

Our Ref: 110073-07-MOD 4 Request for Information_2.docx Rev C

27 August 2020

Lendlease
Level 2, 88 Phillip Street
Parramatta NSW 2150, Australia

Attn: Karen Armstrong

Subject: Request for Information - Calderwood Concept Plan MOD 4 (MP 09_0082 MOD 4)

Dear Karen

Thank you for allowing J. Wyndham Prince to assist Lendlease in providing additional information to the NSW Department of Planning, Industry and Environment (DPIE) regarding the flood impacts of the Calderwood Concept Plan proposal (MP 09_0082) and subsequent MOD 4 submission. The MOD 4 submission looks to modify the existing Concept Plan approval that was granted initially back in 2010.

In a series of correspondence, DPIE has sought further clarification regarding the flooding outcomes that have been achieved in the MOD 4 application and requested a response to these matters. This letter details the further flood mapping that was requested by DPIE to show the differences between the original Concept Plan Scenario (4,800 dwellings) and the MOD 4 uplift scenario (6,000 dwellings). This modelling is described further below, with the flood maps presented in Attachment A.

1. FLOOD IMPACTS

The Shellharbour's City Council's Macquarie Rivulet model which is the basis for the current Calderwood Urban Development Project (CUDP) flood assessment has been rerun for the 6,000 dwelling scenario (MOD 4) and an alternate scenario established for the 4,800 dwelling case. This 4,800 dwelling case scenario was to replicate the development conditions that were modelled in the original 2010 Concept Plan assessment within the current Macquarie Rivulet Model. In order to achieve this, the developed case hydrological model (WBNM) from the Macquarie Rivulet Modelling was revised to match the fraction impervious assumptions that were used in the original 2010 Concept Plan assessment in order to demonstrate the impacts of the proposed MOD 4 density uplift.

A series of figures have been prepared to illustrate the difference between the flood results under the original concept approval scenario and the MOD 4 uplift scenario using the latest Macquarie Rivulet model. Importantly, the colour palettes used in these maps match the Cardno 2010 mapping to provide easier comparisons.

Please find attached in Attachment B the following figures:

- Figure 1.1 – 1% AEP Flood Depth Concept Plan Scenario (4,800 dwellings)
- Figure 1.2 – 1% AEP Flood Depth MOD 4 Scenario (6,000 dwellings)
- Figure 1.3 – 1% AEP Flood Difference – MOD 4 Scenario minus Concept Plan Scenario
- Figure 1.4 – PMF Flood Depth Concept Plan Scenario (4,800 dwellings)
- Figure 1.5 – PMF Flood Depth MOD 4 Scenario (6,000 dwellings)
- Figure 1.6 – PMF Flood Difference – MOD 4 Scenario minus Concept Plan Scenario
- Figure 1.7 – 1% AEP Flood Difference – MOD 4 Scenario minus Approved Development Scenario (Macquarie Rivulet Bridge)
- Figure 1.8 – PMF Flood Difference – MOD 4 Scenario minus Approved Development Scenario (Macquarie Rivulet Bridge)

The difference mapping in Figures 1.3 and 1.6 illustrate that minimal impacts are experienced as expected when increasing the density of the development from the concept plan approval (4,800 dwellings) to the MOD 4 submission (6,000 dwellings). Some minor local increases can be seen in the 1% AEP mapping (Figure 1.3) in catchments discharging to Marshall Mount Creek, however, these impacts disappear once flows join the major watercourse. The flood differences are confined to the proposed drainage corridors and will not impact any developable areas within CUDP.

No impacts can be seen in the PMF flood event due to the magnitude of flows and minor relative increase that occurs as a result of the density uplifts.

Additional mapping has been prepared to highlight the area surrounding the Macquarie Rivulet Bridge (Adjacent to Stage 1 on Escarpment Drive) and the differences that occur between the currently approved (and constructed) development and the MOD 4 scenario (6,000 dwellings). These are illustrated in Figures 1.7 and 1.8. It should be noted that the existing concept plan provided consent for the bridge construction based on the modelling technologies and studies of the time. Therefore, impacts consistent with the concept plan would not be expected when using the updated Macquarie Rivulet modelling. The Macquarie Rivulet, which includes approximately a 15% increase in stormwater flows at this bridge, has changed the flood regime in this area. The work as executed bridge details now forms part of the assessment and result in a minor increase in flood level during a PMF event at this bridge. To ensure commitment 41 of the original concept plan approval is maintained the construction of a small blade wall adjacent to Stage 1 will need to be undertaken and can form part of any conditions/commitments develop for the approval of MOD 4.

