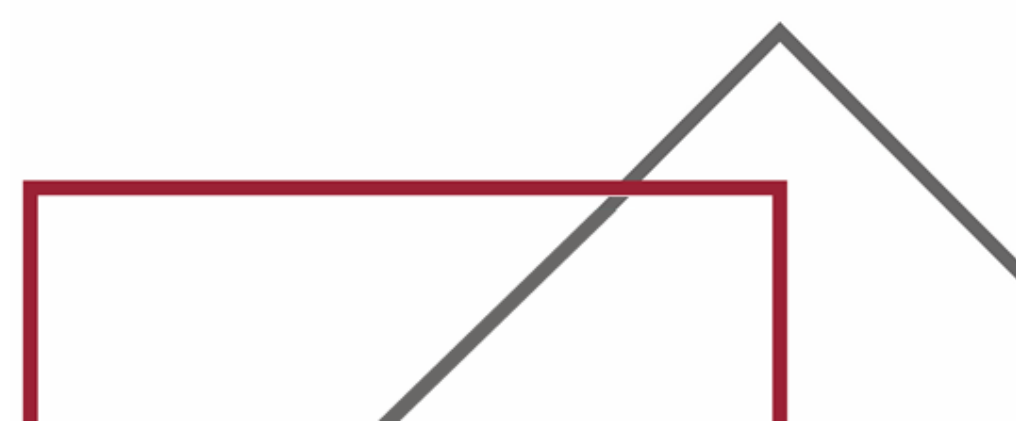




Minnegang Creek Flood Study

Volume 2 - Maps



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Document Control

Rev	Effective Date	Description of Revision	Prepared by:	Reviewed by:
0	22 July 2019	Executive Summary issued to Council	LRE	RST
1	15 August 2019	Internal Review	LRE	RST/ERM
2	16 August 2019	Issue of Draft Flood Study to Council	LRE	RST
3	9 October 2019	Executive Summary issues to Council	RST	RST
4	23 October 2019	Issue of Final Flood Study to Council	LRE	RST

Prepared For: Wollongong City Council

Project Name: Minnegang Creek Flood Study

Rhelm Reference: J1098_R04_Rev4

Document Location: C:\Dropbox (Rhelm)\Jobs\J1074 - Minnegang FS\4. Reports\R005 Minnegang Final Report\J1074_R004_Minnegang_Stage_4_Rev4_Vol-2.docx

Client Reference: Final Flood Study

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

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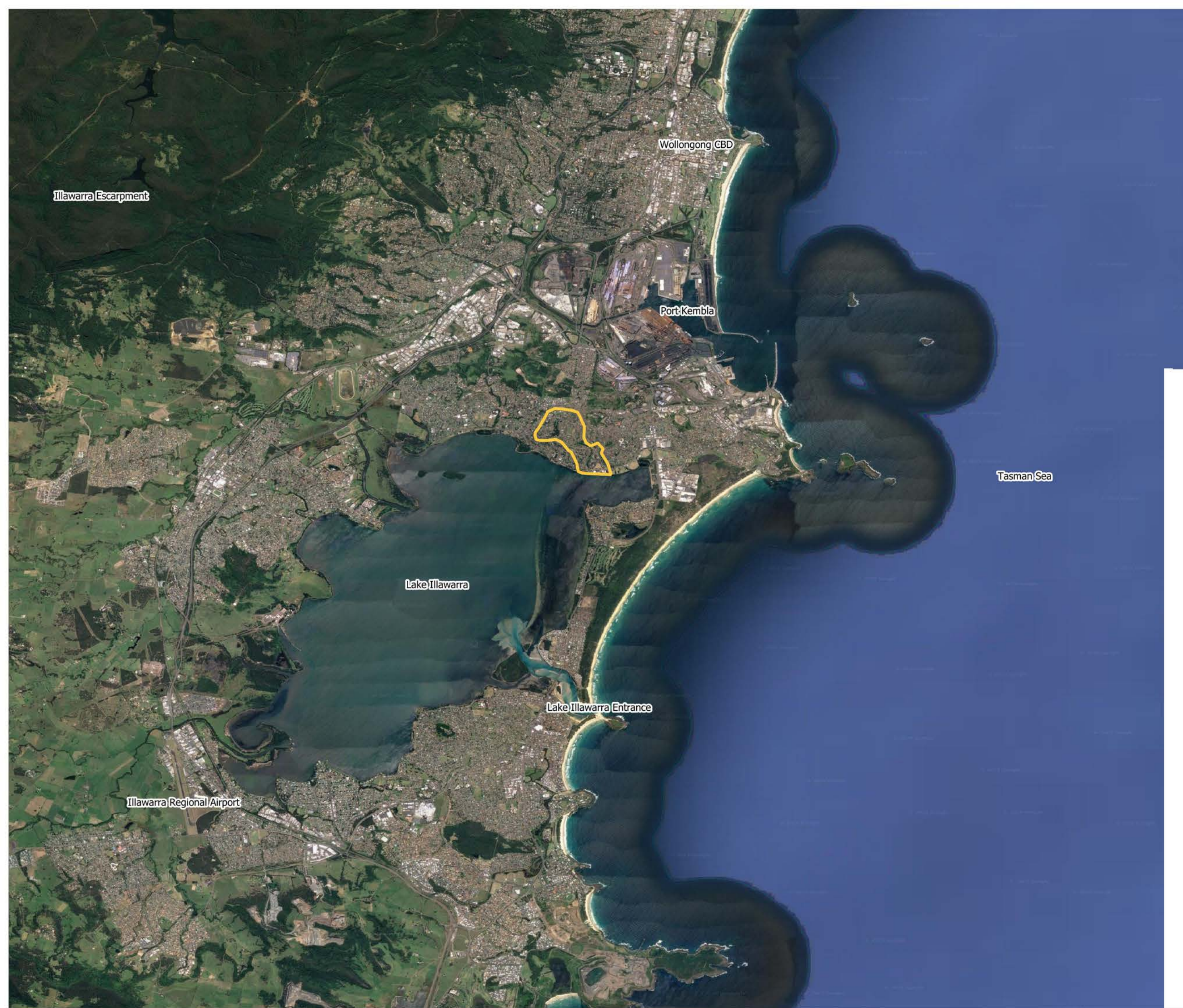
council@wollongong.nsw.gov.au

+612 4227 7111

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G101	Study Area Location	G703-D-1	PMF Hazard – Design Scenario
G201	Catchment Area Features	G703-D-2	1% AEP Hazard – Design Scenario
G301	Additional Survey	G703-R-1	PMF Hazard – Risk Scenario
G302	Historic Survey Marks	G703-R-2	1% AEP Hazard – Risk Scenario
G303	Rainfall Gauges	G704-D-1	PMF Flood Categories – Design Scenario
G501	Subcatchments	G704-D-2	1% AEP Flood Categories – Design Scenario
G502	Tuflow Model Setup	G704-R-1	PMF Flood Categories – Risk Scenario
G503	Roughness Zones	G704-R-2	1% AEP Flood Categories – Risk Scenario
G601	Historical Data Points	G801-R-1	Flood Extent Comparison – Risk Scenario
G602	1985 Validation	G802	Flood Planning Area
G603	1987 Validation	G803-R-1	Flood Emergency Response Classifications
G604	1990 Validation	G901-R-1	PMF Sensitivity Roughness +20% - Risk Scenario
G605	1998 Validation	G901-R-2	1% AEP Sensitivity Roughness -20% - Risk Scenario
G606	Mike-11 Comparison	G902-R-1	PMF Sensitivity Rainfall +20% - Risk Scenario
G701-D-1	PMF Peak Depth & Water Level – Design Scenario	G902-R-2	1% AEP Sensitivity Rainfall -20% - Risk Scenario
G701-D-2	1% AEP Peak Depth & Water Level – Design Scenario	G903-R-1	1% AEP Sensitivity Blockage Risk Scenario less Unblocked Scenario
G701-D-3	2% AEP Peak Depth & Water Level – Design Scenario	G904-D-2	1% AEP Climate Change 2050 – Design Scenario
G701-D-4	5% AEP Peak Depth & Water Level – Design Scenario	G904-D-4	1% AEP Climate Change 2100 – Design Scenario
G701-D-5	10% AEP Peak Depth & Water Level – Design Scenario	G904-R-2	1% AEP Climate Change 2050 – Risk Scenario
G701-D-6	20% AEP Peak Depth & Water Level – Design Scenario	G904-R-4	1% AEP Climate Change 2100 – Risk Scenario
G701-R-1	PMF Peak Depth & Water Level – Risk Scenario		
G701-R-2	1% AEP Peak Depth & Water Level – Risk Scenario		
G701-R-3	2% AEP Peak Depth & Water Level – Risk Scenario		
G701-R-4	5% AEP Peak Depth & Water Level – Risk Scenario		
G701-R-5	10% AEP Peak Depth & Water Level – Risk Scenario		
G701-R-6	20% AEP Peak Depth & Water Level – Risk Scenario		
G702-D-1	PMF Peak Velocity – Design Scenario		
G702-D-2	1% AEP Peak Velocity – Design Scenario		
G702-D-3	2% AEP Peak Velocity – Design Scenario		
G702-D-4	5% AEP Peak Velocity – Design Scenario		
G702-D-5	10% AEP Peak Velocity – Design Scenario		
G702-D-6	20% AEP Peak Velocity – Design Scenario		
G702-R-1	PMF Peak Velocity – Risk Scenario		
G702-R-2	1% AEP Peak Velocity – Risk Scenario		
G702-R-3	2% AEP Peak Velocity – Risk Scenario		
G702-R-4	5% AEP Peak Velocity – Risk Scenario		
G702-R-5	10% AEP Peak Velocity – Risk Scenario		
G702-R-6	20% AEP Peak Velocity – Risk Scenario		



