



NORTHERN LAKES FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN PLAN IN RESPONSE TO OVERLAND FLOODING – VOLUME 2 OF 2 – APPENDICES PART 3 OF 3

Report MHL2571
September 2021

Prepared for:



Cover Photograph: Photograph of road flooding at San Remo in December 2011 provided by F. Blume

MHL2571

Appendix I – Damage assessment results

- Figure I.1 Flood Damages 20% AEP Event
- Figure I.2 Flood Damages 5% AEP Event
- Figure I.3 Flood Damages 1% AEP Event
- Figure I.4 Flood Damages PMF Event
- Figure I.5 Flood Damages Annual Average Damages



N

Figure I.1

**Flood Damages
20% AEP Event**

Legend

- Study area
- Residential Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 110000
- 110000 - 120000
- >120000
- Commercial Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 250000
- 250000 - 500000
- > 500000

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0 1,000 2,000 3,000 4,000 m



Figure I.2

Flood Damages 5% AEP Event

Legend

- Study area
- Residential Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 110000
- 110000 - 120000
- >120000

- Commercial Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 250000
- 250000 - 500000
- > 500000

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0 1,000 2,000 3,000 4,000 m





Figure I.3

**Flood Damages
1% AEP Event**

Legend

- Study area
- Residential Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 110000
- 110000 - 120000
- >120000
- Commercial Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 250000
- 250000 - 500000
- > 500000

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0 1,000 2,000 3,000 4,000 m



Figure I.4
Flood Damages
PMF Event

Legend

- Study area
- Residential Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 110000
- 110000 - 120000
- >120000
- Commercial Damages (\$)**
- < 1000
- 1000 - 10000
- 10000 - 20000
- 20000 - 30000
- 30000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 70000
- 70000 - 80000
- 80000 - 90000
- 90000 - 100000
- 100000 - 250000
- 250000 - 500000
- > 500000

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Figure I.5
Flood Damages
Annual Average
Damages

Legend

- Study area
- Residential AAD (\$)**
- 0 - 100
- 100 - 1000
- 1000 - 2000
- 2000 - 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- 6000 - 7000
- 7000 - 8000
- 8000 - 9000
- 9000 - 10000
- 10000 - 25000
- 25000 - 50000
- >50000

- Commercial AAD (\$)**
- < 1000
- 100 - 1000
- 1000 - 2000
- 2000 - 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- 6000 - 7000
- 7000 - 8000
- 8000 - 9000
- 9000 - 10000
- 10000 - 25000
- 25000 - 50000
- > 50000

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Appendix J – Pipe capacity

- Figure J.1 20% AEP Pipe Capacity
- Figure J.2 5% AEP Pipe Capacity
- Figure J.3 1% AEP Pipe Capacity
- Figure J.4 Probable Maximum Flood Pipe Capacity



Figure J1.1

**20% AEP
Pipe capacity**

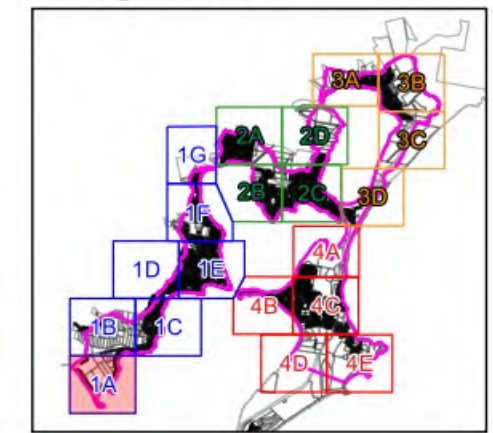
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1A



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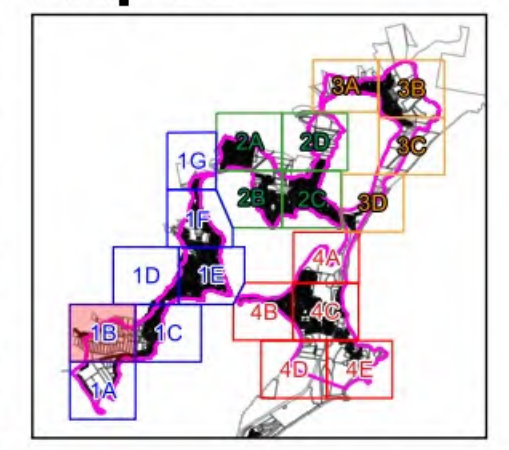
Figure J1.2

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1B



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Figure J1.3

**20% AEP
Pipe capacity**

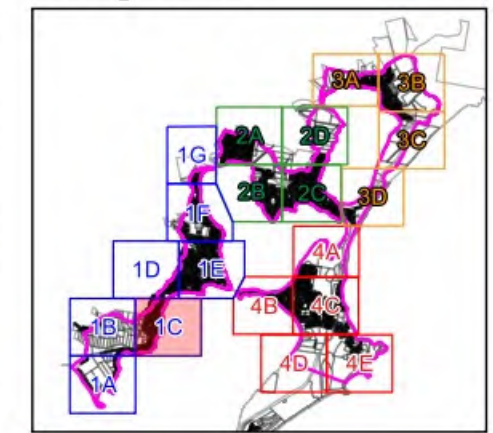
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1C



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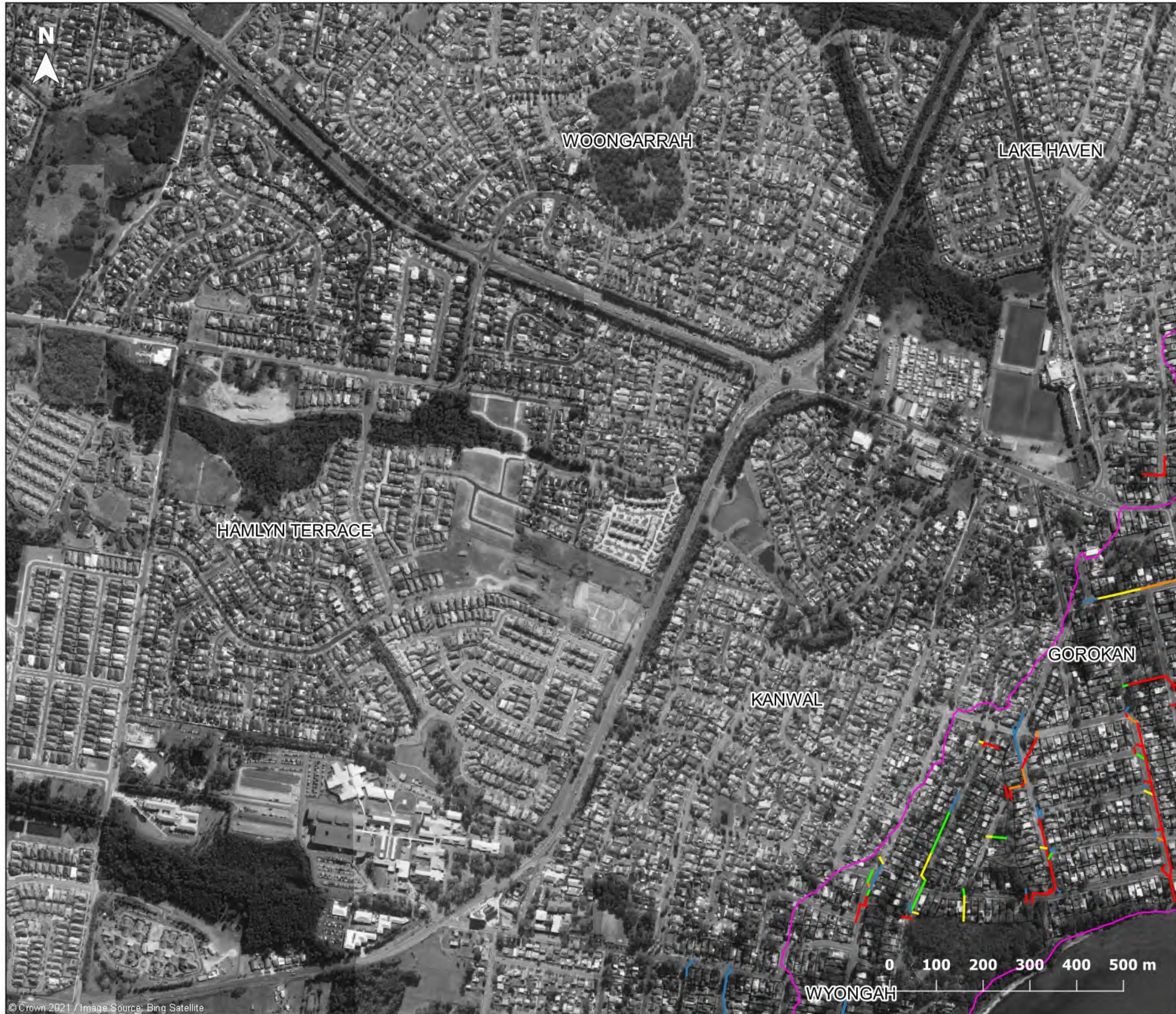


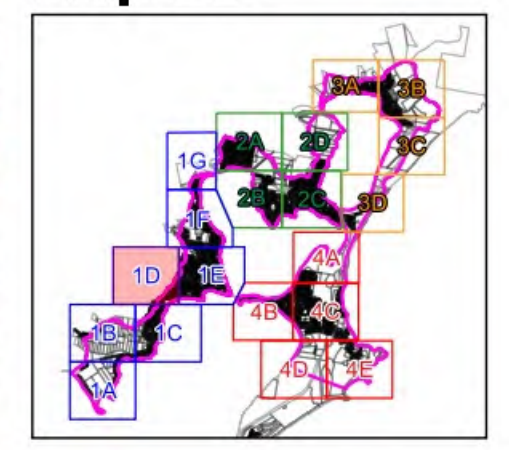
Figure J1.4

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1D



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Figure J1.5

**20% AEP
Pipe capacity**

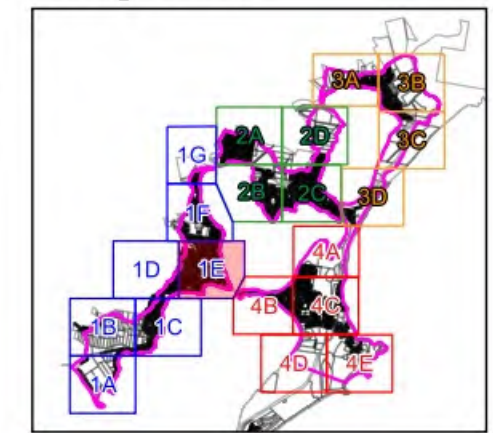
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1E



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Figure J1.6

**20% AEP
Pipe capacity**

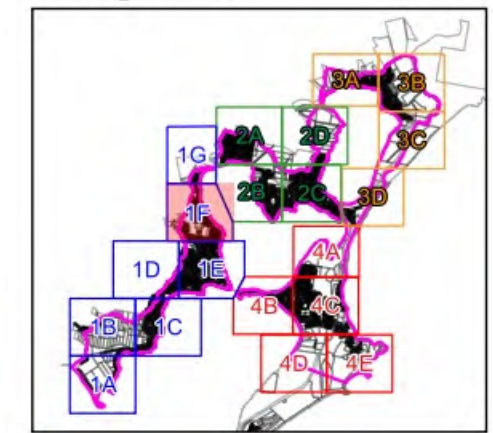
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1F



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Figure J1.7

**20% AEP
Pipe capacity**

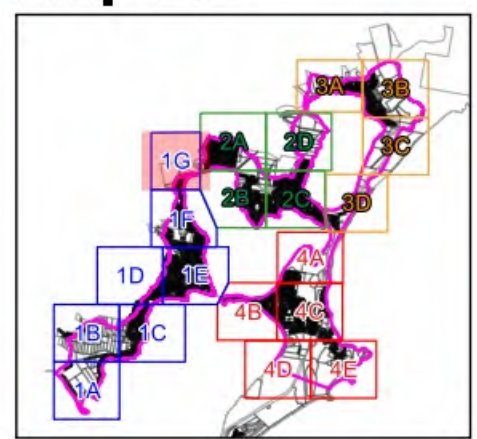
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1G



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Figure J1.8

**20% AEP
Pipe capacity**

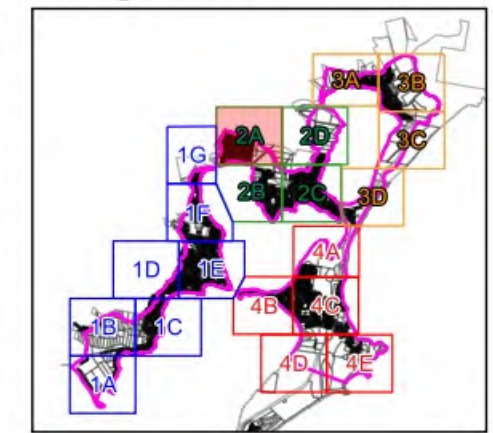
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 2A



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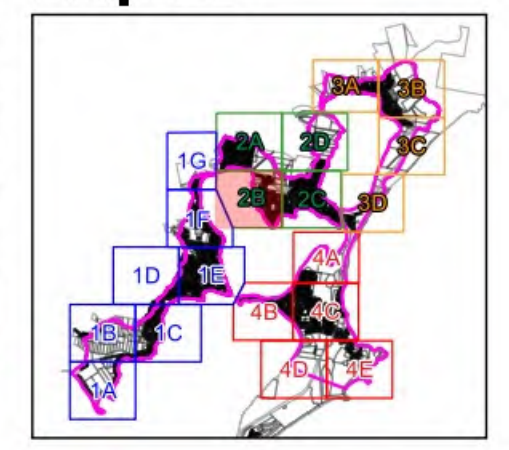
Figure J1.9

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2B



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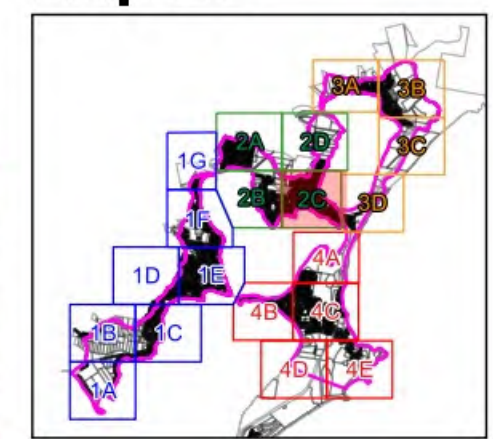
Figure J1.10

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2C



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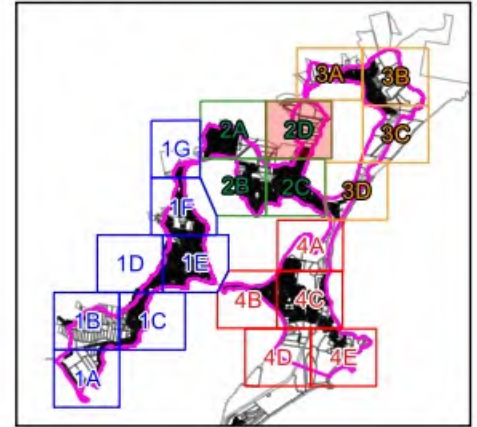
Figure J1.11

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2D



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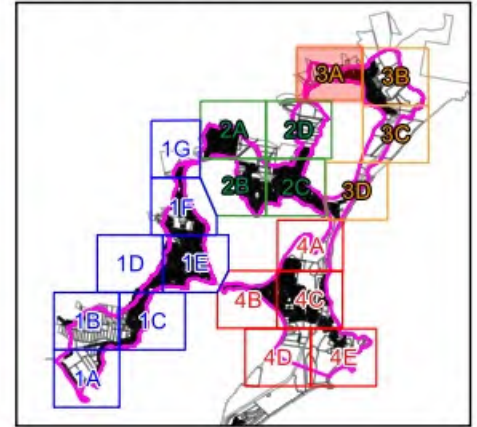
Figure J1.12

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3A



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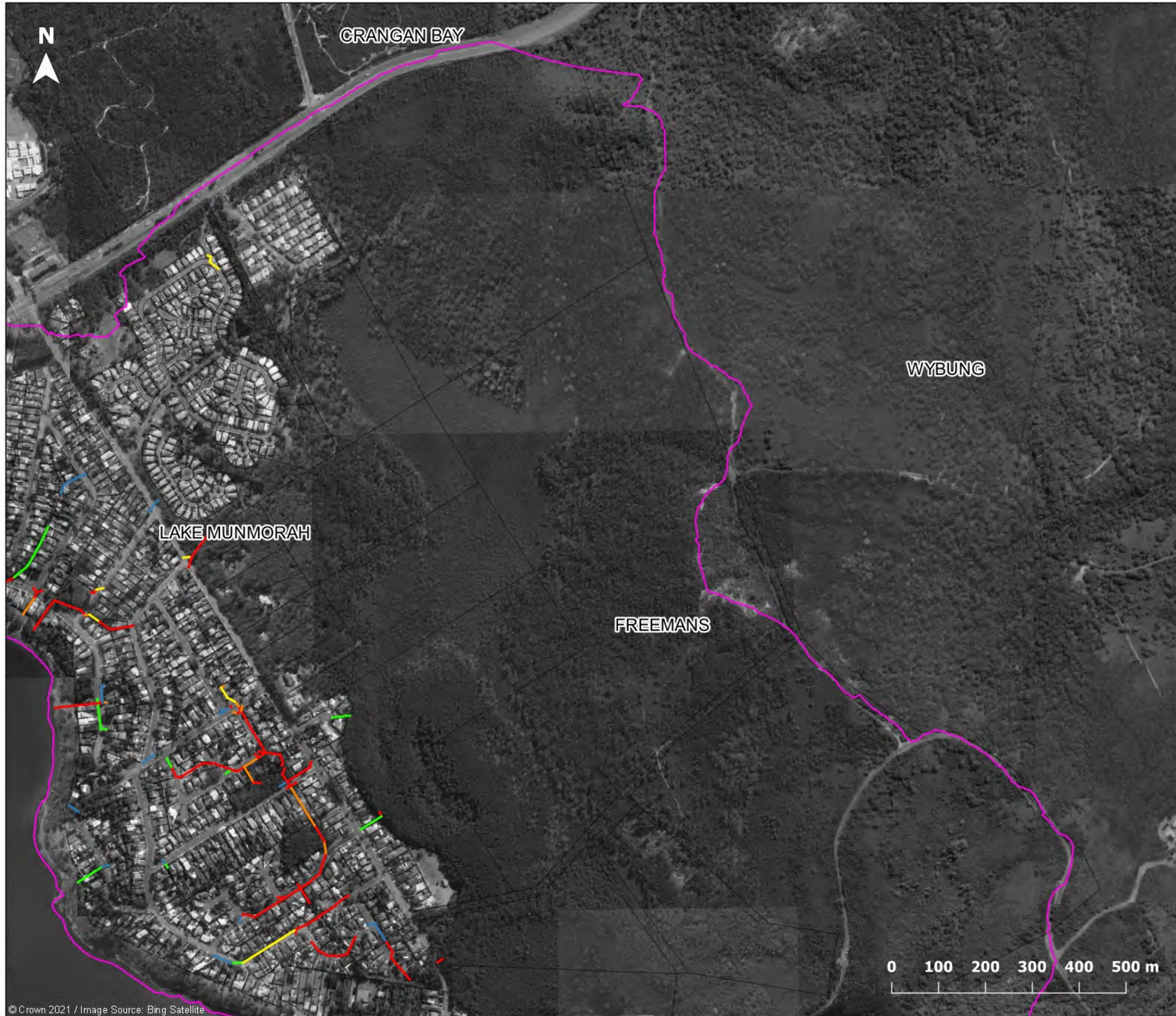


Figure J1.13

**20% AEP
Pipe capacity**

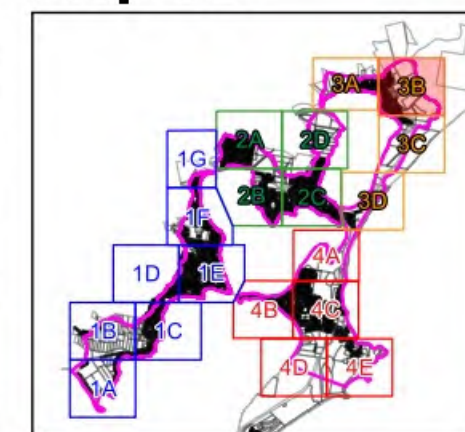
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 3B



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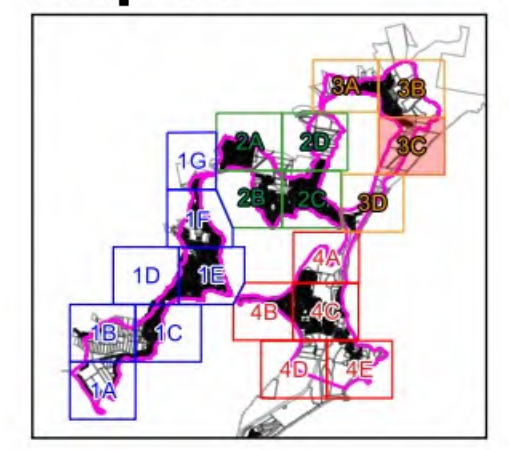
Figure J1.14

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3C



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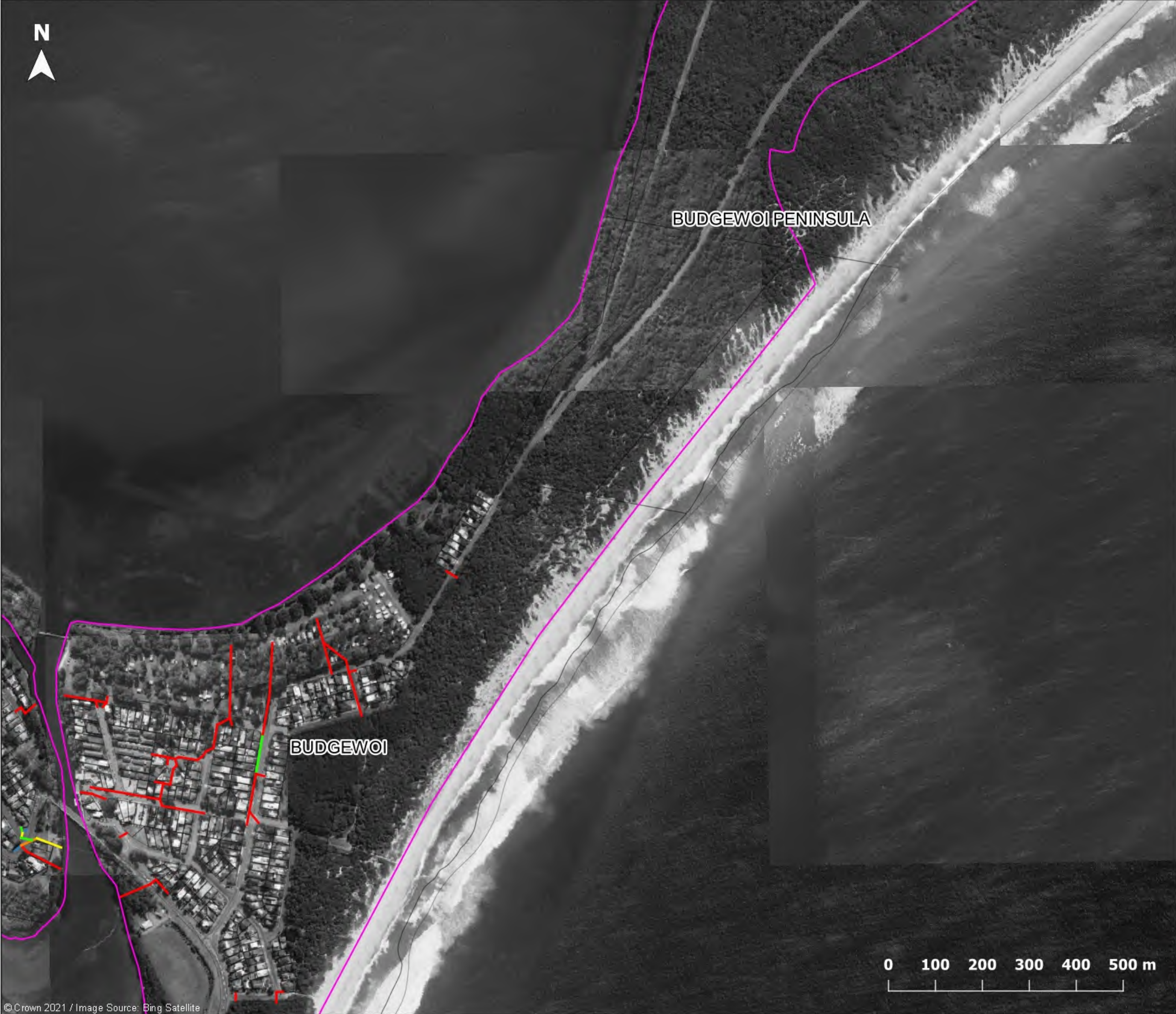









Figure J1.15

**20% AEP
Pipe capacity**

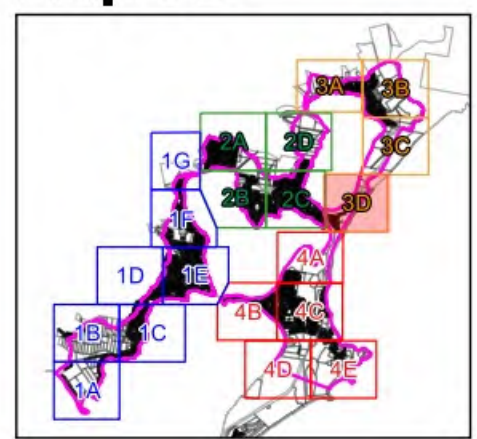
Legend

-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%

Map 3D



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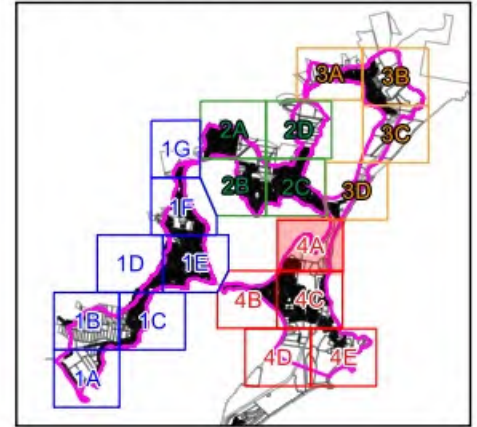
Figure J1.16

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4A



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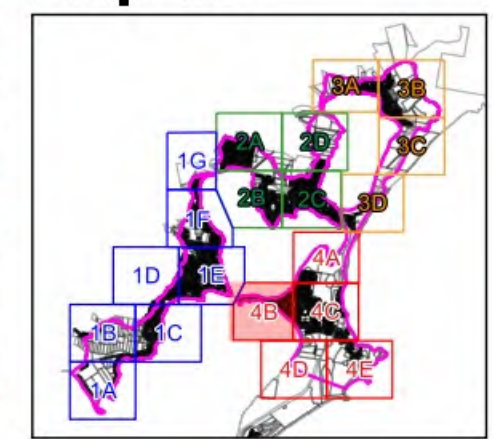
Figure J1.17

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4B



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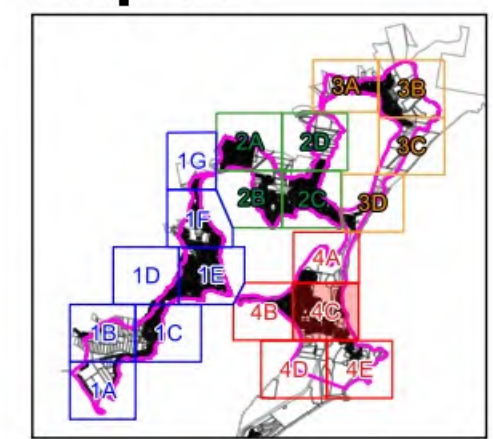
Figure J1.18

**20% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4C



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Figure J1.19

**20% AEP
Pipe capacity**

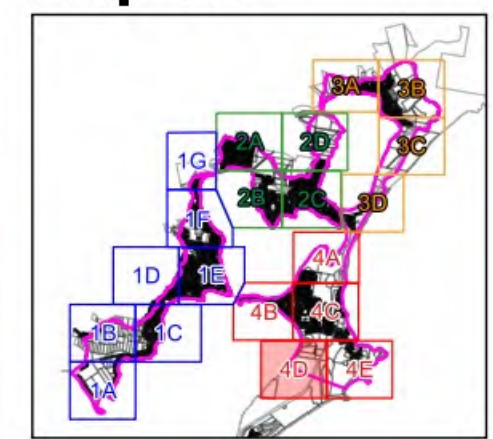
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4D



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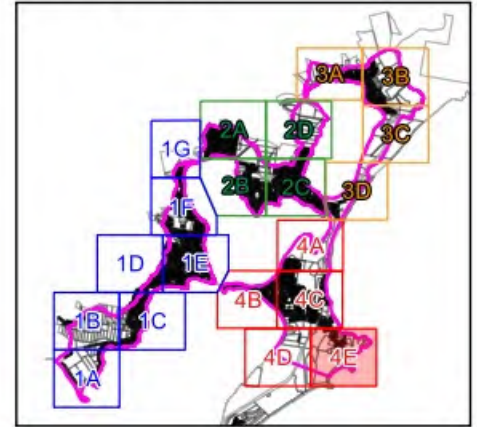
Figure J1.20

**20% AEP
Pipe capacity**

- Legend**
- ▭ Catchment area
 - ▭ Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4E



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Figure J2.1

**5% AEP
Pipe capacity**

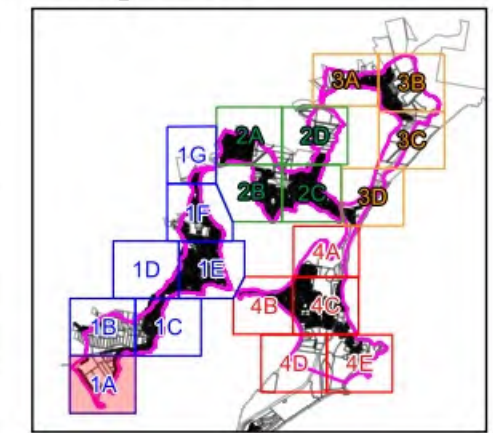
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1A



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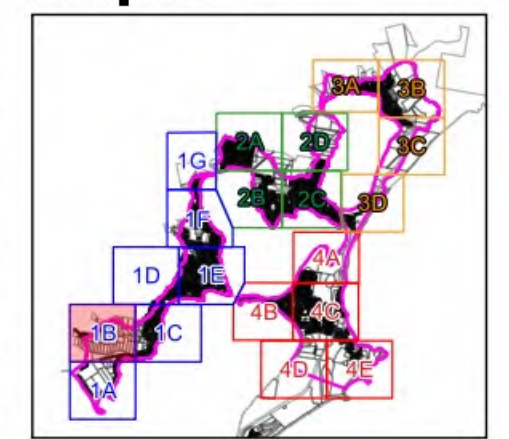
Figure J2.2

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1B



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Figure J2.3

**5% AEP
Pipe capacity**

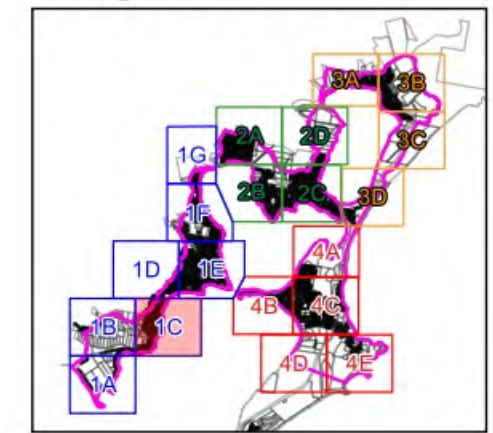
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1C



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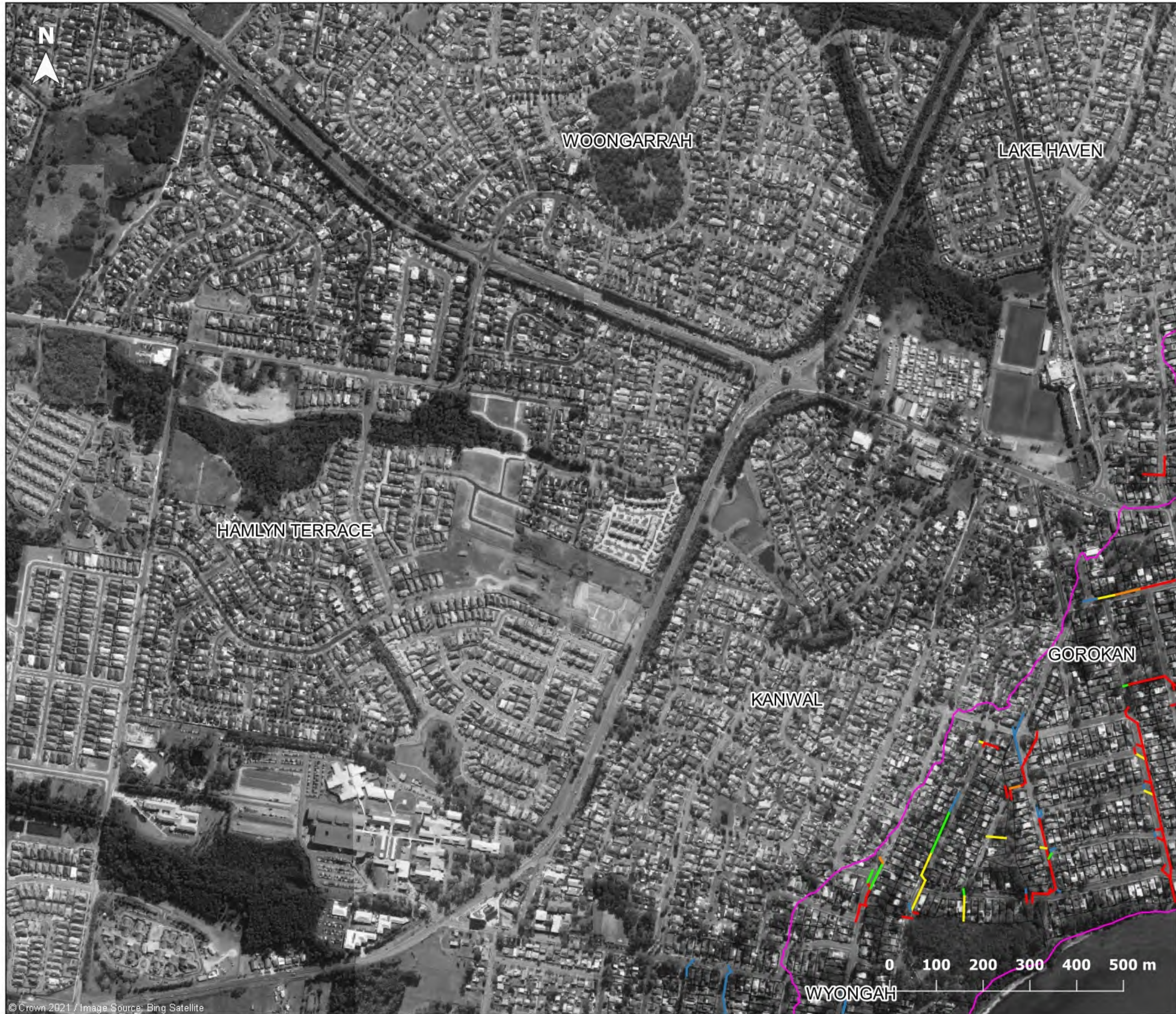


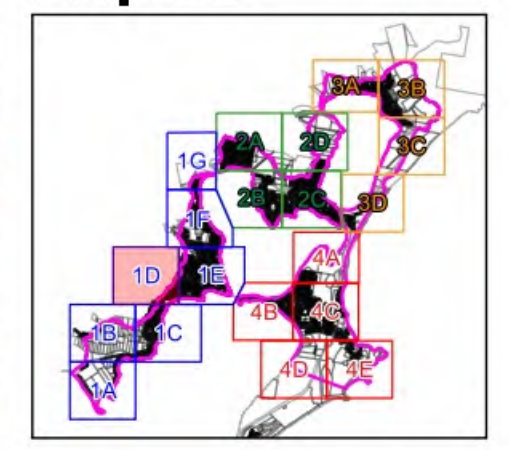
Figure J2.4

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1D





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Figure J2.5

**5% AEP
Pipe capacity**

Legend

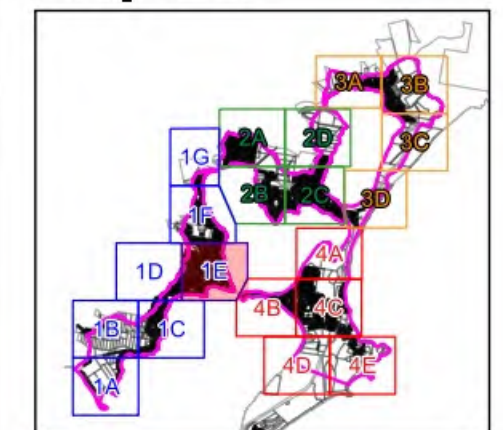
-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%



