Cardno
Shaping the Future

RIPLEY VALLEY
SECONDARY URBAN CENTRE EAST - PRECINCT A
Flooding Report
Appendix J to the Town Planning Report

Project Number: 7901/47-014

Prepared for AMEX Corporation Pty Ltd

12 November 2010

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APPENDICES:

1 INTRODUCTION

This report assesses the flooding impact of developing Precinct A of the proposed Ripley Valley Secondary Urban Centre East (SUCE) development.

The flood strategy outlines the requirements to develop the SUCE whilst not compromising the flood immunity provided for existing buildings located in the area.

The strategy has been developed using the flood model created for the assessment of the entire SUCE development. Modification to the Barrams Road bridge crossing, including additional compensatory excavation areas have been proposed to reduce impact of the Precinct A works. The works involved with Precinct A of the SUCE development include construction of the Barrams Road bridge, embankments, culverts, minor parks and landscaping and filling of the Precinct A area.

2 BACKGROUND

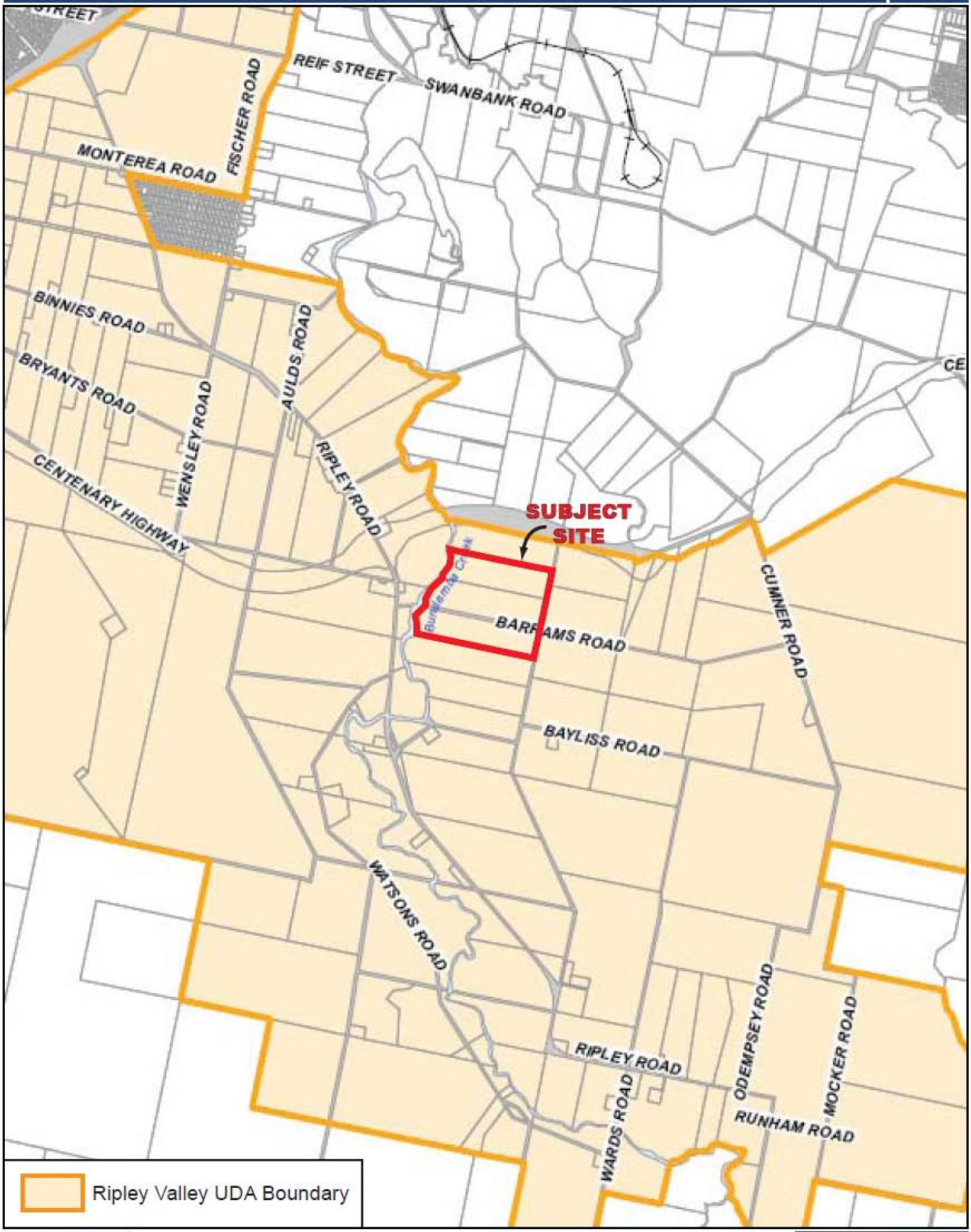
Precinct A of the SUCE has been declared by the Urban Land Development Authority (ULDA) as an Early Release Precinct (ERP). The Precinct A site covers approximately 12Ha and includes 160 lots. See Locality Plan in Figure 1.