2. CONCLUSION

The flooding outcomes presented in the Calderwood MOD 4 application are consistent with the outcomes achieved in the Concept Plan approval and, therefore, supports the proposed uplift of dwellings from 4,800 to 6,000. Though there has been some refinement of design and solutions offered, the revised Water Cycle and Flood Management Strategy remains consistent in philosophy with the original 2010 Concept Plan approval.

We trust that this additional information allows the DPIE to approve the proposed modification to the original concept plan and if you have any further questions regarding this information or any other aspect of the Water Cycle and Flood Management Strategy for the CUDP, please don't hesitate to call me on 0458 181 823.

Yours faithfully,

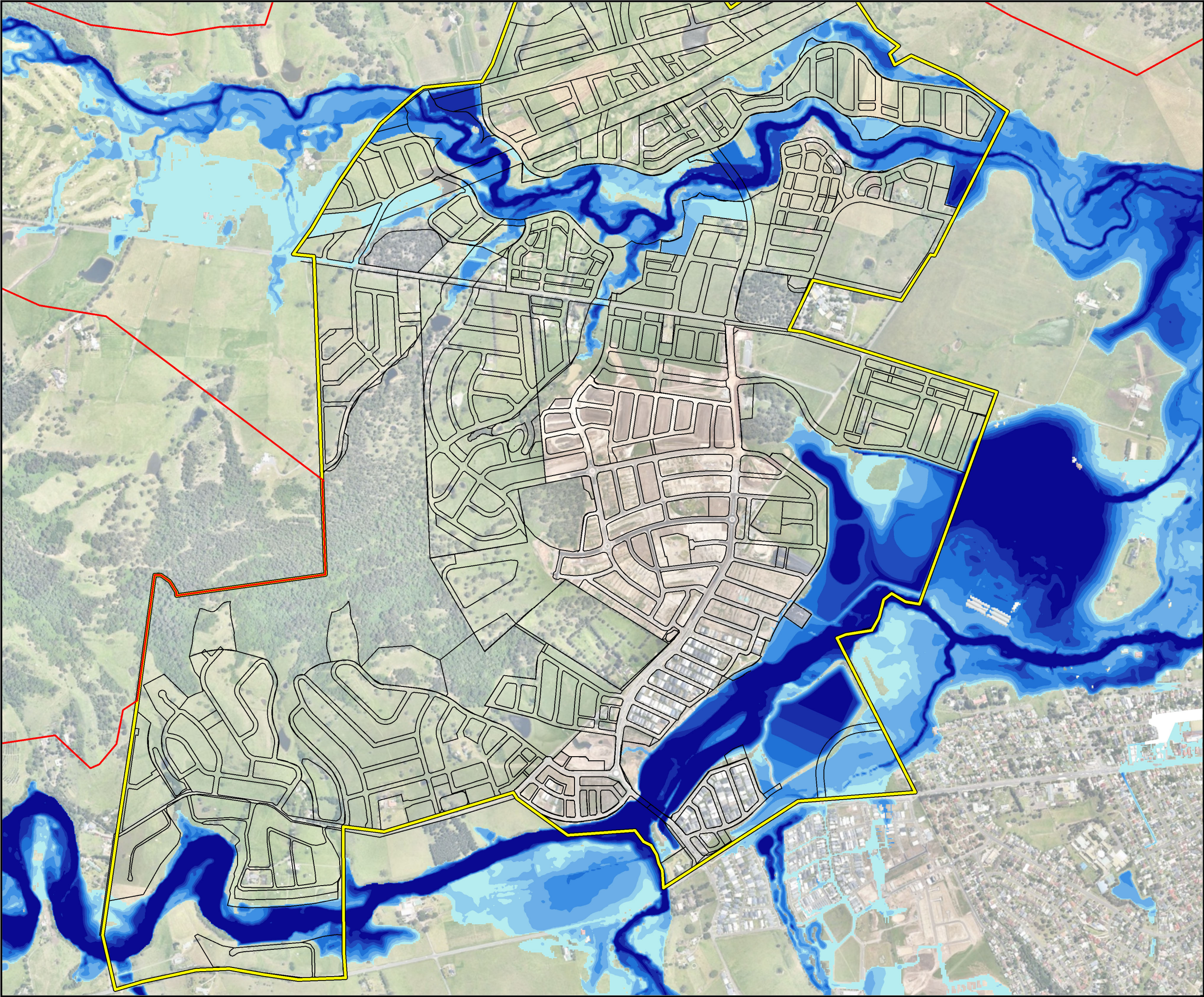


David Crompton



Manager – Stormwater and Environment Group

Attachment A – Flood Maps









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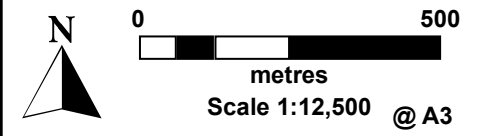


LEGEND

-  Site Boundary
-  TUFLOW Boundary

Cardno 2010 Flood Depth (m)

-  0 to 0.25
-  0.25 to 0.50
-  0.50 to 1.00
-  1.00 to 1.50
-  1.50 to 2.00
-  2.00 to 2.50
-  2.50 to 3.00
-  3.00+



