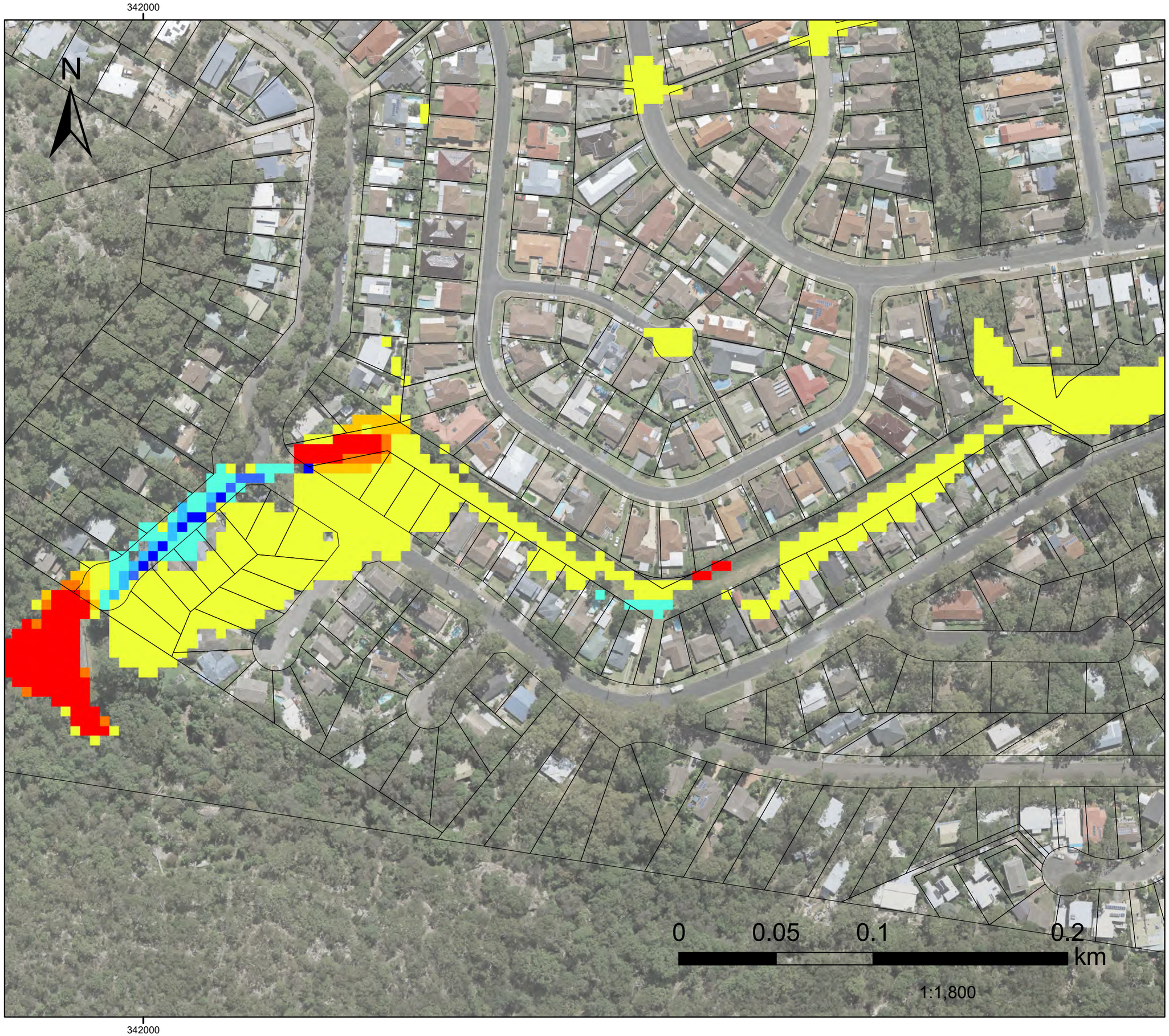

FIGURE L.161

1%AEP FM08

Palmtree Grove Detention Basin

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

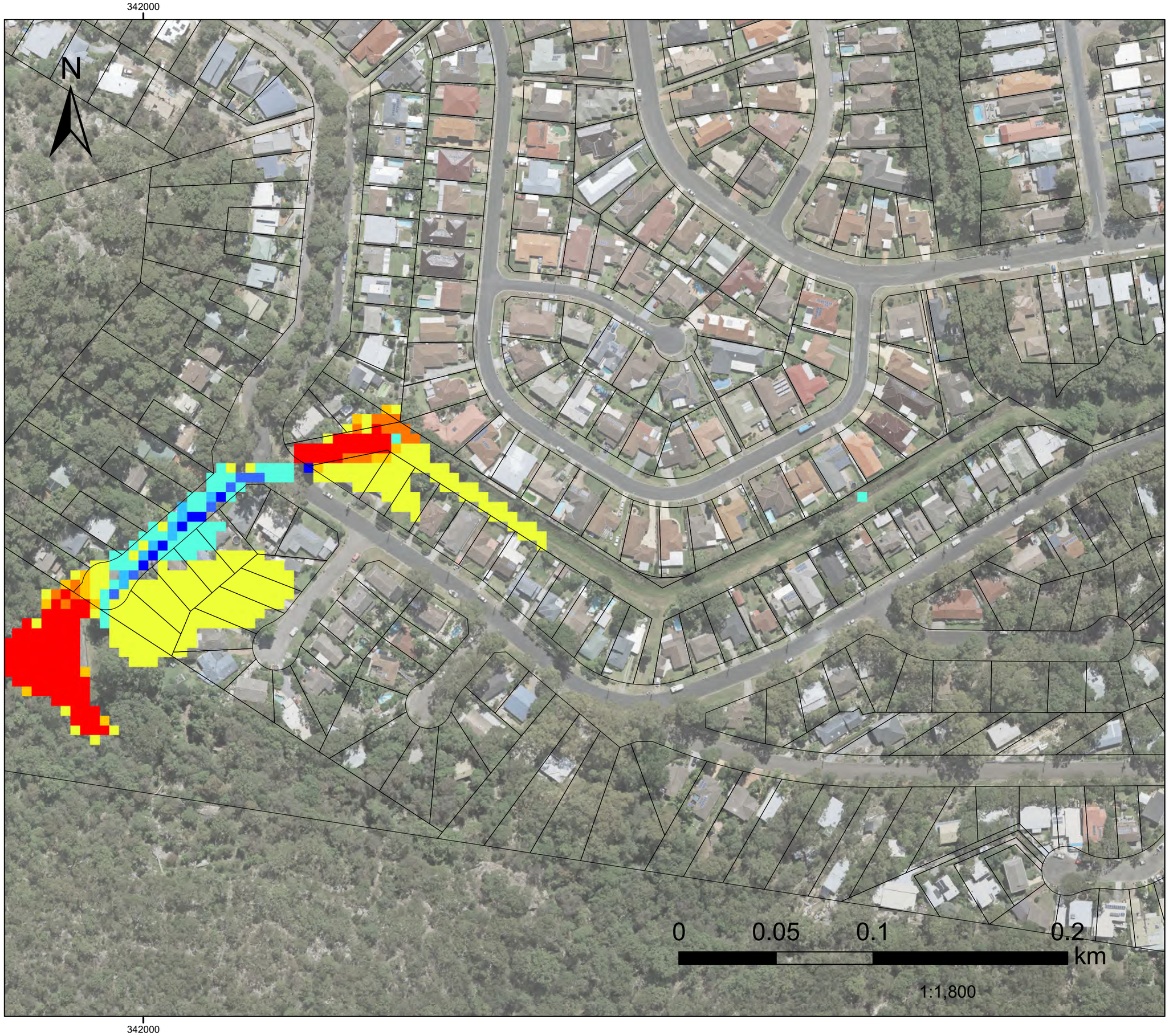

FIGURE L.162

10%AEP FM08

Palmtree Grove Detention Basin

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
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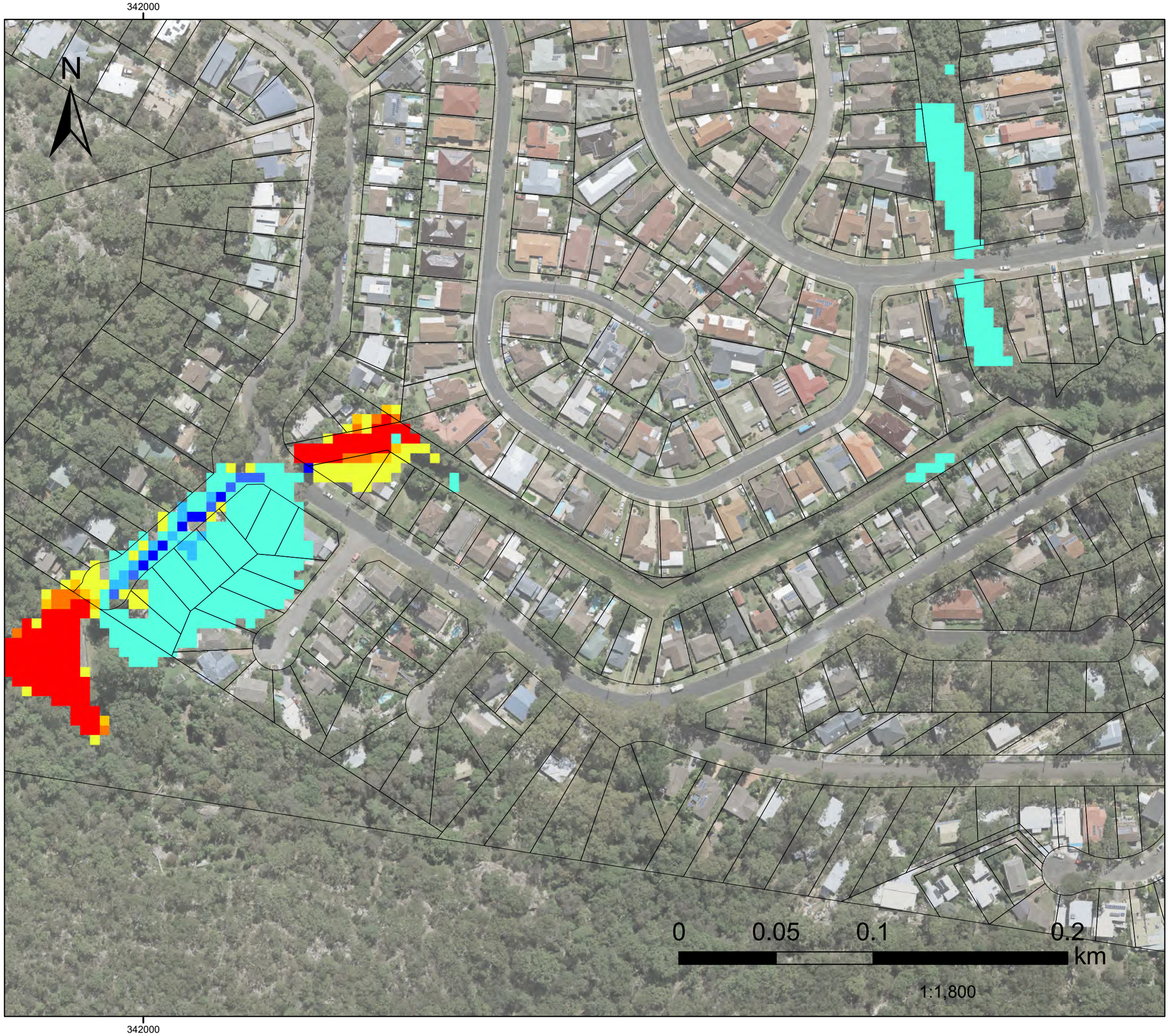