Map 1E



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Figure J2.6

**5% AEP
Pipe capacity**

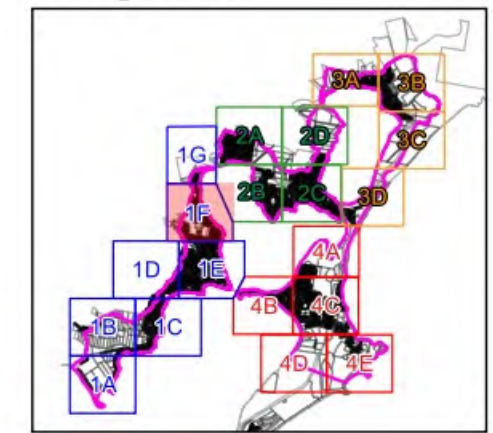
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1F



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BLUE HAVEN

SAN REMO

CHARMHAVEN

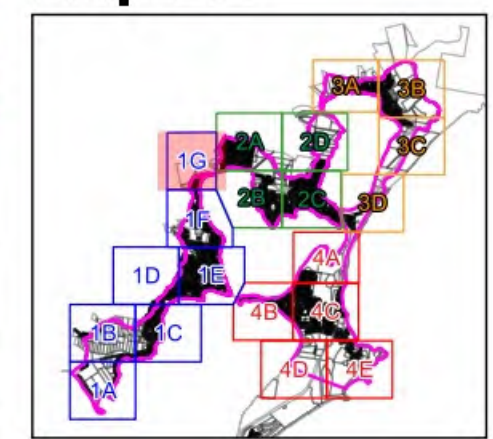
Figure J2.7

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1G



0 100 200 300 400 500 m

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Figure J2.8

**5% AEP
Pipe capacity**

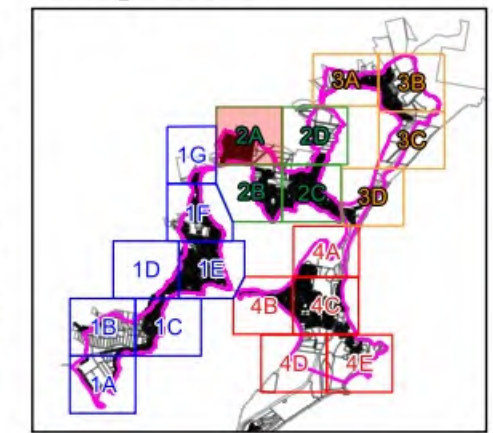
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 2A



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CHARMHAVEN

Figure J2.9

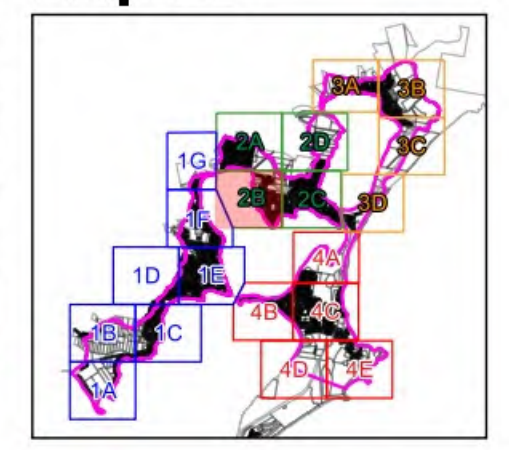
5% AEP Pipe capacity

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%



Map 2B



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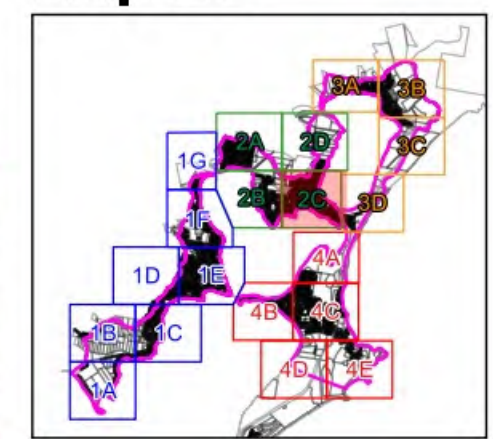
Figure J2.10

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2C



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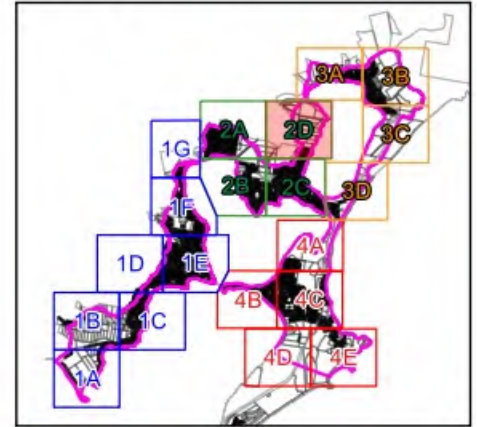
Figure J2.11

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2D



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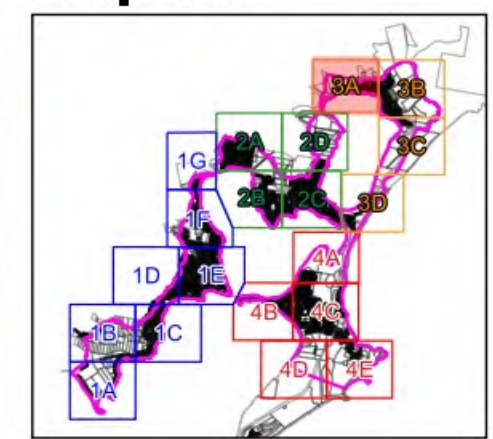
Figure J2.12

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3A



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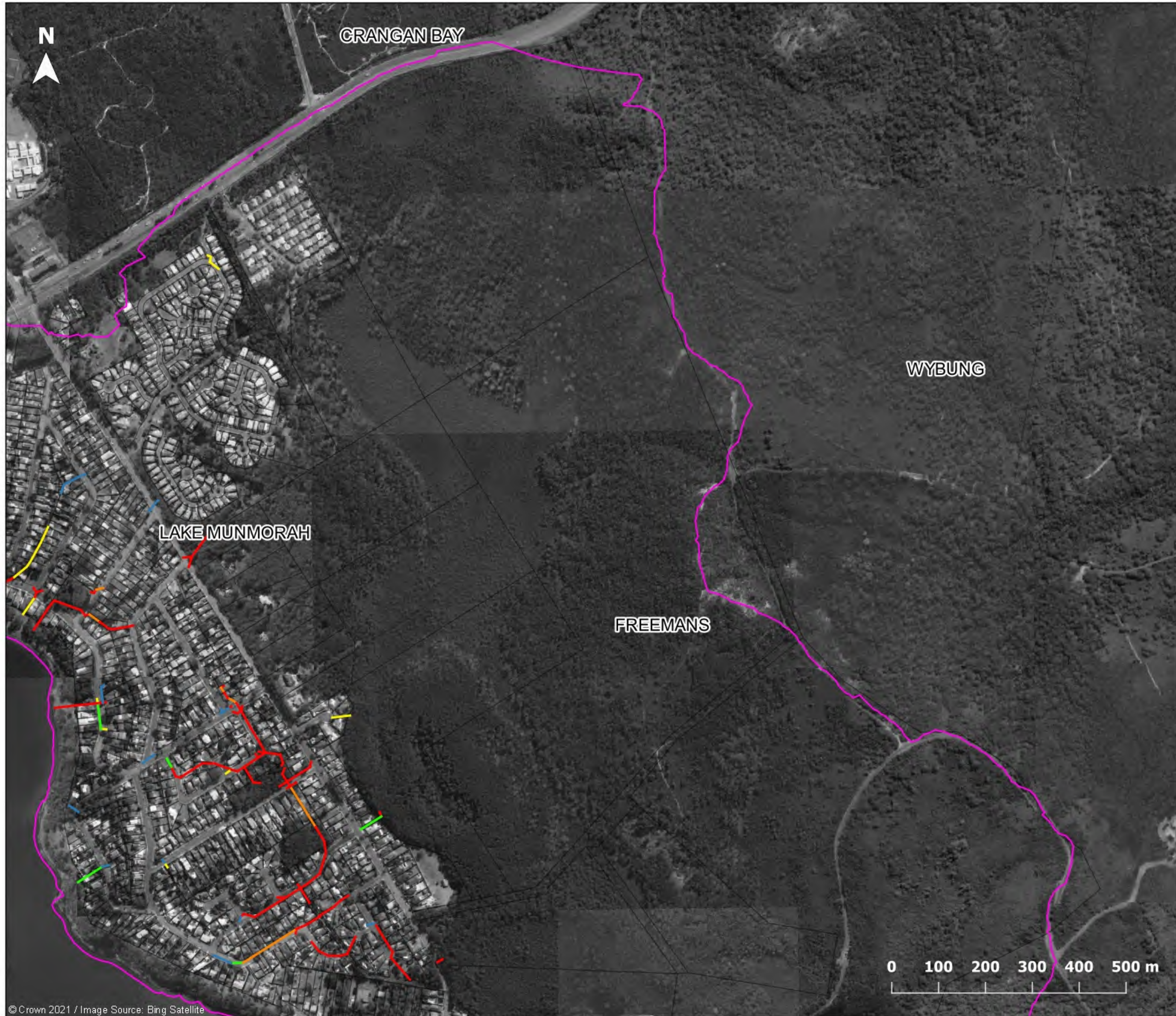


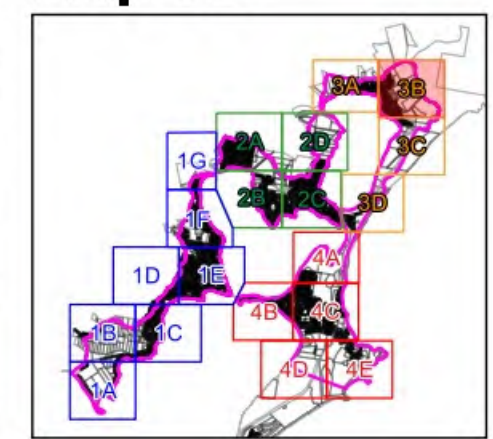
Figure J2.13

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3B



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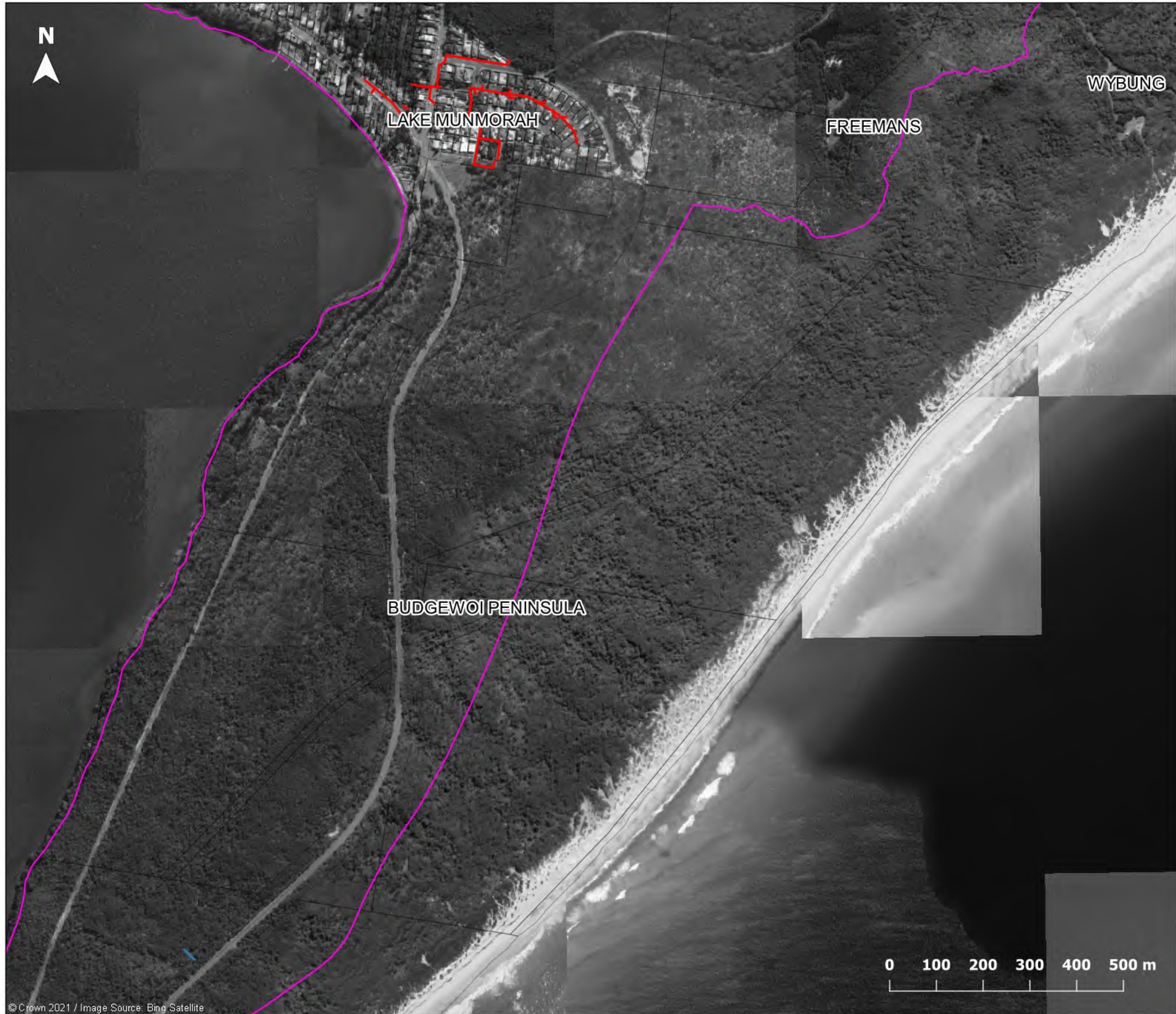


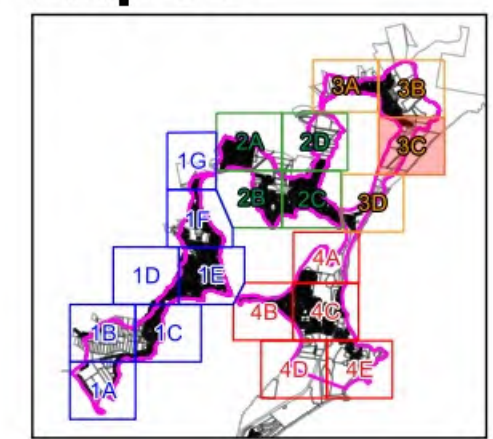
Figure J2.14

5% AEP
Pipe capacity

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3C



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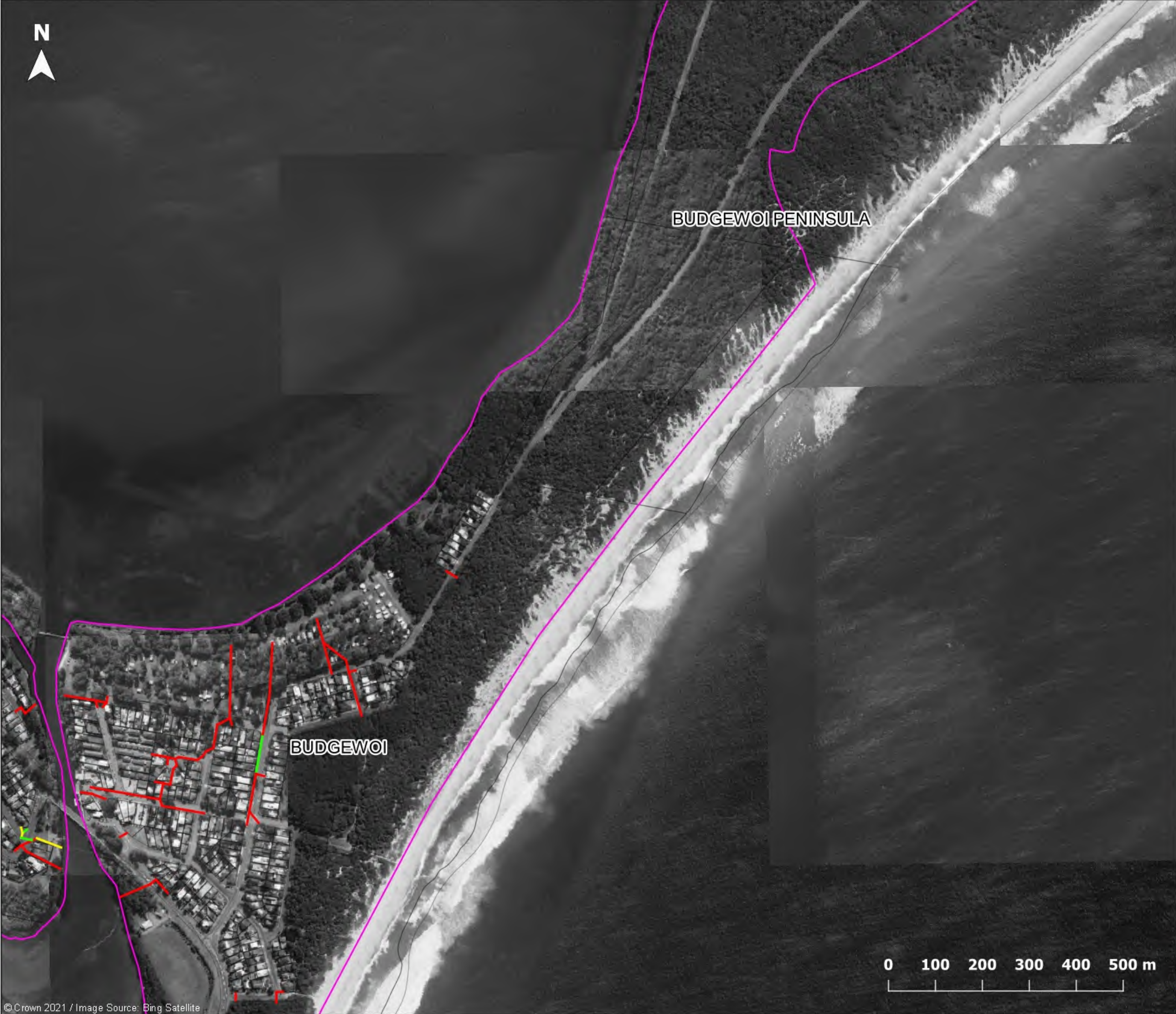


Figure J2.15

**5% AEP
Pipe capacity**

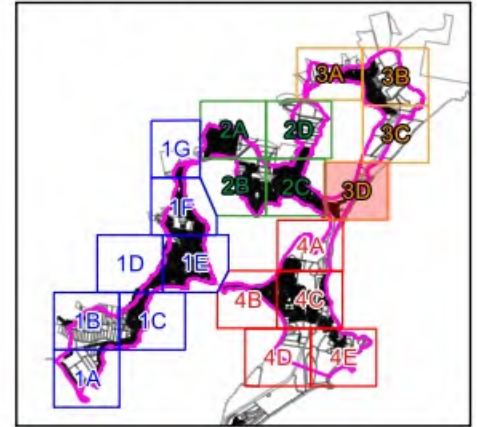
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 3D



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Figure J2.16

**5% AEP
Pipe capacity**

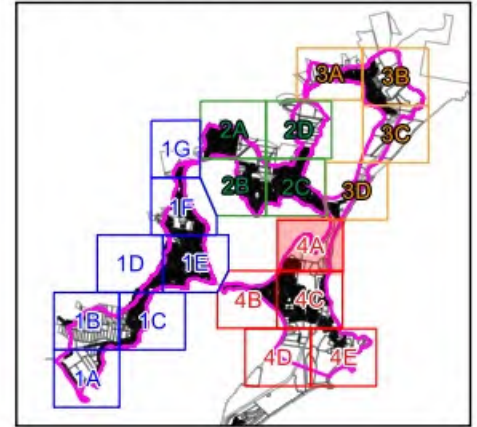
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4A



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Figure J2.17

**5% AEP
Pipe capacity**

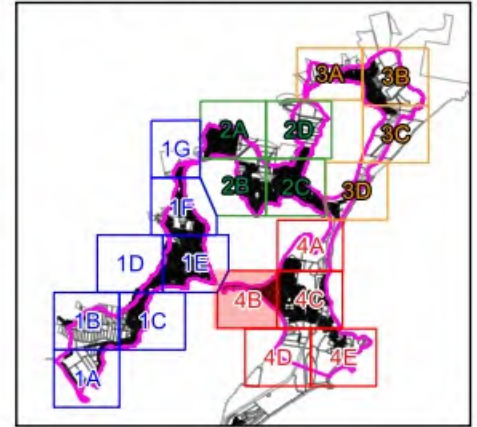
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4B



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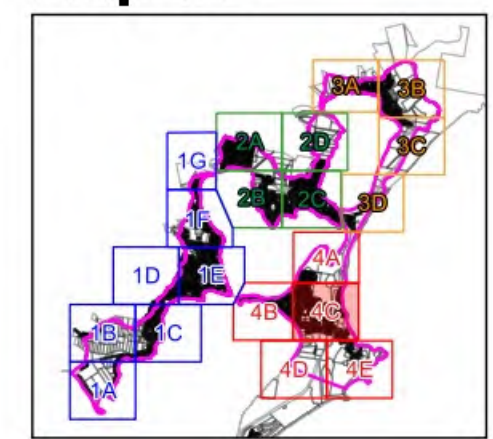
Figure J2.18

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4C



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Figure J2.19

**5% AEP
Pipe capacity**

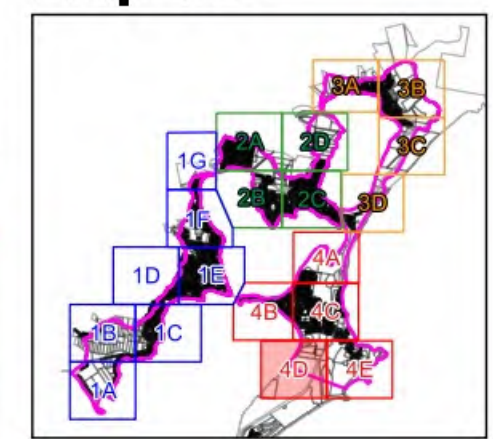
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4D



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0 100 200 300 400 500 m





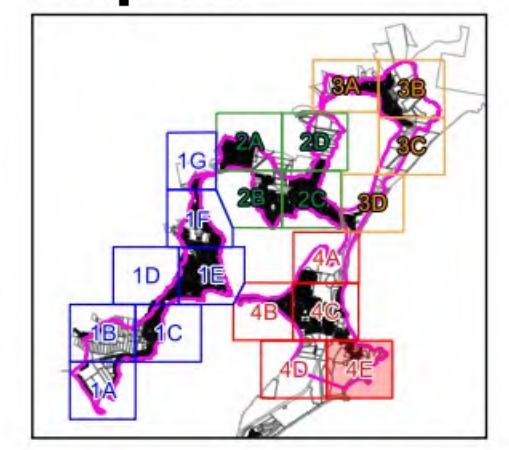
Figure J2.20

**5% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4E



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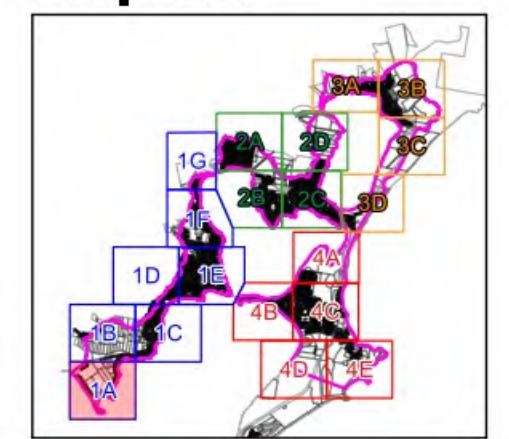
Figure J3.1

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1A



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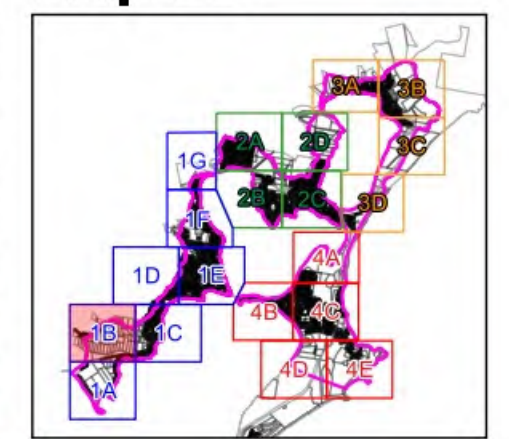
Figure J3.2

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1B





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Figure J3.3

**1% AEP
Pipe capacity**

Legend

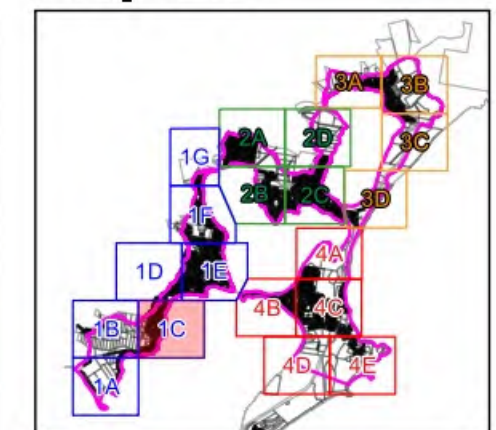
-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%



Map 1C



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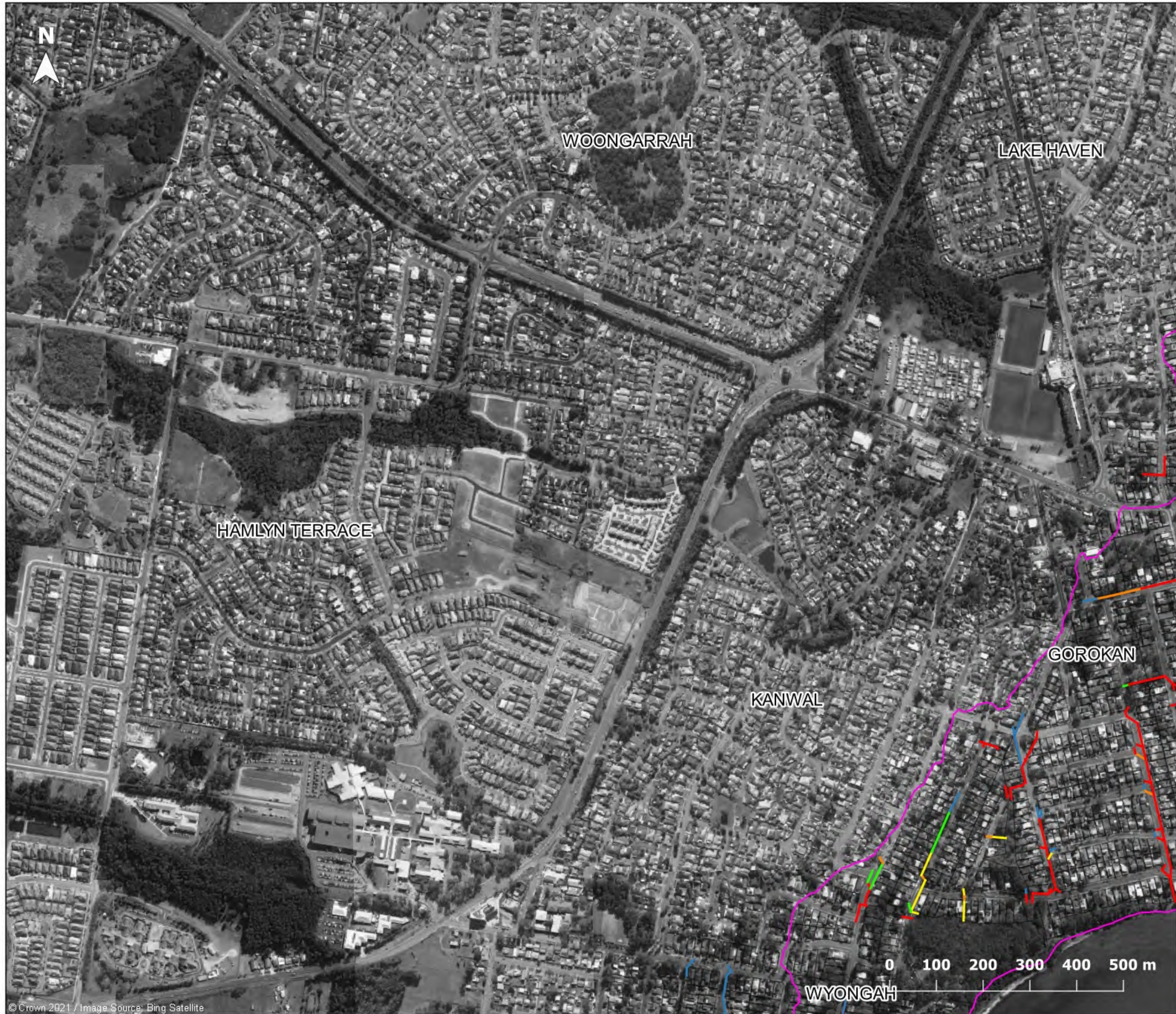


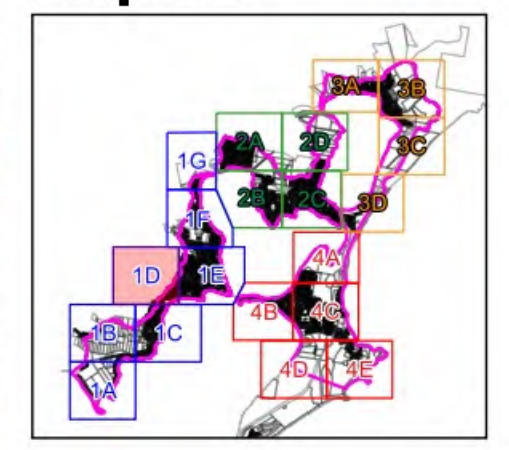
Figure J3.4

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1D





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Figure J3.5

**1% AEP
Pipe capacity**

Legend

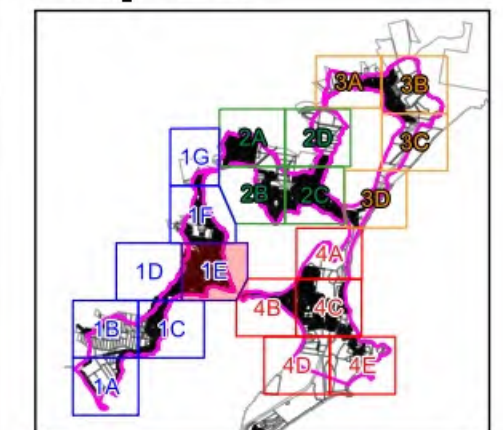
-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%



Map 1E



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Figure J3.6

**1% AEP
Pipe capacity**

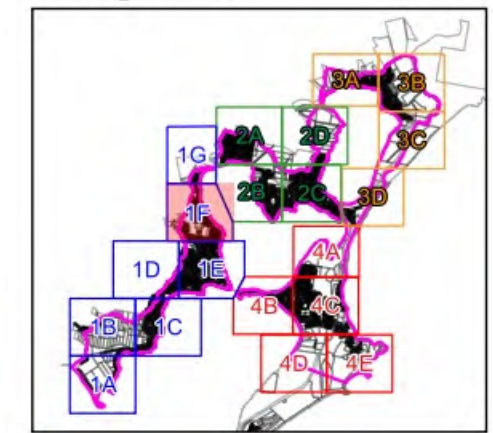
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1F



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Figure J3.7

**1% AEP
Pipe capacity**

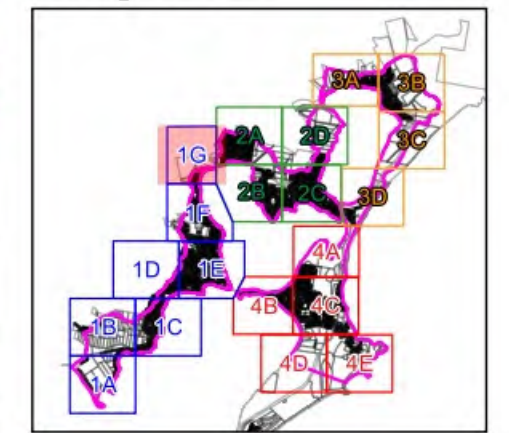
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1G



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Figure J3.8

**1% AEP
Pipe capacity**

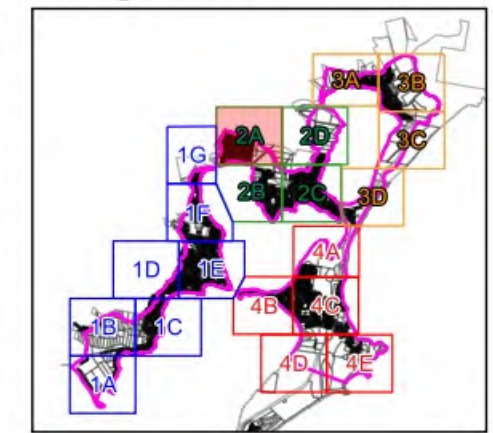
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 2A



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SAN REMO
CHARMHAVEN



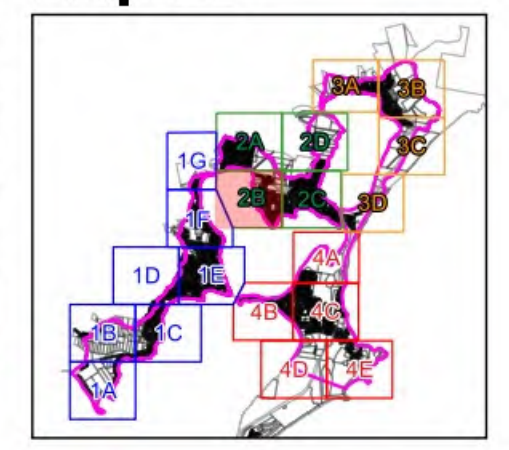
Figure J3.9

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2B



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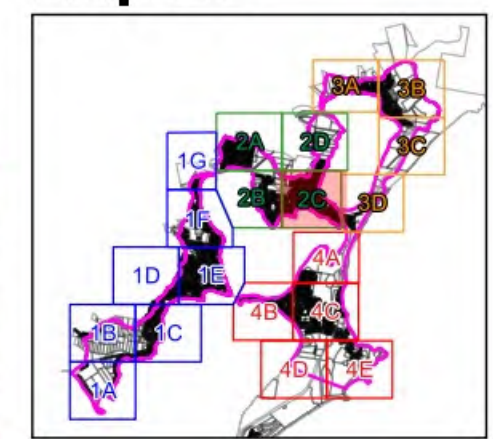
Figure J3.10

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2C



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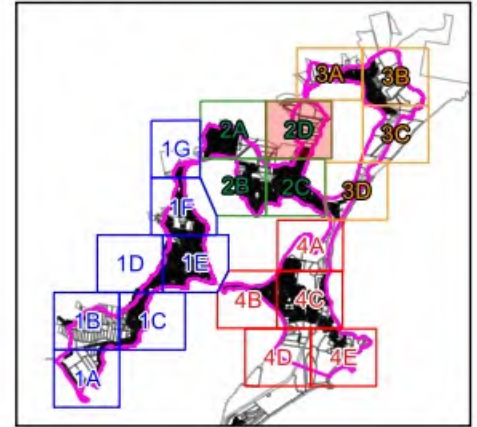
Figure J3.11

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2D



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DOYALSON NORTH

LAKE MUNMORAH

COLONGRA

Figure J3.12

**1% AEP
Pipe capacity**

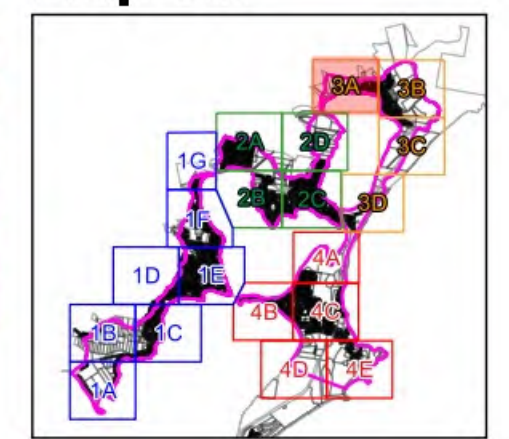
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 3A