Projection: GDA 1994 MGA Zone 56

Figure 1.1

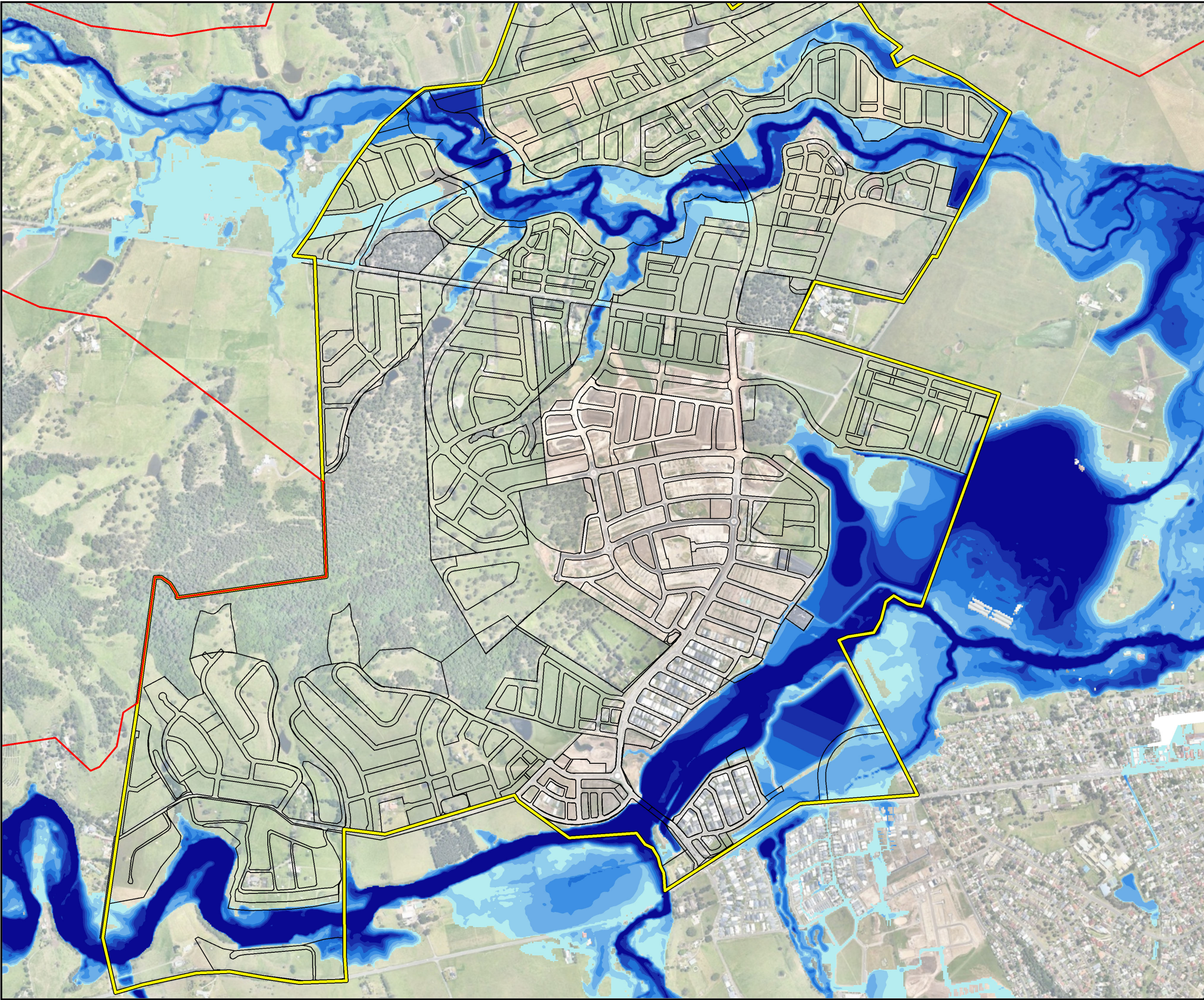
Calderwood Urban Development Project

1% AEP Event
Flood Depth
Concept Plan Scenario
4,800 dwellings



Date: 13/08/2020

Issue: A









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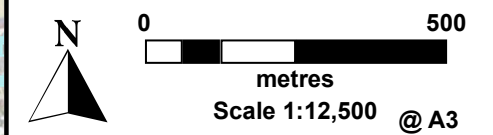


LEGEND

-  Site Boundary
-  TUFLOW Boundary

Cardno 2010 Flood Depth (m)

-  0 to 0.25
-  0.25 to 0.50
-  0.50 to 1.00
-  1.00 to 1.50
-  1.50 to 2.00
-  2.00 to 2.50
-  2.50 to 3.00
-  3.00+