In order to provide access to a substantial area in Ripley Valley and proceed with the Precinct A works it is necessary to upgrade the Bundamba creek crossing at Barrams Road to improve flood immunity. Earthworks associated with the Precinct A area will also be required (an earthworks design strategy is attached as Appendix M to the Town Planning Report). As existing buildings are located directly upstream of the proposed Barrams Road bridge crossing it is important to consider the flooding implications across the floodplain. The location of the existing buildings in the floodplain is shown on Appendix A.

Detailed flood modelling using TUFLOW has been carried out to model the impact of the Precinct A works. The analysis includes compensatory excavation within the floodplain.

Locality UDA Regulatory Plan

Figure 1



RPS

The contents of this plan are conceptual only, for discussion purposes. All areas and dimensions are approximate only subject to relevant studies, Survey, Engineering and Council approval.

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Date:	November 2010
Source:	Queensland Gov.
Scale:	Not to Scale

3 PROPOSED WORKS

3.1 BARRAMS ROAD BRIDGE DETAILS

The proposed Barrams Road bridge crossing includes a multi-span bridge of 100 metres total width across Bundamba Creek. The assumed width of the bridge is 30 metres in the flood model. Culvert crossings on either side of the main waterway are also proposed. The proposed bridge crossing is shown in Appendix A.

For the western tributary it is proposed to have the following culverts:

- 3/4200 by 2700mm RCBCs
- 40 metres length (at an angle)
- Upstream invert level = 42.90m AHD
- Downstream invert level = 42.50m AHD

The area just upstream of these culverts will have to be excavated by around 500mm so that the slope of the culverts can be reduced. The headwall will also need to be rounded to reduce the entrance losses at this point.

For the eastern floodplain it is proposed to have the following culverts:

- 5/3300 by 2100mm RCBCs
- 40 metres length
- Upstream invert level = 43.70m AHD
- Downstream invert level = 43.50m AHD

The area just upstream of these culverts will have to be excavated by around 500mm so that the slope of the culverts can be reduced. An excavated channel downstream of the culverts will be directed towards Bundamba Creek. The headwall will also need to be rounded to reduce the entrance losses at this point.

It was assumed than the main bridge deck soffit level was above the 100 year ARI flood level, so that it would not provide additional obstruction to flows. The Barrams Road levels were also assumed to be above the 100 year ARI flood level and Ripley Road above 50 year ARI. It should be noted that Ipswich City Council advised that arterial and sub-arterial roads require minimum 50 year ARI flood immunity. Further consultation on the immunity requirements for trunk roads is recommended to ensure the configuration of proposed infrastructure and associated impacts is optimised.

3.2 PRECINCT A FILLING

The development footprint will be formed above the 100 year ARI flood level. To allow for battering, a 10 metre buffer around the boundary of these works was also assumed to be filled.

The playground area proposed on the northern side of Barrams Road has been provided with 5 year ARI immunity. To ensure that it is not frequently inundated it was assumed to be raised to 44.3 m AHD.

3.3 COMPENSATORY EXCAVATION

The area of compensatory excavation is shown in Appendix A. The area extends approximately 200 metres upstream of Barrams Road and 110 metres downstream on the eastern floodplain adjacent to the Precinct A works. The excavated levels vary, but generally they are between 0.2m to 1.0m below the existing ground levels.

4 FLOOD MODELLING

4.1 SUMMARY

The flood model was set up using the Bundamba Creek TUFLOW model developed for the Ripley Valley Structure Plan.

The following runs cases were developed for the 100 and 10 year ARI events:

1. Barrams Road Bridge – to determine the impact of constructing the Barrams Road bridge
2. Precinct A Filling and Barrams Road Bridge – to determine the impact of filling of Precinct A (including the playground area).
3. Precinct A Filling, Barrams Road Bridge and Compensatory Excavation – to determine the impact of compensatory excavation.