Map G101

Study Regional Context

 Study Area

Scale : 1:50000@A3
Date : 16 August
Revision : B
Created by : LRE
Coordinate System : MGA 56



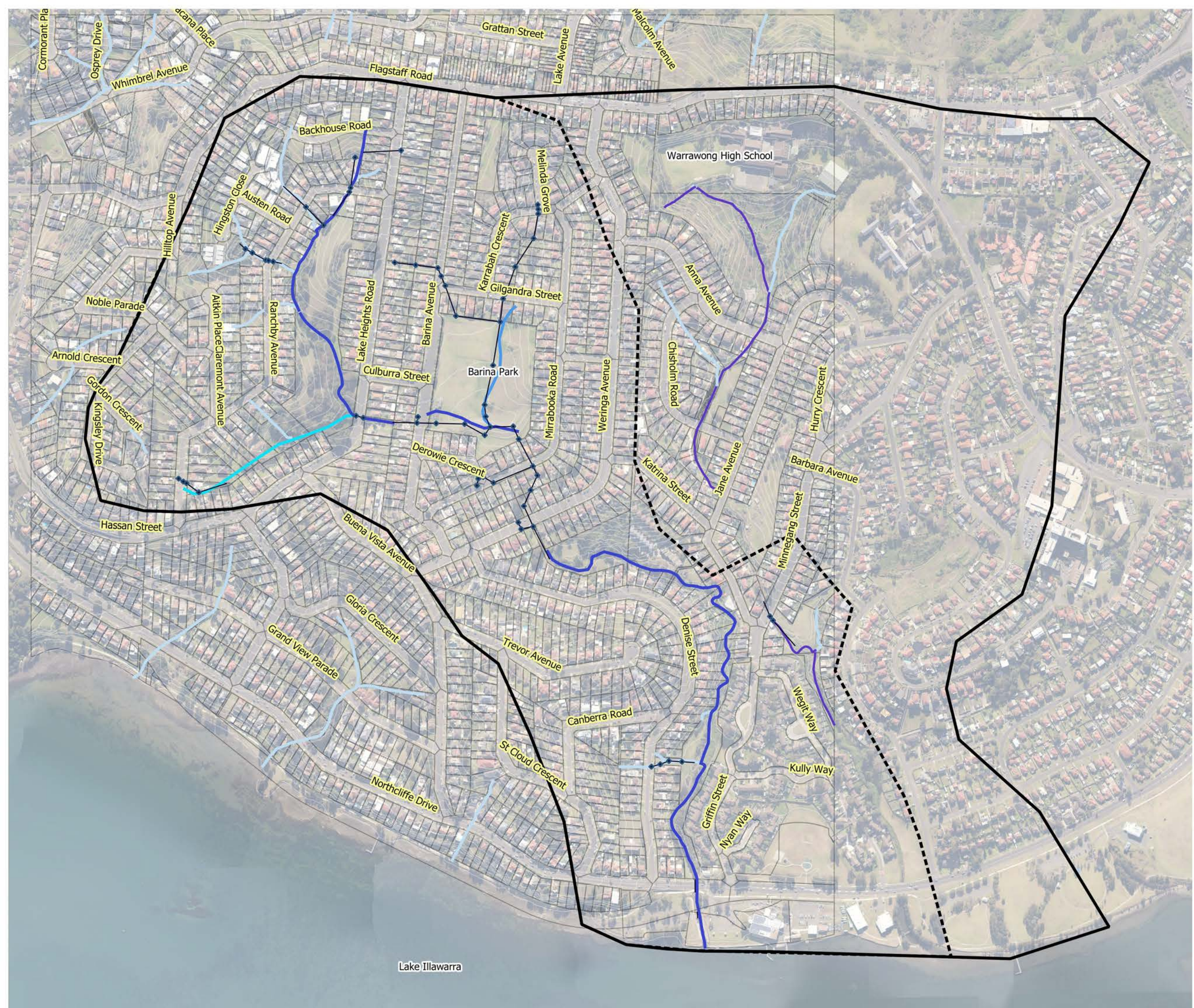


G201

Catchment Area & Features

-  Catchment Area
-  Model Area
-  Pits
-  Pipes
-  Minnegang Creek
-  Gordon Cresnet Tributary
-  Melinda Grove Tributary
-  Hospital Ck
-  Minor Tributaries
-  Cadastre

Scale : 1:6000@A3
Date : 16 August 2019
Revision : D
Created by : LRE
Coordinate System : MGA 56









Lake Illawarra



G301

Additional Survey

-  Model Area
-  Study Area
-  Cross Sections
-  Structures
-  Pits
-  Cadastre

Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G302

**Historical Flood
Marks**

- Historical Flood Marks
- 14 DECEMBER 1985
 - 17 AUGUST 1998
 - 23 OCTOBER 1987
 - DECEMBER 1990
 -
- 1% AEP Extent

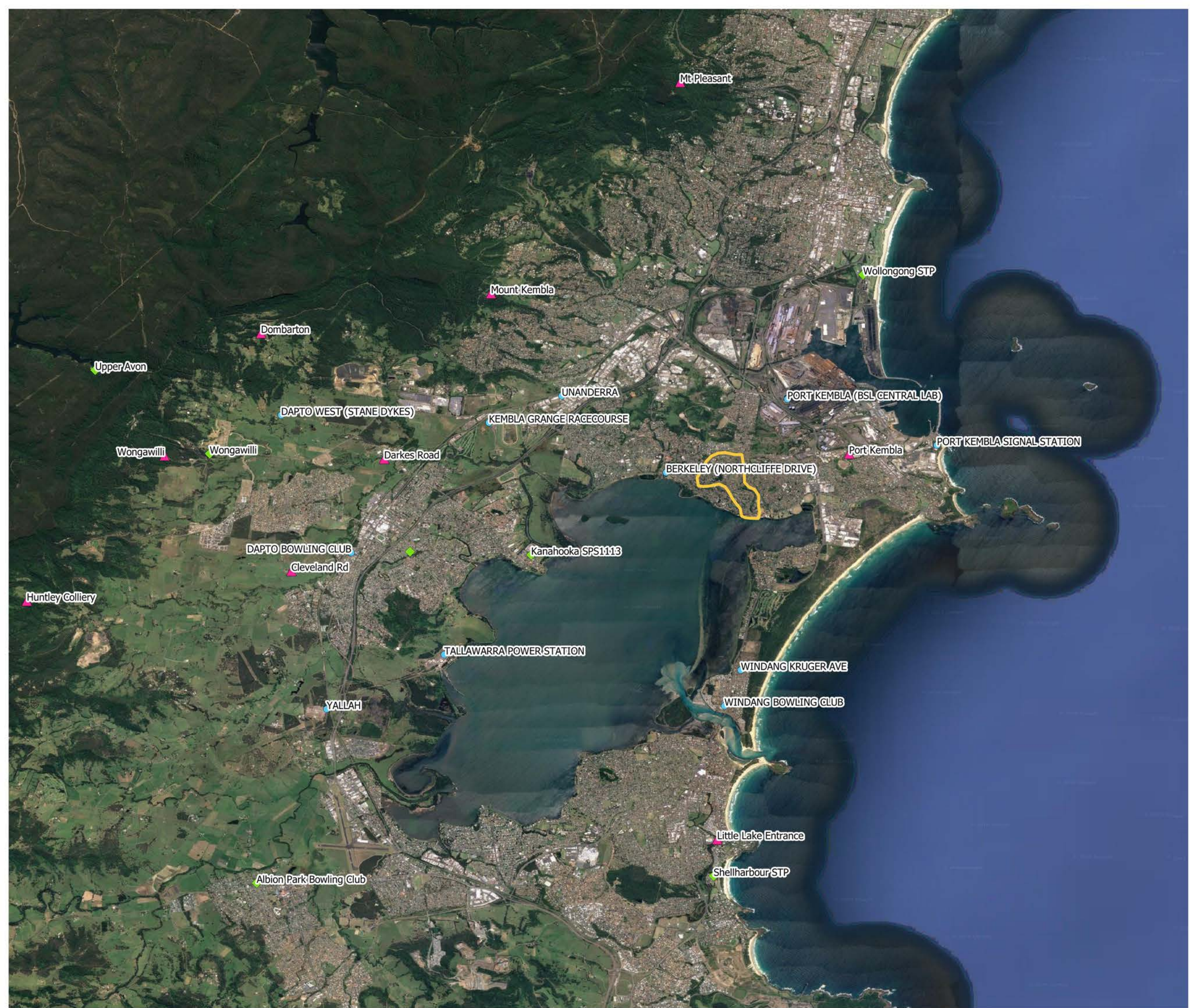
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Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G303