FIGURE L.163

20%AEP FM08

Palmtree Grove Detention Basin

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
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Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
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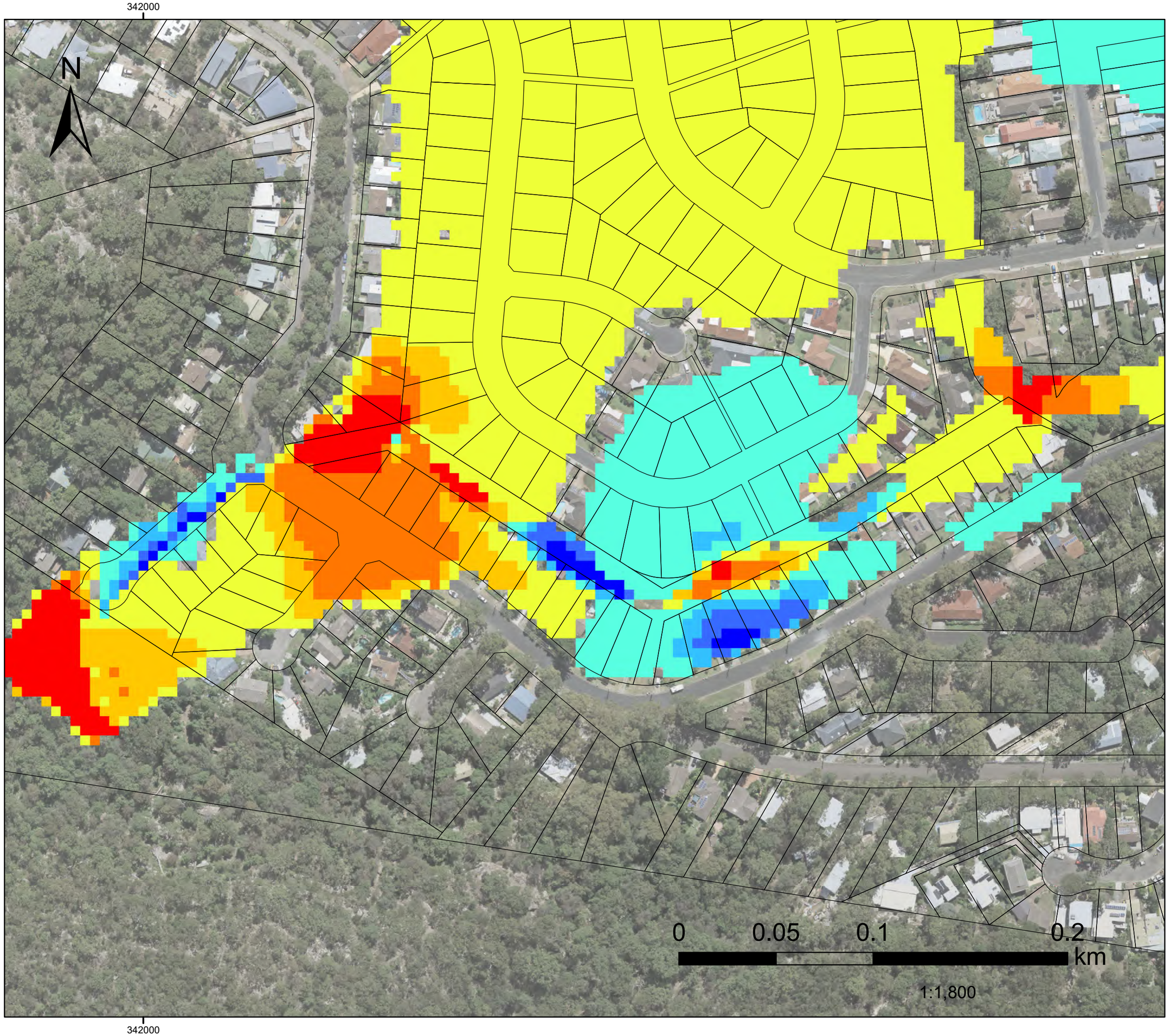

FIGURE L.164

PMF FM08

Palmtree Grove Detention Basin

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
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Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
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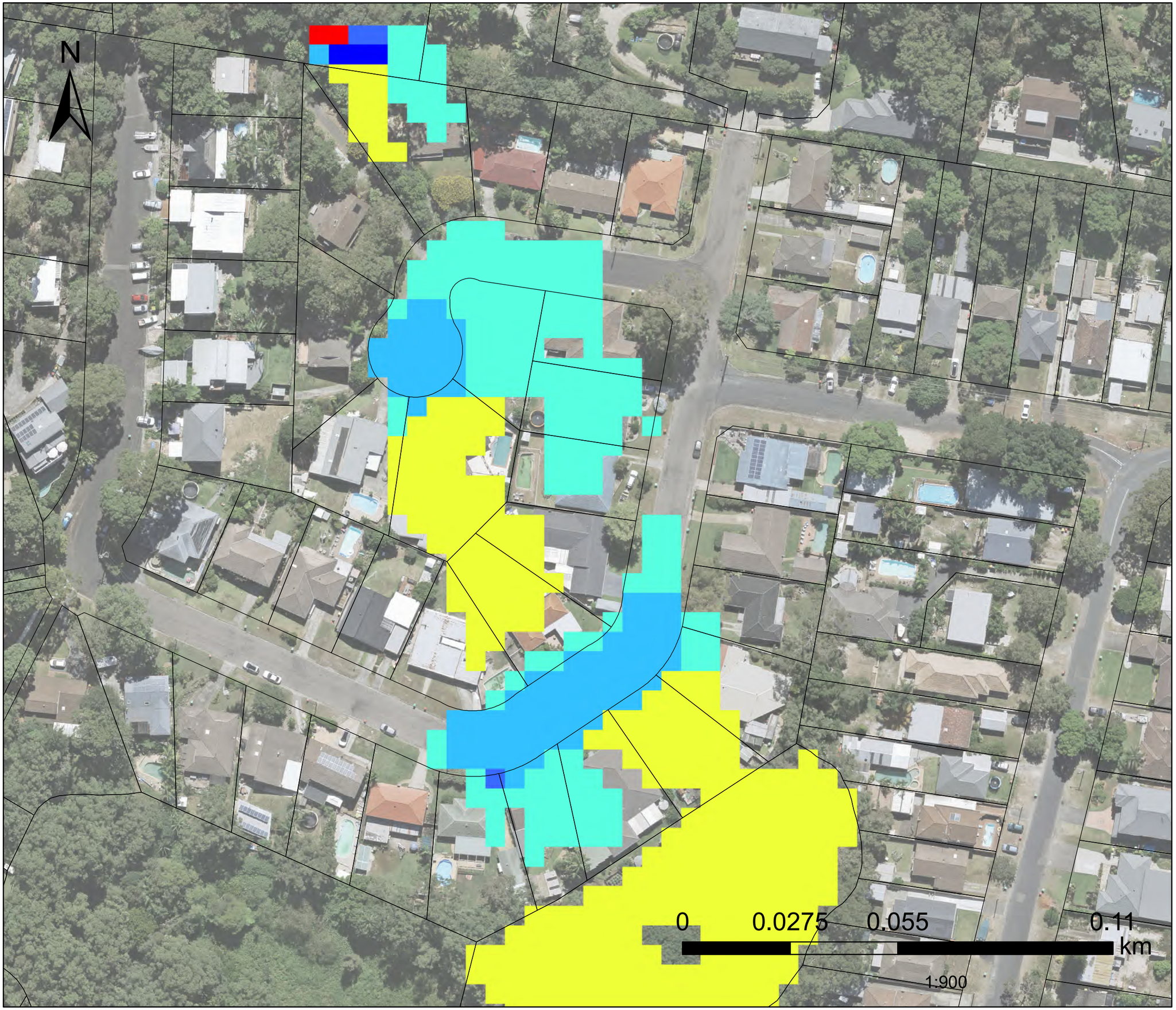

FIGURE L.165

1%AEP FM09

Wilks Av and McManus Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
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Woy Woy
Flood Risk Management Study