4.2 TUFLOW RESULTS

The 100 and 10 year ARI peak water levels for the existing case (pre-development) and the three developed scenarios are shown below in Tables 1 and 2. The extent of the flood inundation is shown in Appendix B.

Table 1 100 Year ARI Peak Water Levels

Location	Floor / Ground Level	100 Year ARI Peak Water Level (m AHD)			
		Existing Case	Case 1	Case 2	Case 3
Existing Buildings					
BLDG1	46.22 (floor)	45.460	45.554	45.558	45.468
BLDG2	45.95 (floor)	46.145	46.144	46.147	46.142
BLDG3	46.59	47.071	47.071	47.071	47.071
TUFLOW Comparison Points					
BUND19395		46.028	46.060	46.060	46.018
BUND19710		45.469	45.560	45.564	45.474
BUND19760		45.456	45.525	45.529	45.437
BUND19805		45.357	45.296	45.301	45.196
BUND19940		45.284	45.223	45.229	45.121
BUND20161		44.475	44.461	44.469	44.454

Table 2 10 Year ARI Peak Water Levels

Location	Floor / Ground Level	10 Year ARI Peak Water Level (m AHD)			
		Existing Case	Case 1	Case 2	Case 3
Existing Buildings					
BLDG1	46.22 (floor)	44.984	44.987	44.987	44.987
BLDG2	45.95 (floor)	45.798	45.798	45.798	45.798
BLDG3	46.59	46.587	46.587	46.587	46.587
TUFLOW Comparison Points					
BUND19395		45.252	45.292	45.298	45.239
BUND19710		44.774	44.827	44.831	44.762
BUND19760		44.760	44.795	44.797	44.723
BUND19805		44.657	44.580	44.581	44.490
BUND19940		44.594	44.506	44.504	44.410
BUND20161		43.914	43.862	43.857	43.790

4.2.1 Case 1 - Impact of Barrams Road Bridge

The impact of the Barrams Road bridge upgrade was an increase in flood level at building 1 of 94mm. No other buildings were impacted upon. It should be noted that the floor level of building 1 is at 46.22m AHD, so it would still have over 660mm 100 year ARI flood immunity.

The 100 year ARI peak water levels in the main channel were increased by around 90mm upstream of the bridge, and decreased by around 60mm downstream of the bridge. Mapping showing the difference in peak water levels due to the bridge construction is shown in Appendix B. Areas shown in blue indicate a decrease, areas shown in red indicate an increase, and areas shown in white indicate no change (+/-10mm).

The 10 year ARI peak water levels at existing buildings were not impacted upon.

The 100 year ARI peak flow downstream of the bridge (BUND20030) was decreased slightly from 405.0m^3/s to 403.7m^3/s.

4.2.2 Case 2- Impact of Precinct A Filling

The impact of the Precinct A filling (including the playground area) was a further increase in peak water levels at building 1 of 4mm. This impact is considered negligible.

4.2.3 Case 3 - Impact of Compensatory Excavation

The proposed compensatory excavation reduces the increase in peak water level at building 1. The 100 year ARI flood level is now only 8mm higher than the existing case. This impact is considered negligible and is within the confidence limits of the modelling. No other buildings are impacted upon. It is therefore shown that compensatory excavation can ensure that Precinct A works do not have an impact on the flood levels for existing buildings.

The 100 year ARI peak water levels in the main channel upstream of the bridge are not increased. The peak water levels downstream of the bridge are decreased further. Mapping showing the difference in peak water levels due to the bridge construction, Precinct A filling and compensatory excavation is shown in Appendix B. Areas shown in blue indicate a decrease, areas shown in red indicate an increase, and areas shown in white indicate no change (+/- 0.01m).

The 10 year ARI peak water levels at existing buildings were not impacted upon.

The 100 year ARI peak flow downstream of the bridge (BUND20030) was further decreased from 405.0m^3/s to 400.8m^3/s.

4.3 IMPACT ON PEAK VELOCITIES

The impact on peak velocities for Case 3 is shown in Appendix B. Areas shown in blue indicate a decrease, areas shown in red indicate an increase, and areas shown in white indicate negligible change. Image 6 indicates the proposed Precinct A works do not increase the peak velocities at existing buildings.