Rainfall Gauges

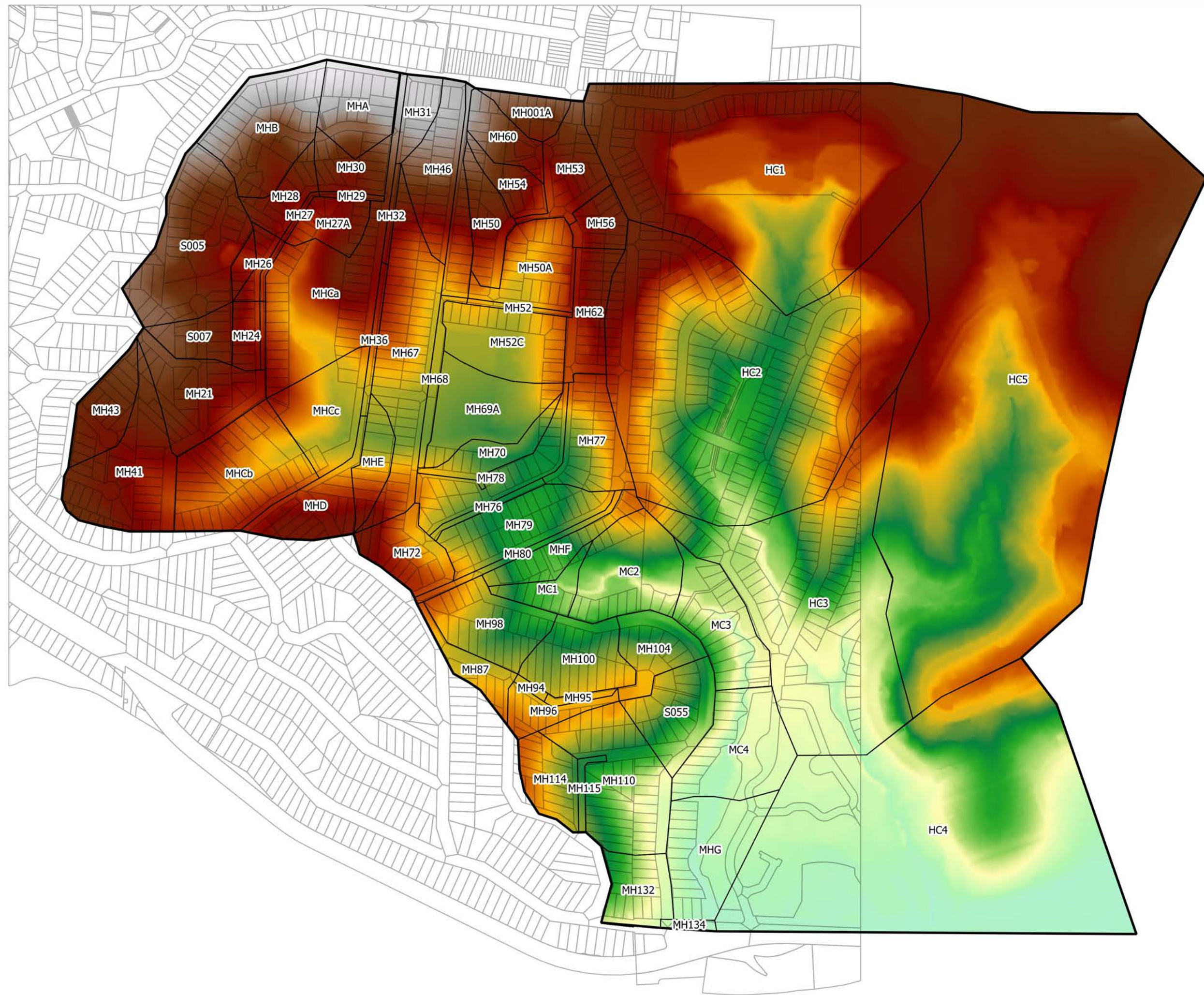


0 1 2 3 4 km



Scale : 1:50000@A3
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Revision : B
Created by : LRE
Coordinate System : MGA 56

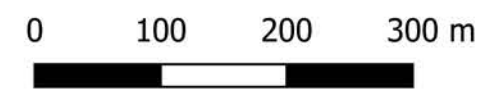




G501

Subcatchments

- Cadastre
- Subcatchments
- Elevation (mAHD)**
- 10
- 20
- 40
- 60
- 80











Scale : 1:6000@A3
 Date : 16 August 2019
 Revision : B
 Created by : LRE
 Coordinate System : MGA 56

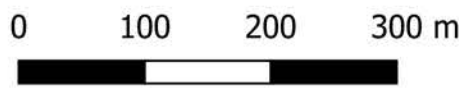




G502

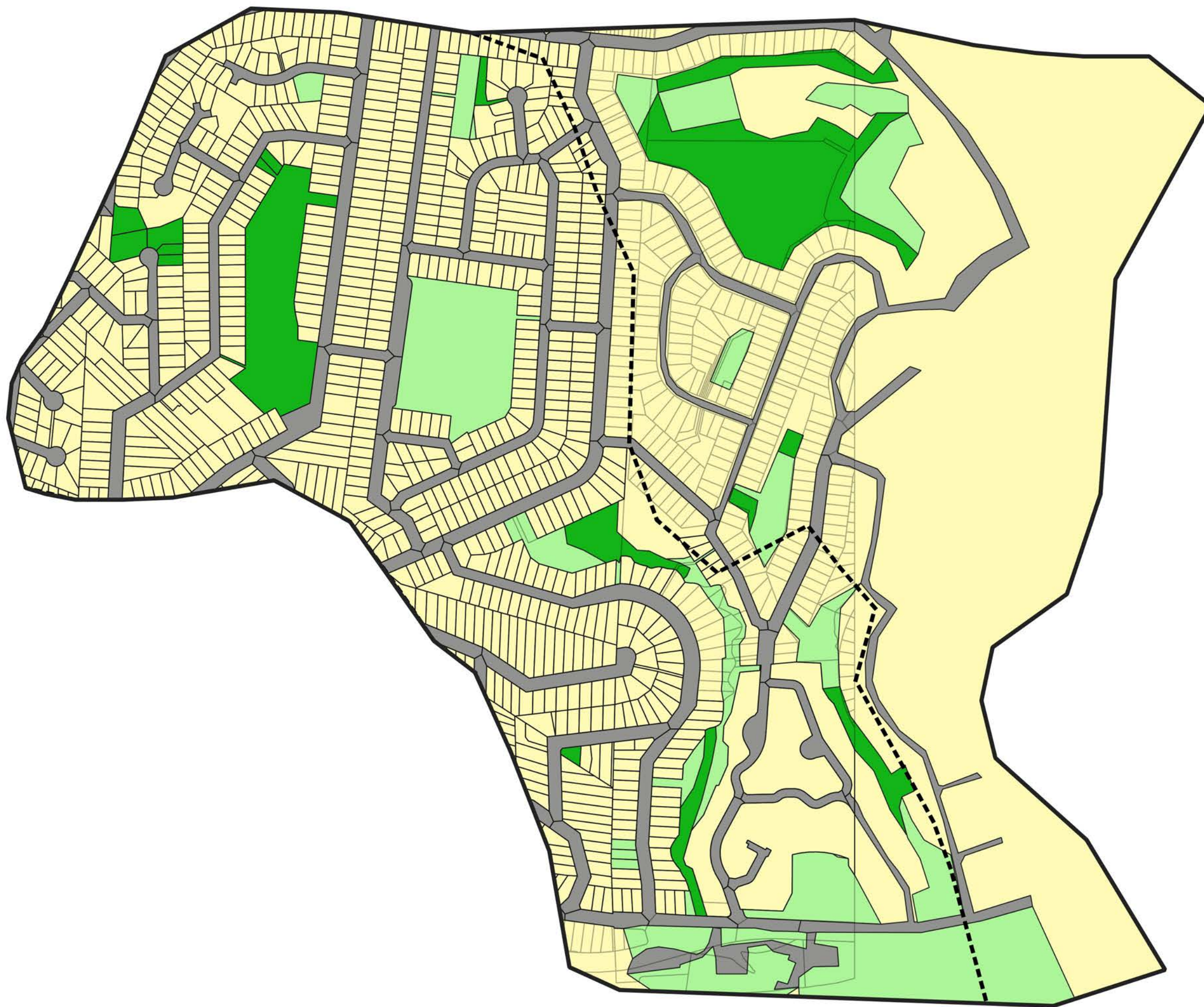
Tuflow Model

-  Cadastre
-  Model Area
-  Study Area
-  Downstream Boundary
-  Pits
-  Pipes
-  Culverts
-  Buildings









Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

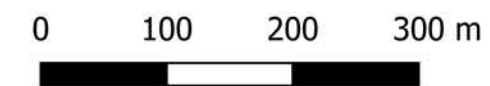




G503

Roughness

-  Model Area
-  Study Area
- 2d_mat_Minnegang_001_R
-  Residential
-  Roads
-  Open Space
-  Vegetation








Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



Map G601

Historical Flood Data Points

Legend

-  Flood survey points
- Extents**
-  50% AEP Extent
-  20% AEP Extent
-  5% AEP Extent
-  1% AEP Extent

Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56

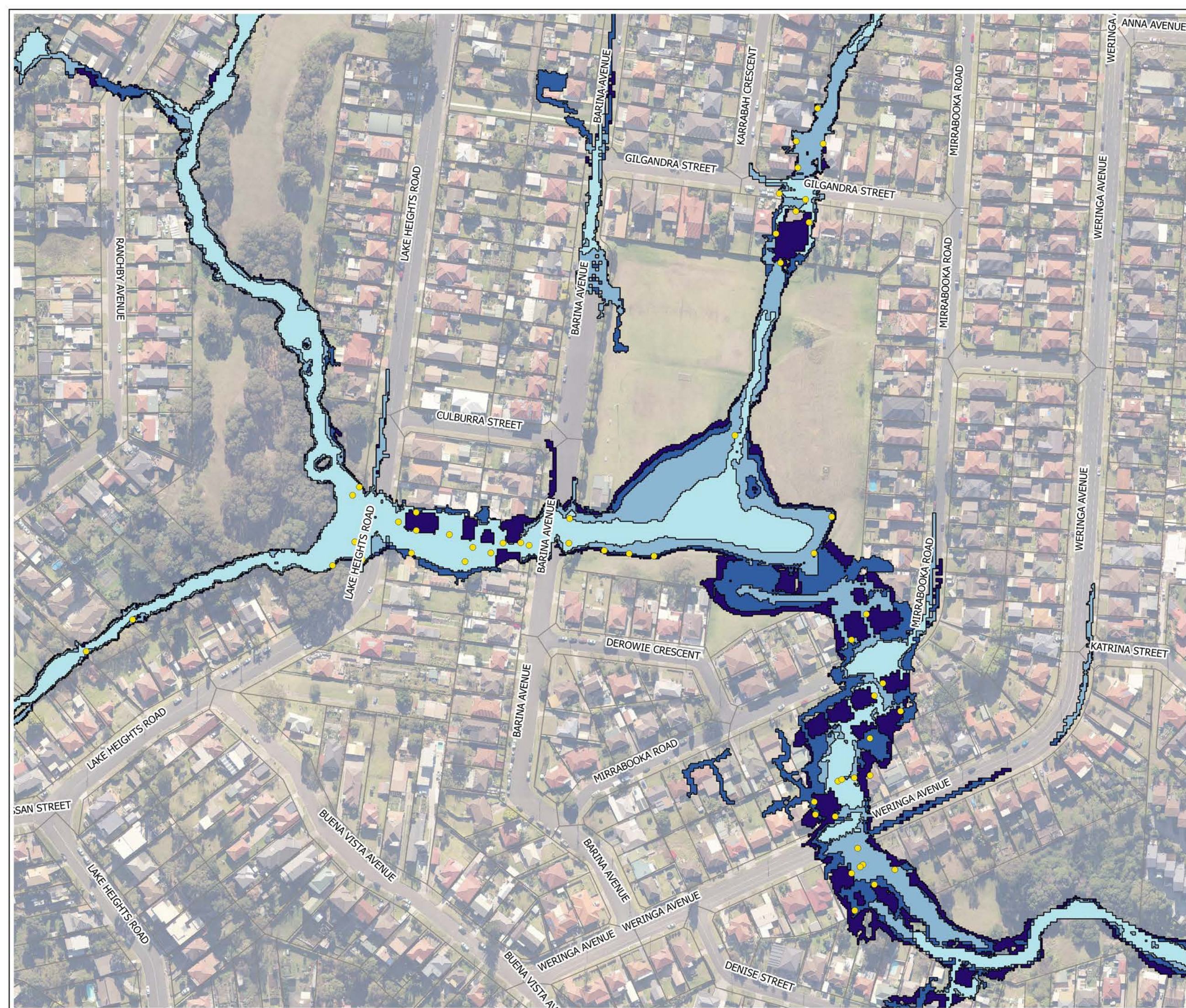




Figure G602

1985 Flood Data Points

Legend

Relative Flood Level

- < 50% AEP
- 50 - 20% AEP
- 20 - 5% AEP
- 5 - 1% AEP
- > 1% AEP

Extents

- 20% AEP Extent
- 1% AEP Extent

Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56

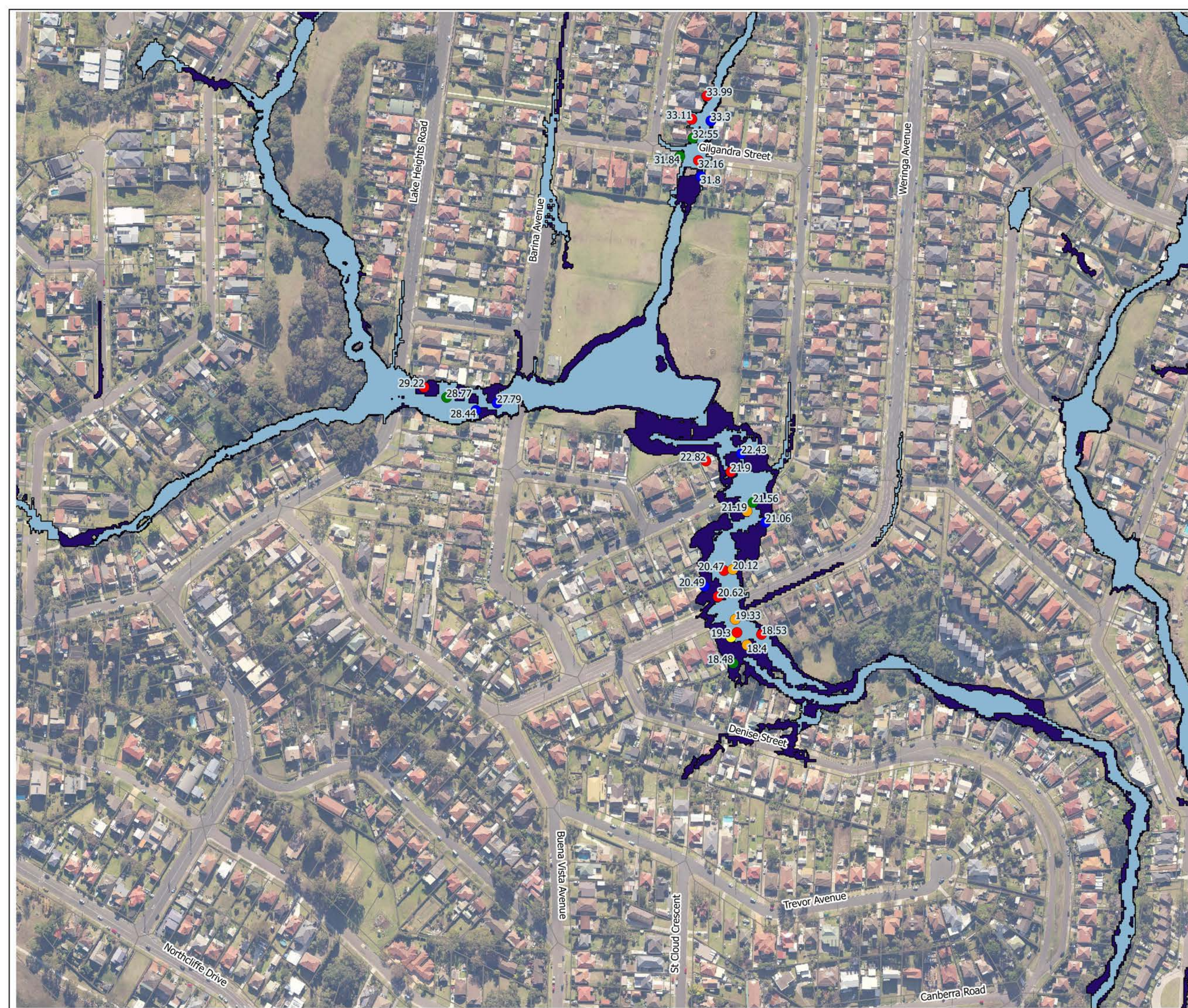
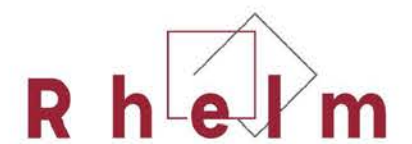