Version	FINAL
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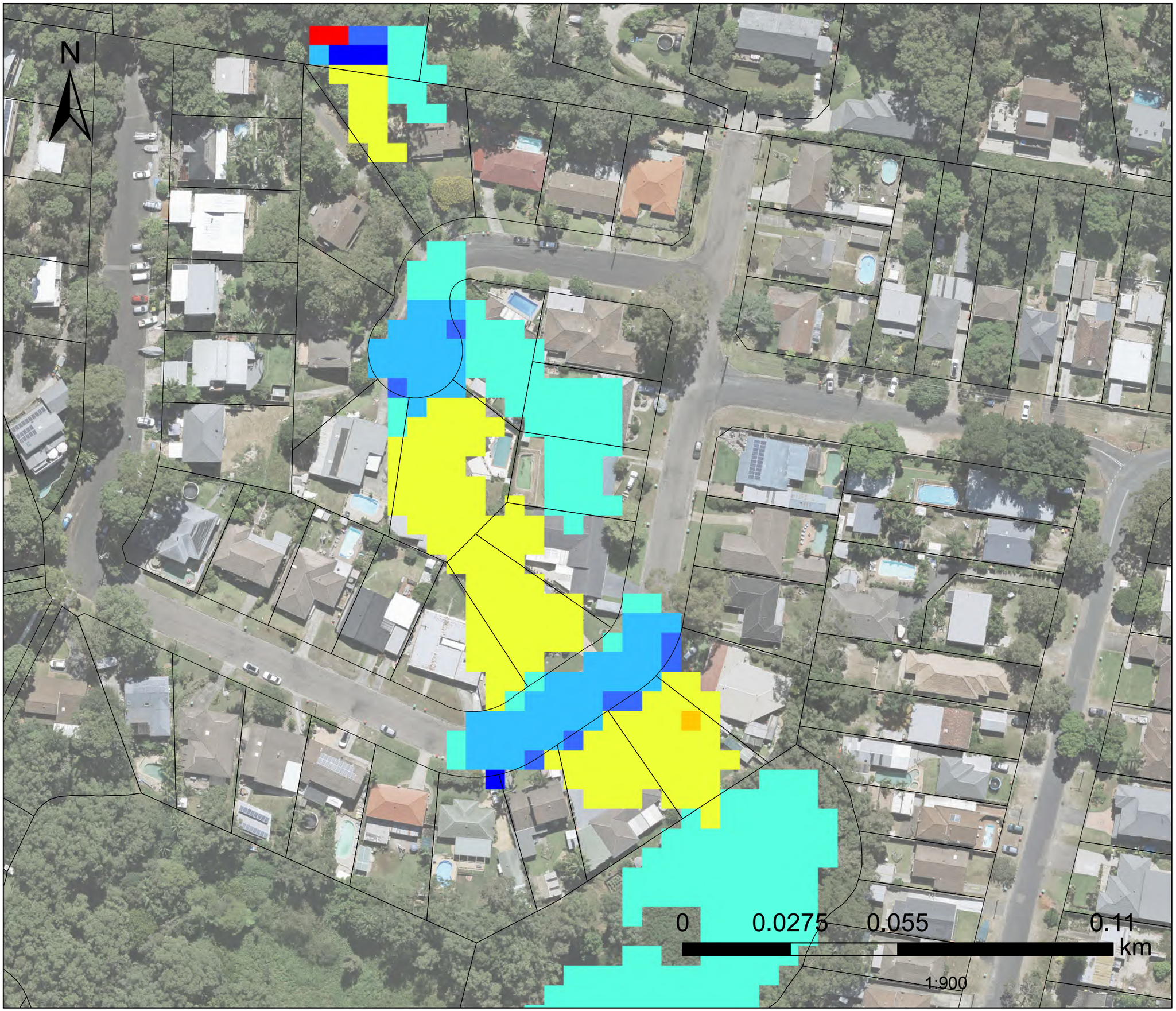

FIGURE L.166

20%AEP FM09

Wilks Av and McManus Cl

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
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Version	FINAL
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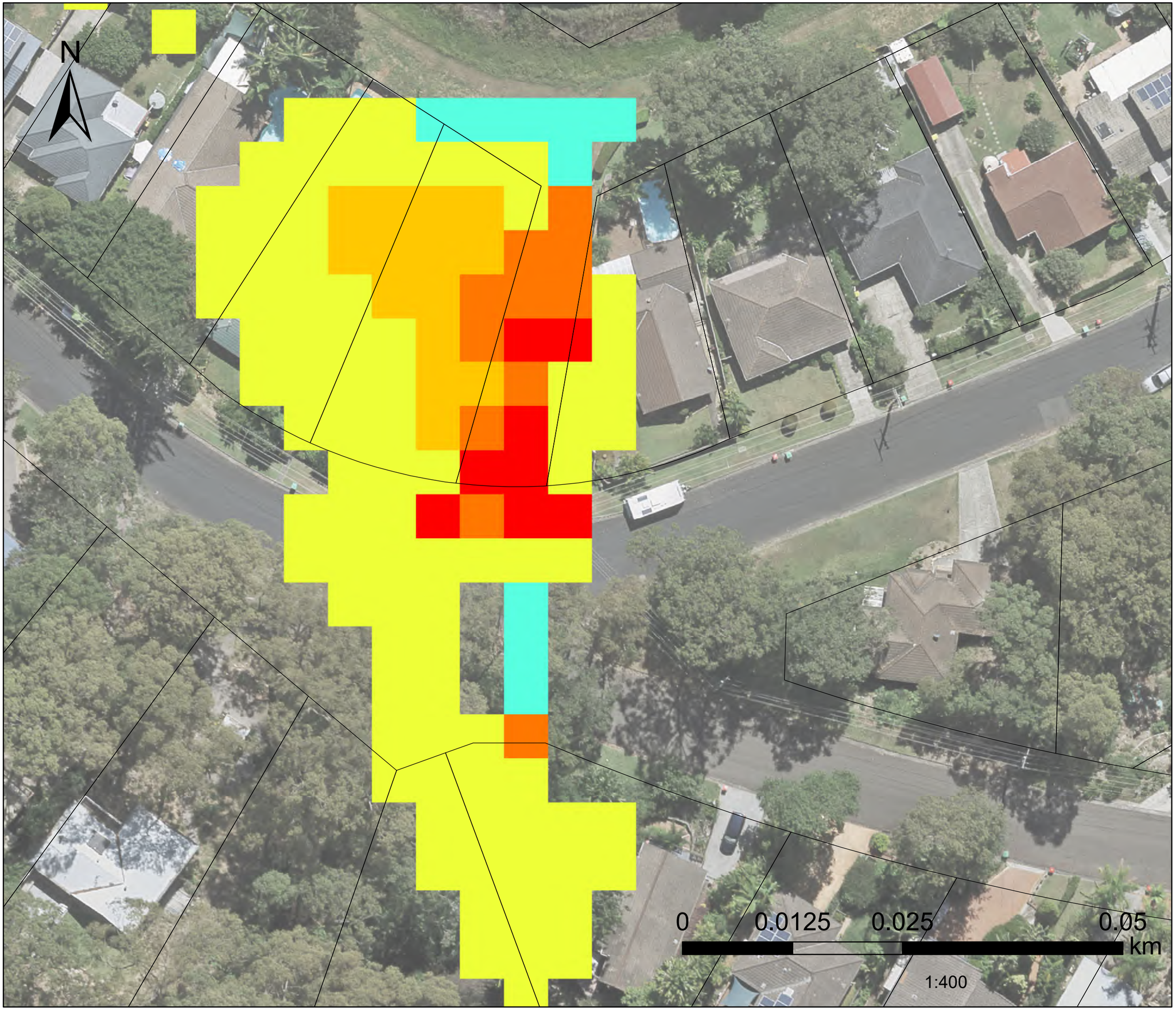

FIGURE L.167

1%AEP FM10

Neera Rd

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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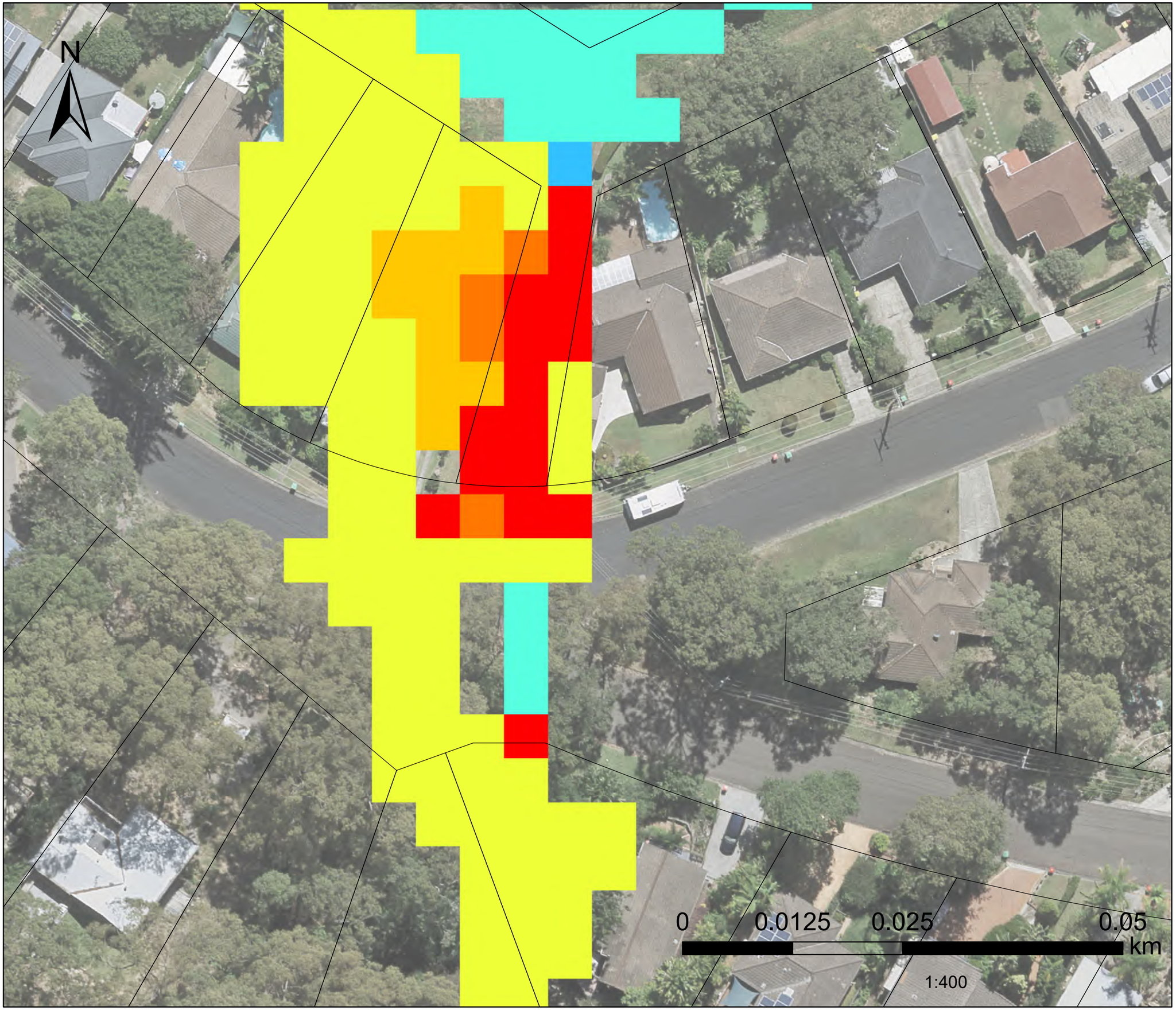