5 CONCLUSIONS

From this investigation the following conclusions can be drawn:

- The proposed Barrams Road bridge upgrade would increase the 100 year ARI flood level at building 1 by 94mm. Over 660mm of flood immunity would still be provided to the floor level of this building. No other buildings would be impacted upon by the construction of this bridge.
- The proposed filling of Precinct A, including the proposed playground area, results in negligible impacts to existing buildings.
- Compensatory excavation can reduce the impact of Barrams Road bridge at building 1 to 8mm, which is considered negligible and within the confidence limits of the model. Compensatory excavation can ensure that Precinct A works do not have an impact on the flood levels for existing buildings.
- The construction of the bridge and compensatory excavation reduce the peak flows downstream.
- Further consultation on the immunity requirements for trunk roads is recommended to ensure the configuration of proposed infrastructure and associated impacts is optimised.

Appendix A

Proposed Precinct A Works

J:\7901-47-22\MapInfo\STAGE 1

RIPLEY ROAD

BARRAMS ROAD

BUND20161

BUND19940

BUND19805

BUND19760

BUND19710

BUND19395

1

2

3

44

44.3

43.2

43.8

44

43.8

43.7

44

44.5

44.25

44

44.25

STAGE 1

LEGEND

- Proposed Bridge
- Proposed Culverts
- Proposed Excavation
- Drainage Channel
- Playground
- Roads
- 0.5m Contour
- Bundamba Creek Flood Comparison Point
- Existing Building

N W E S

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SHEET	A3
Project No:	7901-47-14
Date:	November 2010
Revision Number:	
Designed by:	
Client Name:	AMEX Corpotation Pty Ltd

