Tooheys Brewery

Tooheys WWTP EA

Flood Risk Assessment

221580

Issue_Rev4 | 7 May 2012

Arup
Arup Pty Ltd ABN 18 000 966 165

Arup
Level 10
201 Kent Street
Sydney
NSW 2000
Australia
arup.com.au

Job number 221580

ARUP

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		Signature			
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		Name	Andy Moore	Andy Moore	Brian Cullinane
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Appendices

Executive Summary

Arup has been commissioned to undertake an Environmental Assessment (EA) for planning approval modification for the proposed wastewater treatment plant (WWTP) at Tooheys Brewery. The proposed wastewater treatment plant will treat an average daily flow rate of 2,400kL of industrial waste produced onsite. As part of the EA, a flood risk assessment has been carried out and is outlined in the following report.

It is noted that the northwest corner of the site is the worst location in terms of flood risk as it is within the 100 year Annual Recurrence Interval (ARI) flood plain levels for the Haslams Creek catchment. The proposed location of the wastewater treatment plant is in the west corner of the site and as a result a flood risk assessment is required to determine:

- The design flood levels from the Auburn Development Control Plan;
- The potential impact of the development on flood storage volumes;
- The potential impact of flooding on the development.

An application was submitted to the NSW Department of Planning and Infrastructure in September 2011 to modify the existing approval for the brewery under Section 75W of the NSW *Environmental Planning and Assessment Act*, 1979. In December 2011, the application was approved.

Subsequent to this the wastewater treatment plant has been slightly modified such that a section of the plant is to be elevated using pier structures to manage flood risks. All other aspects of the design remain consistent with the original approval including capacity, process design and plant footprint.

A review of available information found that Auburn Council commissioned a flood study, *'Haslams Creek Floodplain Risk Management Study and Plan'* in January 2003. In the vicinity of Tooheys Brewery, the study predicts a 100 year ARI flood event peak level of 6.9 mAHD, and recommends a Flood Planning Level (FPL) of 7.4mAHD, which includes a 0.5 m allowance for freeboard.

The ground level of a portion of the site where the WWTP is to be located is at an elevation lower than the flood levels above. It is therefore proposed to construct the WWTP on a base slab which will be elevated using piers to ensure a minimum slab elevation of 6.9 mAHD, and therefore above the 100 year ARI event peak flood level. The plant itself will be protected up to a level of 7.4 mAHD to incorporate a freeboard allowance.

In the event of a flood, a protection level of 7.4mAHD will not only reduce damage to the wastewater treatment plant but it will also reduce the risk of environmental impacts on the surrounding areas from industrial waste contamination.

Given the proximity of the Tooheys Brewery site to the adjacent creek, it is likely that the site will be affected by flooding at some point in the future. However the number and size of piers will be kept to a minimum and, as such, the impact of these structures on surrounding flood levels is expected to be negligible.

1 Introduction

Tooheys is proposing to redevelop their current brewery site located at 29 Nyrang Street, Lidcombe to include a wastewater treatment plant to treat industrial waste produced onsite. An application was submitted to the NSW Department of Planning and Infrastructure in September 2011 to modify the existing approval for the brewery under Section 75W of the NSW *Environmental Planning and Assessment Act*, 1979. In December 2011, the application was approved.

Subsequent to this the wastewater treatment plant has been slightly modified such that a section of the plant is to be elevated using pier structures to manage flood risks. All other aspects of the design remain consistent with the original approval including capacity, process design and plant footprint.

This assessment provides a revised analysis of the flood risk assessment including

- impact to the development;
- the impact of the development on flooding elsewhere; and
- details of any mitigation measures which should be incorporated into the proposed development to minimise the impact of future flooding.

All other impacts are generally consistent with those assessed within the original Environmental Assessment and have not been further assessed.

2 Background Information

2.1 Location of Site

Tooheys Brewery is located at 29 Nyrang Street, Lidcombe. The site is bounded by Haslams Creek to the northwest of the site, Nyrang Street to the southeast and other industrial properties to the northeast and southwest as shown below in Figure 1. The Haslams Creek only forms the boundary for Tooheys Brewery on one side of the site. However, this creek is in close proximity to the site on both the northwest and northeast sides of the site. The St Hilliers Road Branch channel connects into Haslams Creek near the west corner of the Tooheys Brewery site. These channels both influence the flooding on the site of the brewery. The proposed development at Tooheys Brewery in Lidcombe is situated within the Haslams Creek Catchment which ultimately drains into Homebush Bay.

Figure 1: Tooheys Brewery site

2.2 Description of the Proposed Works

The wastewater generated from the Tooheys Brewery site is currently discharged directly to Sydney Water's sewerage system under a Sydney Water Trade Waste agreement. However, Sydney Water has directed Tooheys to improve the quality of its liquid trade waste. In order to improve the liquid waste water quality, Tooheys propose to install a wastewater treatment plant on site to treat an average flow rate of 2,400kL of wastewater per day.

The final design and location of the wastewater treatment plant within the site are still being developed. The proposed layout is shown below in Figure 2 and has the wastewater treatment plant located in the west corner of the Tooheys Brewery site.

