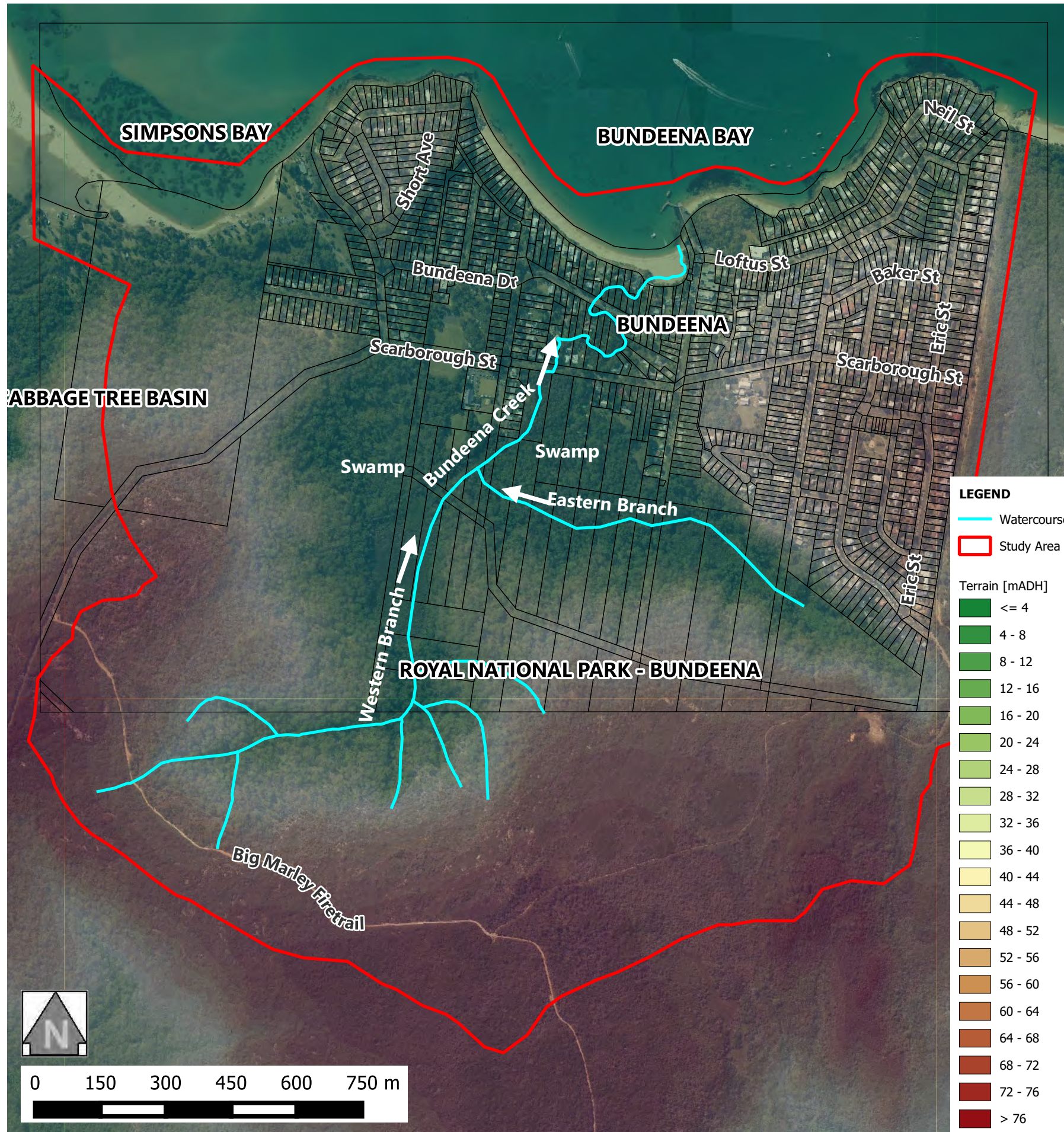


**FIGURE 1.1**

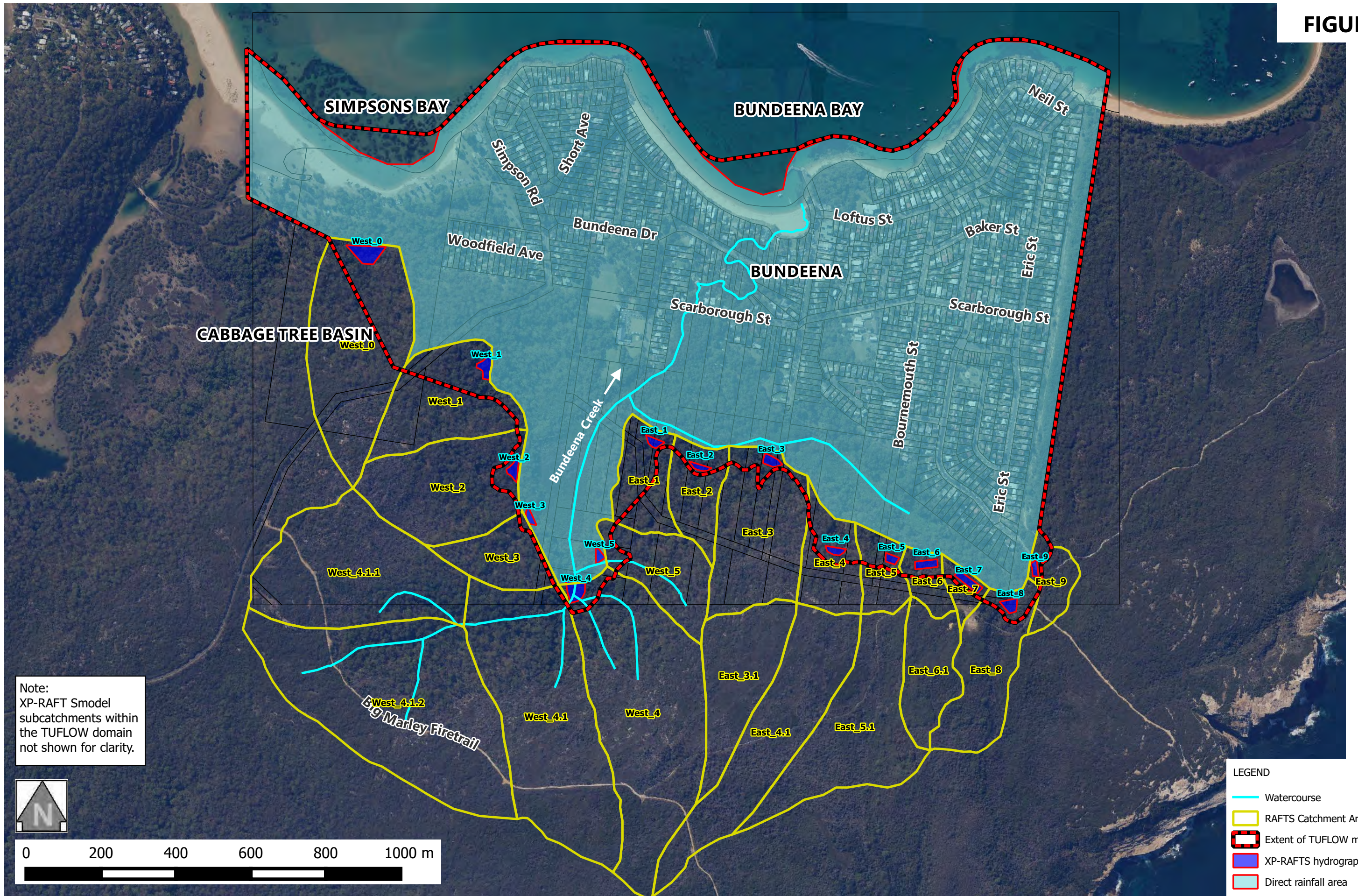


Aerial Imagery © Land and Property Information 2017



**BUNDEENA CREEK STUDY AREA**

FIGURE 3.1



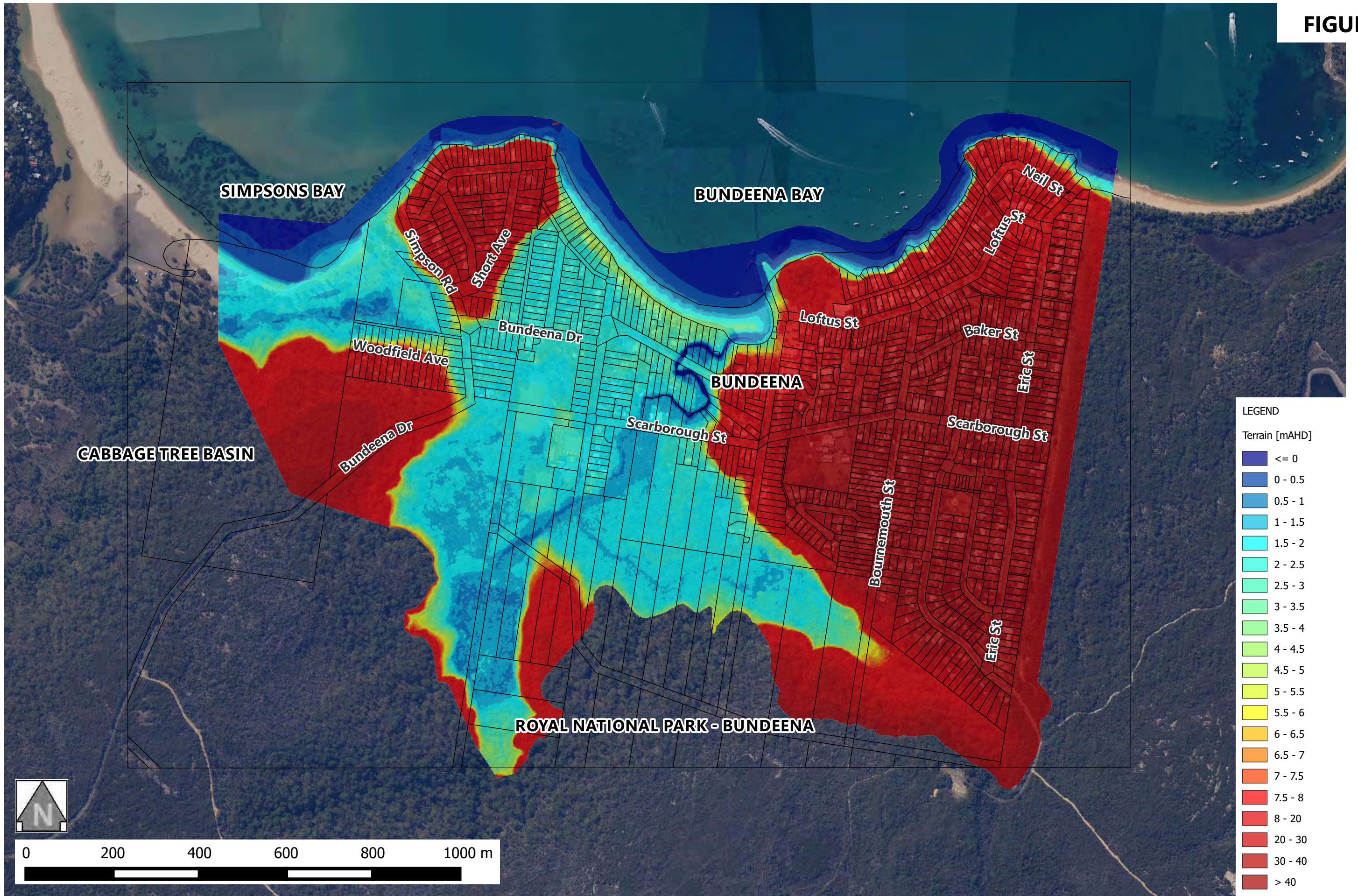
Note:  
XP-RAFT Smodel  
subcatchments within  
the TUFLOW domain  
not shown for clarity.

- LEGEND
- Watercourse
  - RAFTS Catchment Area
  - Extent of TUFLOW model
  - XP-RAFTS hydrograph inflow
  - Direct rainfall area

Aerial Imagery © Land and Property Information 2017

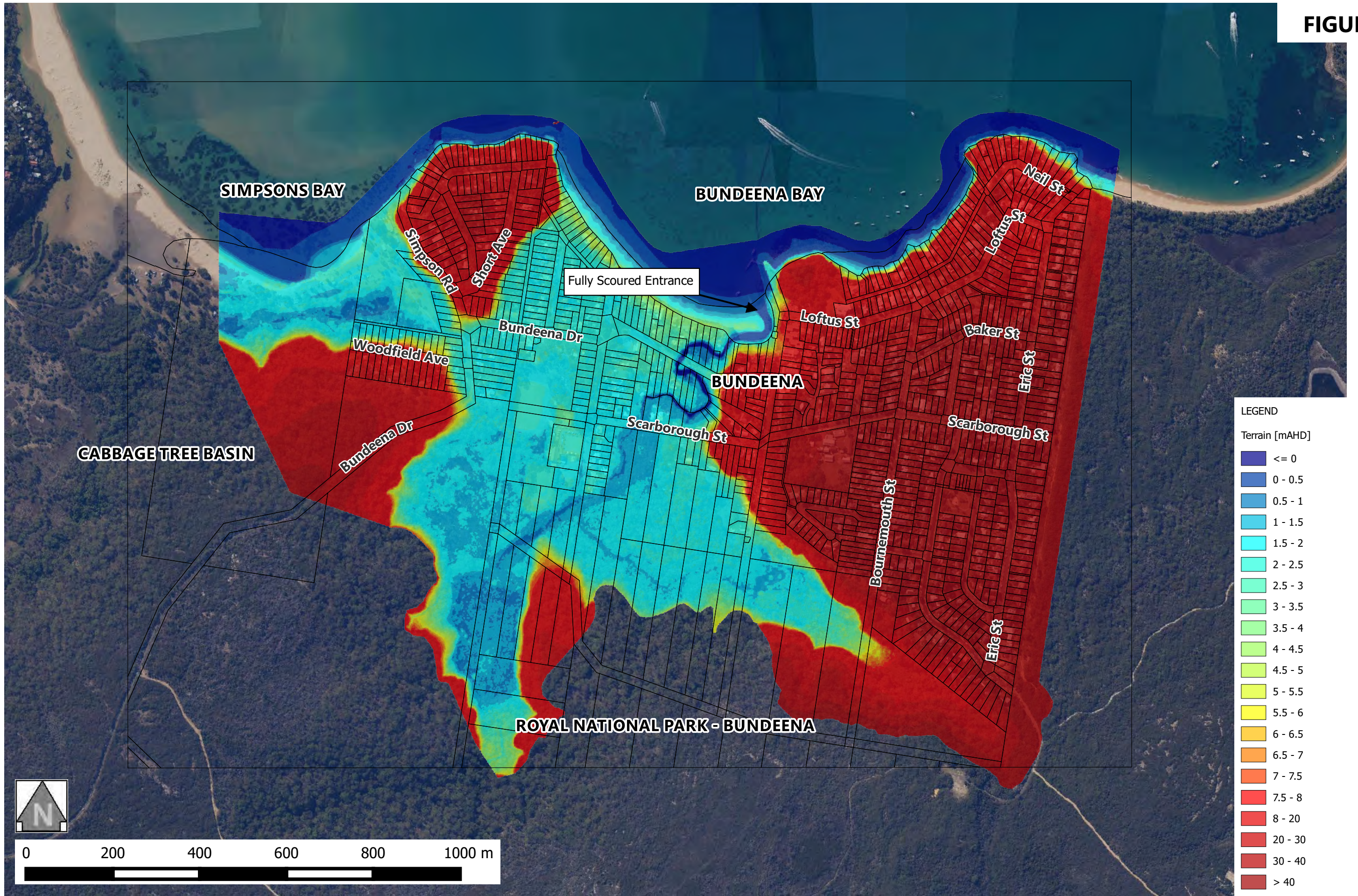
**LAYOUT OF UPSTREAM SUBCATCHMENTS IN THE XP-RAFTS MODEL  
AND RUNOFF INFLOW LOCATIONS IN THE TUFLOW MODEL**

FIGURE 3.2



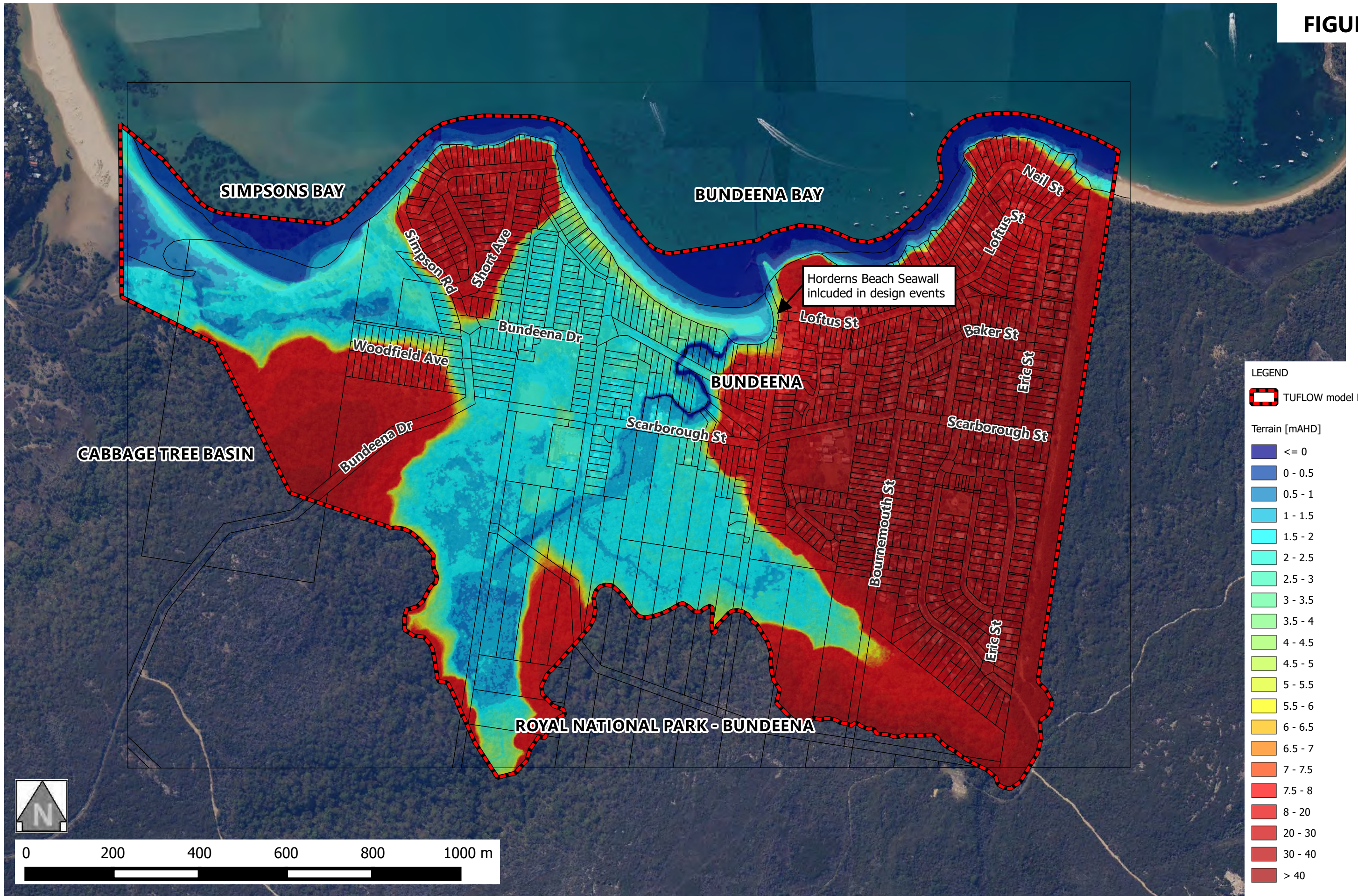
Aerial Imagery © Land and Property Information 2017

FIGURE 3.3



Aerial Imagery © Land and Property Information 2017

FIGURE 3.4



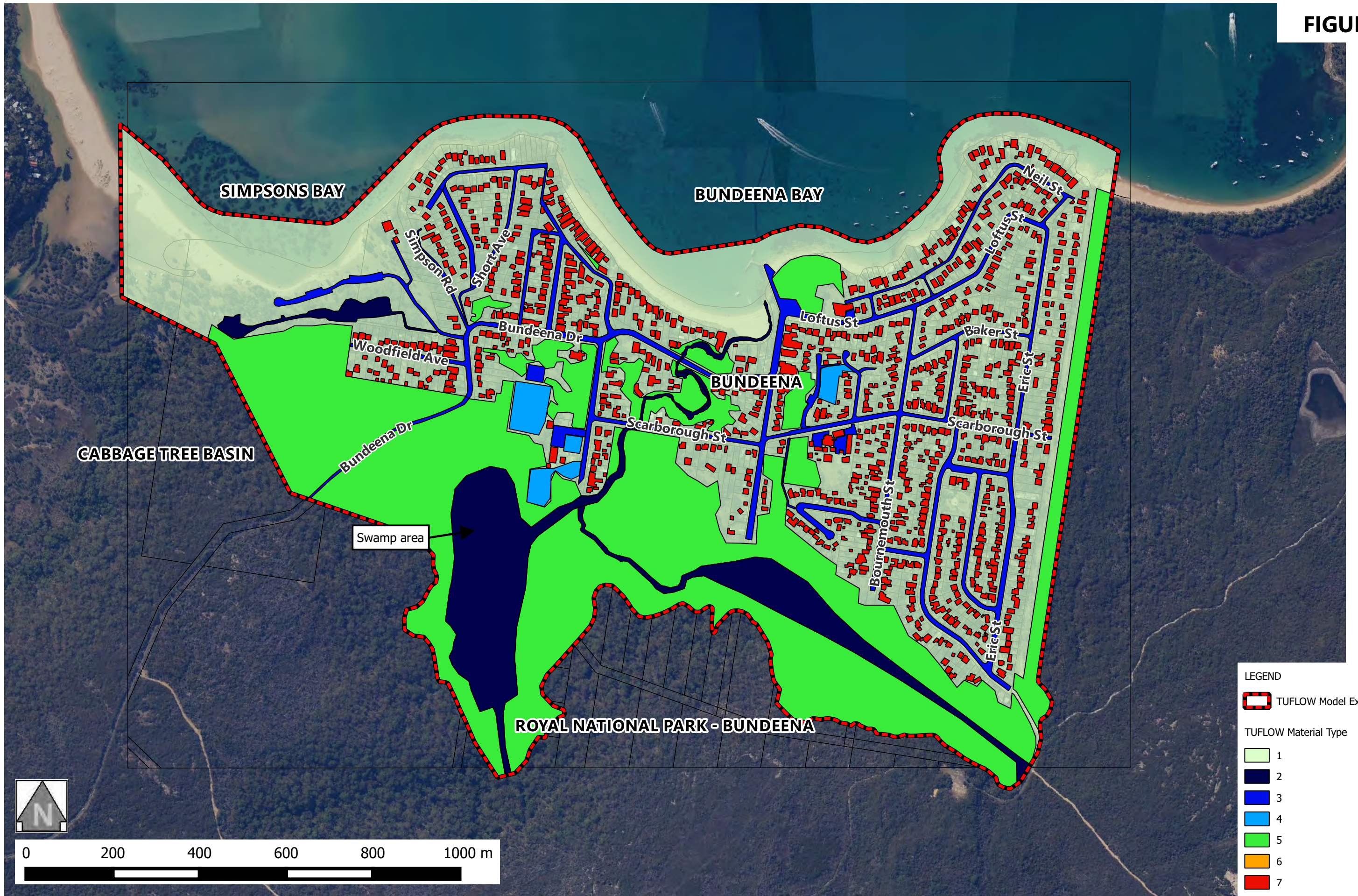
Aerial Imagery © Land and Property Information 2017

FIGURE 3.5



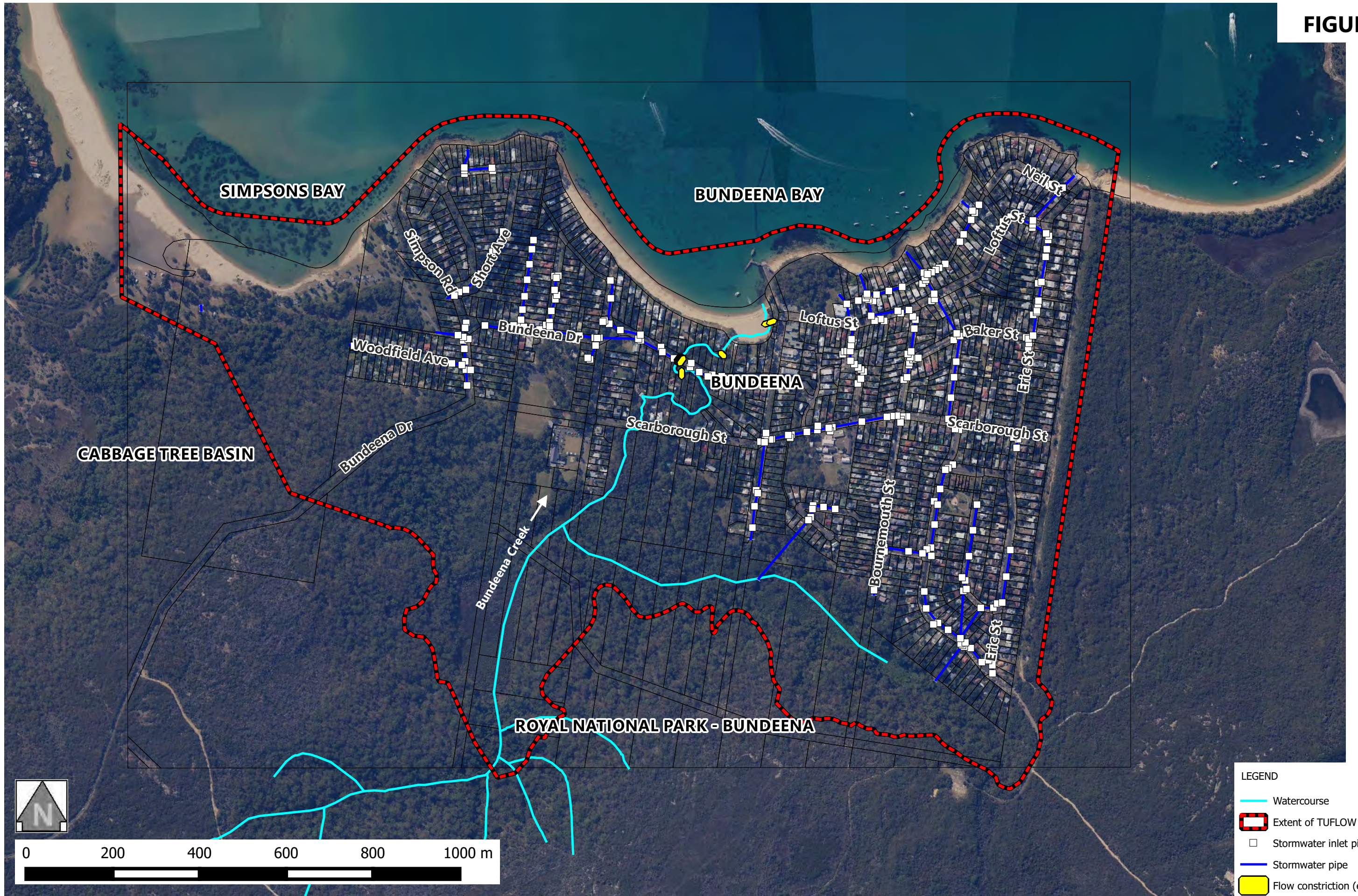
Aerial Imagery © Land and Property Information 2017

FIGURE 3.6



Aerial Imagery © Land and Property Information 2017

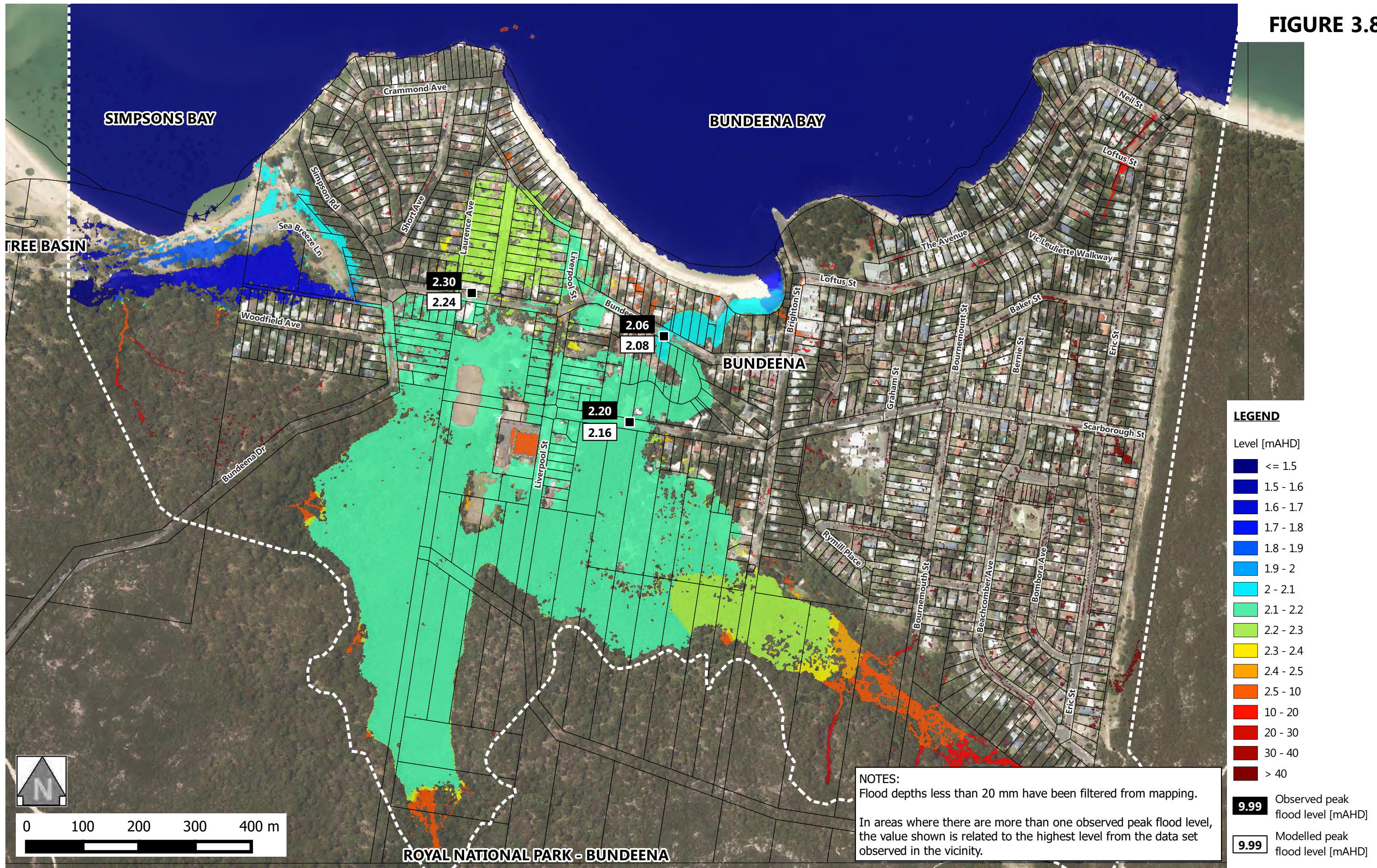
FIGURE 3.7



Aerial Imagery © Land and Property Information 2017



FIGURE 3.8



**LEGEND**

Level [mAHD]

- <= 1.5
- 1.5 - 1.6
- 1.6 - 1.7
- 1.7 - 1.8
- 1.8 - 1.9
- 1.9 - 2
- 2 - 2.1
- 2.1 - 2.2
- 2.2 - 2.3
- 2.3 - 2.4
- 2.4 - 2.5
- 2.5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- > 40

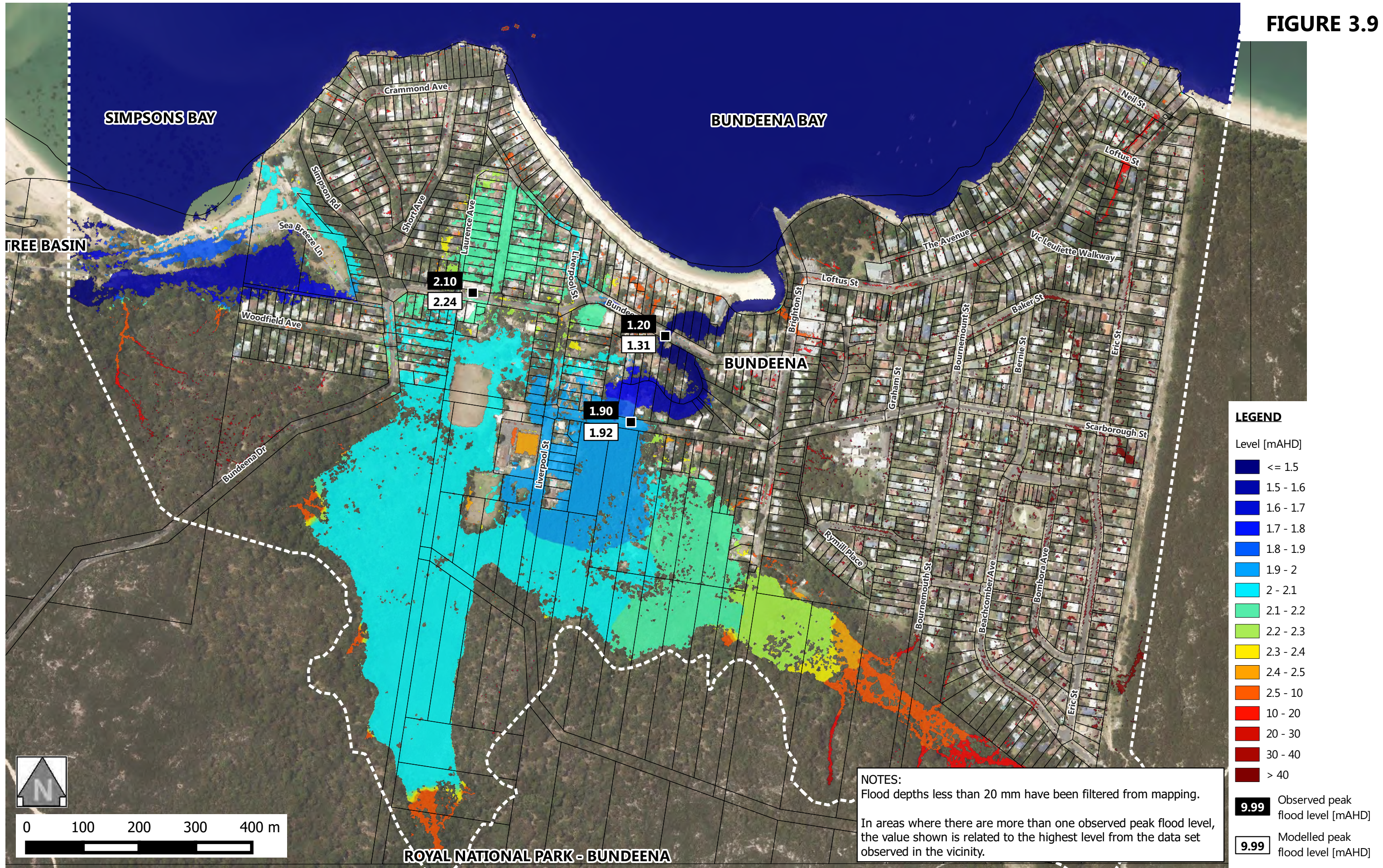
Observed peak flood level [mAHD]

9.99 Modelled peak flood level [mAHD]

**NOTES:**  
 Flood depths less than 20 mm have been filtered from mapping.  
 In areas where there are more than one observed peak flood level, the value shown is related to the highest level from the data set observed in the vicinity.

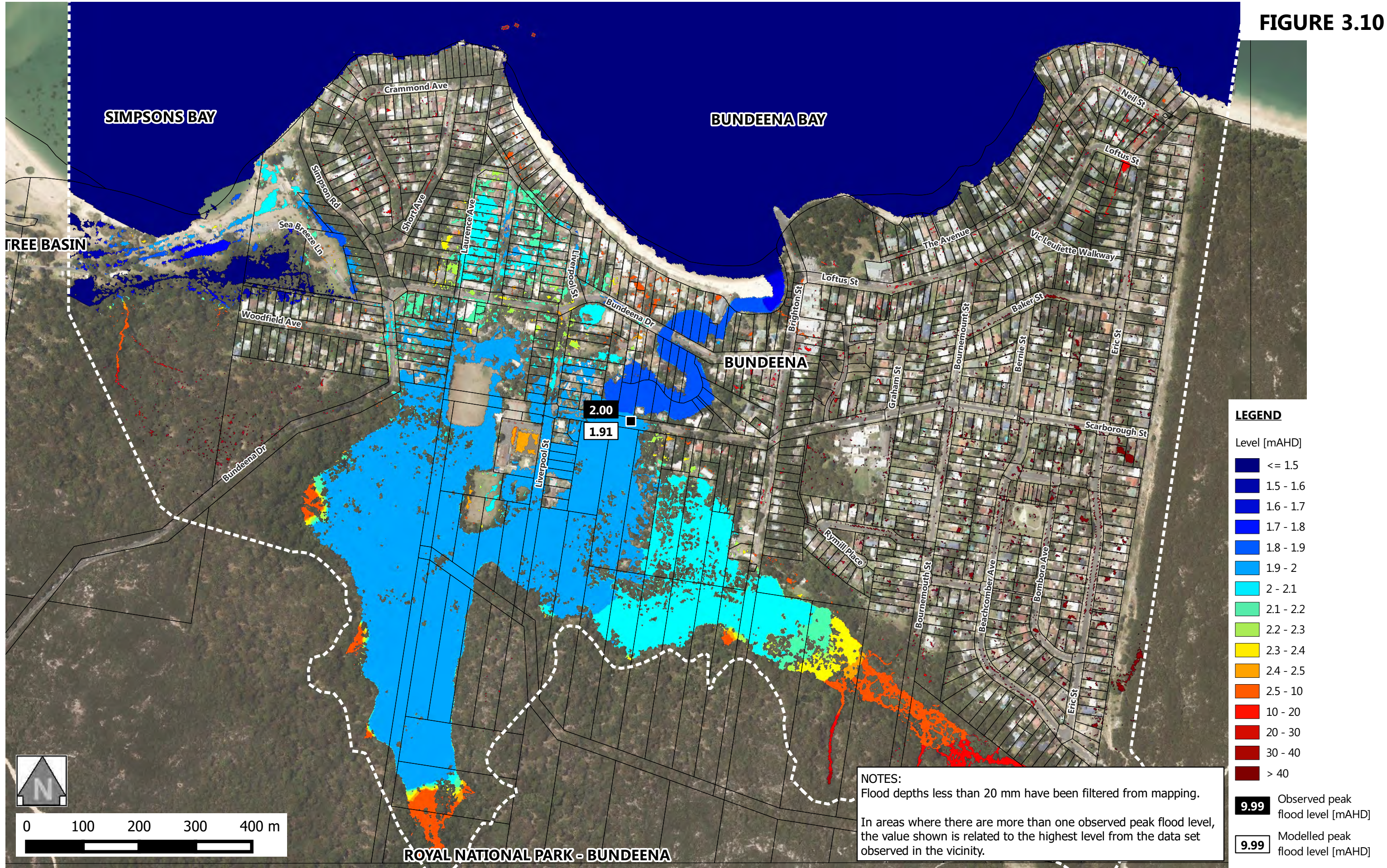
Aerial Imagery © Land and Property Information 2017

**FIGURE 3.9**



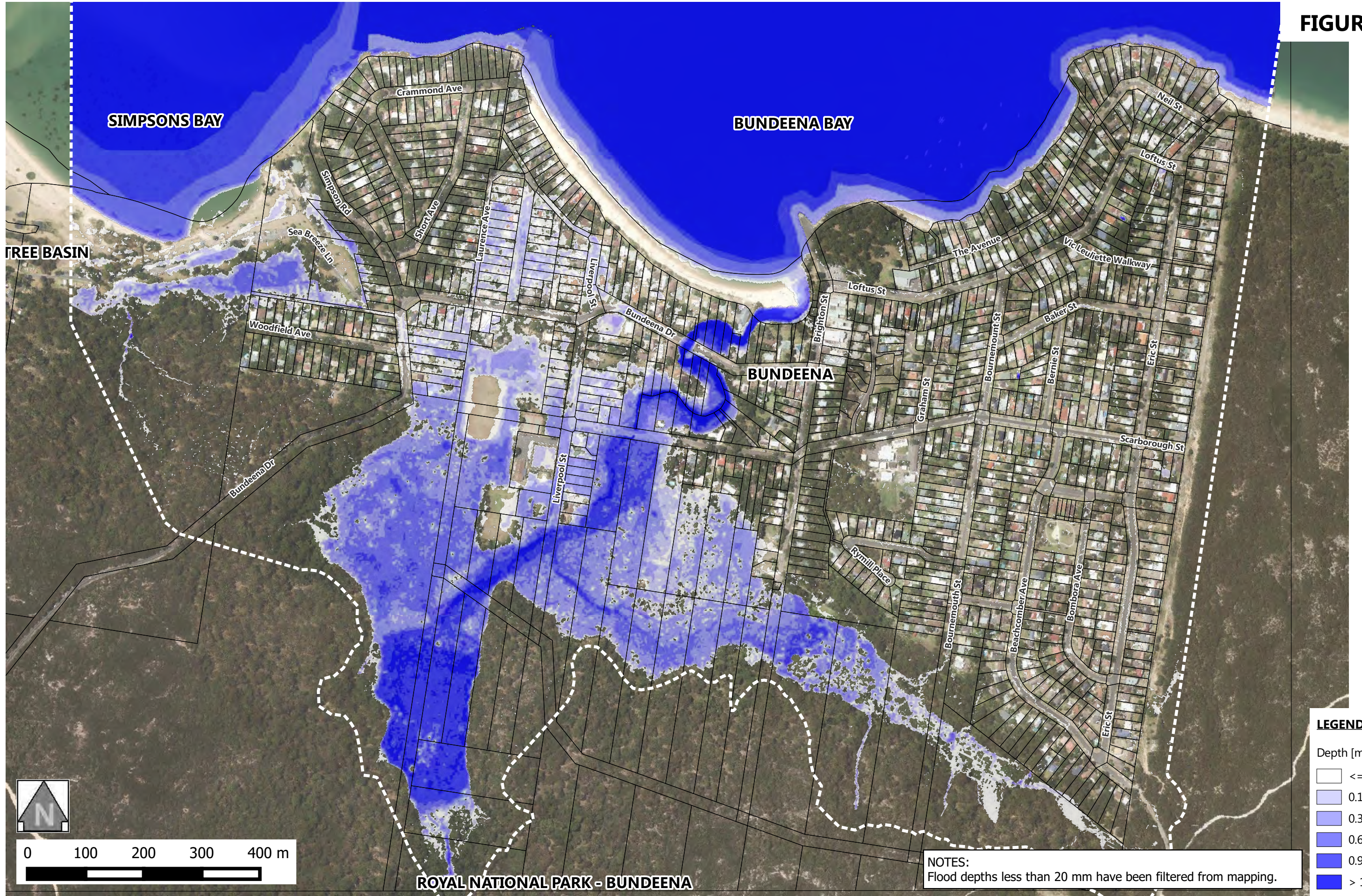
Aerial Imagery © Land and Property Information 2017

**FIGURE 3.10**



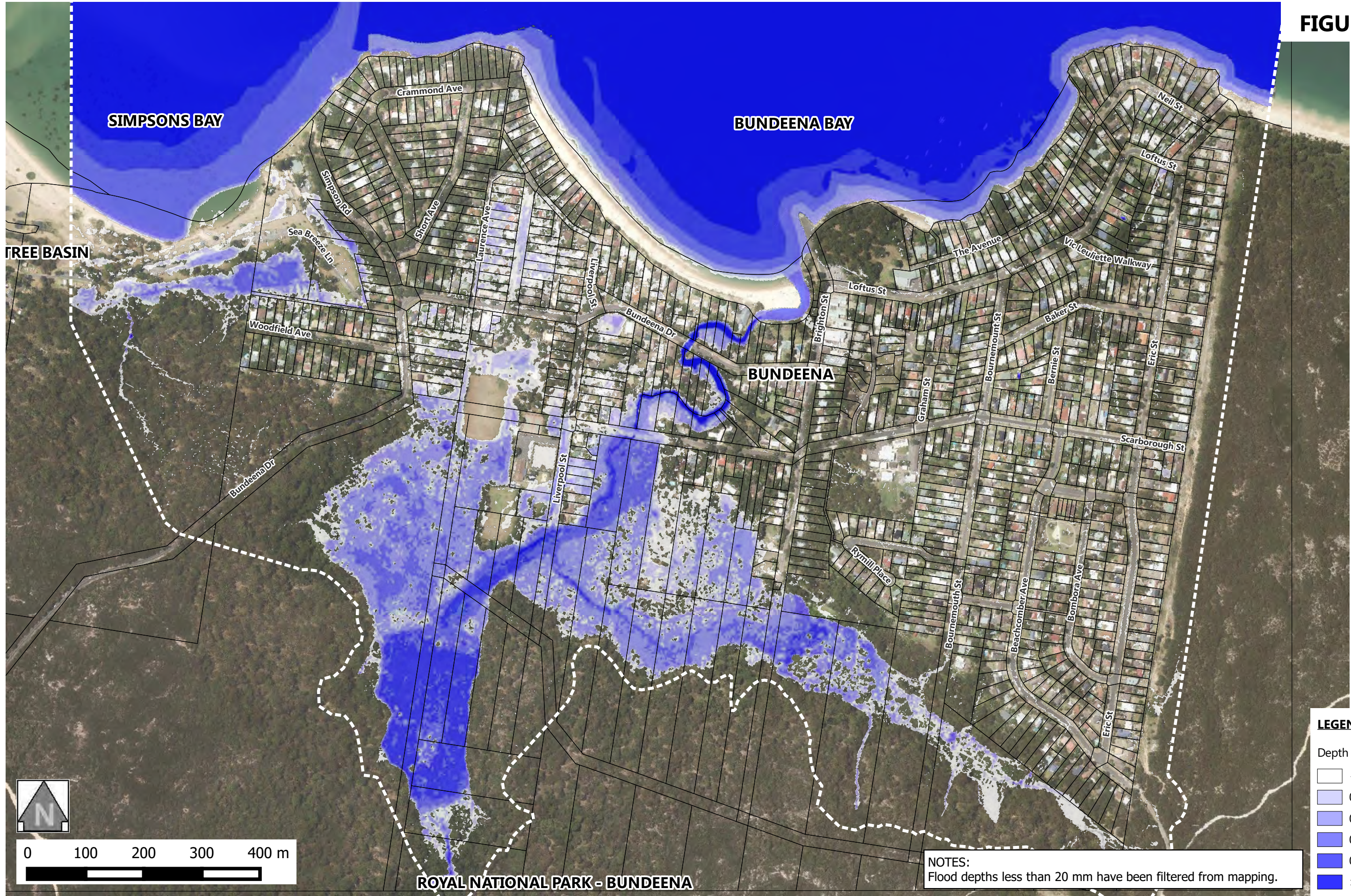
Aerial Imagery © Land and Property Information 2017

FIGURE 3.11



Aerial Imagery © Land and Property Information 2017

FIGURE 3.12



**LEGEND**

Depth [m]

|            |
|------------|
| <= 0.15    |
| 0.15 - 0.3 |
| 0.3 - 0.6  |
| 0.6 - 0.9  |
| 0.9 - 1.2  |
| > 1.2      |

NOTES:  
Flood depths less than 20 mm have been filtered from mapping.