Figure G603

1987 Flood Data Points

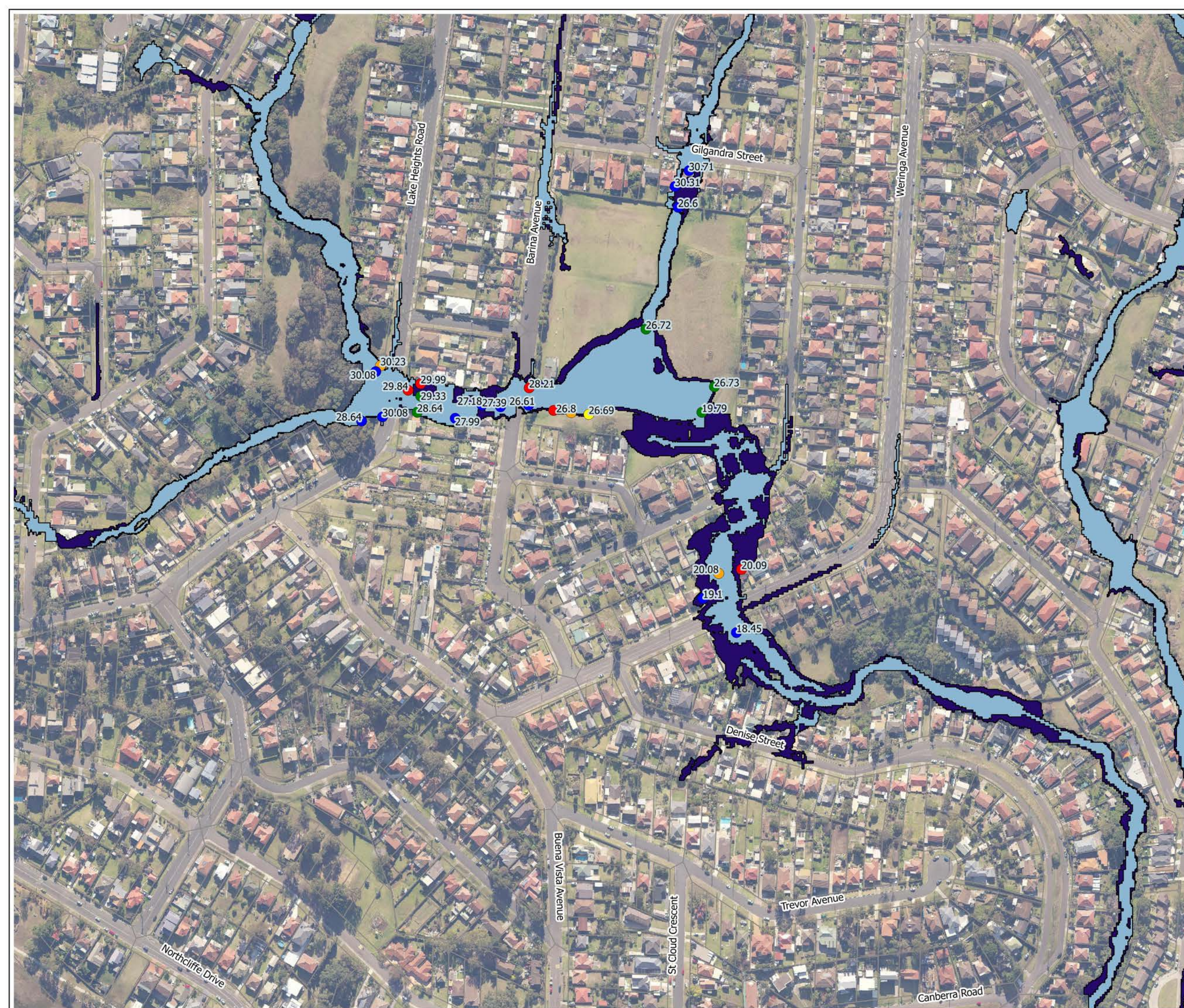
Legend

Relative Flood Level

- < 50% AEP
- 50 - 20% AEP
- 20 - 5% AEP
- 5 - 1% AEP
- > 1% AEP

Extents

- 20% AEP Extent
- 1% AEP Extent



Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56





Figure G604

1990 Flood Data Points

Legend

Relative Flood Level

- < 50% AEP
- 50 - 20% AEP
- 20 - 5% AEP
- 5 - 1% AEP
- > 1% AEP

Extents

- 20% AEP Extent
- 1% AEP Extent

Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56

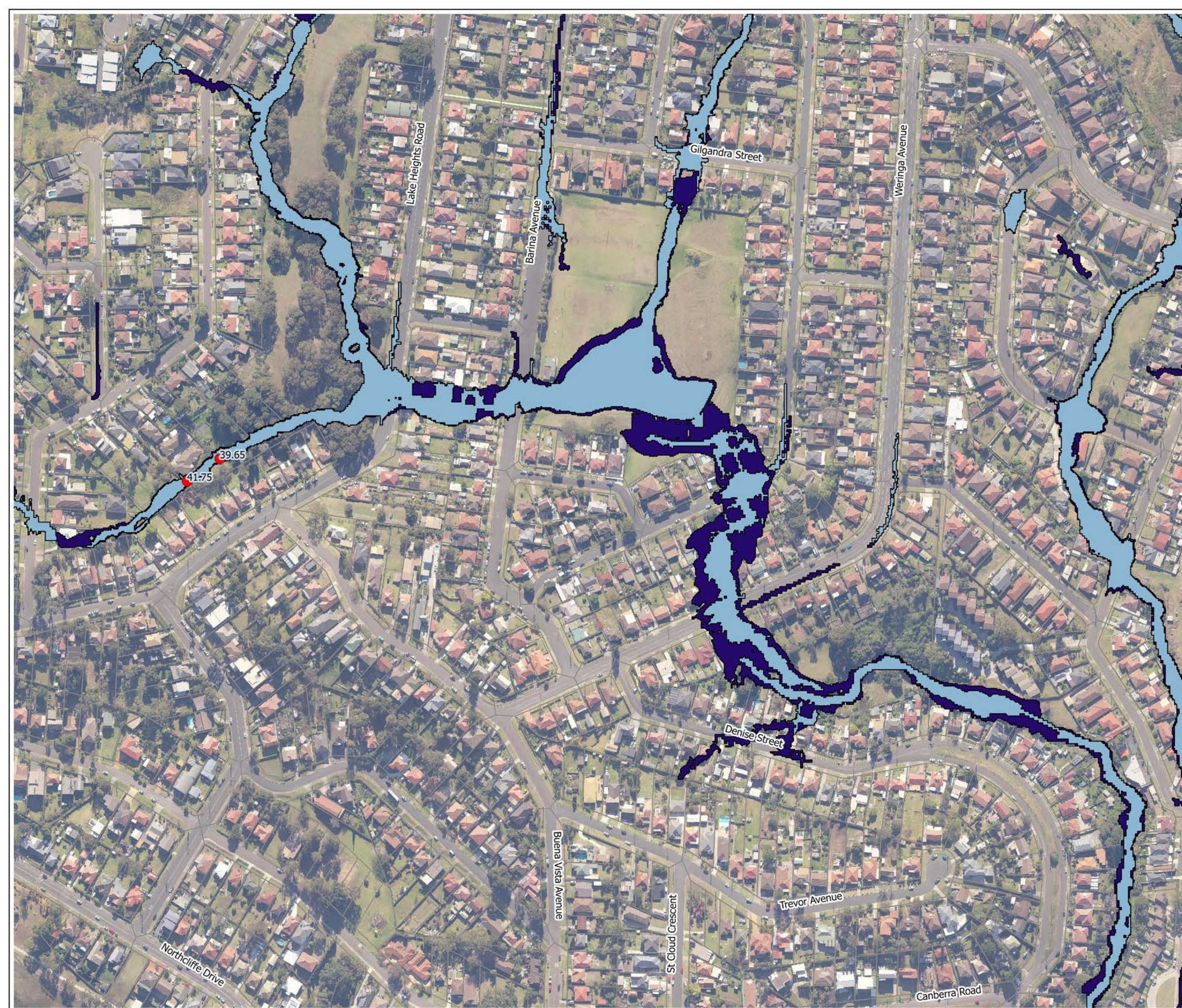
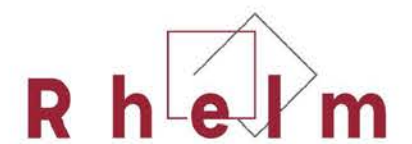




