

# Technical Memorandum

From: Richard Sharpe To: Stockland  
Date: 01 June 2016 CC:  
Subject: Aura Town Centre Revised Flood Modelling

## 1 Introduction

BMT WBM prepared a Caloundra South Development Flood Risk Management Strategy (FRMS)<sup>1</sup> in October 2015 in support of a Development Application to the Minister for Economic Development Queensland. Recently, Stockland's team of civil designers have made revisions to the drainage strategy in the Town Centre area. The overall methodology for the flooding assessment has not changed; refer to the previous FRMS document<sup>1</sup> for technical details on the modelling and results for the existing case flooding conditions. This technical memo documents:

- The revisions made to the developed case flood modelling (based on the revised drainage strategy);
- A brief discussion on how the revised drainage strategy effects the flood model results;
- Revised mapping of the peak 100 year ARI including climate change water levels (used to inform Flood Planning Levels for the proposed development); and
- Revised mapping of the change in peak flood levels between the developed and existing catchment conditions.

## 2 Flood Model Revisions

The flood modelling comprised:

- A hydrologic model that computed the rate of rainfall runoff based on hypothetical design rainfall events; and
- A hydraulic model to route the runoff computed by the hydrologic model through the catchment.

The hydrologic modelling of the Town Centre area was revised to account for:

- The anticipated rainfall losses relating to the proposed land uses;
- The anticipated hard standing areas (percentage impervious) relating to the proposed land uses;
- The anticipated surface roughness relating to the proposed land uses; and

<sup>1</sup> Caloundra South Development: Flood Risk Management Strategy, BMT WBM, October 2015

- The sub-catchment characteristics (area and slope) formed by the proposed drainage strategy and terrain.

The hydraulic modelling was revised to account for:

- The revised runoff rates computed by the revised hydrologic modelling;
- The proposed drainage strategy in the Town Centre area; and
- The revised terrain in the proposed Town Centre area (including end of line water treatment devices).

The proposed land uses for the Town Centre area were based on the concept design – see Figure 1. The proposed Town Centre terrain and drainage strategy is shown in Figure 2.