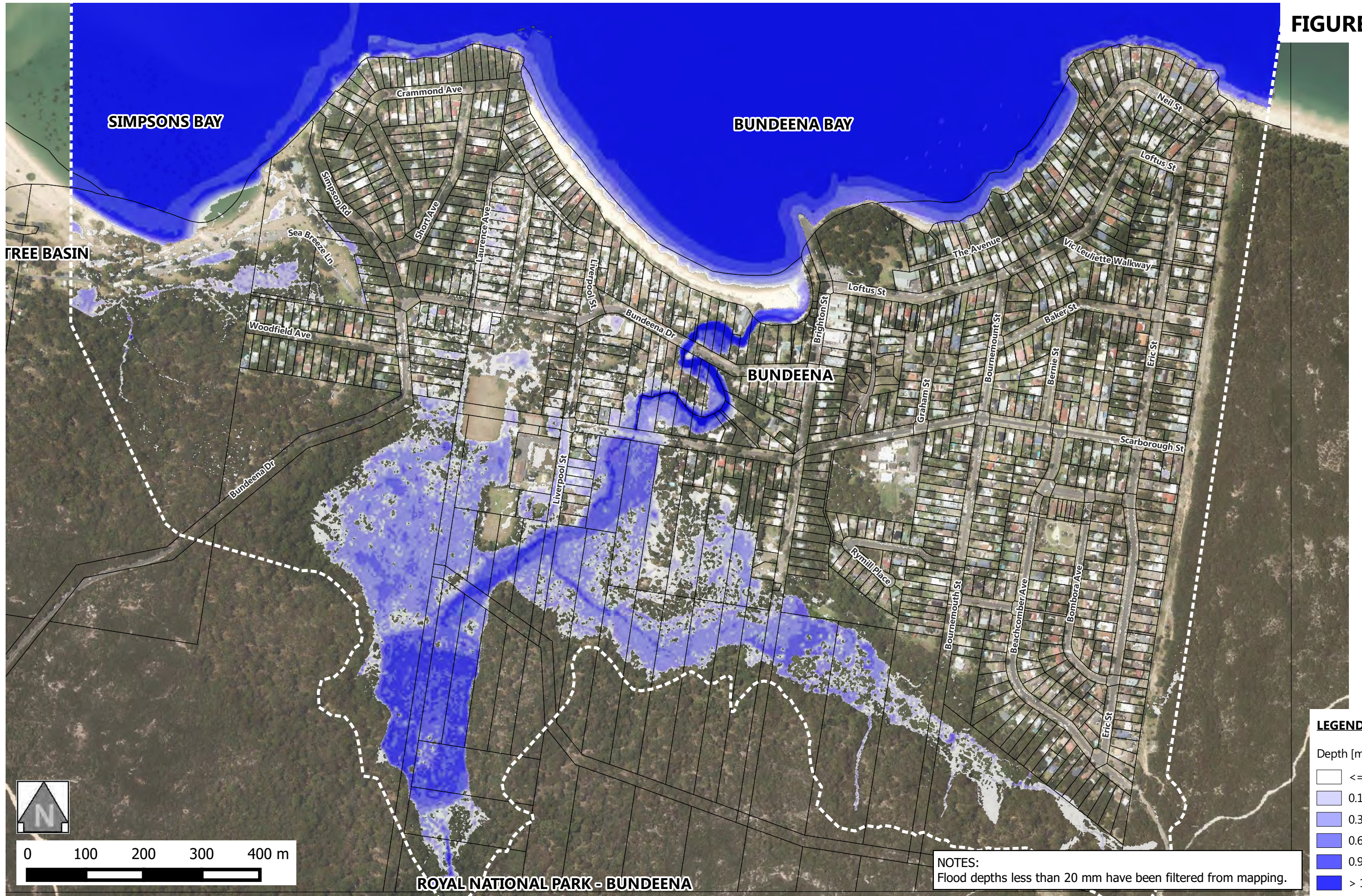
Aerial Imagery © Land and Property Information 2017



DPaper 1 2017-02-17 - Fig 3.5 November 1984 Depths  
2017-02-07 Bundeena FRMS Figures.qgs

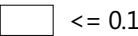
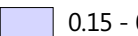
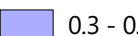
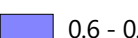
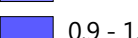

**MODELLED PEAK FLOOD DEPTHS  
DURING THE NOVEMBER 1984 EVENT**

FIGURE 3.13



**LEGEND**

Depth [m]

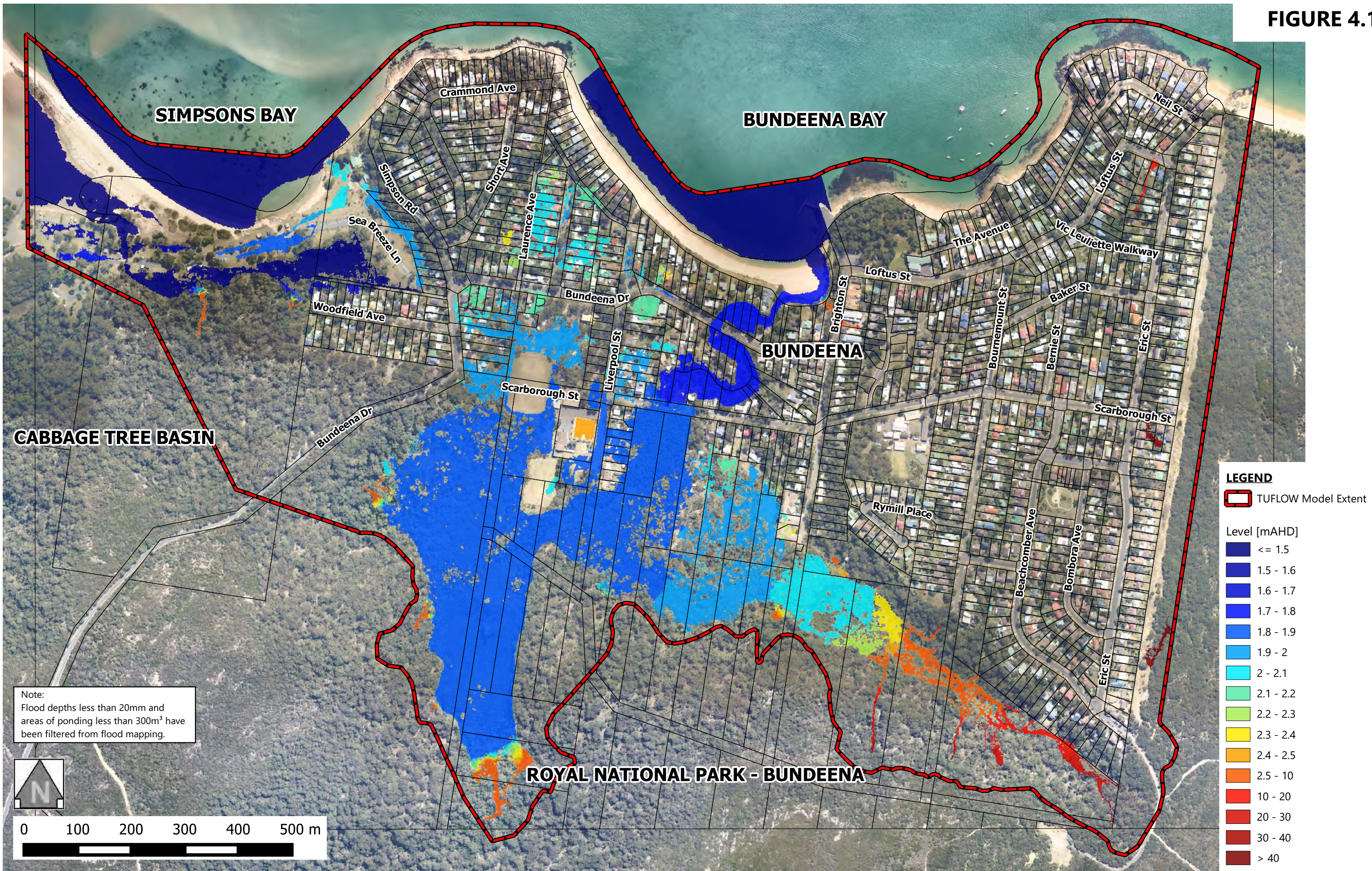
-  <= 0.15
-  0.15 - 0.3
-  0.3 - 0.6
-  0.6 - 0.9
-  0.9 - 1.2
-  > 1.2

NOTES:  
Flood depths less than 20 mm have been filtered from mapping.

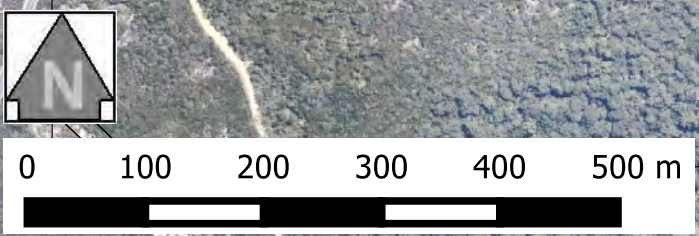
ROYAL NATIONAL PARK - BUNDEENA

Aerial Imagery © Land and Property Information 2017

**FIGURE 4.1**



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



**LEGEND**

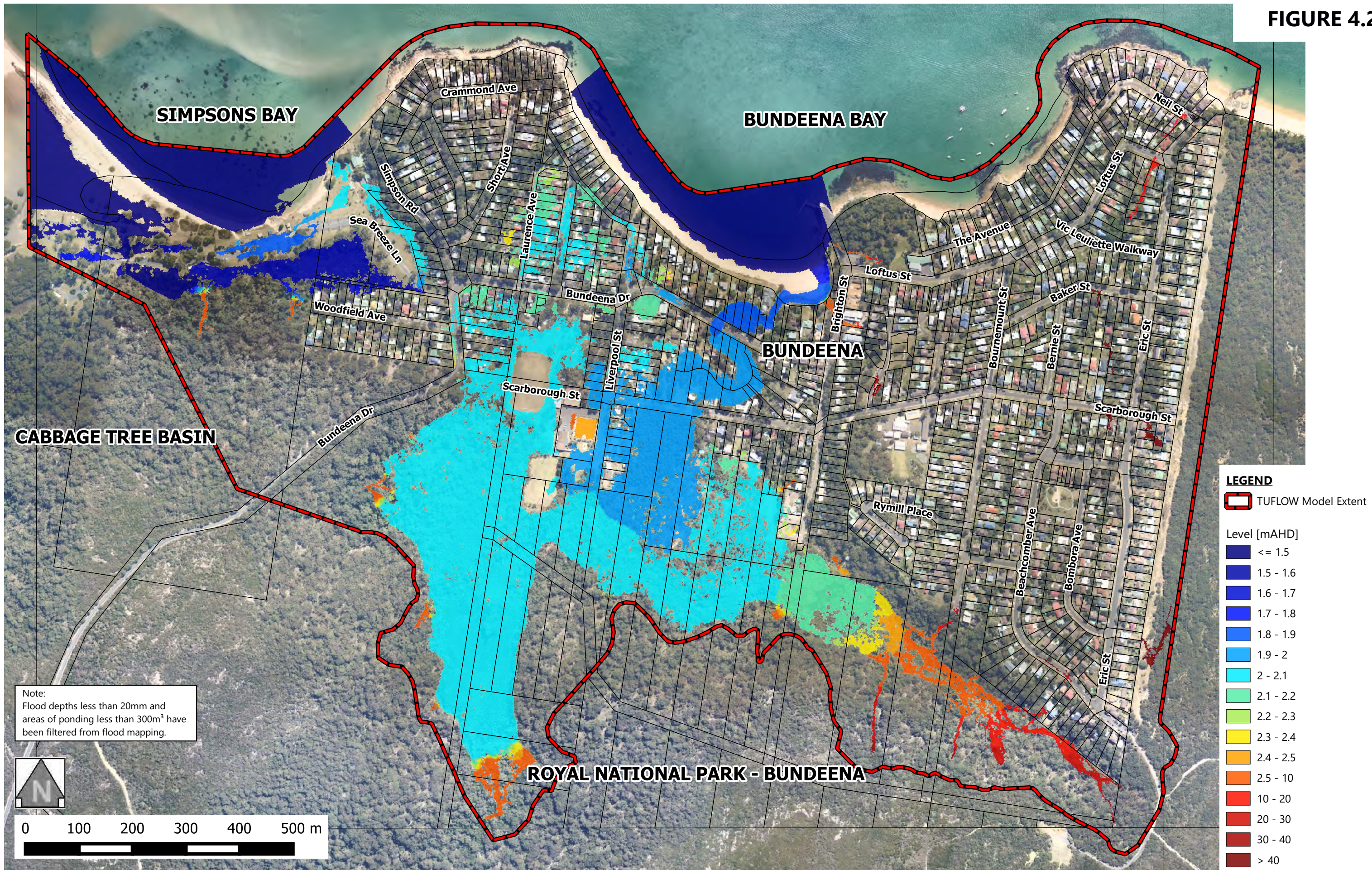
TUFLOW Model Extent

Level [mAHD]

|  |           |
|--|-----------|
|  | <= 1.5    |
|  | 1.5 - 1.6 |
|  | 1.6 - 1.7 |
|  | 1.7 - 1.8 |
|  | 1.8 - 1.9 |
|  | 1.9 - 2   |
|  | 2 - 2.1   |
|  | 2.1 - 2.2 |
|  | 2.2 - 2.3 |
|  | 2.3 - 2.4 |
|  | 2.4 - 2.5 |
|  | 2.5 - 10  |
|  | 10 - 20   |
|  | 20 - 30   |
|  | 30 - 40   |
|  | > 40      |

Aerial Imagery © Land and Property Information 2017

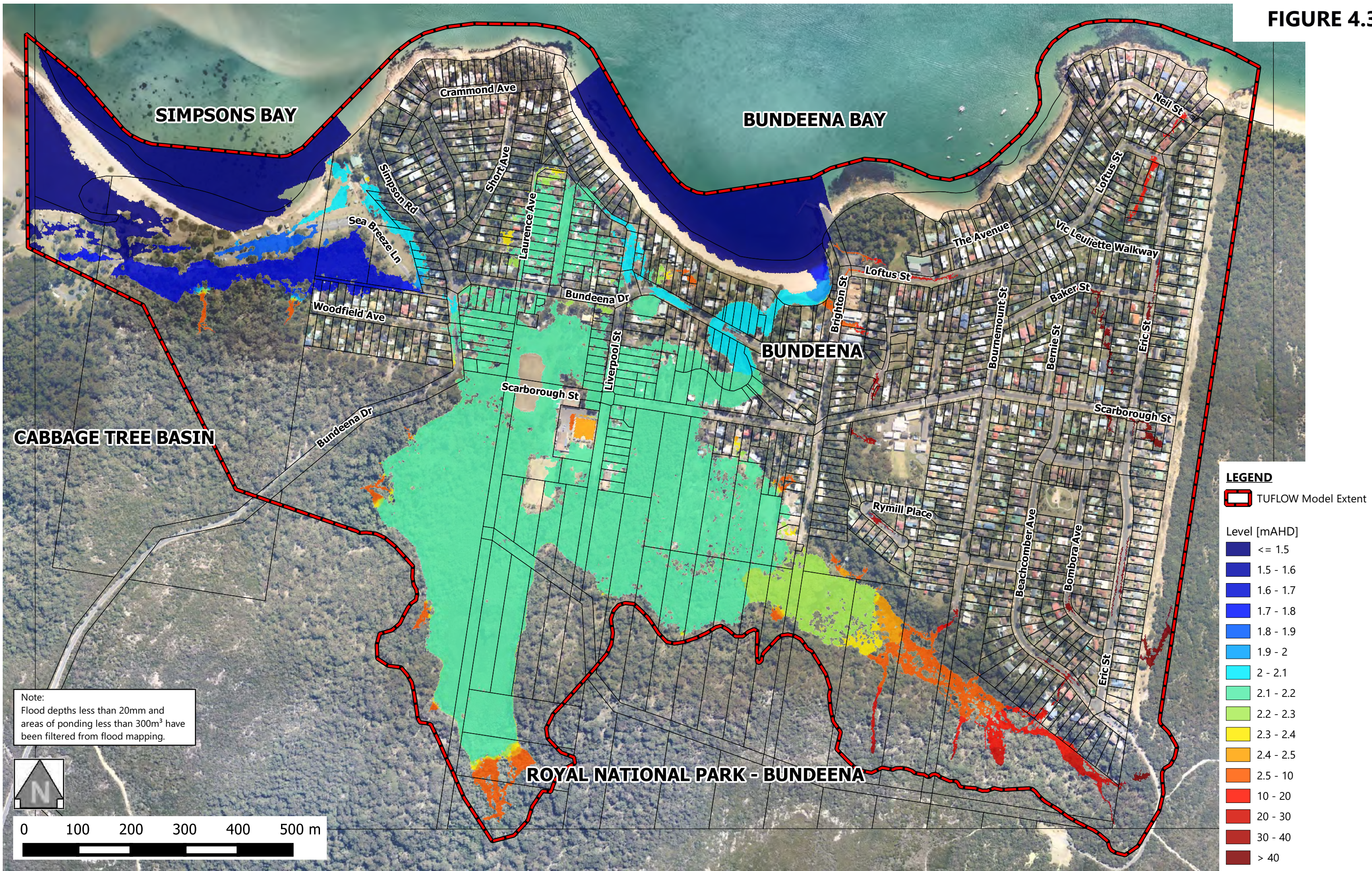
FIGURE 4.2



Aerial Imagery © Land and Property Information 2017



**FIGURE 4.3**



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.

**LEGEND**

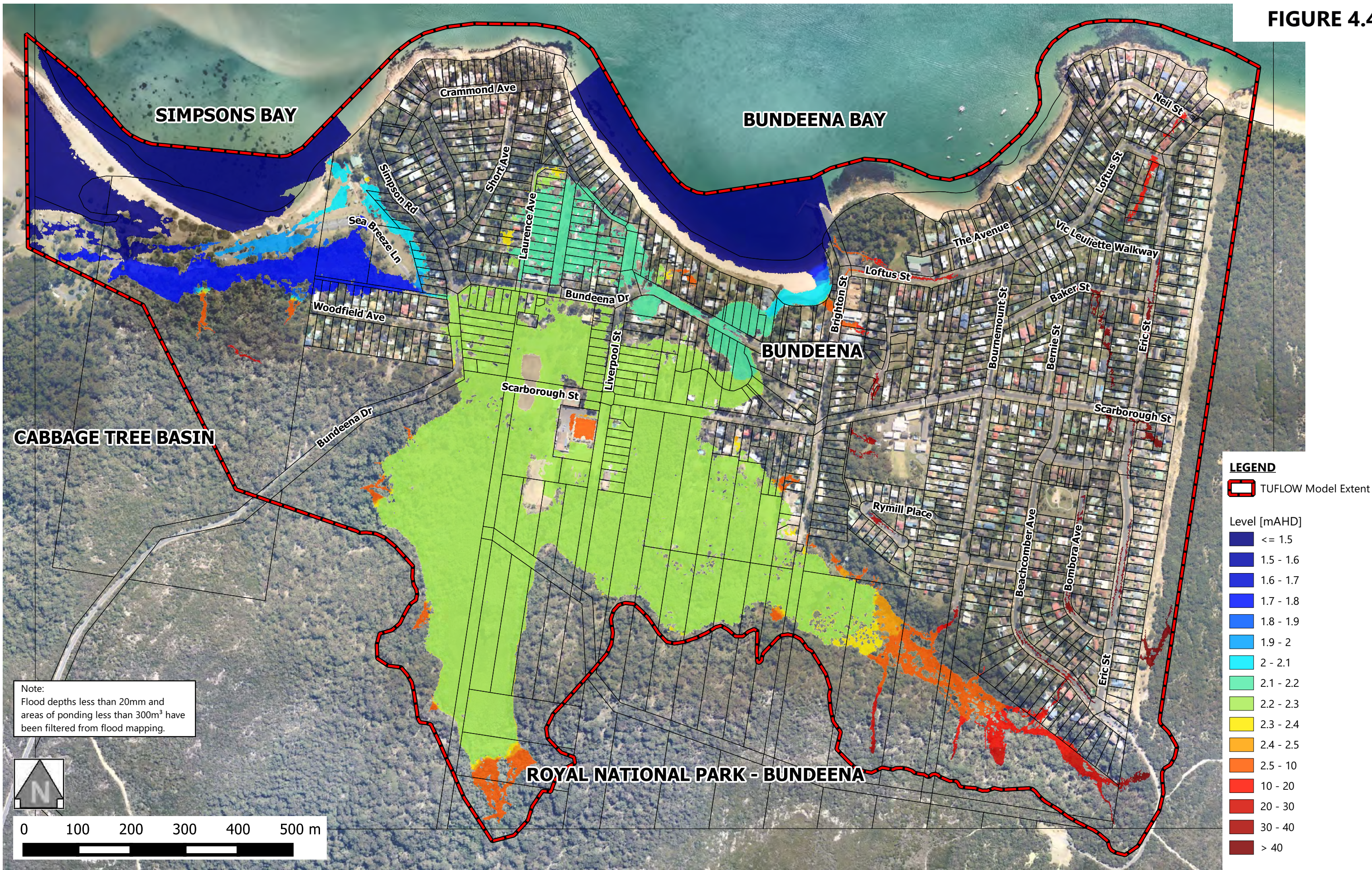
TUFLOW Model Extent

Level [mAHD]

- <math>\le 1.5</math>
- 1.5 - 1.6
- 1.6 - 1.7
- 1.7 - 1.8
- 1.8 - 1.9
- 1.9 - 2
- 2 - 2.1
- 2.1 - 2.2
- 2.2 - 2.3
- 2.3 - 2.4
- 2.4 - 2.5
- 2.5 - 10
- 10 - 20
- 20 - 30
- 30 - 40
- > 40

Aerial Imagery © Land and Property Information 2017

**FIGURE 4.4**

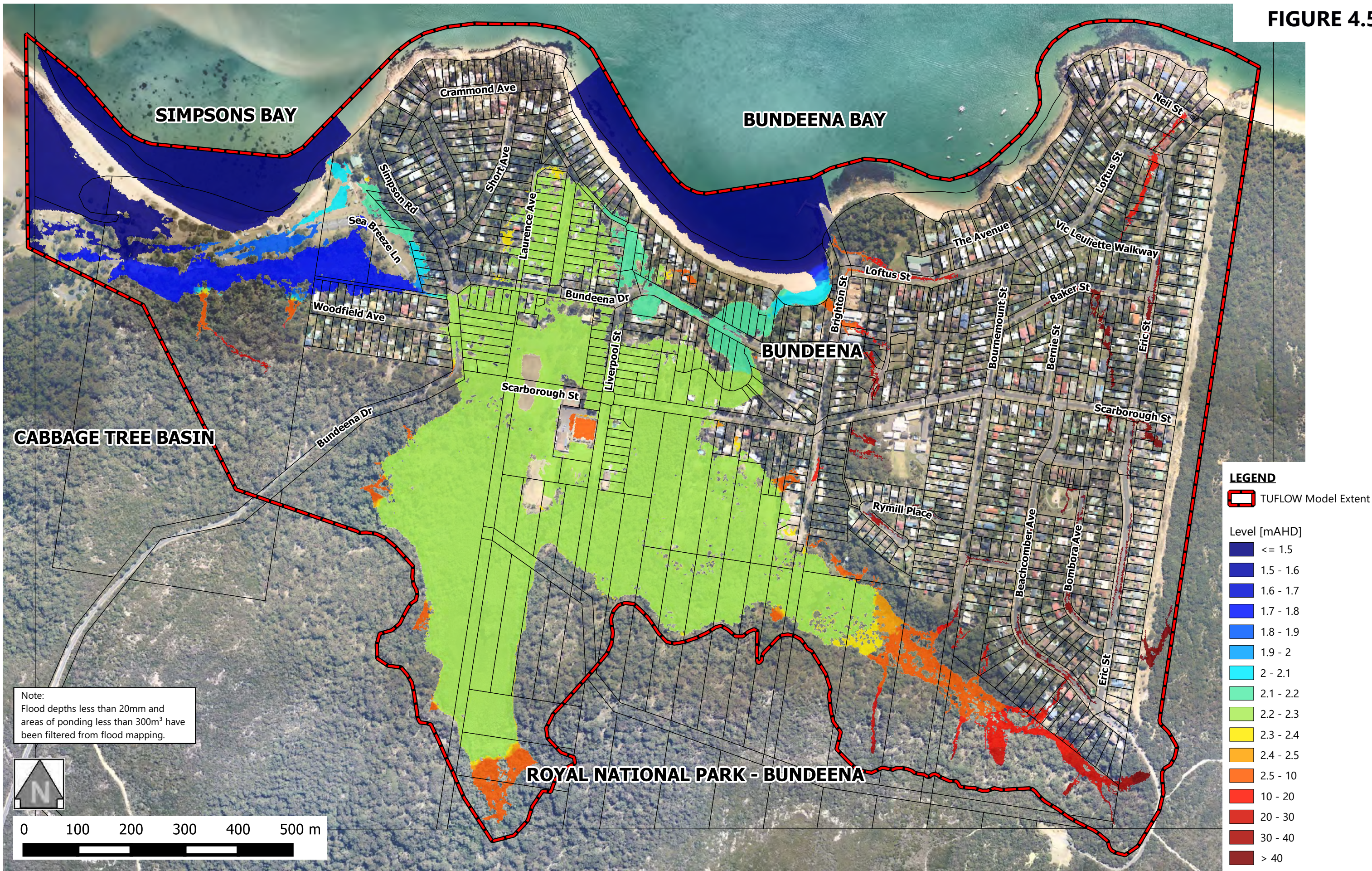


Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



Aerial Imagery © Land and Property Information 2017

**FIGURE 4.5**



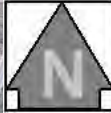
**LEGEND**

TUFLOW Model Extent

Level [mAHd]

|  |           |
|--|-----------|
|  | <= 1.5    |
|  | 1.5 - 1.6 |
|  | 1.6 - 1.7 |
|  | 1.7 - 1.8 |
|  | 1.8 - 1.9 |
|  | 1.9 - 2   |
|  | 2 - 2.1   |
|  | 2.1 - 2.2 |
|  | 2.2 - 2.3 |
|  | 2.3 - 2.4 |
|  | 2.4 - 2.5 |
|  | 2.5 - 10  |
|  | 10 - 20   |
|  | 20 - 30   |
|  | 30 - 40   |
|  | > 40      |

Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.

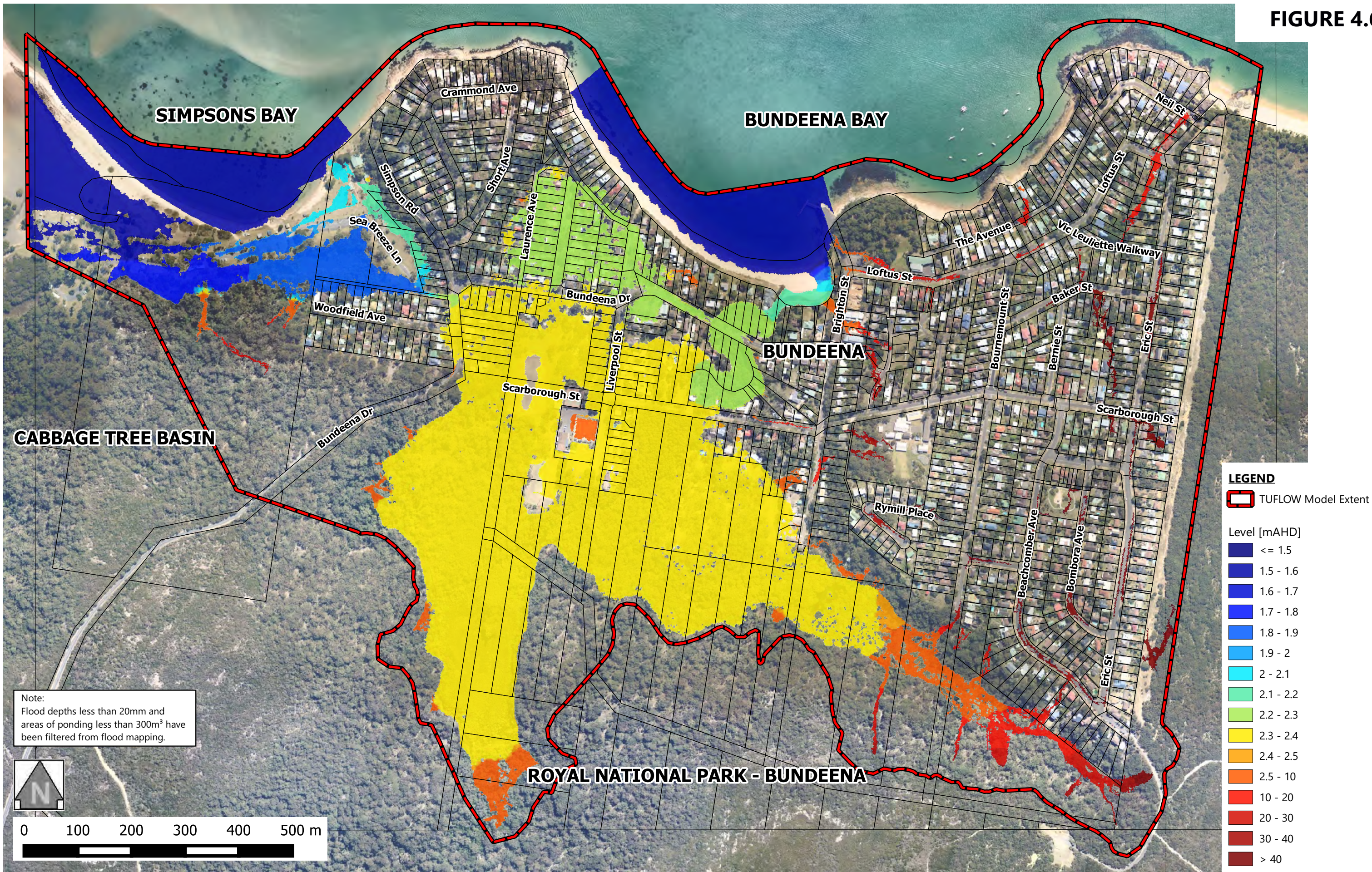


Aerial Imagery © Land and Property Information 2017



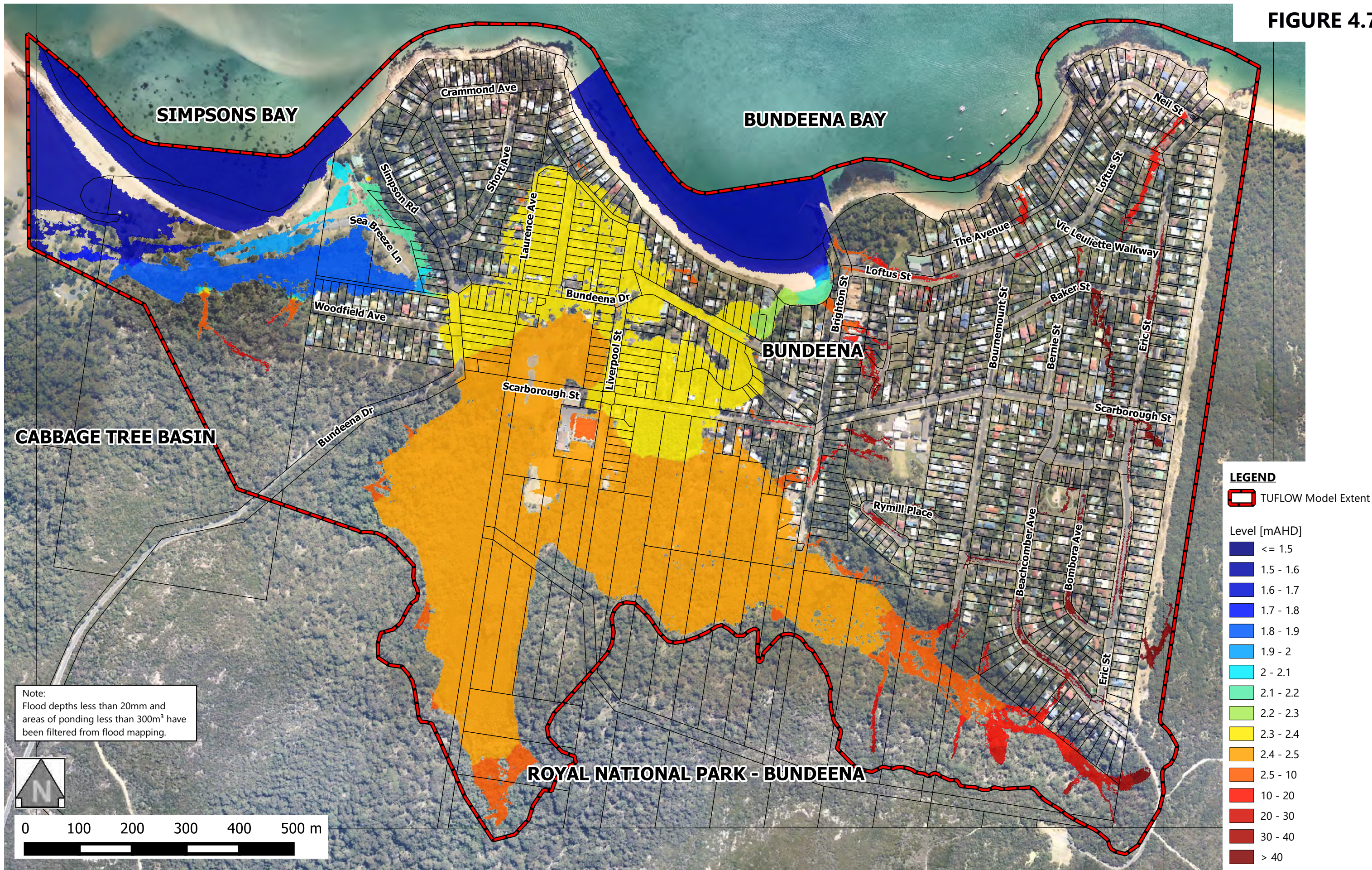
**PEAK FLOOD LEVELS FOR THE 2% AEP EVENT**