Figure G605

1998 Flood Data Points

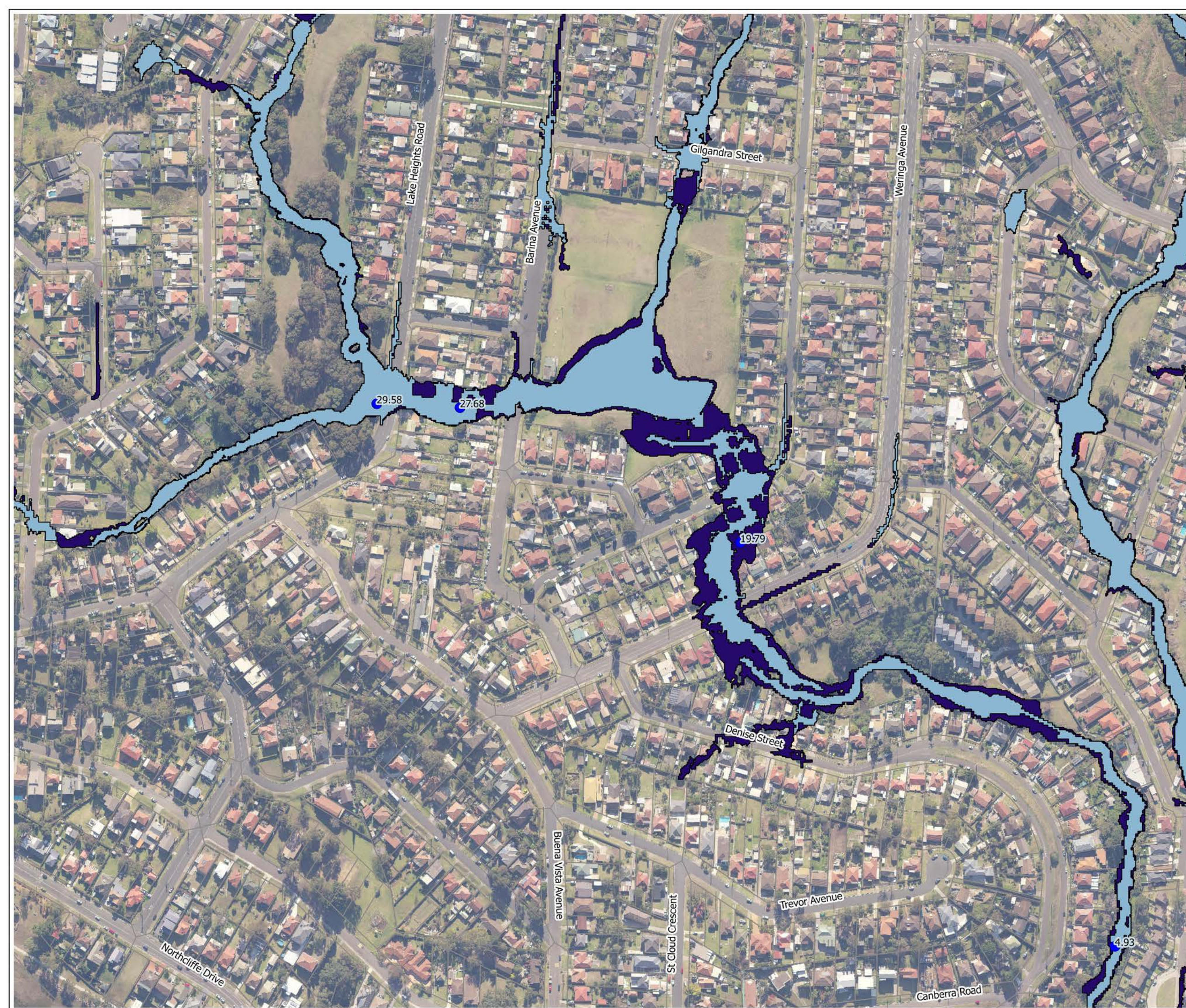
Legend

Relative Flood Level

- < 50% AEP
- 50 - 20% AEP
- 20 - 5% AEP
- 5 - 1% AEP
- > 1% AEP

Extents

- 20% AEP Extent
- 1% AEP Extent



Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56





Map G606

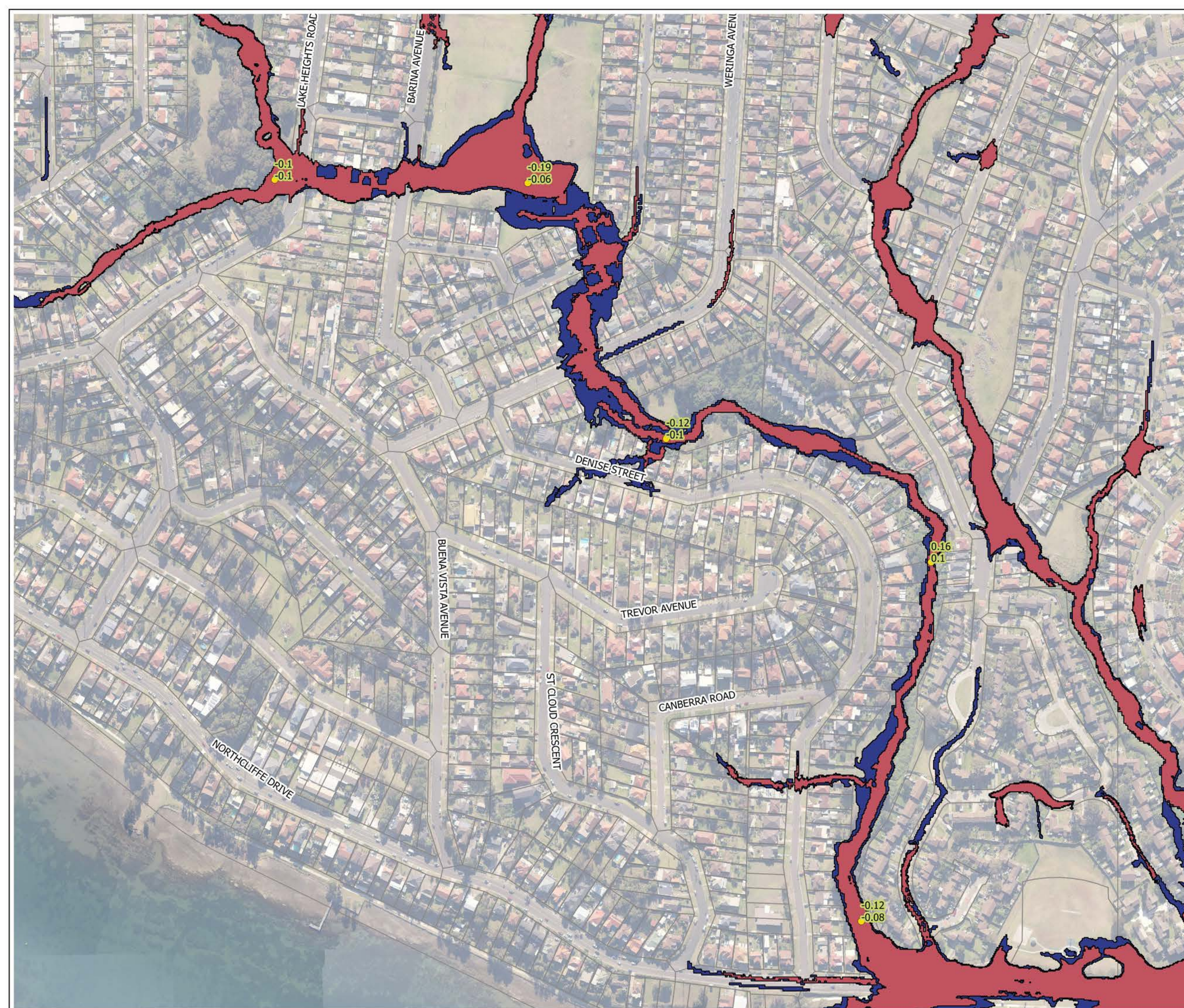
Comparison of Tuflow and Mike-11 models

Legend

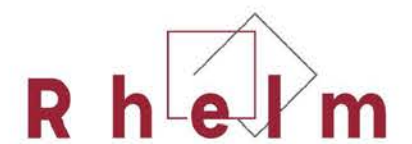
- Water Level Differences (5% AEP / 1% AEP)

Extents

- 20% AEP Extent
- 1% AEP Extent



Scale : 1:3,500@A3
Date : 5 December 2018
Revision : A
Created by : LRE
Coordinate System : MGA 56





G701-D-1

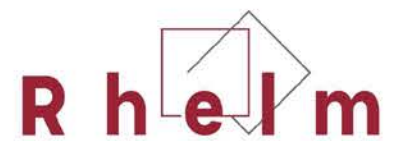
**Peak Depth & Water Level
PMF**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

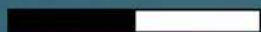
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 6 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56



0 100 200 m





G701-D-2

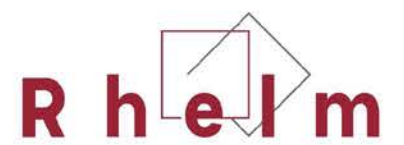
**Peak Depth & Water Level
1% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

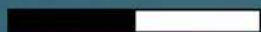
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