Figure 1: Aura Town Centre Concept Design

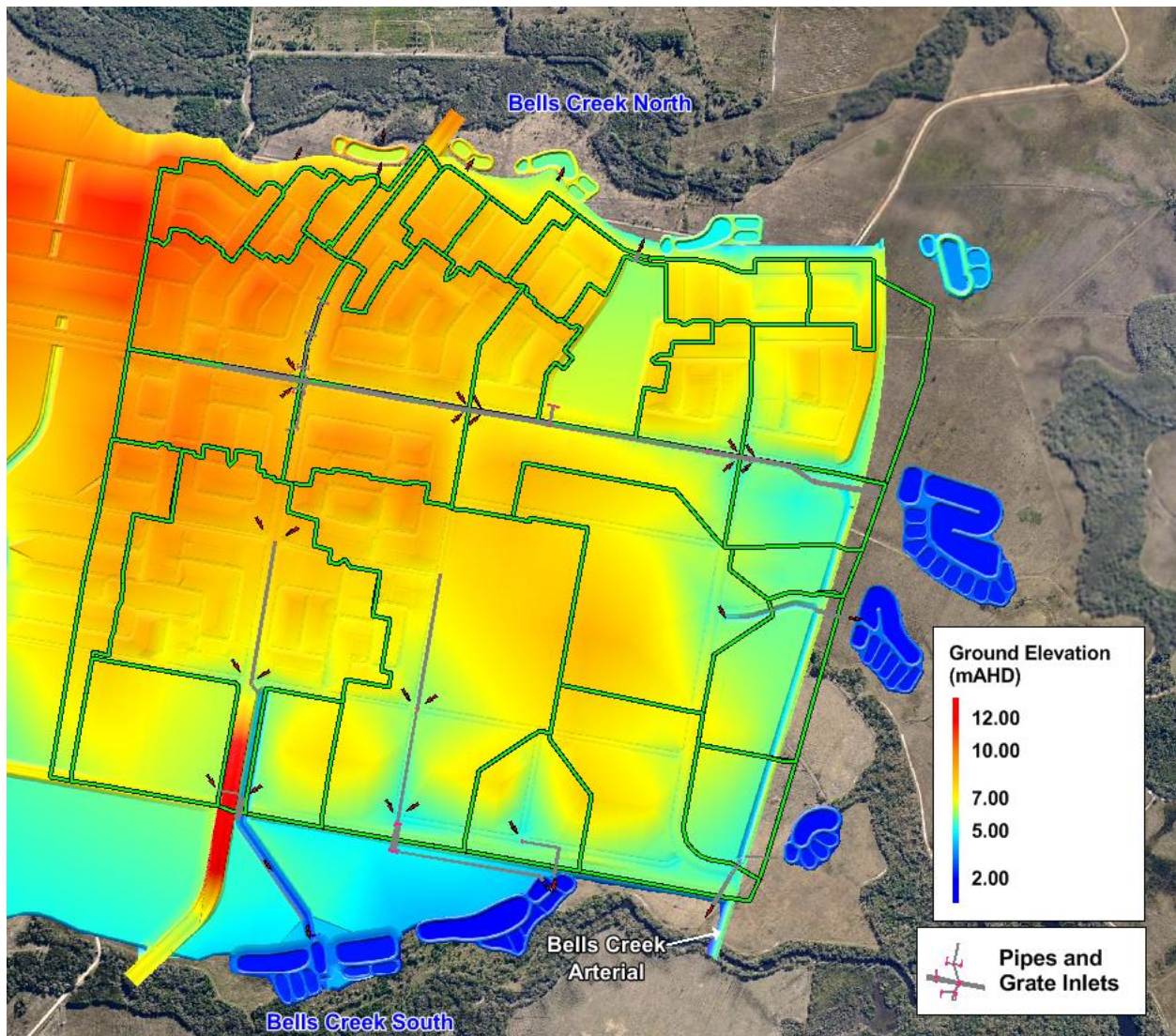


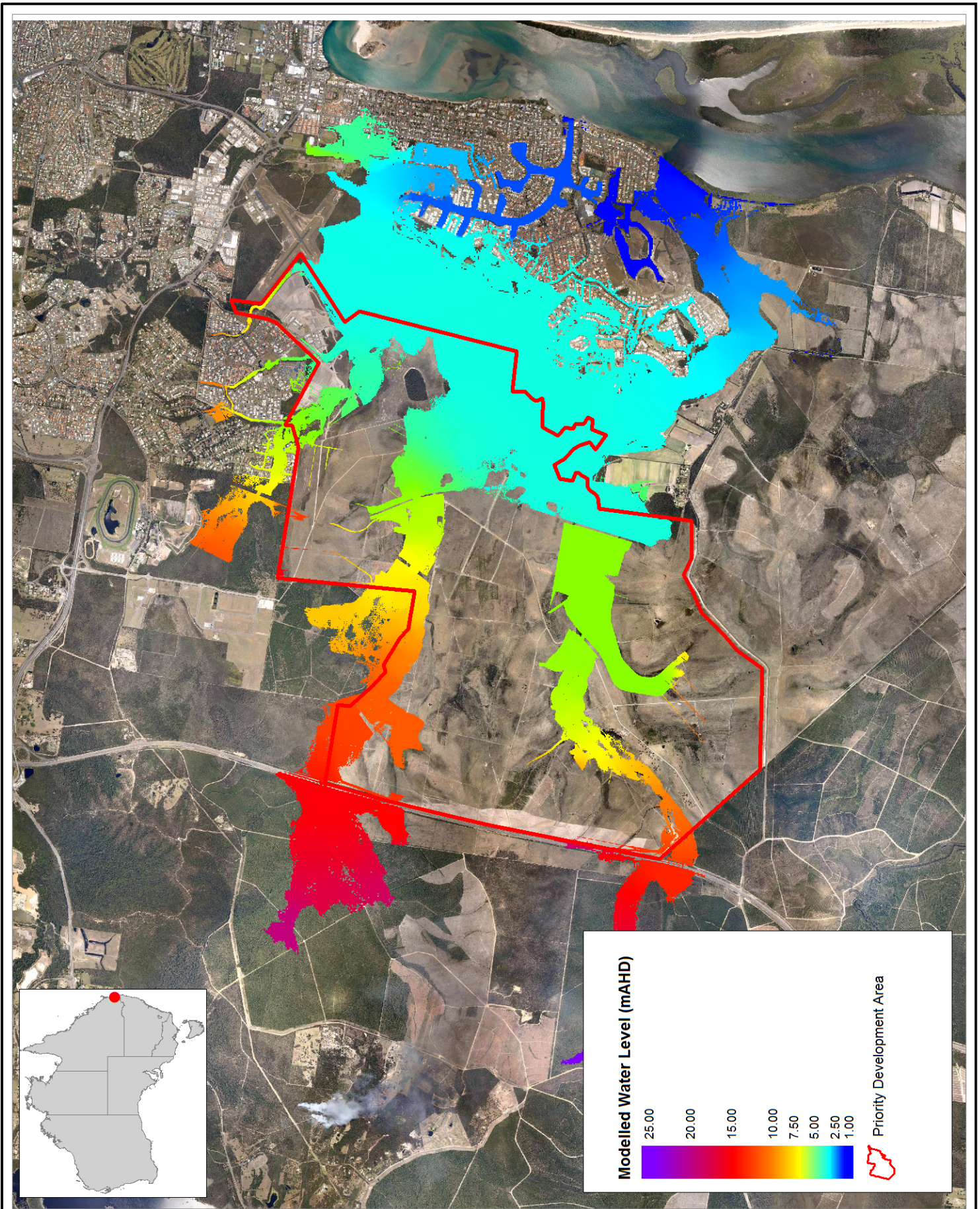
Figure 2: Proposed Terrain and Drainage Strategy (from Bulk Earthworks Model)

### 3 Changes in Flood Levels

The peak flood levels for the 100 year including climate change scenario are shown in Figure 3. These results show that the Town Centre remains flood immune in this event, and the flood levels and extent of inundation are similar to that reported in the FRMS.