FIGURE L.168

10%AEP FM10

Neera Rd

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
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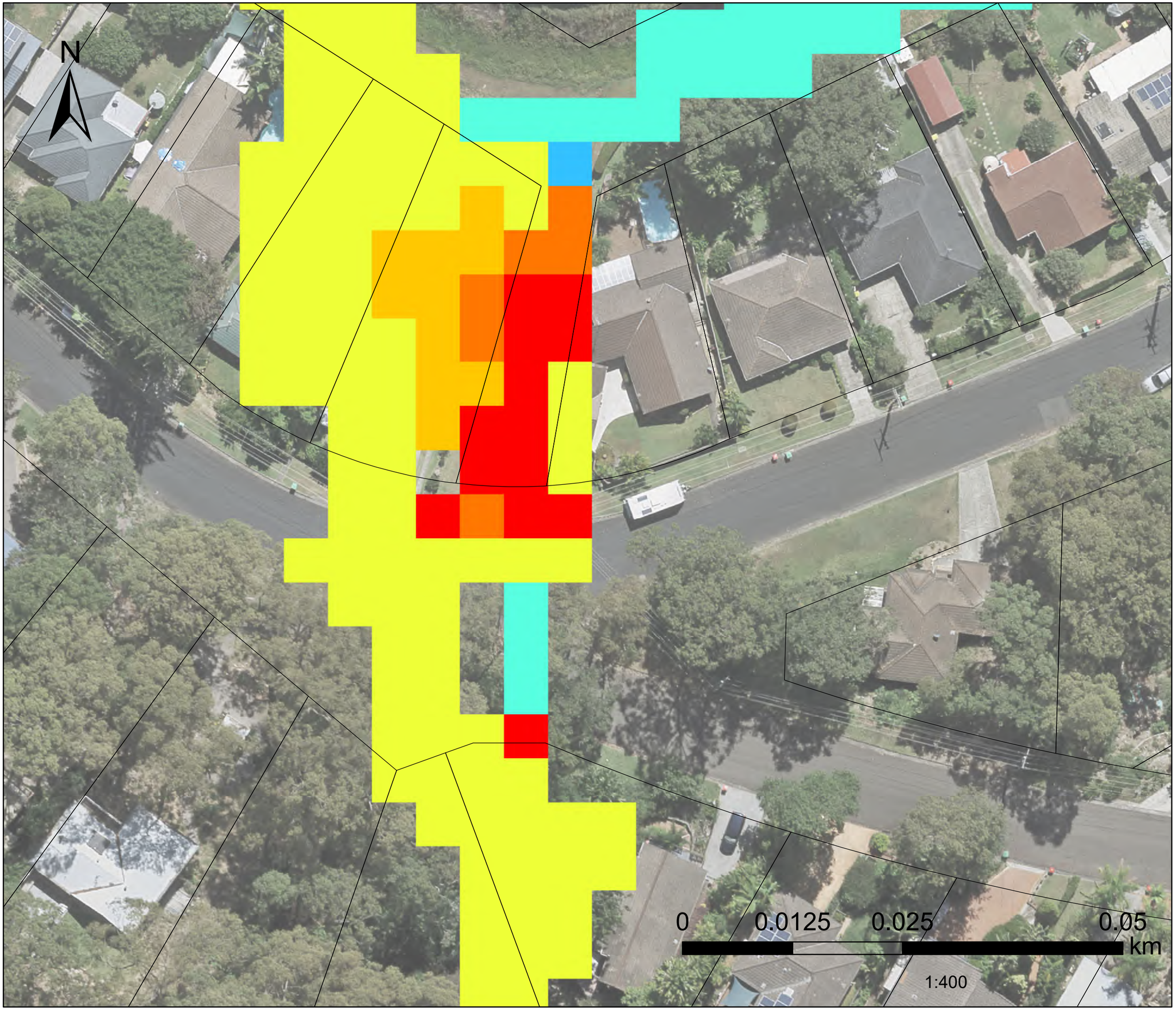

FIGURE L.169

20%AEP FM10

Neera Rd

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

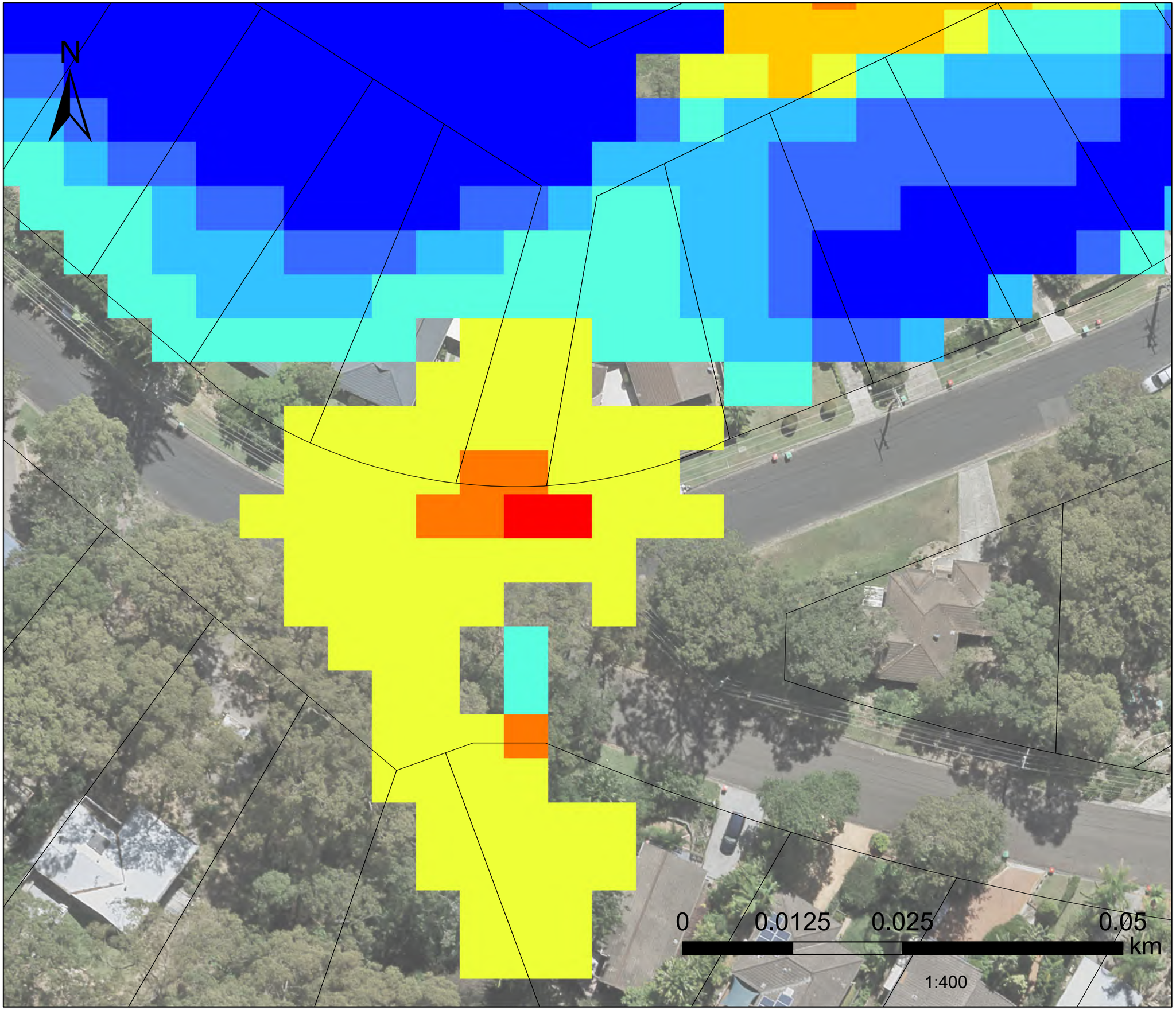

FIGURE L.170

PMF FM10

Neera Rd

Flood Level Difference

Flood Level Difference

(m)

- -0.31 - -0.3
- -0.29 - -0.2
- -0.19 - -0.1
- -0.09 - -0.01
- -0.009 - 0.01
- 0.011 - 0.1
- 0.11 - 0.2
- 0.21 - 0.3
- 0.31 - 1

Datum Projection: GDA 1994 MGA Zone 56
Vertical Datum: Australian Height Datum
Grid: Map Grid of Australia

Woy Woy
Flood Risk Management Study

Version	FINAL
Date	1 Aug 2021
Project No	43803055

APPENDIX M – Consultation Strategy

M Consultation Strategy

The consultation strategy outlined in **Table M. 1** describes the approach to consultation adopted for this study. The approach is in accordance with the IAP2 framework and the requirements of the NSW Government's Floodplain Development Manual (2005).

Table M. 1 Consultation Strategy Outline.

IAP2 Engagement Strategy Guide	Woy Woy FRMSP
Context ***The internal and external drivers, pressures and other background information that is of relevance to the consultation strategy, and in particular how these may influence how the community receives and responds to the consultation program.***	The context of the consultation has been defined by the following: • Floodplain Development Manual. • Australian Emergency Management Handbook 7. • Council's policies. • Flood behaviour (e.g. Brisbane Water levels, waterway flooding and overland flow and the coincidence of these). • Past flooding experiences and local, regional, and national media on flooding. • Council's contact with flood impacted residents following previous flood events. • Consultation undertaken as part of the 2010 Flood Study and 2015 Brisbane Water FRMSP (it is important to build on this rather than just repeat or supersede it). The consultation approach, breadth and outcomes of relevant projects will be reviewed prior to finalising the consultation program and materials.
Scope ***The scoping statements are based on the project context and articulate why the consultation is being undertaken for this project, what the desired outcomes would be, and what the limitations of the engagement are.***	The scope of the consultation strategy is to engage with stakeholders and the community to better understand the flood risks within the study area, to identify preferred methods of floodplain management and to develop community understanding and ownership of the study outcomes.
Stakeholders ***This section provides an overview of the different categories of stakeholders, and their relative level of interest, influence, and impact.*** ***This process is useful in identifying the level of engagement under the IAP2 Consultation Spectrum that may be suitable for different types of stakeholders.***	A stakeholder matrix has been provided below this strategy. This has informed the selection of appropriate consultation methods.