0 100 200 m



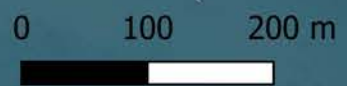
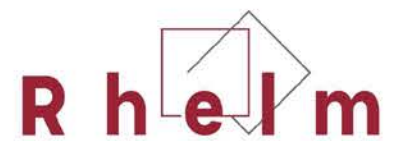


G701-D-3

**Peak Depth & Water Level
2% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4
- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
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Coordinate System : MGA 56





G701-D-4

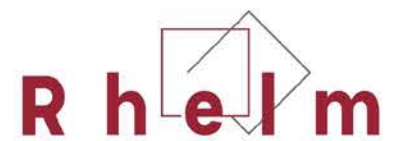
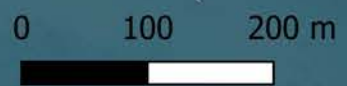
**Peak Depth & Water Level
5% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G701-D-5

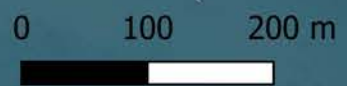
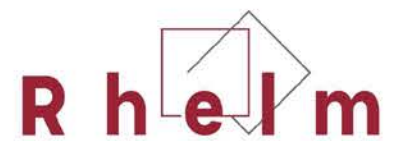
**Peak Depth & Water Level
10% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings

- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G701-D-6

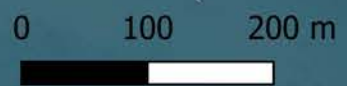
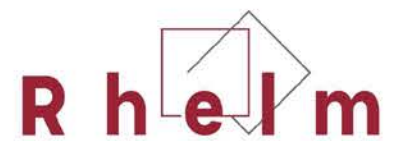
**Peak Depth & Water Level
20% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings

- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G701-R-1

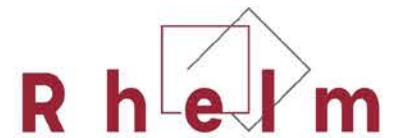
**Peak Depth & Water Level
PMF**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

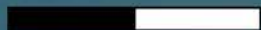
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- 0.15 - 0.3
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- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



0 100 200 m



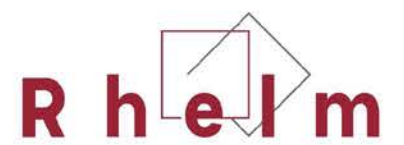


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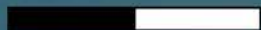
**Peak Depth & Water Level
1% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4
- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



0 100 200 m





G701-R-3

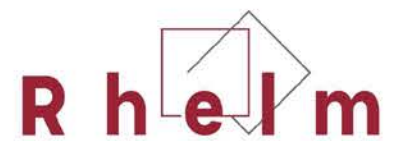
**Peak Depth & Water Level
2% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

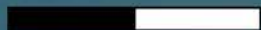
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



0 100 200 m





G701-R-4

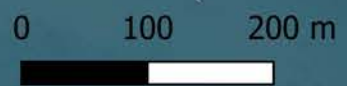
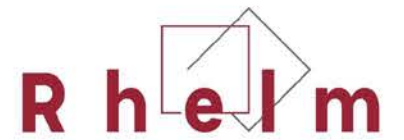
**Peak Depth & Water Level
5% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G701-R-5

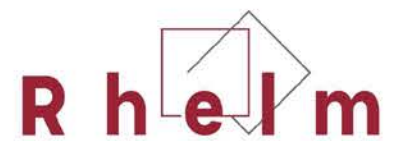
**Peak Depth & Water Level
10% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

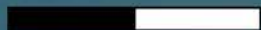
- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56



0 100 200 m





G701-R-6

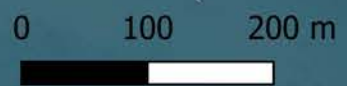
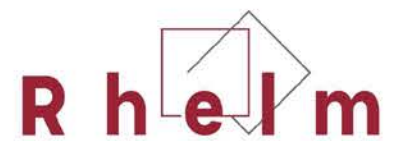
**Peak Depth & Water Level
20% AEP**

- Cadastre
- ▭ Model Area
- - - Study Area
- Buildings

- Depth (m)
- 0 - 0.15
- 0.15 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- >4

- Contour 1m
- Contour 5m

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G702-D-1

**Peak Velocity
PMF**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m



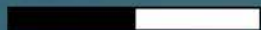
G702-D-2

**Peak Velocity
1% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





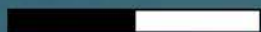
G702-D-3

**Peak Velocity
2% AEP**

- Cadastre
- ▭ Model Area
- ▭ Study Area
- Buildings
- Velocity (m/s)
- ≤0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G702-D-4

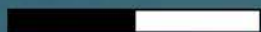
**Peak Velocity
5% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings

- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





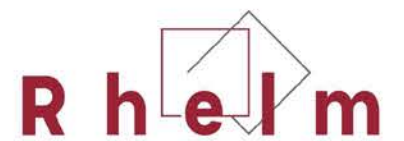
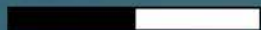
G702-D-5

**Peak Velocity
10% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G702-D-6

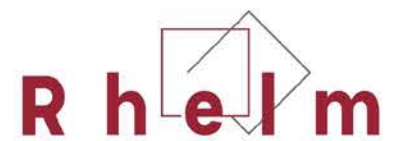
**Peak Velocity
20% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings

- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





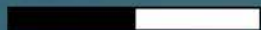
G702-R-1

**Peak Velocity
PMF**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





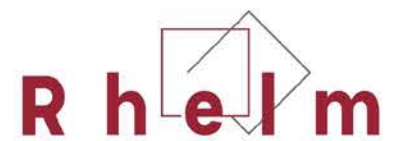
G702-R-2

**Peak Velocity
1% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G702-R-3

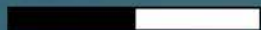
**Peak Velocity
2% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings

- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





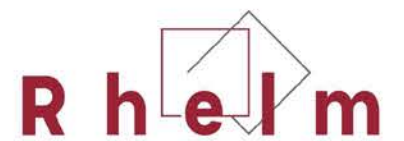
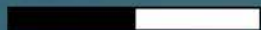
G702-R-4

**Peak Velocity
5% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





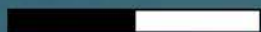
G702-R-5

**Peak Velocity
10% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





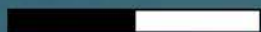
G702-R-6

**Peak Velocity
20% AEP**

- Cadastre
- ▭ Model Area
- ⋯ Study Area
- Buildings
- Velocity (m/s)
- ≤ 0.01
- 0.01 - 0.5
- 0.5 - 1
- 1 - 2
- 2 - 3
- 3 - 4
- > 4

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





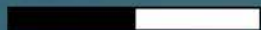
G703-D-1

**Peak Hazard
PMF**

- Cadastre
 - ▭ Model Area
 - ▭ Study Area
 - Buildings
- Hazard**
- H1 - Generally safe for vehicles, people & buildings
 - H2 - Unsafe for small vehicles
 - H3 - Unsafe for vehicles, children and the elderly
 - H4 - Unsafe for vehicles and people
 - H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
 - H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





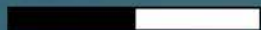
G703-D-2

**Peak Hazard
1% AEP**

- Cadastre
 - ▭ Model Area
 - ▭ Study Area
 - Buildings
- Hazard**
- H1 - Generally safe for vehicles, people & buildings
 - H2 - Unsafe for small vehicles
 - H3 - Unsafe for vehicles, children and the elderly
 - H4 - Unsafe for vehicles and people
 - H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
 - H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





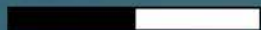
G703-R-1

**Peak Hazard
PMF**

- Cadastre
 - ▭ Model Area
 - ▭ Study Area
 - Buildings
- Hazard**
- H1 - Generally safe for vehicles, people & buildings
 - H2 - Unsafe for small vehicles
 - H3 - Unsafe for vehicles, children and the elderly
 - H4 - Unsafe for vehicles and people
 - H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
 - H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





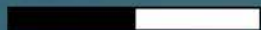
G703-R-2

**Peak Hazard
1% AEP**

- Cadastre
 - ▭ Model Area
 - ▭ Study Area
 - Buildings
- Hazard**
- H1 - Generally safe for vehicles, people & buildings
 - H2 - Unsafe for small vehicles
 - H3 - Unsafe for vehicles, children and the elderly
 - H4 - Unsafe for vehicles and people
 - H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure
 - H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure

Scale : 1:6000@A3
Date : 15 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56








0 100 200 m





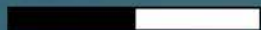
G704-D-1

**Flood Categories
PMF**

-  Model Area
-  Study Area
-  Cadastre
-  Buildings
- Flood Function**
-  Floodway
-  Storage
-  Fringe

Scale : 1:6000@A3
Date : 16 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56








0 100 200 m





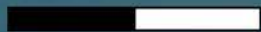
G704-D-2

**Flood Categories
1% AEP**

-  Model Area
-  Study Area
-  Cadastre
-  Buildings
- Flood Function**
-  Floodway
-  Storage
-  Fringe