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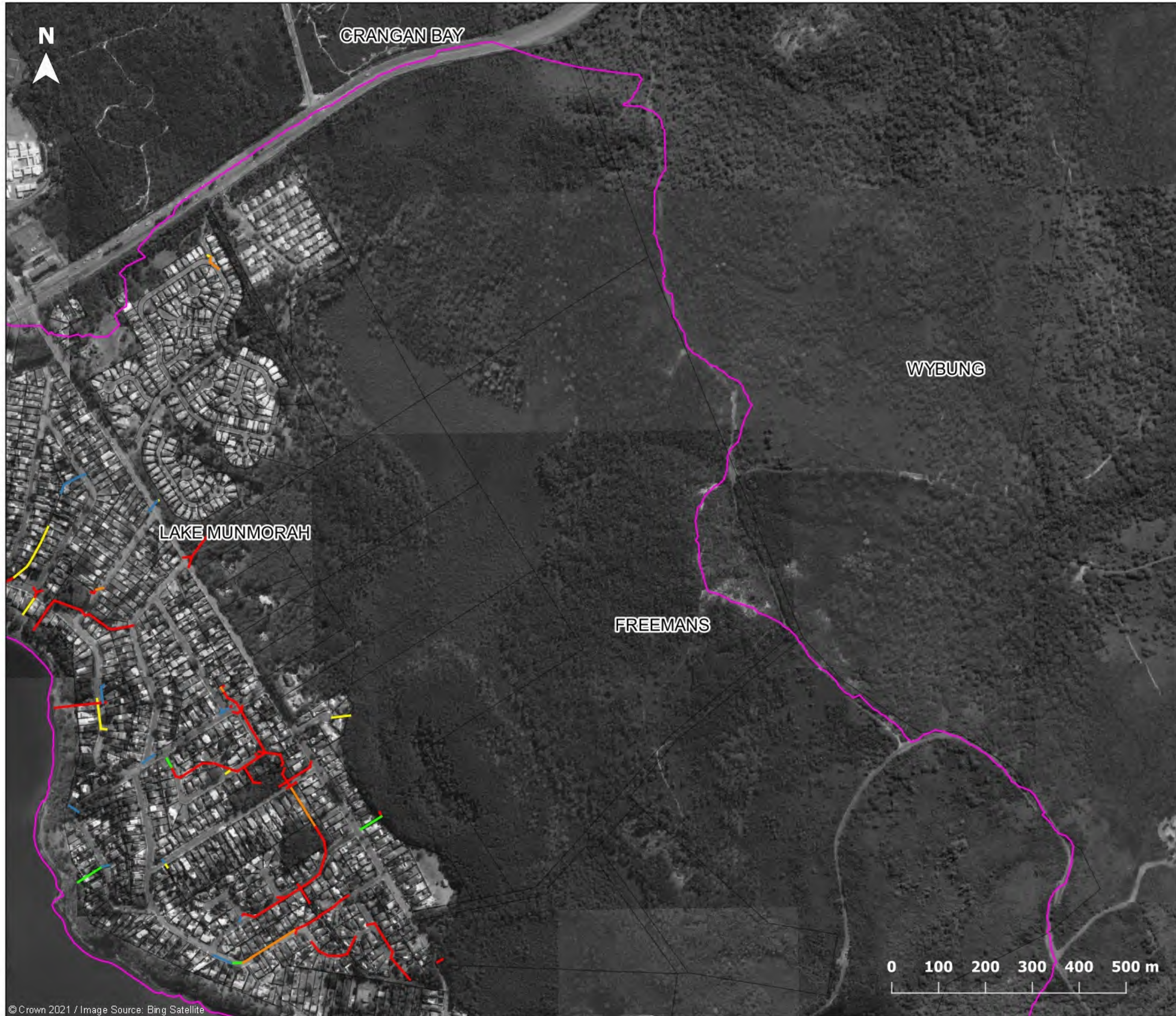


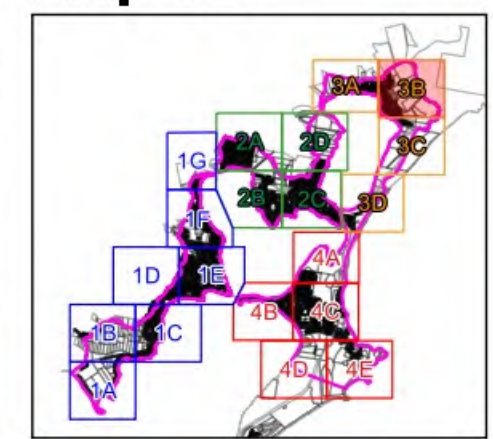
Figure J3.13

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3B



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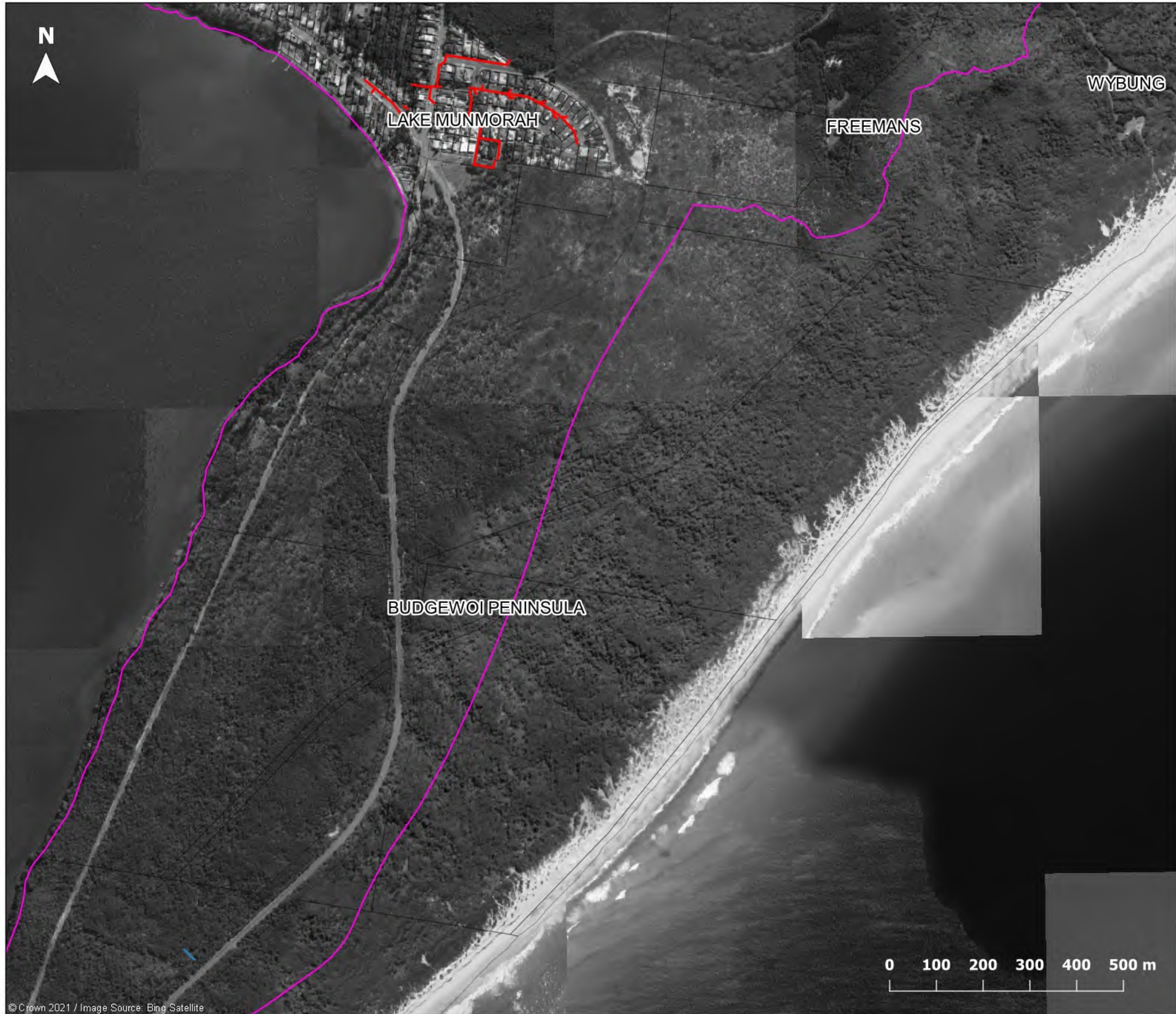


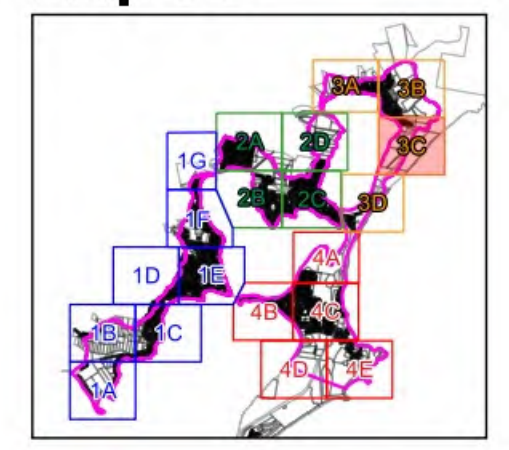
Figure J3.14

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 3C



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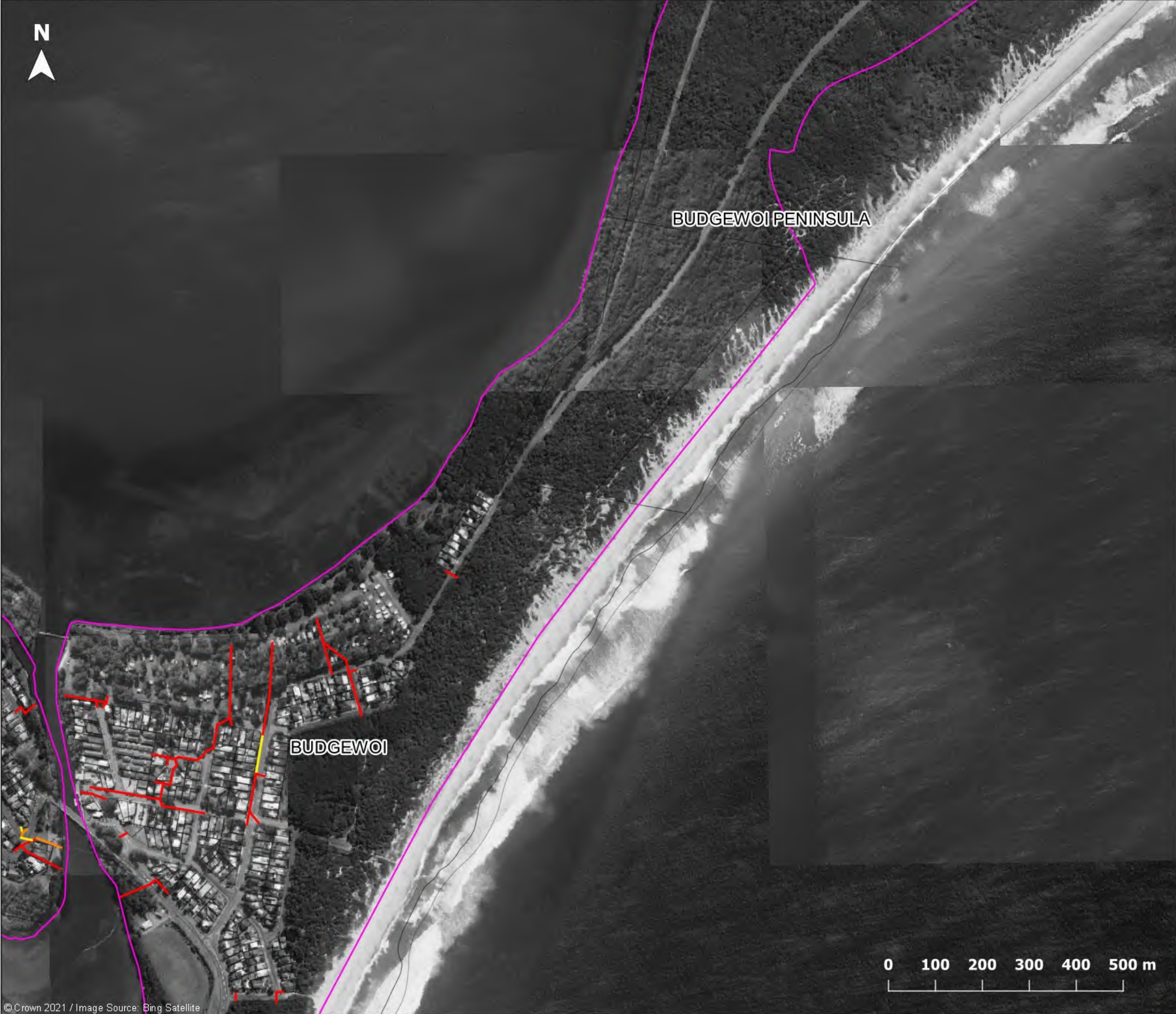









Figure J3.15

**1% AEP
Pipe capacity**

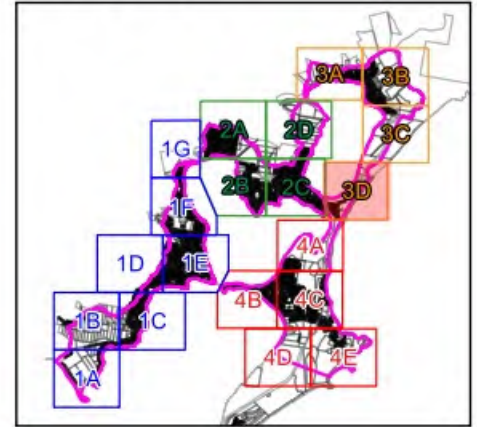
Legend

-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%

Map 3D



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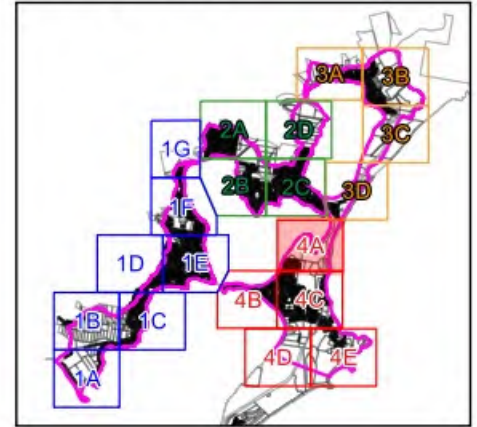
Figure J3.16

**1% AEP
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4A



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Figure J3.17

**1% AEP
Pipe capacity**

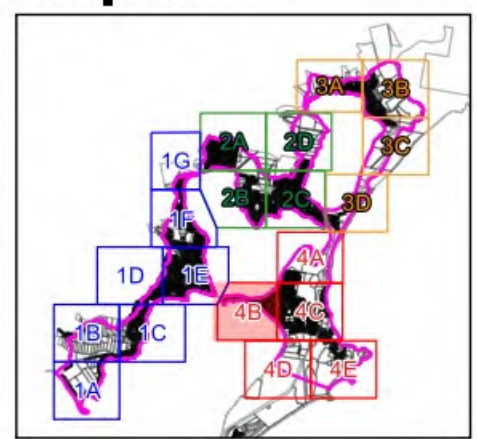
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4B



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Figure J3.18

**1% AEP
Pipe capacity**

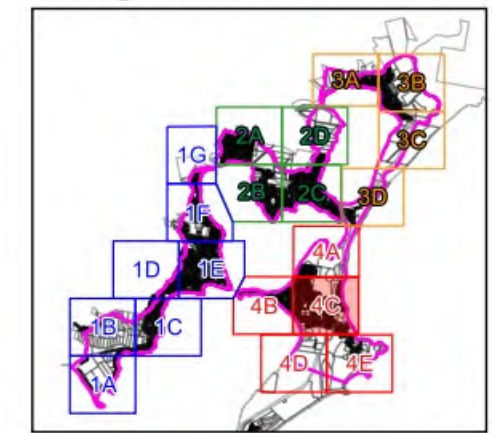
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4C



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Figure J3.19

**1% AEP
Pipe capacity**

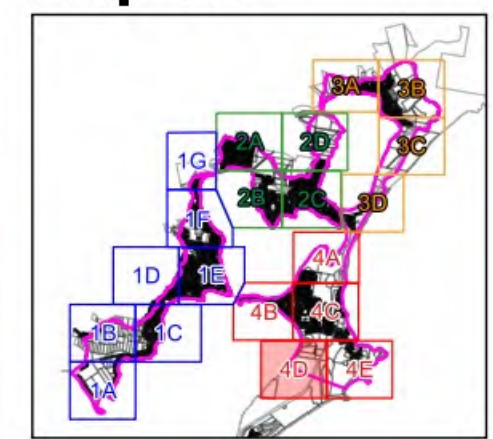
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4D



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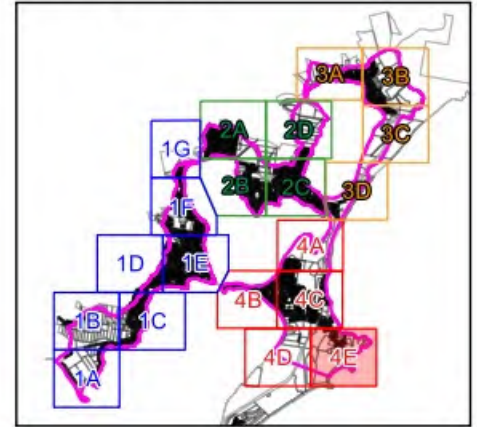
Figure J3.20

**1% AEP
Pipe capacity**

- Legend**
- ▭ Catchment area
 - ▭ Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4E



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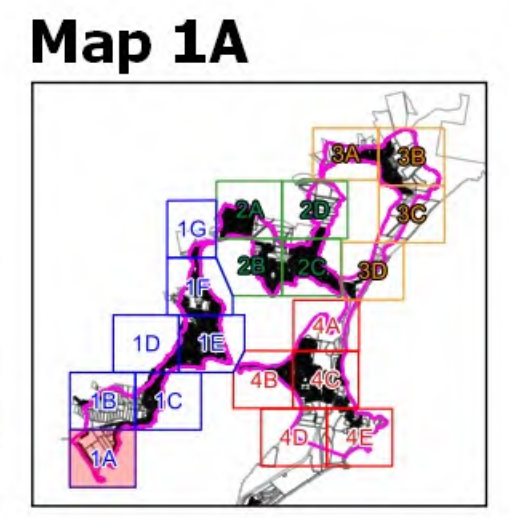
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Figure J4.1
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%



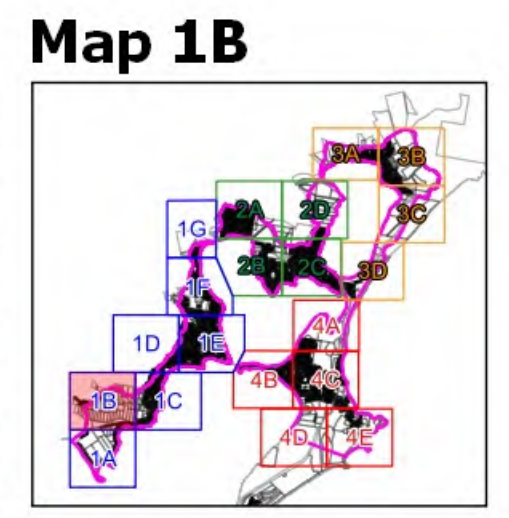
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Figure J4.2
Probable Maximum Flood
Pipe capacity

- Legend**
- Catchment area
 - Cadastre
- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%



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Figure J4.3

**Probable Maximum Flood
Pipe capacity**

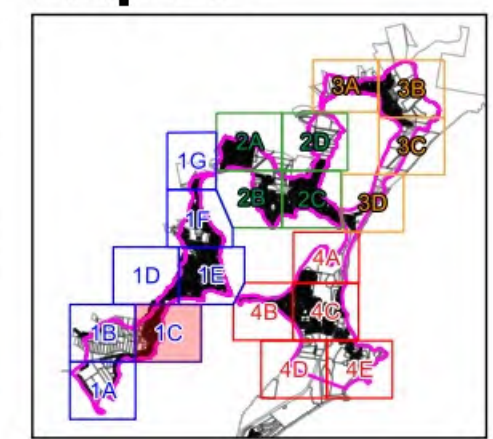
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 1C



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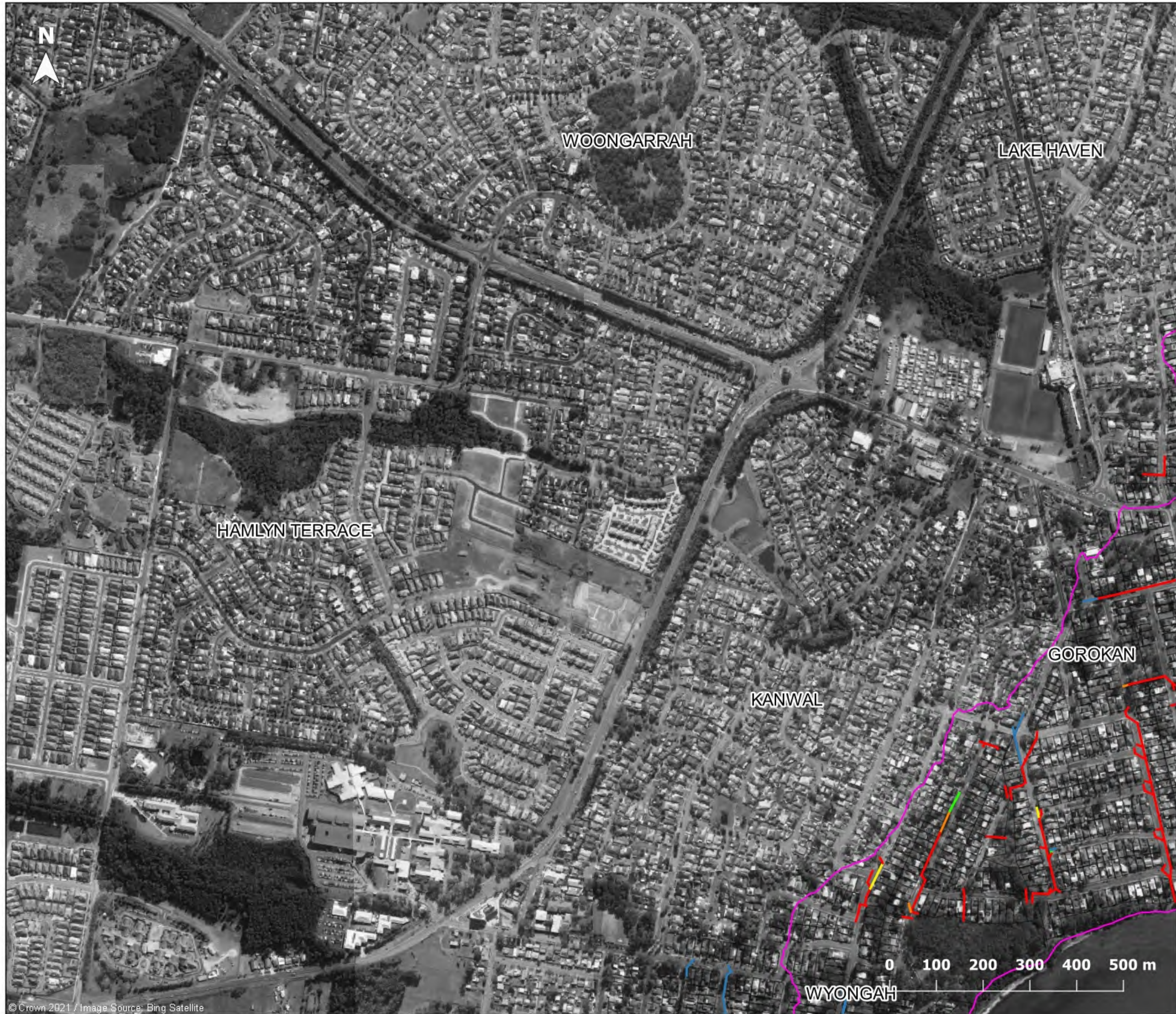
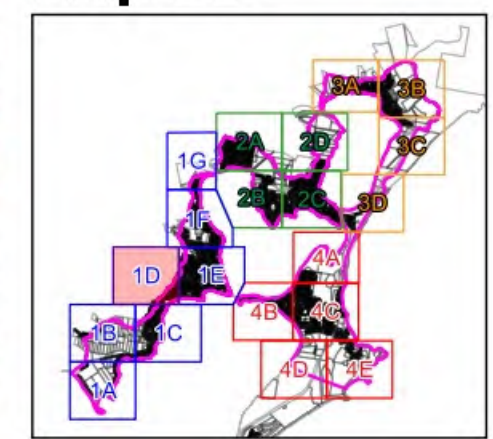


Figure J4.4
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%

Map 1D



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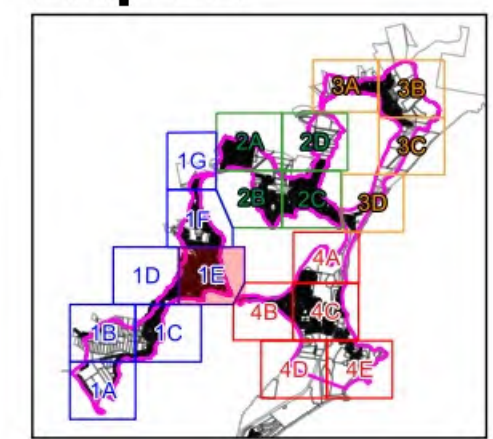
Figure J4.5

**Probable Maximum Flood
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 1E



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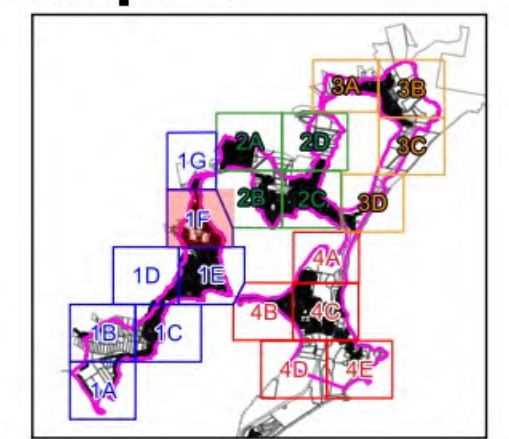


Figure J4.6
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%

Map 1F



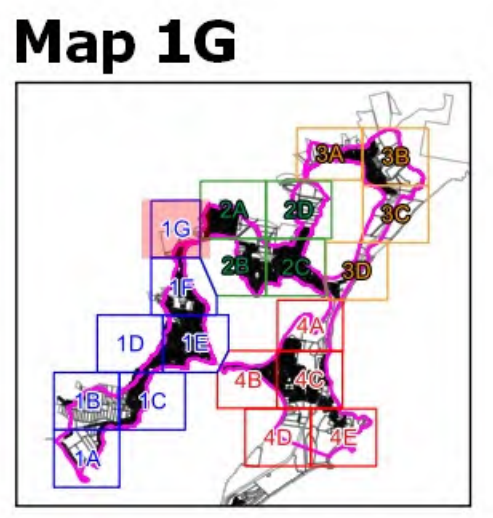
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Figure J4.7
Probable Maximum Flood
Pipe capacity

- Legend**
- Catchment area
 - Cadastre
- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%



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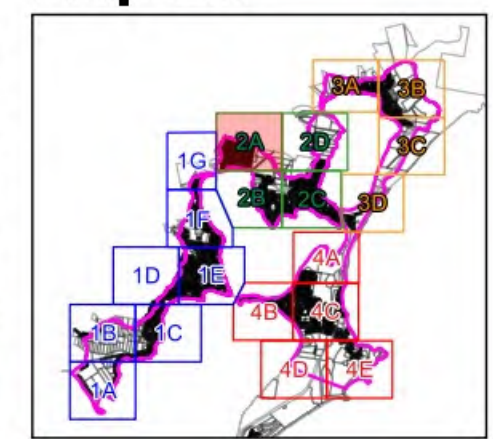
Figure J4.8

**Probable Maximum Flood
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 2A





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SAN REMO
CHARMHAVEN






Figure J4.9

**Probable Maximum Flood
Pipe capacity**

Legend

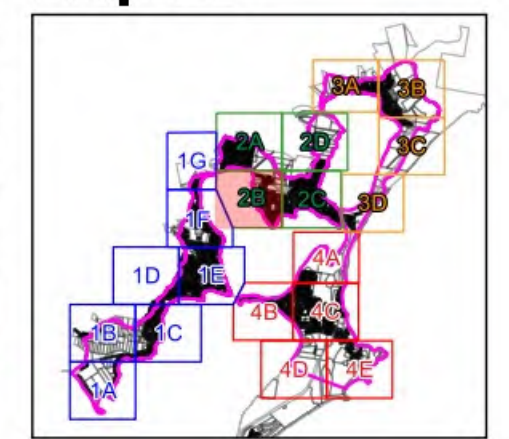
-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%



Map 2B



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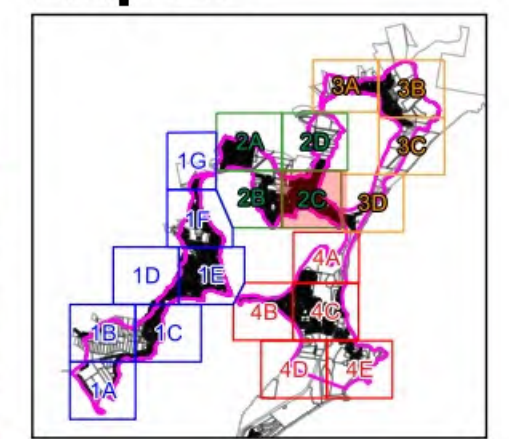
Figure J4.10

**Probable Maximum Flood
Pipe capacity**

- Legend**
- █ Catchment area
 - Cadastre

- Pipe Percentage Full**
- █ 0% - 20%
 - █ 20% - 40%
 - █ 40% - 60%
 - █ 60% - 80%
 - █ 80% - 100%

Map 2C



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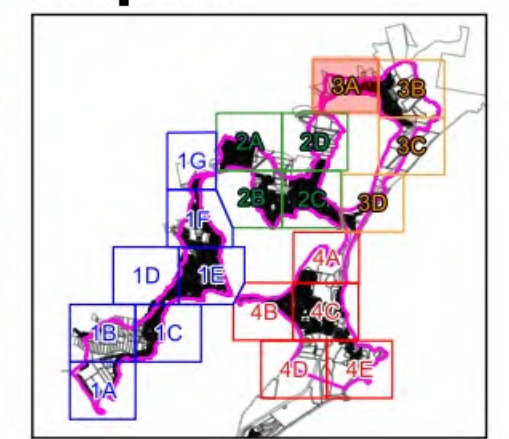


Figure J4.12
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%

Map 3A



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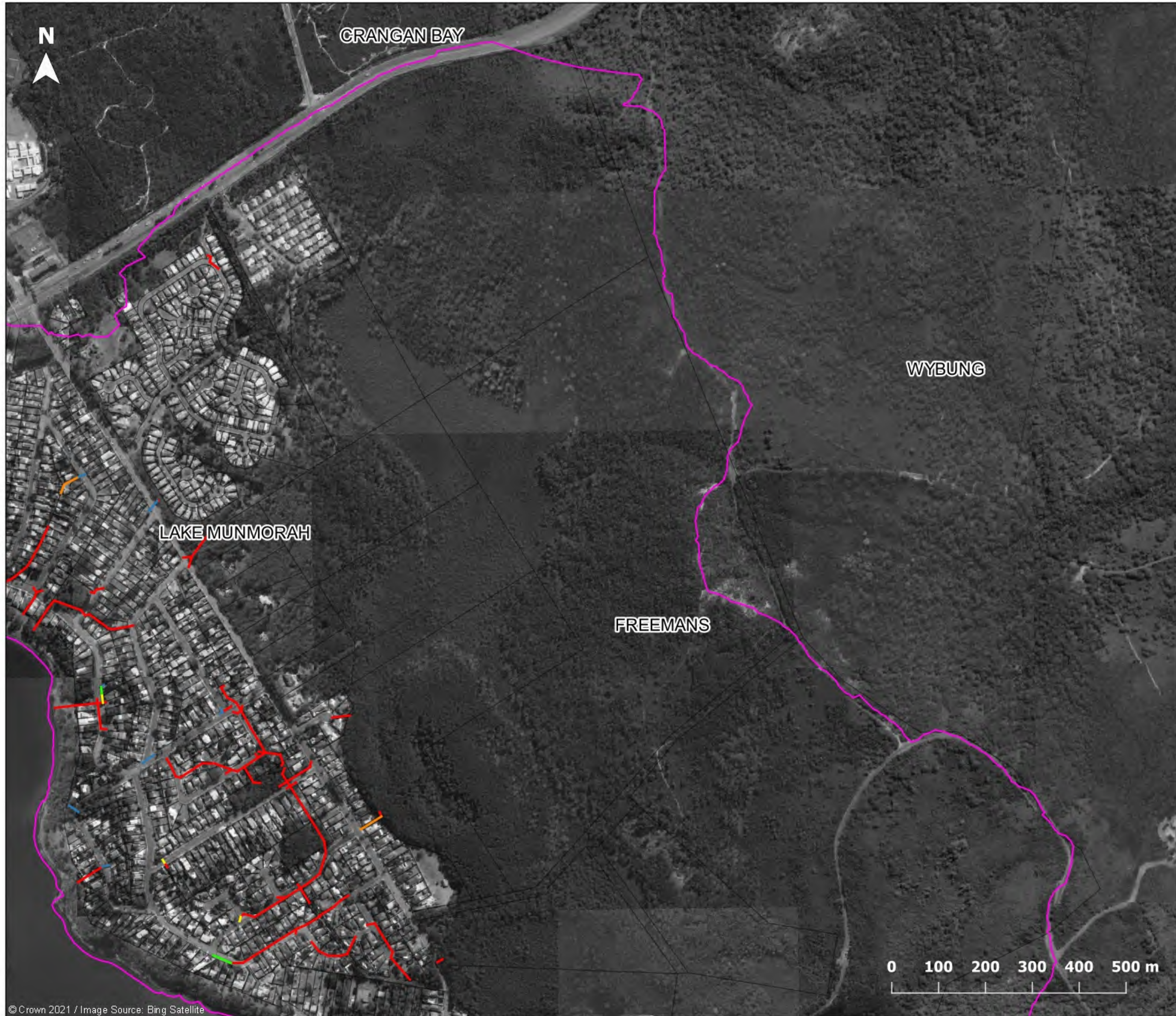
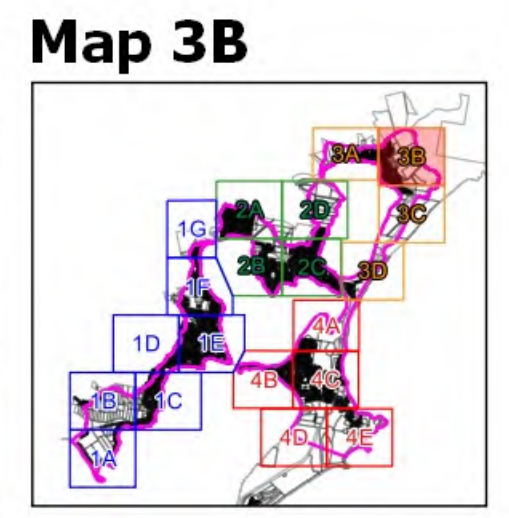


Figure J4.13
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%



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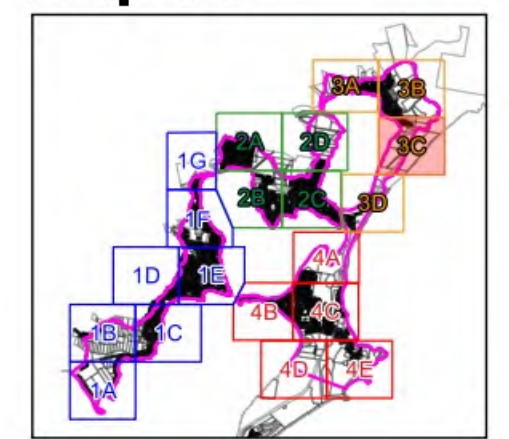