FIGURE 4.6

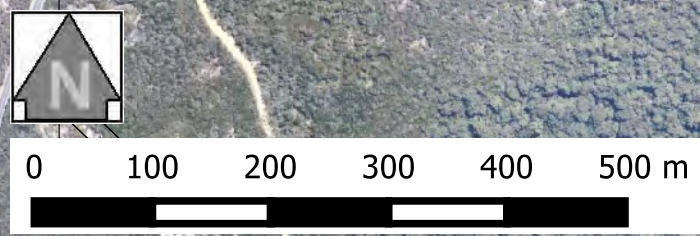


Aerial Imagery © Land and Property Information 2017

**FIGURE 4.7**



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



**LEGEND**

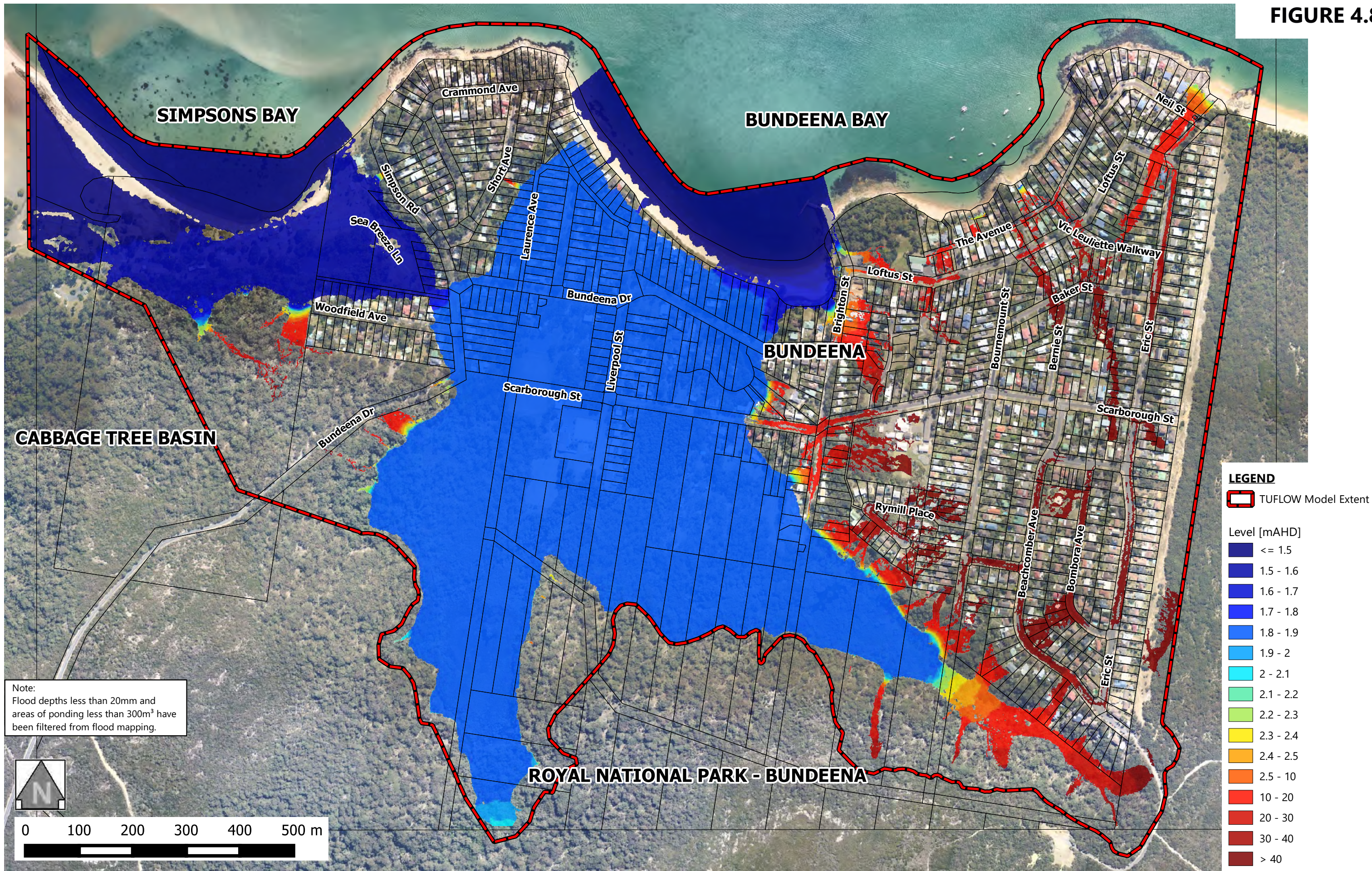
TUFLOW Model Extent

Level [mAHd]

|  |           |
|--|-----------|
|  | <= 1.5    |
|  | 1.5 - 1.6 |
|  | 1.6 - 1.7 |
|  | 1.7 - 1.8 |
|  | 1.8 - 1.9 |
|  | 1.9 - 2   |
|  | 2 - 2.1   |
|  | 2.1 - 2.2 |
|  | 2.2 - 2.3 |
|  | 2.3 - 2.4 |
|  | 2.4 - 2.5 |
|  | 2.5 - 10  |
|  | 10 - 20   |
|  | 20 - 30   |
|  | 30 - 40   |
|  | > 40      |

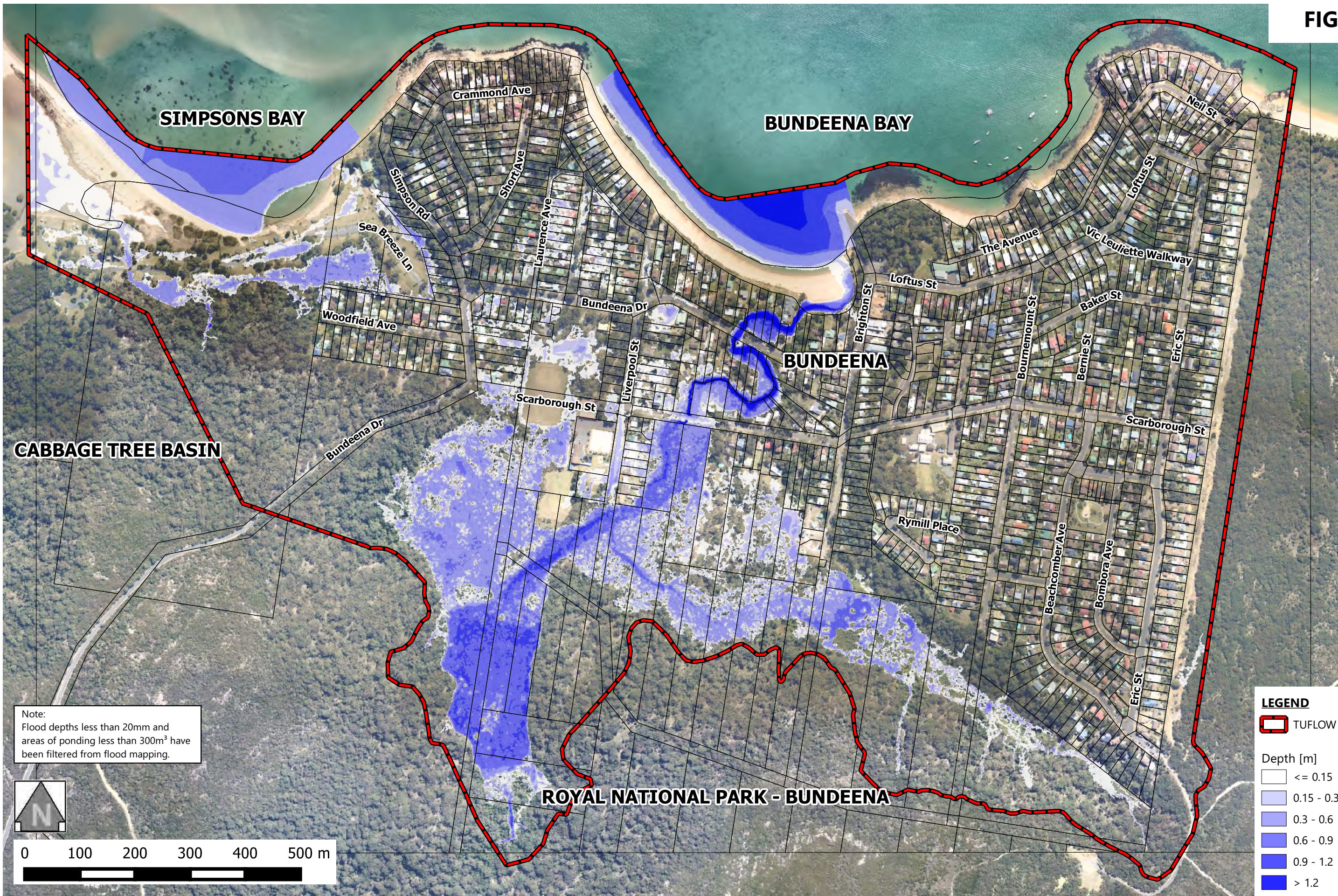
Aerial Imagery © Land and Property Information 2017

**FIGURE 4.8**



Aerial Imagery © Land and Property Information 2017

**FIGURE 4.9**



**LEGEND**

TUFLOW Model Extent

Depth [m]

- <= 0.15
- 0.15 - 0.3
- 0.3 - 0.6
- 0.6 - 0.9
- 0.9 - 1.2
- > 1.2

Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.

0 100 200 300 400 500 m

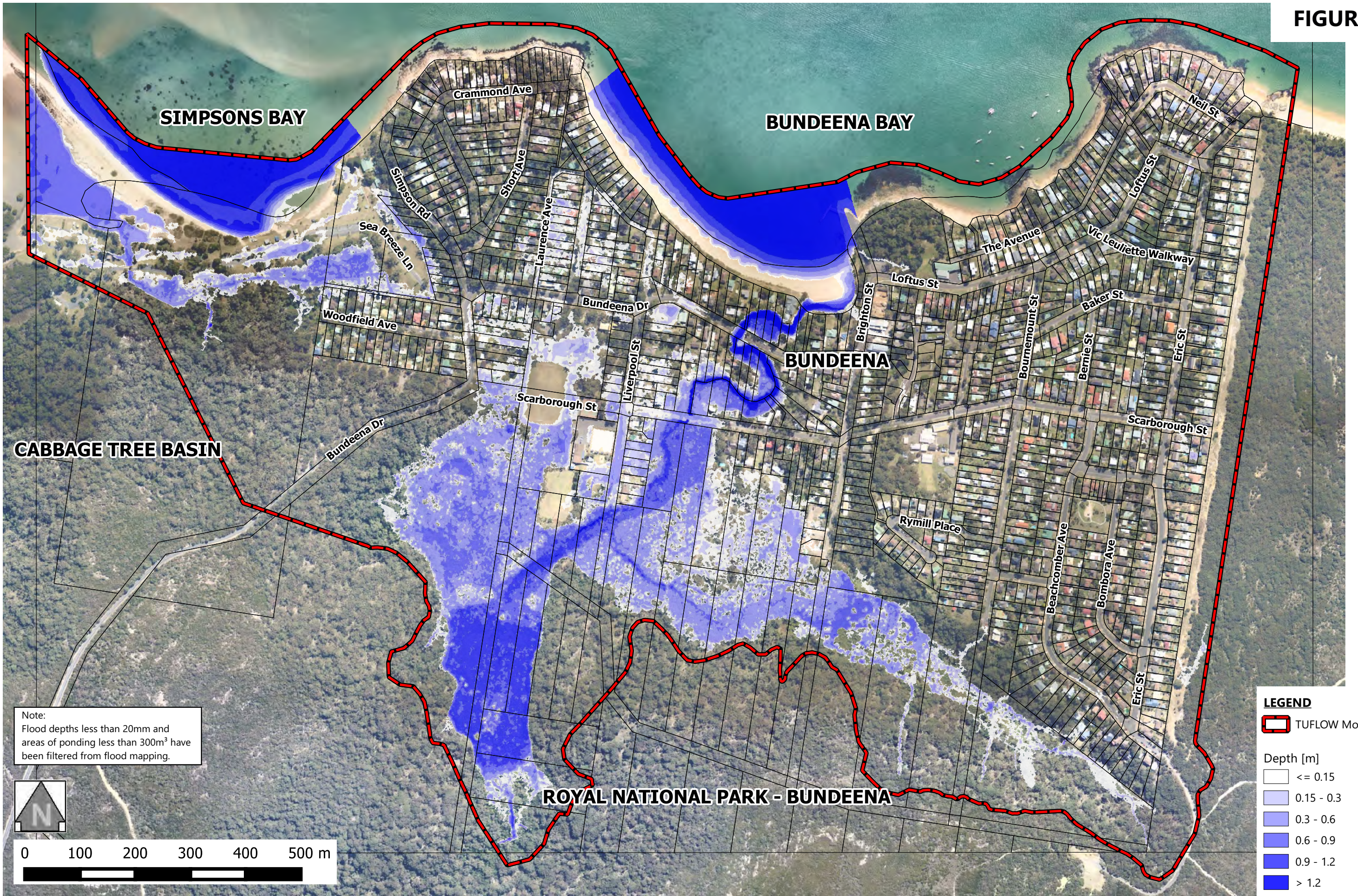
Aerial Imagery © Land and Property Information 2017



**PEAK FLOOD DEPTHS FOR THE 50% AEP EVENT**

FRMP 2018-06-28 Fig 1.10 - 50% AEP Depth  
18-06-28 Bundeena FRMP Flood Mapping.qgs

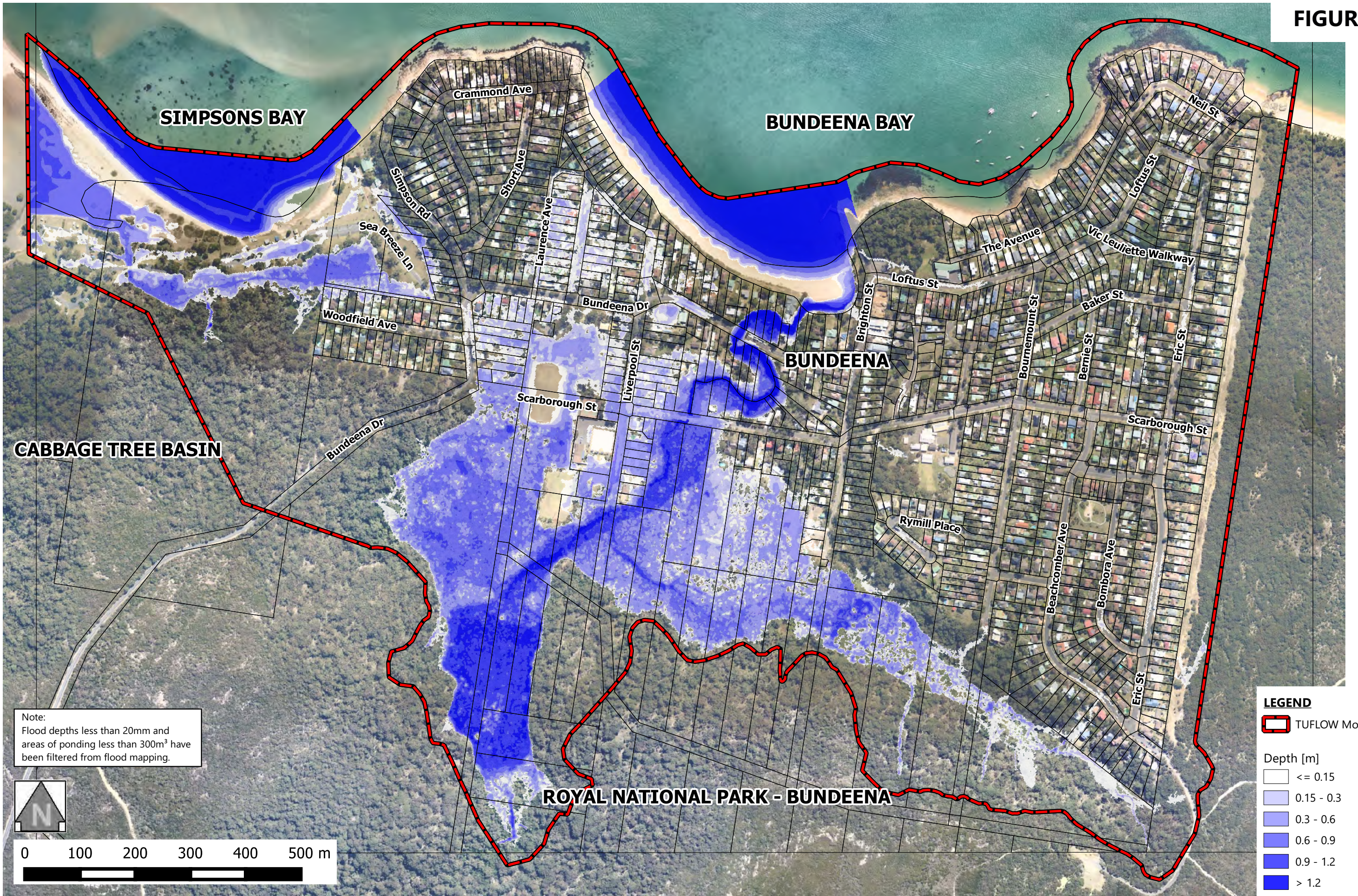
FIGURE 4.10



Aerial Imagery © Land and Property Information 2017

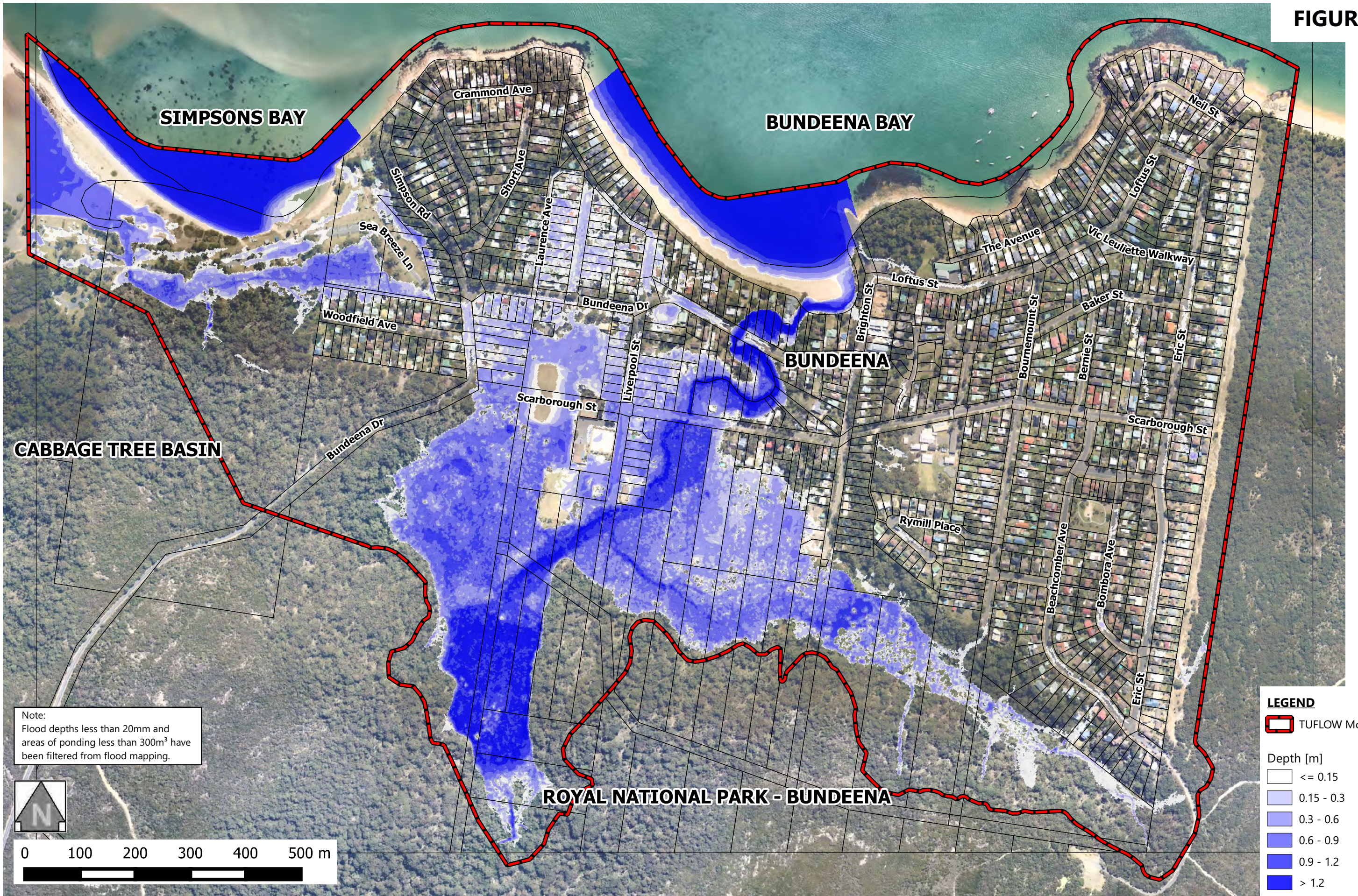


FIGURE 4.11



Aerial Imagery © Land and Property Information 2017

FIGURE 4.12



Aerial Imagery © Land and Property Information 2017

FIGURE 4.13

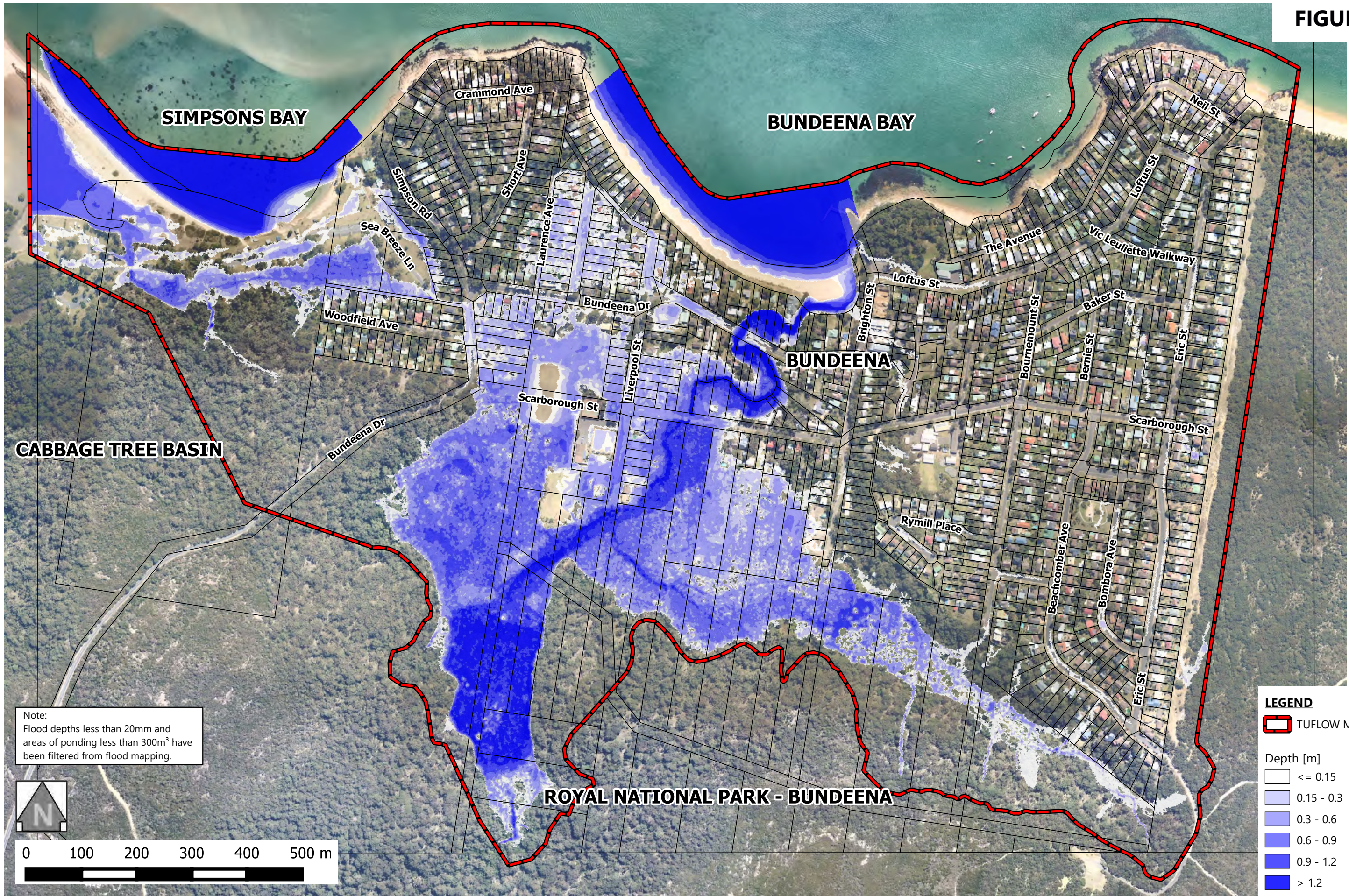
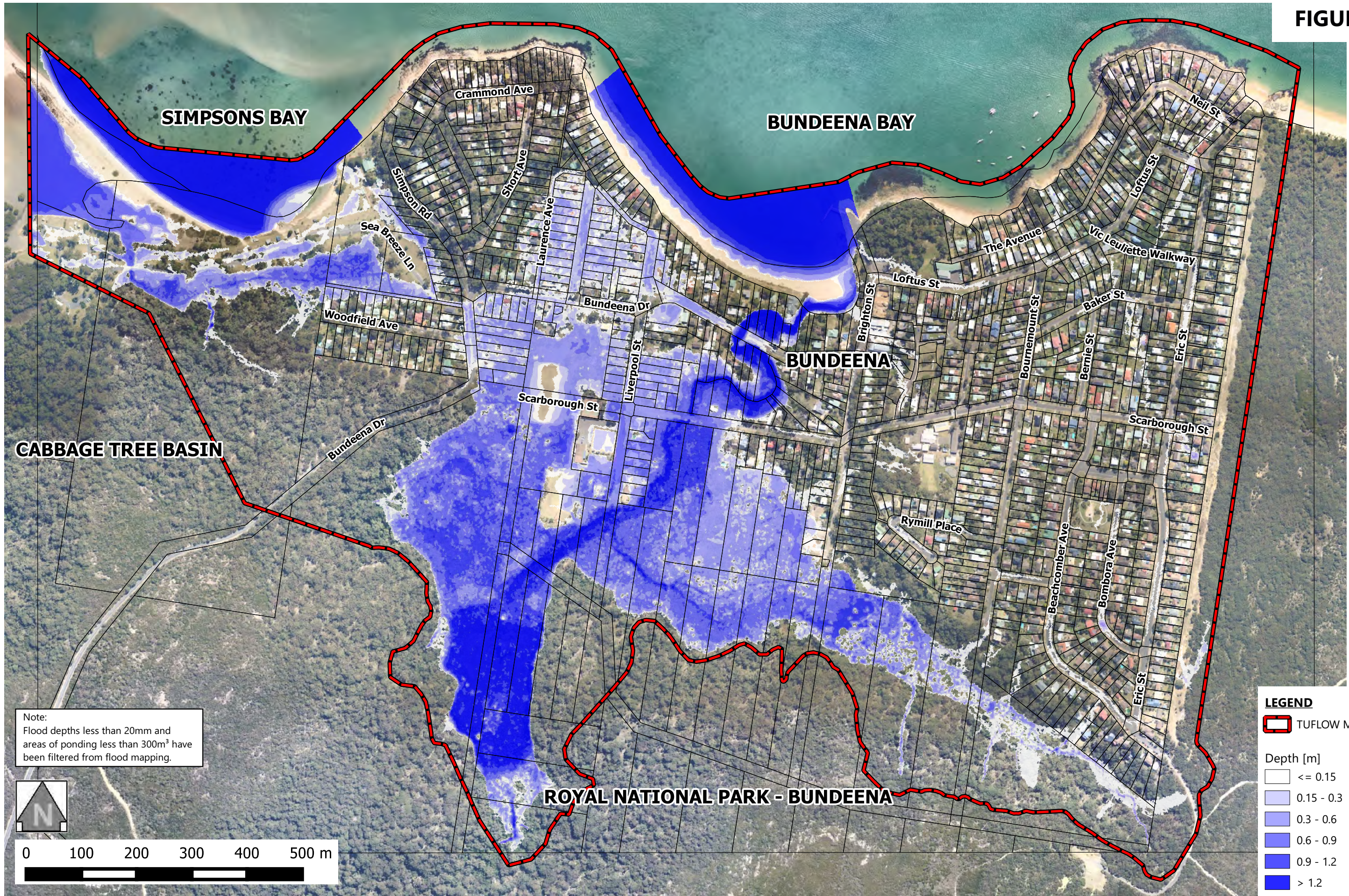


FIGURE 4.14



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



**LEGEND**

TUFLOW Model Extent

Depth [m]

- <= 0.15
- 0.15 - 0.3
- 0.3 - 0.6
- 0.6 - 0.9
- 0.9 - 1.2
- > 1.2

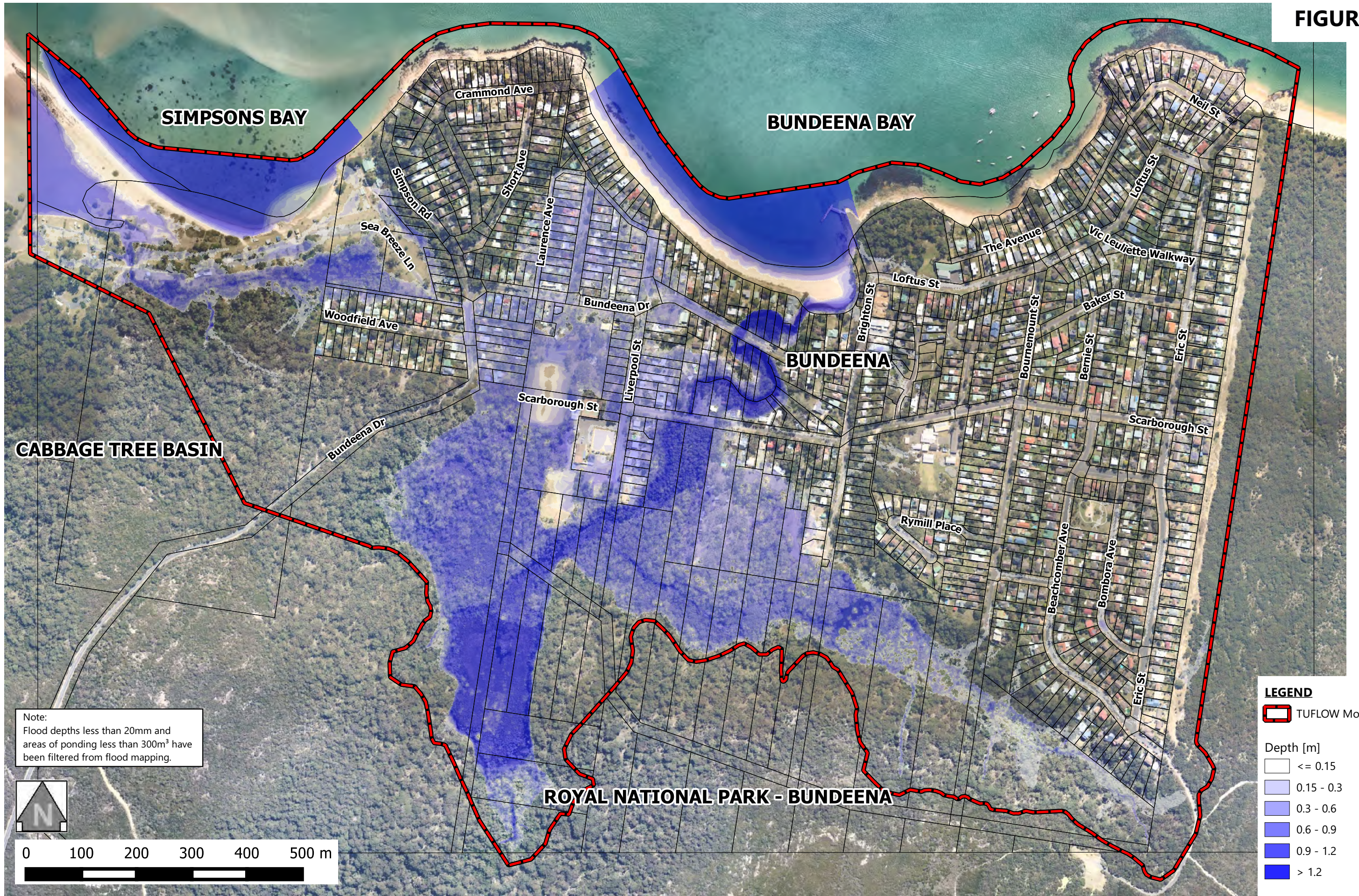
Aerial Imagery © Land and Property Information 2017



PEAK FLOOD DEPTHS FOR THE 1% AEP EVENT

FRMP 2018-06-28 Fig 1.15 - 1% AEP Depth  
18-06-28 Bundeena FRMP Flood Mapping.qgs

**FIGURE 4.15**



Aerial Imagery © Land and Property Information 2017

FIGURE 4.16

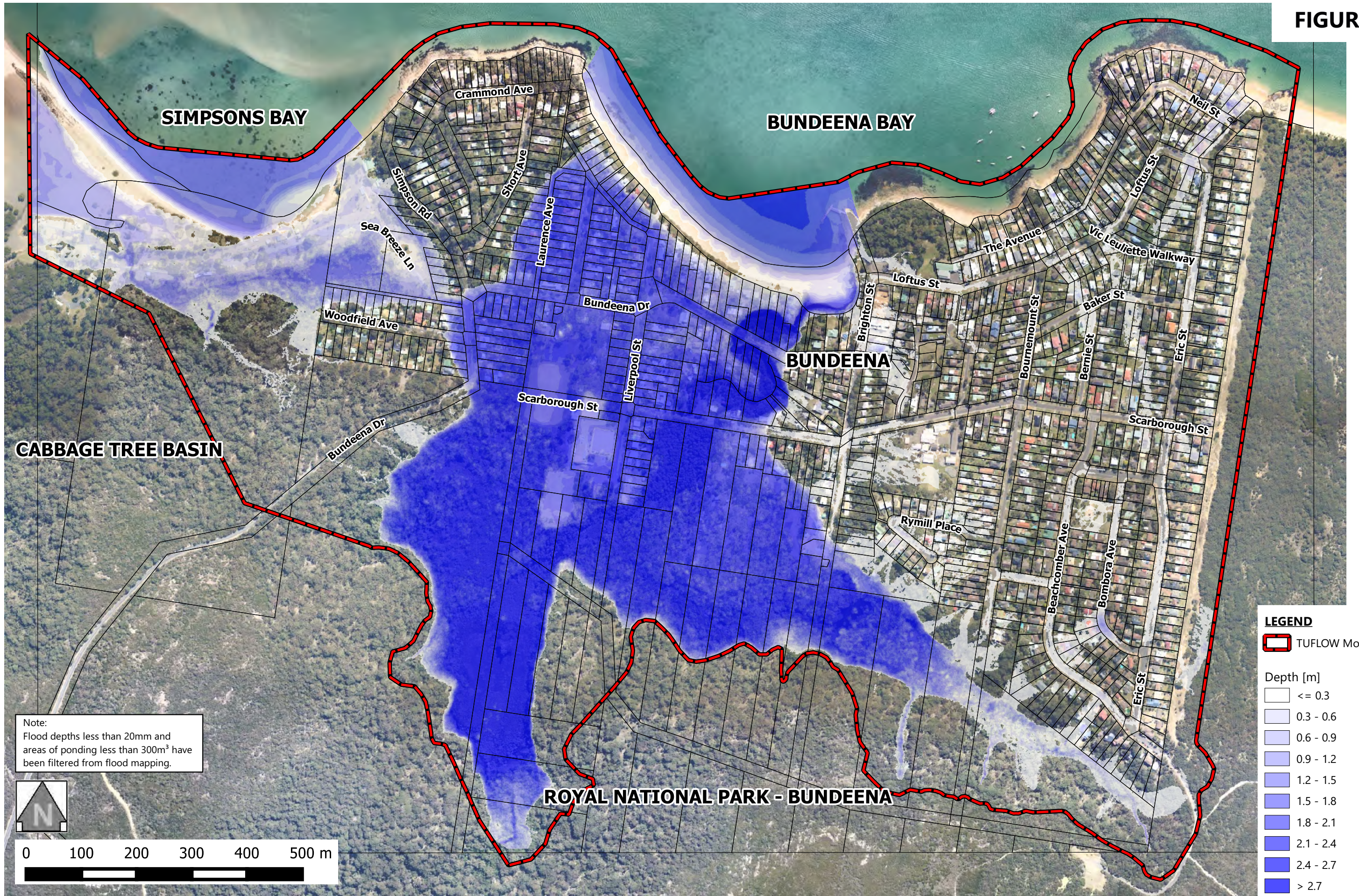
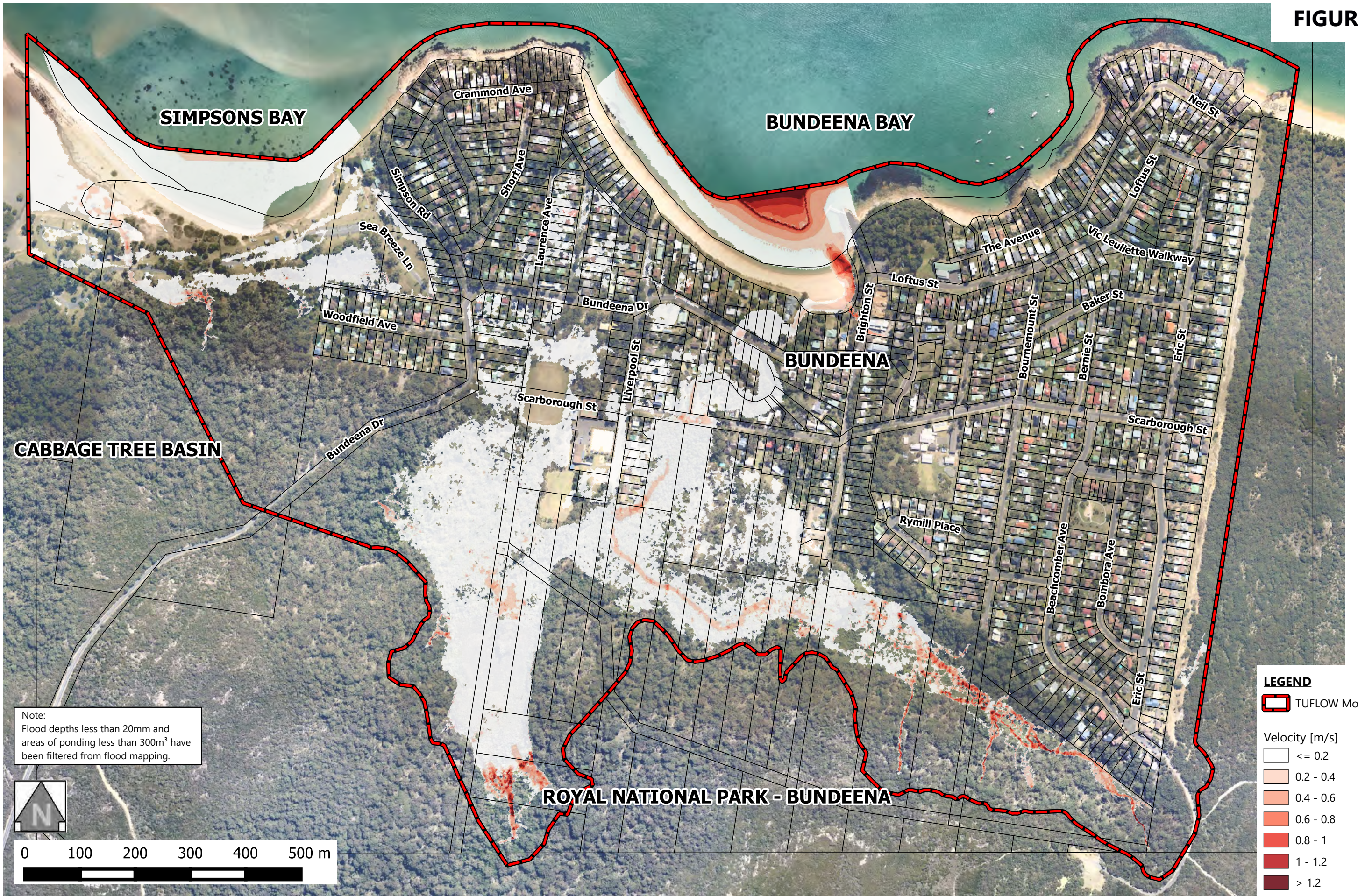
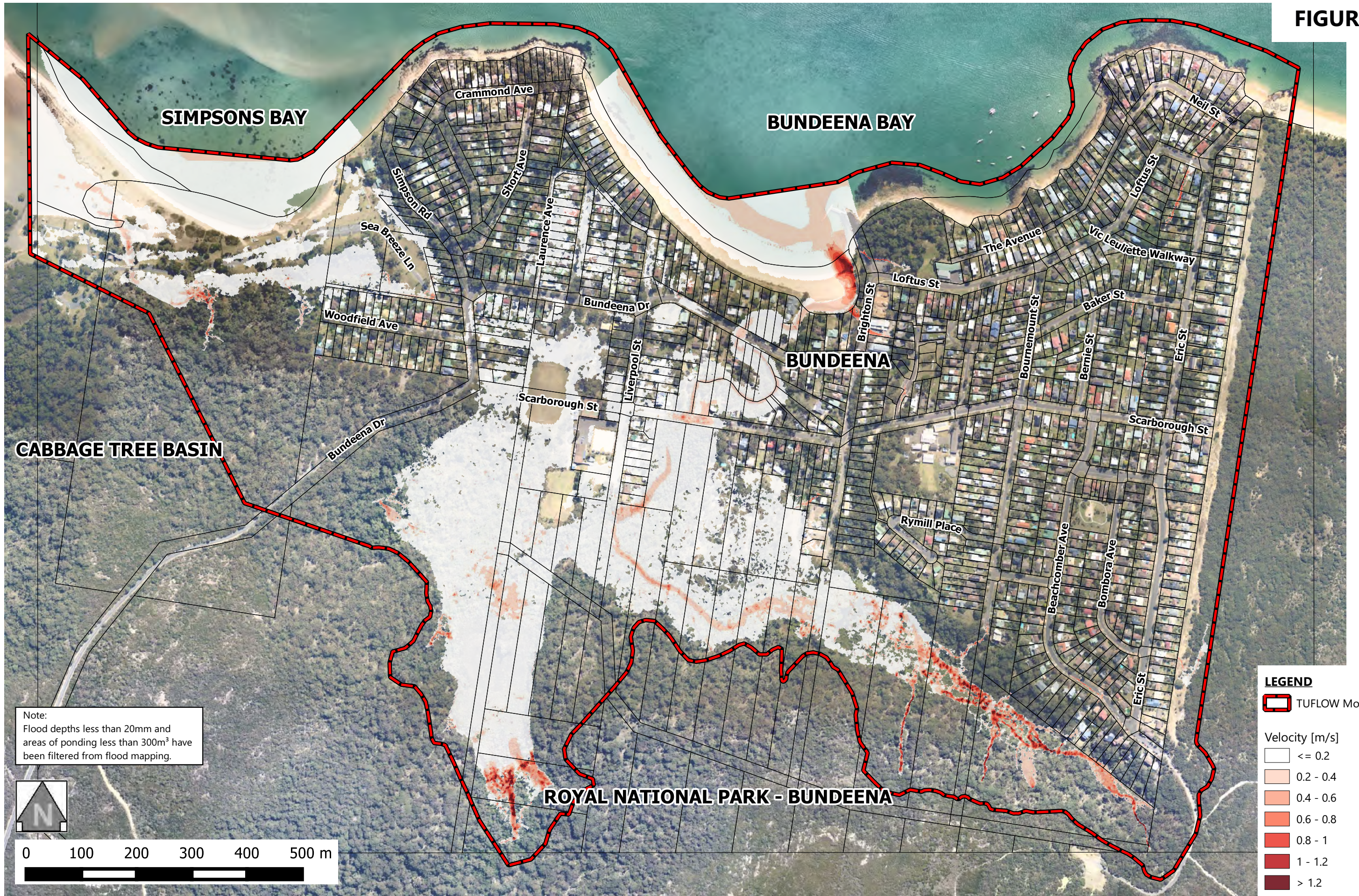