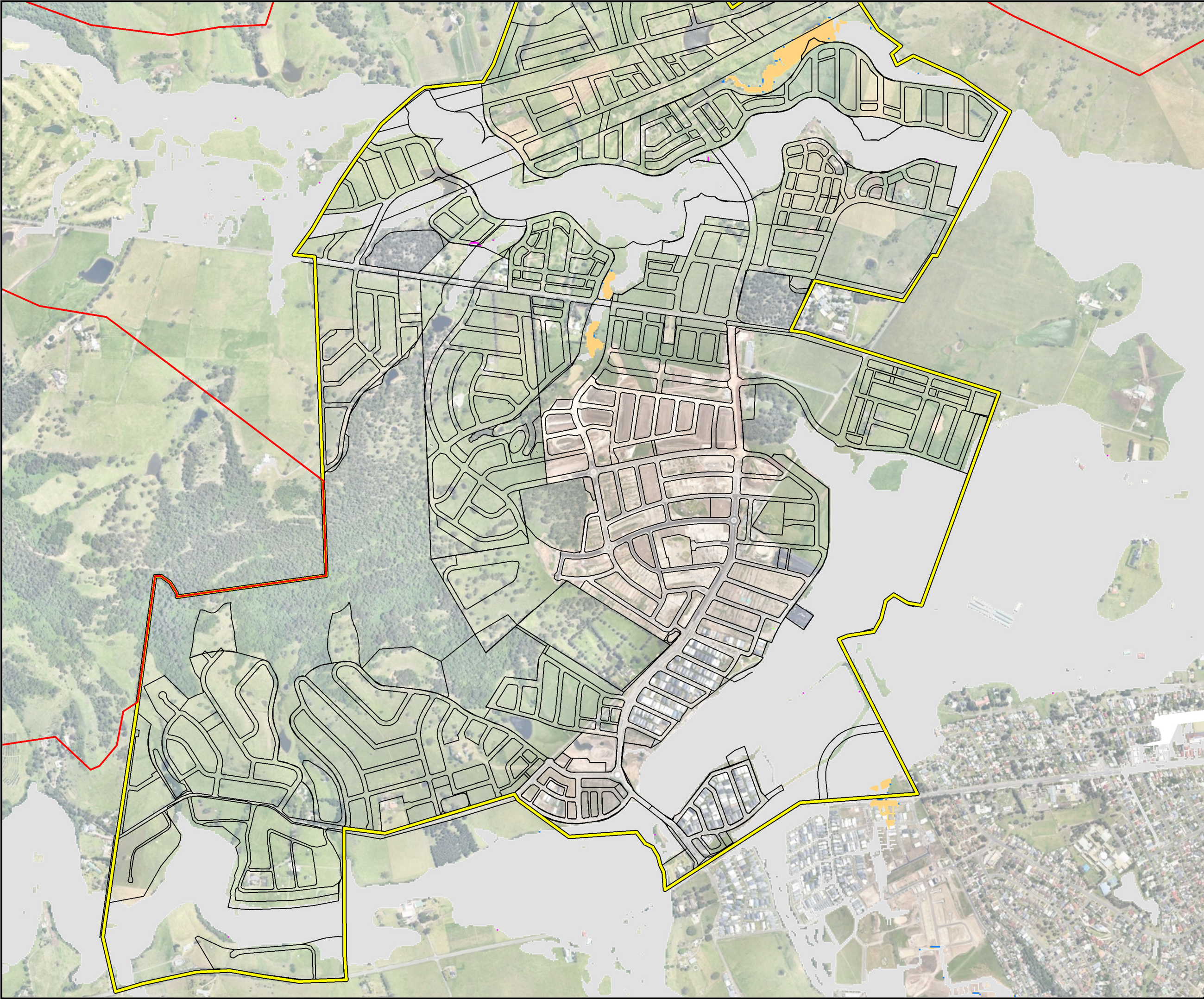
Projection: GDA 1994 MGA Zone 56

Figure 1.2 Calderwood Urban Development Project

1% AEP Event
Flood Depth
MOD 4 Scenario
6,000 dwellings

Date: 17/08/2020 Issue: A