Appendix A
Stage 1 Development

AMEX Urban East - Stage 1

Flooding Report

Scale: 1:2,500

25 0 25 50 75
Metres

Appendix B

TUFLOW Results

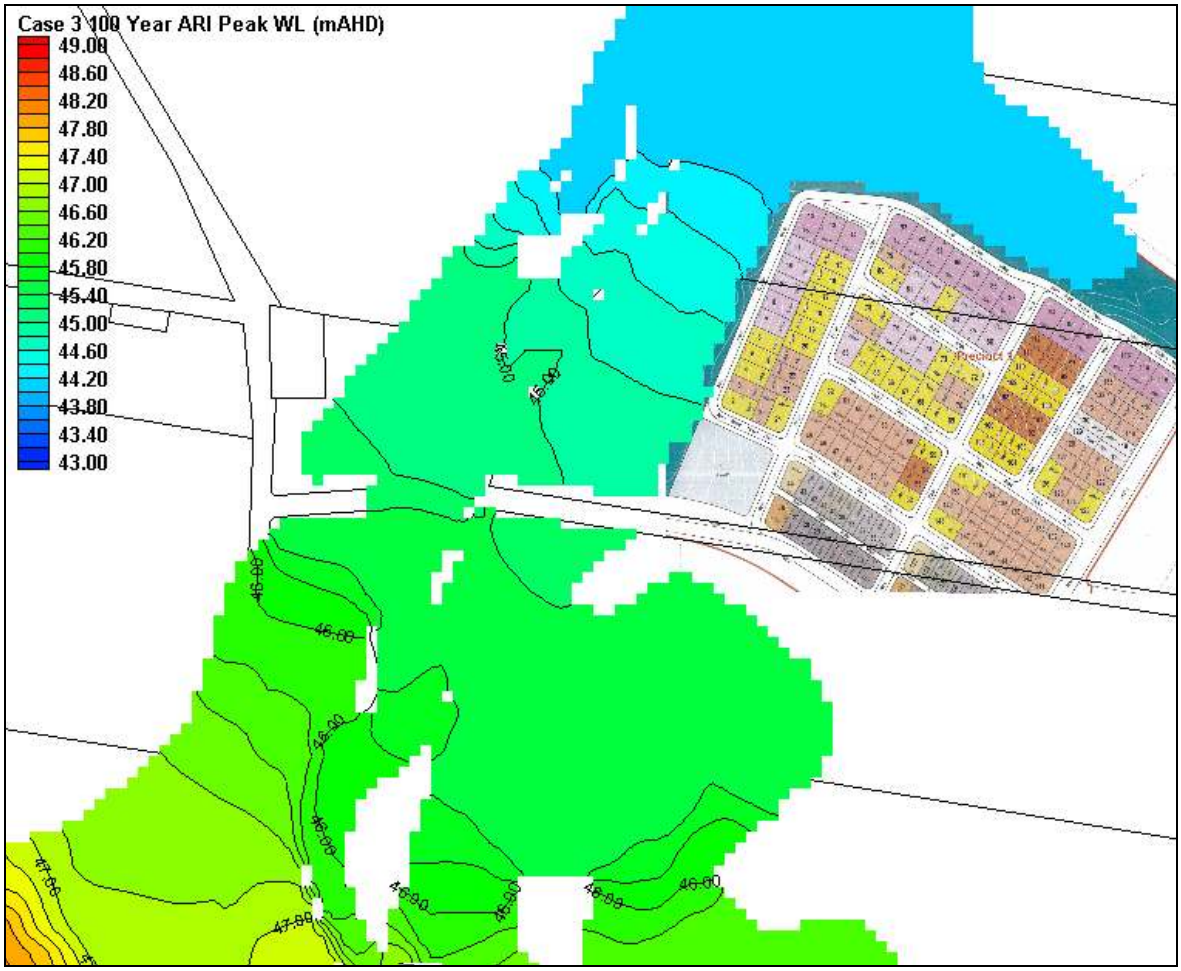

Image 2 Case 3 100 Year ARI Peak Water Level

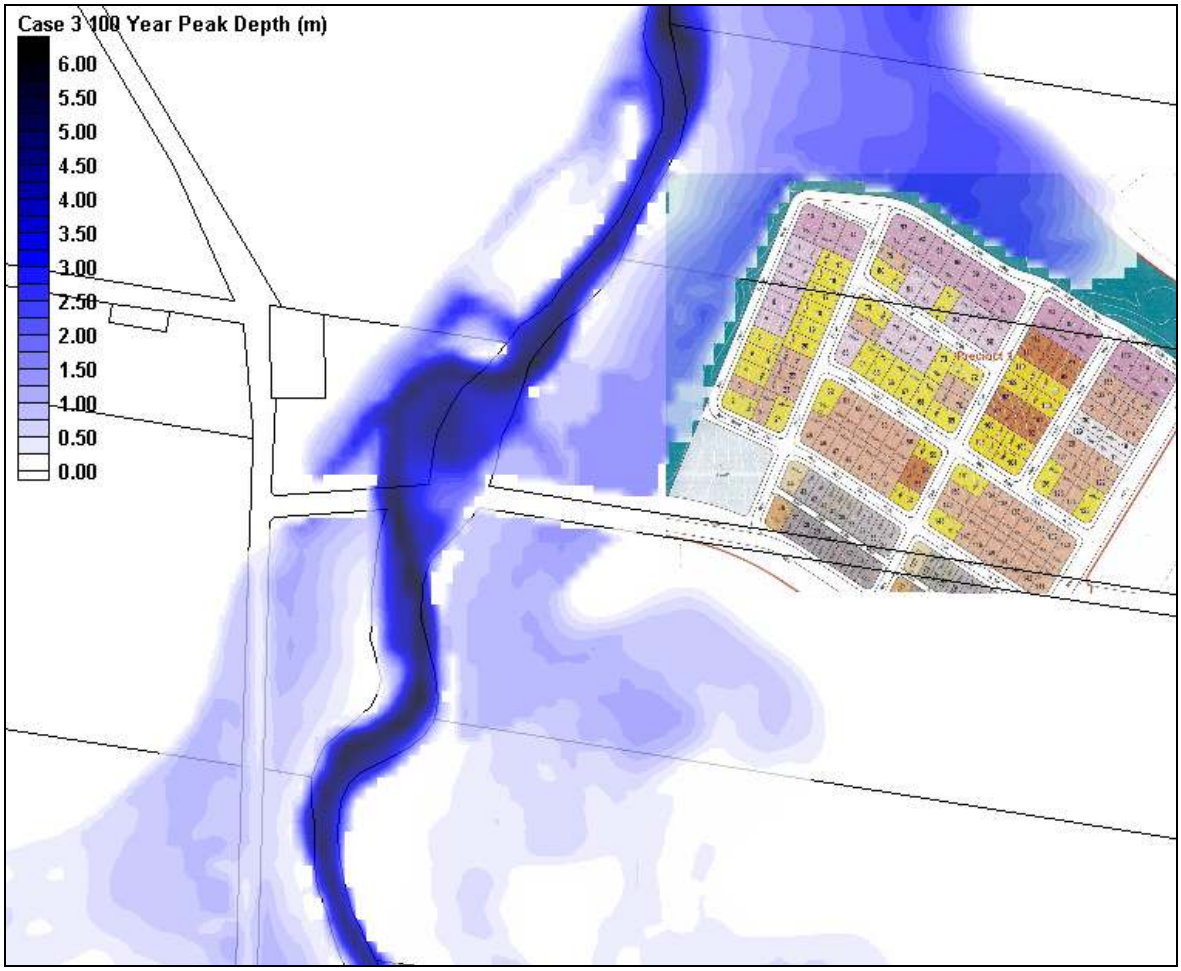