IAP2 Engagement Strategy Guide	Woy Woy FRMSP
Purpose ***The purpose relates to the purpose of the consultation not the overall project.*** ***Stakeholders will be linked to each purpose and the goals within each purpose for each stakeholder will be identified.***	The purpose of the consultation is to: • Inform the community and stakeholders of the study • Gain an understanding of the community and stakeholders' concerns relating to flooding in the study area • Seek input from the community on management options • Gather information from the community by participation • Obtain feedback on the Draft Floodplain Risk Management Study • Develop and maintain community confidence and collaboration with the study results.
Methods	Details of the engagement methods are provided in **Section 7** of the FRMS.

M.1 Stakeholder Matrix

It is important to ensure that all those who need to be involved in the floodplain management (i.e. those with responsibility for managing flood risk and those with a vested interest in its management, such as property owners) are kept informed and invited to contribute to the process to establish a common understanding of flood risk and how decisions are made.

Stakeholders may tend to make judgements about risk based solely on their own perceptions. These perceptions can vary due to differences in values, needs, assumptions, concepts, concerns and degrees of knowledge. Stakeholders' views can have a significant impact on the decisions made, so it is important that differences in their perceptions of risk be identified, recorded, and addressed.

A stakeholder matrix (**Table M. 2**) has been developed to provide an overview of the different categories of stakeholders, and their relative level of interest, influence, and impact on the FRMS. Each stakeholder has been recommended a type of consultation based on the IAP2 consultation spectrum (**Table M. 3**).

Table M. 2 Stakeholder Matrix

Stakeholder	Level of Impact	Level of Interest	Level of Influence	Recommended Type of Consultation
Impacted Stakeholders				
Central Coast Council	High	High	High	Empower
Department of Planning, Industry and Environment	High	High	High	Empower
Brisbane Water and Gosford Lagoon Catchments and Coast Committee	High	High	High	Involve
State Emergency Service	High	High	Moderate	Collaborate
Impacted Infrastructure Service Providers (Ausgrid, Telstra, Jemena Gas, Optus, Ambulance Service, Rail)	Low	High	Low	Inform
Internal Sections at Council and Councol Officers	Moderate	Moderate	Moderate	Involve
Interested Stakeholders				
Roads and Maritime Service / TfNSW	High	High	Low	Inform
WaterNSW	Moderate	Moderate	Low	Inform
Ecosystem managers	Moderate	Low	Moderate	Inform
Darkinjung Aboriginal Land Council	Moderate	Low	Moderate	Inform
Impacted Community Stakeholders				
Flood-affected property owners	High	High	Low	Consult
Flood-affected residents	High	High	Low	Consult
Flood-affected business owners	High	High	Low	Consult
Property owners directly impacted by proposed flood risk management options	Moderate – High (depending on type of option)	Moderate – High (depending on type of option)	Moderate	Involve
Residents and owners of properties not affected by flooding but within the study area (e.g. impacted by flood access)	Moderate	Moderate	Low	Consult
Users of the area (e.g. impacted by flood access)	Low	Moderate	Low	Consult
Interested Community Stakeholders				

Stakeholder	Level of Impact	Level of Interest	Level of Influence	Recommended Type of Consultation
Community groups: Peninsula Environment Group, South Woy Woy Progress Association, Ettalong Ratepayers & Citizen Progress Association, The Bays Community Group, Woy Woy Bay Bushcare, Everglades Probus Club, Central Coast Inc., Rotary Club of Woy Woy, Peninsula Mainstreet (Chamber of Commerce), Woy Woy Peninsula Neighbourhood Service Inc., Country Womens Association of NSW Woy Woy Branch	Moderate	Low	Low	Consult
Wider community	Low	Low	Low	Consult

Table M. 3 IAP2 Consultation Spectrum

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Public Participation Goal	**Public Participation Goal**	**Public Participation Goal**	**Public Participation Goal**	**Public Participation Goal**
To provide the public with balanced and objective information to assist them in understanding the problems, alternatives and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision, including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the Council
Promise	**Promise**	**Promise**	**Promise**	**Promise**
We will keep you informed.	We will keep you informed, listen to, and acknowledge concerns and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Stakeholders	**Stakeholders**	**Stakeholders**	**Stakeholders**	**Stakeholders**

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Impacted Infrastructure Services RMS WaterNSW Department of Industry Ecosystem Managers Local Member (MP)	Impacted Community Stakeholders	Impacted Stakeholders-Internal Business Units Council	Office of Environment & Heritage State Emergency Services Catchments & Coast Committee	Councillors
Engagement Tools	**Engagement Tools**	**Engagement Tools**	**Engagement Tools**	**Engagement Tools**
Media Releases Have your Say Website (including access to online survey) Technical Papers (Study & Plan)	Newsletter & Survey (directly mailed to potentially flood affected residents) Briefings Public Information Sessions (2) Submissions Have your Say Website Stakeholder meetings	Direct email / mail and follow up phone calls, as required	C & C Committee meetings Technical Subcommittee Workshops Briefings Internal	Council Workshops Council Meetings

M.2 Engagement Approach and Communication Deliverables

Based on the objectives of the consultation (identified in the consultation strategy outline), the level of consultation identified for each of the stakeholders (in the stakeholder matrix), and discussions with Council, engagement methods were selected to achieve the project objectives (**Table M. 4**).

Table M. 4 Engagement Methods

Event/Activity	Action / key messages	Target Audience	Engagement level	Responsibility
Brief sent to Communication and Engagement		Internal	N/A	Project Officer
Contact Council's Knowledge Management Officer of Customer Relationships	Currently Sandra Smith – on x8317	Internal	N/A	Project Officer
Inception meeting	• Provide overview of project scope • Identify key issues for the study • Discuss approach to consultation	Internal Business Units Council, SES and OEH	Collaborate and Involve	Project Officer and Consultants
South Woy Woy Progress Association briefing	• Provide brief summary of the project	Progress Association	Inform	Council
Your Voice Our Coast page – with a link to the project website	• Provide scope and context of project. • Invite community input on what they see as the key flooding issues and how they would like to see them managed. • Provide project updates throughout project.	Impacted and interested stakeholders	Inform and consult	Council and Rhelm (Consultant)
Community newsletter and questionnaire	• Provide scope and context of project. • Invite community input on what they see as the key flooding issues and how they would like to see them managed.	Residents, property owners, local business owners, and the wider community.	Consult	Rhelm (Consultant)
Media release	• Advise of the project and advertise the engagement activities	Residents, property owners, local business owners, and the wider community.	Inform	Rhelm to provide draft content. Council to finalise and release.
Public notice in Coast Community News	• Advise of the project and advertise the engagement activities	Residents, property owners, local business owners, and the wider community.	Inform	Communications

Event/Activity	Action / key messages	Target Audience	Engagement level	Responsibility
Community information sessions	• Provide scope and context of project. • Invite community input on what they see as the key flooding issues and how they would like to see them managed. • Provide interactive mapping via WaterRide dongles, laptops, iPad, TVs and connecting cables for ease of representing the study	Residents, property owners, local business owners, and the wider community.	Consult	Engagement, Project Officer and Rhelm
Stakeholder meetings	• Provide scope and context of project. • Invite community input on what they see as the key flooding issues and how they would like to see them managed.	Community groups, action groups and other key stakeholders identified	Consult and Involve	Project Officer and Rhelm
Engagement summary	• A one-page summary of the engagement campaign to be uploaded to Your Voice Our Coast	All stakeholders	Inform	Engagement to create and upload summary
Technical Papers Committee Meeting	• Recommendation to Council regarding public exhibition	Catchment and Coasts Committee	Consult	Council and Rhelm (Consultant)
Technical Papers Council Meeting	• Approval for documents to go on public exhibition	Councillors	Consult	Council
Media release	• Advise of the project and advertise the engagement activities	Residents, property owners, local business owners, and the wider community.	Inform	Rhelm to provide draft content. Council to finalise and release.
Public notice in Coast Community News	• Advise of the project and advertise the engagement activities	Residents, property owners, local business owners, and the wider community.	Inform	Communications
Public Exhibition – Your Voice Our Coast page, with a link to the project website	• Invite feedback on draft documents	Residents, property owners, local business owners, the wider	Consult	Council and Rhelm (Consultant)

Event/Activity	Action / key messages	Target Audience	Engagement level	Responsibility
		community, agency stakeholders and community groups.		
Community information sessions	• Invite feedback on draft documents	All stakeholders	Consult	Council and Rhelm (Consultant)
Stakeholder meetings	• Provide scope and context of project. • Invite community input on what they see as the key flooding issues and how they would like to see them managed.	Community groups, action groups and other key stakeholders identified.	Consult	Council and Rhelm (Consultant)
Engagement summary	• A one-page summary of the engagement campaign to be uploaded to Your Voice Our Coast	All stakeholders	Inform	Engagement to create and upload summary
Finalisation and handover	• Data uploaded to SES Web portal	DPIE, SES		Council and Rhelm (Consultant)

APPENDIX N – Economic Flood Damages

N Economic Flood Damages

N.1 Damage Categories

In order to quantify the economic impacts of flooding, a flood damage assessment has been undertaken. A property may suffer economic impacts from flooding through several ways. These are broadly grouped into three categories, as summarised in **Table N. 1**.

Table N. 1 Flood Damages Categories

Type of Flood Damages		Description
Tangible	**Direct**	Building contents (internal) Structure (building repair and clean) External items (vehicles, contents of sheds etc.) Infrastructure
	Indirect	Clean-up (immediate removal of debris) Financial (loss of revenue, extra expenditure) Opportunity (non-provision of public services)
Intangible		Social – increased levels of insecurity, depression, stress General inconvenience in post-flood stage

Damage dealt directly to a property or its contents (direct damages) are only a component of the total damages accrued during a flood event. Indirect costs, while also tangible, arise as a result of consequences of the flood event, such as clean-up costs, opportunity costs, and other financial impacts.