FIGURE 4.17



Aerial Imagery © Land and Property Information 2017

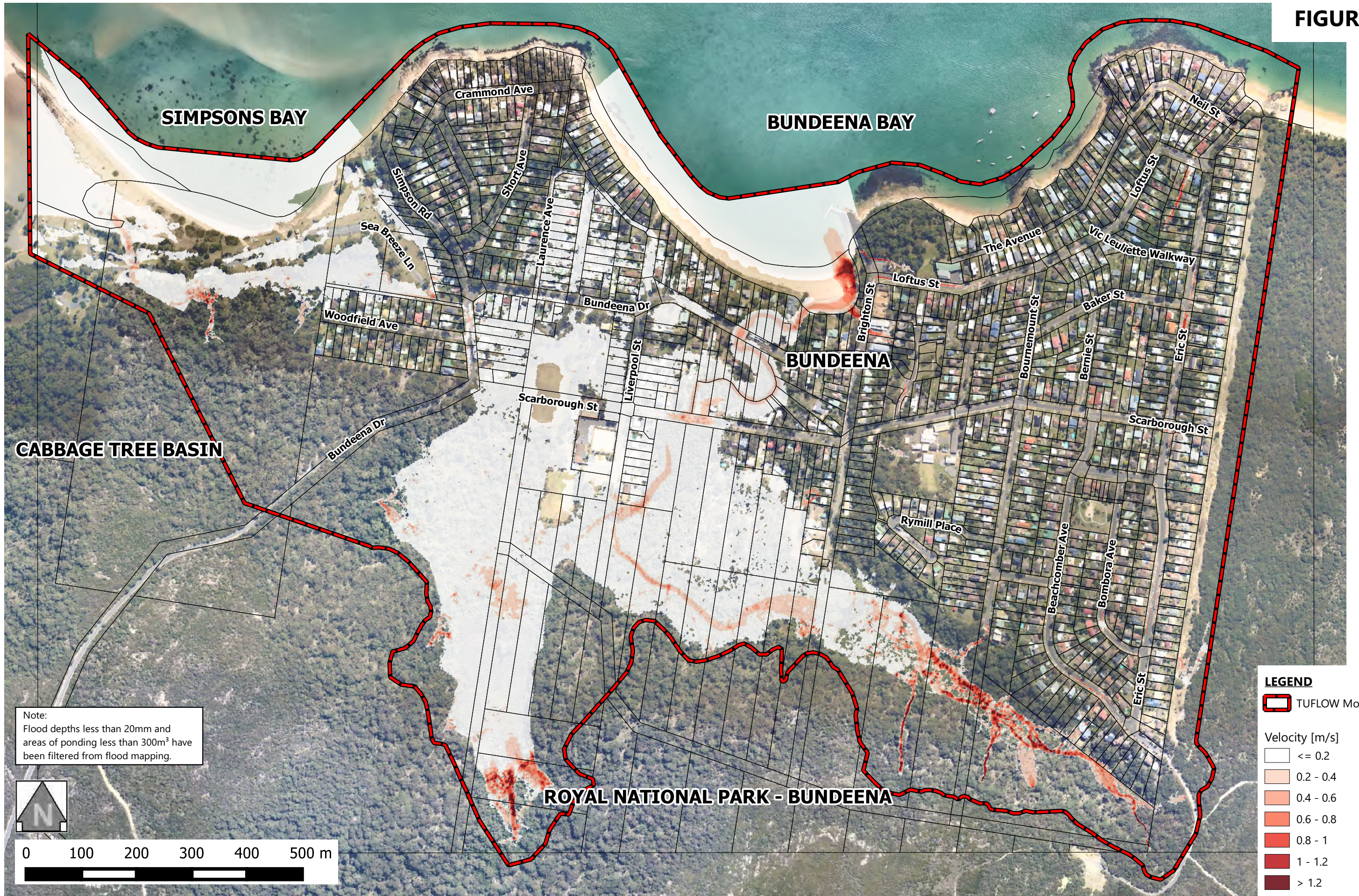
FIGURE 4.18



Aerial Imagery © Land and Property Information 2017

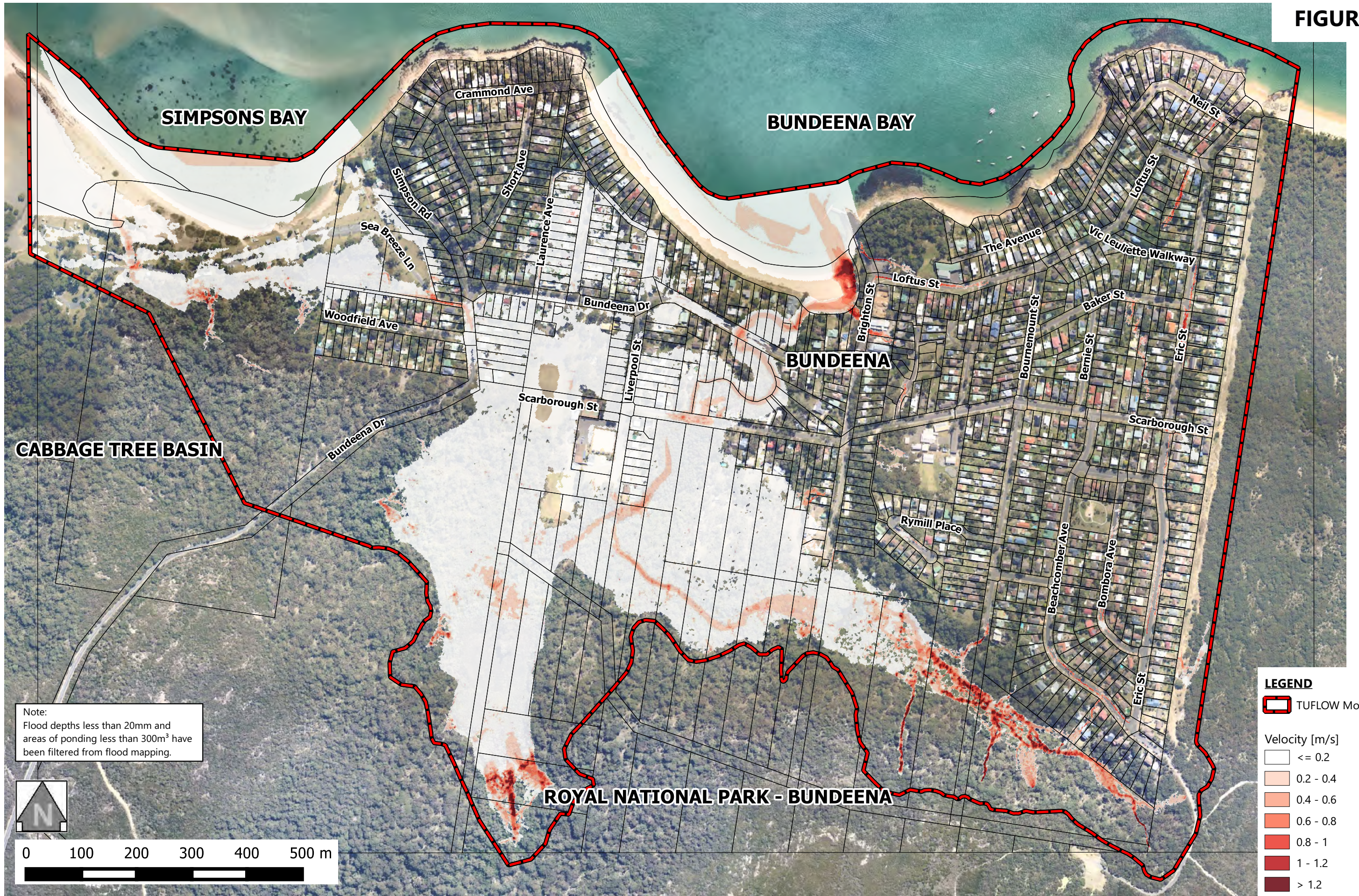


FIGURE 4.19



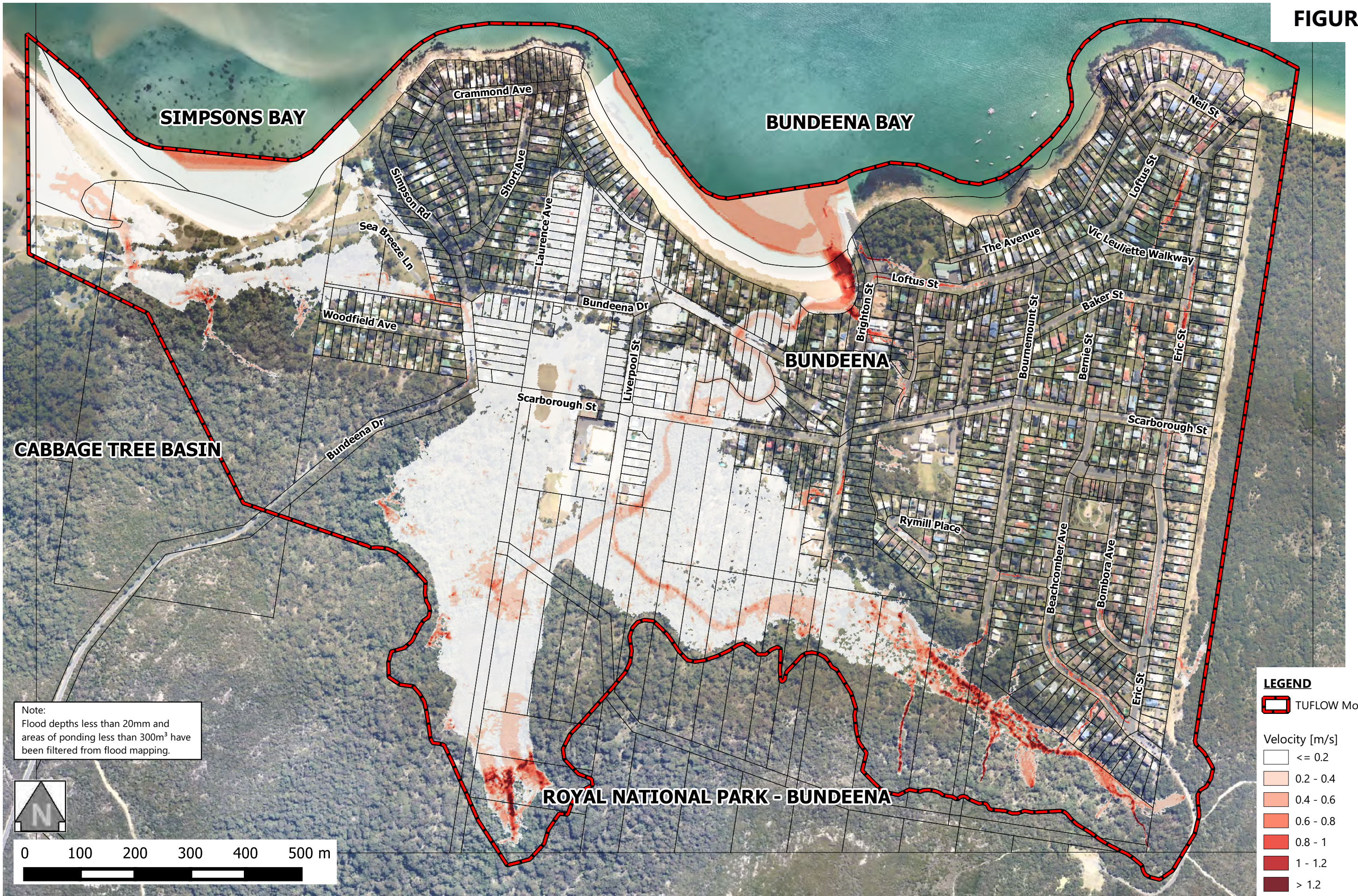
Aerial Imagery © Land and Property Information 2017

FIGURE 4.20



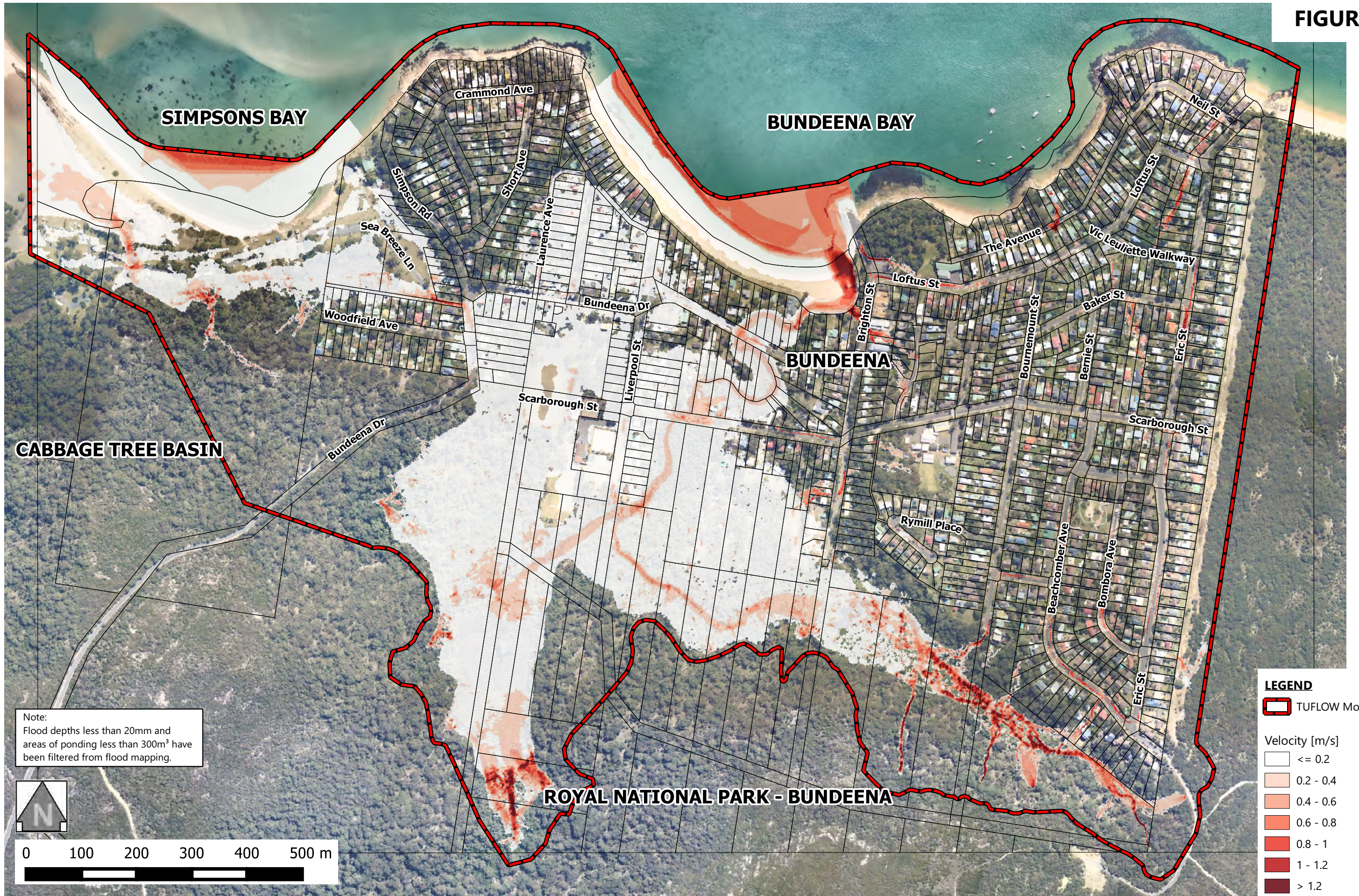
Aerial Imagery © Land and Property Information 2017

FIGURE 4.21



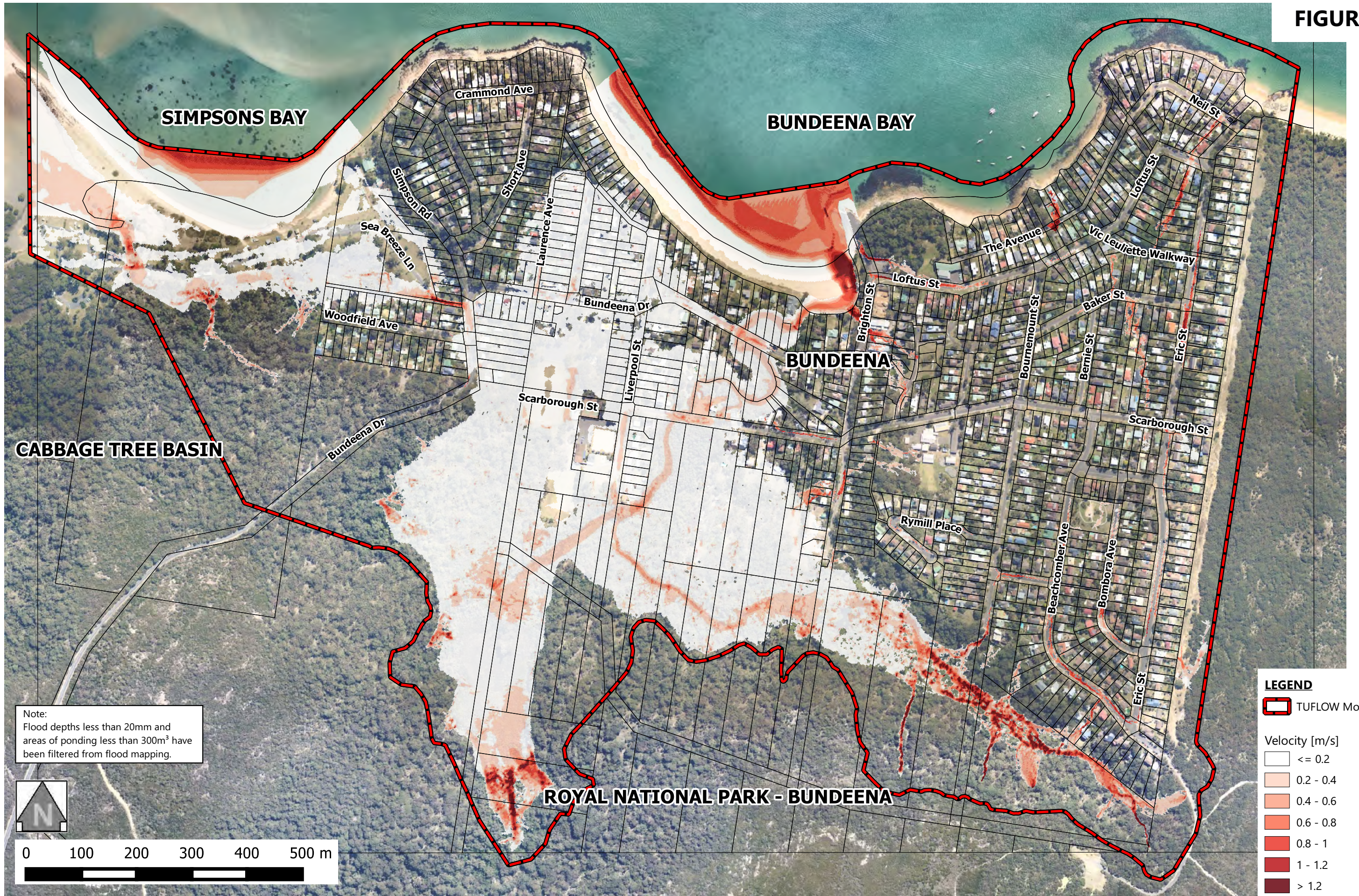
Aerial Imagery © Land and Property Information 2017

**FIGURE 4.22**



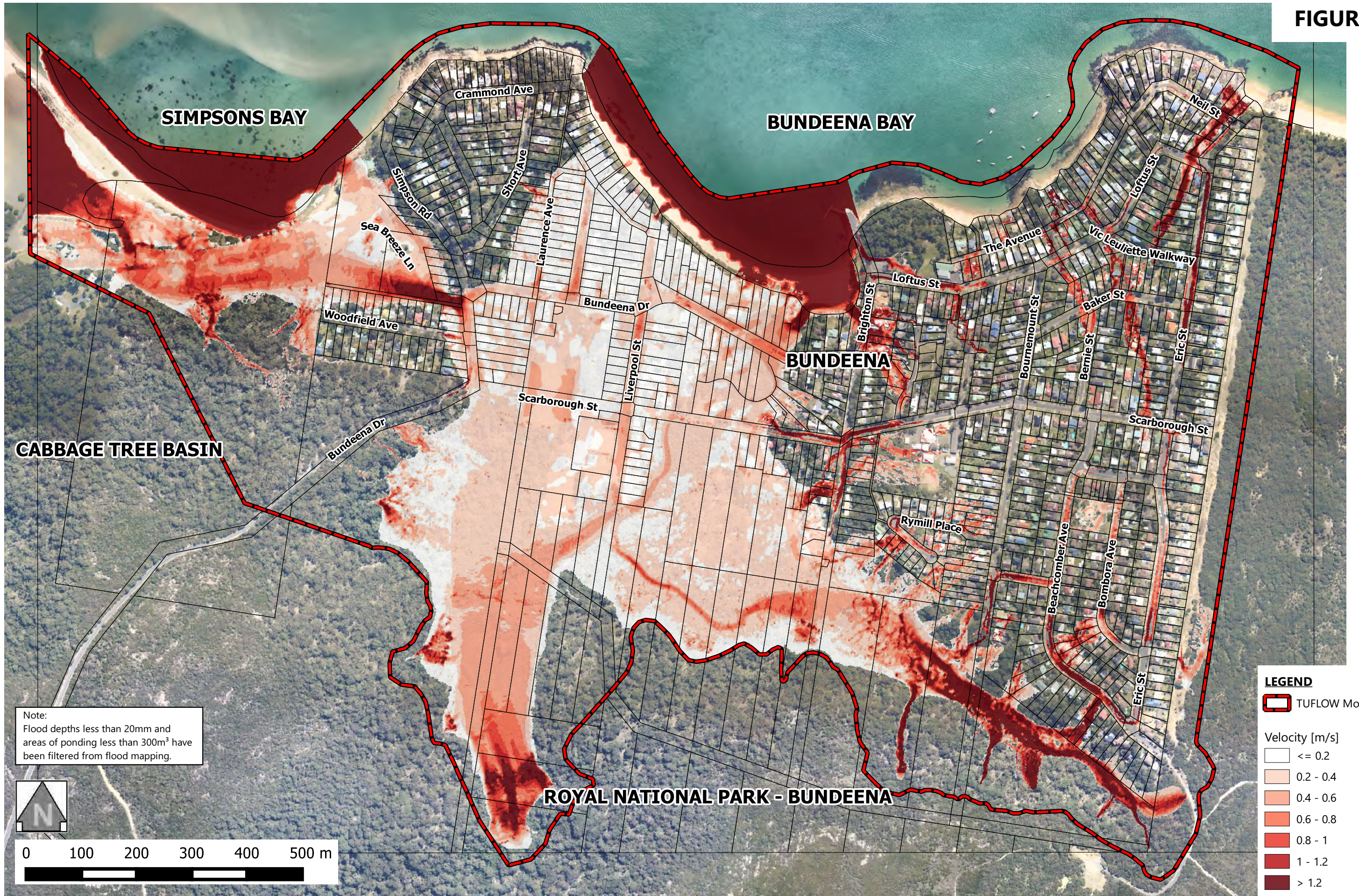
Aerial Imagery © Land and Property Information 2017

FIGURE 4.23



Aerial Imagery © Land and Property Information 2017

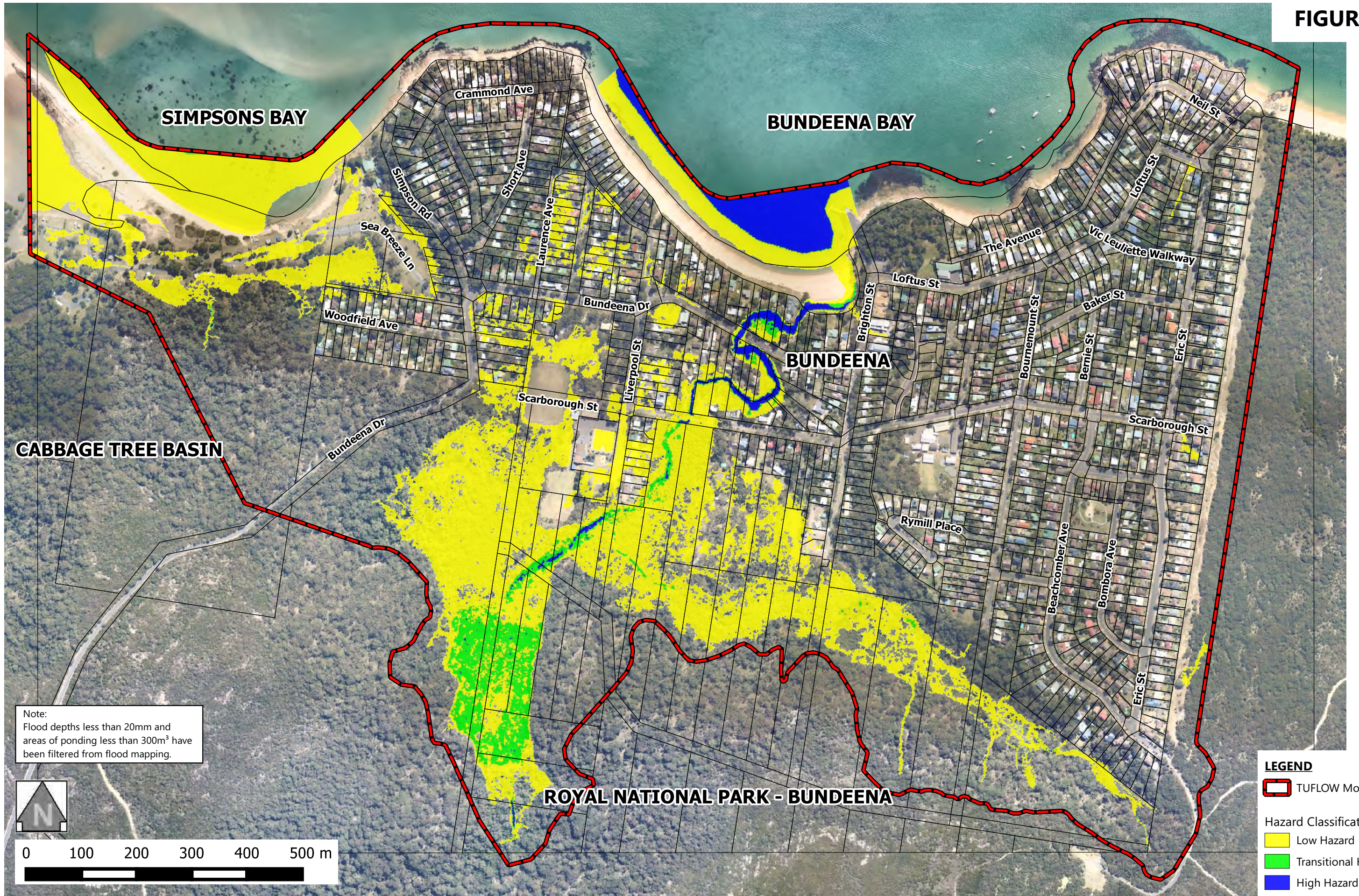
FIGURE 4.24



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.

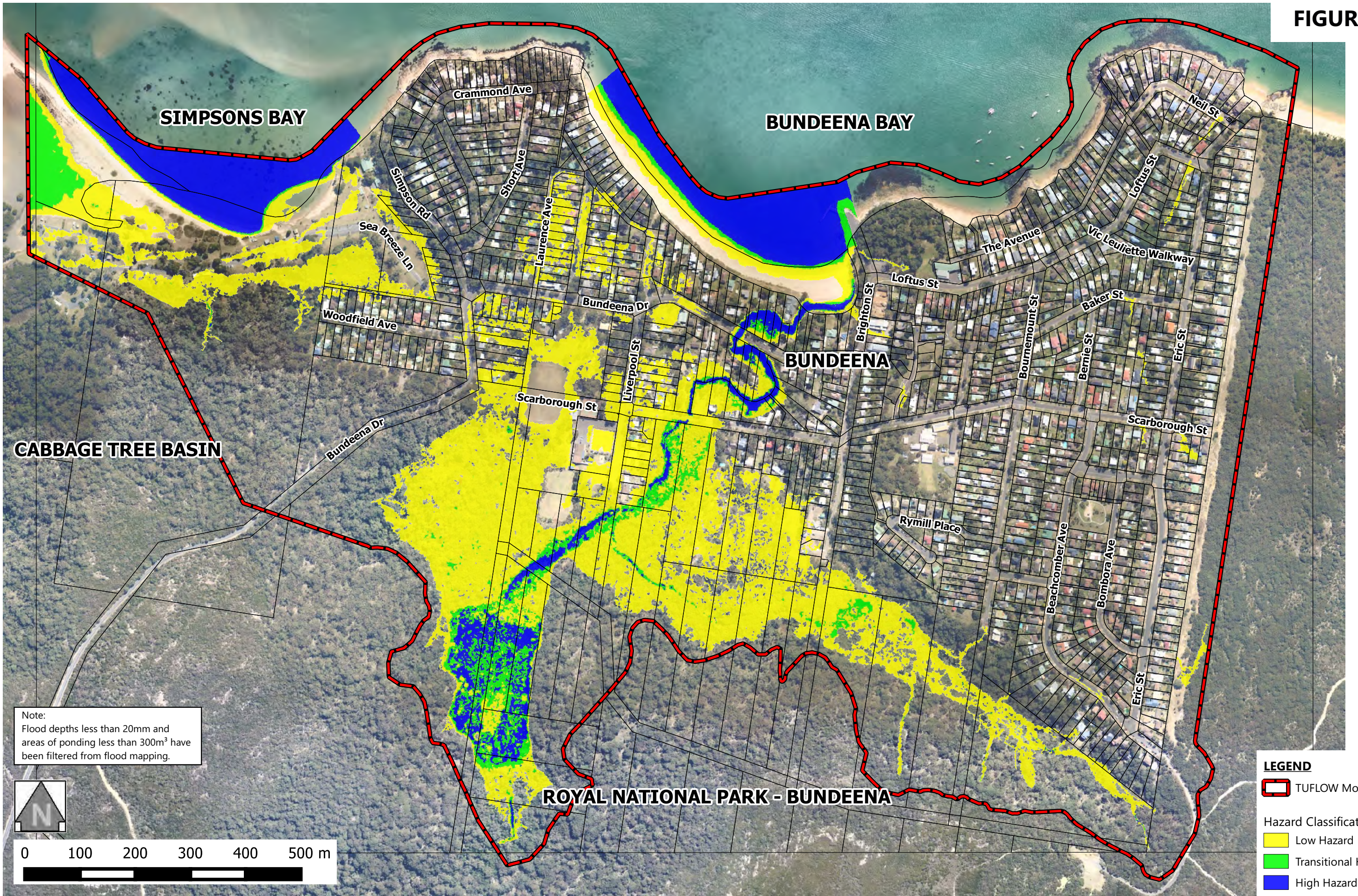
Aerial Imagery © Land and Property Information 2017

FIGURE 4.25



Aerial Imagery © Land and Property Information 2017

FIGURE 4.26



Note:  
 Flood depths less than 20mm and  
 areas of ponding less than 300m<sup>3</sup> have  
 been filtered from flood mapping.



**LEGEND**

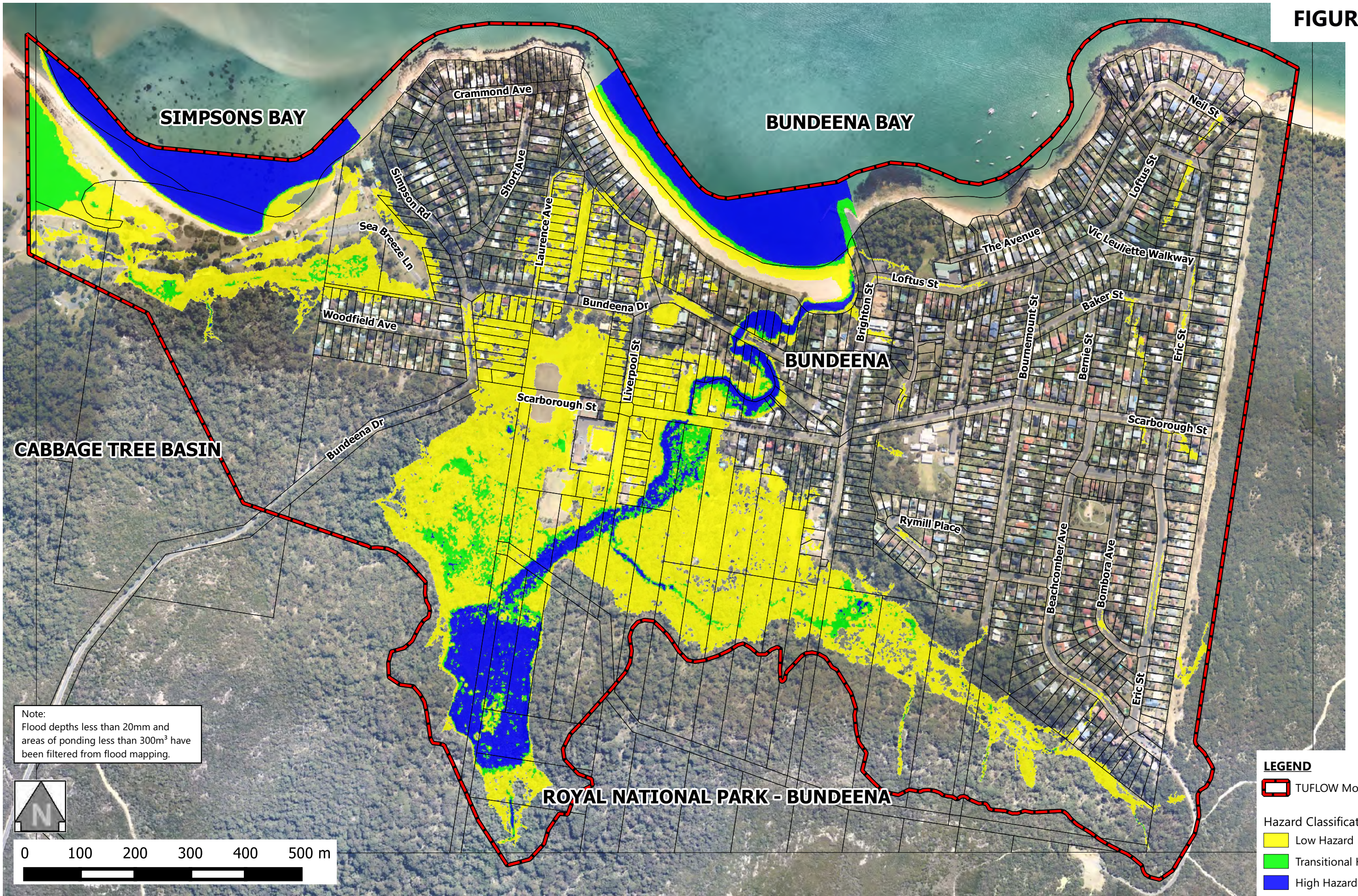
- TUFLOW Model Extent
- Low Hazard
- Transitional Hazard
- High Hazard

Aerial Imagery © Land and Property Information 2017

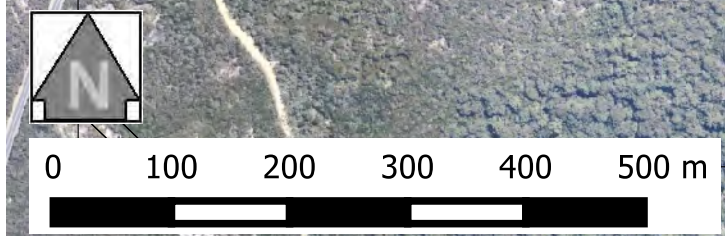




FIGURE 4.27



Note:  
 Flood depths less than 20mm and  
 areas of ponding less than 300m<sup>3</sup> have  
 been filtered from flood mapping.



**LEGEND**

- TUFLOW Model Extent
- Low Hazard
- Transitional Hazard
- High Hazard

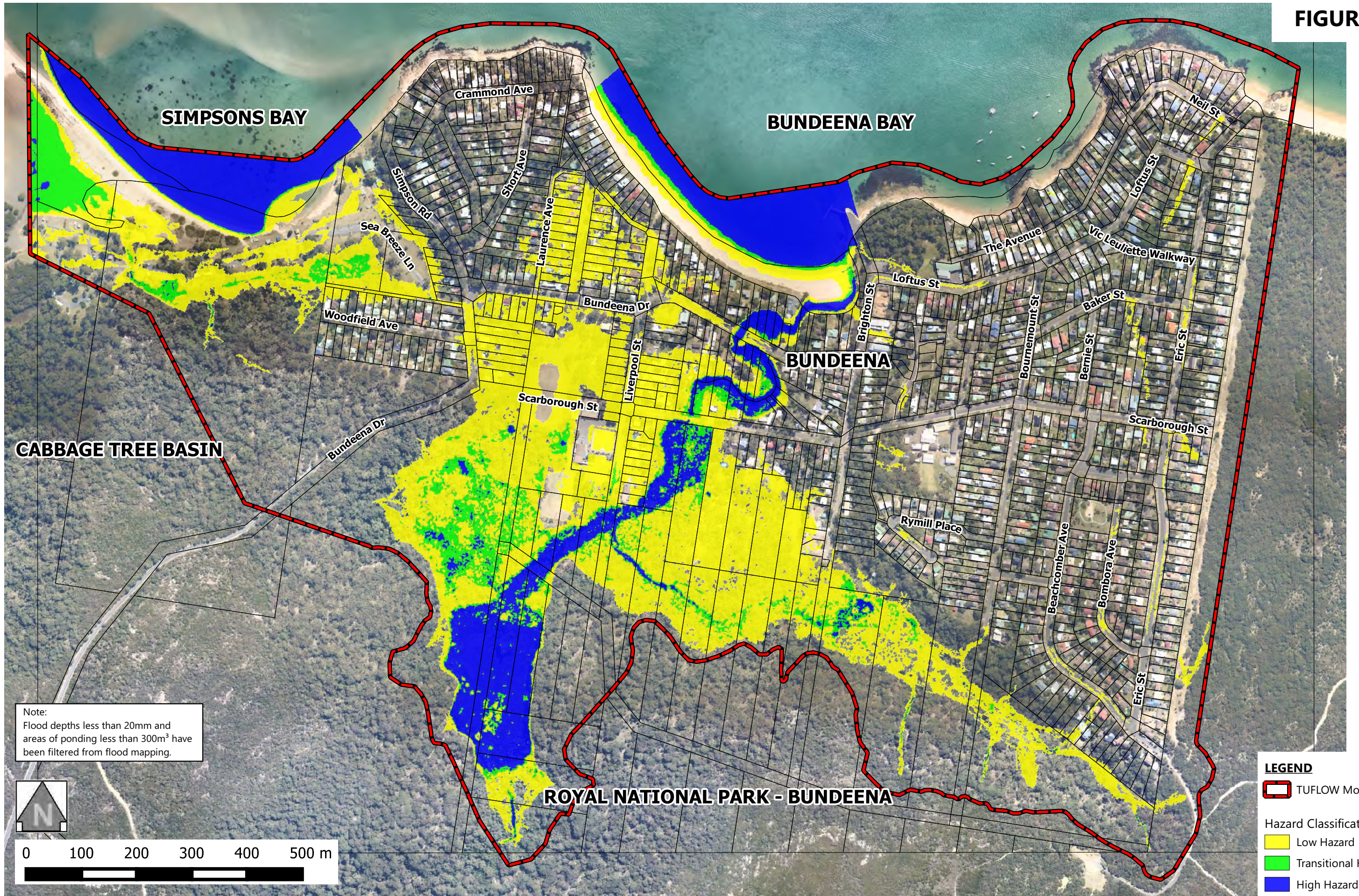
Aerial Imagery © Land and Property Information 2017



**PROVISIONAL FLOOD HAZARD FOR THE 10% AEP EVENT  
 [NSW FLOODPLAIN DEVELOPMENT MANUAL 2005]**

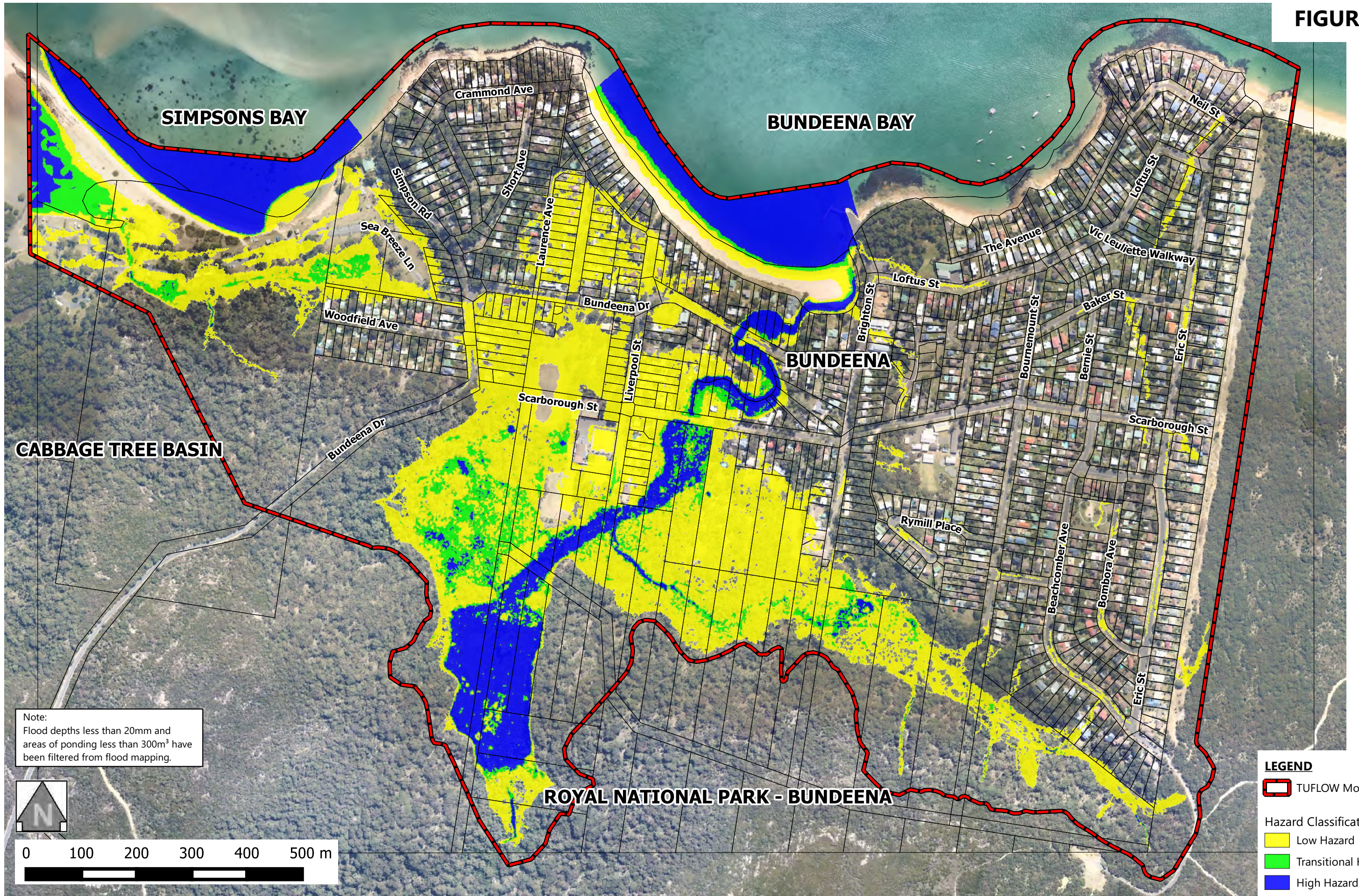
FRMP 2018-06-28 Fig 1.28 - 10% AEP FDM Hazard  
 18-06-28 Bundeena FRMP Flood Mapping.qgs

FIGURE 4.28



Aerial Imagery © Land and Property Information 2017

FIGURE 4.29



Note:  
 Flood depths less than 20mm and  
 areas of ponding less than 300m<sup>3</sup>  
 have been filtered from flood mapping.