The revised drainage strategy directs more runoff across the proposed Bells Creek Arterial into the wetland to the east of the Town Centre than in the previous drainage strategy. This reduces the volume of runoff flowing off the Town Centre to the north and south into Bells Creek North and South. This has caused a decrease in flood levels in Bells Creek South of 40mm west of the Bells Creek Arterial compared to the levels shown in the FRMS for the 100 year ARI flood event including climate change.

The change in flood level in Bells Creek North is mixed; flood levels have increased where end of line treatment devices are now positioned and decreased where these treatment devices were previously positioned. Flood levels have increased along the eastern edge of the Bells Creek Arterial due to the revised drainage strategy directing higher volumes of runoff into this area. However, these increases are localised, and dissipate moving further into the wetland to the east.

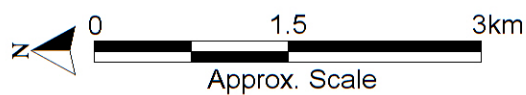


Title:  
**Developed Case Peak Fluvial 100 Year ARI Flood Level Including Climate Change**

Figure:  
**3**

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## 4 Changes in Flood Impacts

The 100, 50 and 5 year ARI difference in peak flood levels is shown in:

- Figure 5, Figure 6 and Figure 7 for the fully developed case across the full PDA; and
- Figure 8, Figure 9 and Figure 10 for the partially developed case (only including precincts for which RoL applications have been lodged - this includes the Town Centre area).

There has generally been little change in the flood impacts and the outcomes of the flood impact assessment are the same as the outcomes reported in the FRMS. The flood impacts have increased marginally (10mm to 20mm) in only one location that is external to the PDA. This is on the northern bank of Bells Creek North on land currently owned by Sunshine Coast Regional Council (see Figure 4). This change in flood level is likely to be due to the development footprint assumptions in the previous FRMS modelling being slightly less extensive on the southern bank of Bells Creek North in this area compared to the current bulk earthworks model. Council's land was impacted in the FRMS, and a discussion on this is provided in Section 7.1 of the FRMS<sup>1</sup>. The area of inundation in a 100 year flood event on Council's land beyond the creek corridor is 40% larger than for the existing (undeveloped) case; the increase in inundation extent was 30% in the FRMS reporting.