In addition to tangible damages, there are also a category of damages referred to as intangible damages. Intangible costs relate to social impacts, such as insecurity and depression, that arise as a result of major flood event, or general inconveniences that occur during the post-flood stage. The intangible costs are difficult to calculate in economic terms.

N.2 Property Survey

Detailed floor level survey was available for a total of 1,606 properties within the Woy Woy study area. The floor levels of the remaining properties (11,513) were estimated using aerial imagery, Google Street view and site inspections, whilst the ground level was estimated using the LiDAR derived ground surface DEM. Where it was not possible to get a good reading of the floor level of a property, the damages assessment assumed that the floor level was 0.3 metres higher than the ground level. A total of 13,119 properties were assessed in terms of floodplain damages, with a breakdown of their survey source provided in **Table N. 2**.

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Table N. 2 Property Survey in Woy Woy Study Area

Survey Source	Residential Single Storey	Residential Double Storey	Commercial	Total
Woy Woy	138	24	3	165
Brisbane Water	680	256	89	1,025
Kahibah Creek	245	0	2	247
Kahibah	167	0	2	169
'Estimated'	11,300	*N/A*	213	11,513
Total	12,530	280	309	13,119

Due to the large number of properties estimated through aerial imagery and Google Maps, the damages assessment assumed that these properties were single storey. A full list of assumptions and inputs is provided in the following section.

N.3 Methodology, Assumptions and Inputs

The damage assessment undertaken for this study has examined the tangible damages only, using the Excel template (Version 3.00) developed by the Department of Environment and Climate Change (DECC) (now DPIE) in 2007. The spreadsheet provides damage curves for three residential building types:

1. Single storey, high set
1. Single storey, slab on ground
2. Two storey, slab on ground.

Damage curves for commercial buildings were derived using ANUFLOOD, with values indexed to present day dollars ($2021).

The spreadsheet is subject to a number of assumptions and inputs, which are detailed in **Table N. 3**. The residential and commercial damage curves applied to the analysis are illustrated in **Figure N. 1**. The sudden jump in the two storey damage curve at a depth of 2.60m indicates that the flooding is starting to impact the upper storey, significantly increasing the damages incurred.

Table N. 3 List of assumptions and inputs in the damages assessment

Assumption / Input	Value	Justification
Regional cost variation factor	1.02	Obtained from Rawlinsons – Regional Indices. Gosford is 1.02, relative to Sydney (1.00), and is the closest location to Woy Woy
Inflation adjustments	2.02	Based on Average Weekly Earning (AWE): November 2020: $1,711.60 November 2001: $848.70
Post-flood inflation factor	1.50	Large scale impacts in a regional area, with more than 150 properties affected
Typical duration of immersion	6 hours	Assumed

Assumption / Input	Value	Justification
Building damage repair limitation factor	0.85	Short duration
Typical house size	170 m^2	Estimated, based on aerial imagery of a range of representative properties
Contents damage repair limitation factor	0.75	Short duration
Level of flood awareness	Low	Assumed
Effective warning time	0 hours	Assumed
Interpolated Damage Reduction Factor	1.00	Assumed
Likely time and cost in alternate accommodation	6 weeks, $220 per week	Recommended values
Clean-up costs	$4,000	Recommended value, per property
External/Garden damage: Major cost	$5,000 per property	Triggered if depth of inundation above ground level is greater than 0.50 metres
External/Garden damage: Minor cost	$500 per property	Triggered if depth of inundation above ground level is greater than 0.15 metres but less than 0.50 metres
Single Storey Properties	High-Set	All single storey properties within the study area are assumed to be high-set (as opposed to slab on ground)
Commercial and Industrial properties	Low value	All commercial and industrial properties within the study area are assumed to be of low value (as opposed to medium or high)

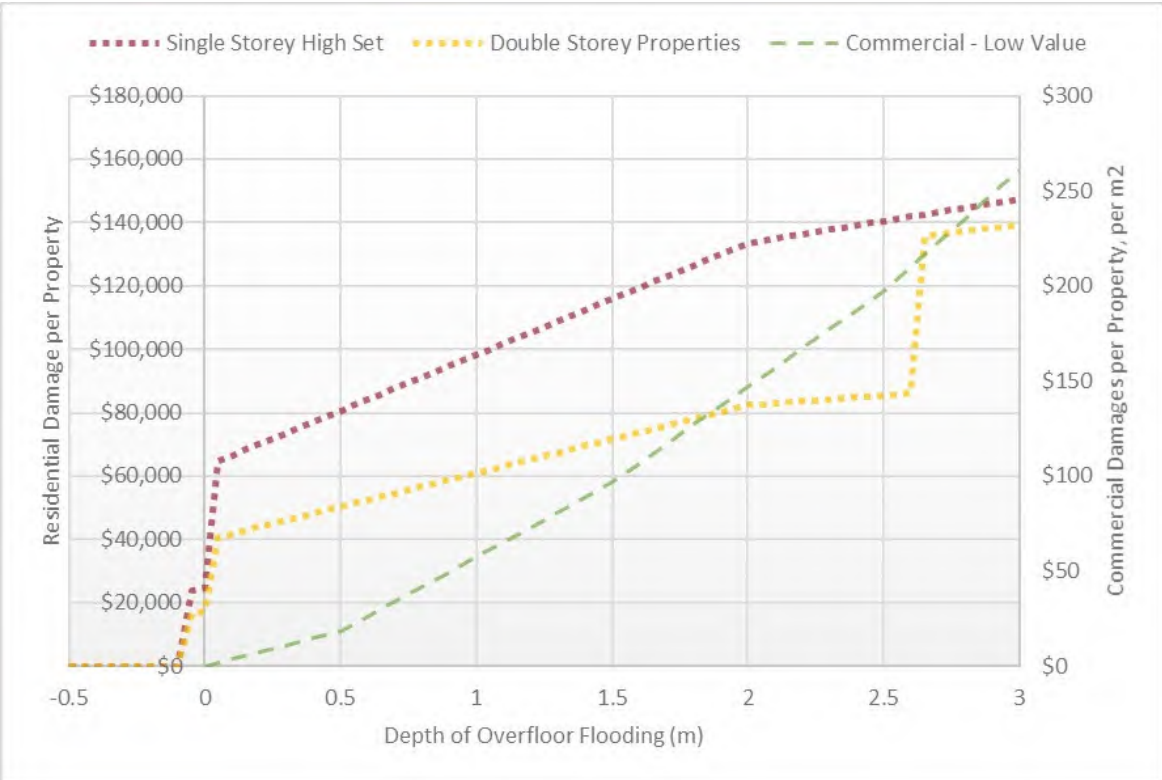

Figure N. 1 Damage Curves

The following events were modelled in terms of catchment flooding to form the basis of the floodplain damages assessment:

- PMF
- 1% AEP
- 10% AEP
- 20% AEP

N.3.1 Technical Note: Damages Calculation

The floodplain damages associated with the base case were calculated based on the median temporal pattern for the critical storm across the mitigation option locations. The change in damages associated with each floodplain management option was calculated based on the difference between the median temporal pattern and critical duration of the flood event, as detailed below:

- PMF: 2 hour critical duration
- 1% AEP: 6 hour critical duration, temporal pattern 09
- 10% AEP: 3 hour critical duration, temporal pattern 04
- 20% AEP: 1 hour critical duration, temporal pattern 03

N.4 Results: Existing (Base Case)

The results from the damage assessment are summarised in **Table N. 4.** The average annual damage (AAD) for the Woy Woy study area under existing conditions is $2,911,637. Over a 50-year assessment period and under a seven per cent discount rate, this is equivalent to a Net Present Value (NPV) of $40.2 million. Note that these damages were calculated based on the tangible damages only.

Table N. 4 Woy Woy – Existing Damages Assessment Results

AEP	Properties with Over-Floor Flooding	Max Over-Floor Depth (m)	Average Over-Floor Depth (m)	Total Damages
PMF	2,138	2.07	0.23	$165,207,840
1% AEP	36	1.54	0.25	$2,603,748
10% AEP	19	1.36	0.25	$1,459,712
20% AEP	16	0.32	0.12	$1,152,774

As there are 2,138 properties in the damages assessment that experience over-floor flooding in the PMF, this equates to an AAD per property of $620.

The removal of garden damages has a negligible impact on the result of the damages assessment, suggesting that the outcome of the damages is not sensitive to this assumption.

As an additional sensitivity test, an assessment was undertaken for the assumption of all buildings using floor levels estimated based on ground LiDAR values. The assumed value of 0.3m above ground level was based on a combination of site inspections, Google Streetview and aerial imagery. **Table N. 5** shows the impact of increasing this value on over floor flooding and total damages.

Table N. 5 Existing Damages Assessment Results – Sensitivity to Estimated Floor Level Heights

		0.3m Above Ground Level	0.4m Above Ground Level	0.5m Above Ground Level	0.6m Above Ground Level
PMF	Properties with Over-Floor Flooding	2,138	1,538	1,127	823
	Total Damages	$165,207,840	$121,392,367	$89,602,079	$67,738,650
1% AEP	Properties with Over-Floor Flooding	36	35	34	34
	Total Damages	$2,603,748	$2,575,765	$2,530,196	$2,463,699
10% AEP	Properties with Over-Floor Flooding	19	19	18	18
	Total Damages	$1,459,712	$1,456,185	$1,391,451	$1,367,448
20% AEP	Properties with Over-Floor Flooding	16	16	15	15
	Total Damages	$1,152,774	$1,086,729	$1,062,274	$1,062,274
Average Annual Damage		$1,324,615	$1,090,814	$918,702	$803,890

The estimated floor level above ground level has a minor impact on the resultant AAD (potentially a 18% to 39% reduction when increased 0.1m to 0.3m, respectively). This reduction is mostly attributed to reduction in damages in the PMF event. In the smaller modelled events, over floor flooding is largely experienced by dwellings which have had their floor levels surveyed, hence the reduction of only one or two properties experiencing a change when the estimated floor level elevation is increased.

N.5 Results: Options

The flood damages assessment is a useful tool for comparing the merits of various options, it is not a precise flood risk analysis tool and the limitation associated with the assessment should be considered when interpreting the results. The outcomes of the damages assessment for the seven options that were assessed in detail are provided in the following sections.