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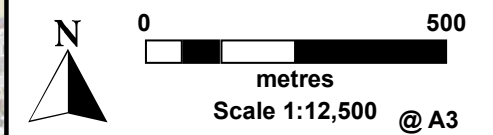
LEGEND

Site Boundary
TUFLOW Boundary
Site Layout

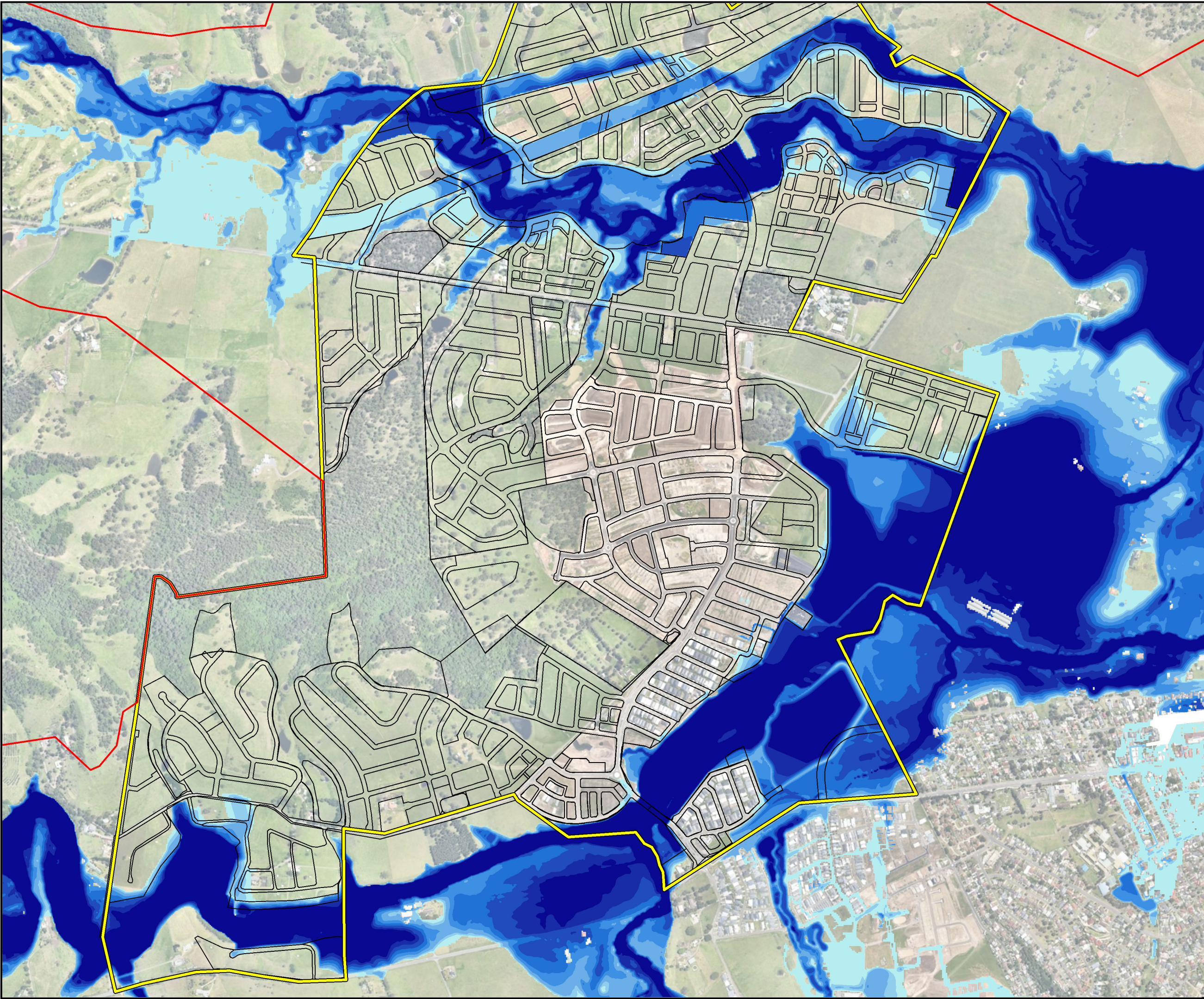
Increase in Flood Levels (m)