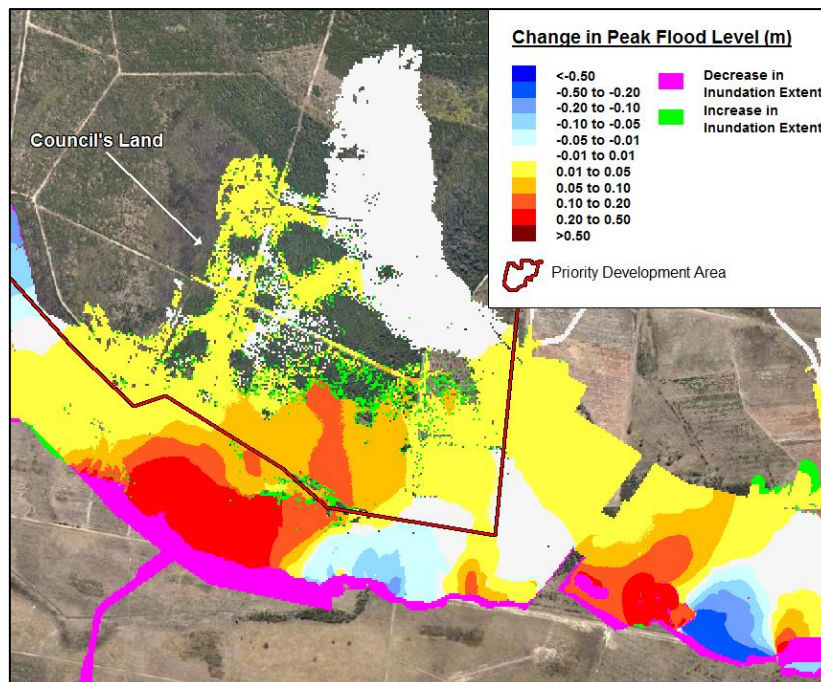
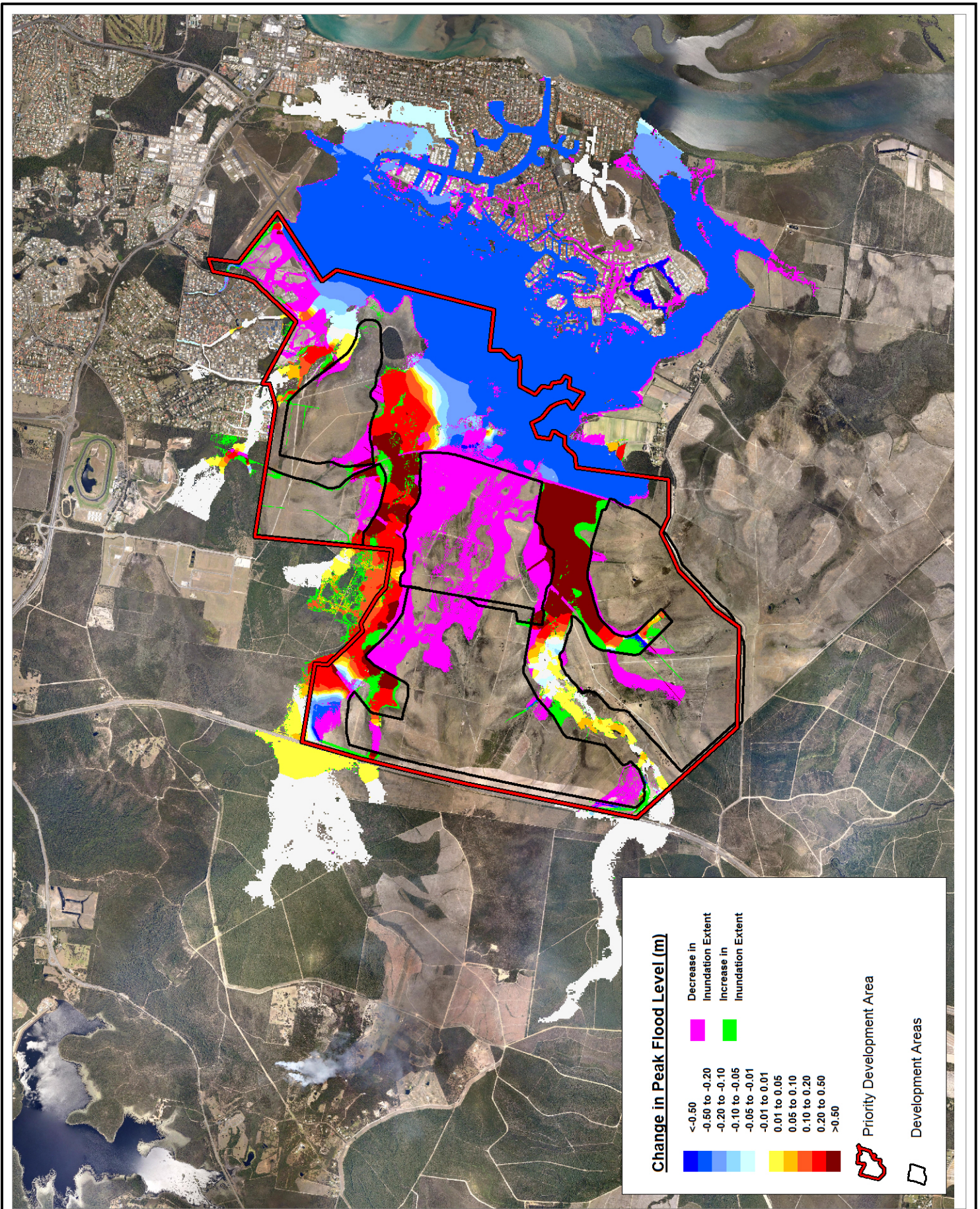


Figure 4: Change in Developed Case Flood Level for 100 year ARI Flood Event (FRMS peak flood level minus revised peak flood level)

## 5 Conclusions

The regional flood modelling of the proposed Aura development has been revised to account for revisions of the drainage strategy in the Town Centre area. The results show little deviation to that obtained in the previous modelling reported by BMT WBM<sup>1</sup>, particularly external to the PDA boundary. As such, the outcomes reported in the previous Flood Risk Management Strategy prepared by BMT WBM are still current.