0 100 200 300 400 500 m

**LEGEND**

TUFLOW Model Extent

Hazard Classification

Low Hazard

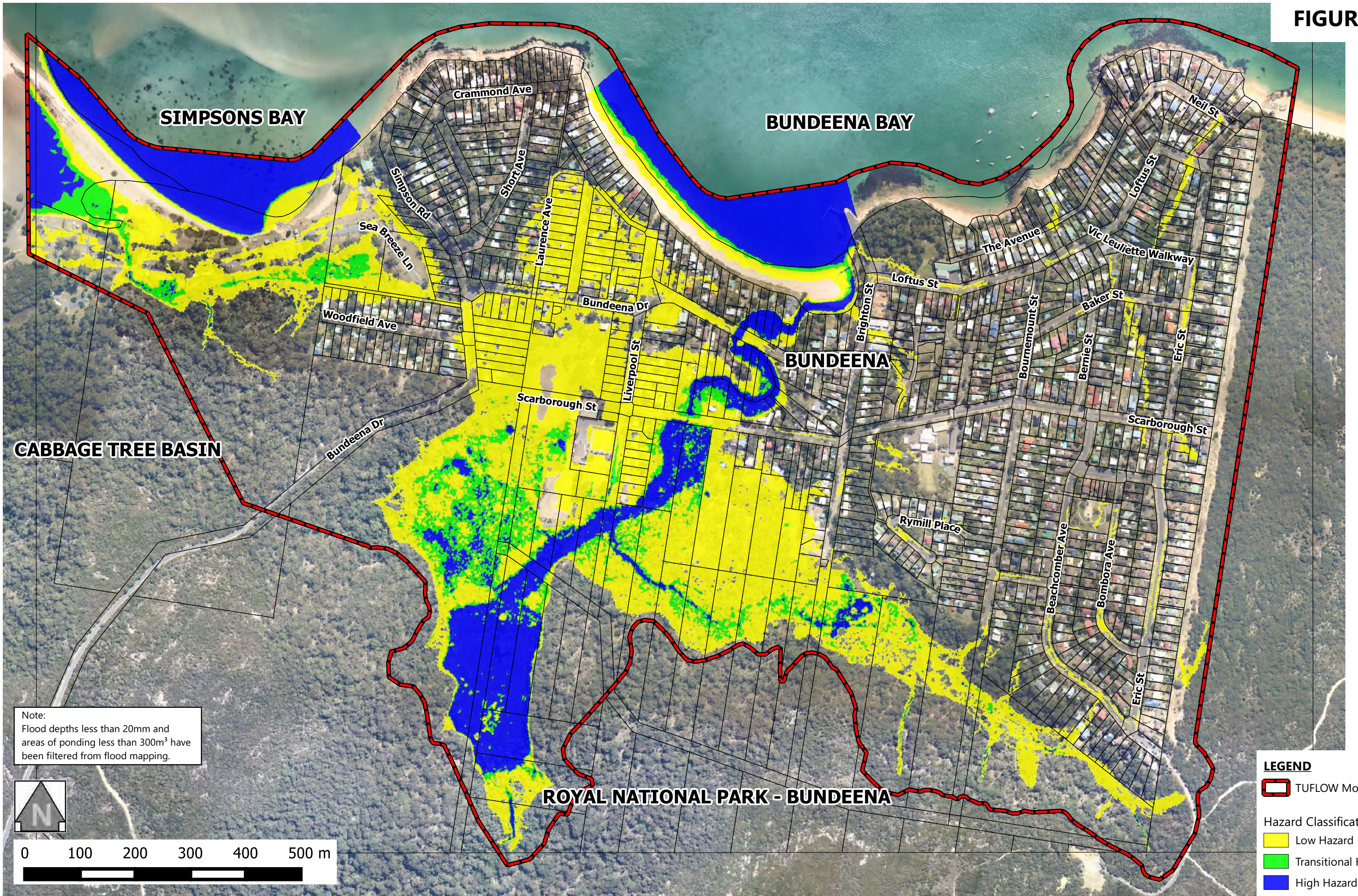
Transitional Hazard

High Hazard

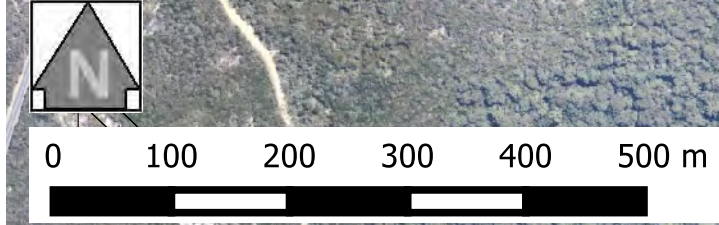
Aerial Imagery © Land and Property Information 2017



FIGURE 4.30



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



**LEGEND**

- TUFLOW Model Extent
- Low Hazard
- Transitional Hazard
- High Hazard

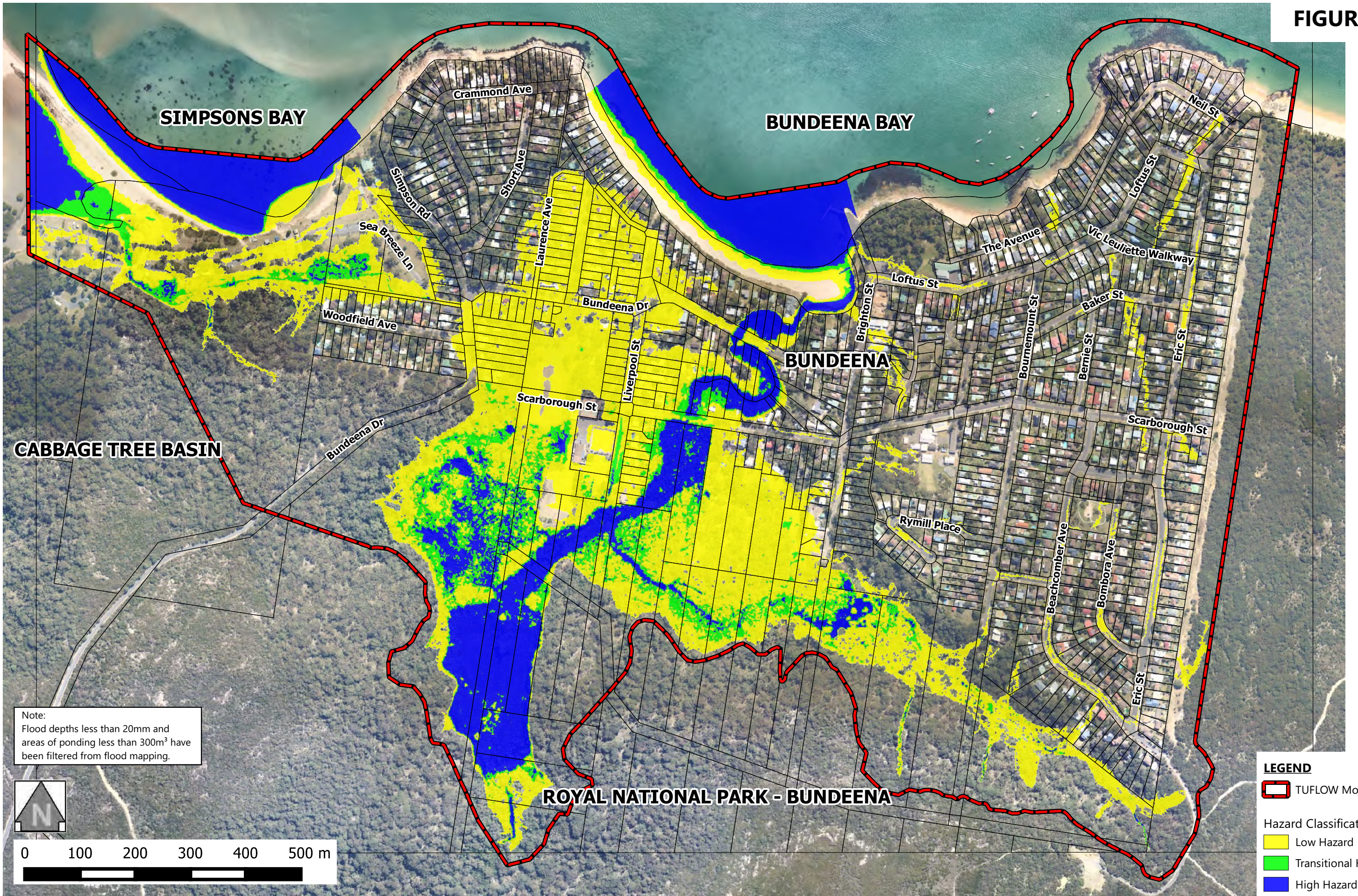
Aerial Imagery © Land and Property Information 2017



FRMP 2018-06-28 Fig 1.31 - 1% AEP FDM Hazard  
18-06-28 Bundeena FRMP Flood Mapping.qgs

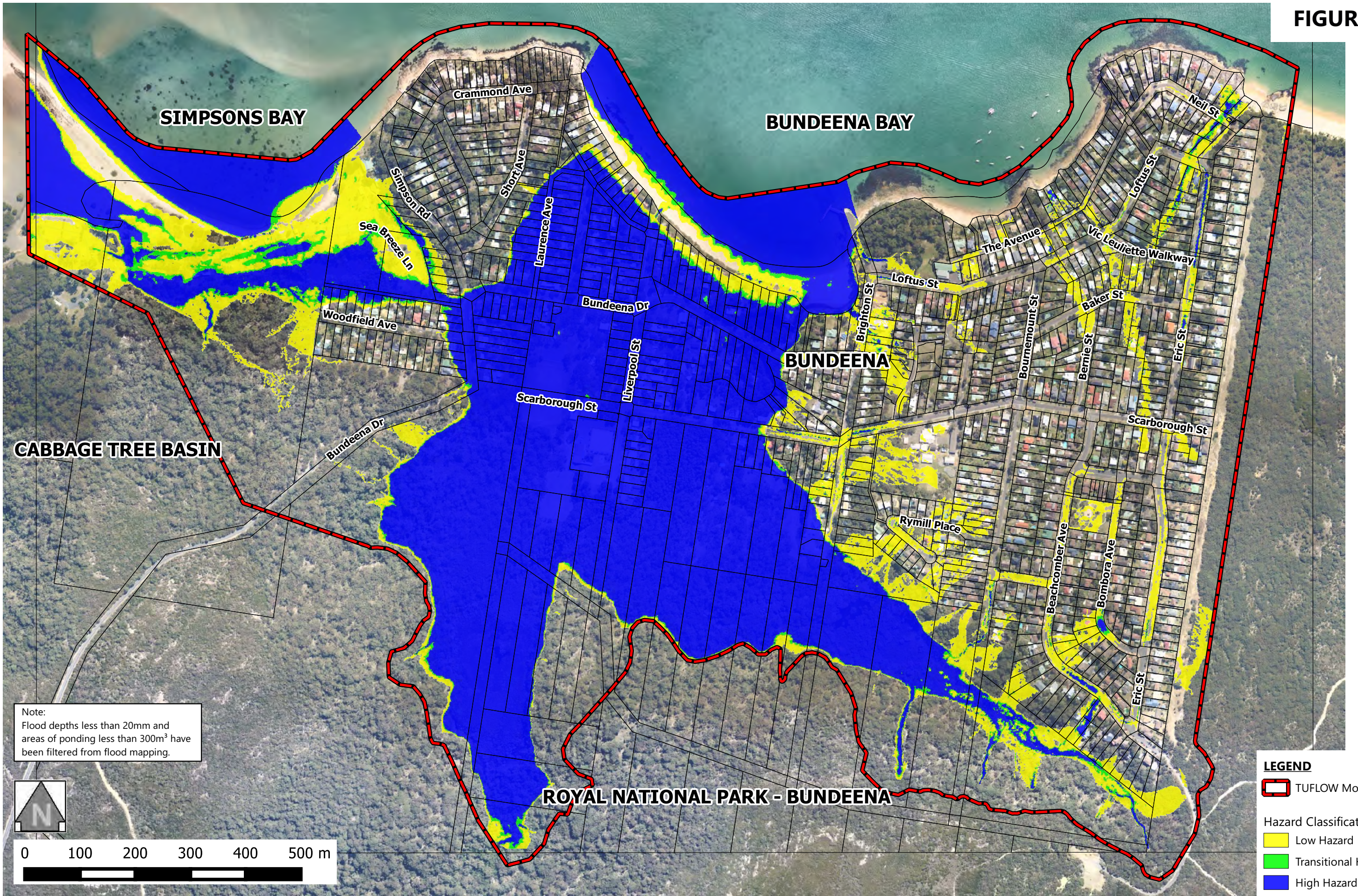
**PROVISIONAL FLOOD HAZARD FOR THE 1% AEP EVENT  
[NSW FLOODPLAIN DEVELOPMENT MANUAL 2005]**

FIGURE 4.31

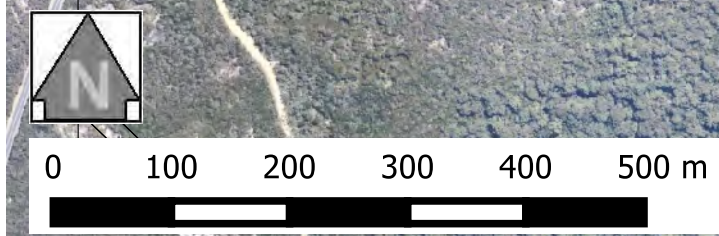


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FIGURE 4.32



Note:  
 Flood depths less than 20mm and  
 areas of ponding less than 300m<sup>3</sup> have  
 been filtered from flood mapping.



**LEGEND**

- TUFLOW Model Extent
- Low Hazard
- Transitional Hazard
- High Hazard

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**PROVISIONAL FLOOD HAZARD FOR THE PROBABLE MAXIMUM FLOOD  
 [NSW FLOODPLAIN DEVELOPMENT MANUAL 2005]**

FRMP 2018-06-28 Fig 4.32 - PMF FDM Hazard  
 18-06-28 Bundeena FRMP Flood Mapping.qgs

FIGURE 4.33

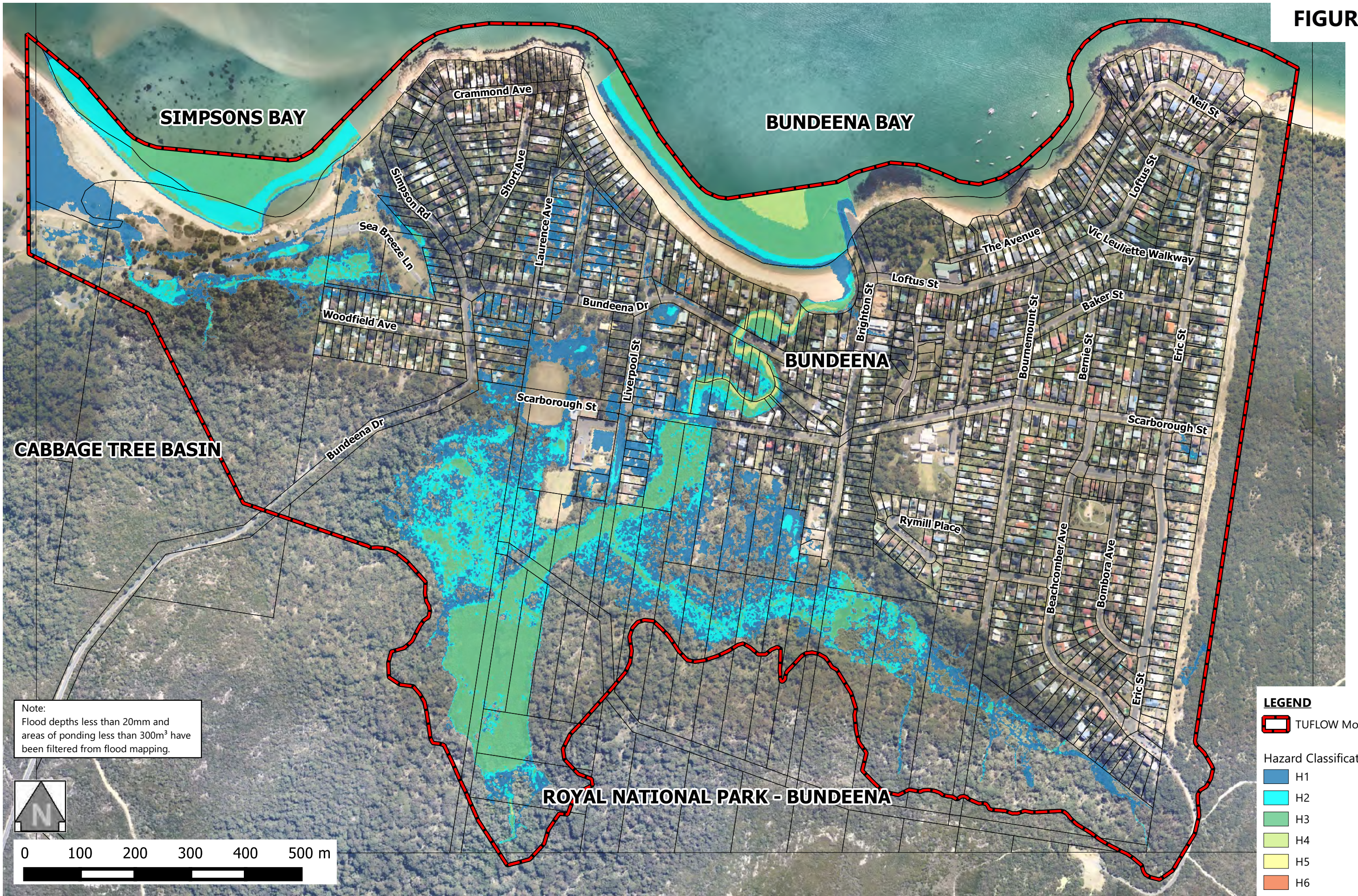
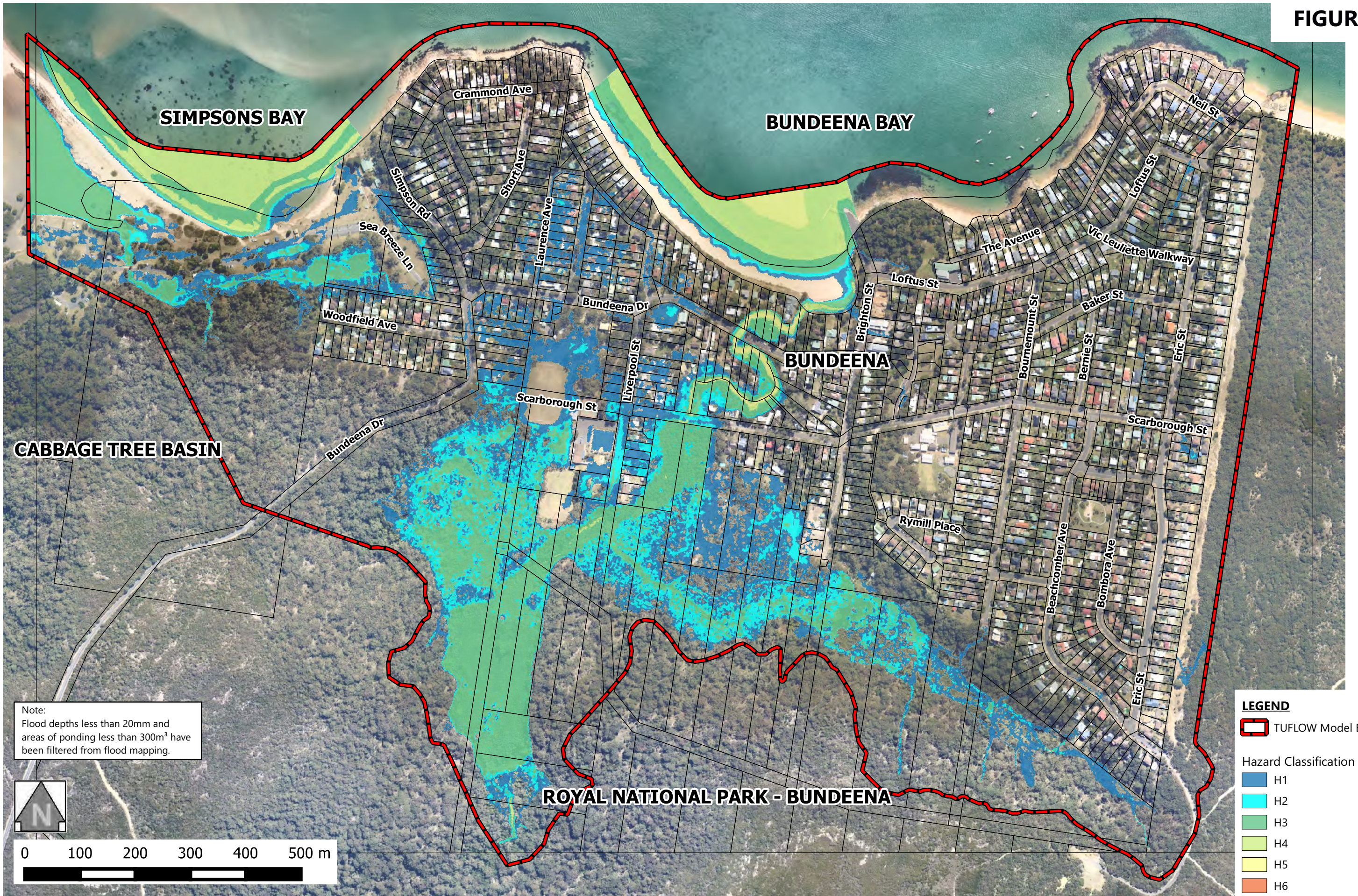


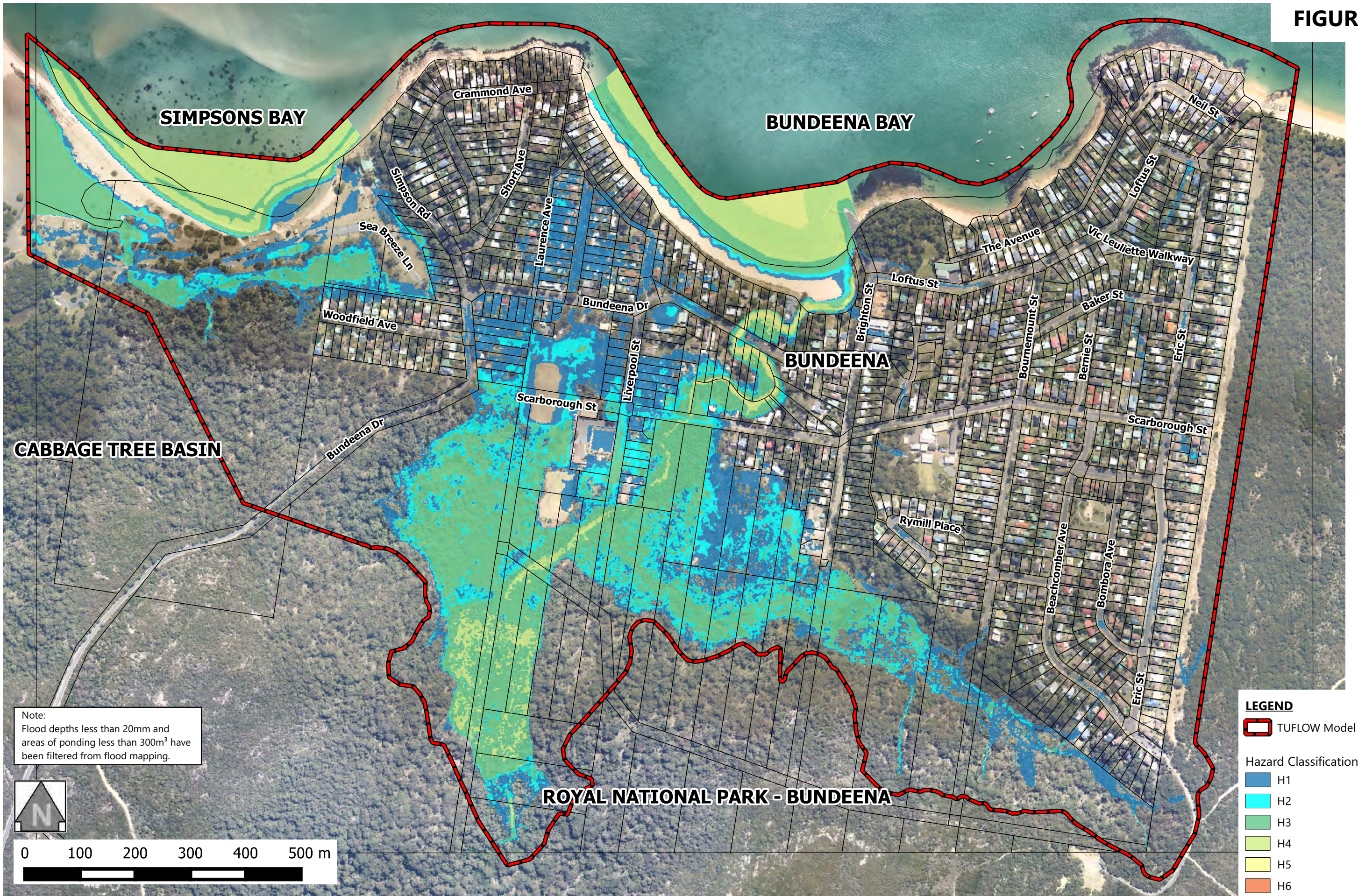
FIGURE 4.34



Aerial Imagery © Land and Property Information 2017

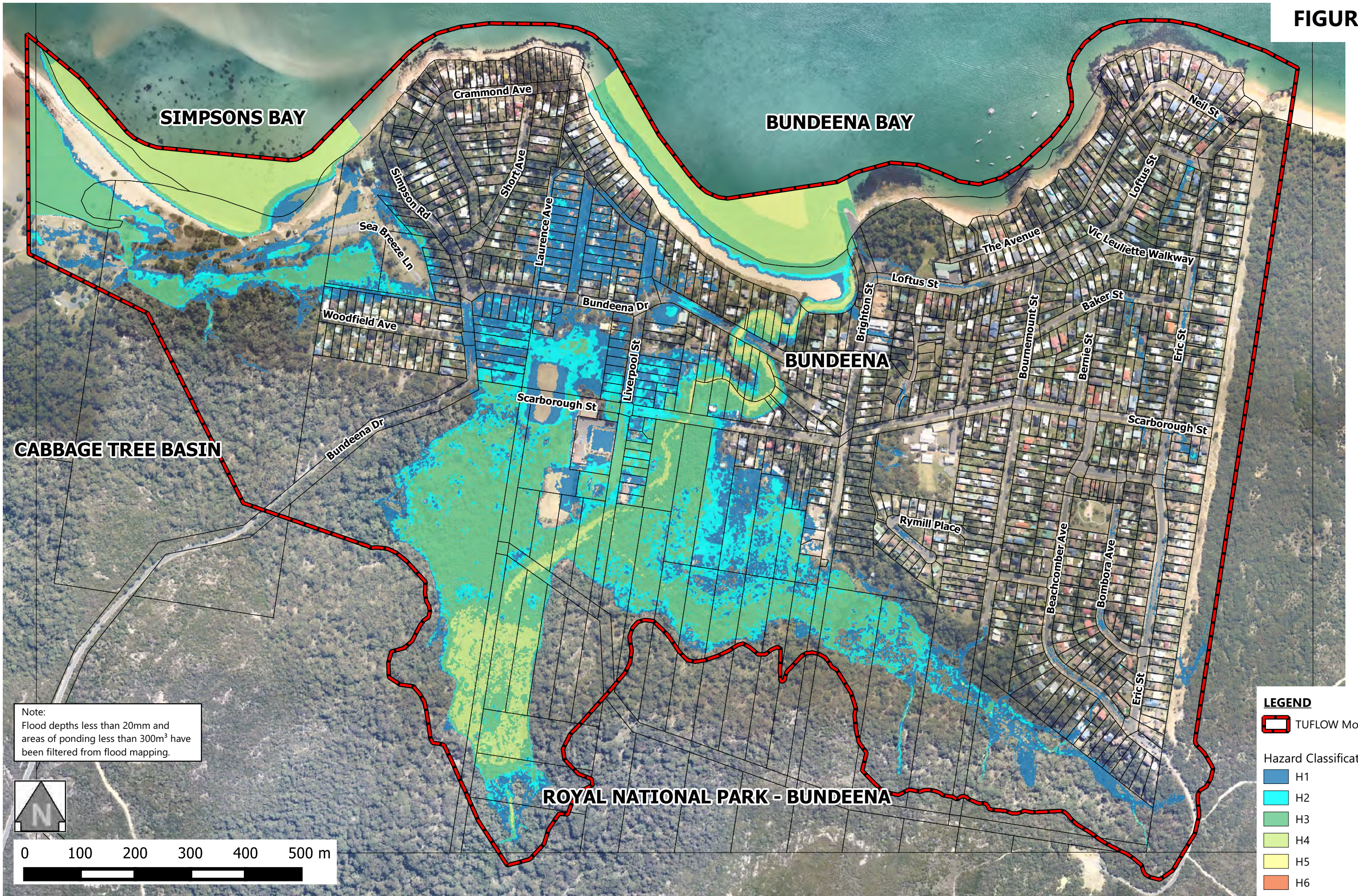


FIGURE 4.35



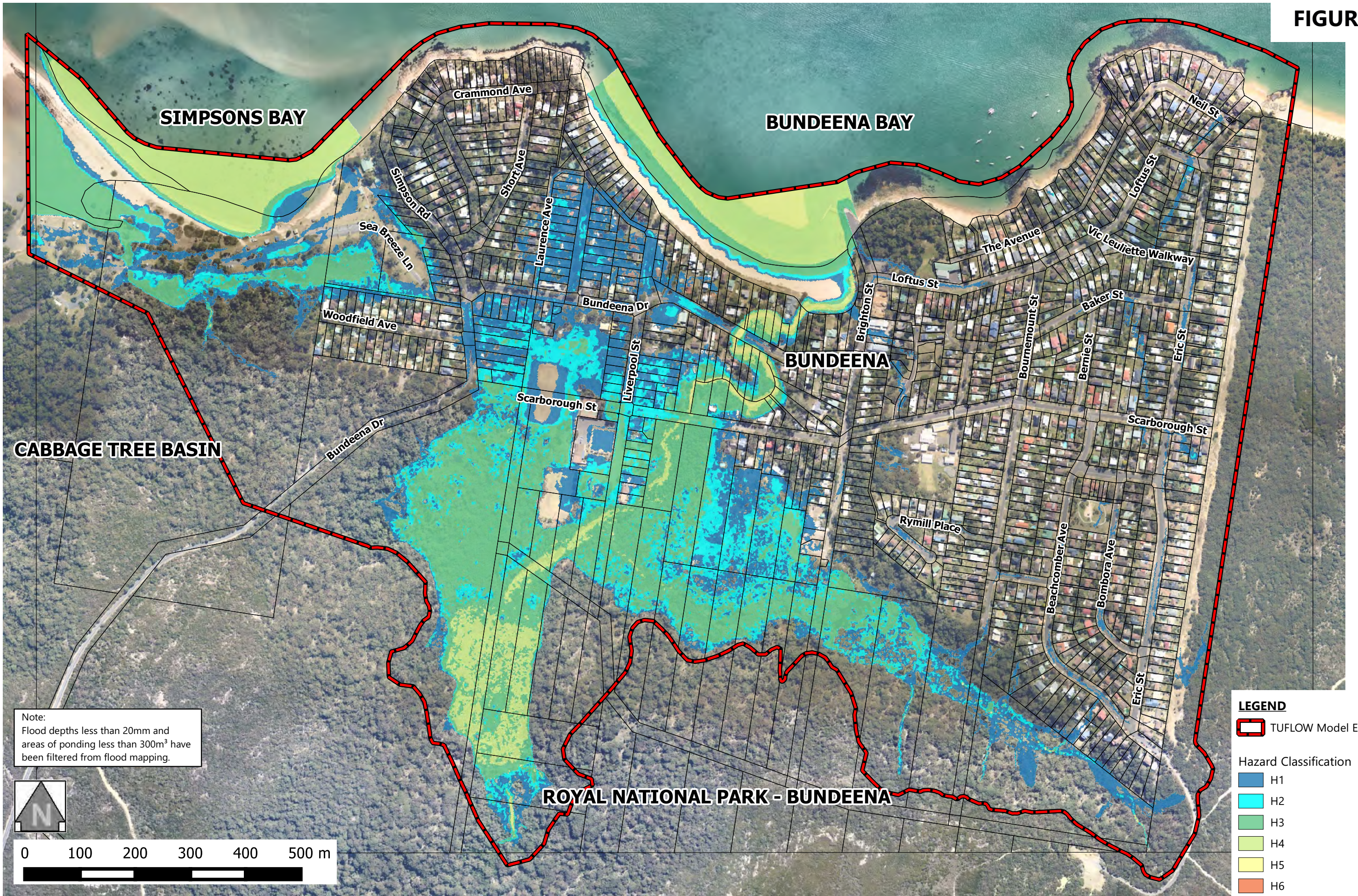
Aerial Imagery © Land and Property Information 2017

FIGURE 4.36



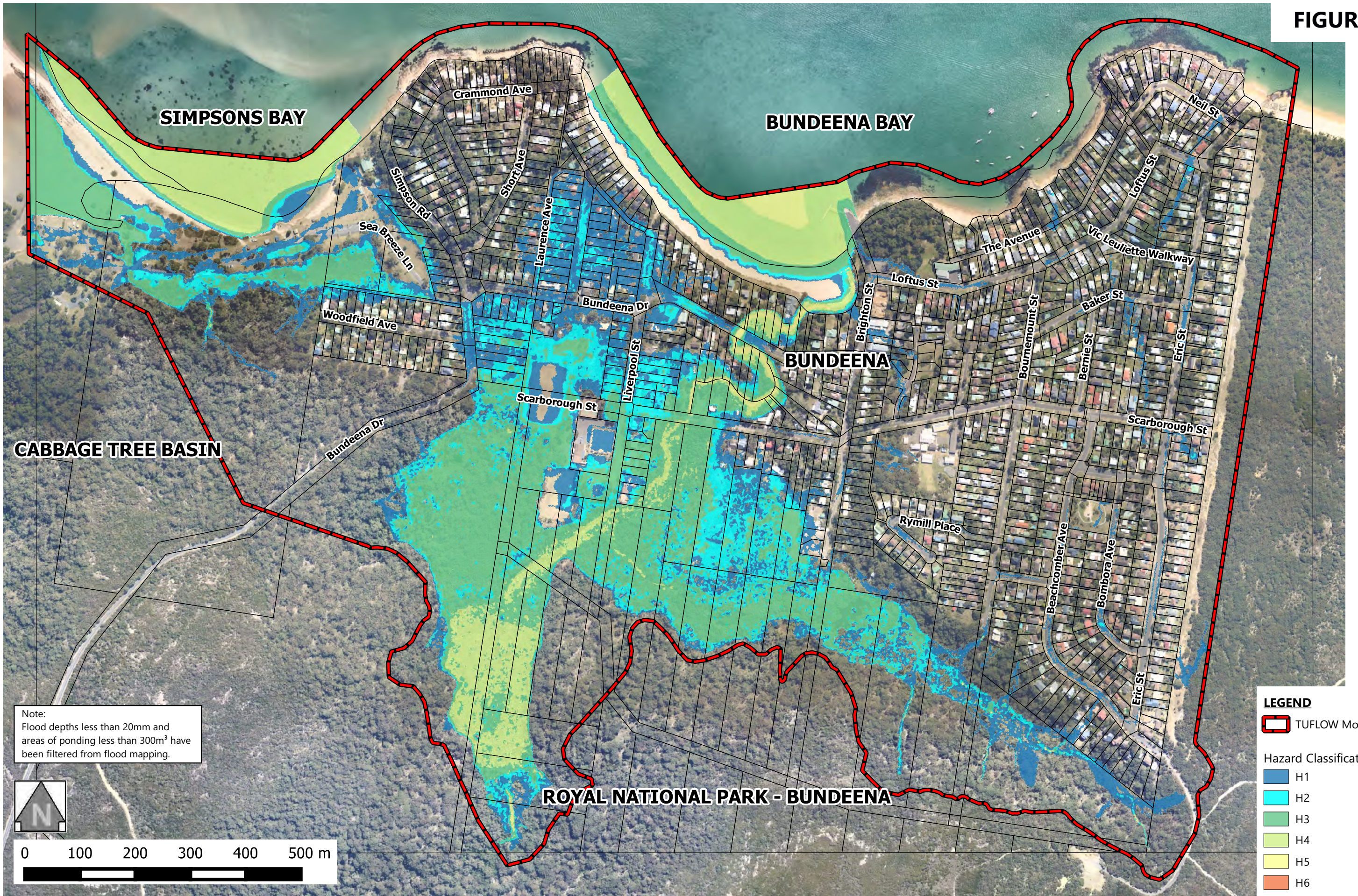
Aerial Imagery © Land and Property Information 2017

FIGURE 4.37



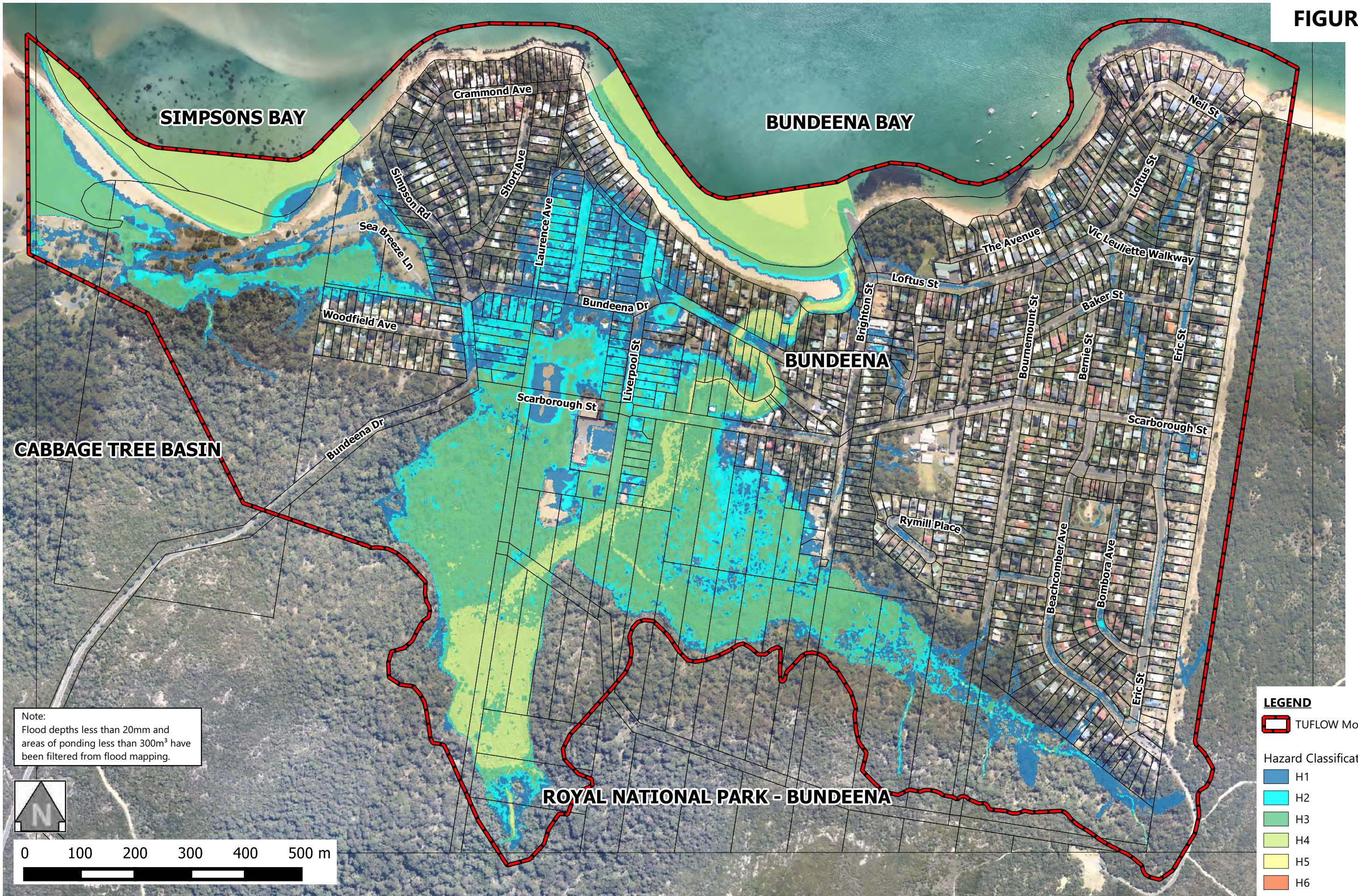
Aerial Imagery © Land and Property Information 2017

**FIGURE 4.38**



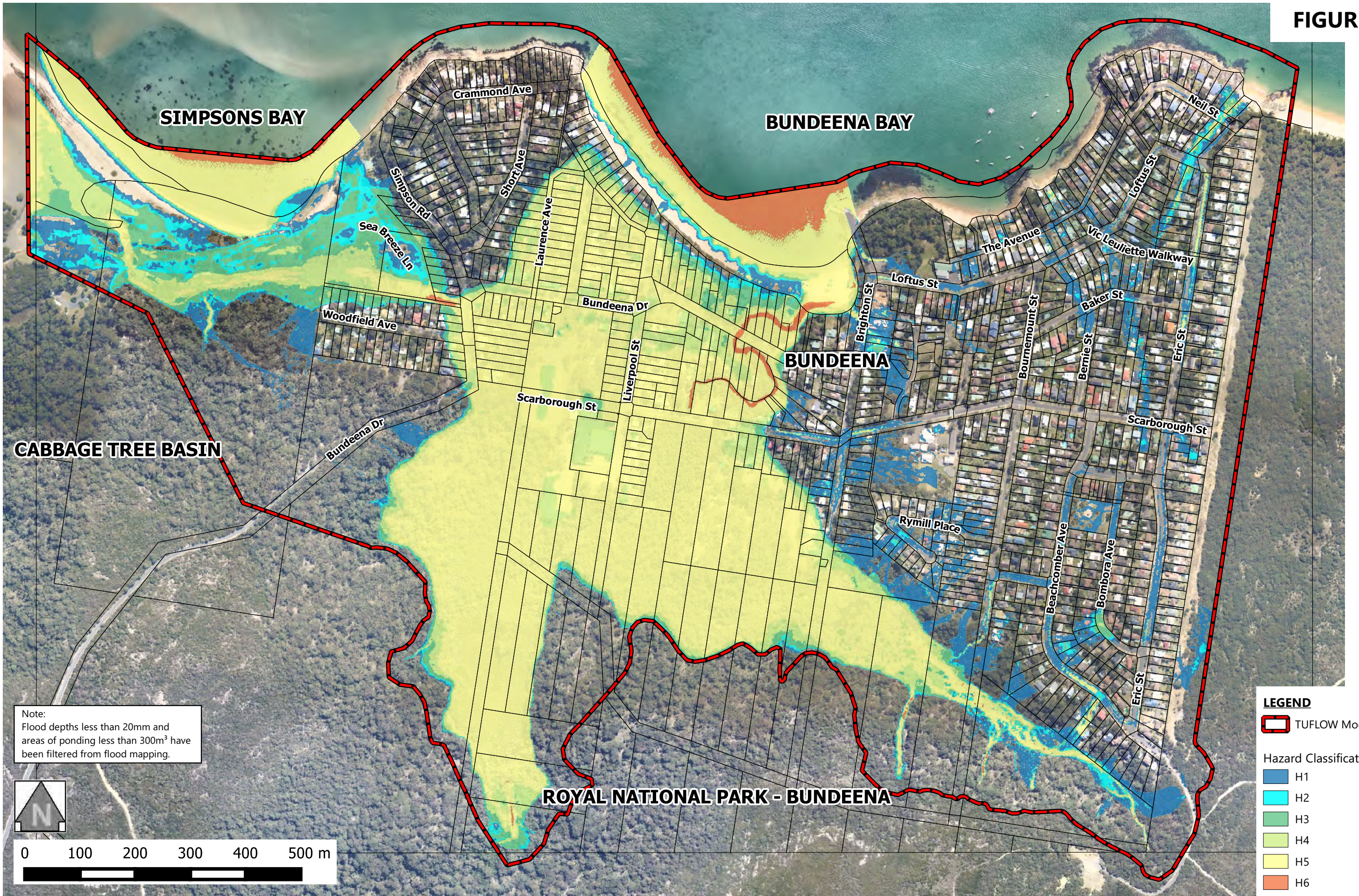
Aerial Imagery © Land and Property Information 2017

**FIGURE 4.39**

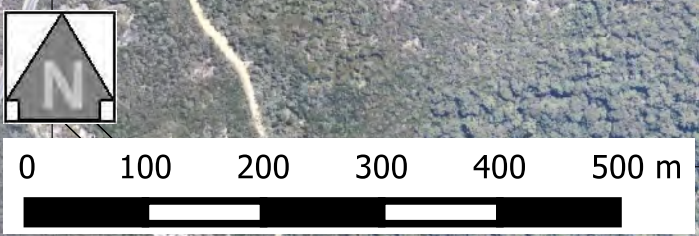


Aerial Imagery © Land and Property Information 2017

FIGURE 4.40



Note:  
Flood depths less than 20mm and  
areas of ponding less than 300m<sup>3</sup> have  
been filtered from flood mapping.