Figure J4.14
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%

Map 3C



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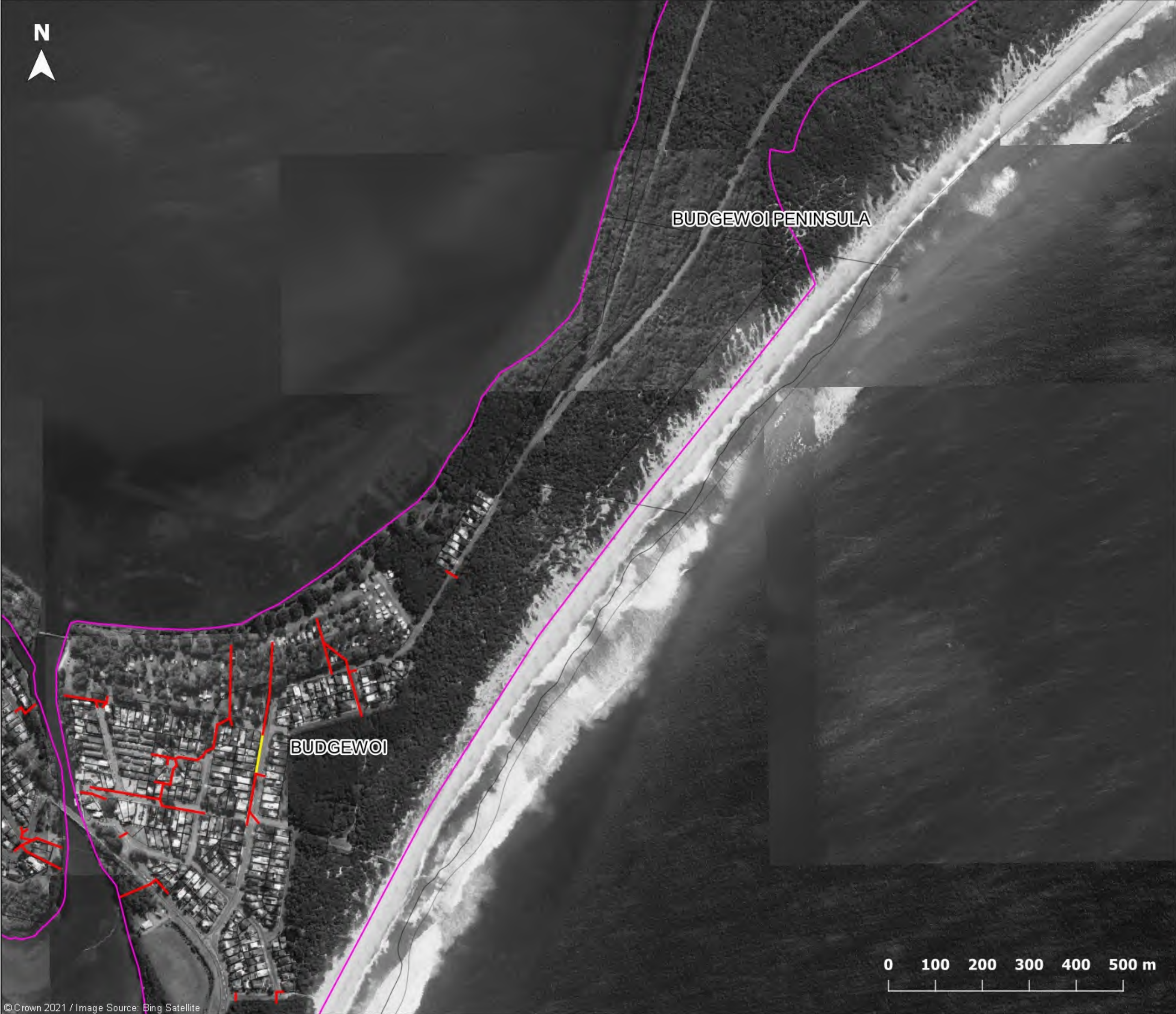









Figure J4.15

**Probable Maximum Flood
Pipe capacity**

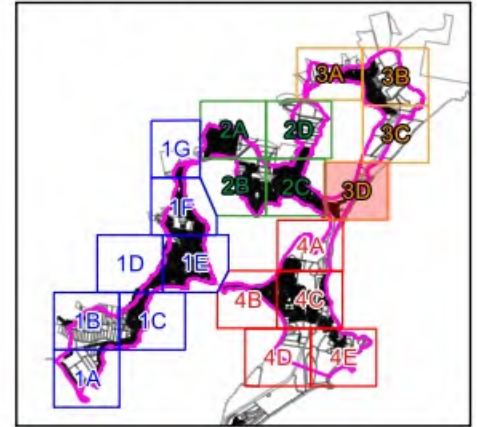
Legend

-  Catchment area
-  Cadastre

Pipe Percentage Full

-  0% - 20%
-  20% - 40%
-  40% - 60%
-  60% - 80%
-  80% - 100%

Map 3D



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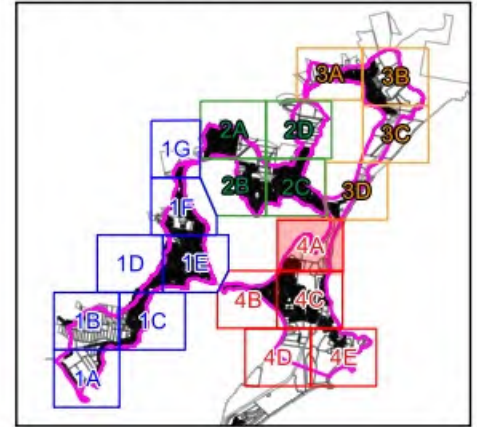
Figure J4.16

**Probable Maximum Flood
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4A



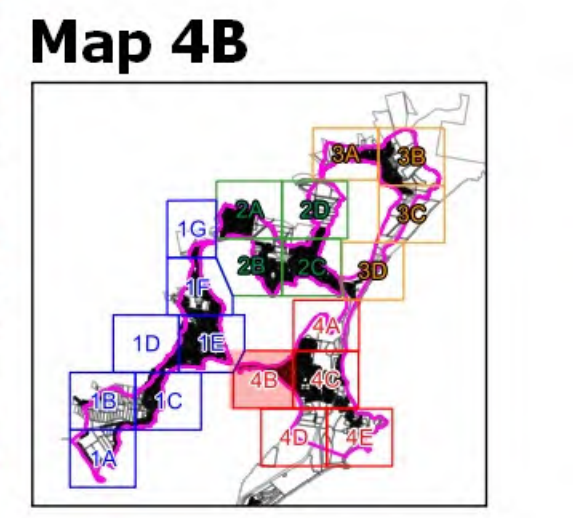
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Figure J4.17
Probable Maximum Flood
Pipe capacity

- Legend**
- Catchment area
 - Cadastre
- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%



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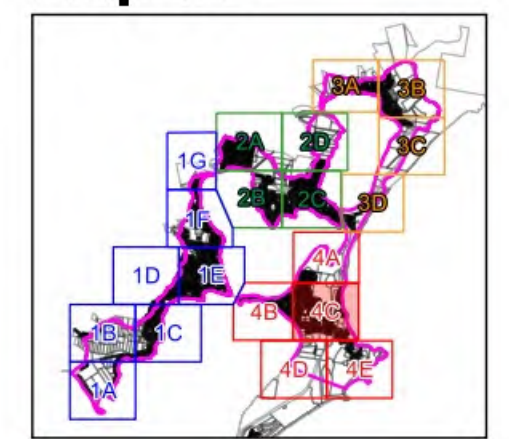


Figure J4.18
Probable Maximum Flood
Pipe capacity

Legend
 Catchment area
 Cadastre

Pipe Percentage Full
 0% - 20%
 20% - 40%
 40% - 60%
 60% - 80%
 80% - 100%

Map 4C



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N



Figure J4.19

**Probable Maximum Flood
Pipe capacity**

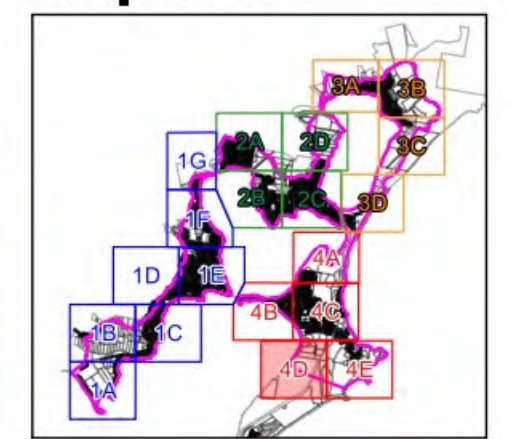
Legend

- Catchment area
- Cadastre

Pipe Percentage Full

- 0% - 20%
- 20% - 40%
- 40% - 60%
- 60% - 80%
- 80% - 100%

Map 4D



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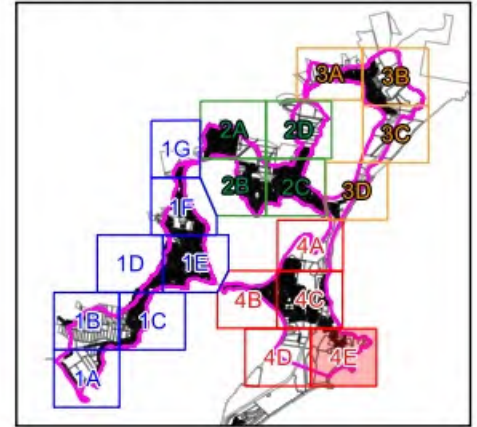
Figure J4.20

**Probable Maximum Flood
Pipe capacity**

- Legend**
- Catchment area
 - Cadastre

- Pipe Percentage Full**
- 0% - 20%
 - 20% - 40%
 - 40% - 60%
 - 60% - 80%
 - 80% - 100%

Map 4E



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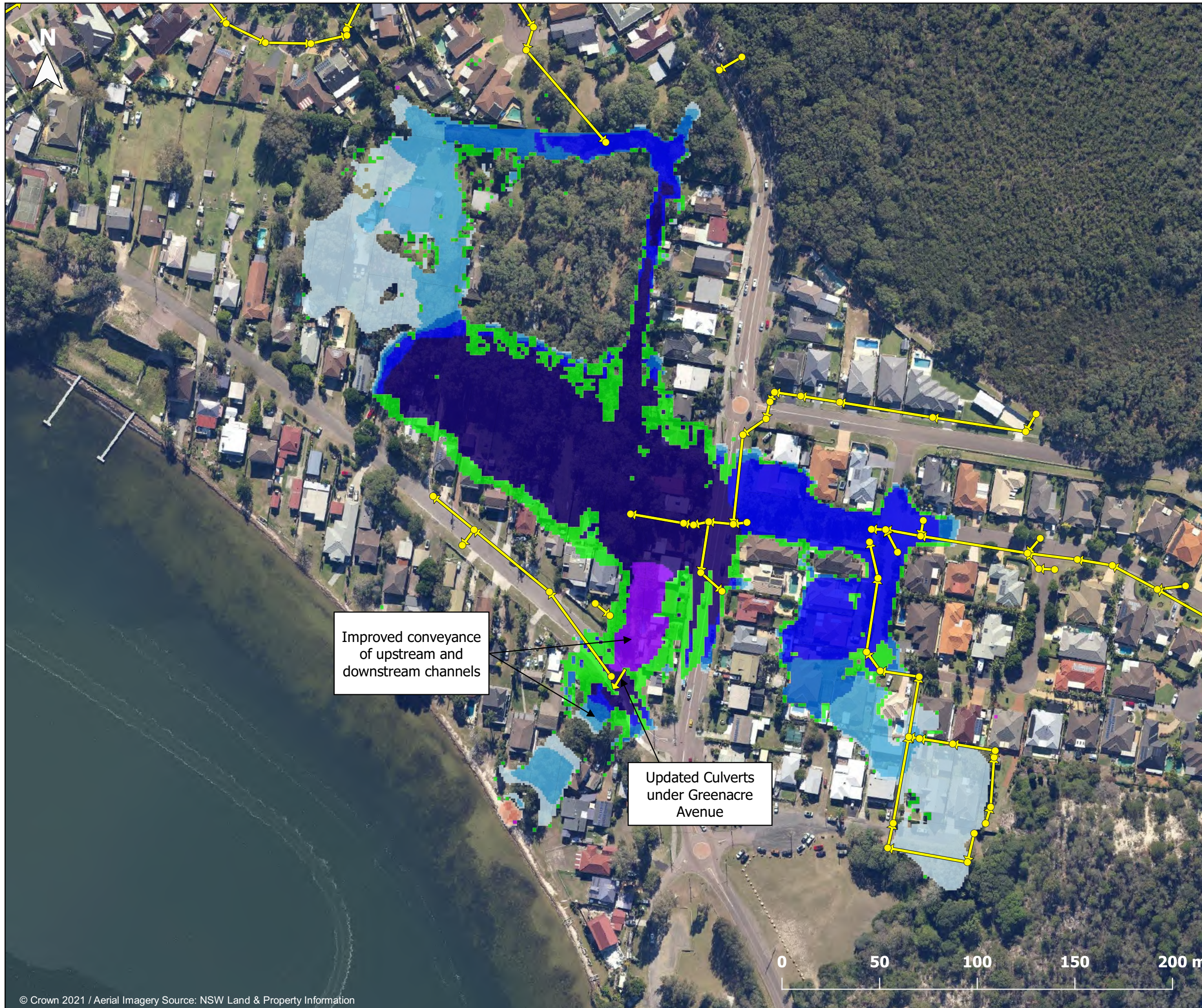
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Appendix K – Detailed management option assessment

- Figure K.1 Option 1 Greenacre Ave, Lake Munmorah Culverts 1% AEP Afflux Map
- Figure K.2 Option 2a Belbowrie Street, Canton Beach Culvert Upgrade 1% AEP Afflux Map
- Figure K.3 Option 2b Crossingham Street, Canton Beach Culverts Upgrade 1% AEP Afflux Map
- Figure K.4 Option 2c Moss Ave, Canton Beach Culverts Upgrade 1% AEP Afflux Map
- Figure K.5 Option 3a Pathway Upgrade from Lett Street to Lake, Gorokan 1% AEP Afflux Map
- Figure K.6 Option 3b Culvert Upgrade under Lett Street, Gorokan 1% AEP Afflux Map
- Figure K.7 Option 3c Detention Basin upstream of Lett St, Gorokan 1% AEP Afflux Map
- Figure K.8 Option 3d Pathway and Culvert Upgrade from Lett Street to Lake, Gorokan 1% AEP Afflux Map
- Figure K.9 Option 4 Channel Clearing near Woodland Reserve 1% AEP Afflux Map
- Figure K.10 Option 5 Channel widening downstream of Panorama Ave near Wurriga Ave 1% AEP Afflux Map
- Figure K.11 Option 6 Properties raising along Budgewoi Road, Noraville 1% AEP Afflux Map
- Figure K.12 Option 7a Culvert Upgrade under Cooranga Road, Wyongah 1% AEP Afflux Map
- Figure K.13 Option 7b Flow Diversion to Lake, Wyongah 1% AEP Afflux Map
- Figure K.14 Option 7c Flow Diversion to Lake and Culvert Upgrade under Cooranga Road, Wyongah 1% AEP Afflux Map
- Figure K.15 Option 8 Upgrade of Gorokan Park Detention Basin, Gorokan 1% AEP Afflux Map

Figure K.1

**Option 1
Greenacre Ave, Lake
Munmorah Culverts
1% AEP Afflux Map**



Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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







Figure K.2

**Option 2a
Belbowrie Street,
Canton Beach Culvert
Upgrade
1% AEP Afflux Map**

Legend

-  Cadastre
-  Pipes/Culverts/Channels
-  Pits/Headwalls

Afflux (m)

-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50
-  Was wet, now dry
-  Was dry, now wet

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Figure K.3

**Option 2b
Crossingham Street,
Canton Beach
Culverts Upgrade
1% AEP Afflux Map**



Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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Figure K.4

**Option 2c
Moss Ave, Canton
Beach Culverts
Upgrade
1% AEP Afflux Map**

Legend

-  Cadastre
-  Pipes/Culverts/Channels
-  Pits/Headwalls

Afflux (m)

-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50
-  Was wet, now dry
-  Was dry, now wet

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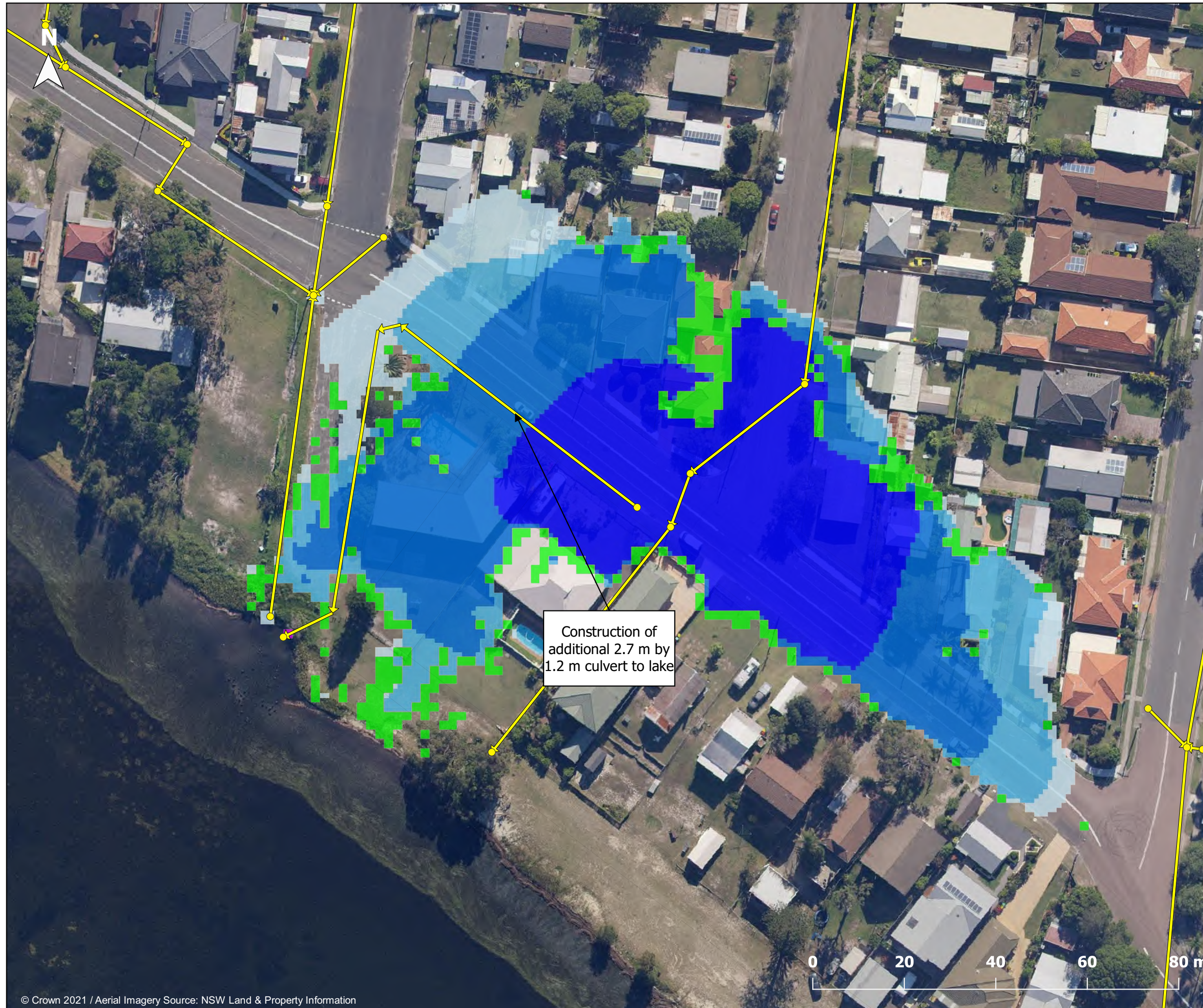




Figure K.5

**Option 3a
Pathway Upgrade
from Lett Street to
Lake, Gorokan
1% AEP Afflux Map**

Legend

- Cadastre
 - Pipes/Culverts/Channels
 - Pits/Headwalls
- Afflux (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50
 - Was wet, now dry
 - Was dry, now wet

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Figure K.6

**Option 3b
Culvert Upgrade
under Lett Street,
Gorokan
1% AEP Afflux Map**

Legend

- Cadastre
 - Pipes/Culverts/Channels
 - Pits/Headwalls
- Afflux (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50
 - Was wet, now dry
 - Was dry, now wet

Upgrade culvert to
2 x 3.2 m x 1.2 m
under Lett Street



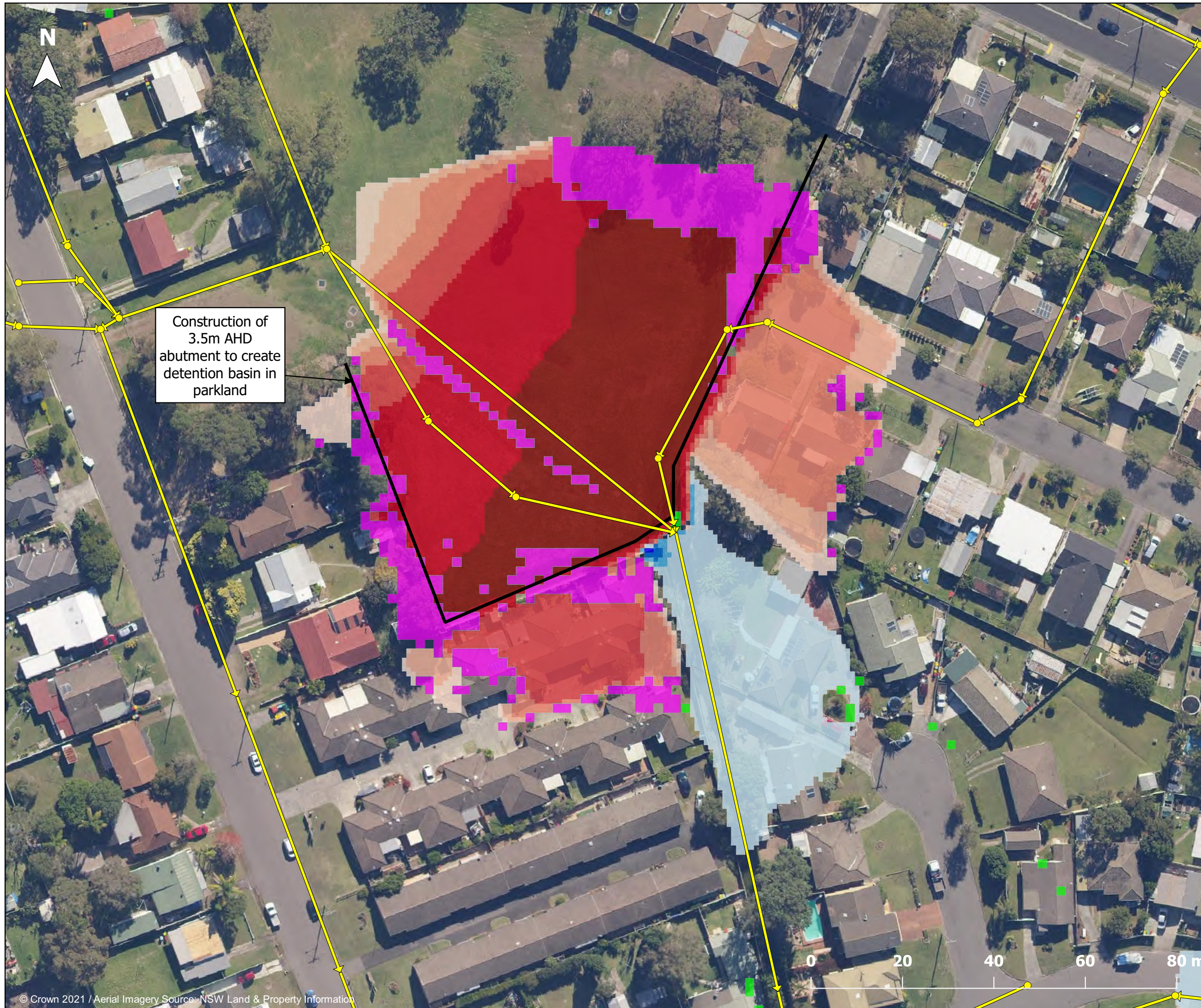


Figure K.7

**Option 3c
Detention Basin
upstream of Lett St,
Gorokan
1% AEP Afflux Map**

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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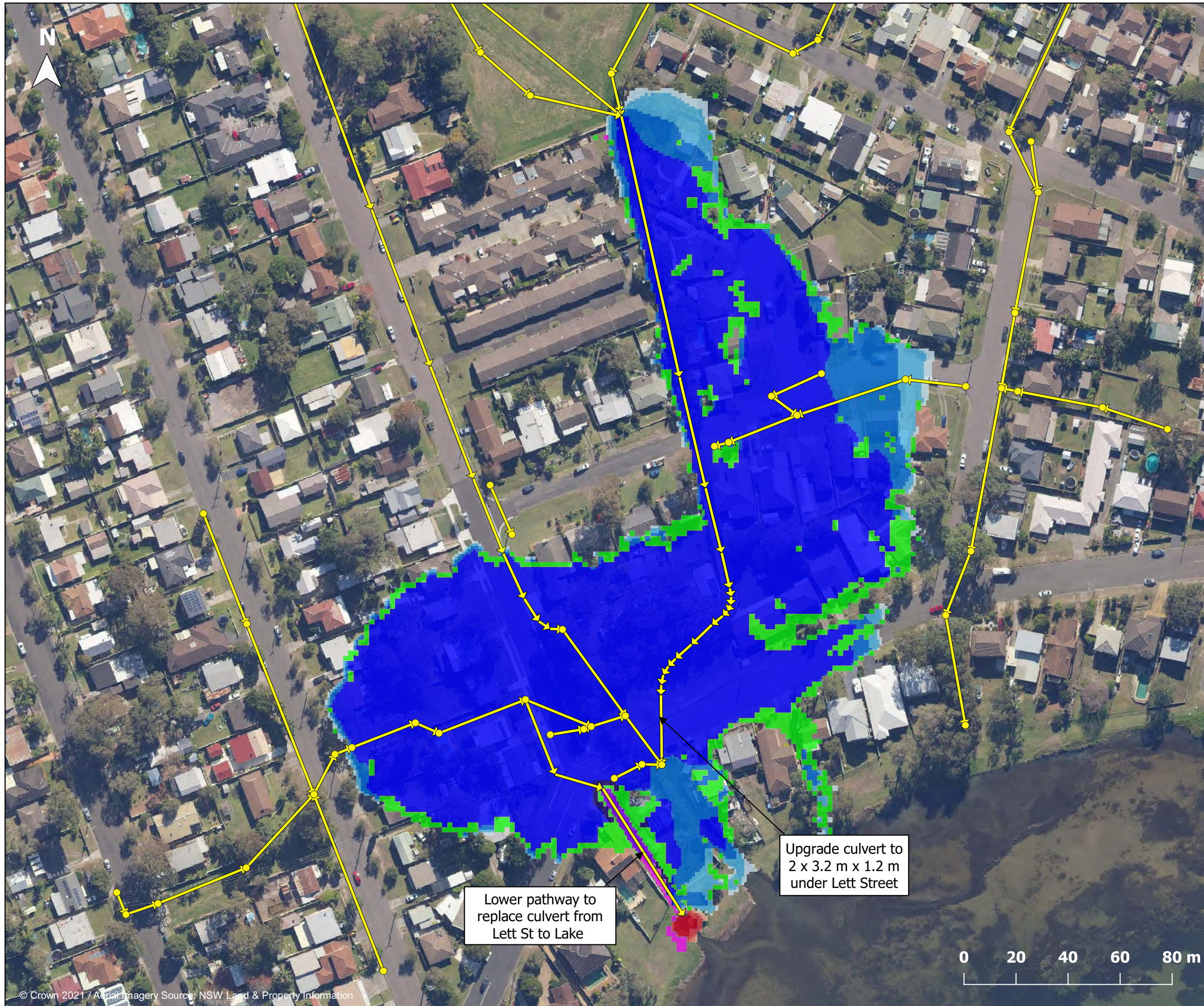


Figure K.8

**Option 3d
Pathway and Culvert
Upgrade from Lett
Street to Lake,
Gorokan
1% AEP Afflux Map**

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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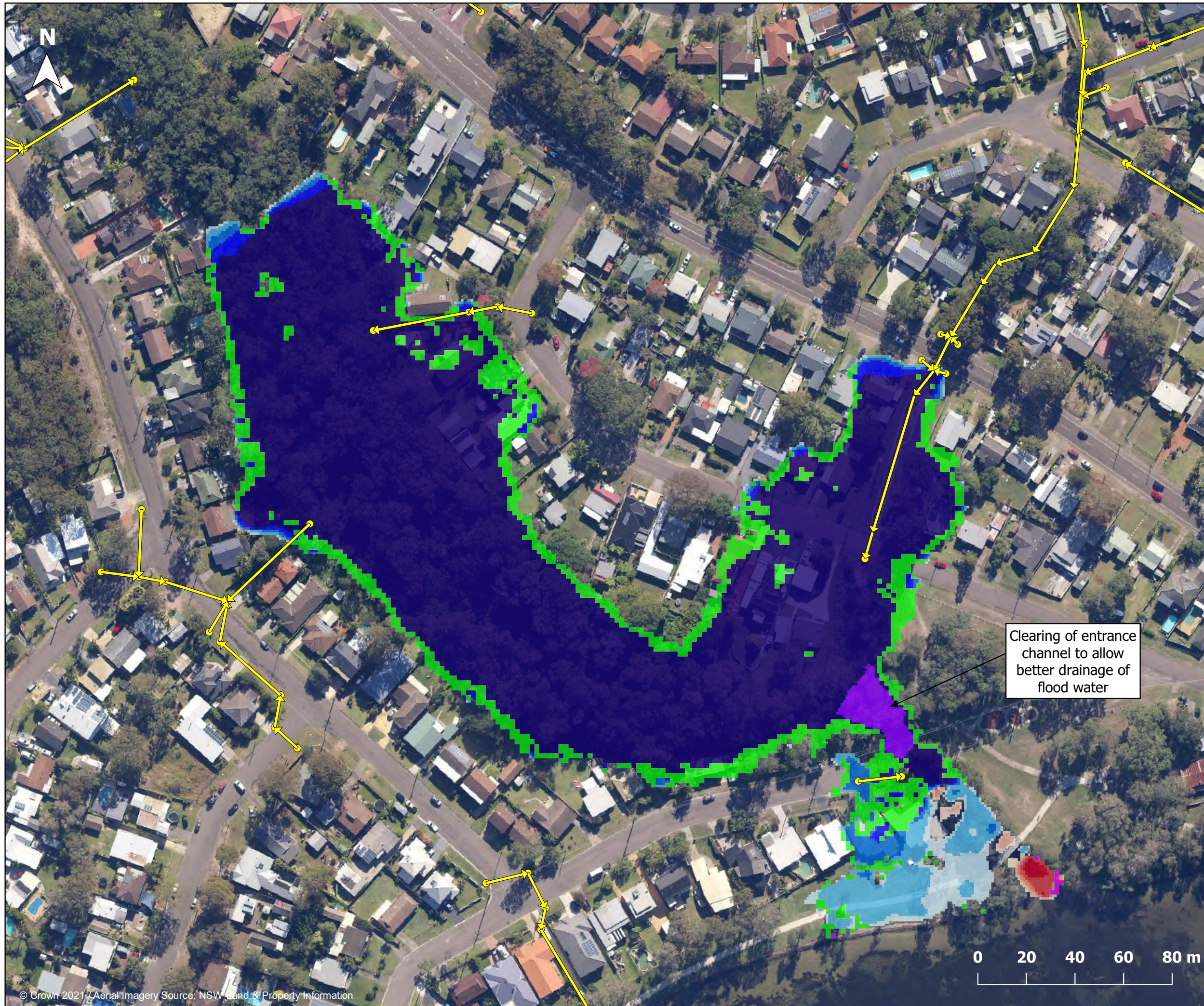


Figure K.9

**Option 4
Channel Clearing
near Woodland
Reserve
1% AEP Afflux Map**

- Legend**
- Cadastre
 - Pipes/Culverts/Channels
 - Pits/Headwalls
- Afflux (m)**
- < -0.50
 - -0.50 to -0.20
 - -0.20 to -0.10
 - -0.10 to -0.05
 - -0.05 to -0.02
 - -0.02 to -0.01
 - -0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50
 - Was wet, now dry
 - Was dry, now wet

Clearing of entrance channel to allow better drainage of flood water

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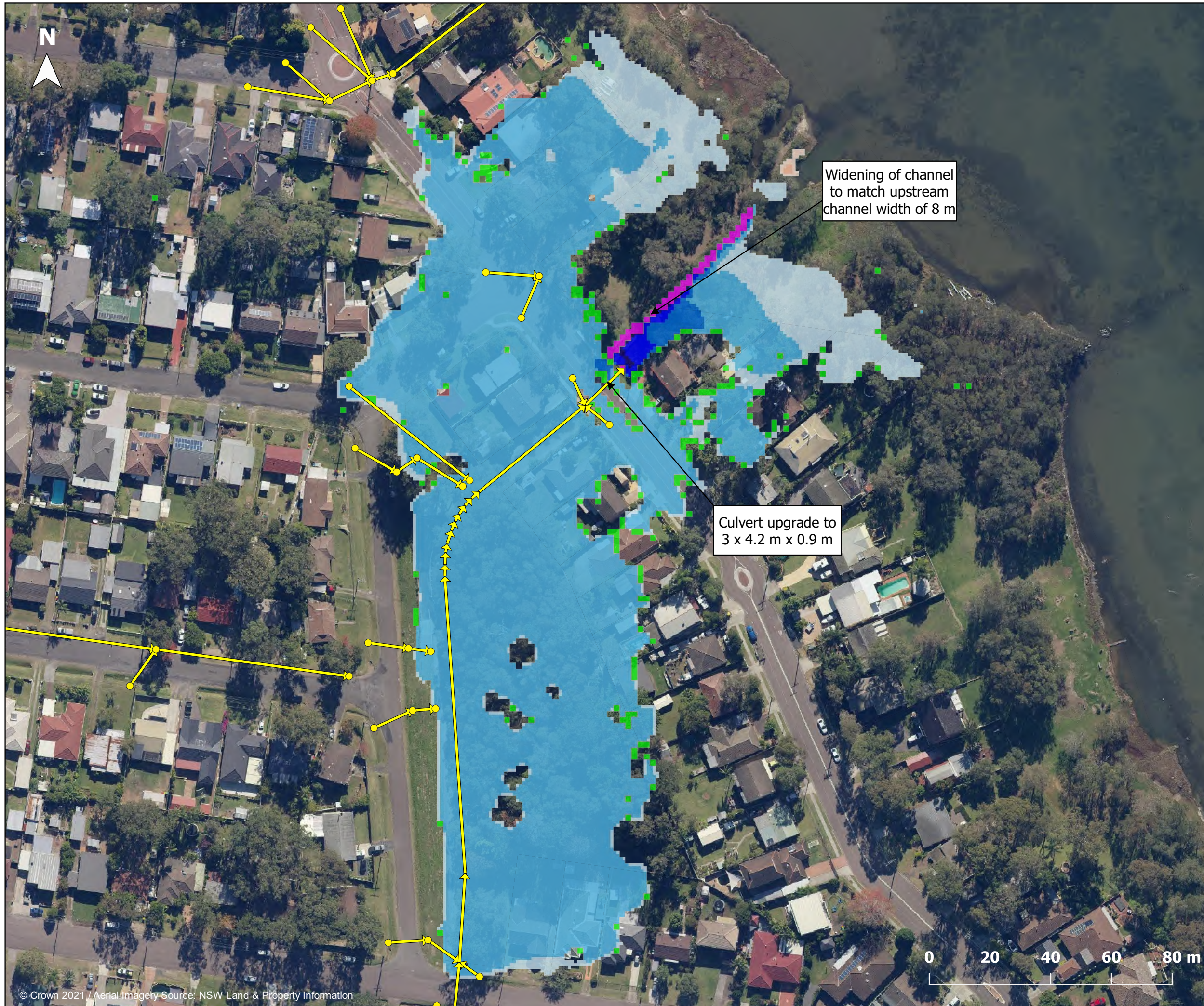




















Figure K.10

**Option 5
Channel widening
downstream of
Panorama Ave near
Wirriga Ave
1% AEP Afflux Map**

Legend

-  Cadastre
-  Pipes/Culverts/Channels
-  Pits/Headwalls

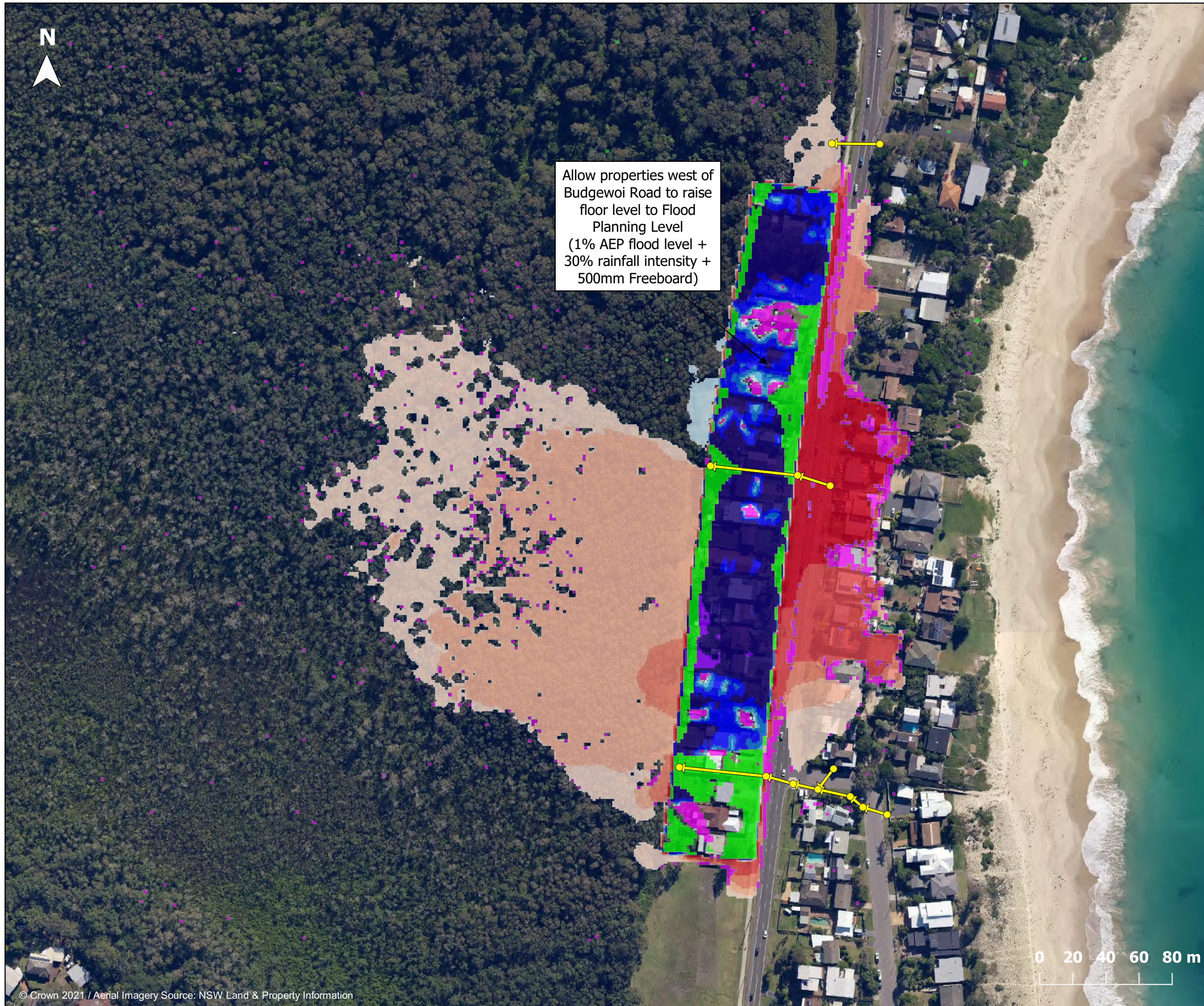
Afflux (m)