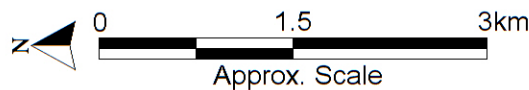


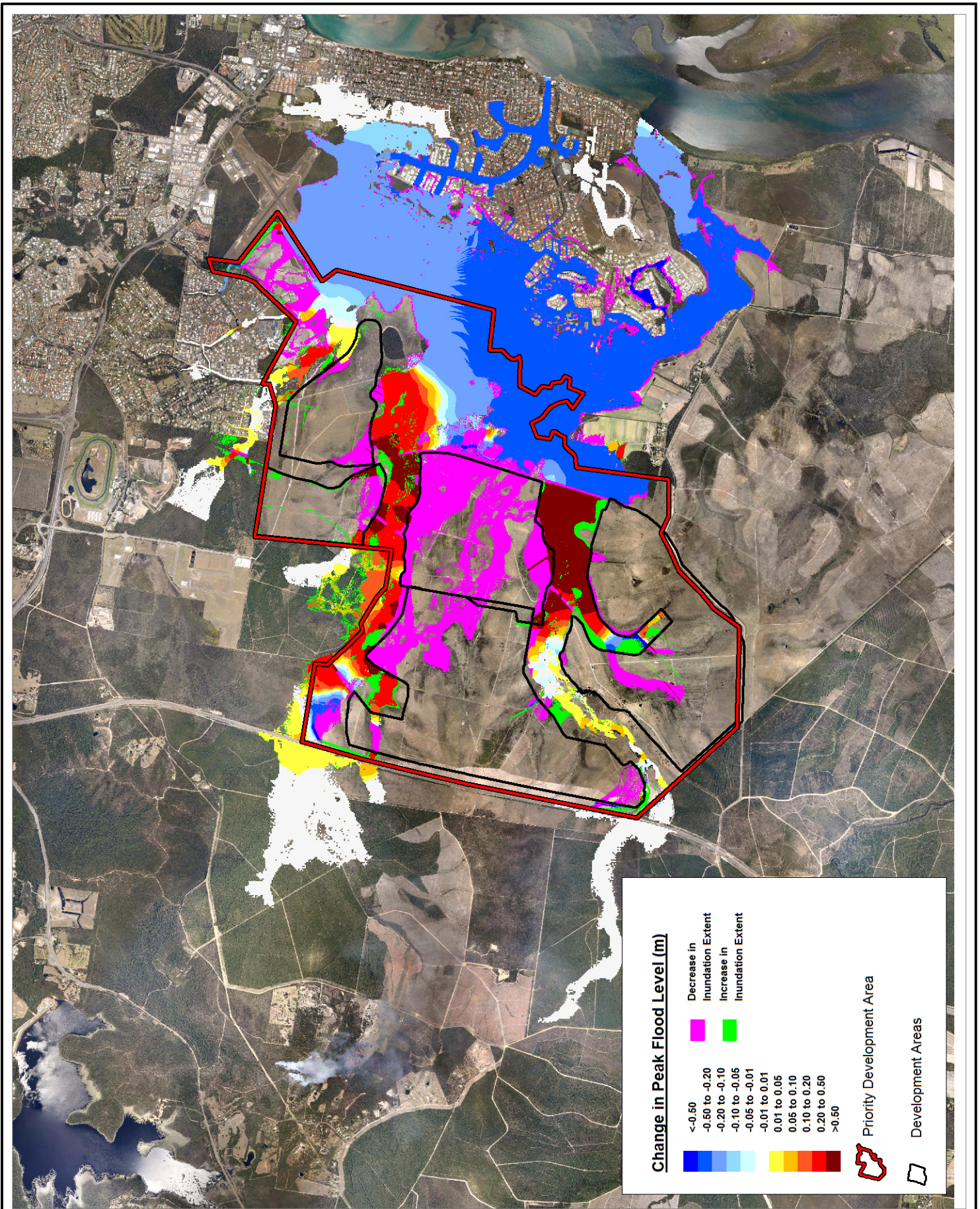
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**100 Year ARI Difference in Peak Flood Levels**

Figure:  
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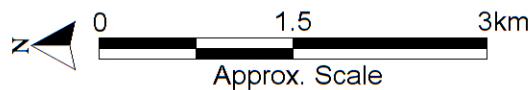