**LEGEND**

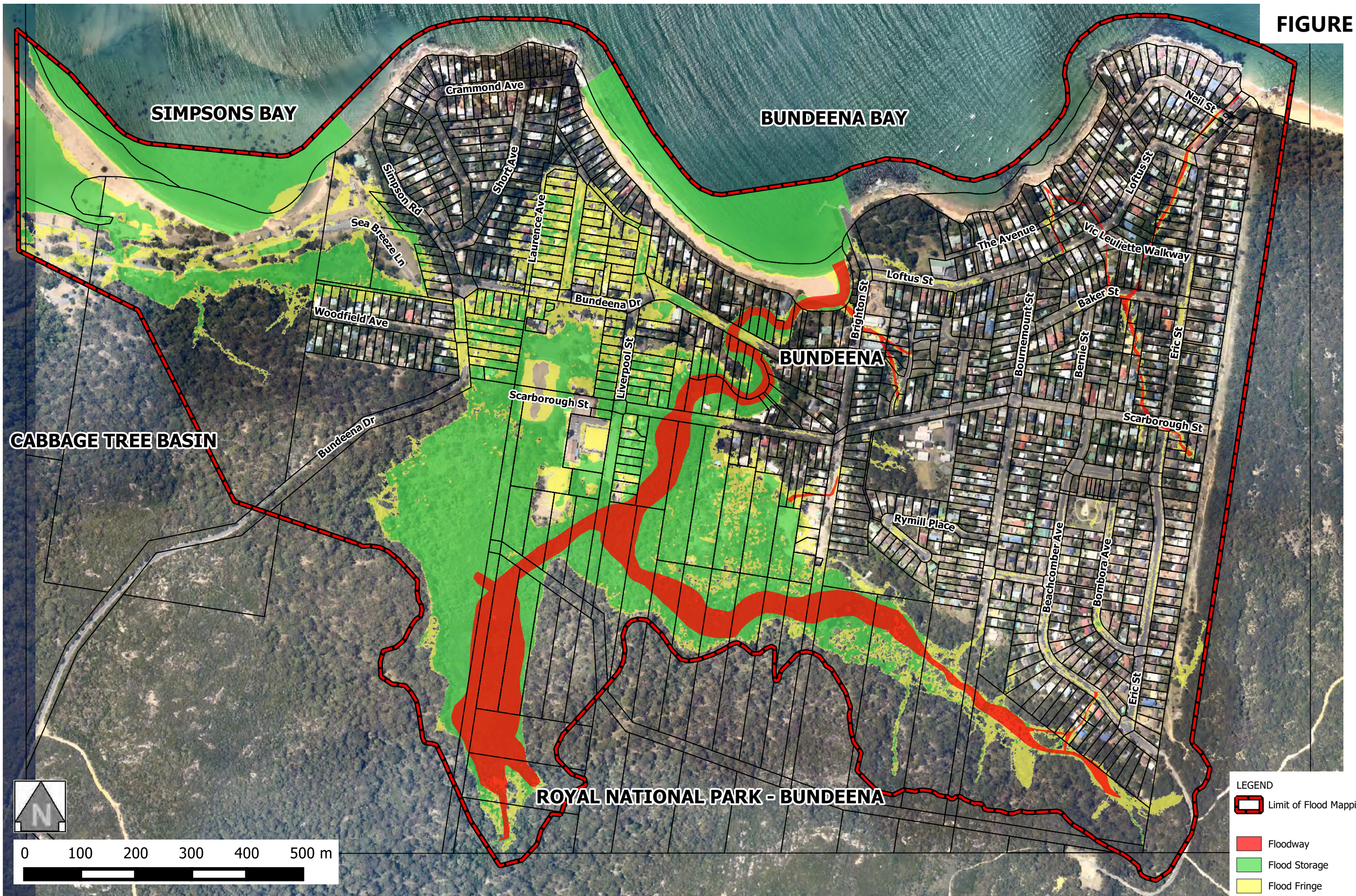
- TUFLOW Model Extent
- Hazard Classification**
- H1
- H2
- H3
- H4
- H5
- H6

Aerial Imagery © Land and Property Information 2017



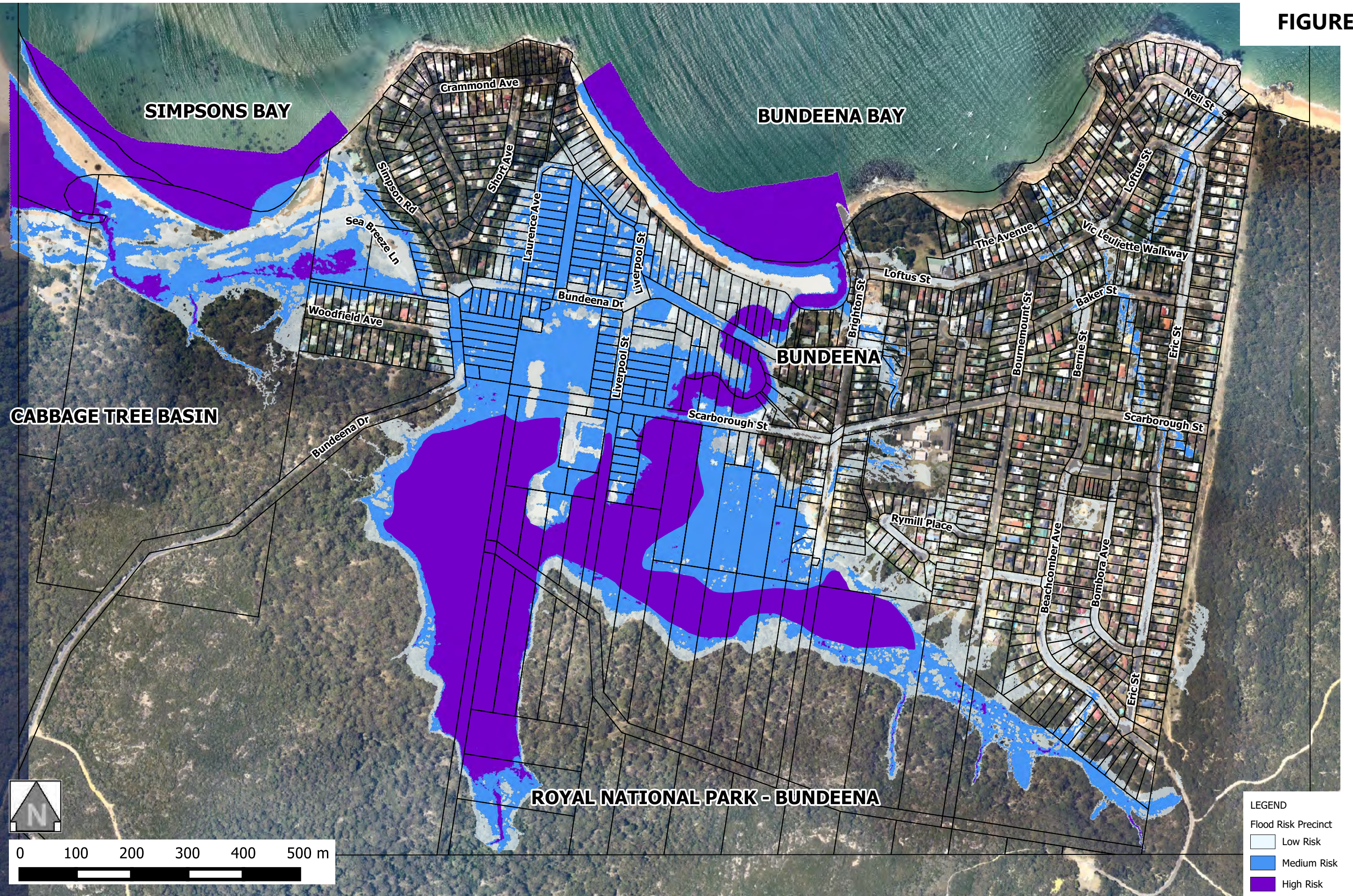
**PROVISIONAL FLOOD HAZARD FOR THE PROBABLE MAXIMUM FLOOD  
[AUSTRALIAN RAINFALL & RUNOFF 2016]**

FIGURE 4.41



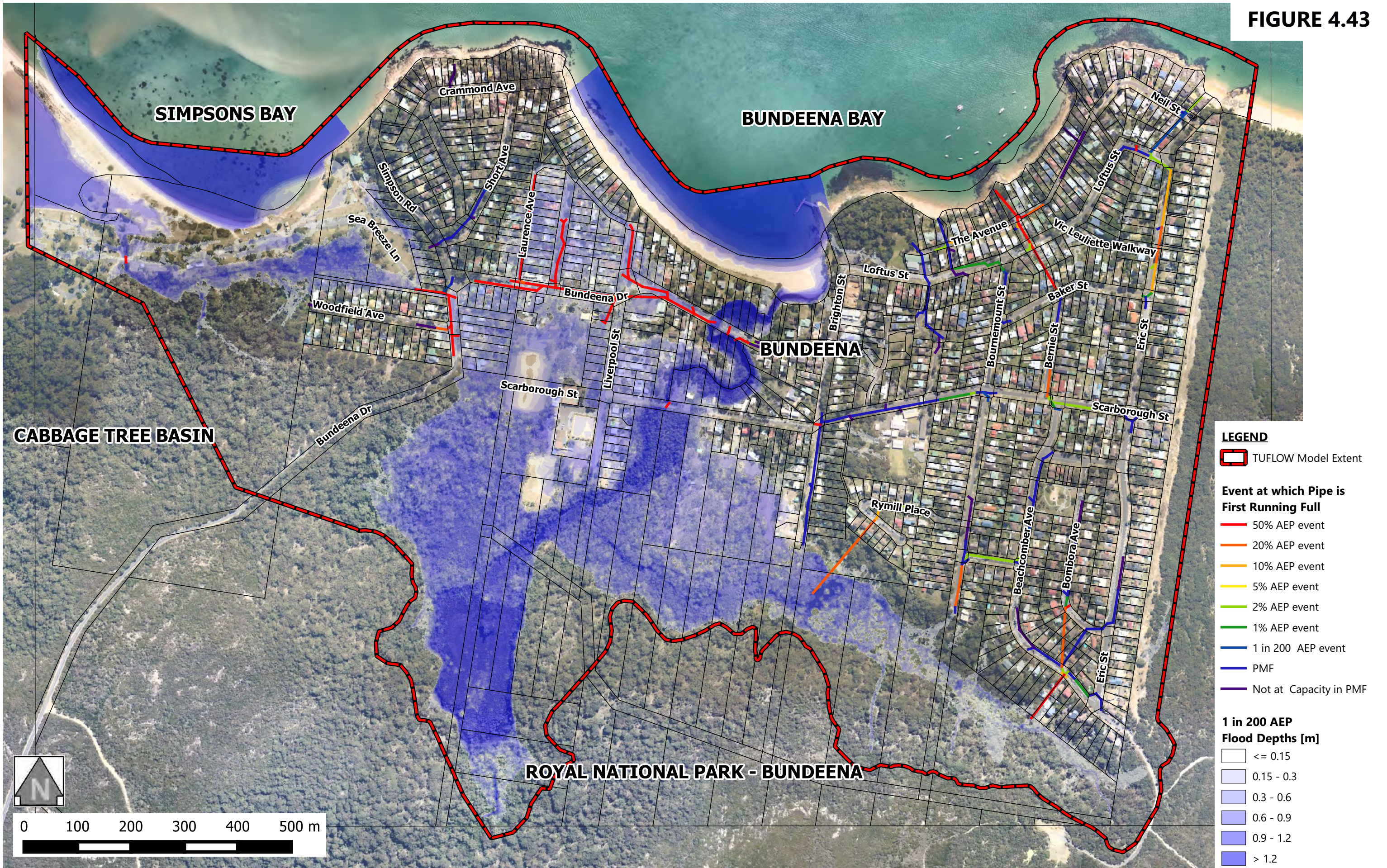
Aerial Imagery © Land and Property Information 2017

FIGURE 4.42



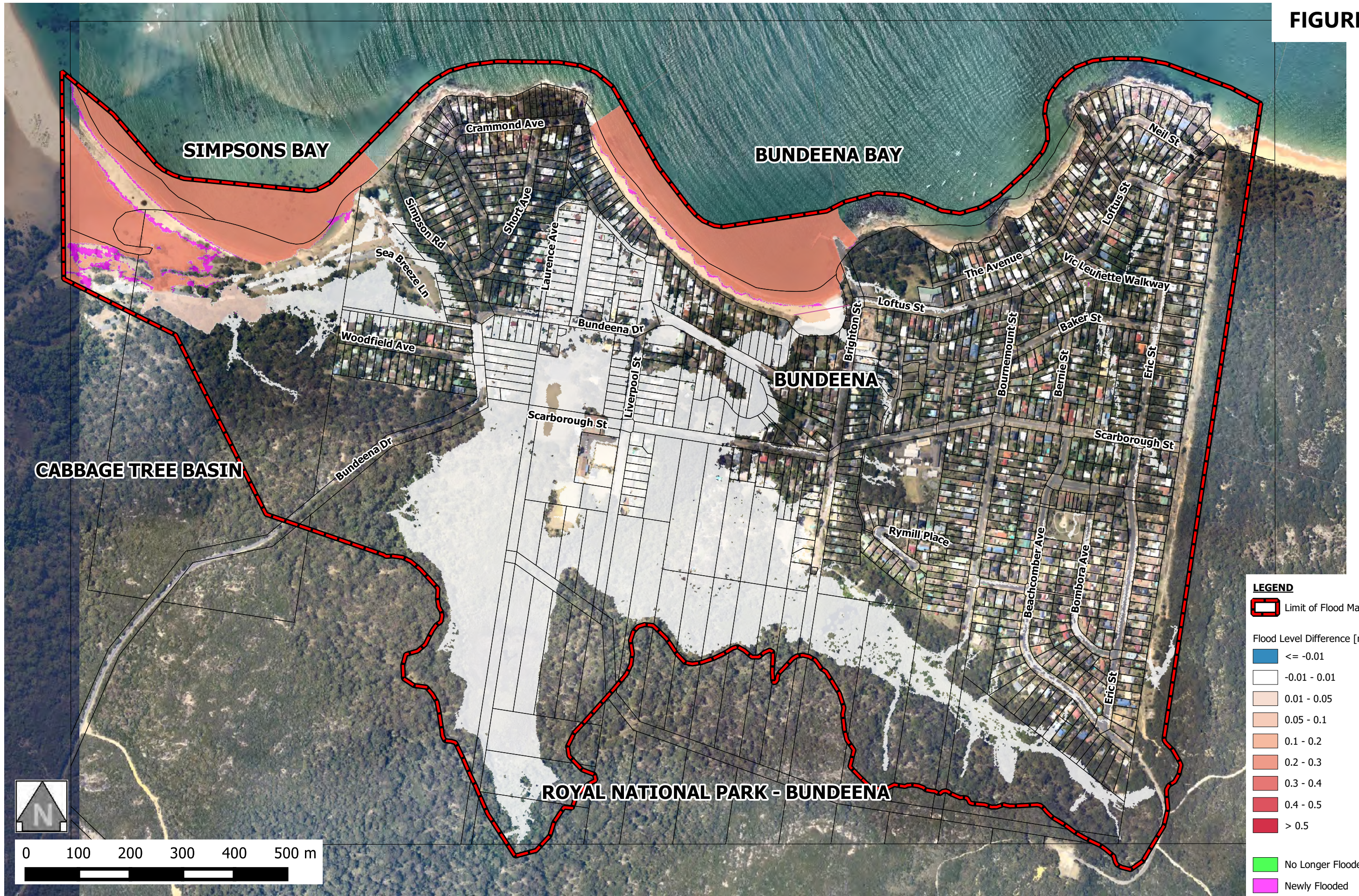


**FIGURE 4.43**



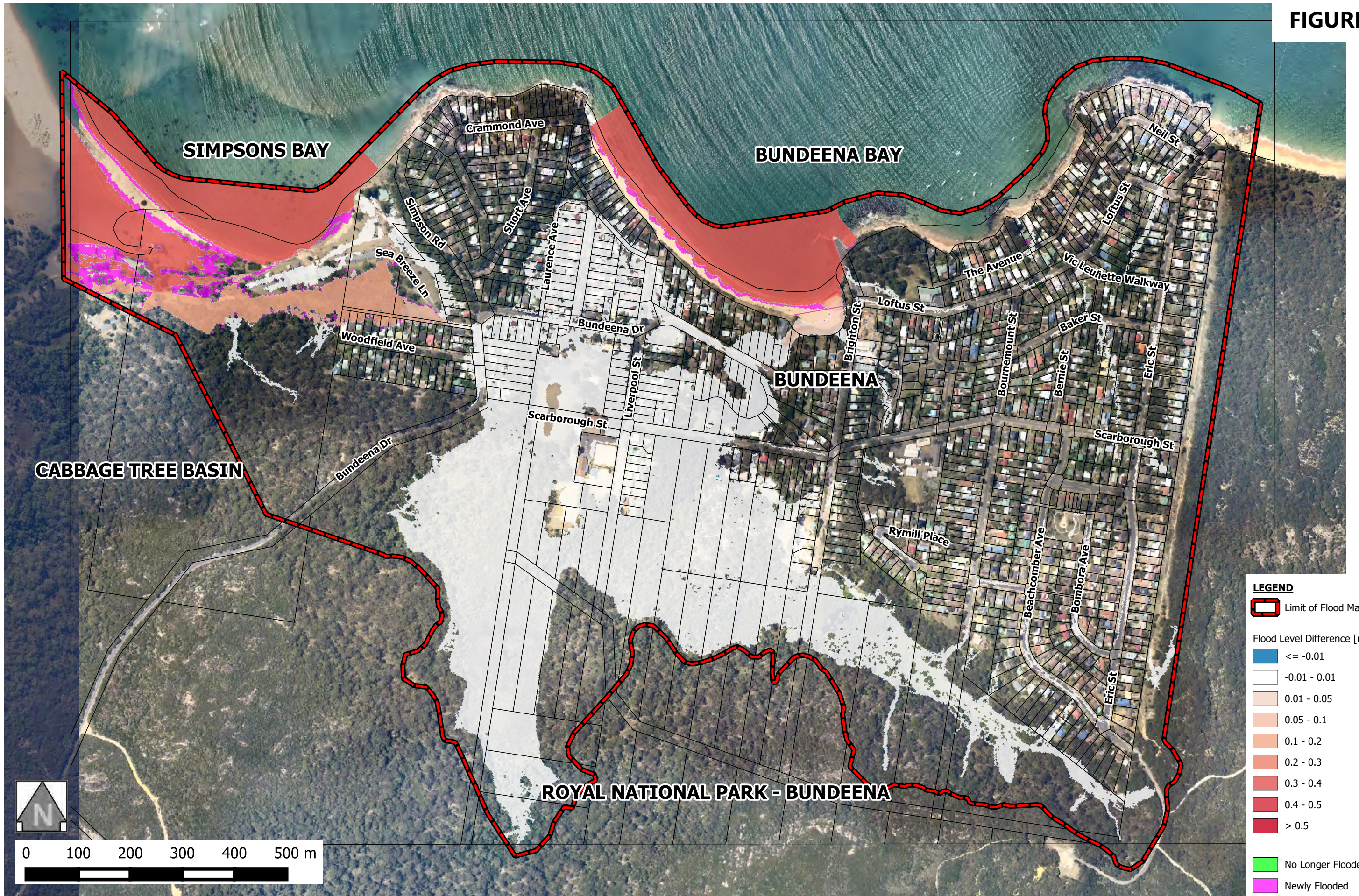
Aerial Imagery © Land and Property Information 2017

FIGURE 4.44



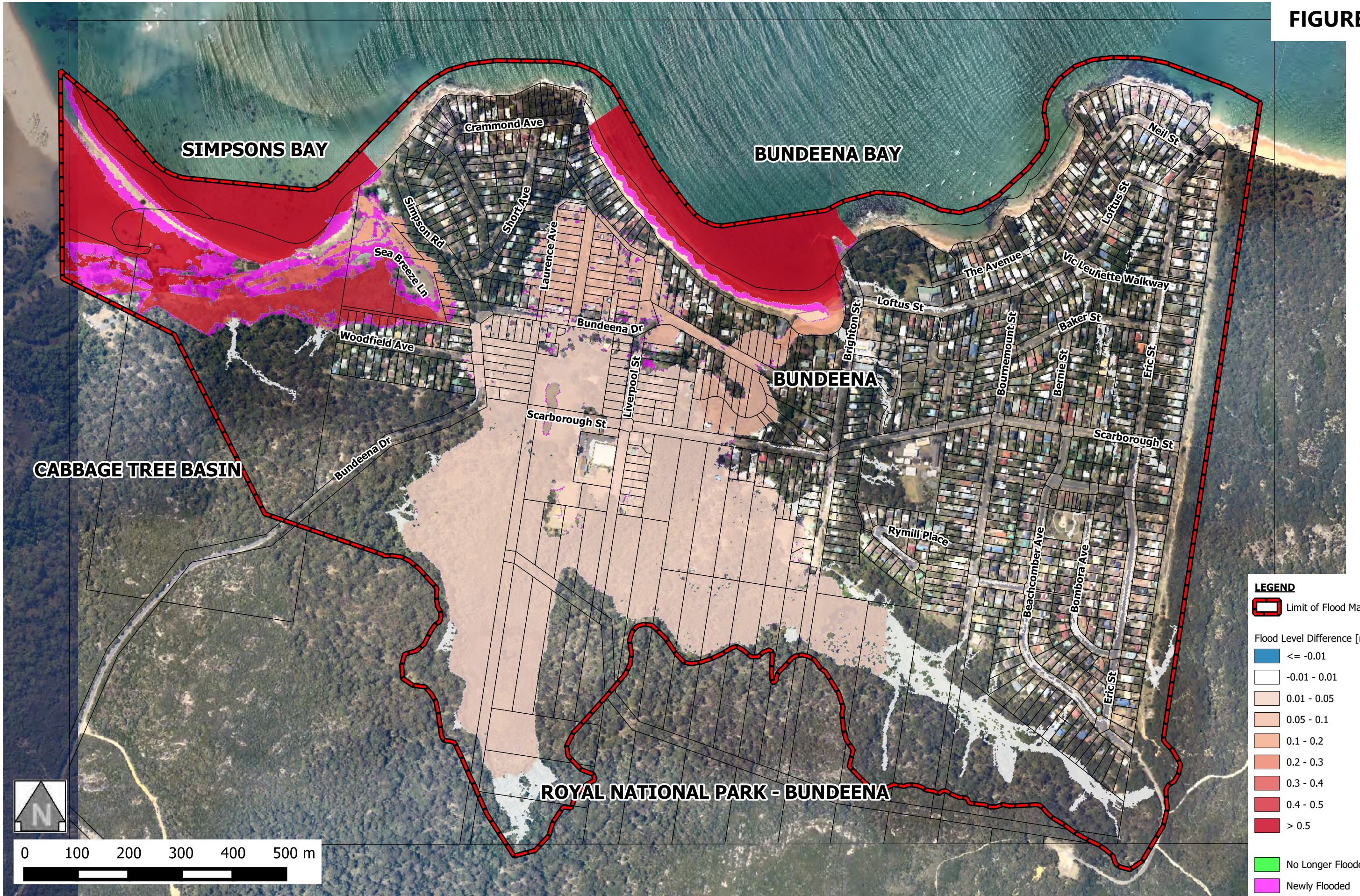
Aerial Imagery © Land and Property Information 2017

FIGURE 4.45



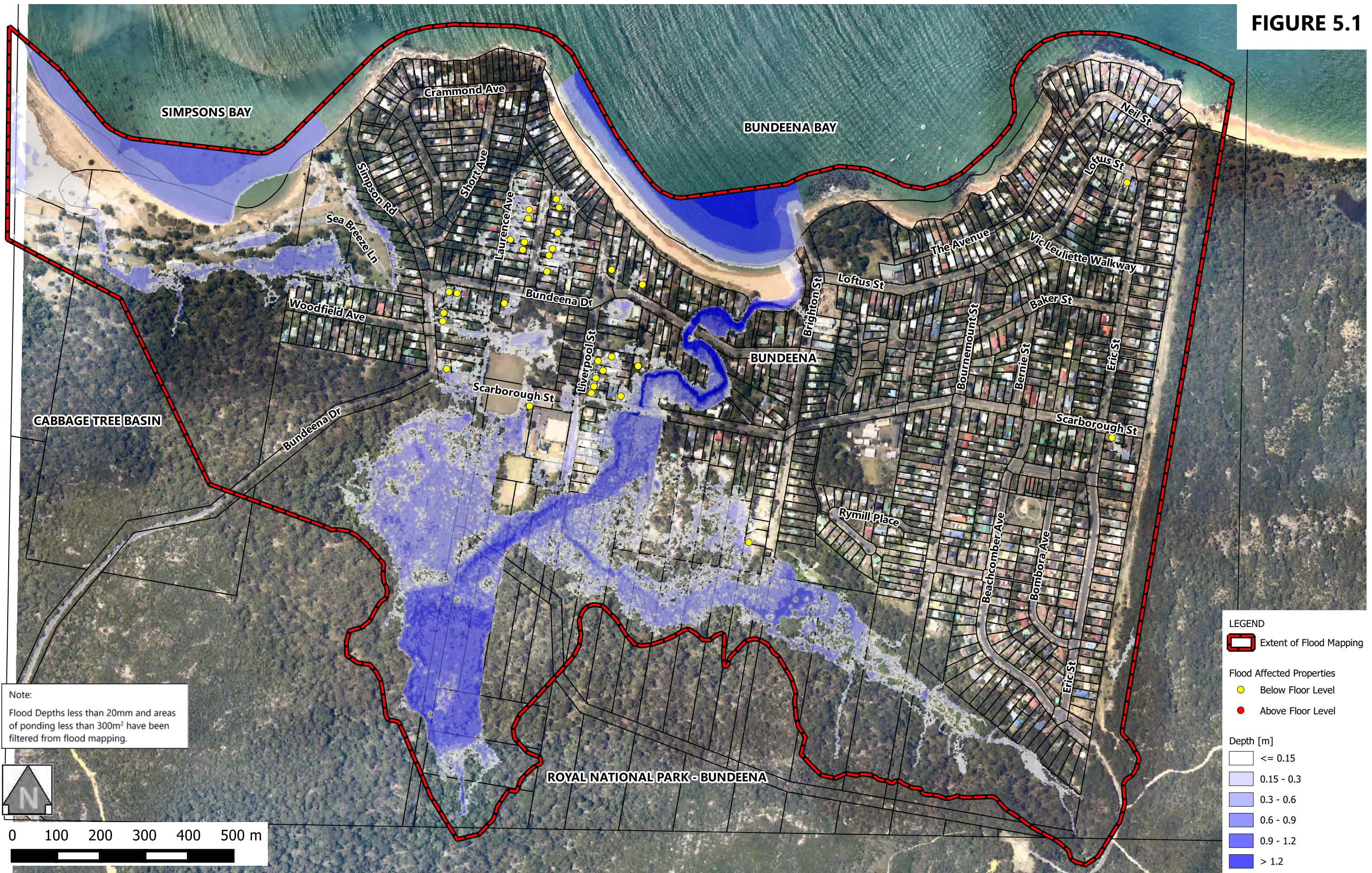
Aerial Imagery © Land and Property Information 2017

FIGURE 4.46

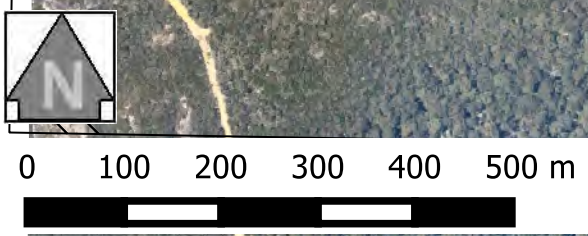


Aerial Imagery © Land and Property Information 2017

**FIGURE 5.1**



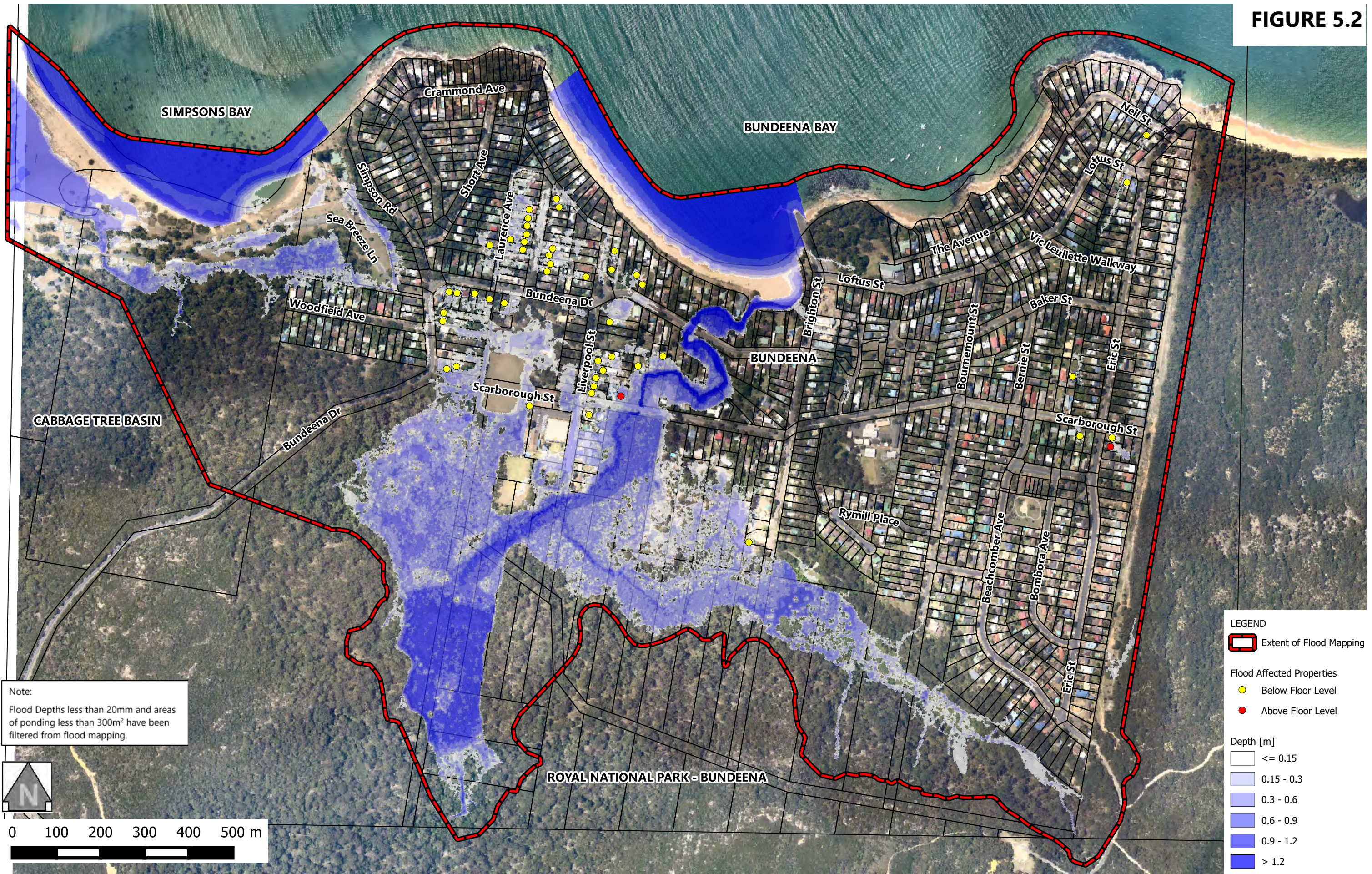
Note:  
Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.



Aerial Imagery © Land and Property Information 2017

**PROPERTIES SUBJECT TO FLOOD DAMAGES  
DURING THE 50% AEP EVENT**

FIGURE 5.2



Note:  
Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.

**LEGEND**

- Extent of Flood Mapping
- Flood Affected Properties**
  - Below Floor Level
  - Above Floor Level
- Depth [m]**
  - <= 0.15
  - 0.15 - 0.3
  - 0.3 - 0.6
  - 0.6 - 0.9
  - 0.9 - 1.2
  - > 1.2

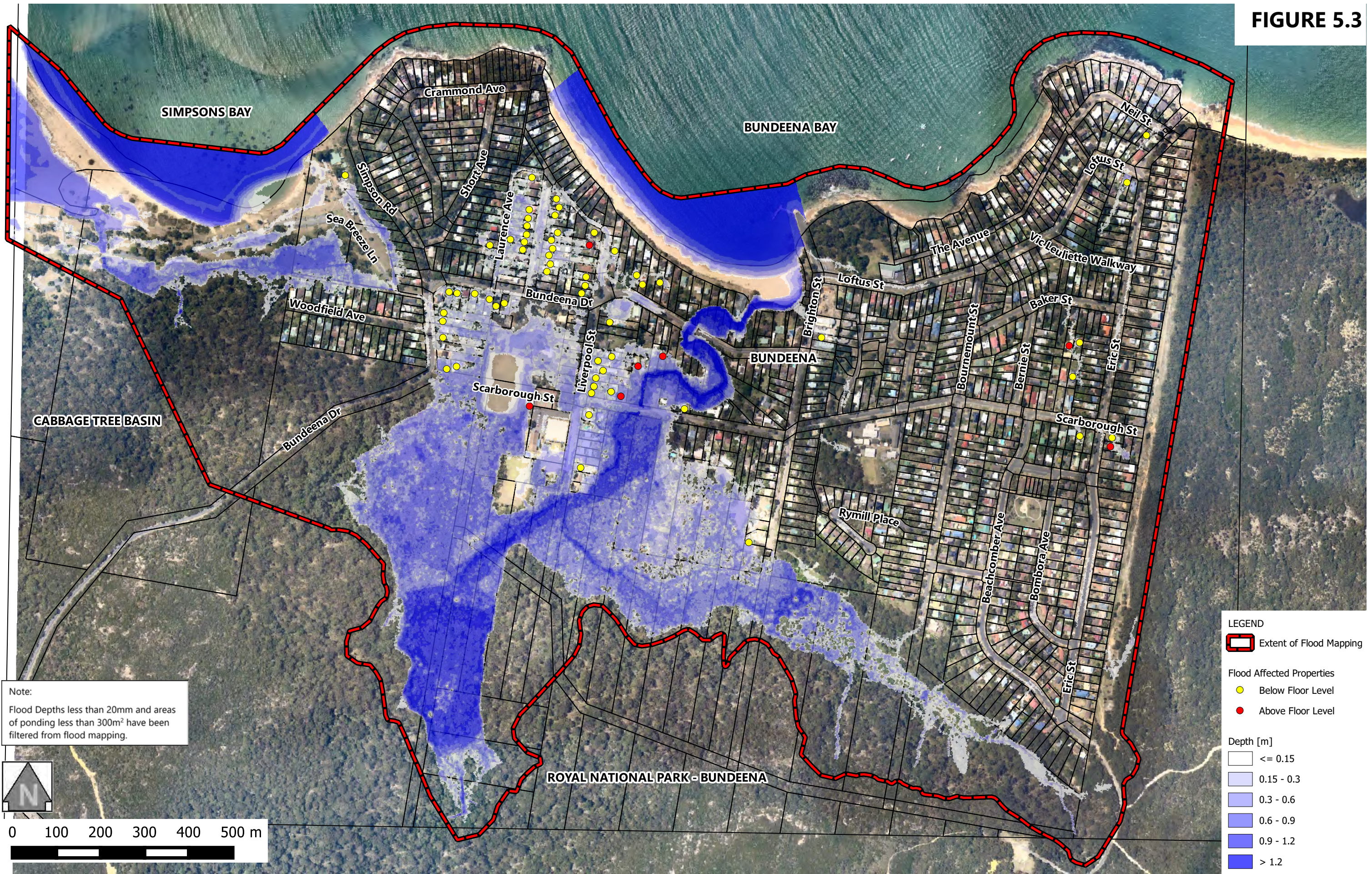
Aerial Imagery © Land and Property Information 2017



**PROPERTIES SUBJECT TO FLOOD DAMAGES DURING THE 20% AEP EVENT**

Figure 5.2 17115-20% AEP Flooded Properties  
2017-10-04 Bundeena Damages.qgs

FIGURE 5.3



Note:  
 Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.