Image 1 Case 3 100 Year ARI Peak Depth

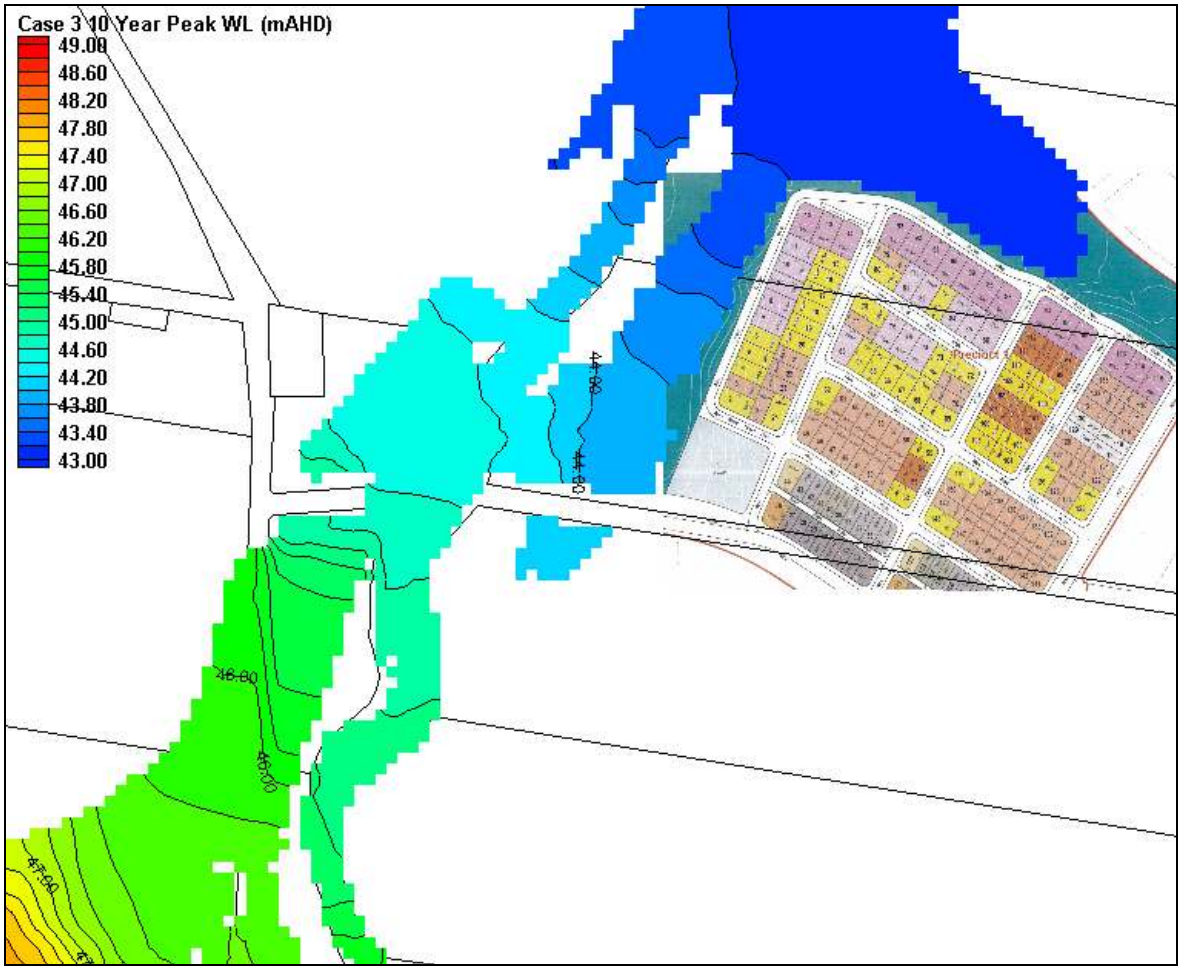

Image 3 Case 3 10 Year ARI Peak Water Level

Image 4 Impact of Bridge Only (Case 1) on 100 Year WL

Image 5 Impact of Precinct A with Bridge and Compensatory Excavation (Case 3) on 100 Year WL