Scale : 1:6000@A3
Date : 16 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56








0 100 200 m





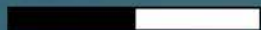
G704-R-1

**Flood Categories
PMF**

-  Model Area
-  Study Area
-  Cadastre
-  Buildings
- Flood Function**
-  Floodway
-  Storage
-  Fringe

Scale : 1:6000@A3
Date : 16 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56








0 100 200 m






G704-R-2

**Flood Categories
1% AEP**

-  Model Area
-  Study Area
-  Cadastre
-  Buildings
- Flood Function**
-  Floodway
-  Storage
-  Fringe

Scale : 1:6000@A3
Date : 16 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56

0 100 200 m



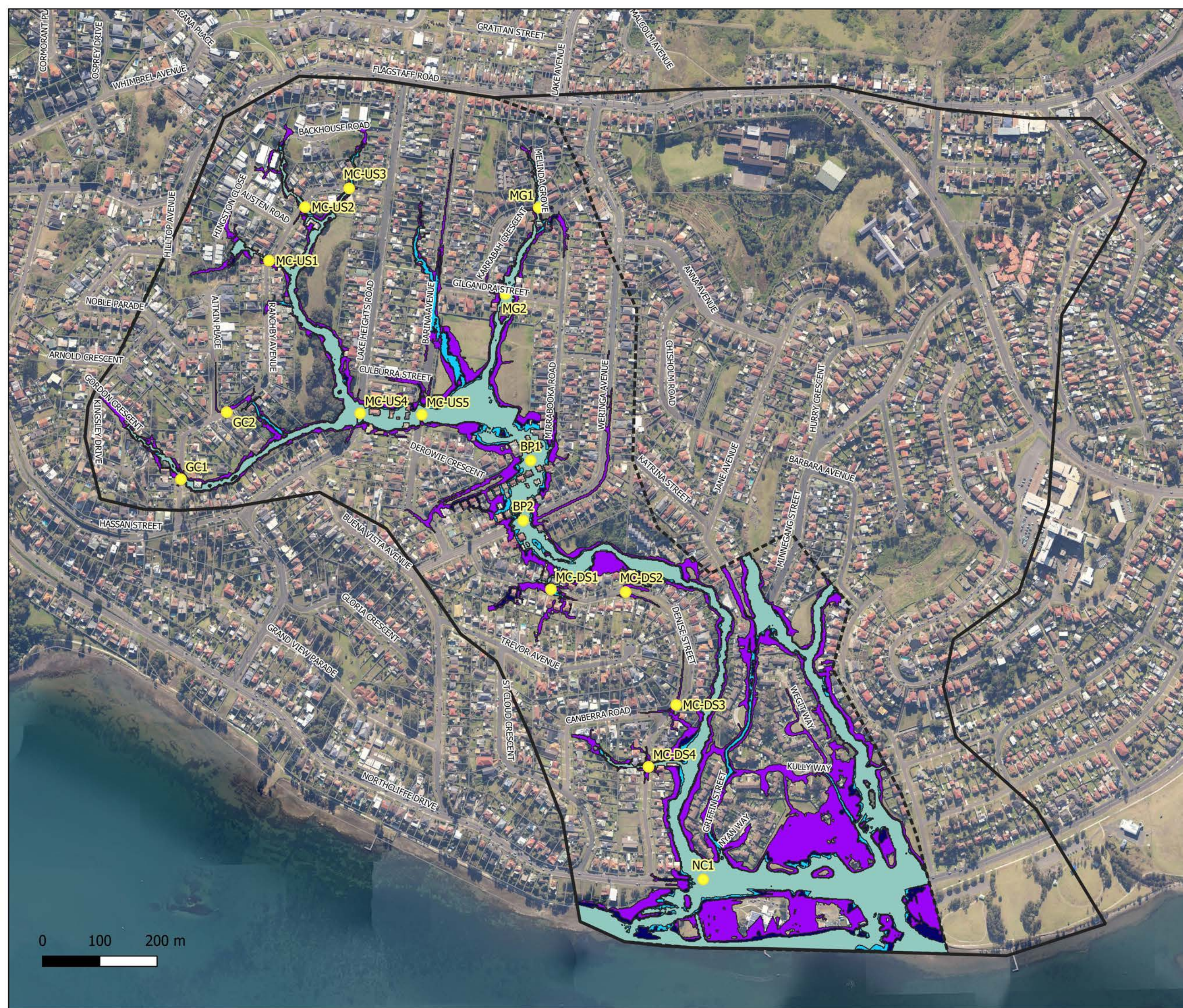


G801-R-1

Peak Flood Extent Comparison

- Model Area
- Study Area
- Cadastre
- PMF Extent
- 1% AEP Extent
- 5% AEP Extent
- 20% AEP Extent

Scale : 1:6000@A3
Date : 15 August 2019
Revision : C
Created by : LRE
Coordinate System : MGA 56



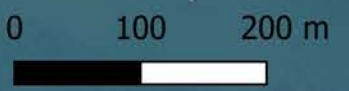


G802

Flood Planning Area

-  Model Area
-  Cadastre
-  Flood Planning Area

Scale : 1:6000@A3
Date : 13 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56





G803-R-1

Flood Emergency Response Classifications

 Model Area

Buildings

— Cadastre

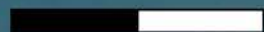
Categories

 Flooded Rising Road

 Flooded Overland Escape

Scale : 1:6000@A3
Date : 16 August 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G901-R-1










**Sensitivity
+20% Roughness
1% AEP
Risk Scenario**

 Model Area

Buildings

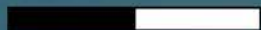
— Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G901-R-2










**Sensitivity
-20% Roughness
1% AEP
Risk Scenario**

 Model Area

Buildings

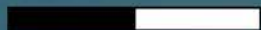
— Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G902-R-1










**Sensitivity
+20% Rainfall Intensity
1% AEP
Risk Scenario**

 Model Area

Buildings

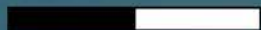
— Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





G902-R-2










**Sensitivity
-20% Rainfall Intensity
1% AEP
Risk Scenario**

 Model Area

Buildings

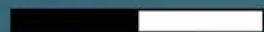
— Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 16 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m






G903-R-1

**Sensitivity: Blockage
1% AEP
Risk Scenario LESS
Unblocked Scenario**


 Model Area


 Study Area


Buildings

— Cadastre


Difference (m)


 ≤ -0.2


 $-0.2 - -0.1$


 $-0.1 - -0.05$

 $-0.05 - -0.01$

 $-0.01 - 0.01$

 $0.01 - 0.05$

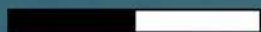
 $0.05 - 0.1$

 $0.1 - 0.2$

 > 0.2

Scale : 1:6000@A3
Date : 13 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56

0 100 200 m




**R h e l m**



G903-R-2

**Sensitivity: Blockage
20% AEP
Risk Scenario LESS
Unblocked Scenario**


 Model Area


 Study Area


Buildings


— Cadastre


Difference (m)


 ≤ -0.2


 $-0.2 - -0.1$


 $-0.1 - -0.05$

 $-0.05 - -0.01$

 $-0.01 - 0.01$

 $0.01 - 0.05$

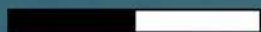
 $0.05 - 0.1$


 $0.1 - 0.2$

 > 0.2

Scale : 1:6000@A3
Date : 13 May 2019
Revision : A
Created by : LRE
Coordinate System : MGA 56

0 100 200 m







R h e l m












G904-D-2

**Climate Change 2050
1% AEP**

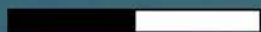
-  Model Area
-  Study Area
-  Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 13 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56




0 100 200 m














G904-D-4

**Climate Change 2100
1% AEP**

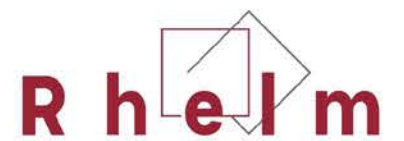
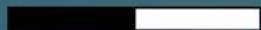
-  Model Area
-  Study Area
-  Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 13 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56




0 100 200 m














G904-R-2

**Climate Change 2050
1% AEP**

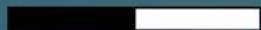
-  Model Area
-  Study Area
-  Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 13 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56




0 100 200 m














G904-R-2

**Climate Change 2100
1% AEP**

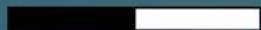
-  Model Area
-  Study Area
-  Cadastre

Difference (m)

-  ≤ -0.2
-  $-0.2 - -0.1$
-  $-0.1 - -0.05$
-  $-0.05 - -0.01$
-  $-0.01 - 0.01$
-  $0.01 - 0.05$
-  $0.05 - 0.1$
-  $0.1 - 0.2$
-  > 0.2

Scale : 1:6000@A3
Date : 13 August 2019
Revision : B
Created by : LRE
Coordinate System : MGA 56

0 100 200 m





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