-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50
-  Was wet, now dry
-  Was dry, now wet

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Allow properties west of Budgewoi Road to raise floor level to Flood Planning Level (1% AEP flood level + 30% rainfall intensity + 500mm Freeboard)

Figure K.11

**Option 6
Properties raising
along Budgewoi
Road, Noraville
1% AEP Afflux Map**

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.02
- -0.02 to -0.01
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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Figure K.12

**Option 7a
Culvert Upgrade
under Cooranga
Road, Wyongah
1% AEP Afflux Map**

Legend

-  Cadastre
-  Pipes/Culverts/Channels
-  Pits/Headwalls

Afflux (m)

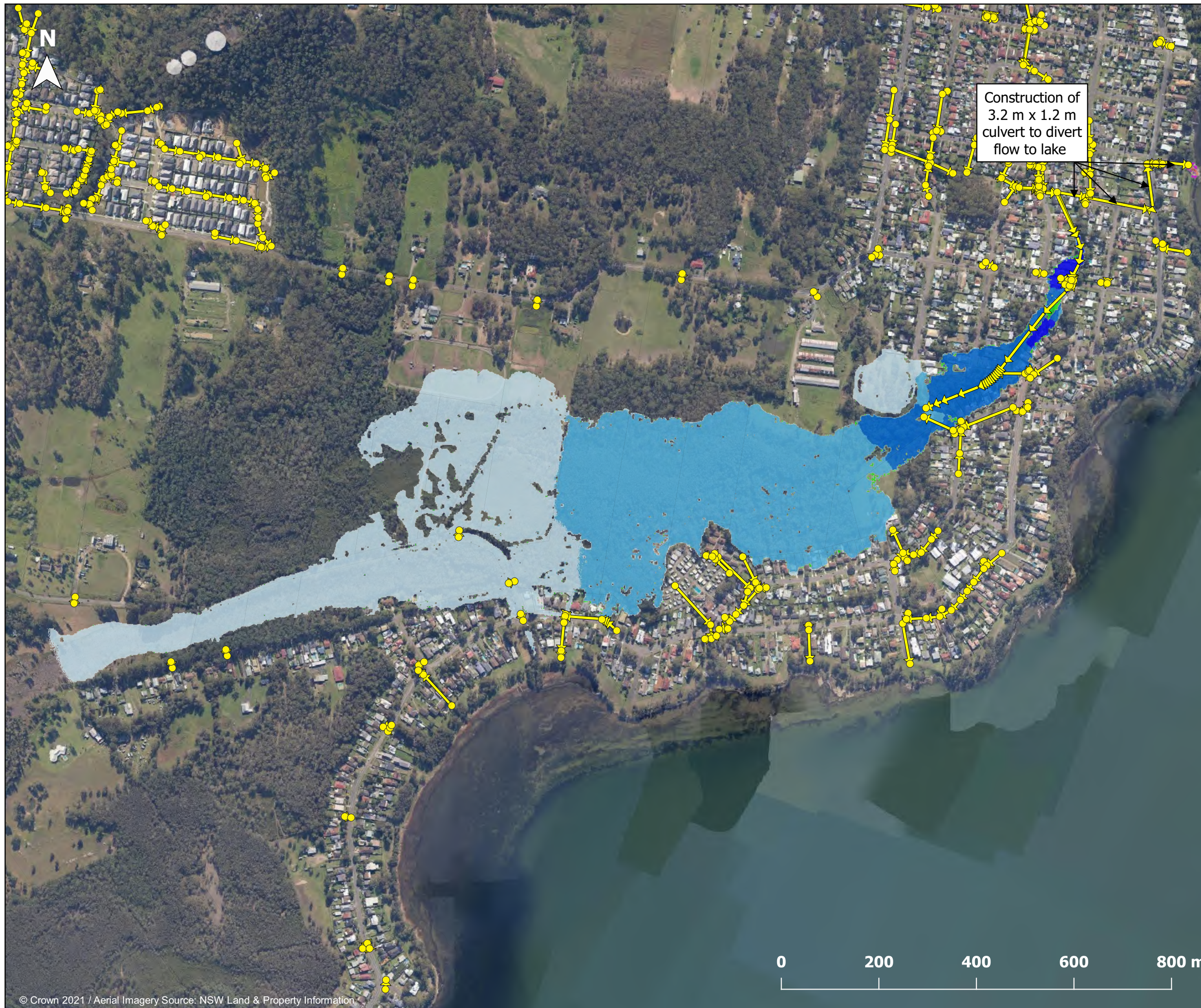
-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50
-  Was wet, now dry
-  Was dry, now wet

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Figure K.13

Option 7b Flow Diversion to Lake, Wyongah 1% AEP Afflux Map



Construction of
3.2 m x 1.2 m
culvert to divert
flow to lake

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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Figure K.14

**Option 7c
Flow Diversion to
Lake and Culvert
Upgrade under
Cooranga Road,
Wyongah
1% AEP Afflux Map**

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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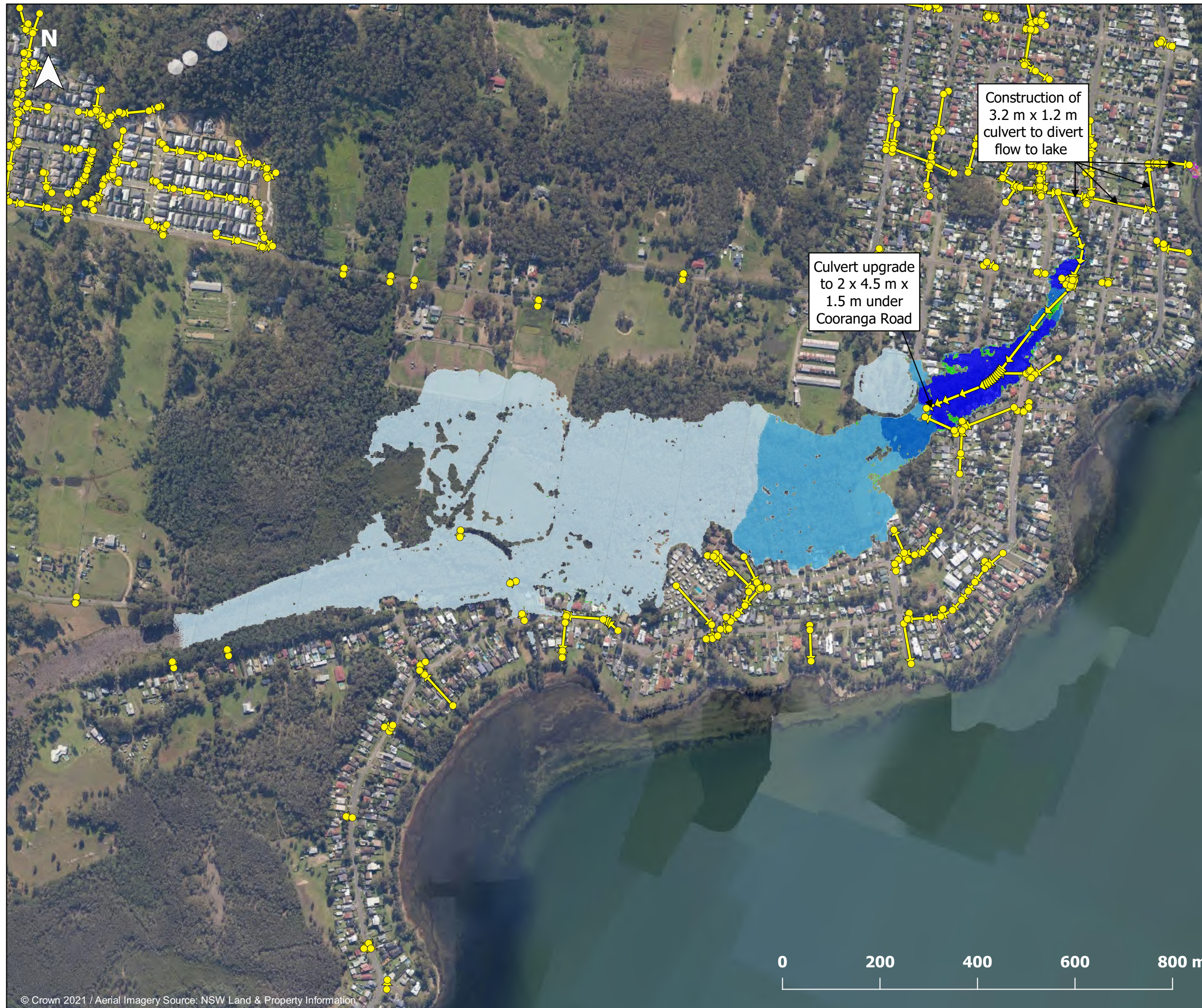


Figure K.15

**Option 8
Upgrade of Gorokan
Park Detention
Basin, Gorokan
1% AEP Afflux Map**

Legend

- Cadastre
- Pipes/Culverts/Channels
- Pits/Headwalls

Afflux (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50
- Was wet, now dry
- Was dry, now wet

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Reduce ground level of basin by 1 m

Reduce outlet pipe diameter to 0.9 m to reduce flow out of basin

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Appendix L – Climate change impact assessment

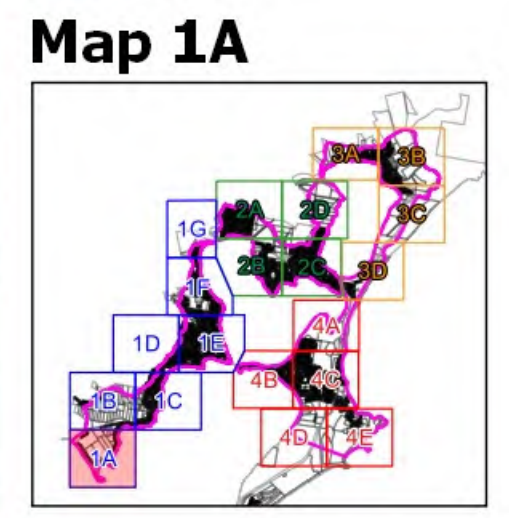
Figure L.1 1% AEP Flood Sensitivity 30% Increase in Rainfall Intensity

Figure L.2 1% AEP Flood Sensitivity Sea Level Rise of 740 mm



Figure L1.1
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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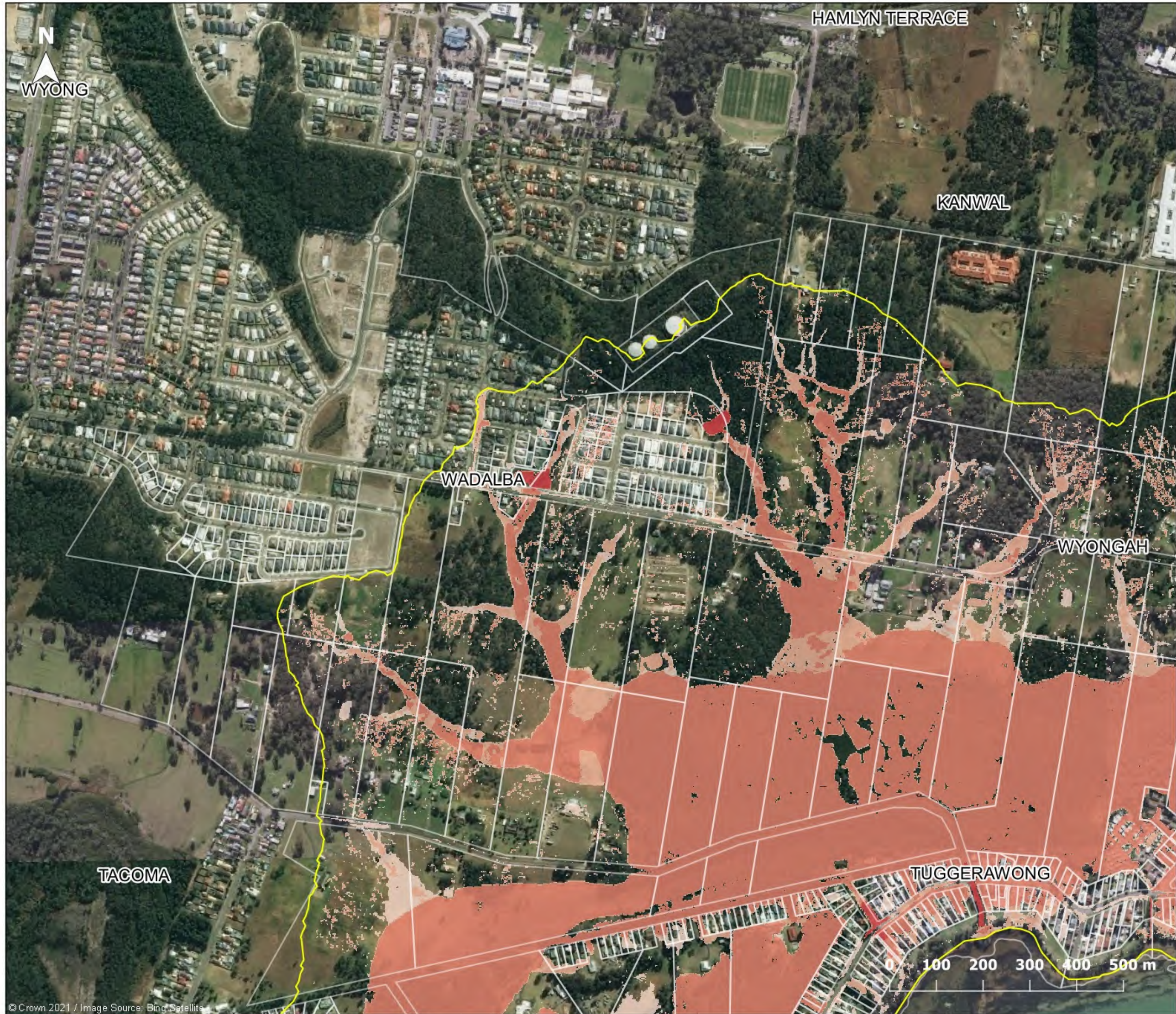
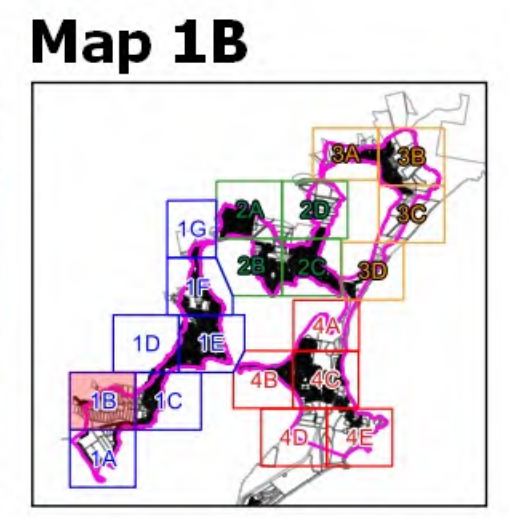


Figure L1.2
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



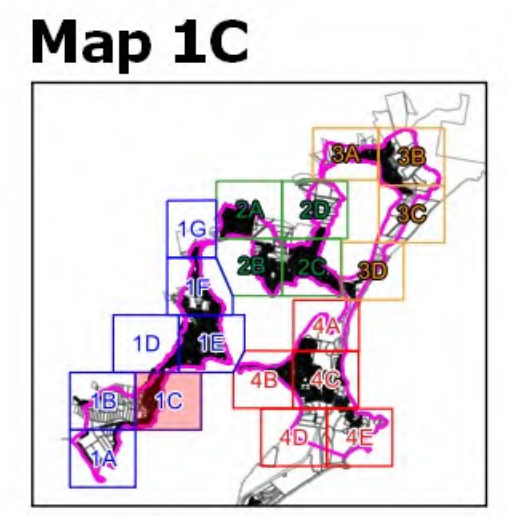
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Figure L1.3
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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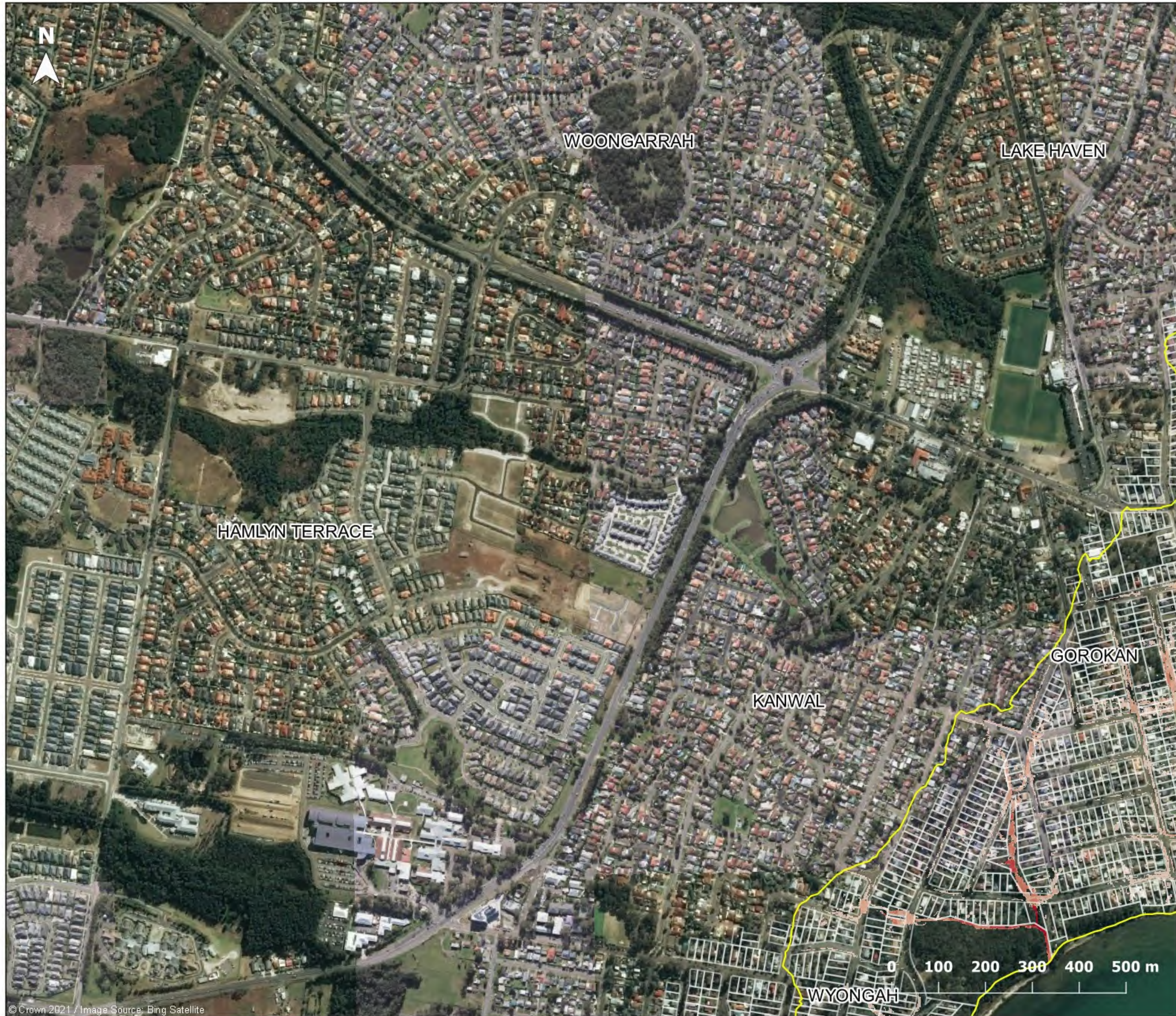
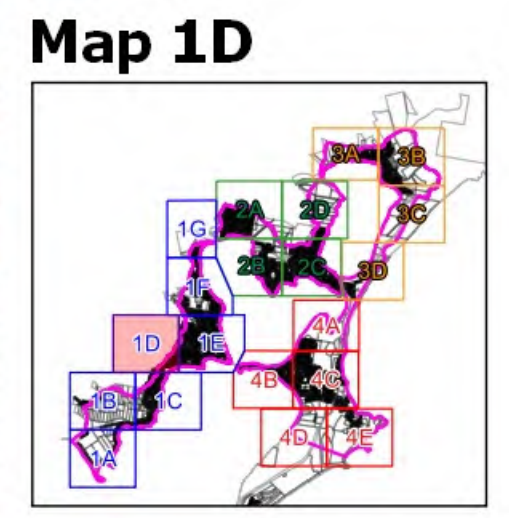


Figure L1.4
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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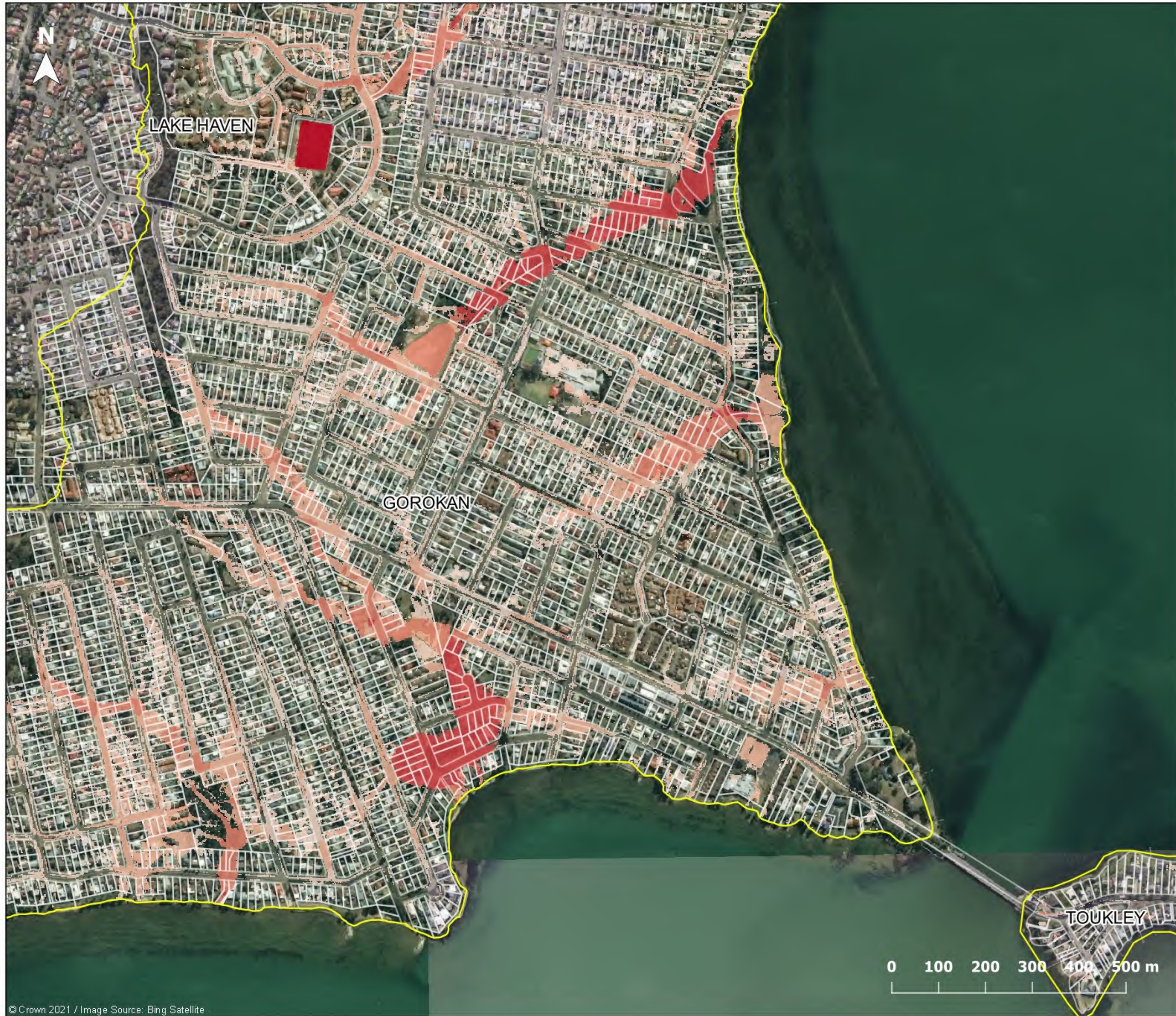
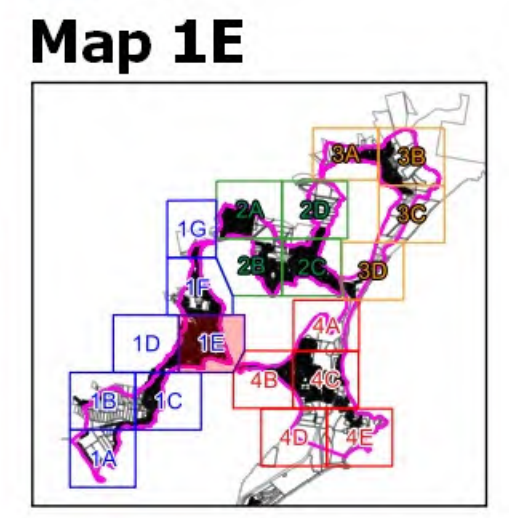
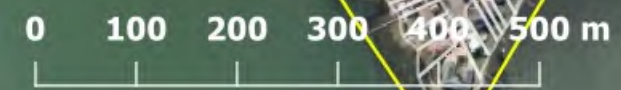


Figure L1.5
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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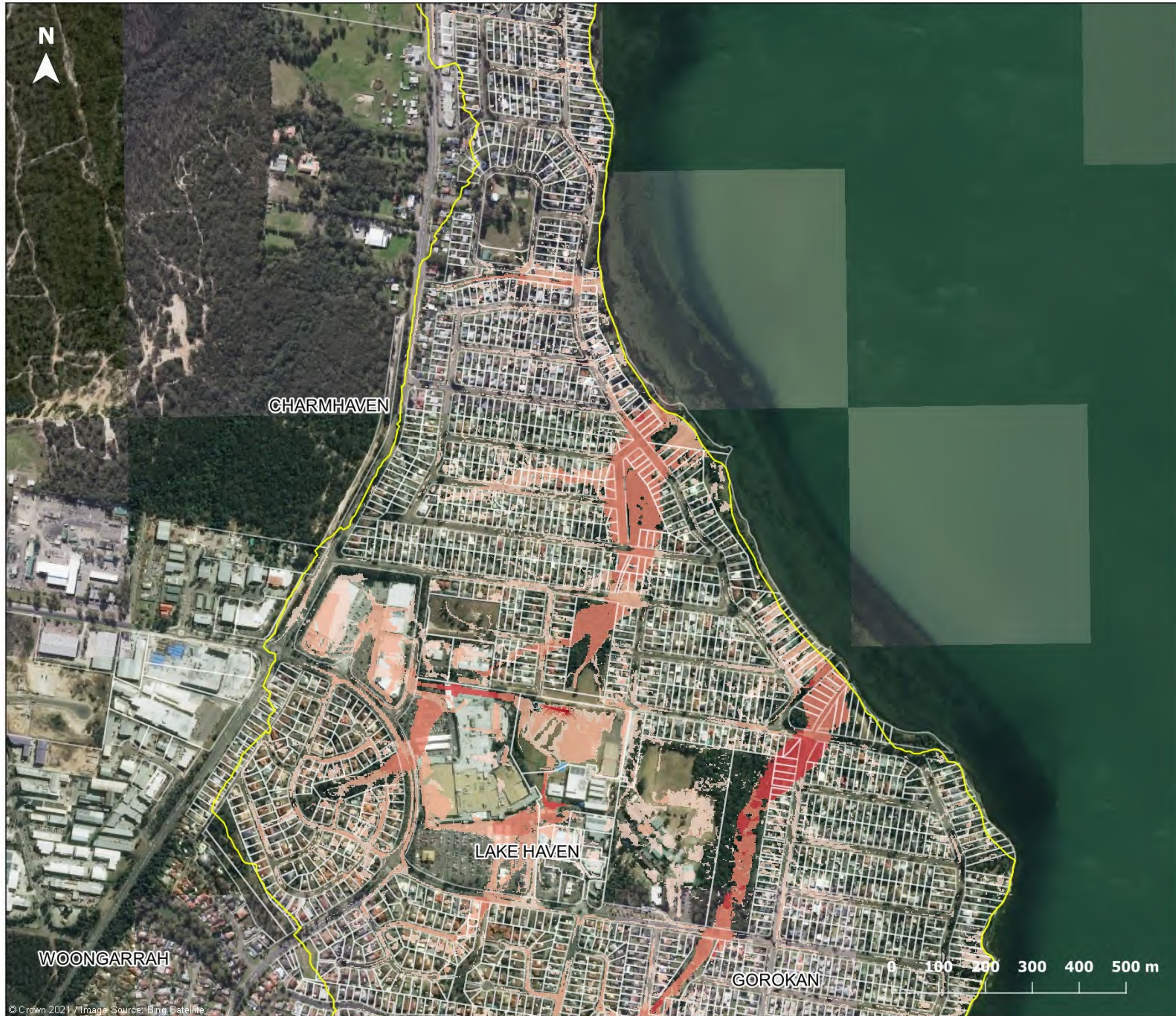
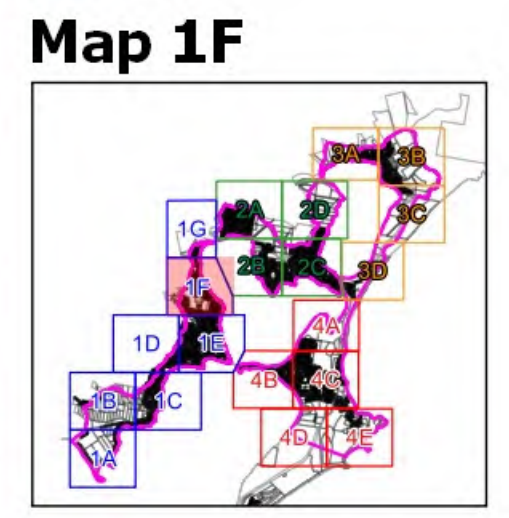


Figure L1.6
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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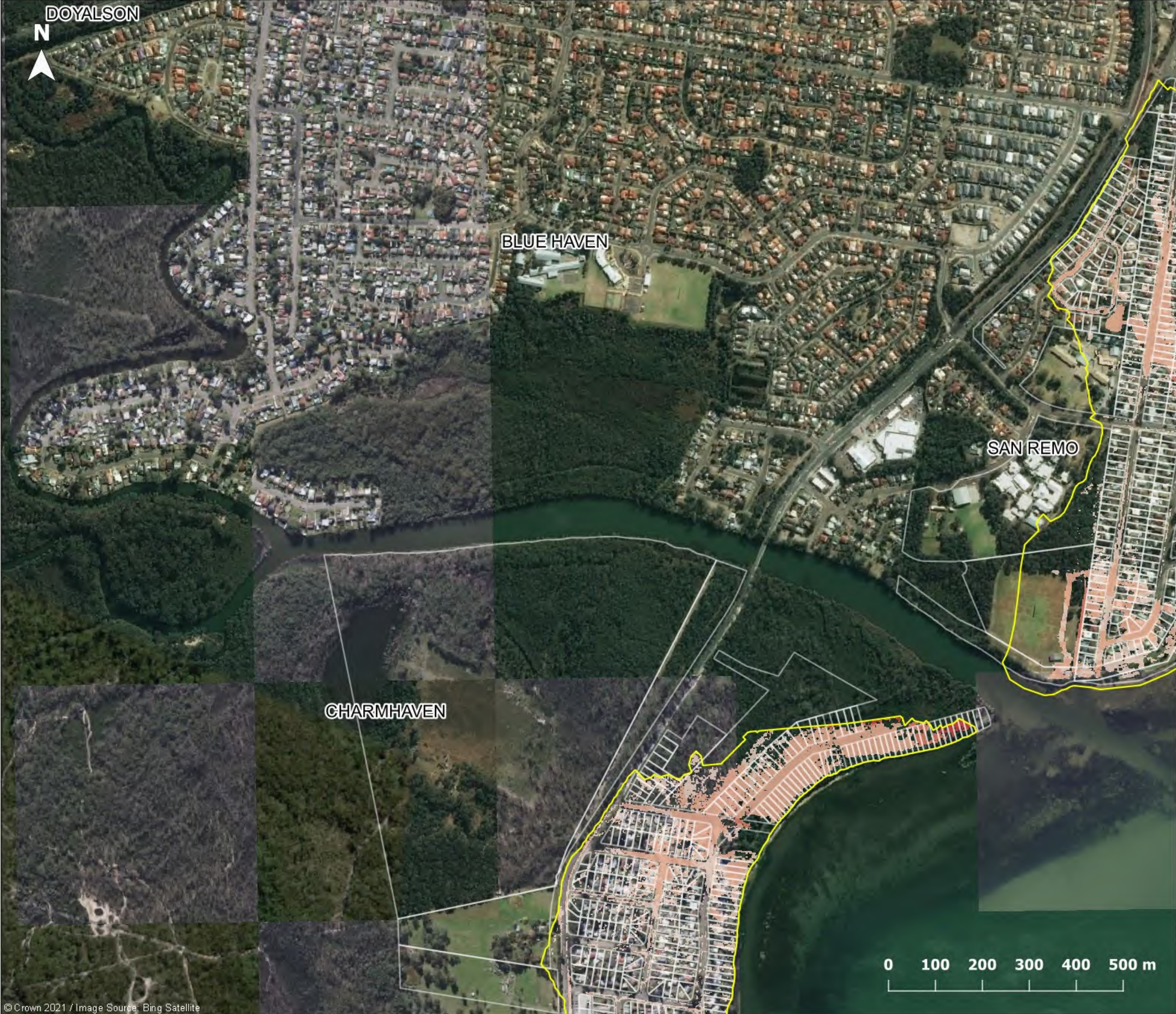
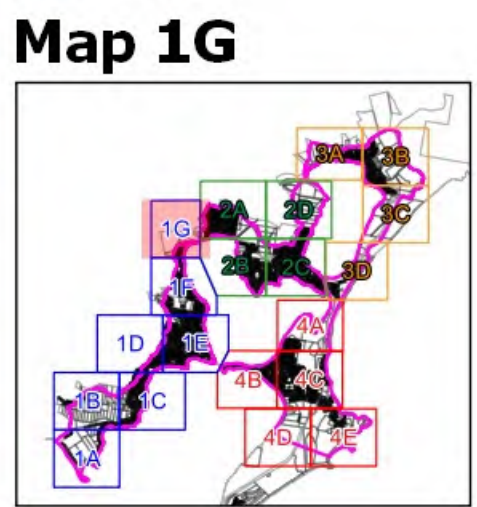


Figure L1.7
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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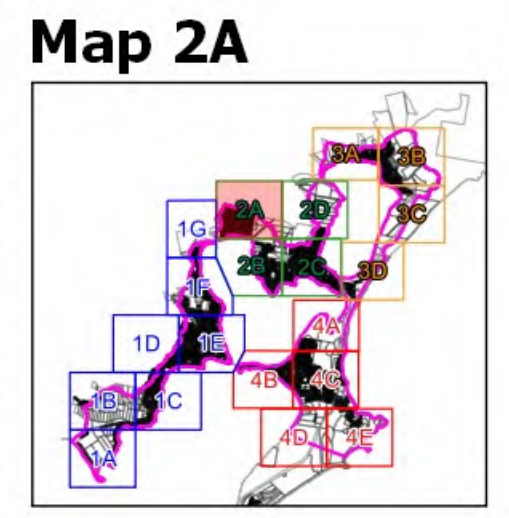