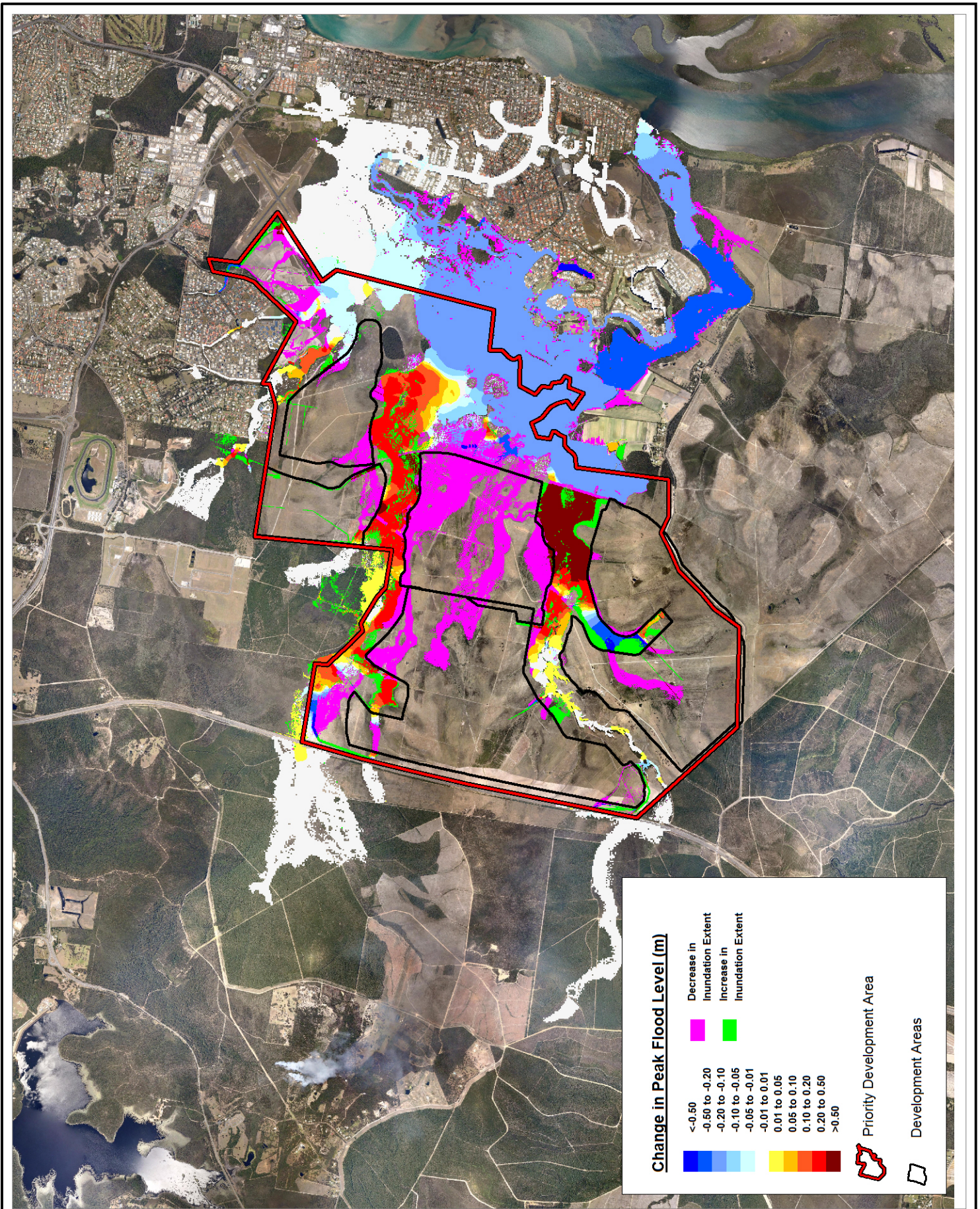
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**50 Year ARI Difference in Peak Flood Levels**

Figure:  
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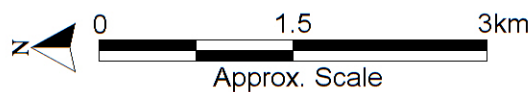


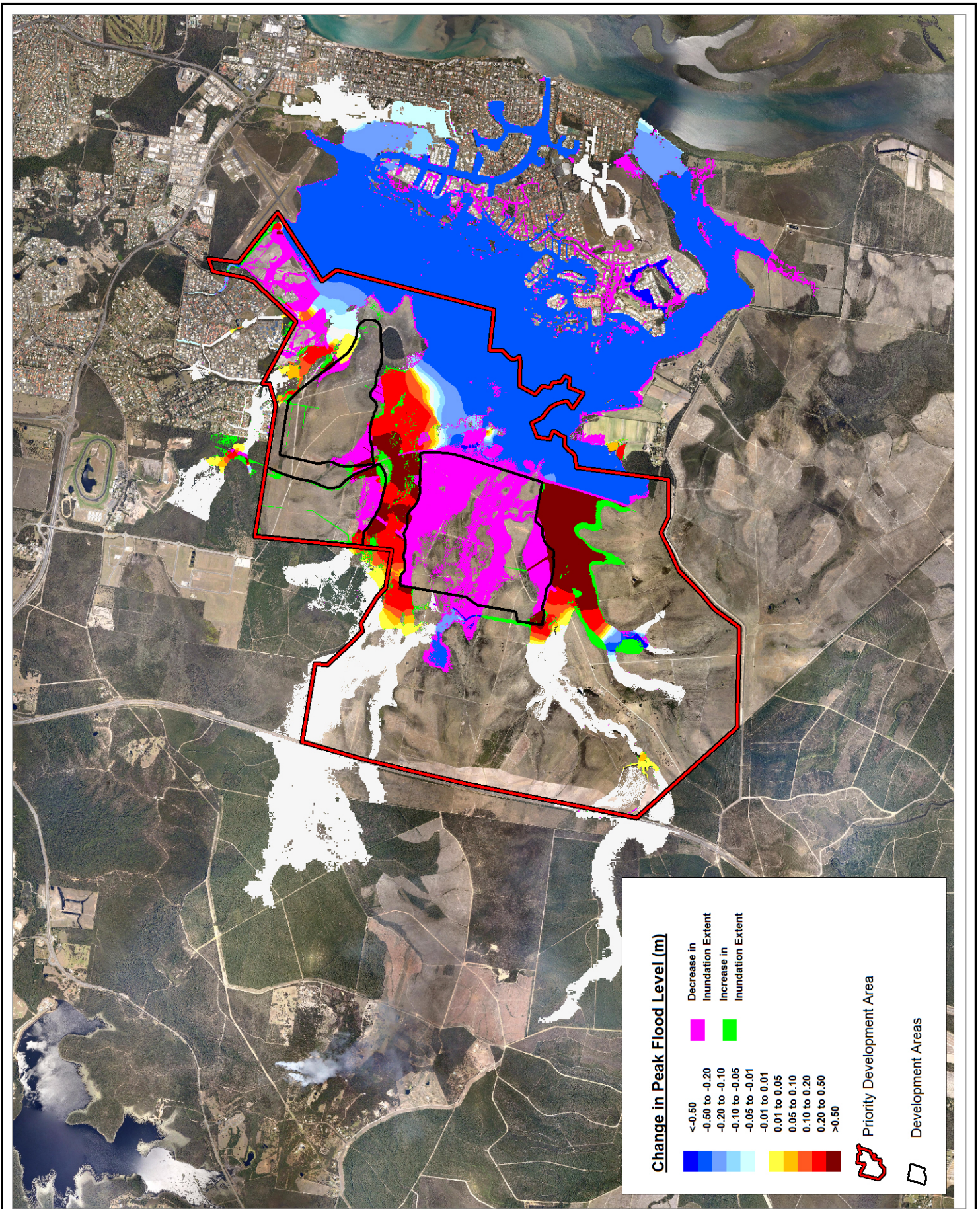
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**5 Year ARI Difference in Peak Flood Levels**