**LEGEND**

- Extent of Flood Mapping
- Flood Affected Properties**
  - Below Floor Level
  - Above Floor Level
- Depth [m]**
  - <= 0.15
  - 0.15 - 0.3
  - 0.3 - 0.6
  - 0.6 - 0.9
  - 0.9 - 1.2
  - > 1.2

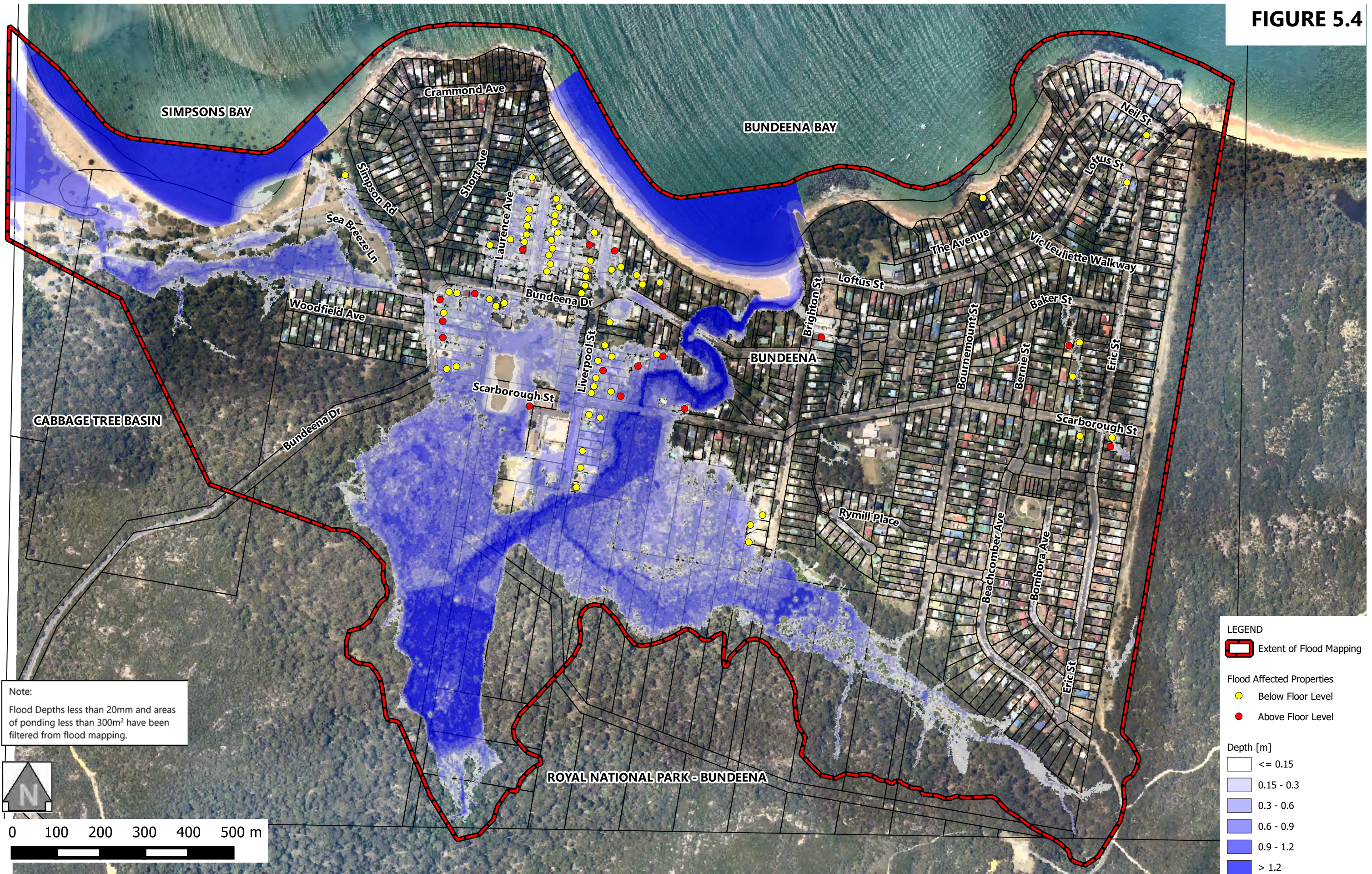
Aerial Imagery © Land and Property Information 2017



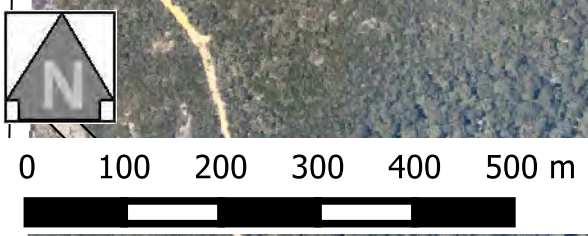
**PROPERTIES SUBJECT TO FLOOD DAMAGES DURING THE 10% AEP EVENT**

Figure 5.3 17115-10% AEP Flooded Properties  
 2017-10-04 Bundeena Damages.qgs

**FIGURE 5.4**



Note:  
Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.



**LEGEND**

- Extent of Flood Mapping
- Below Floor Level
- Above Floor Level

Depth [m]

|  |            |
|--|------------|
|  | <= 0.15    |
|  | 0.15 - 0.3 |
|  | 0.3 - 0.6  |
|  | 0.6 - 0.9  |
|  | 0.9 - 1.2  |
|  | > 1.2      |

Aerial Imagery © Land and Property Information 2017



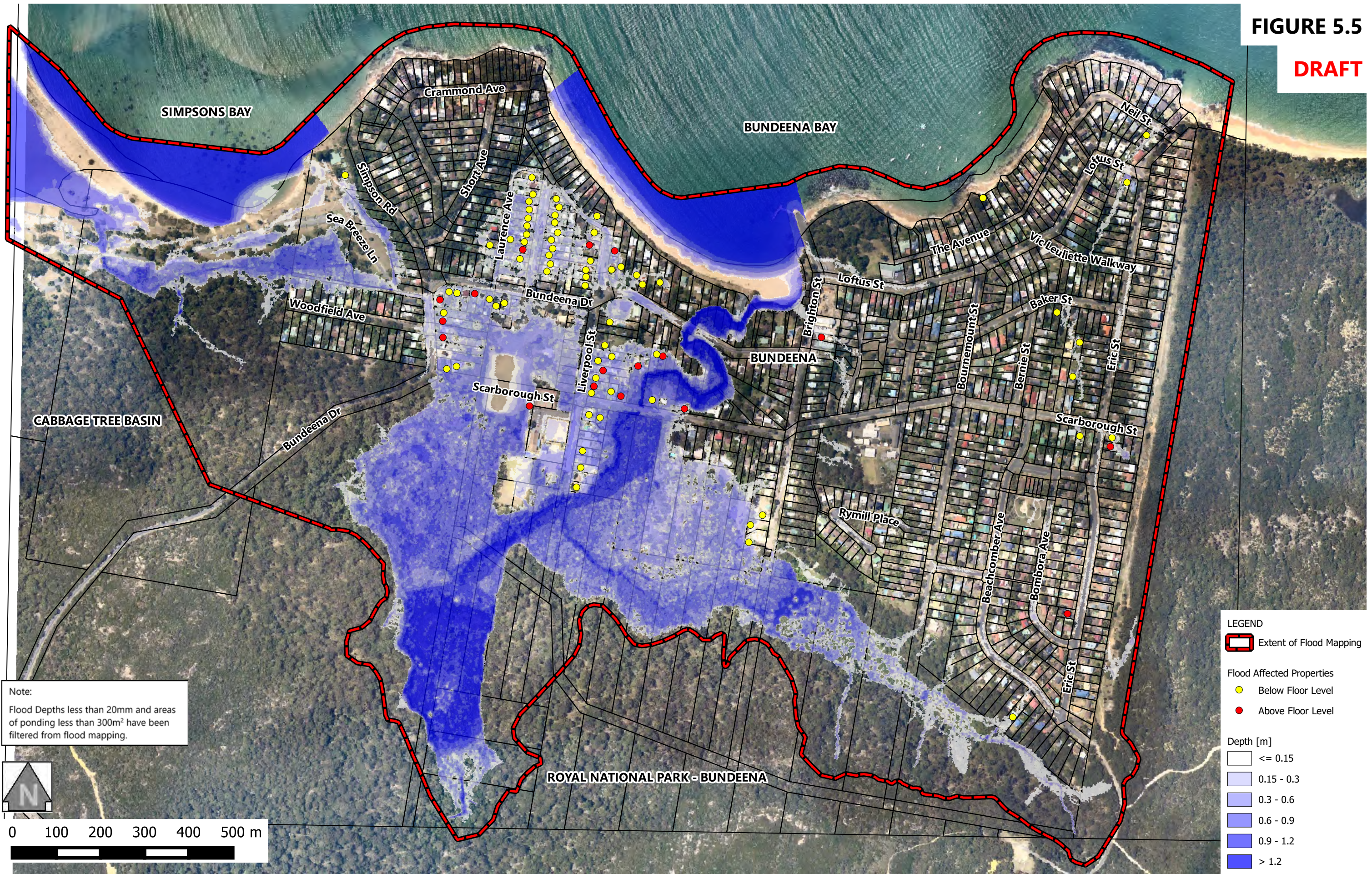
**PROPERTIES SUBJECT TO FLOOD DAMAGES  
DURING THE 5% AEP EVENT**

Figure 5.4 17115-5% AEP Flooded Properties  
2017-10-04 Bundeena Damages.qgs

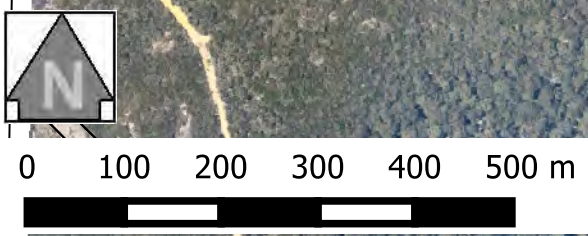


FIGURE 5.5

DRAFT



Note:  
 Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.



**LEGEND**

- Extent of Flood Mapping
- Flood Affected Properties**
  - Below Floor Level
  - Above Floor Level
- Depth [m]**
  - <= 0.15
  - 0.15 - 0.3
  - 0.3 - 0.6
  - 0.6 - 0.9
  - 0.9 - 1.2
  - > 1.2

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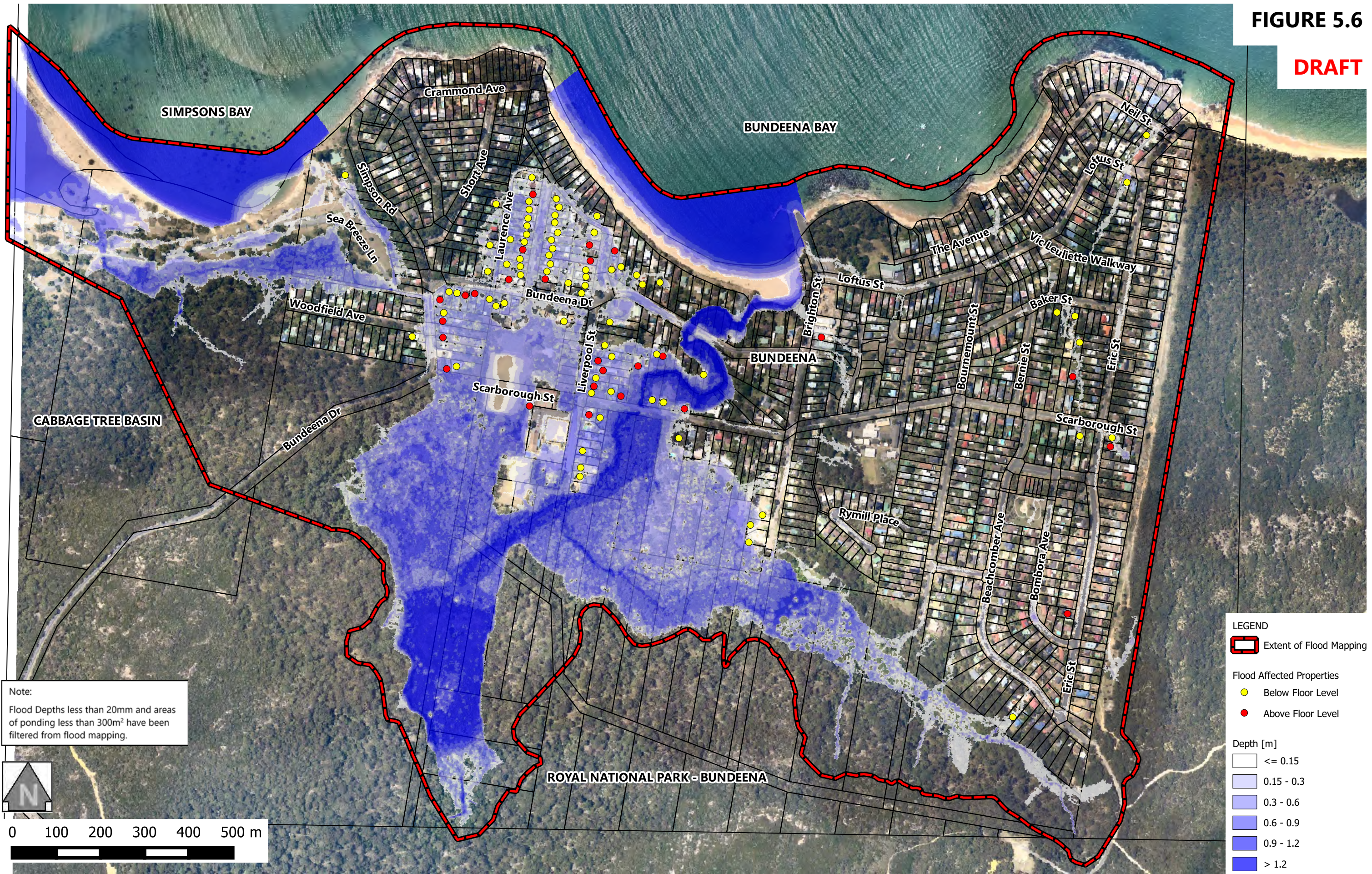


**PROPERTIES SUBJECT TO FLOOD DAMAGES  
 DURING THE 2% AEP EVENT**

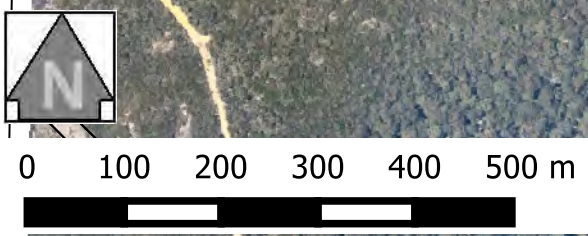
Figure 5.5 17115-2% AEP Flooded Properties  
 2017-10-04 Bundeena Damages.qgs

FIGURE 5.6

DRAFT



Note:  
 Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.



**LEGEND**

- Extent of Flood Mapping
- Flood Affected Properties**
  - Below Floor Level
  - Above Floor Level
- Depth [m]**
  - <= 0.15
  - 0.15 - 0.3
  - 0.3 - 0.6
  - 0.6 - 0.9
  - 0.9 - 1.2
  - > 1.2

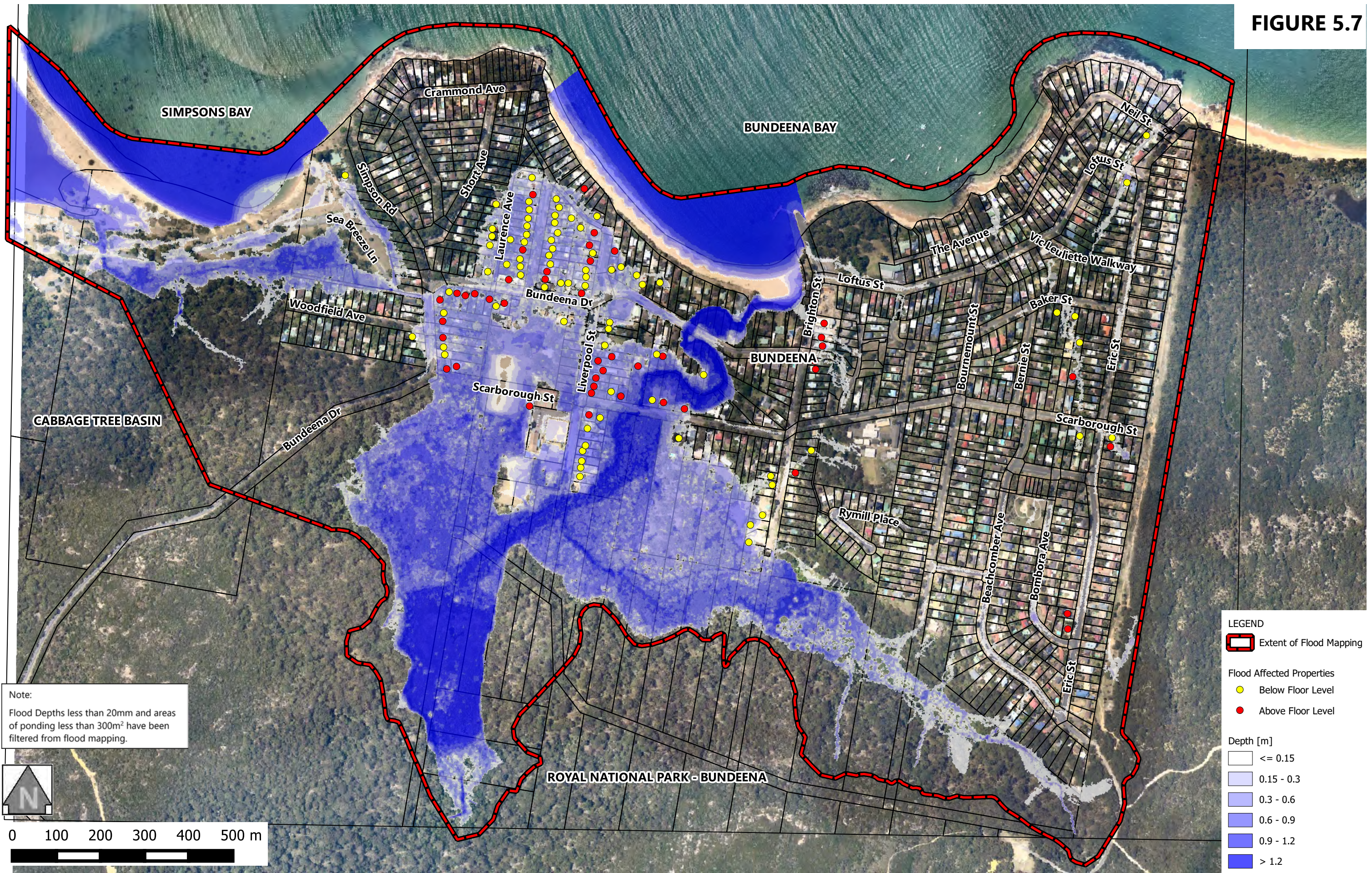
Aerial Imagery © Land and Property Information 2017



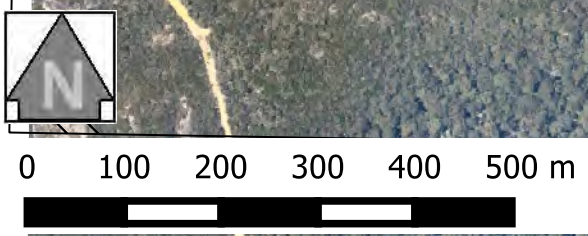
**PROPERTIES SUBJECT TO FLOOD DAMAGES  
 DURING THE 1% AEP EVENT**

Figure 5.6 17115-1% AEP Flooded Properties  
 2017-10-04 Bundeena Damages.qgs

**FIGURE 5.7**



Note:  
Flood Depths less than 20mm and areas of ponding less than 300m<sup>2</sup> have been filtered from flood mapping.



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Figure 5.7 17115-0.5% AEP Flooded Properties  
2017-10-04 Bundeena Damages.qgs

**PROPERTIES SUBJECT TO FLOOD DAMAGES  
DURING THE 1 IN 200 AEP EVENT**

FIGURE 5.8

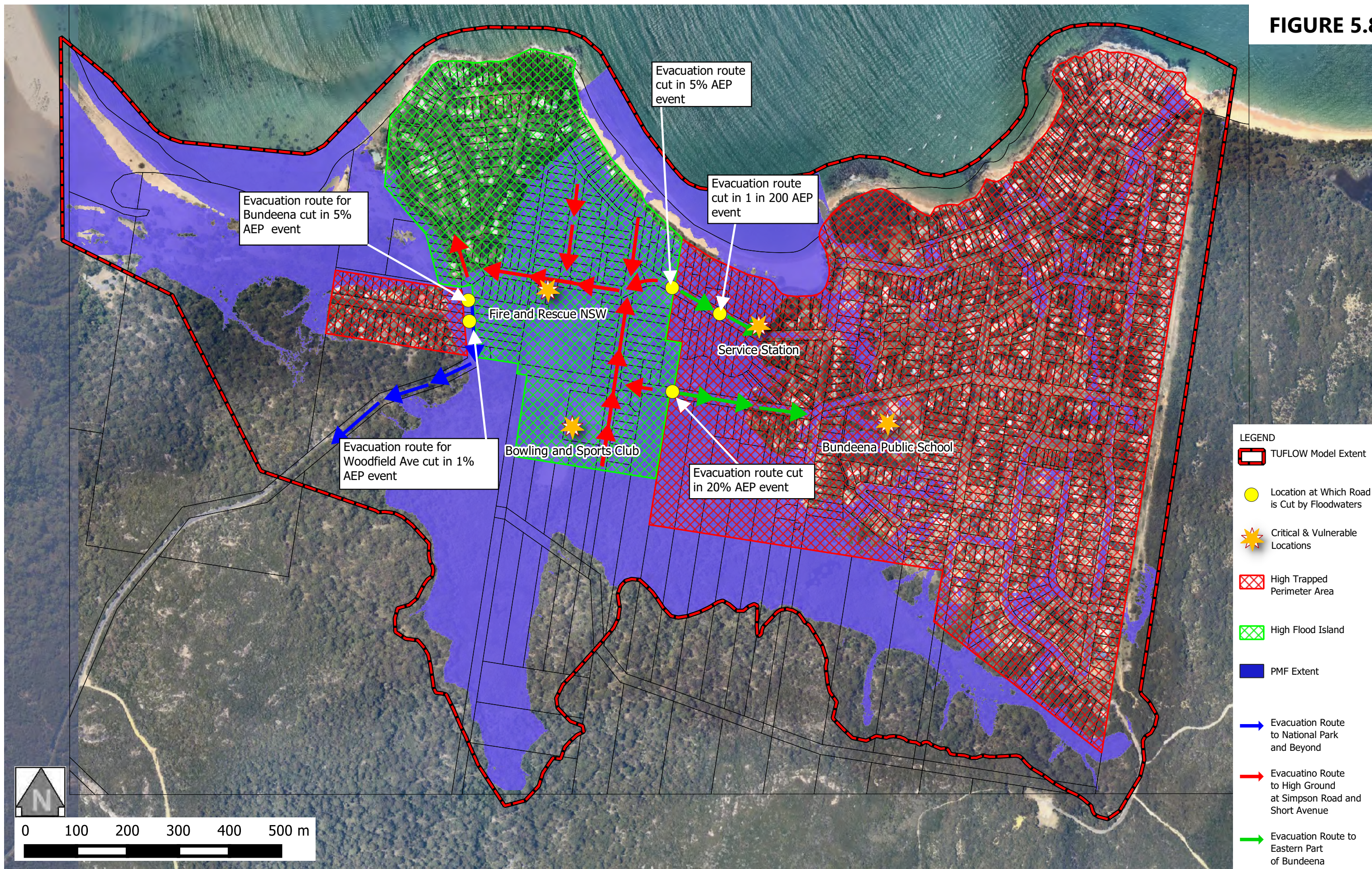
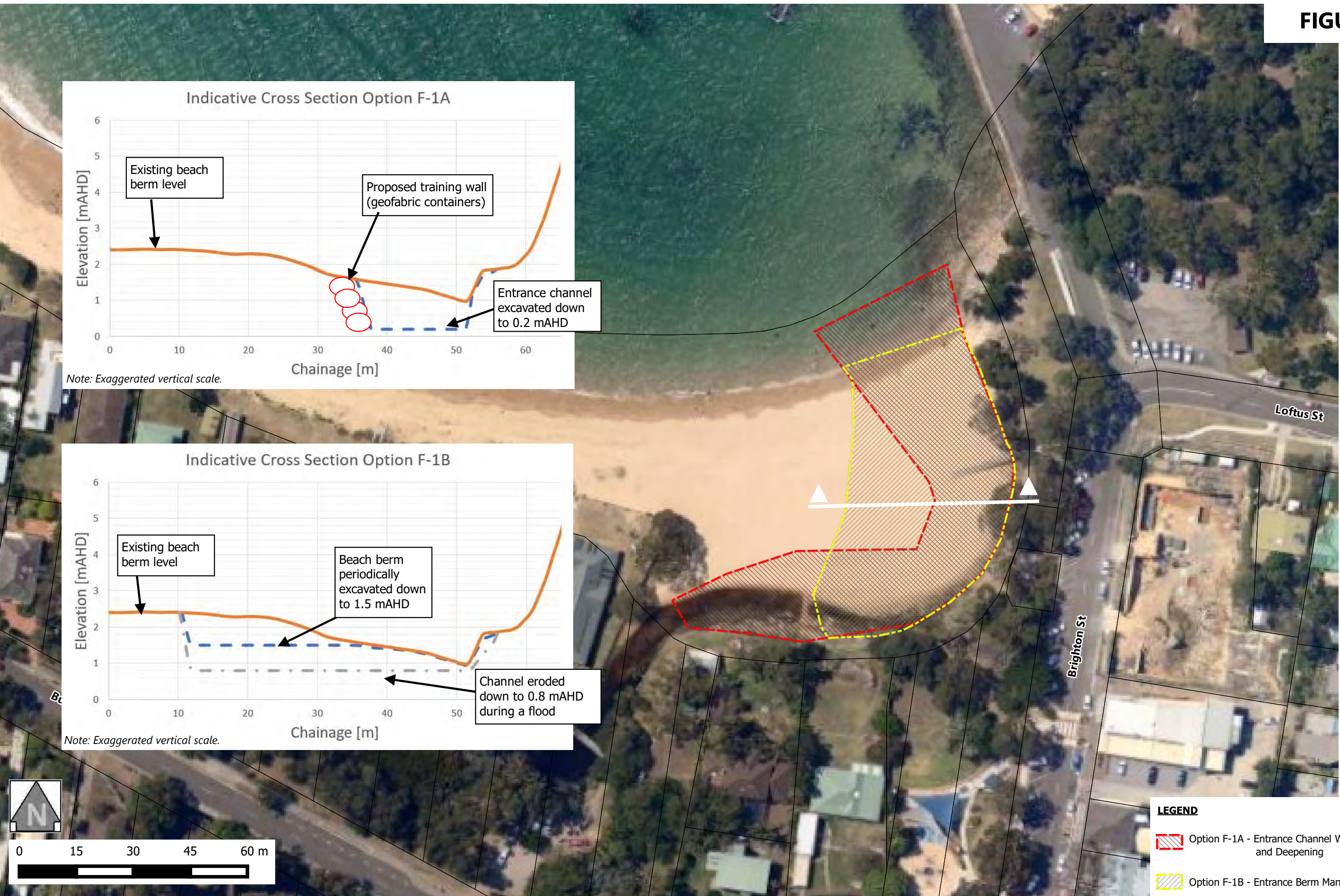
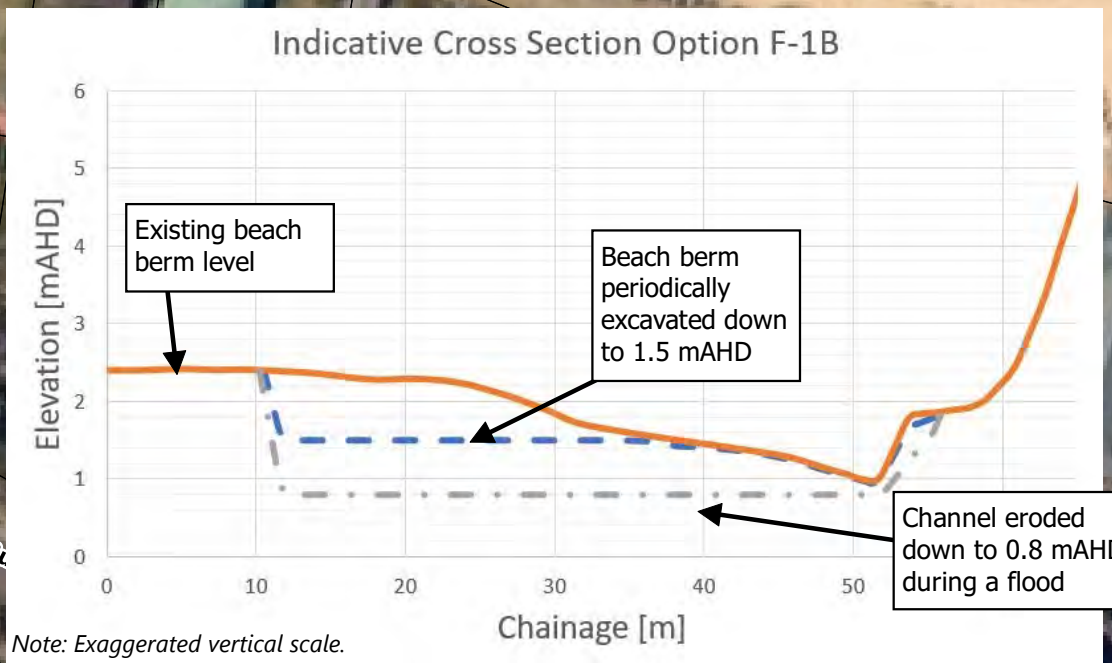
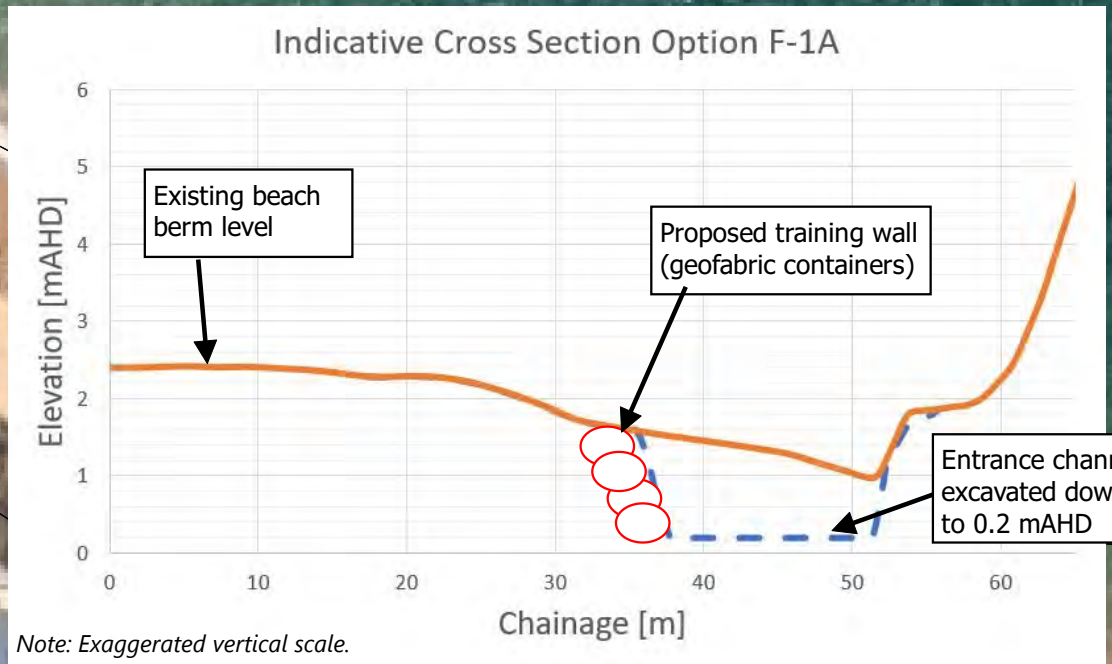


FIGURE 7.1



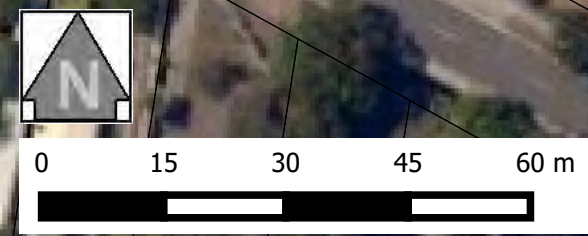
Aerial Imagery © Land and Property Information 2017

**FIGURE 7.2**



**LEGEND**

- Option F-1A - Entrance Channel Widening and Deepening
- Option F-1B - Entrance Berm Management



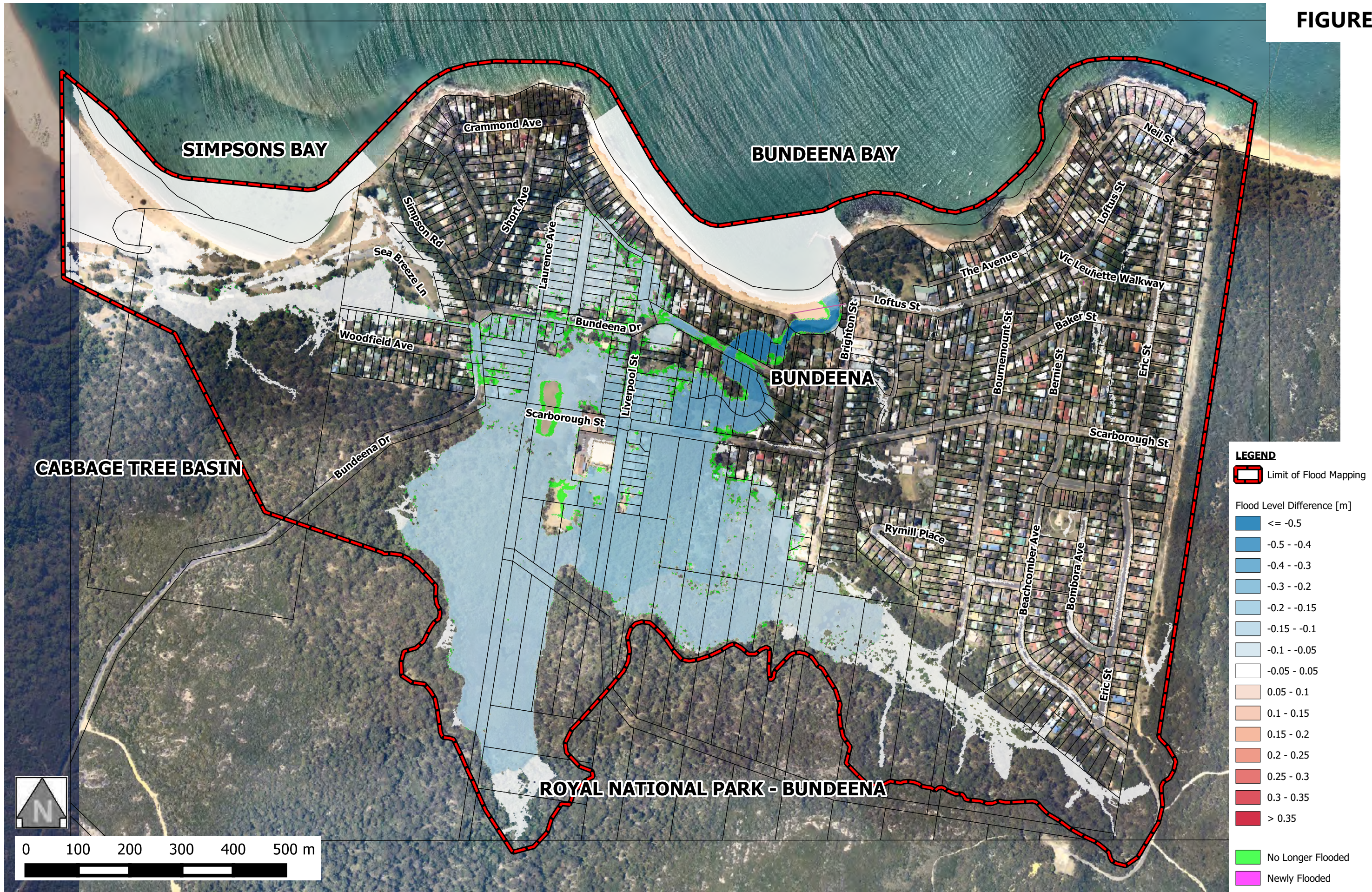
Aerial Imagery © Land and Property Information 2017