< -1.0
-1.0 to -0.5
-0.5 to -0.2
-0.2 to -0.02
-0.02 to 0.02
0.02 to 0.2
0.2 to 0.5
0.5 to 1.0
> 1.0



Area Now Flood Free in Modelled Event
Area Now Flood Affected in Modelled Event











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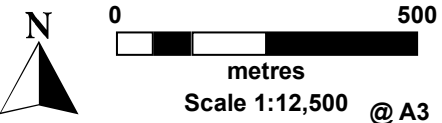


LEGEND

-  Site Boundary
-  TUFLOW Boundary

Cardno 2010 Flood Depth (m)

-  0 to 0.25
-  0.25 to 0.50
-  0.50 to 1.00
-  1.00 to 1.50
-  1.50 to 2.00
-  2.00 to 2.50
-  2.50 to 3.00
-  3.00+



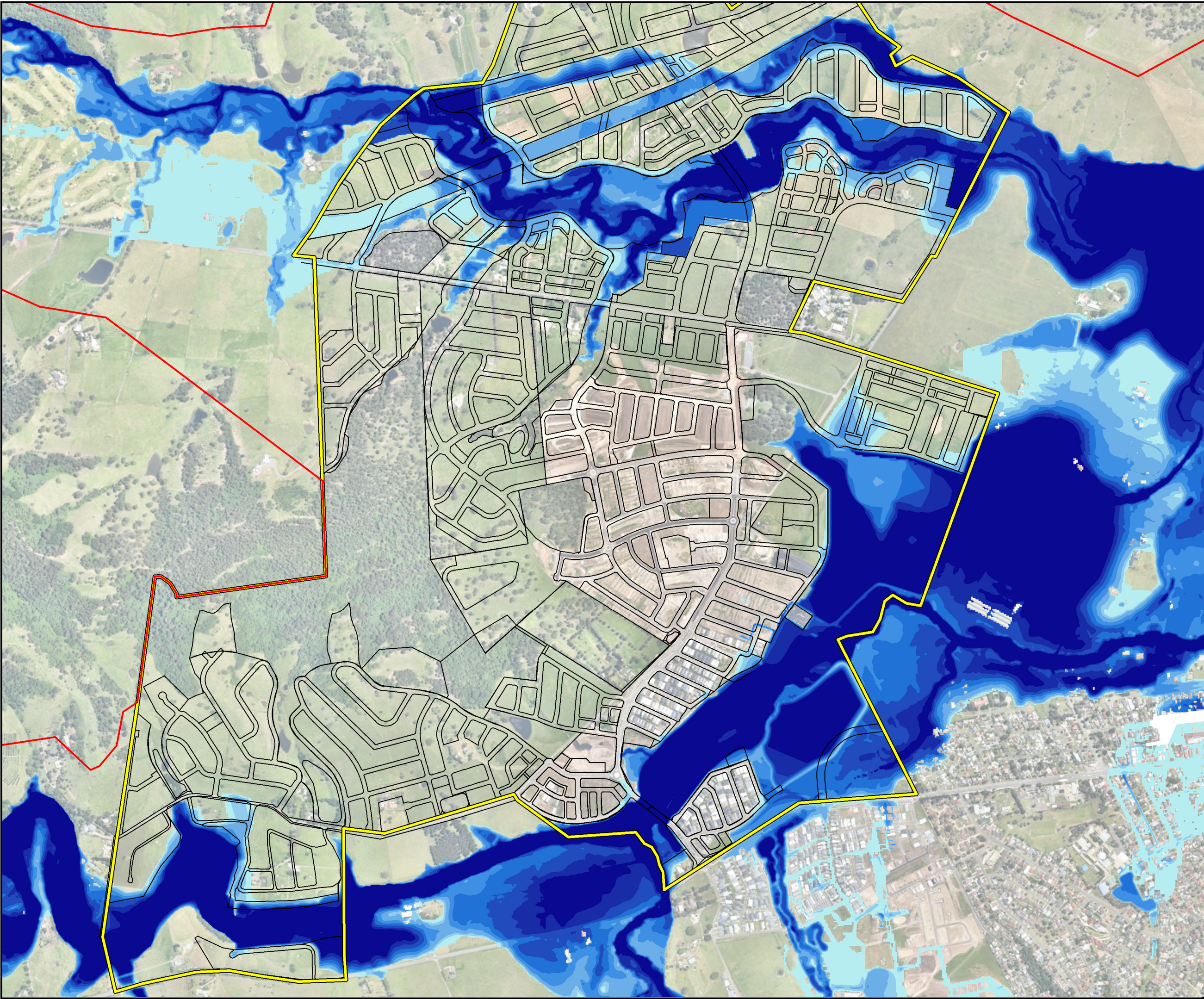
Projection: GDA 1994 MGA Zone 56

Figure 1.4
Calderwood Urban Development Project



PMF Event
Flood Depth
Concept Plan Scenario
4,800 dwellings

Date: 26/08/2020 Issue: A









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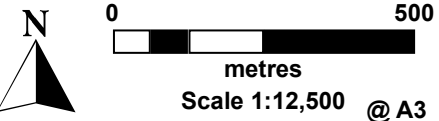


LEGEND

-  Site Boundary
-  TUFLOW Boundary

Cardno 2010 Flood Depth (m)

-  0 to 0.25
-  0.25 to 0.50
-  0.50 to 1.00
-  1.00 to 1.50
-  1.50 to 2.00
-  2.00 to 2.50
-  2.50 to 3.00
-  3.00+



Projection: GDA 1994 MGA Zone 56

Figure 1.5
Calderwood Urban
Development Project

PMF Event
Flood Depth
MOD 4 Scenario
6,000 dwellings

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& PROJECT MANAGERS
P 02 4720 3300
www.jwprince.com.au

LEGEND

Site Boundary

TUFLOW Boundary

Site Layout

Increase in Flood Levels (m)