Figure:  
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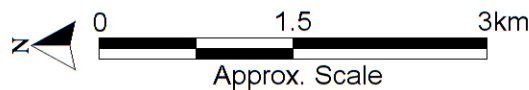


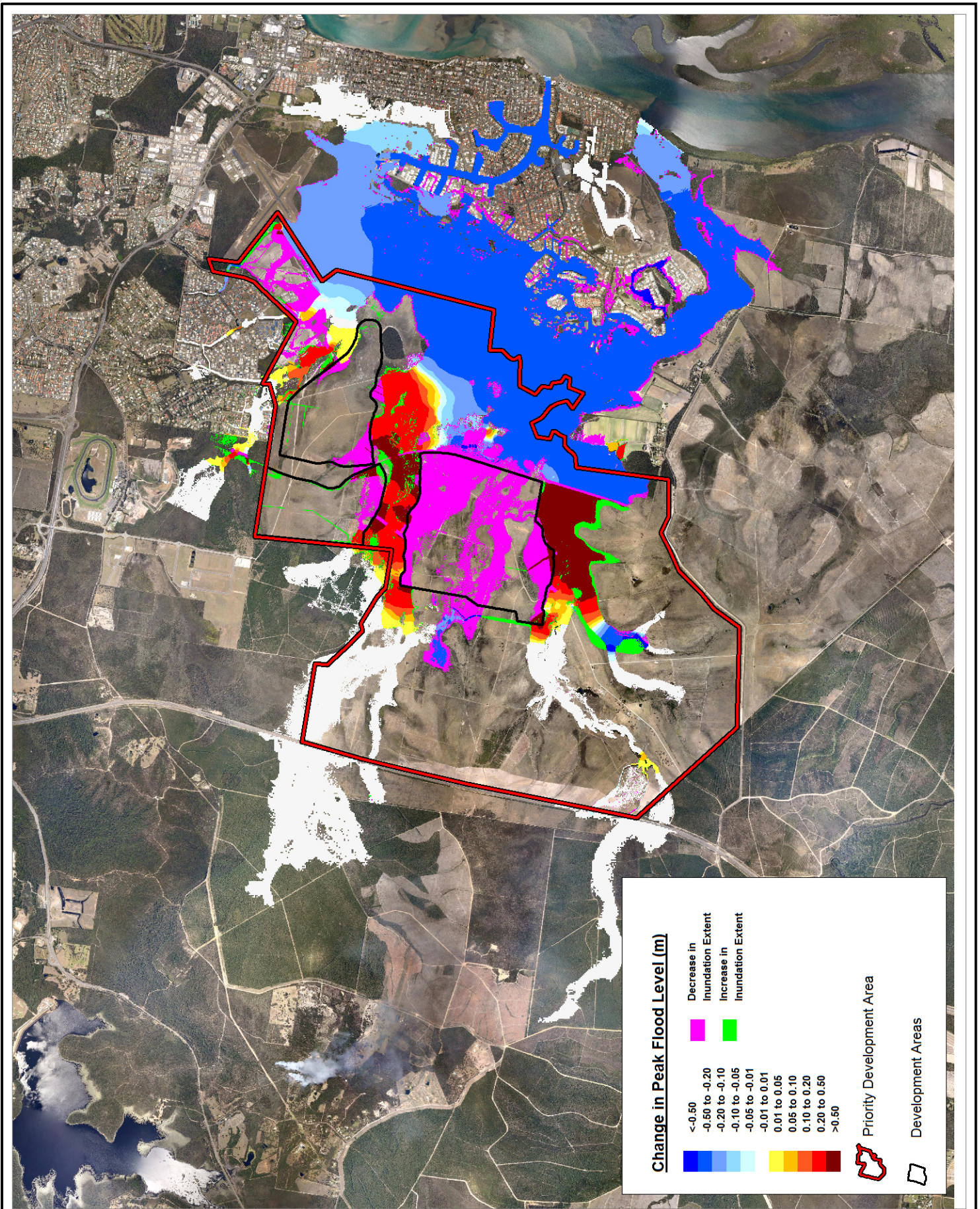
Title:  
**100 Year ARI Difference in Peak Flood Levels  
 Development Areas**