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Figure L1.8
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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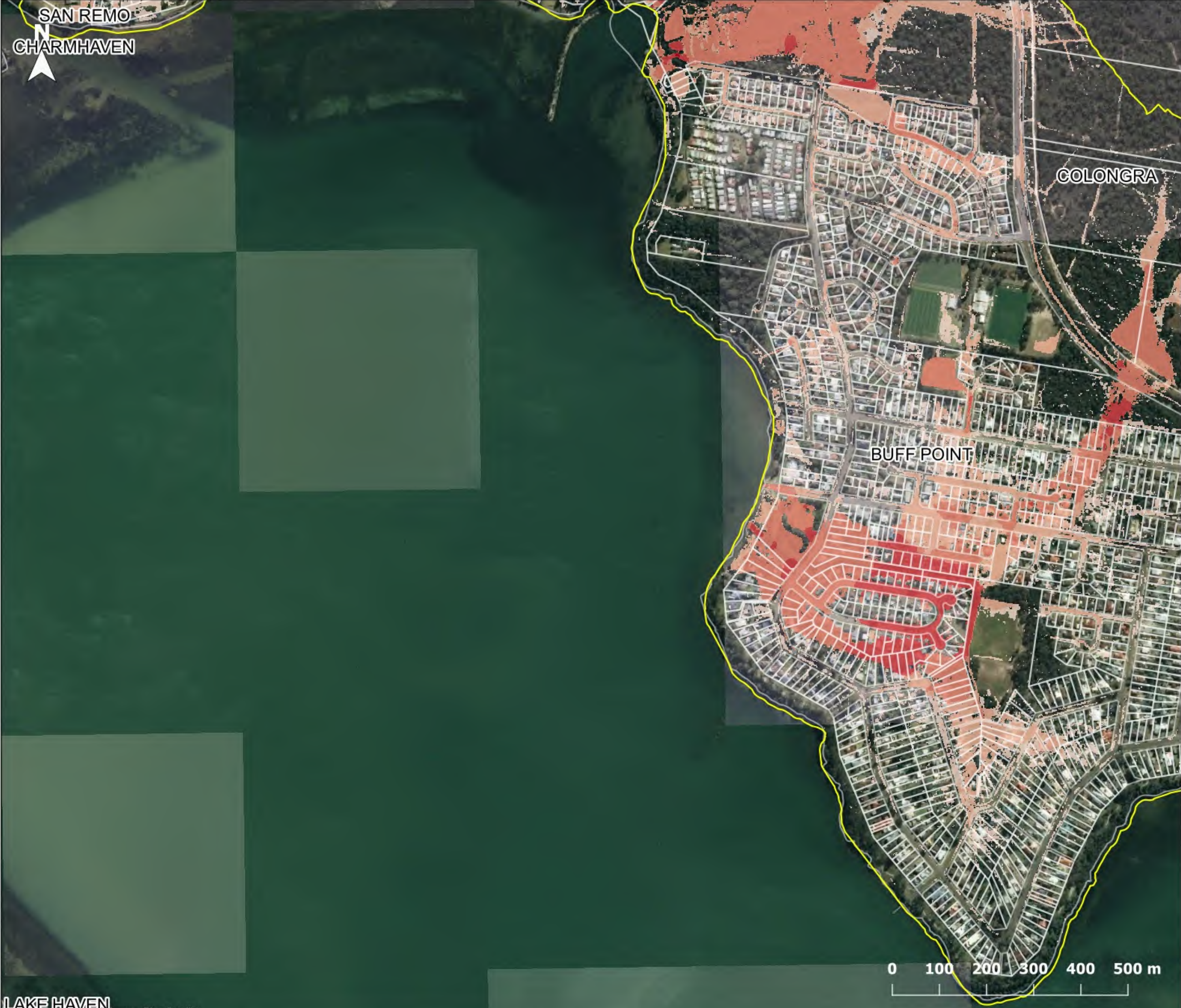
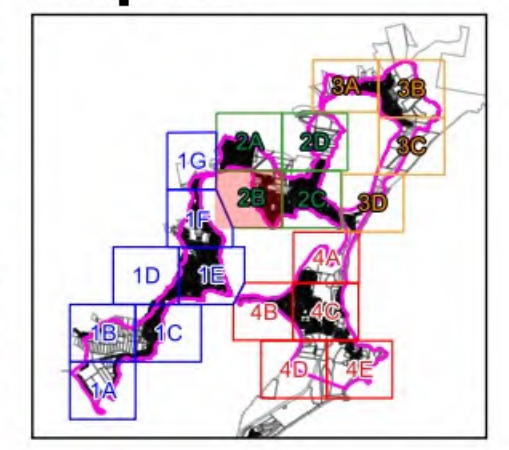


Figure L1.9

**1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity**

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 2B



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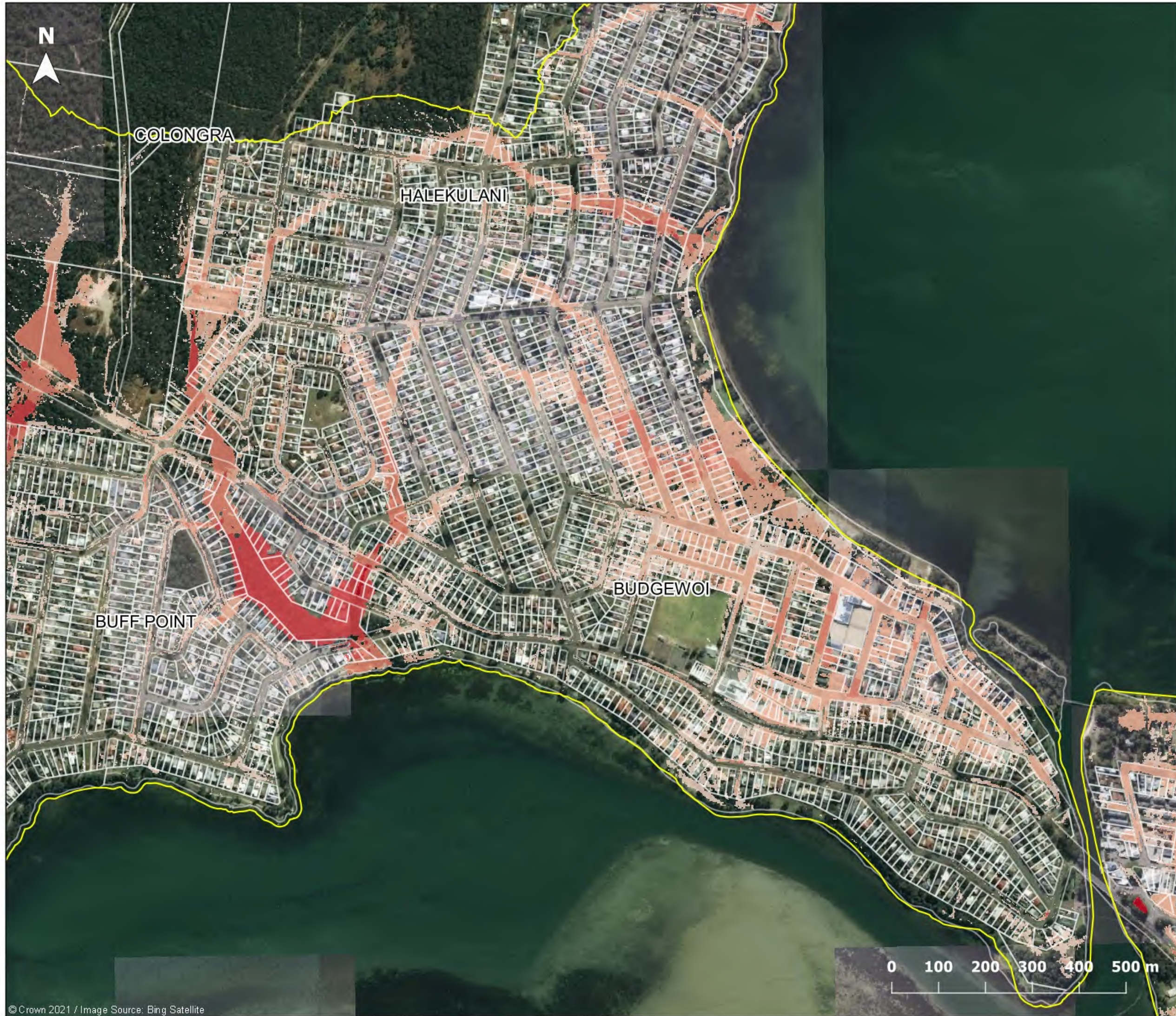


Figure L1.10

**1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity**

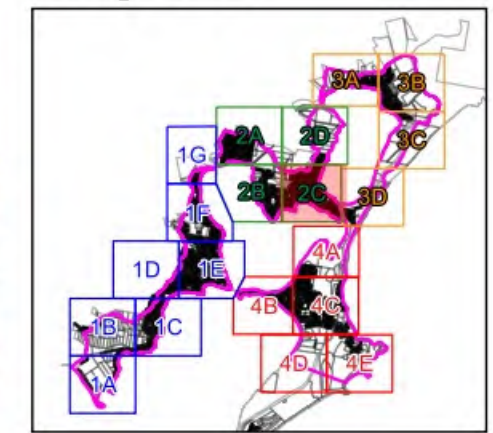
Legend

▭ Catchment area
▭ Cadastre

Water Level Difference (m)

- ▭ < -0.50
- ▭ -0.50 to -0.20
- ▭ -0.20 to -0.10
- ▭ -0.10 to -0.05
- ▭ -0.05 to -0.02
- ▭ -0.02 to -0.01
- ▭ -0.01 to 0.01
- ▭ 0.01 to 0.02
- ▭ 0.02 to 0.05
- ▭ 0.05 to 0.10
- ▭ 0.10 to 0.20
- ▭ 0.20 to 0.50
- ▭ > 0.50

Map 2C



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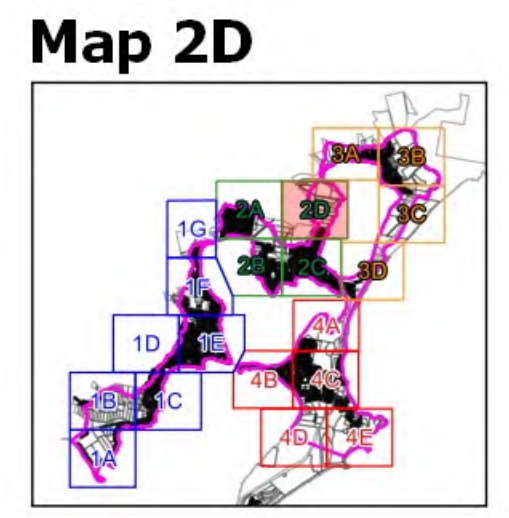
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Figure L1.11
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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DOYALSON NORTH

LAKE MUNMORAH

COLONGRA

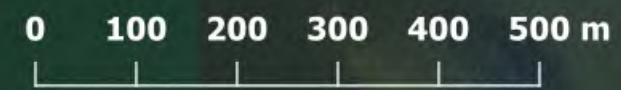


Figure L1.12

**1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity**

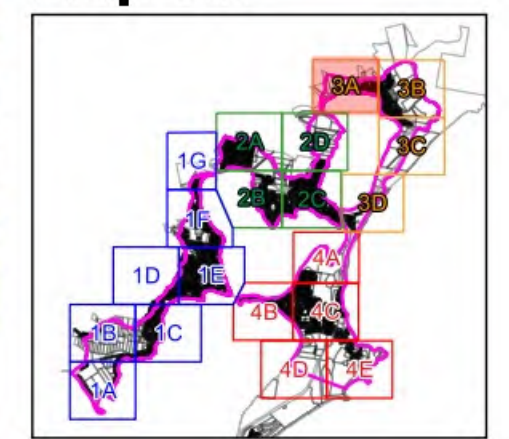
Legend

Catchment area
 Cadastre

Water Level Difference (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 3A



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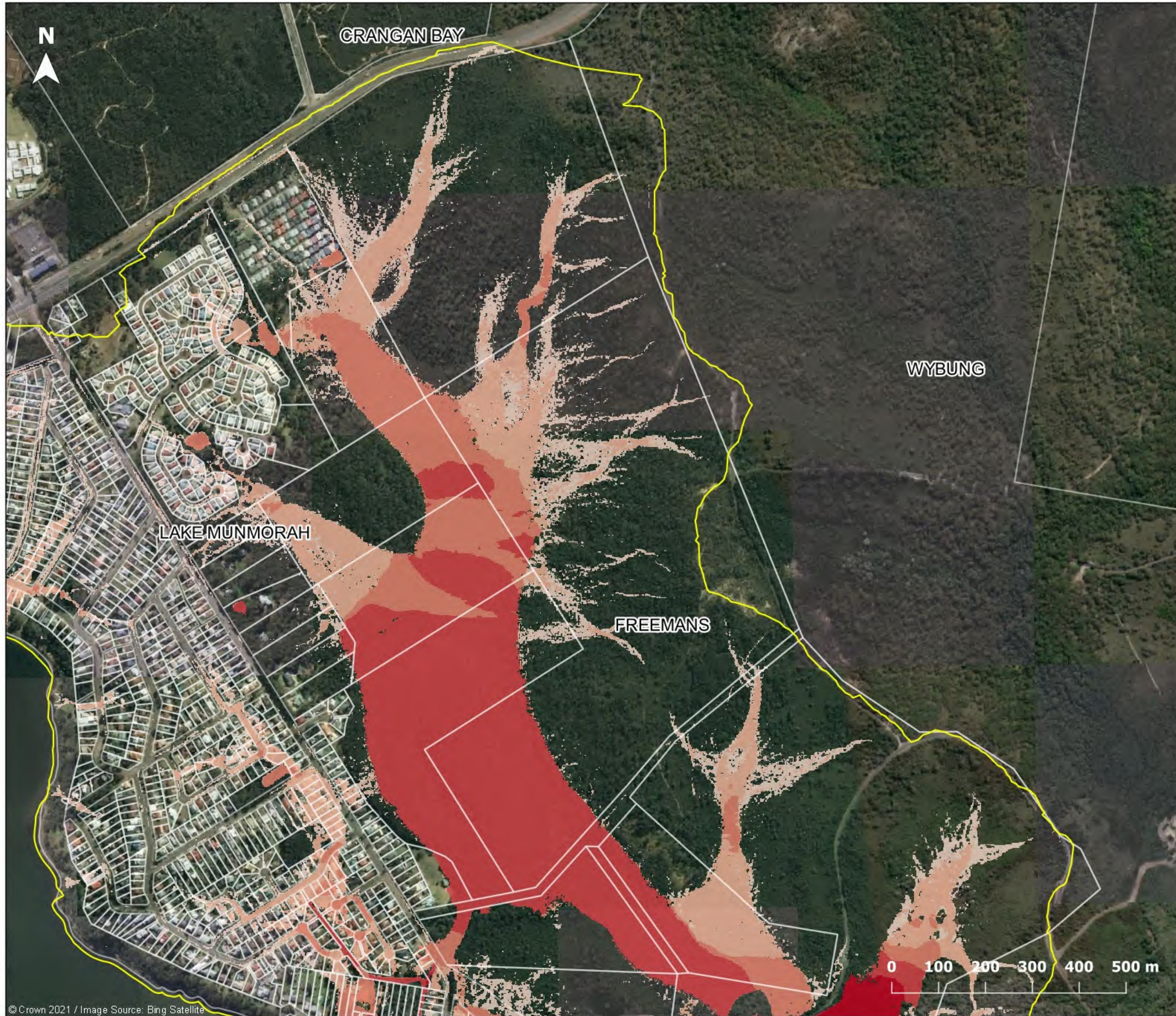


Figure L1.13

**1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity**

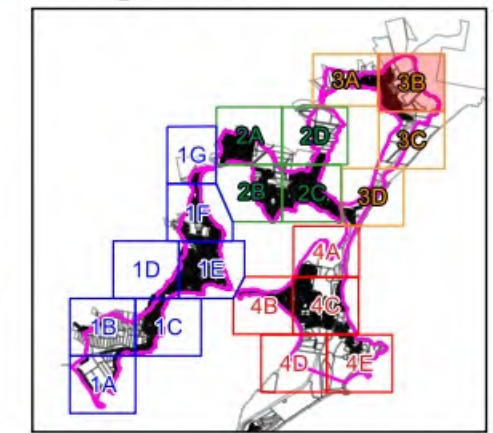
Legend

Catchment area
 Cadastre

Water Level Difference (m)

- <math>< -0.50</math>
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 3B



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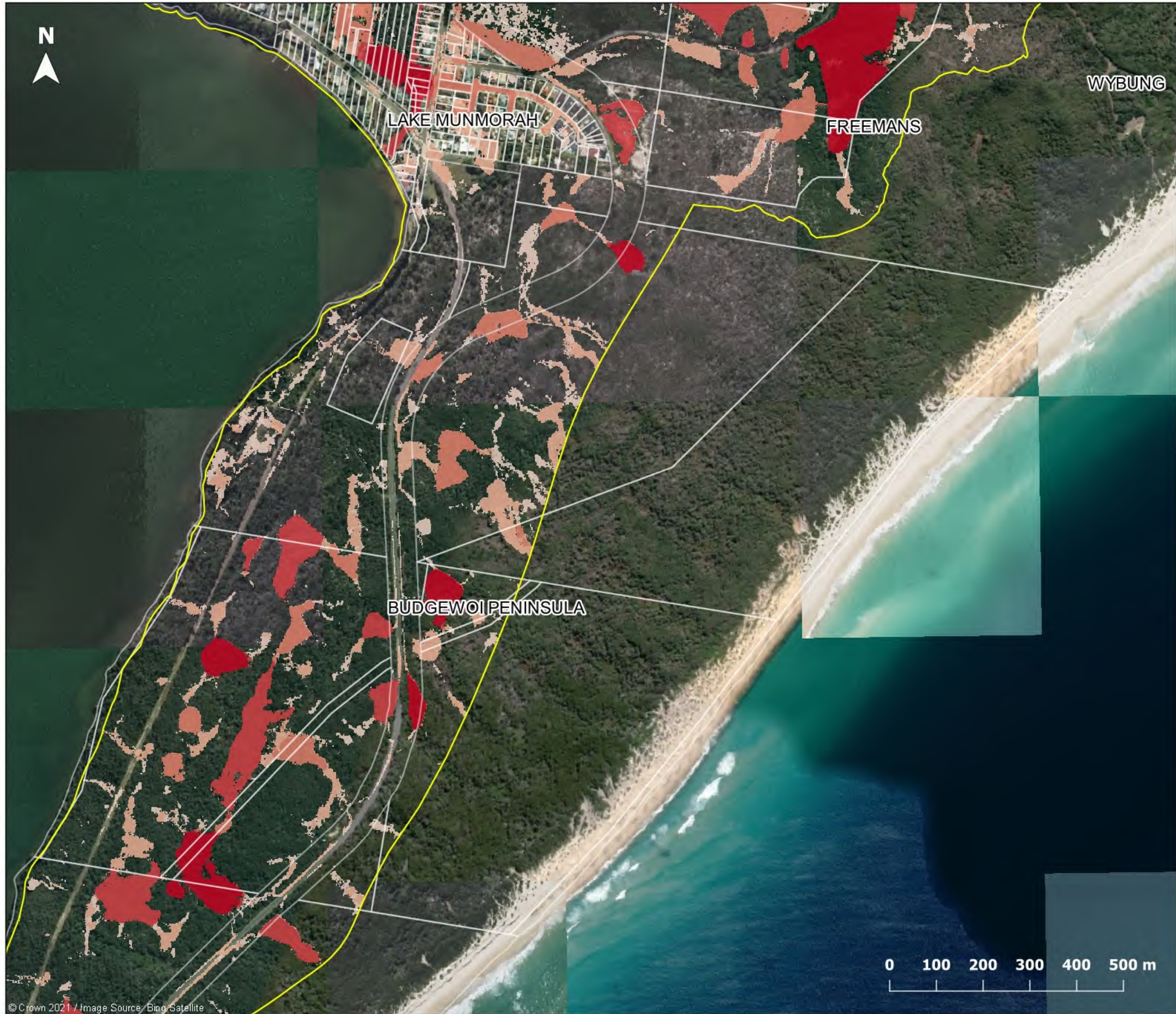


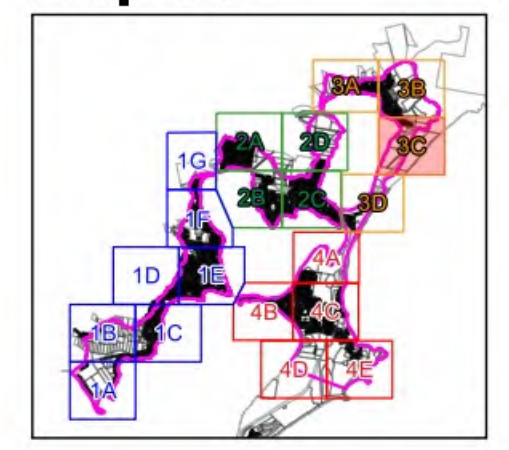
Figure L1.14

**1% AEP Flood Sensitivity
30% Increase in
Rainfall Intensity**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 3C



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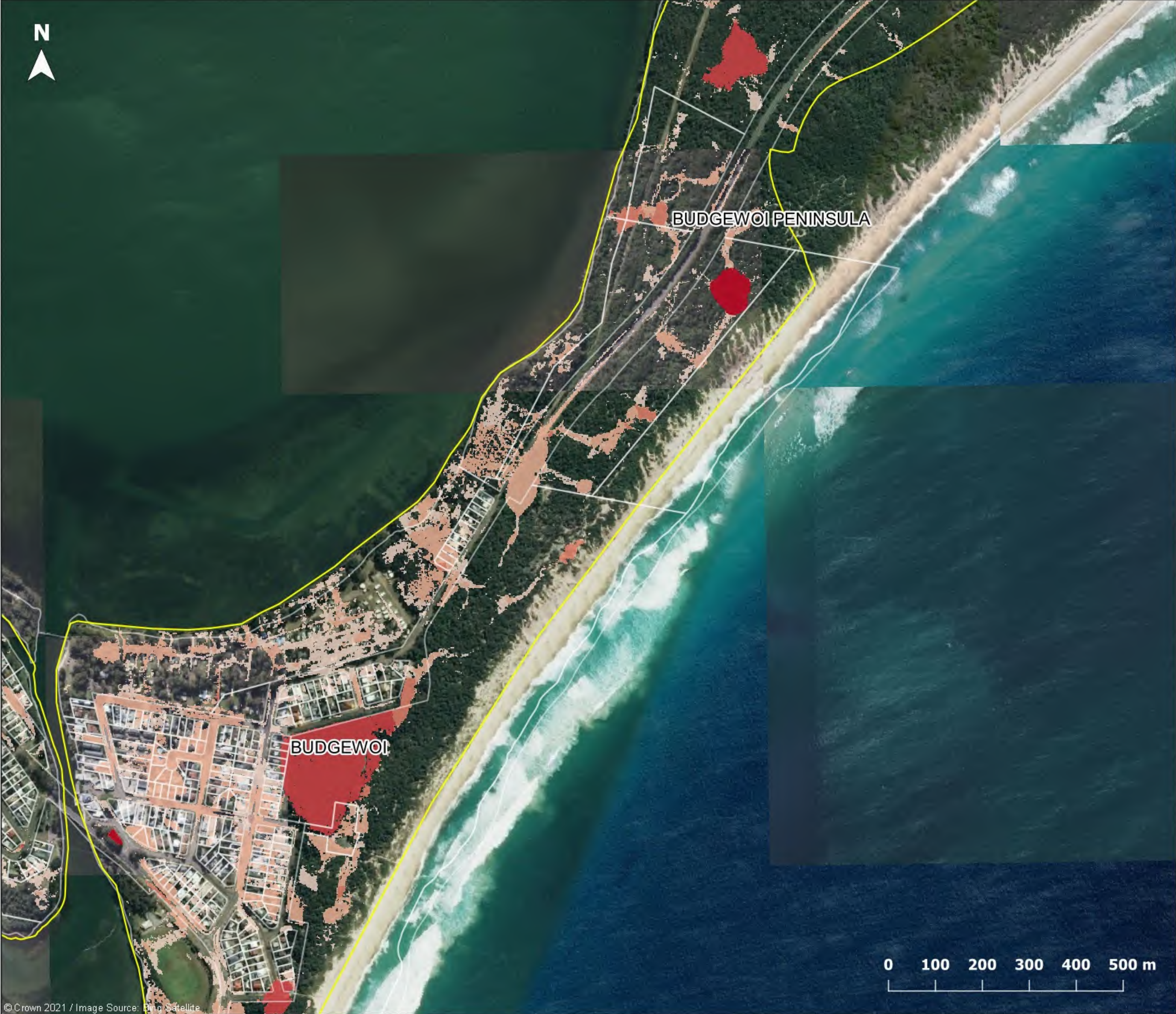
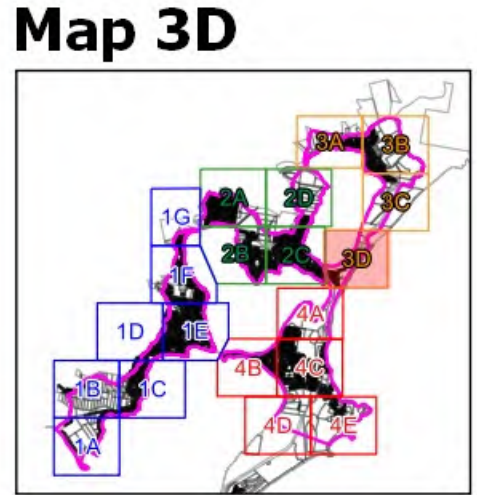


Figure L1.15
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastrate
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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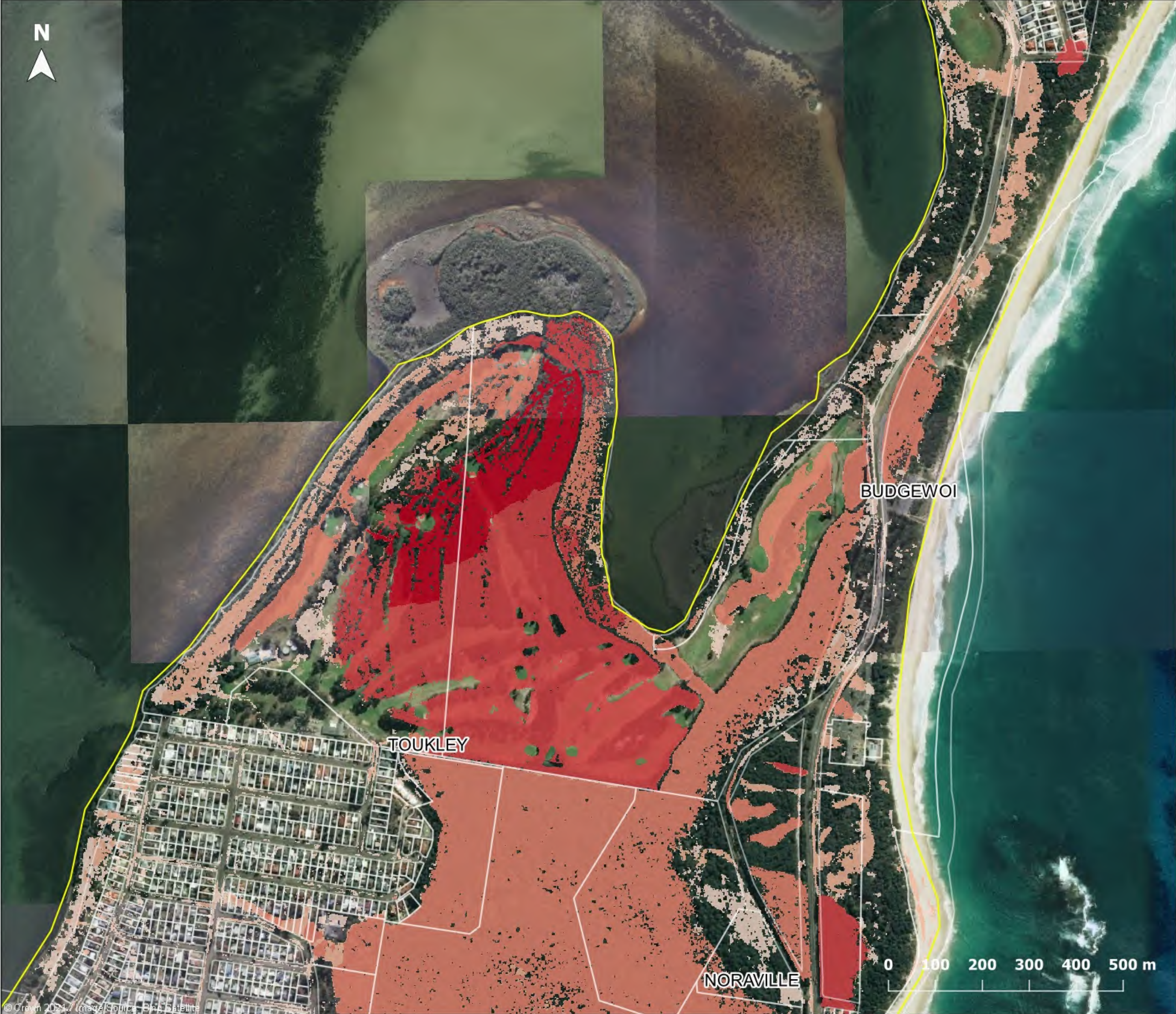
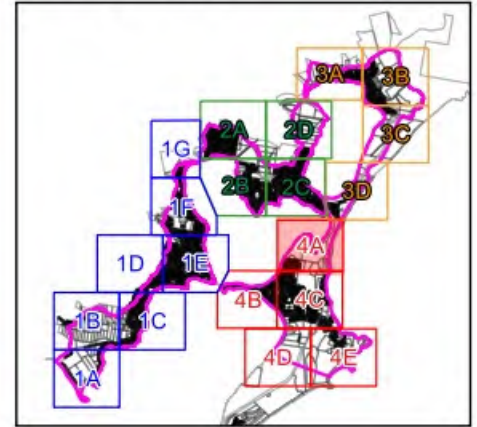


Figure L1.16
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 4A



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0 100 200 300 400 500 m

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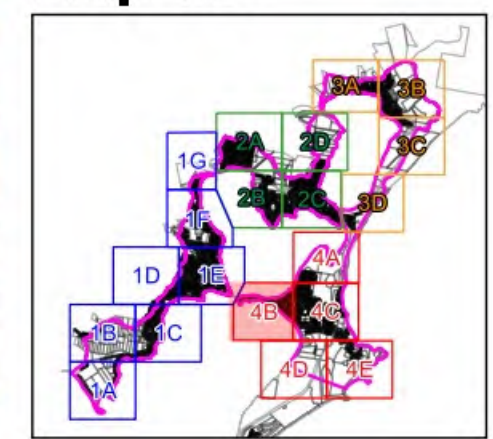


Figure L1.17

**1% AEP Flood Sensitivity
30% Increase in
Rainfall Intensity**

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 4B



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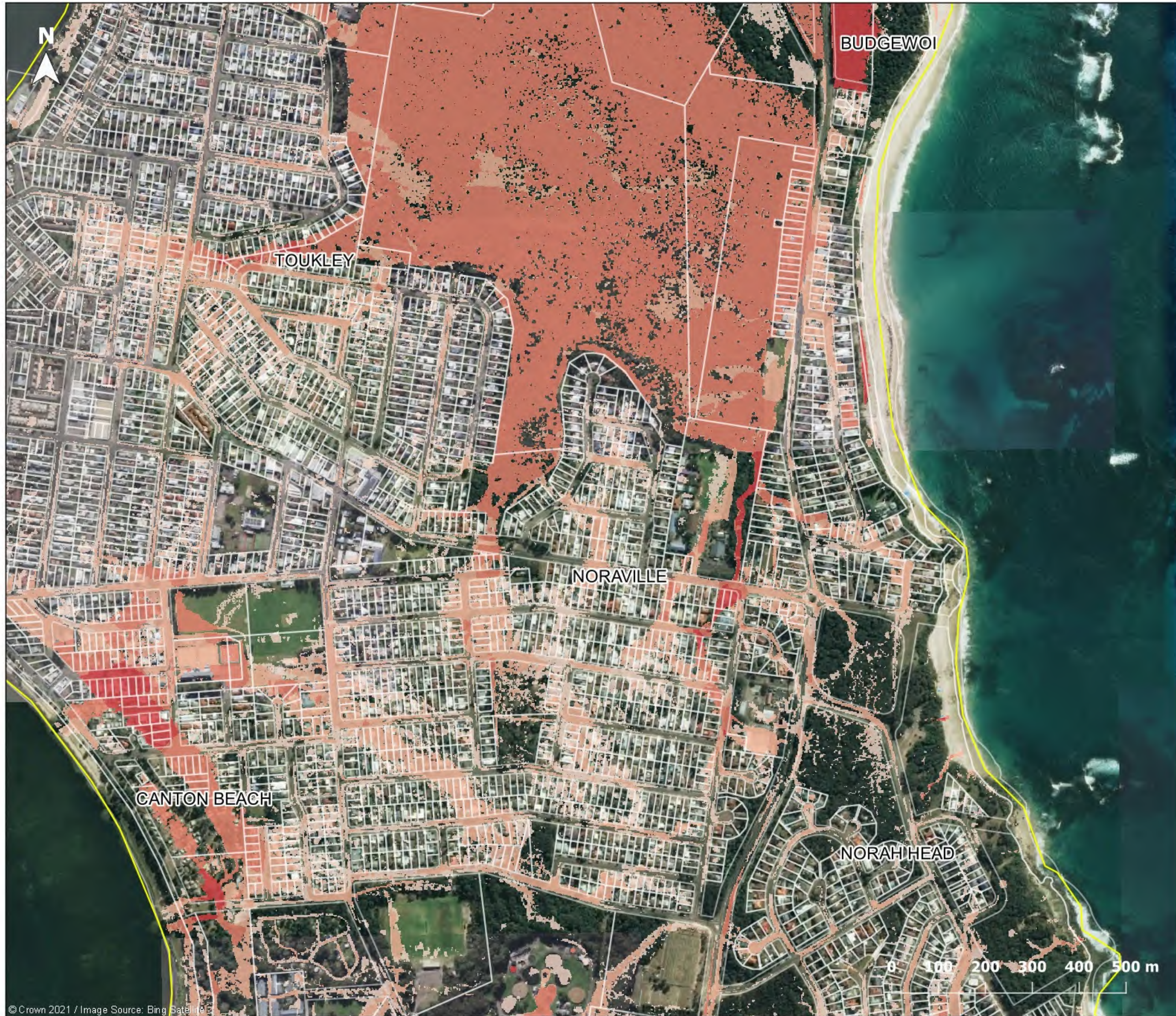
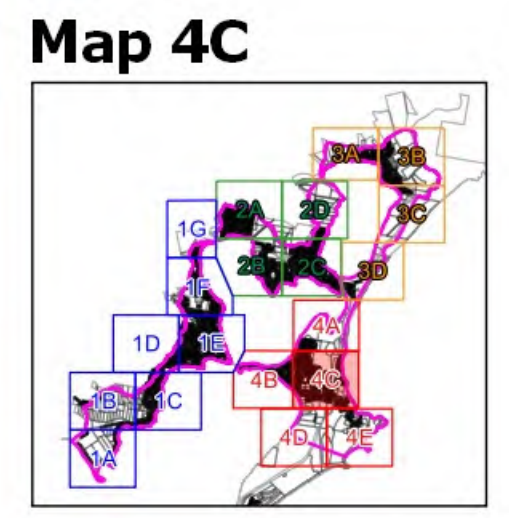


Figure L1.18
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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N



Figure L1.19

**1% AEP Flood Sensitivity
30% Increase in
Rainfall Intensity**

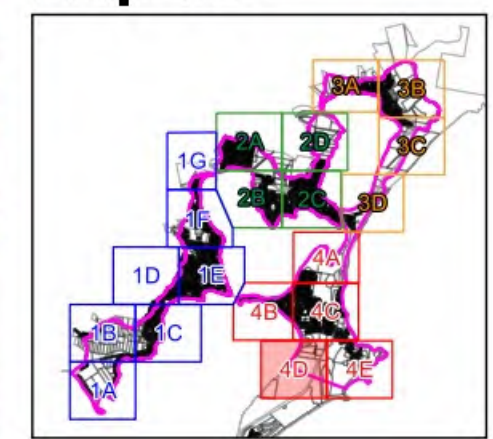
Legend

Catchment area
 Cadastre

Water Level Difference (m)