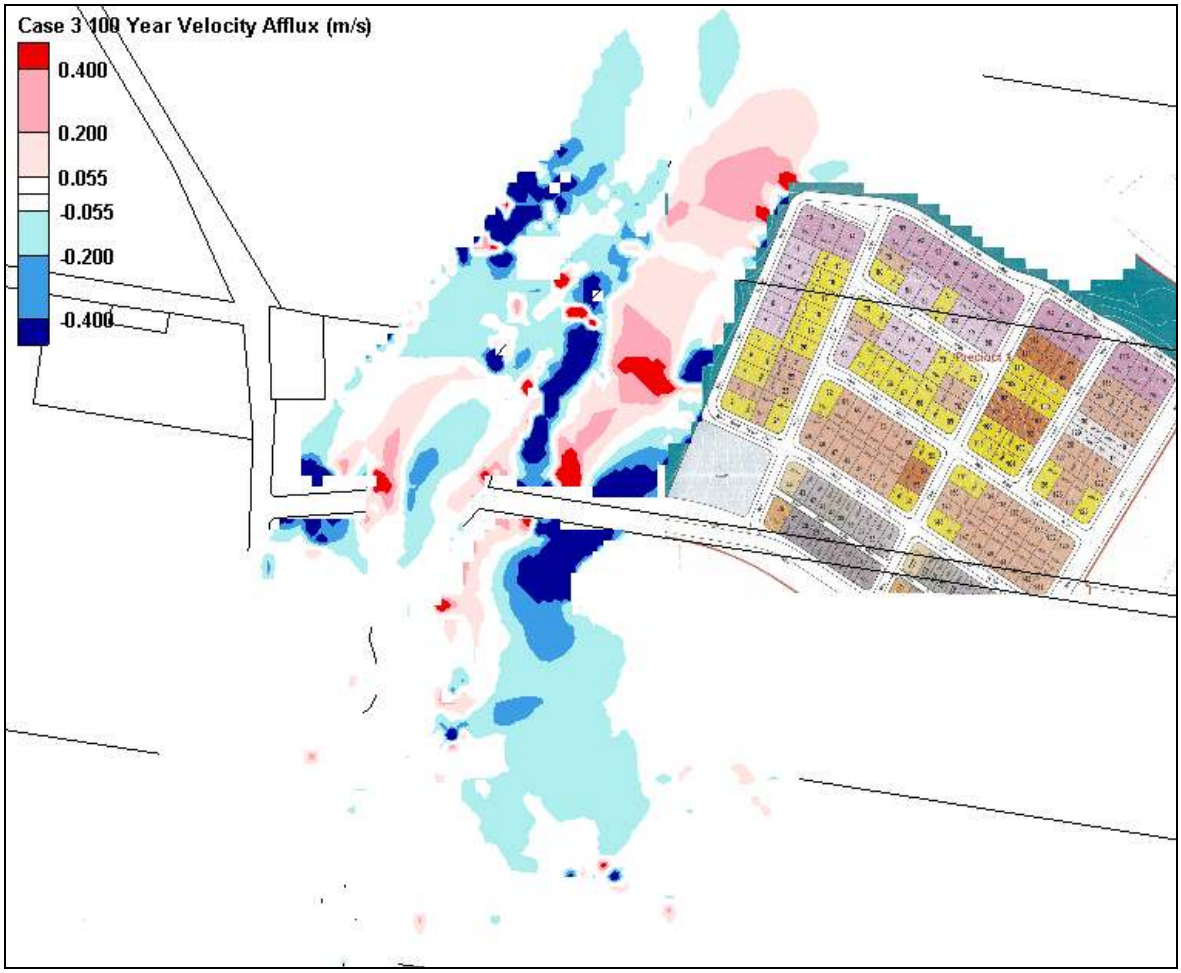

Image 6 Impact of Case 3 on Peak Velocities