Figure:  
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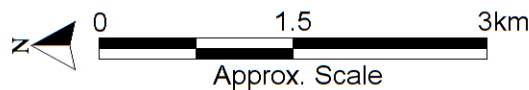


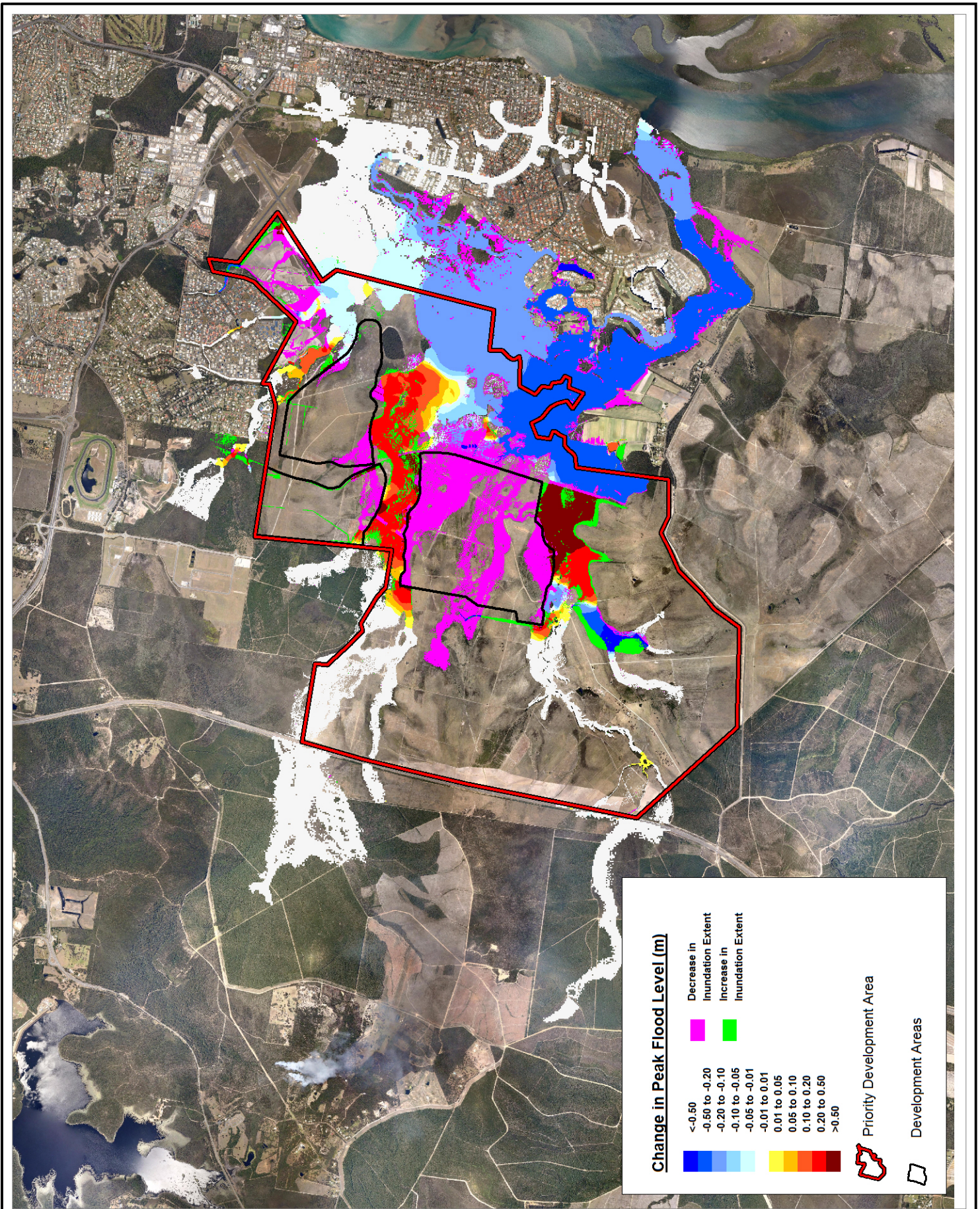
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**50 Year ARI Difference in Peak Flood Levels  
 Development Areas**

Figure:  
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Title:  
**5 Year ARI Difference in Peak Flood Levels  
 Development Areas**

Figure:  
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