< -1.0

-1.0 to -0.5

-0.5 to -0.2

-0.2 to -0.02

-0.02 to 0.02

0.02 to 0.2

0.2 to 0.5

0.5 to 1.0

> 1.0

Area Now Flood Free in Modelled Event

Area Now Flood Affected in Modelled Event

N

0 500

metres

Scale 1:12,500 @ A3

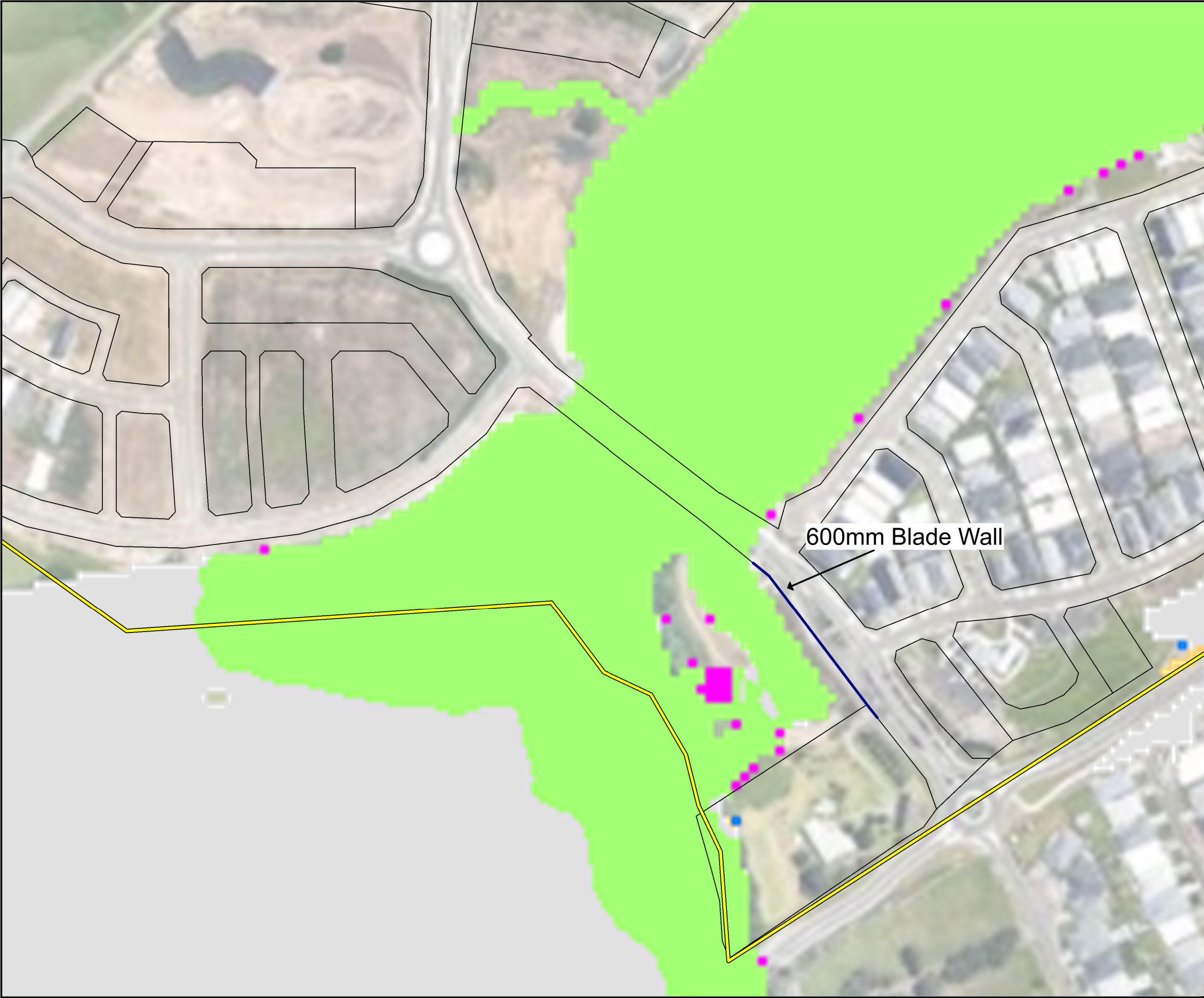
Projection: GDA 1994 MGA Zone 56

Figure 1.6
Calderwood Urban Development Project

PMF Event
Flood Difference
MOD 4 Scenario minus Concept Plan Scenario

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LEGEND

Site Boundary

TUFLOW Boundary

Site Layout

Increase in Flood Levels (m)

< -1.0

-1.0 to -0.5

-0.5 to -0.2

-0.2 to -0.02

-0.02 to 0.02

0.02 to 0.2

0.2 to 0.5

0.5 to 1.0

> 1.0

Area Now Flood Free in Modelled Event

Area Now Flood Affected in Modelled Event

Blade Wall

N

0 80

metres

Scale 1:2,000 @ A3

Projection: GDA 1994 MGA Zone 56

Figure 1.7
Calderwood Urban Development Project

1% AEP Event
Flood Difference
MOD 4 Developed Scenario minus
Approved Development Scenario

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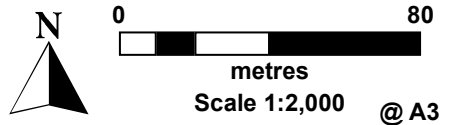
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LEGEND

Site Boundary

 TUFLOW Boundary

Increase in Flood Levels (m)

 < -1.0 -1.0 to -0.5 -0.5 to -0.2 -0.2 to -0.02 -0.02 to 0.02 0.02 to 0.2 0.2 to 0.5 0.5 to 1.0 > 1.0 Area Now Flood Free
in Modelled Event Area Now Flood Affected
in Modelled Event Blade Wall

Projection: GDA 1994 MGA Zone 56

Figure 1.8

Calderwood Urban
Development Project

PMF Event
Flood Difference
MOD 4 Developed Scenario minus
Approved Development Scenario

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