FIGURE 7.3



Aerial Imagery © Land and Property Information 2017

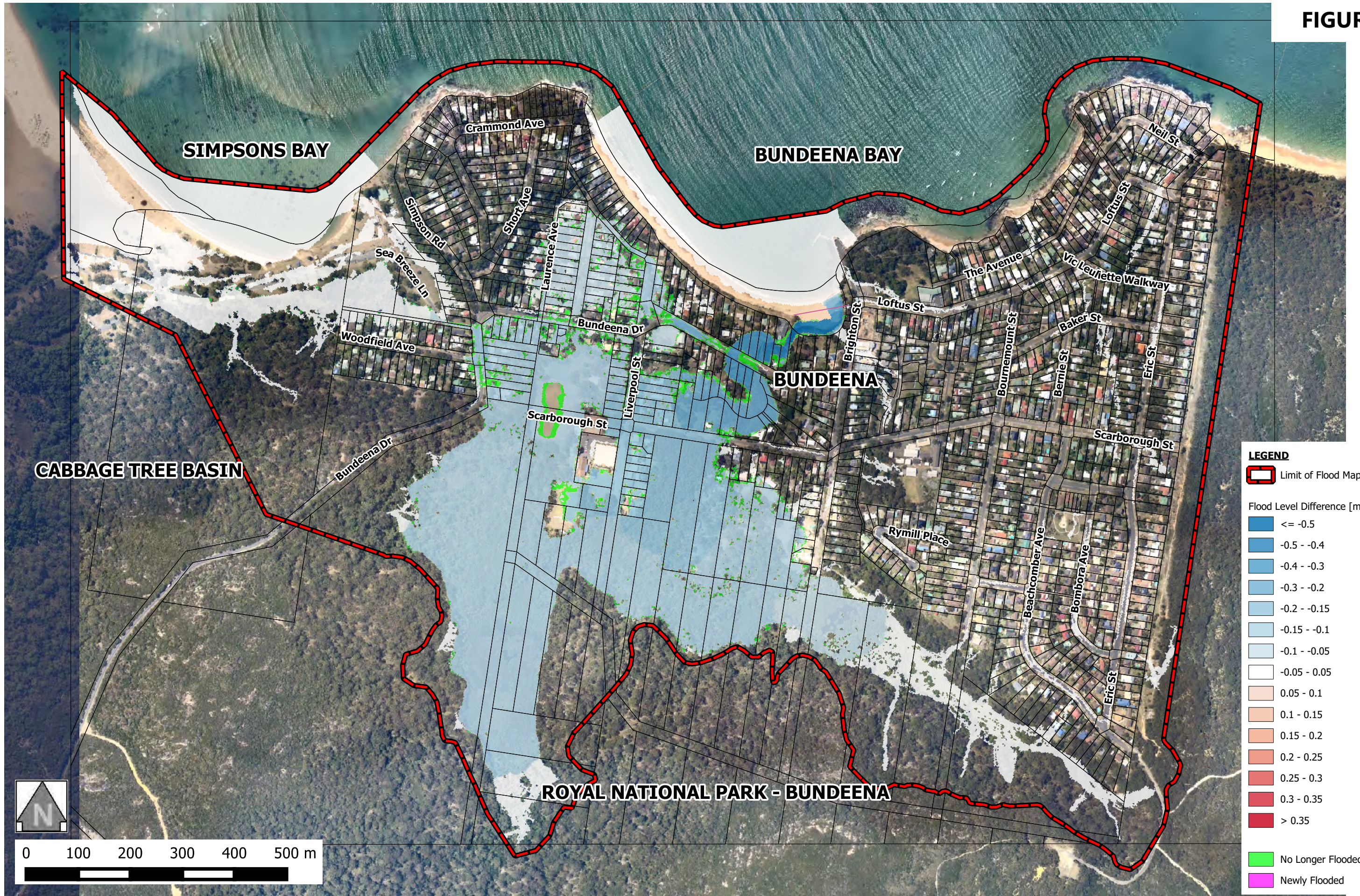
FIGURE 7.4



Aerial Imagery © Land and Property Information 2017

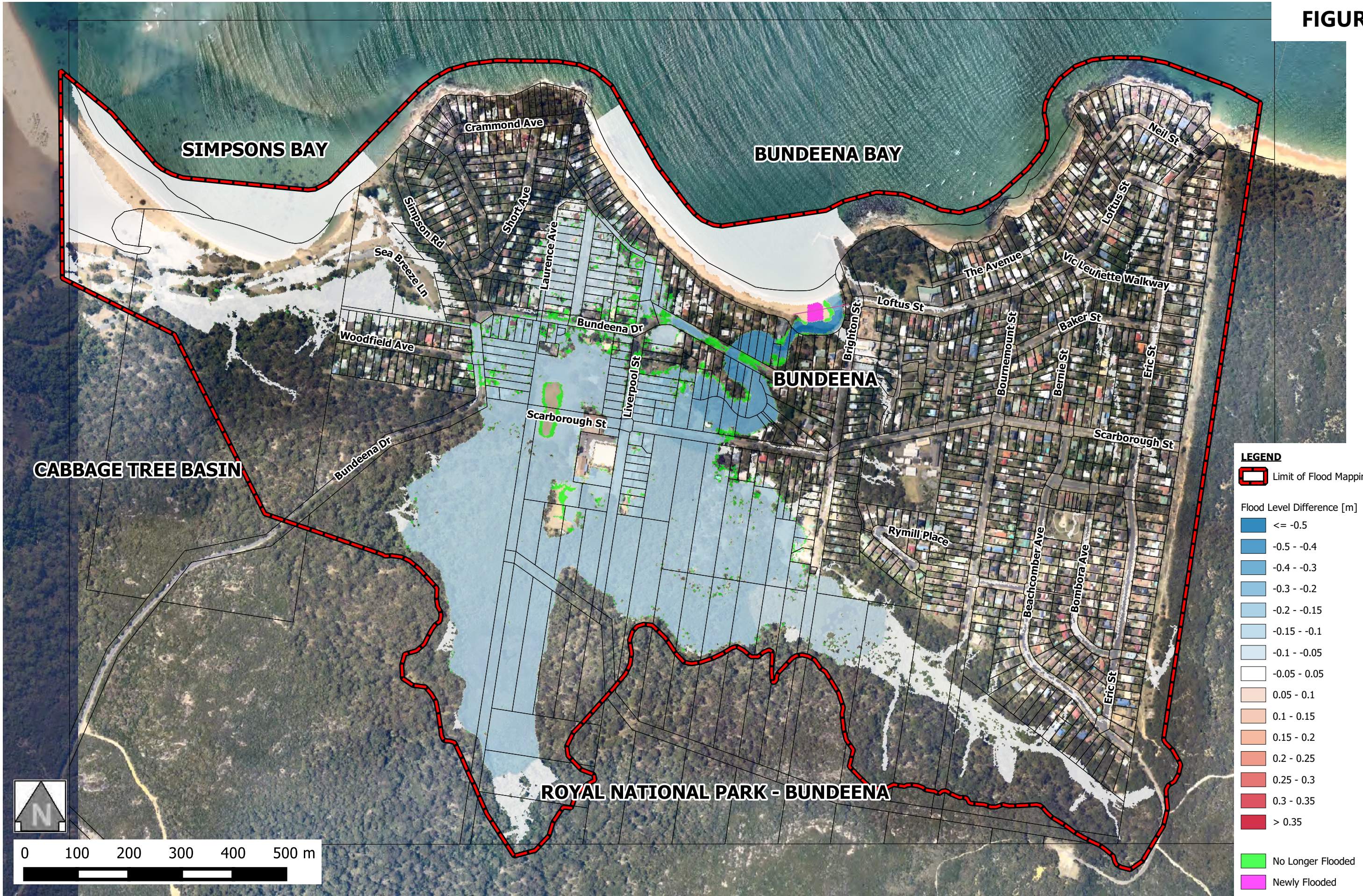


FIGURE 7.5



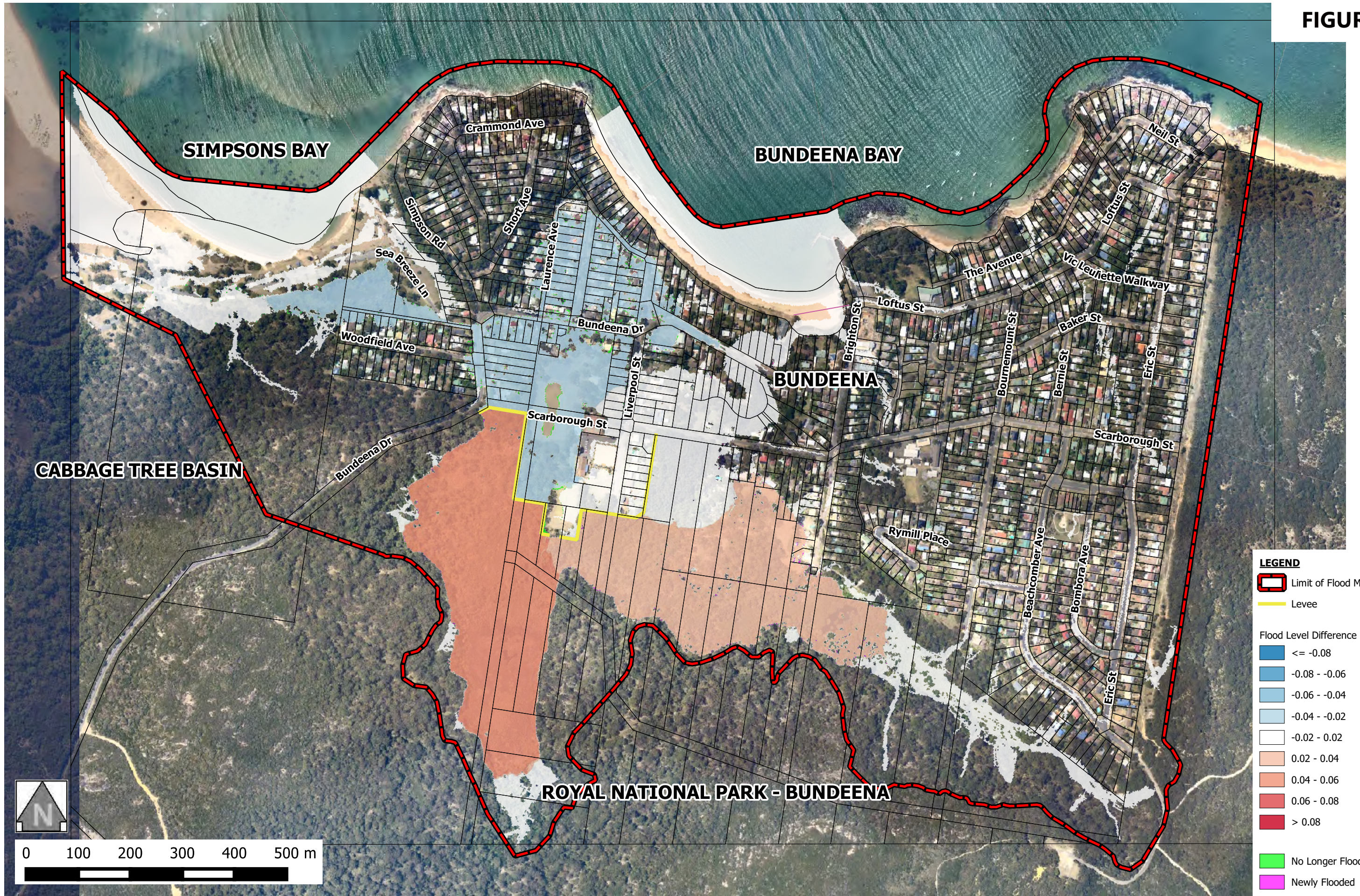
Aerial Imagery © Land and Property Information 2017

**FIGURE 7.6**



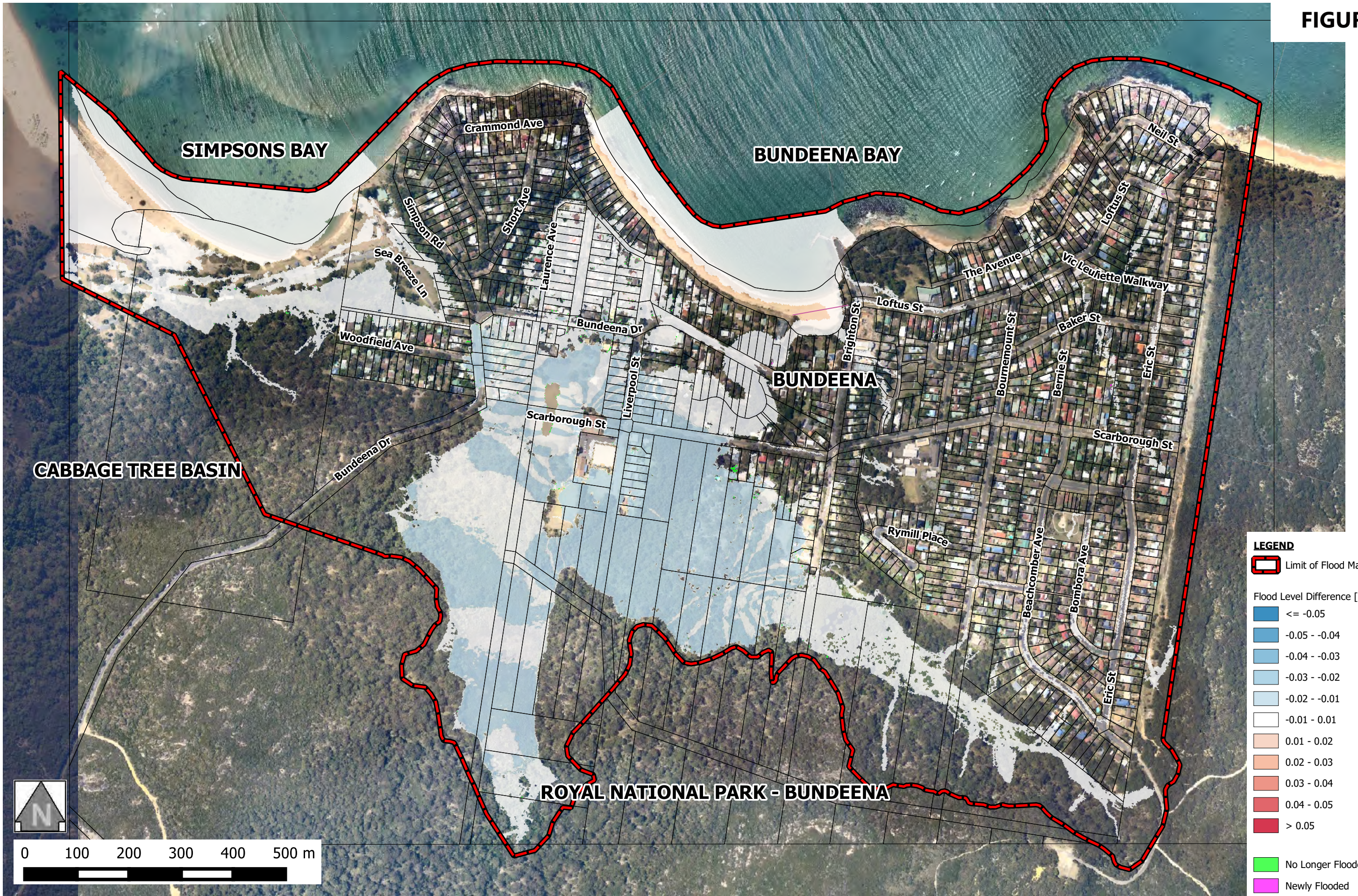
Aerial Imagery © Land and Property Information 2017

FIGURE 7.7



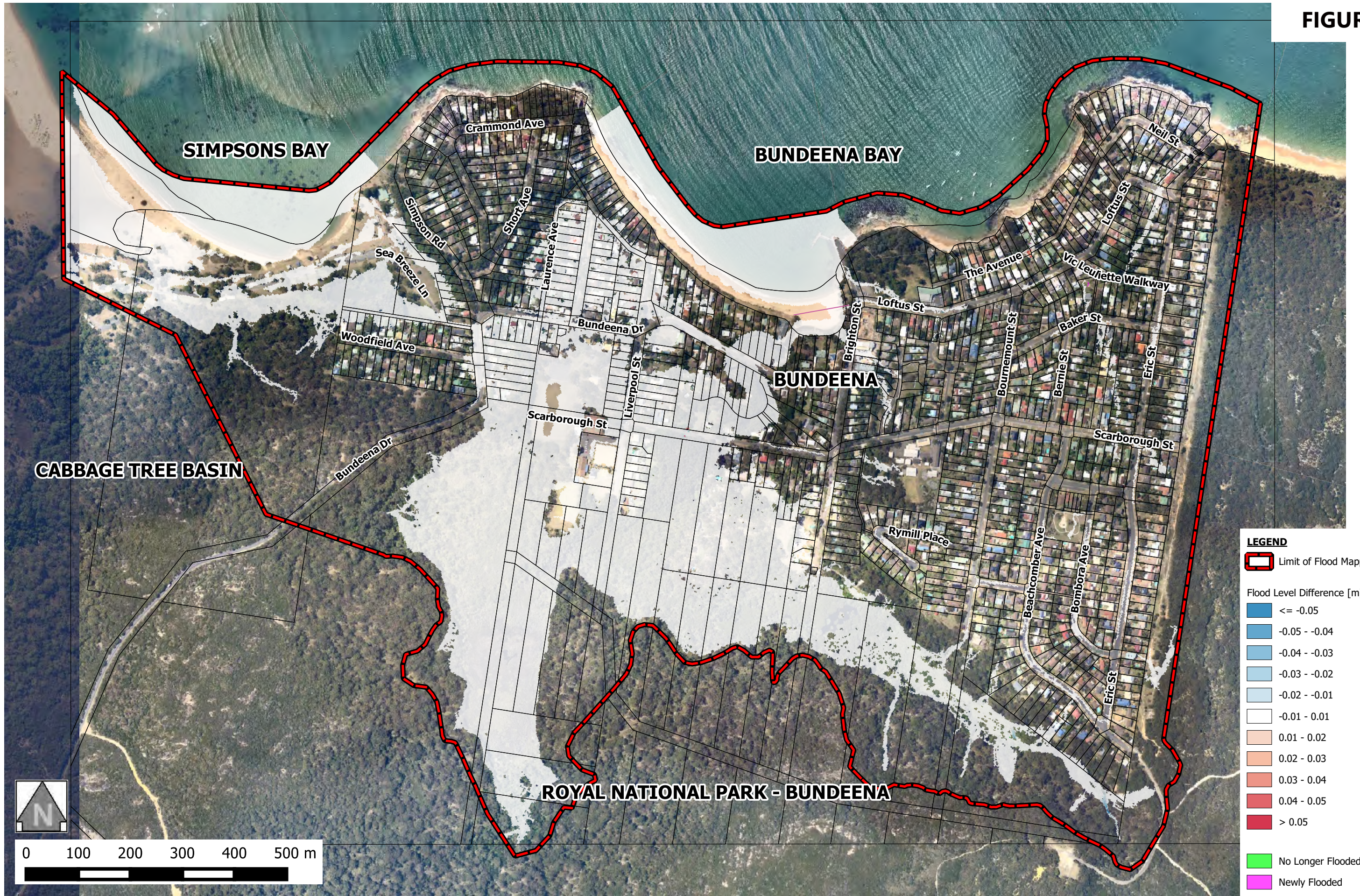
Aerial Imagery © Land and Property Information 2017

FIGURE 7.8



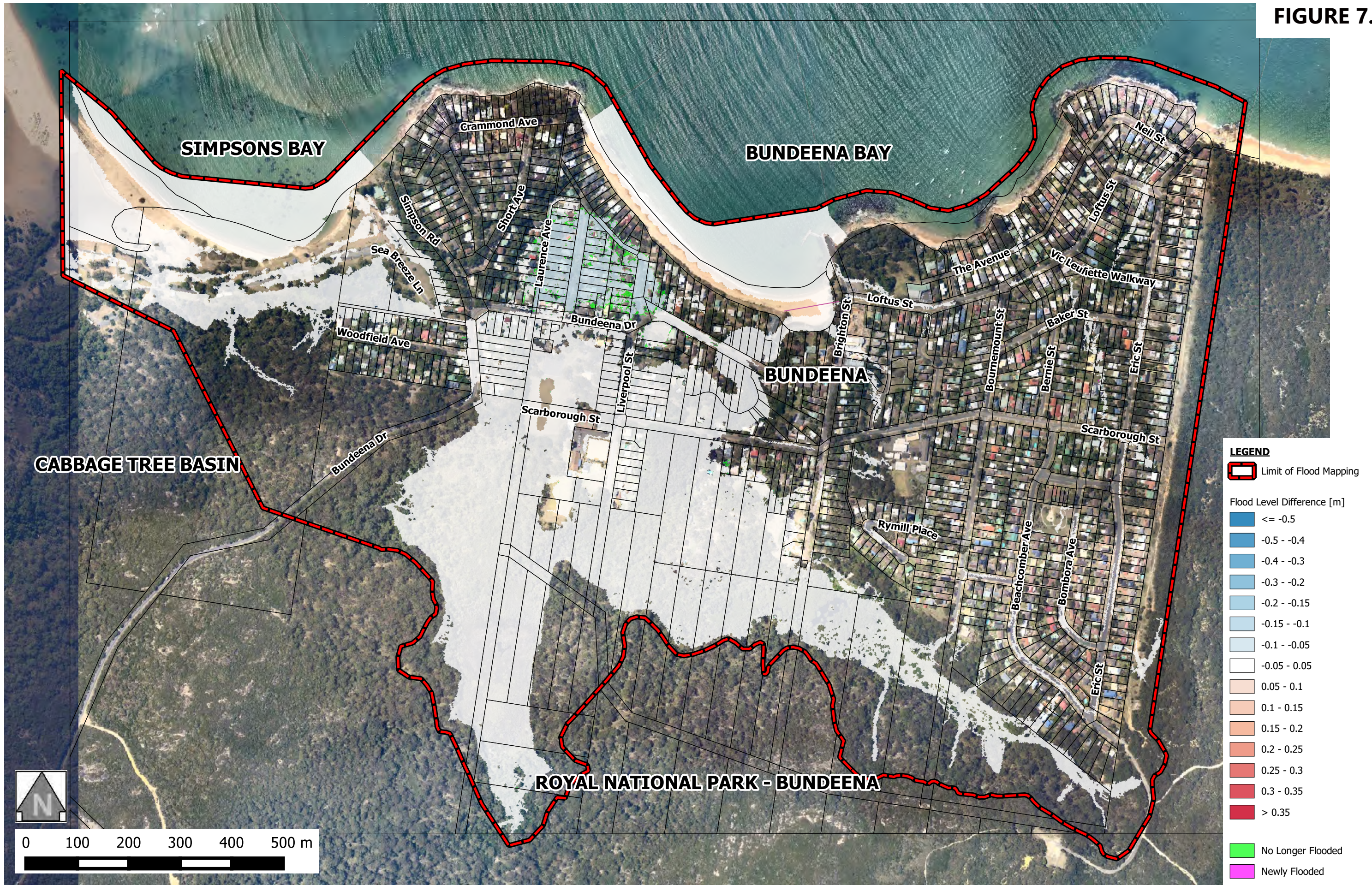
Aerial Imagery © Land and Property Information 2017

FIGURE 7.9



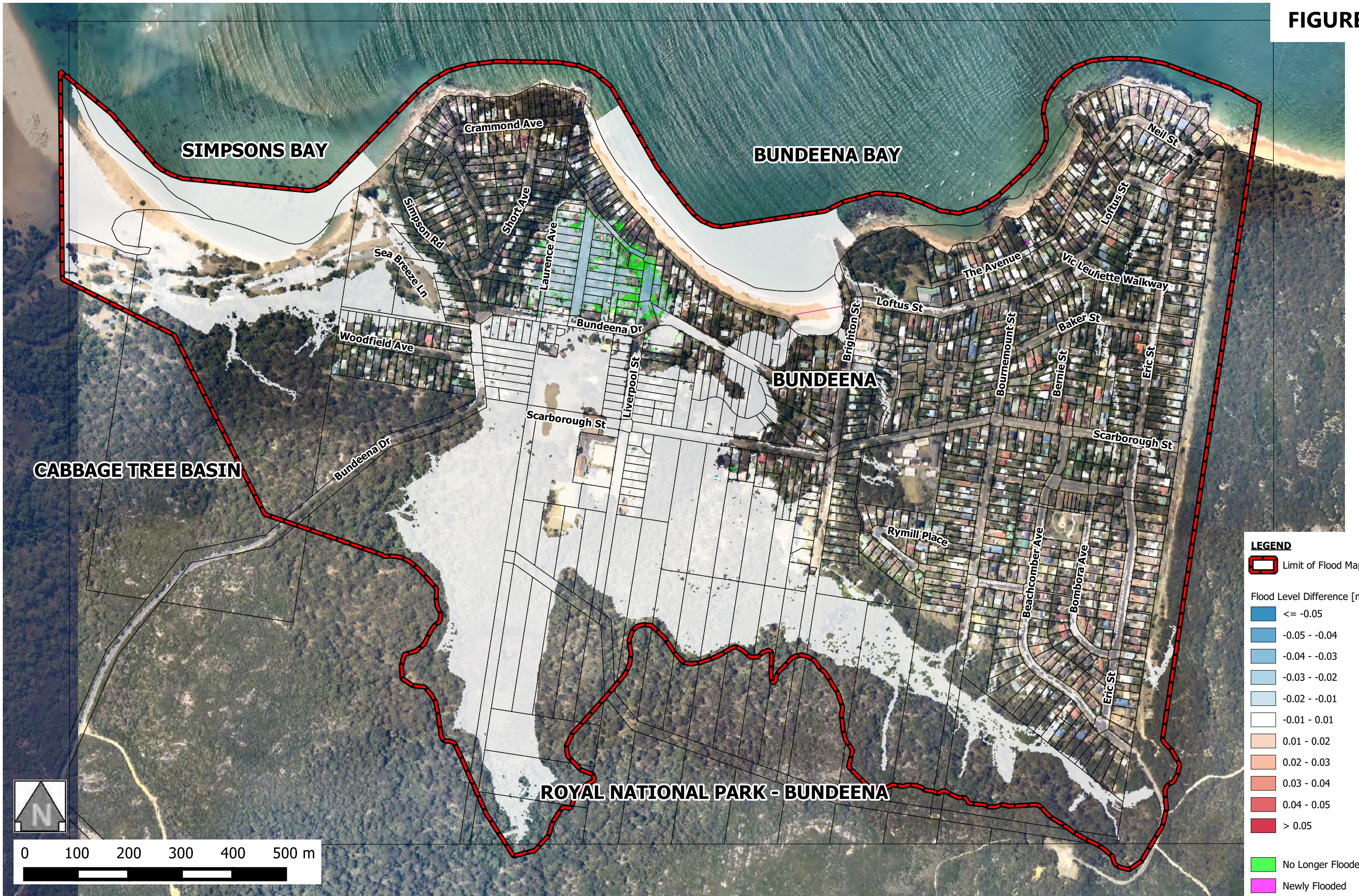
Aerial Imagery © Land and Property Information 2017

FIGURE 7.10



Aerial Imagery © Land and Property Information 2017

FIGURE 7.11



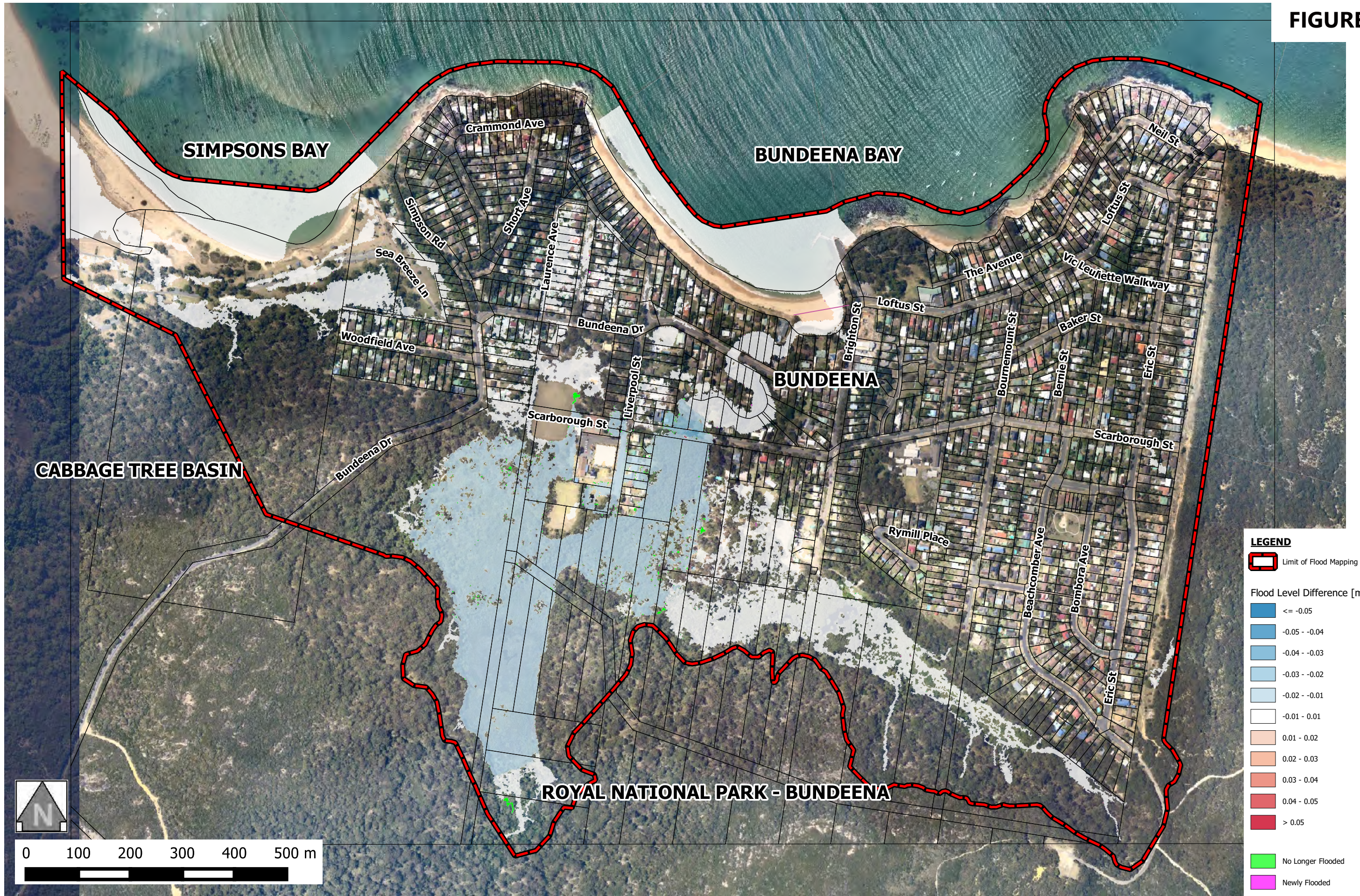
Aerial Imagery © Land and Property Information 2017

FIGURE 7.12





FIGURE 7.13



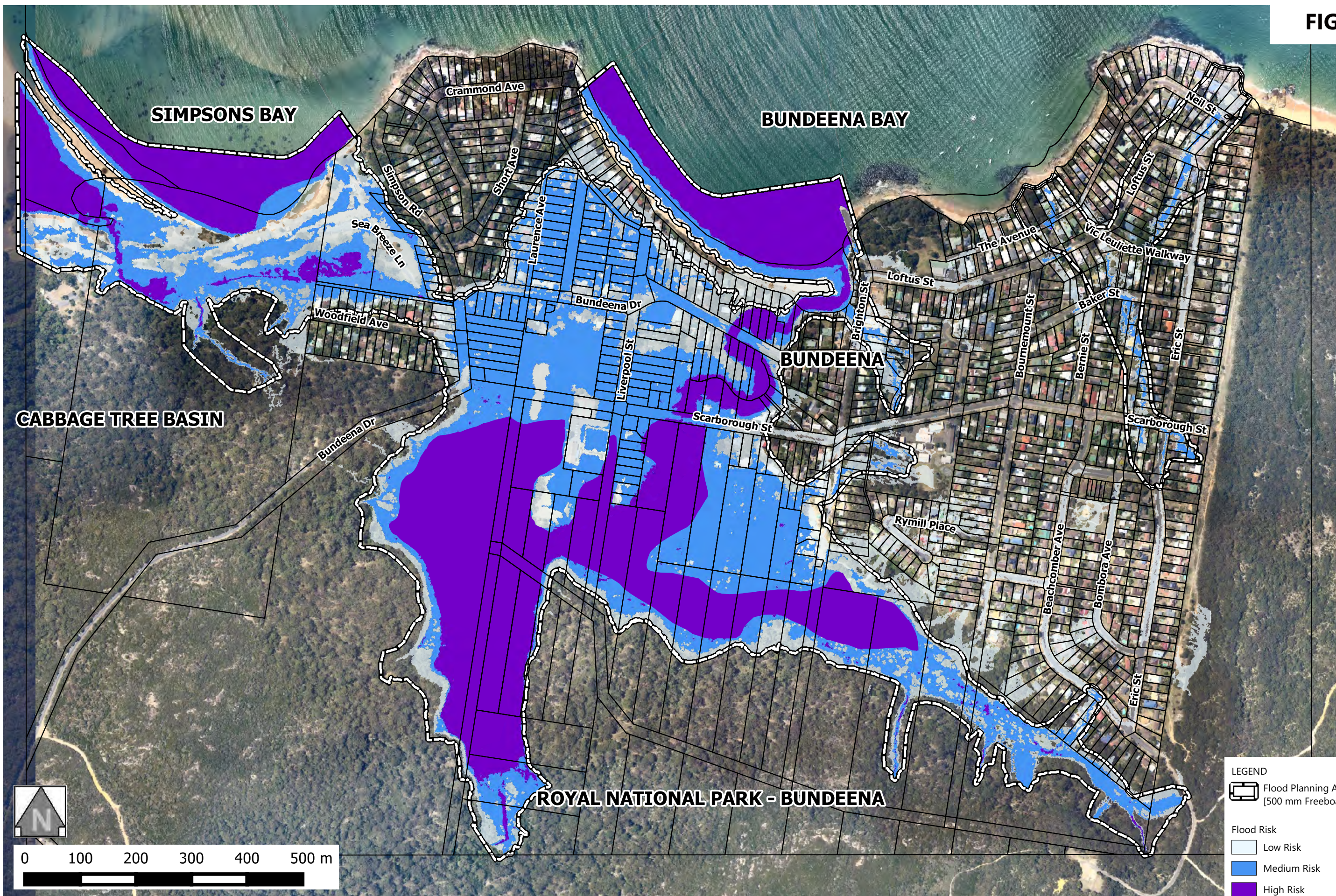
Aerial Imagery © Land and Property Information 2017

FIGURE 8.1



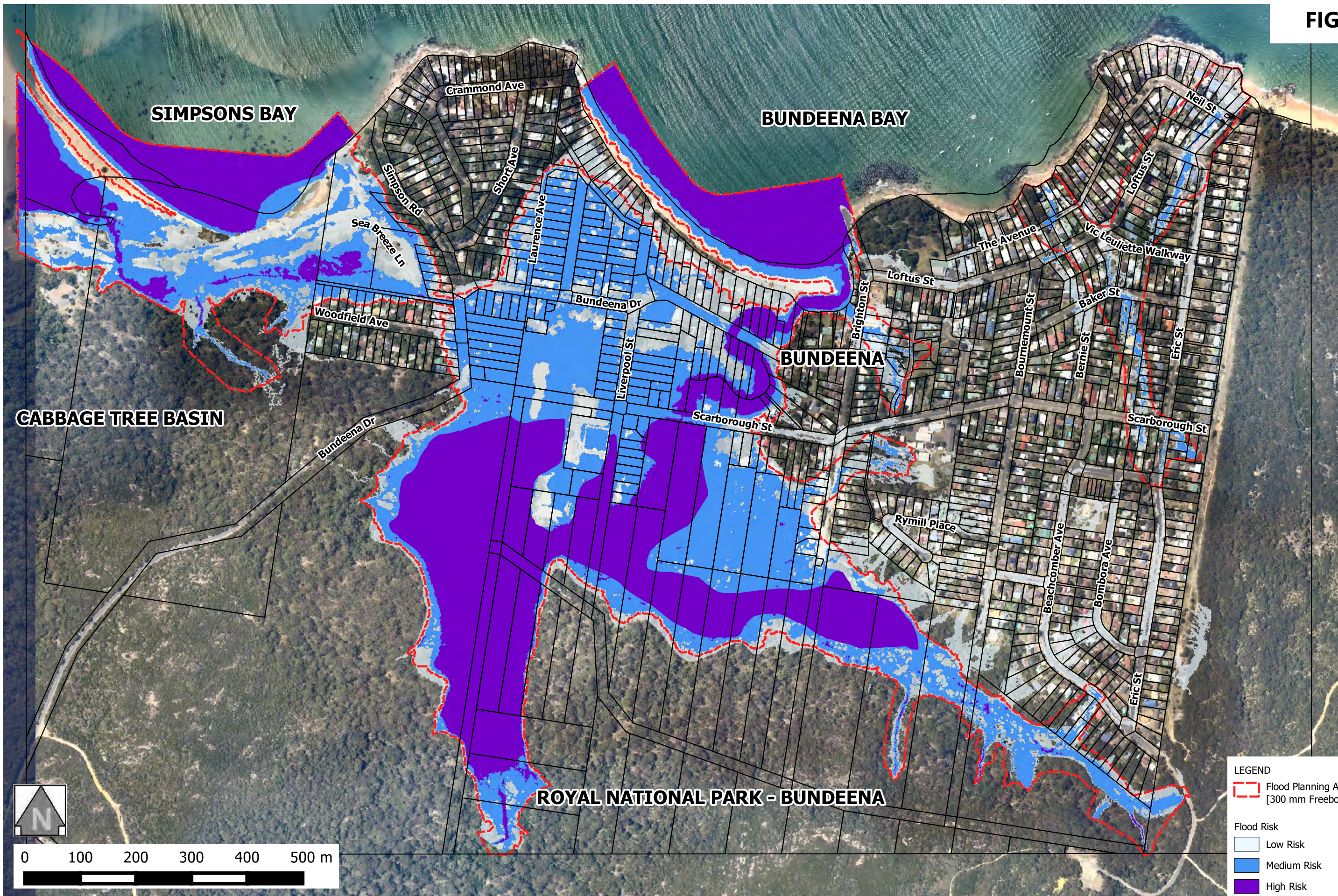
Aerial Imagery © Land and Property Information 2017

FIGURE 8.2



Aerial Imagery © Land and Property Information 2017

FIGURE 8.3



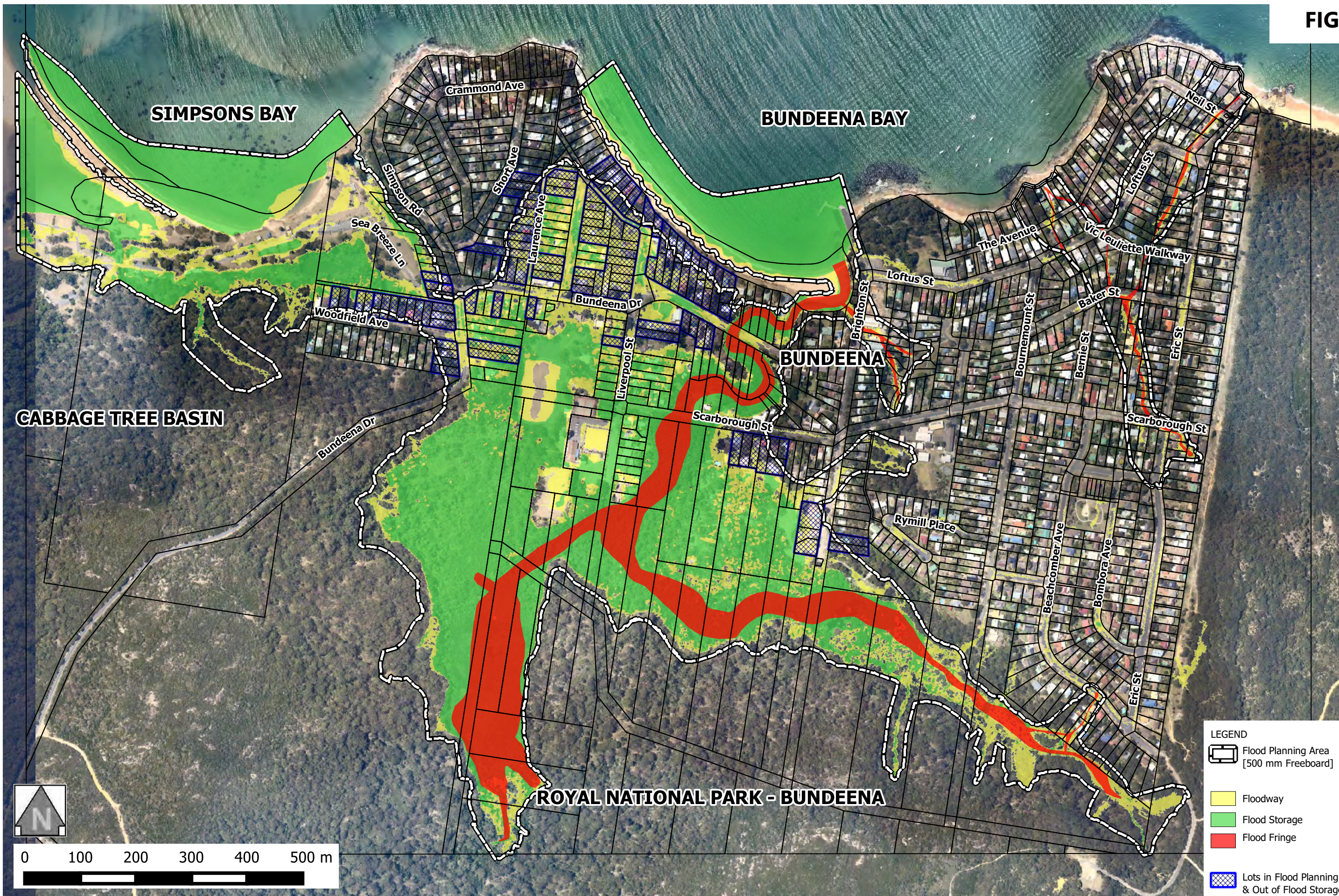
Aerial Imagery © Land and Property Information 2017



2017-10-03 Bundeena TUFLOW results  
2019-03-13 Fig 8.2 FPA and Risk Precincts [300mm]

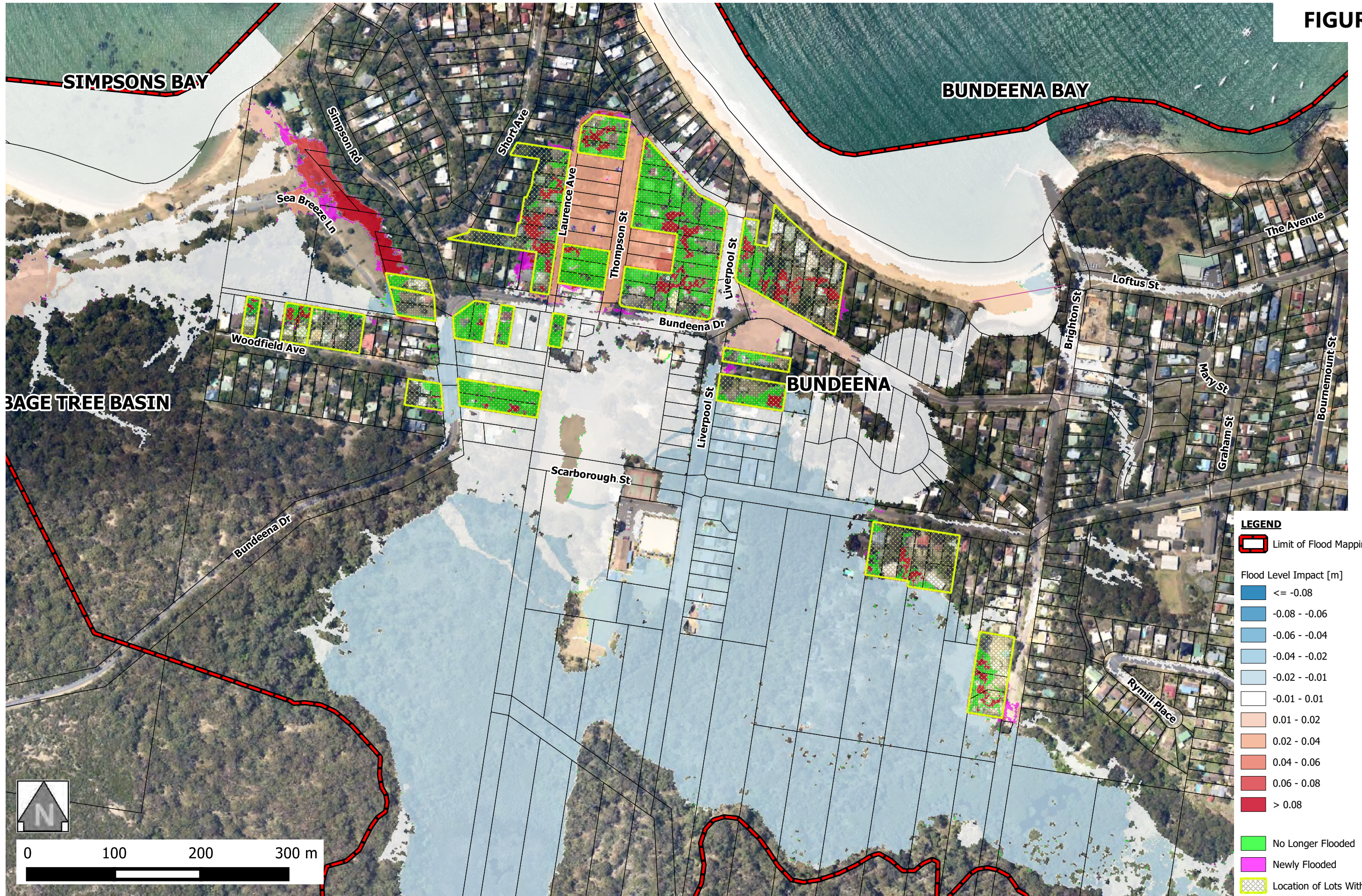
**FLOOD RISK PRECINCT AND  
FLOOD PLANNING AREA MAPPING  
[300mm FREEBOARD]**

FIGURE 8.4



Aerial Imagery © Land and Property Information 2017

FIGURE 8.5



Aerial Imagery © Land and Property Information 2017