The PMF event was removed from the damages assessment, as it was concluded that the modelled flood mitigation options have minimal effect on design flood levels and the effect on reduction in AAD is negligible.

The economic evaluation of each of these options was also assessed by considering the reduction in the amount of flood damages incurred for the design events and by then comparing this value with the cost of implementing the measure.

The indicator adopted to rank these measures on economic merit is the benefit-cost ratio (B/C or BCR), which is based on the net present value (NPV) of the benefits (reduction in AAD) and the costs (capital and ongoing), adopting a 7% discount rate and an implementation period of 50 years.

The benefit-cost ratio provides an insight into how the damage savings from a measure, relate to its cost of construction and maintenance:

- Where the benefit-cost ratio is greater than 1, the economic benefits are greater than the costs of implementing the measure;
- Where the benefit-cost ratio is less than 1 but greater than 0, there is still an economic benefit from implementing the measure but the cost of implementing the measure is greater than the economic benefit;
- Where the benefit-cost is equal to zero, there is no economic benefit from implementing the measure; and
- Where the benefit-cost is less than zero, there is a negative economic impact of implementing the measure.

The following sections detail the damage assessment results for each of the seven options. The Figure below displays the difference in Annual Average Damage (AAD) between the floodplain mitigation option and the Base Case (existing scenario).

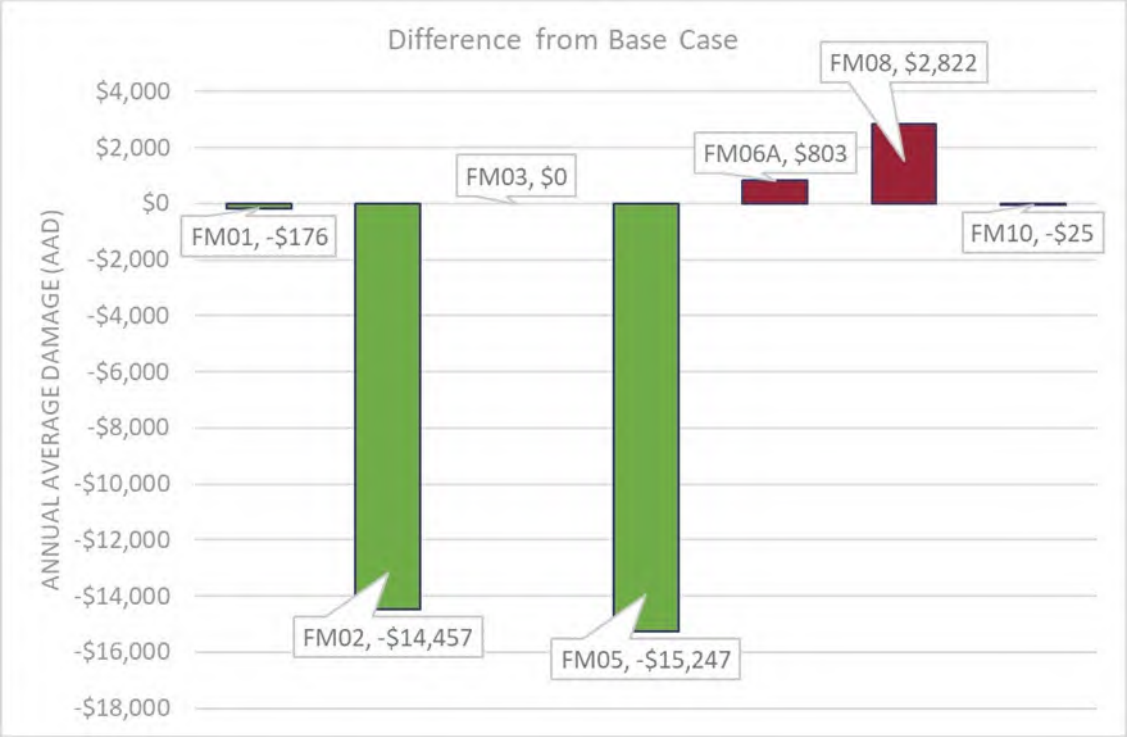

Figure N. 2 Difference in AAD between floodplain options and the Base Case (existing scenario)

N.5.1 FM01

FM01 considers mitigation of flooding around Woy Woy CBD which is low-lying area close to the coastline.

The table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show a marginal reduction in the AAD ($176). There is also a negligible change in the number of properties affected by over-floor and overground flooding as a result of implementing this mitigation option.

Table N. 6 FM01: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages
	Existing	FM01	Existing	FM01	Existing	FM01	
1% AEP	36	36	239	239	$2,603,748	$2,600,221	$3,527
10% AEP	19	19	92	92	$1,459,712	$1,459,712	$0
20% AEP	16	16	73	73	$1,152,774	$1,152,774	$0
AAD					$1,324,615	$1,324,439	$176

The cost of implementing Option FM01 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table K.1 FM01: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	NPV	Benefit Cost Ratio
FM01	$1,708,840	$500	$1,603,947	$2,434	-$1,601,513	0.00

N.5.2 FM02

FM02 considers the increase of drainage capacity at Dulkala Road to Karingal Close including the utilization of the public space north of Dulkala Road and west of St John the Baptist Catholic Primary School. Modifications include increase of the drainage pipe sizes and gradient changes to Karloo Rd and Lentara Rd to reduce flow entering to properties.

The table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show a minor reduction in the AAD ($14,457), despite a negligible change in the number of properties affected by over-floor and overground flooding as a result of implementing this mitigation option.

Table N. 7 FM02: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages
	Existing	FM02	Existing	FM02	Existing	FM02	
1% AEP	36	35	239	238	$2,603,748	$2,559,888	$43,861
10% AEP	19	19	92	92	$1,459,712	$1,421,498	$38,215
20% AEP	16	16	73	73	$1,152,774	$1,109,607	$43,167
AAD					$1,324,615	$1,310,158	$14,457

The cost of implementing Option FM02 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table N. 8 FM02: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	NPV	Benefit Cost Ratio
FM02	$653,100	$500	$617,274	$199,512	-$417,762	0.32

N.5.3 FM03

FM03 considers the installation of infiltration devices along streets with ponding. A number of infiltration devices were tested in several locations of the Woy Woy peninsula previously and showed improvements to local drainage issues, while the maintenance of devices has been a challenge.

The Table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show no reduction in the AAD, and no change in the number of

properties affected by over-floor and overground flooding as a result of implementing this mitigation option.

The cost of implementing Option FM03 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table N. 9 FM03: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	NPV	Benefit Cost Ratio
FM03	$144,200	$6,000	$217,571	$0	-$217,571	0.00

N.5.4 FM05

FM05 considers increasing the capacity of the drainage along The Rampart, Greenhaven Drive, Australia Avenue, and Glenhaven Close and navigating more ponding water to the drainage system.

The Table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show a minor reduction in the AAD ($15,247), despite a negligible change in the number of properties affected by over-floor and overground flooding as a result of implementing this mitigation option.

Table N. 10 FM05: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages
	Existing	FM05	Existing	FM05	Existing	FM05	
1% AEP	36	35	239	237	$2,603,748	$2,601,532	$2,216
10% AEP	19	19	92	92	$1,459,712	$1,435,709	$24,003
20% AEP	16	16	73	73	$1,152,774	$1,088,493	$64,281
AAD					$1,324,615	$1,309,368	$15,247

The cost of implementing Option FM05 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table N. 11 FM05: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	Net Present Value	Benefit Cost Ratio
FM05	$163,520	$0	$152,822	$210,424	$57,601	1.38

N.5.5 FM06A

Council has been undertaking a routine vegetation maintenance program at the Kahibah Creek system established following the *Kahibah Creek Floodplain Management Plan* (Willing & Partners, 1996) as well as development controls along the drainage reserves along the channels.

The Baseline model was modified to increase surface roughness along the creek riparian area, representing a scenario prior to when the routine maintenance started taking place. This option determines the viability of the current maintenance program by comparing the benefits it produces against the cost of its implementation.

The table below shows a comparison between the forecasted results of the vegetation maintenance program against the scenario where it is not implemented. The results show a marginal decrease in the AAD ($803).

Table N. 12 FM06A: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages
	Existing	FM06A	Existing	FM06A	Existing	FM06A	
1% AEP	36	36	239	243	$2,603,748	$2,613,625	$9,877
10% AEP	19	20	92	92	$1,459,712	$1,462,298	$2,586
20% AEP	16	16	73	73	$1,152,774	$1,153,091	$317
AAD					$1,324,615	$1,325,418	$803

The cost of implementing the vegetation maintenance program is compared against the reduction in AAD to provide a benefit cost ratio (see table below).

Table N. 13 FM06A: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	Net Present Value	Benefit Cost Ratio
FM06A	$0	$320,000	$4,416,239	$11,079	$4,405,160	0.00

N.5.6 FM08

Palmtree Grove Detention Basin stores flow from the upper catchment originating on the escarpment. It is registered as a declared dam and requires significant maintenance costs for Council. FM08 considers the impact on flood risk in case that the basin storage is reduced. To minimize the impact, alternative mitigation measures are proposed.

The table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show a minor increase in the AAD ($2,822). This is resulting from the behaviour of the dam producing additional flood flows towards properties in the 20% AEP, while in larger events, these flood levels are reduced because a greater proportion of flow is directed along Palmtree Grove.

Table N. 14 FM08: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages^
	Existing	FM08	Existing	FM08	Existing	FM08	
1% AEP	36	34	239	238	$2,603,748	$2,576,510	$27,238

10% AEP	19	19	92	92	$1,459,712	$1,453,449	$6,264
20% AEP	16	16	73	74	$1,152,774	$1,176,667	-$23,893
AAD					$1,324,615	$1,327,437	-$2,822

^ A negative reduction corresponds to an increase in flood damages

The cost of implementing Option FM08 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table N. 15 FM08: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	Net Present Value	Benefit Cost Ratio*
FM08	$295,400	-$30,000	-$137,948	-$38,943	$99,005	3.54

^ This BCR interprets the negative benefits as costs and negative costs as benefits.

N.5.7 FM10

FM10 considers increasing the capacity of the drainage at Neera Road and navigating more ponding water to the drainage system.