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4D



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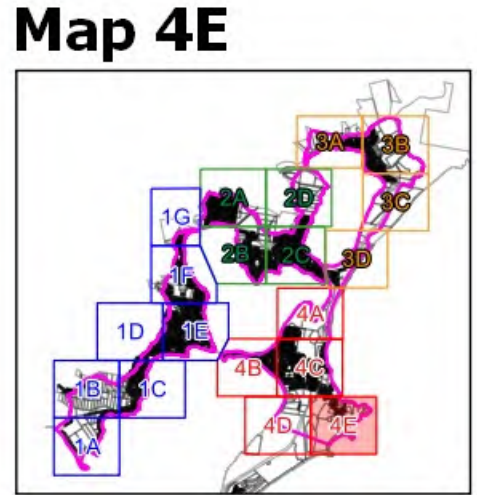
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Figure L1.20
1% AEP Flood Sensitivity
30% Increase in Rainfall Intensity

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50



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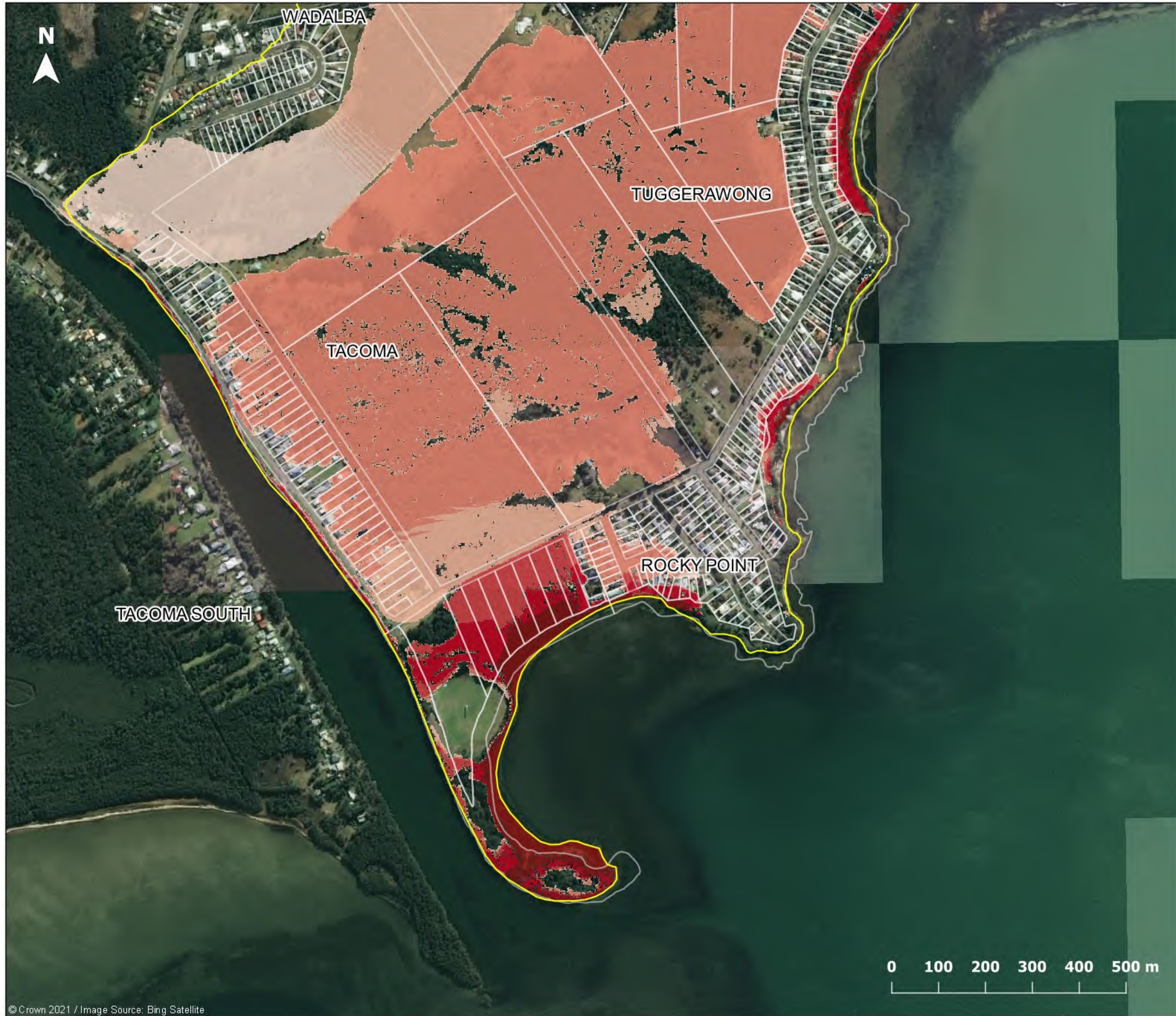
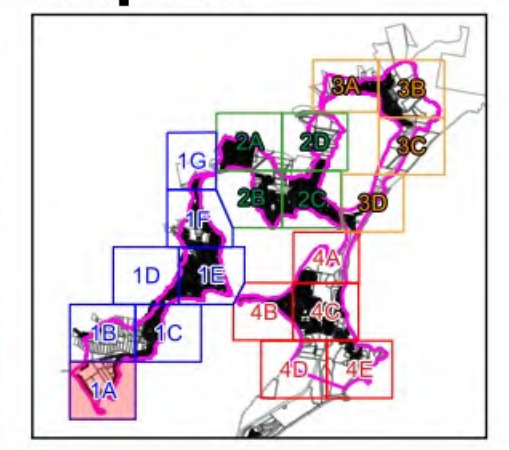


Figure L2.1

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 1A



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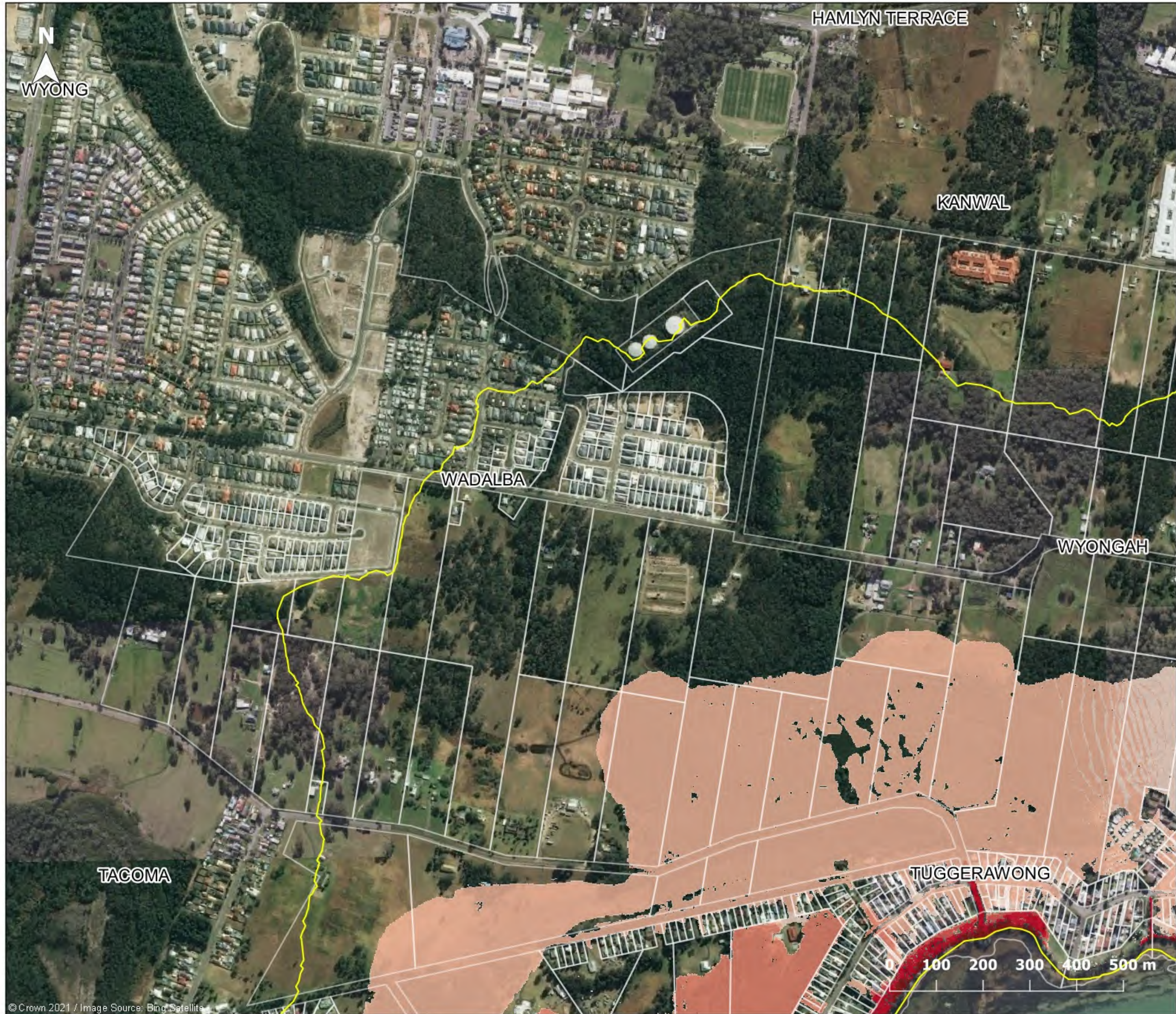


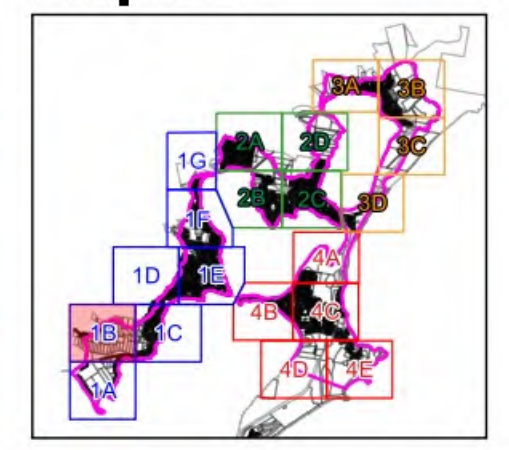
Figure L2.2

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 1B



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












Figure L2.3

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

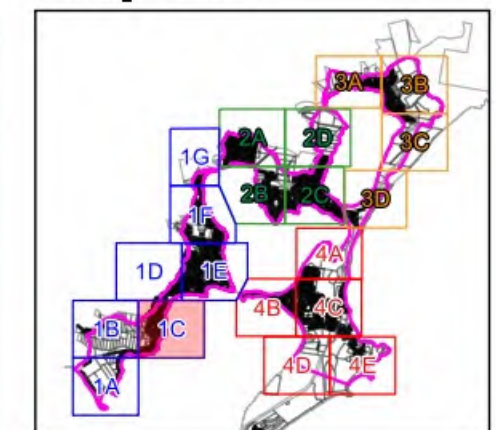
Legend

 Catchment area
Cadastre

**Water Level
Difference (m)**

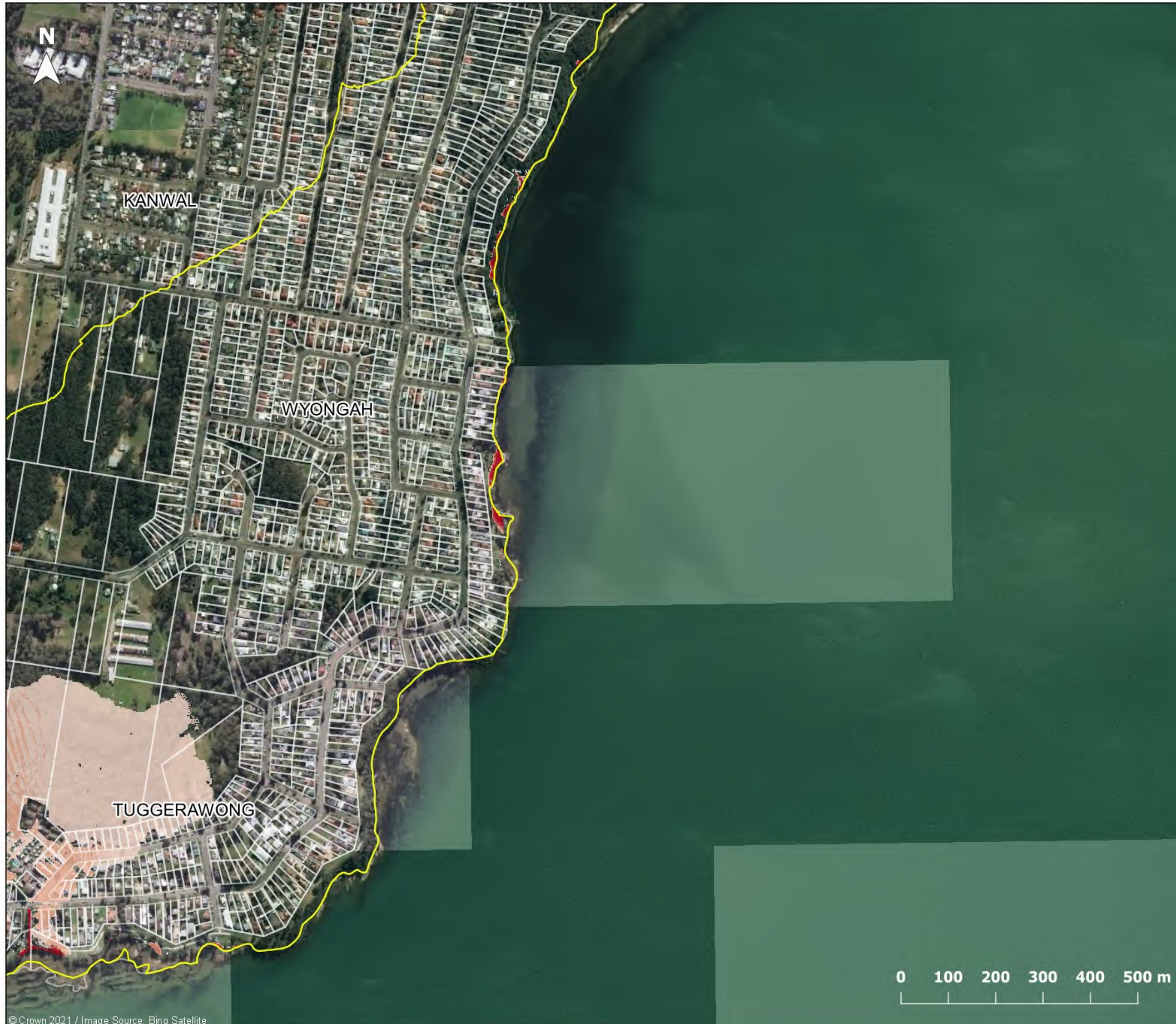
-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50

Map 1C



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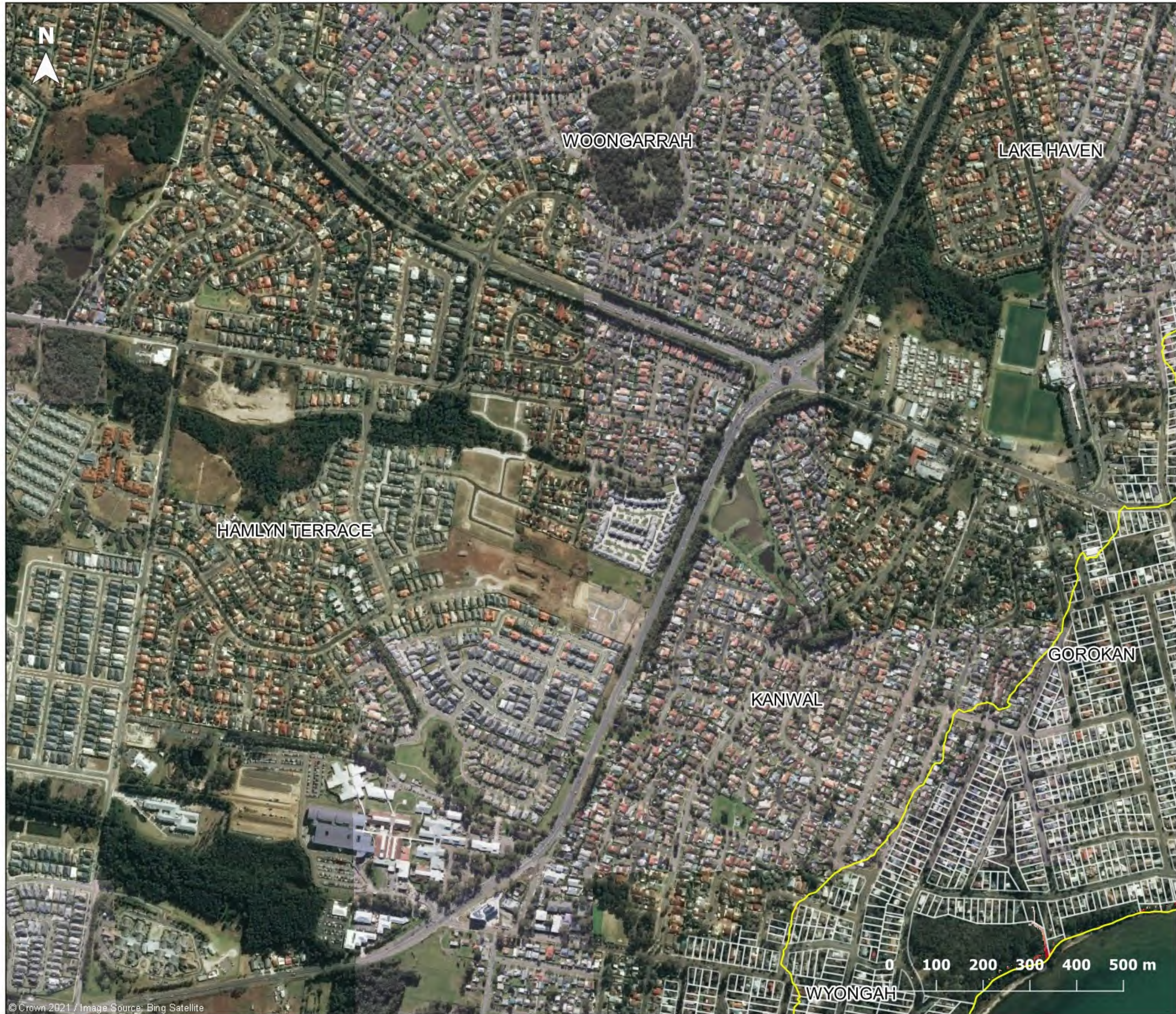


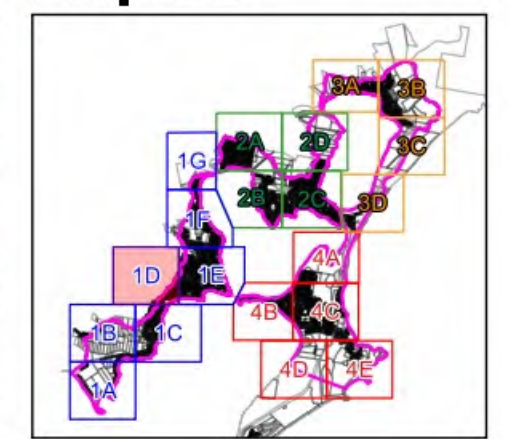
Figure L2.4

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 1D



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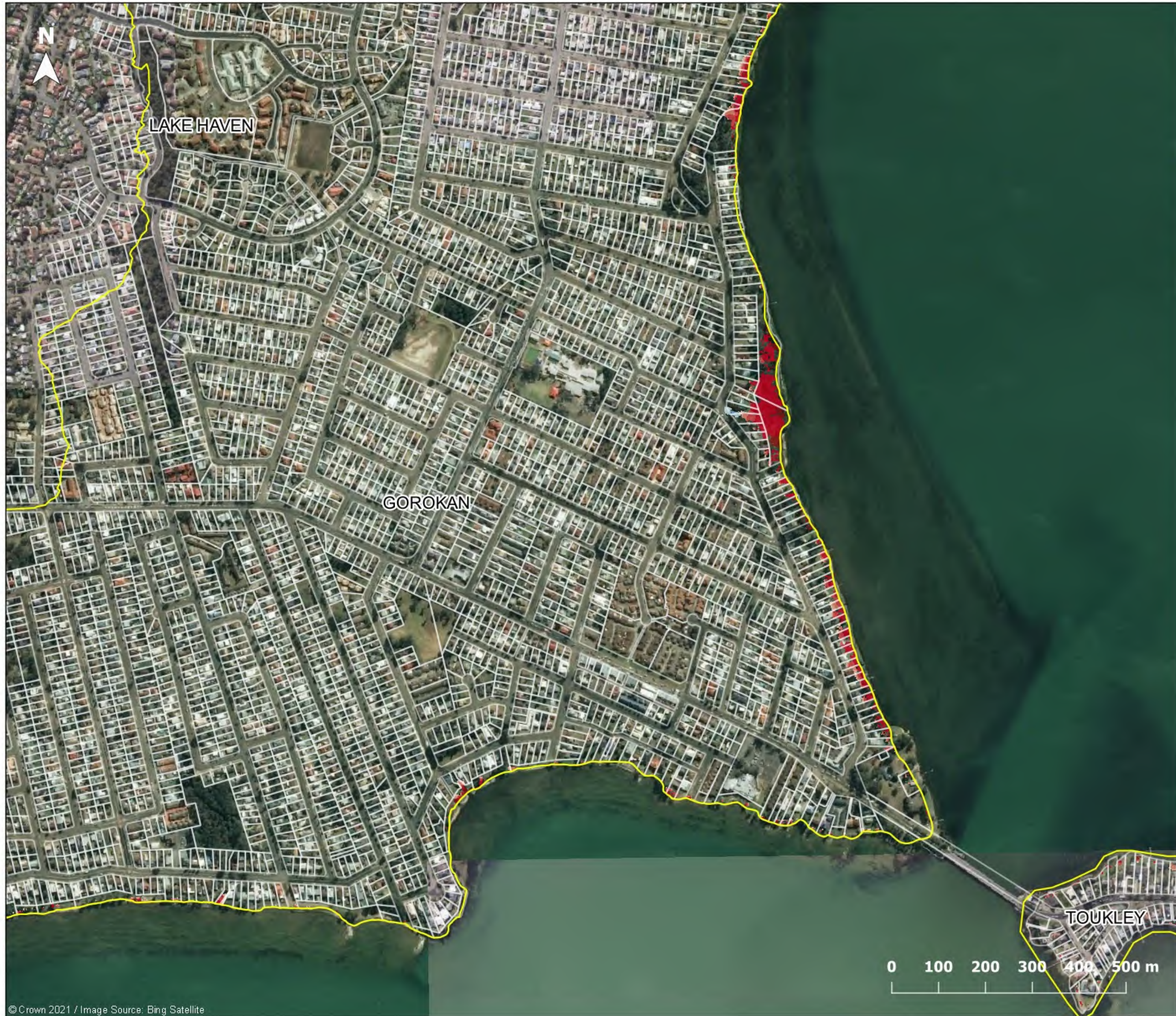


Figure L2.5

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

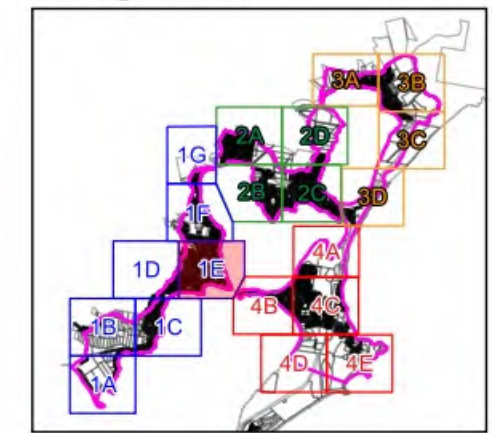
Legend

Catchment area
 Cadastre

**Water Level
Difference (m)**

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 1E



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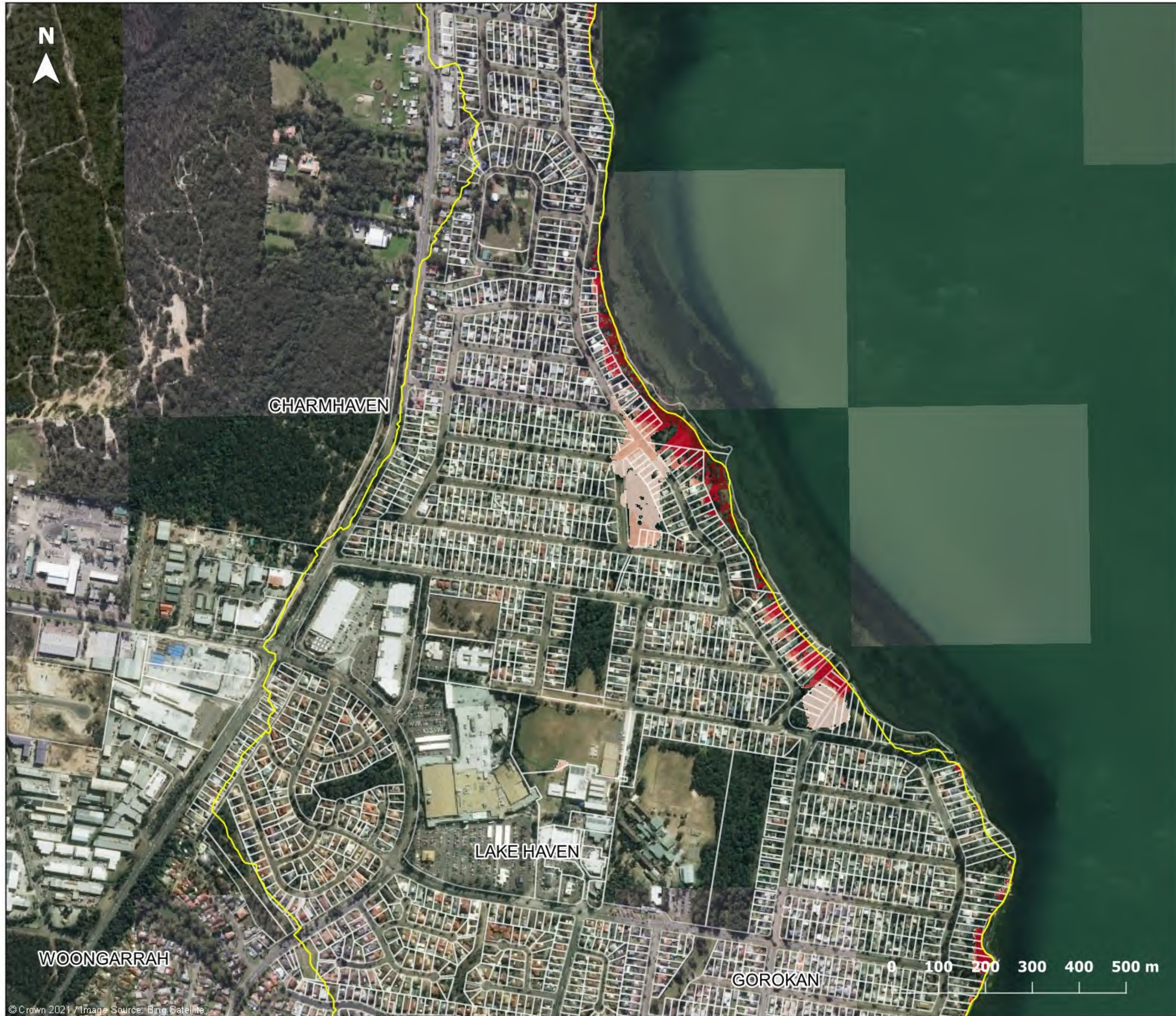


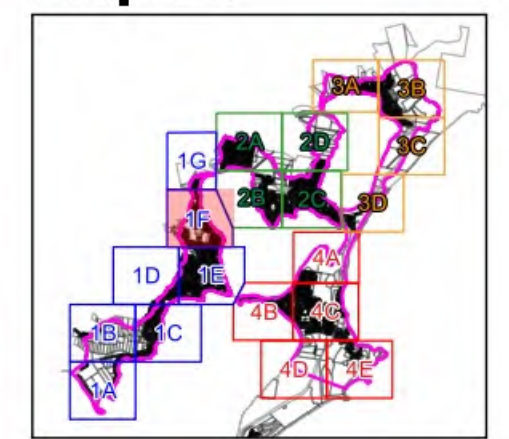
Figure L2.6

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 1F



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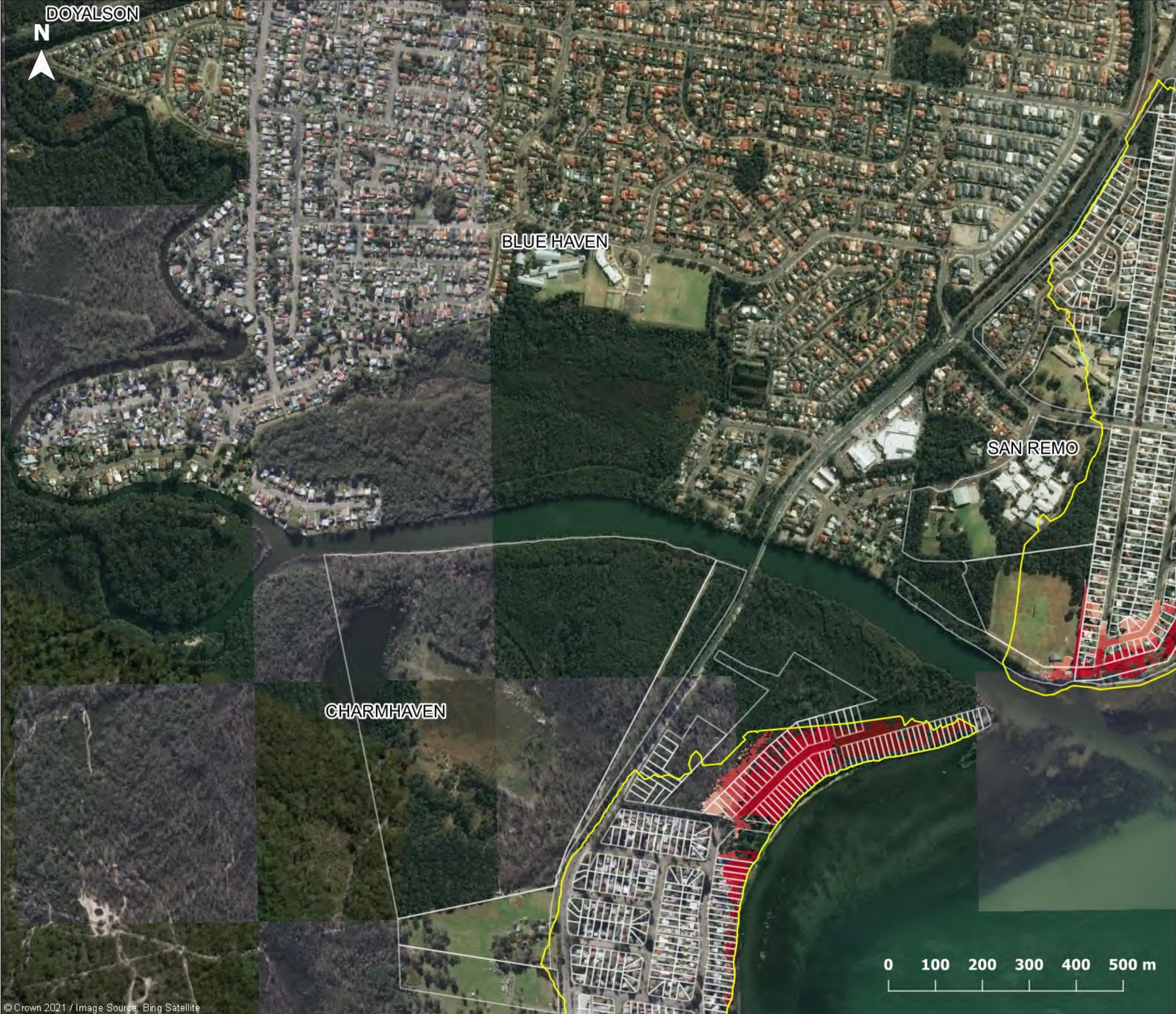


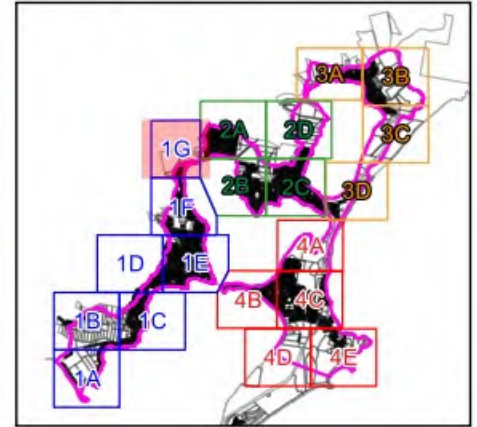
Figure L2.7

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 1G



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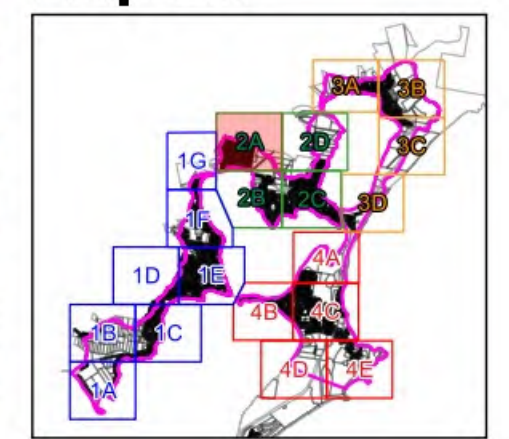
Figure L2.8

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 2A



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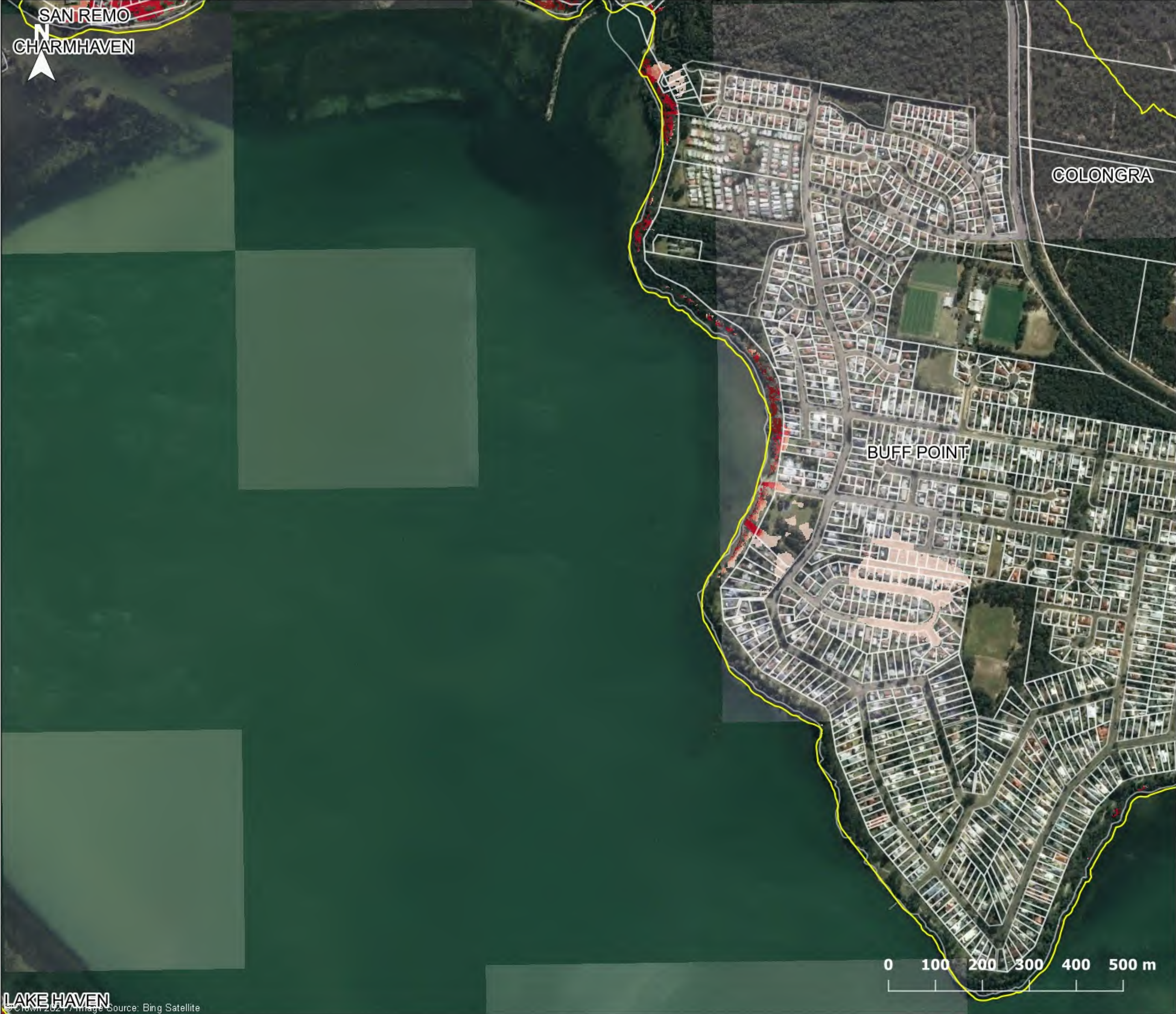


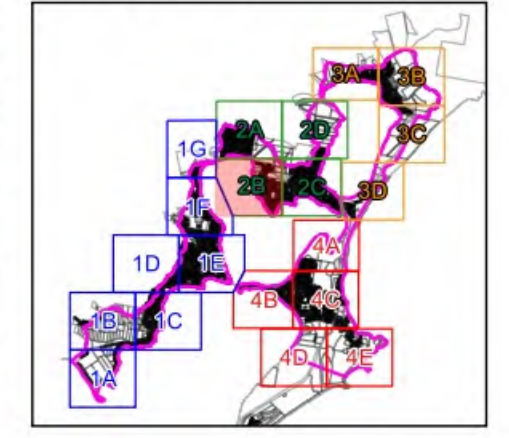
Figure L2.9

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 2B



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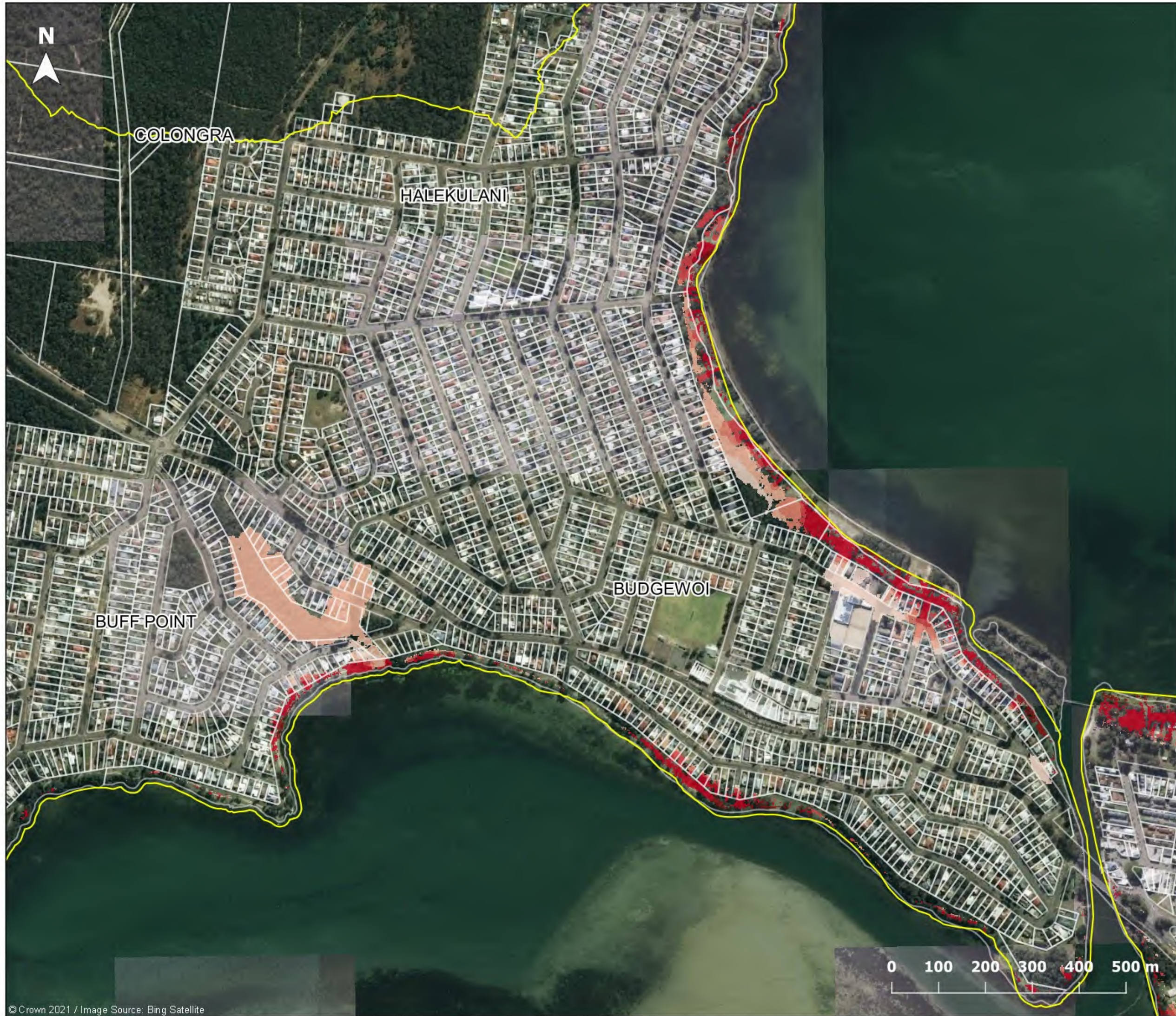
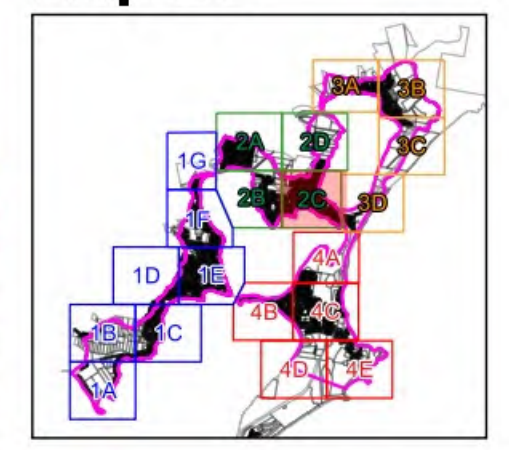


Figure L2.10

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 2C



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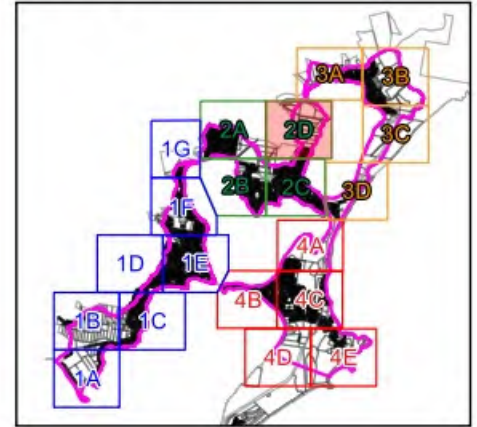
Figure L2.11

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 2D



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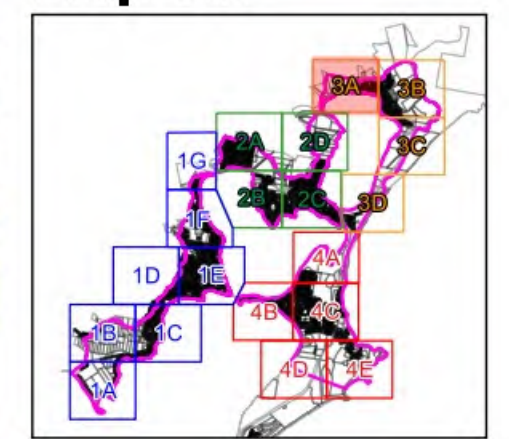
Figure L2.12

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 3A



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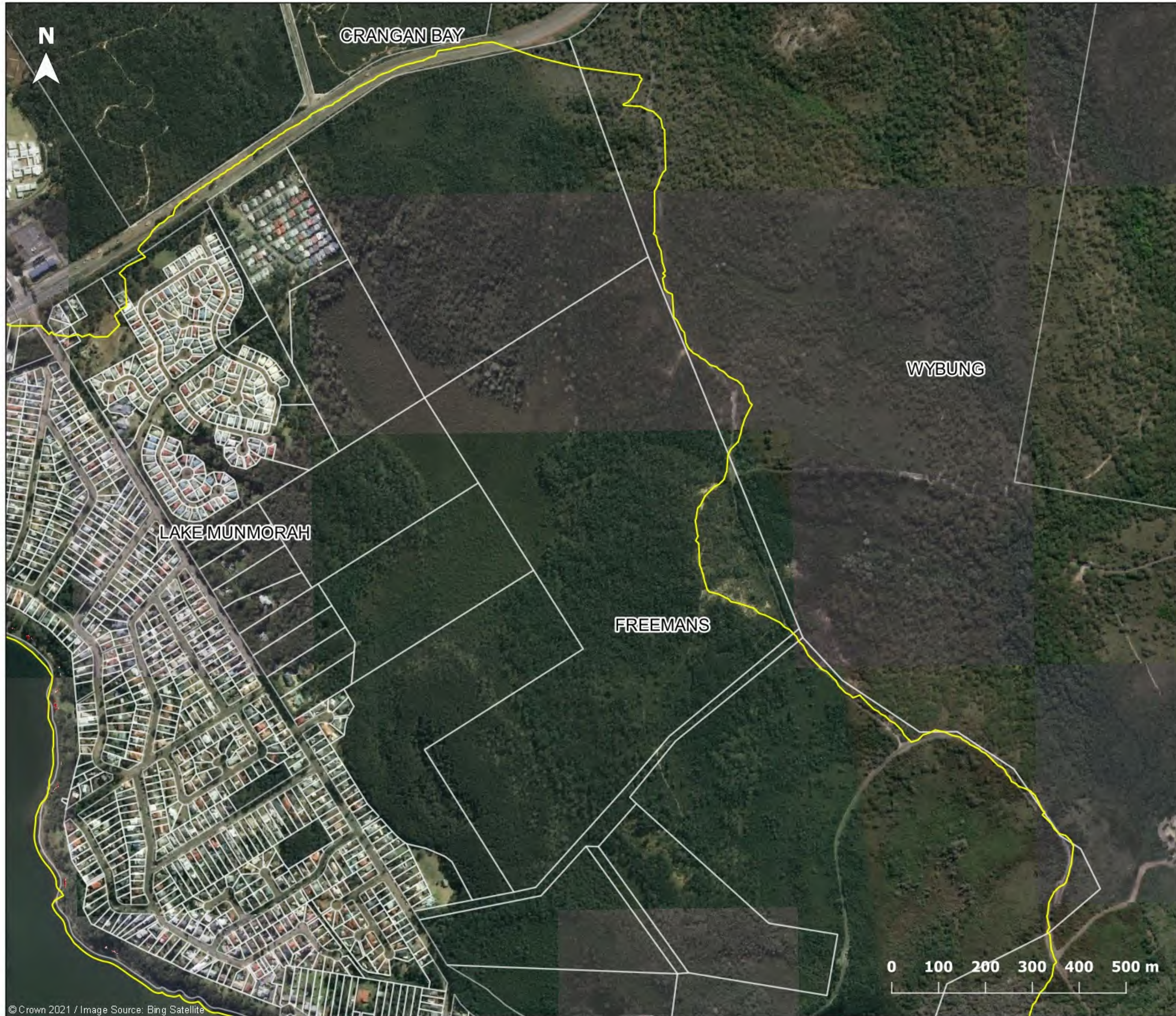


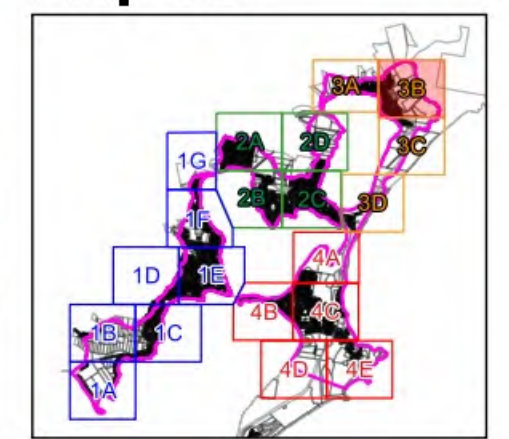
Figure L2.13

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 3B



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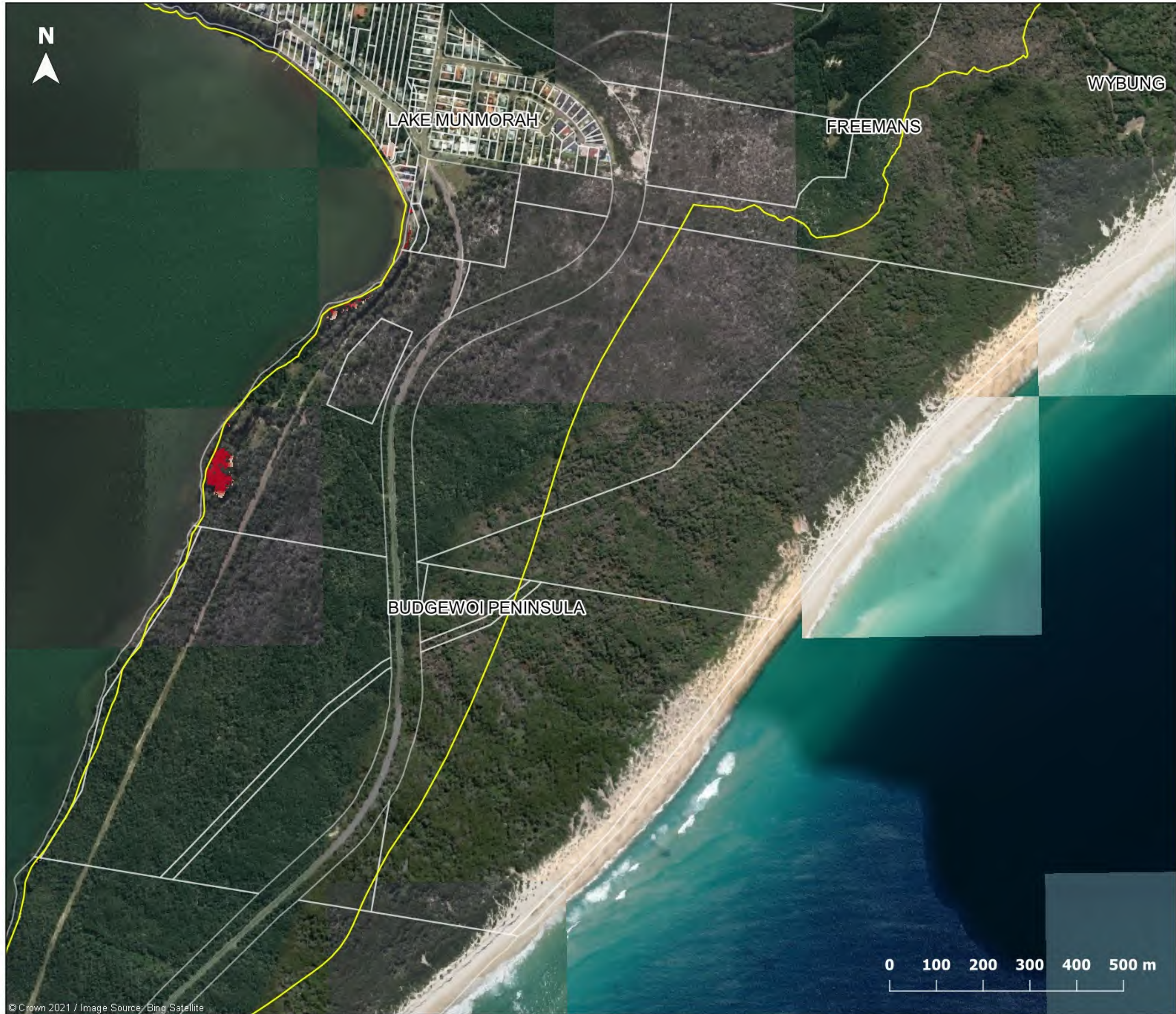
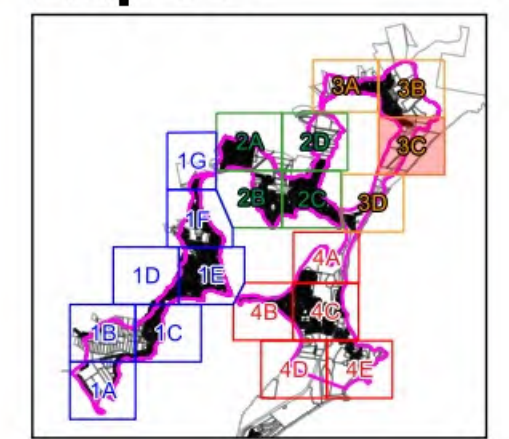


Figure L2.14

1% AEP Flood Sensitivity Sea Level Rise of 740 mm

- Legend**
- Catchment area
 - Cadastre
- Water Level Difference (m)**
- < -0.50
 - 0.50 to -0.20
 - 0.20 to -0.10
 - 0.10 to -0.05
 - 0.05 to -0.02
 - 0.02 to -0.01
 - 0.01 to 0.01
 - 0.01 to 0.02
 - 0.02 to 0.05
 - 0.05 to 0.10
 - 0.10 to 0.20
 - 0.20 to 0.50
 - > 0.50

Map 3C



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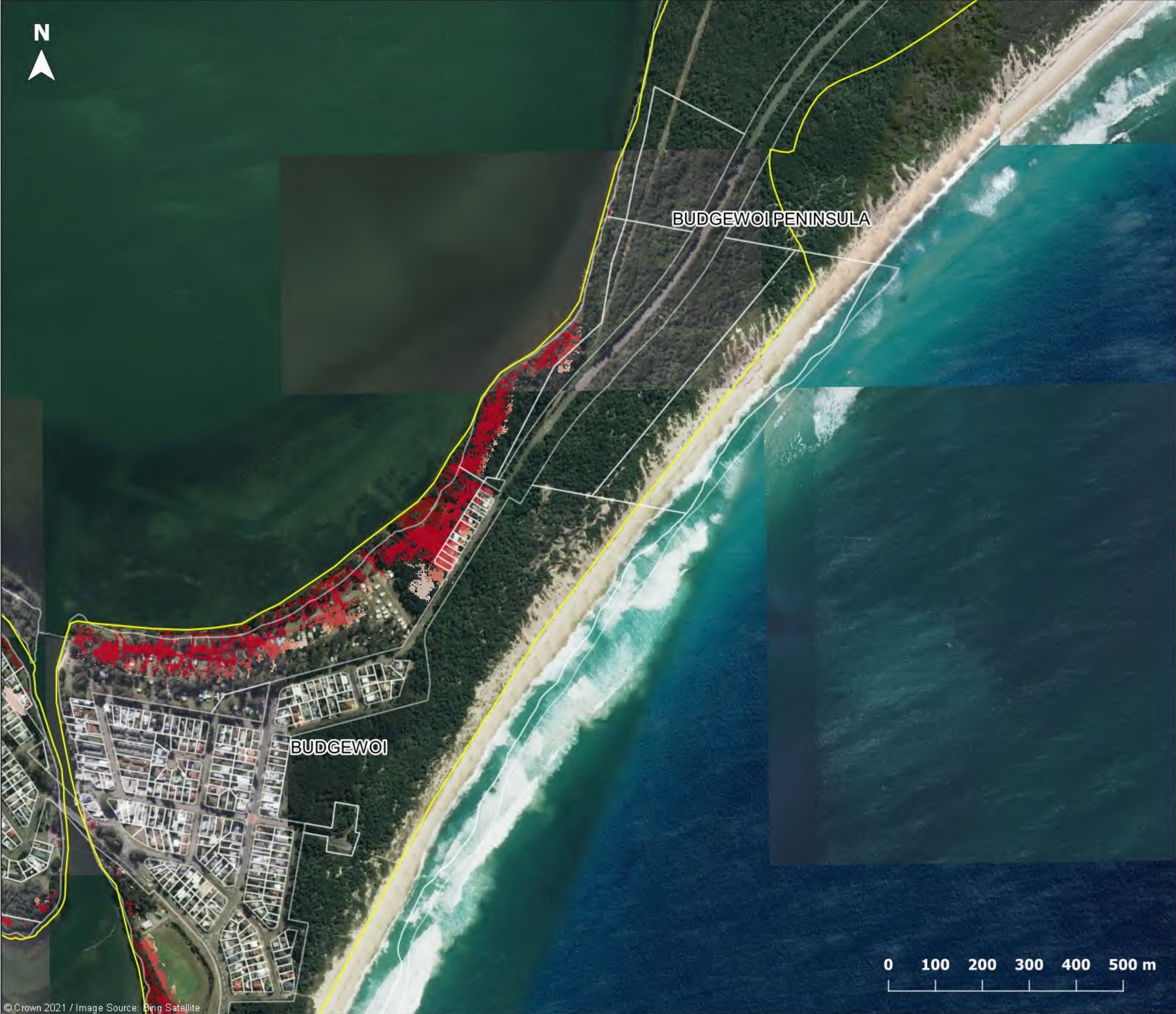

















Figure L2.15

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

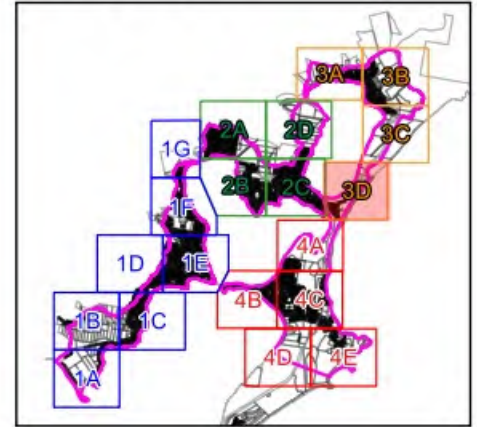
Legend

 Catchment area
 Cadastre

**Water Level
Difference (m)**

-  < -0.50
-  -0.50 to -0.20
-  -0.20 to -0.10
-  -0.10 to -0.05
-  -0.05 to -0.02
-  -0.02 to -0.01
-  -0.01 to 0.01
-  0.01 to 0.02
-  0.02 to 0.05
-  0.05 to 0.10
-  0.10 to 0.20
-  0.20 to 0.50
-  > 0.50

Map 3D



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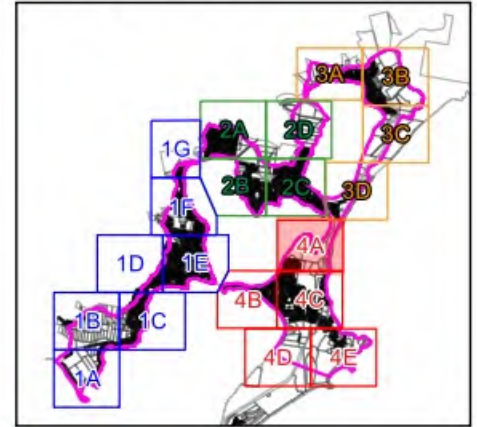
Figure L2.16

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4A



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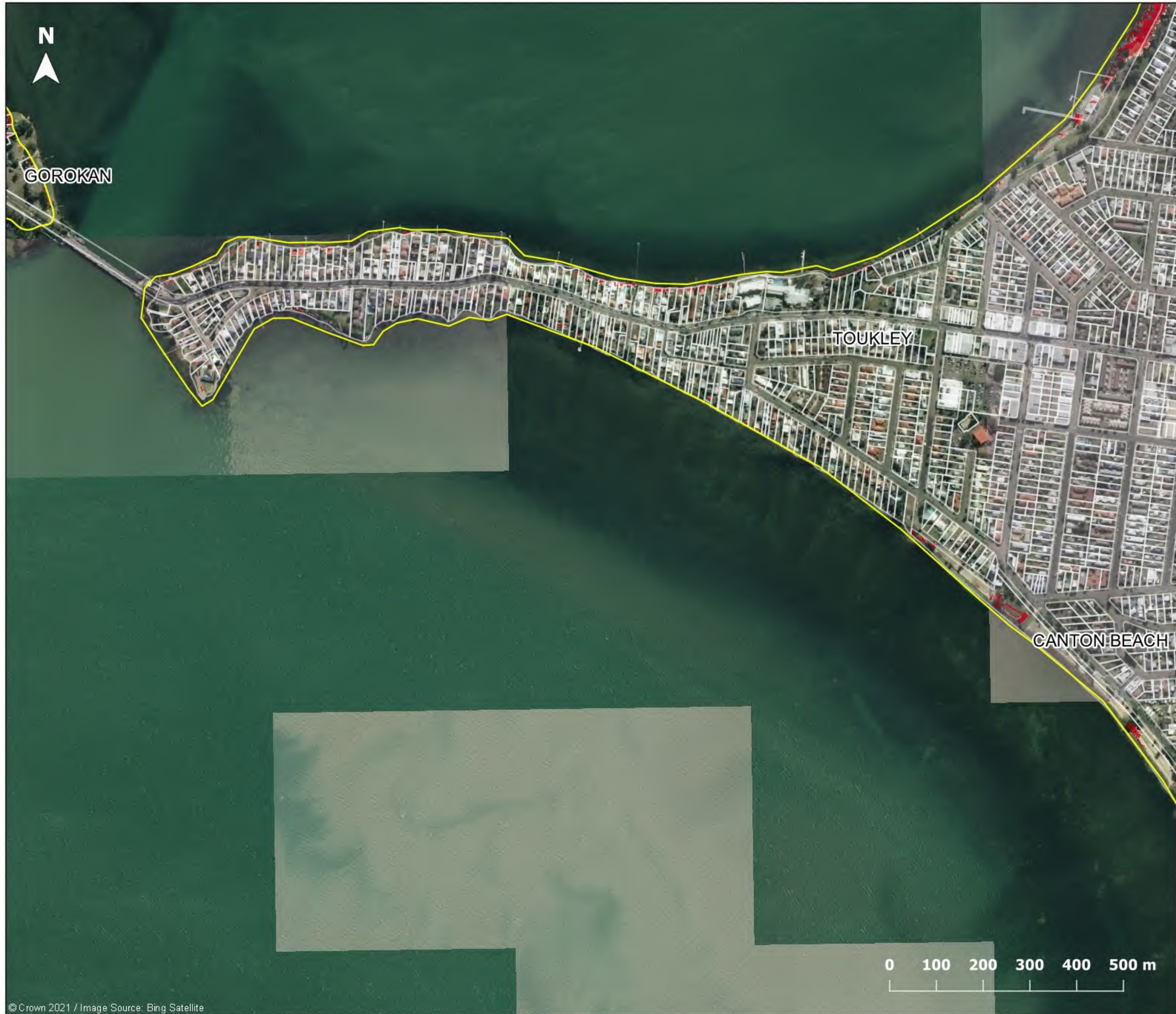


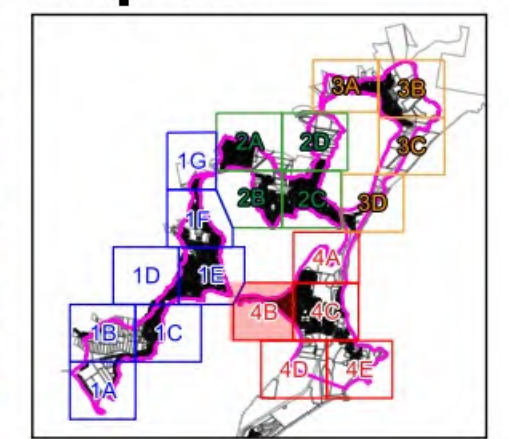
Figure L2.17

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4B



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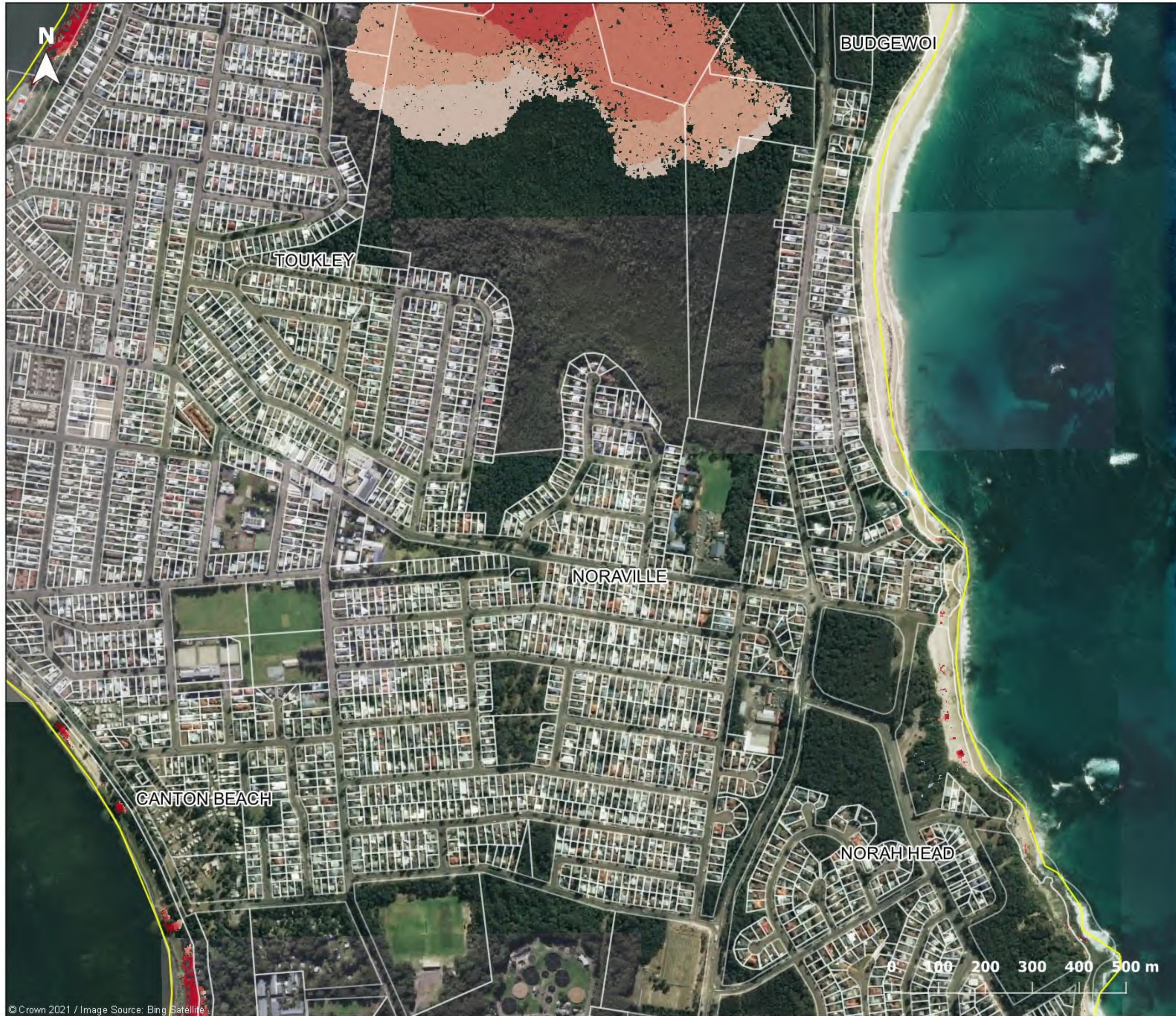


Figure L2.18

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

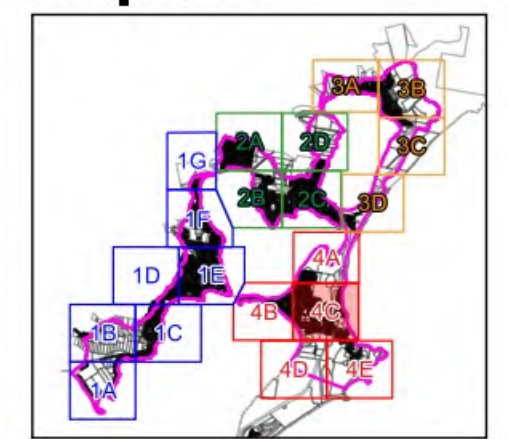
Legend

Catchment area
Cadastre

**Water Level
Difference (m)**

- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4C



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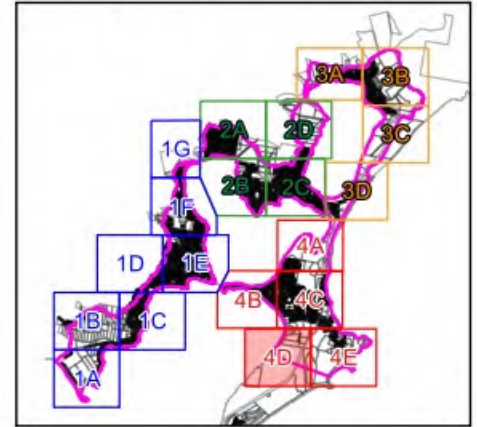
Figure L2.19

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- <math>< -0.50</math>
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4D



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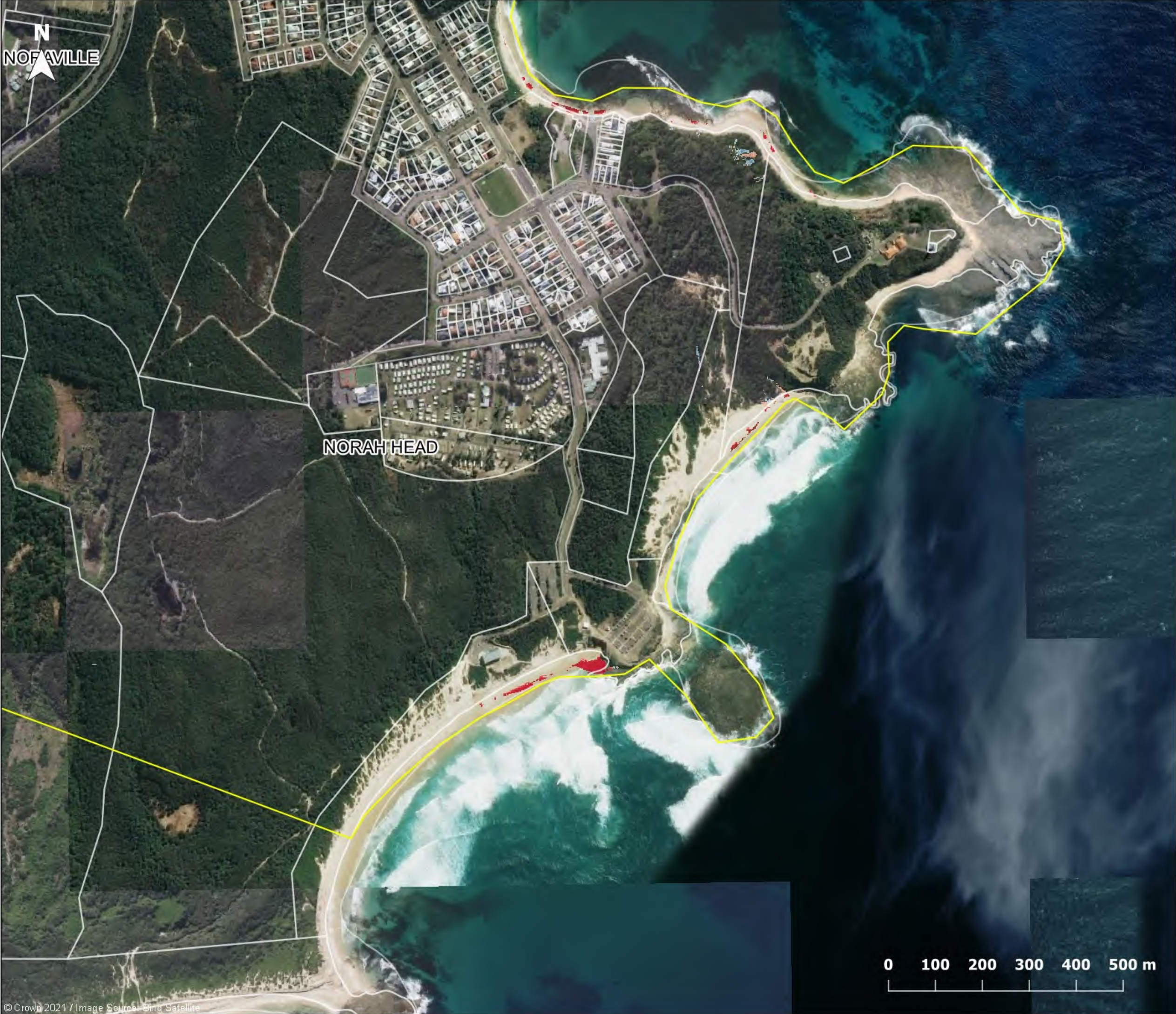


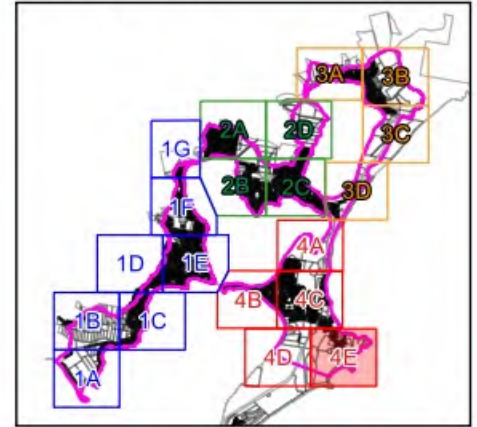
Figure L2.20

**1% AEP Flood Sensitivity
Sea Level Rise
of 740 mm**

Legend

- Catchment area
- Cadastre
- Water Level Difference (m)**
- < -0.50
- 0.50 to -0.20
- 0.20 to -0.10
- 0.10 to -0.05
- 0.05 to -0.02
- 0.02 to -0.01
- 0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

Map 4E



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