The Table below shows a comparison between the forecasted results of the mitigation option and the Base Case. The results show no significant reduction in the AAD ($25). There is also no change in the number of properties affected by over-floor and overground flooding as a result of implementing this mitigation option.

Table N. 16 FM10: Comparison with Existing Damages

	Properties with Over-Floor Flooding		Flood affected properties		Total Damages ($2021)		Reduction in Damages
	Existing	FM10	Existing	FM10	Existing	FM10	
1% AEP	36	36	239	239	$2,603,748	$2,603,248	$500
10% AEP	19	19	92	92	$1,459,712	$1,459,712	$0
20% AEP	16	16	73	73	$1,152,774	$1,152,774	$0
AAD					$1,324,615	$1,324,590	$25

The cost of implementing Option FM10 is compared against the reduction in AAD (compared to the existing case) to provide a benefit cost ratio (see Table below).

Table N. 17 FM10: Economic Results

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	Net Present Value	Benefit Cost Ratio
FM10	$138,880	$0	$129,794	$345	-$129,449	0.00

N.6 Results Summary: Economic Outcome of Options

The economic assessment considers the comparative costs and benefits of the proposed floodplain management options against the existing scenario (base case). The economic merit of the options was determined by comparing the present value (PV) of the change in AAD (compared with the base case) less the change in capital and maintenance costs.

The Table below and **Figure N. 3** summarises the results of the economic assessment of floodplain damages for the seven options, across a 50-year assessment period. A positive NPV and BCR greater than one support a claim for the program to be considered as economically feasible.

Table N. 18 Economic Summary of Floodplain Management Options

Option	Capital Cost	Recurrent Cost (Annual)	NPV of Costs	NPV of Reduction in AAD	Net Present Value	Benefit Cost Ratio
FM01	$1,708,840	$500	$1,603,947	$2,434	-$1,601,513	0.00
FM02	$653,100	$500	$617,274	$199,512	-$417,762	0.32
FM03	$144,200	$6,000	$217,571	$0	-$217,571	0.00
FM05	$163,520	$0	$152,822	$210,424	$57,601	1.38
FM06A	$0	$320,000	$4,416,239	$11,079	$4,405,160	0.00
FM08	$295,400	-$30,000	-$137,948	-$38,943	$99,005	3.54
FM10	$138,880	$0	$129,794	$345	-$129,449	0.00

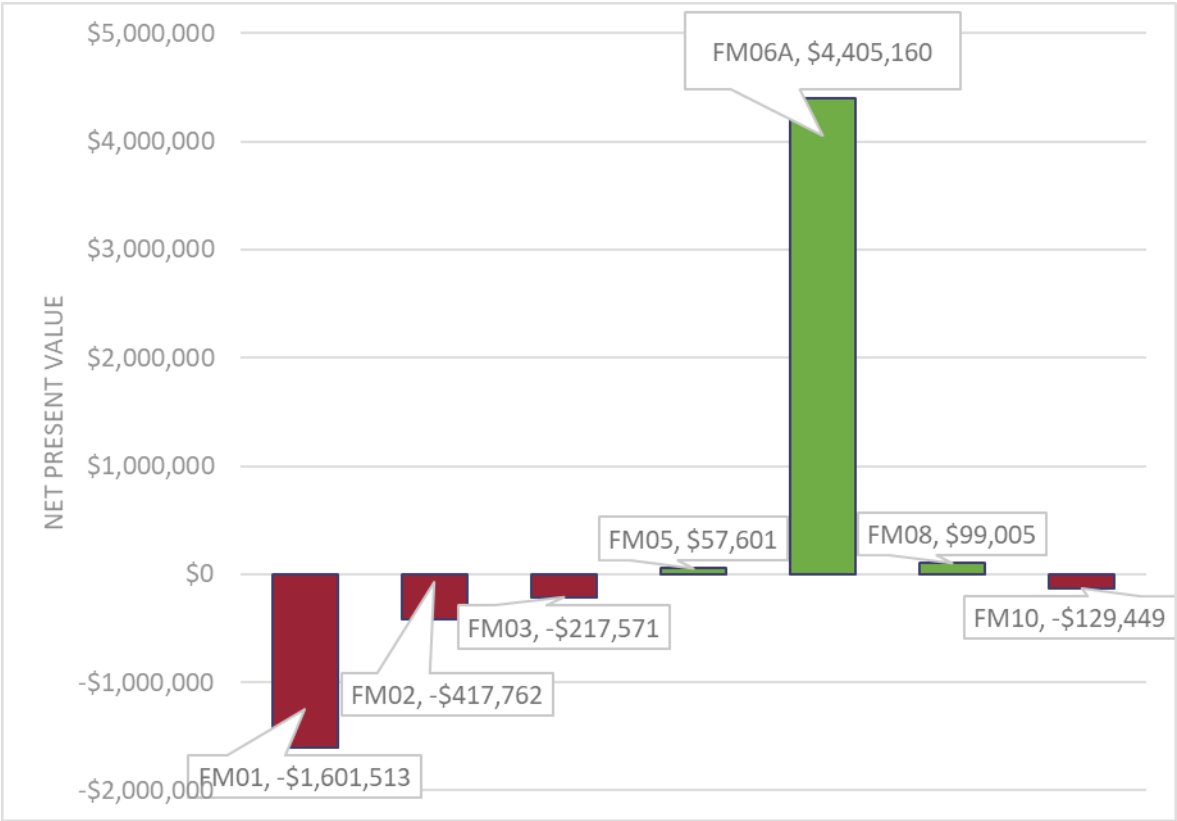

Figure N. 3 Net Present Value of Floodplain Management Options

The results show that FM05 and FM08 are the best performing options, with a BCR greater than 1. Both FM06A and FM08 result in increased flood damages to private properties.

APPENDIX O – Multi-Criteria Assessment Scoring Details

O Multi-Criteria Assessment Scoring Details

						Economic						Social					Environ -mental			
Option ID	Option Description	Capital Cost	Recurrent Cost	Reduction in AAD	BCR	Reduction in Flood Damages	Capital Cost	Operating and Maintenance Costs	Implementation Complexity	Staging of Works	Availability of Financial Assistance	Increased Community Flood Awareness	Reduction in Risk to Life	Emergency Access and Traffic Disruption	Compatible with Council's Plans and Policies	Likely Community Support	Flora/Fauna, Visual, Recreational Space, and Water Quality Impacts	Score	Overall Rank	Sub-Category Rank
					Criteria Weighting	*5*	*5*	*5*	*2*	*2*	*4*	*2*	*5*	*4*	*2*	*3*	*5*			
FM01	Woy Woy CBD drainage upgrades	$1,708,840	$ 500	$176	0.00	1	-3	-1	-2	2	1	0	0	1	-1	0	-1	-14.0	18	8
FM02	Dulkara Road to Karringal Close drainage upgrades	$ 653,100	$ 500	$14,457	0.32	1	-3	-1	-2	1	-1	0	1	1	1	0	-1	-15.0	19	9
FM03	Infiltration Devices	$ 144,200	$6,000	$138	N/A	1	-2	-2	2	2	-1	0	1	1	2	3	0	11.0	6	1
FM04	Groundwater pumping and Everglades drainage update work	$ -	$4,000	N/A	N/A	0	0	-1	2	0	-1	0	0	0	2	0	0	-1.0	11	3

Capital Works Rank

FM05	Greenhaven Drive drainage upgrades	$ 163,520	$ -	$15,247	1.38	1	-1	0	-2	1	-1	0	1	1	1	0	-1	0.0	10	2	
FM06A	Kahibah Creek system maintenance	$ -	$ 320,000	$ 803	0.00	-1	0	-3	0	2	-1	2	0	1	2	-2	-2	-24.0	20	10	
FM06B	Increase Kahibah Creek system maintenance	$ 300,000	$ 200,000	N/A	N/A	1	0	-3	-2	2	-1	2	0	0	0	1	0	-7.0	15	6	
FM08	Palmtree Grove detention basin reduced capacity	$ 295,400	-$30,000	-$ 2,822	3.54	-1	-2	2	-2	1	-1	0	1	1	1	-1	0	-3.0	12	4	
FM09	Wilks Avenue and McManus Close drainage upgrades	$96,320	$ -	N/A	N/A	0	-2	0	-2	1	-1	0	1	1	1	0	-1	-10.0	16	7	
FM10	Neera Road drainage upgrades	$138,880	$ -	$25	0.00	1	-2	0	-1	1	-1	0	1	1	1	0	-1	-3.0	12	4	
PM03	Voluntary House Raising	$100,000 each	$ -	$10 - $20k each	0.01	3	-3	0	-3	-1	-1	0	3	0	0	0	0	3.0	9	8	Planning Measures Rank
PM04	Property Flood Risk Education Program	$ -	$2,000	N/A	N/A	0	-1	0	3	0	-1	2	0	0	2	0	0	5.0	7	6	
PM05	Property Management Education Program	$80,000	$5,000	N/A	N/A	1	-2	-2	3	0	-1	2	0	0	1	2	1	4.0	8	7	
PM06	Reduced Level of Drainage Service	$20,000	N/A	N/A	N/A	0	-1	2	3	2	-1	0	0	0	0	-1	1	13.0	3	3	
PM07	Landform Adaptation	$2.0M to $49.6M	$ -	$1,000 to $10,000 per property	0.2 to 0.8	3	-3	2	-3	2	2	0	3	3	2	2	0	53.0	1	1	
EM01	Review of Evacuation Centre Locations	$10,000	$ -	N/A	N/A	0	-1	0	2	0	-1	0	2	0	1	0	1	12.0	5	5	

EM02A EM02B	Access Improvements During Flooding	$1.6M - 1% AEP $12.2M - PMF	$ -	N/A	N/A	0	-3	0	-3	1	-1	0	0	2	1	0	0	-13.0	17	10	
EM03	Flood Warning System	$50,000	$ 10,000	NA	NA	0	-2	-2	1	1	-1	0	2	0	1	1	0	-5.0	14	9	
EM04	Flood Warning Signs	$5,000	$ -	NA	NA	0	-1	-1	3	2	-1	3	2	0	1	0	0	14.0	2	2	
EM05	Flood Education Programs	$10,000	$4,500	NA	NA	0	-1	-1	3	0	-1	3	2	0	1	1	0	13.0	3	3	
PM02	Voluntary House Purchase	Not considered																			