Figure 2 Proposed wastewater treatment plant layout

THE BREWHOUSE ROAD

TANK FARM 3

BUFFER
(Ø10m x 12m)

DIVERSION
TANK
(Ø10m x 12m)

FLARE

CAUSTIC

HYPO

CITRIC
ACID

UREA

SLUDGE PUMP
(UNDERGROUND)

LRB

IC
FEED PUMPS

MIX
FEED PUMPS

PAT
MIXING PUMPS

PAT
(Ø8.54m)

OVERHEAD
MIXING
TANK
(Ø4.0m)

IC

GAS BAG
(Ø4.9m)

MCC/LAB

POLYMER

CENTRIFUGE

SLUDGE BIN

CIP TANK
(Ø3.0m)

SLUDGE TANK
(Ø3.0m)

CARBON
FILTER

PIPERACK / ELECTRICAL

VACUUM PUMP

VACUUM PUMP

MIXING PUMP

MIXING PUMP

SLUDGE PUMP

WAS PUMP

BLOWER

BLOWER

BLOWER

MBR 1

MBR 2

PERMEATE
TANK

SUBMERSIBLE
PERMEATE
TRANSFER PUMPS

FUTURE RO PLANT

MAINTENANCE ACCESS AREA

BOUNDARY/FENCE

WASTE WATER
TREATMENT PLANT

M.G.A. NORTH

SITE NORTH

0 5m 10m 30m

REFERENCE DRAWINGS	
DRAWING No.	TITLE
374-SK-001	MASTER SITE PLAN - SHEET 1

GENERAL NOTES

1. THIS SITE PLAN WAS RE-DRAFTED BASED ON BRUNSKILL McCLENAHAN & ASSOCIATES PTY LTD SITE SURVEY CONDUCTED 11/03/2011 (BMA REF. 10081-SC).
2. CRITICAL FEATURES ON THIS PLAN MUST BE VERIFIED BY THE USER AS TO THE ACCURACY REQUIRED FOR THE INTENDED PURPOSE.

No.	DATE	REVISION	DRN	CHK	APP.
A	05.09.2011	ISSUED FOR DA APPROVAL	RPZ	SK	-

TOOHEYS LIMITED

WASTE WATER TREATMENT PLANT
GENERAL ARRANGEMENT
SHEET 1

SCALE	LOCATION	PLOT DATE	DRAWING No.	REV.
1:150 (A1)	AUBURN BREWERY	–	374-SK-005	A

3 Review of Existing Information

3.1 Auburn Council Involvement

Arup wrote to Auburn Council on 19 April 2011 to involve them in a consultation process for the flood risk assessment and to request the most recent flooding information and design standards. This was followed up with a visit to the Auburn Council office on 3 May 2011 where more flood modelling data was obtained.

A further meeting was held with Auburn Council officers on 2nd March 2012 where the proposals outlined in this assessment were discussed.

3.2 Existing Flood Studies

The site is covered by an Auburn Council commissioned flood study *'Haslams Creek Floodplain Risk Management Study and Plan'* undertaken by Bewsher Consulting Pty Ltd in January 2003. Bewsher Consulting Pty Ltd undertook flood modelling in HEC-RAS, a one-dimensional hydraulic model. The results of the flood study as shown in *'Figure 4.2 100 year and probable maximum flood extents along open channel systems'* indicate that some flooding is expected on the site in the 100 year Average Recurrence Interval (ARI) flood event. The report also confirms that the majority of the site lies within the extent of the Probable Maximum Flood (PMF) event thus in this major event, the majority of the Tooheys Brewery site is expected to be inundated.

As *'Figure 4.4 Flood risk precincts along open channel systems'* indicates, the varying flood levels on the site for the 100 year ARI flood event results in parts of the site being classed as a medium flood risk precinct while the remainder is classed as a low flood risk precinct. These figures can be found in Appendix A. For design purposes the proposed wastewater treatment plant should be considered as being within the medium flood risk precinct.

Buckton Lysenko Consulting Engineers undertook a smaller study in August 2006, *'Flood Study for 17 to 19 Percy Street'*. On behalf of Buckton Lysenko Consulting Engineers, DHI Water and Environment Pty Ltd undertook two-dimensional flood modelling using the software package Mike11. The resulting flood levels are lower than the previous modelling as a result of improved accuracy in the representation of flood mechanisms.

3.3 Flood Levels

The 100 year ARI event Flood Planning Level (FPL) nearest to the proposed location of the wastewater treatment plant is shown as 7.4mAHD according to *'Table 4.2 Water levels and planning levels'* in the *'Haslams Creek Floodplain Risk Management Study and Plan'*. This planning level is the result of the 100 year ARI flood level plus an allowance for freeboard.

For the purposes of flood modelling Bewsher Consulting Pty Ltd adopted a freeboard of 0.5m for subcritical flow and 1.0m for supercritical flow. During major flood events the flow in Haslams Creek is expected to oscillate between subcritical and supercritical flow conditions. This is the case in the vicinity of the Tooheys Brewery as is shown in the design profile in Figure 3 below (the

Tooheys Brewery site lies between sections 1033 to 1093 of the flood model). However, the FPL of 7.4 mAHD used within this assessment contains a 0.5 m allowance for freeboard.

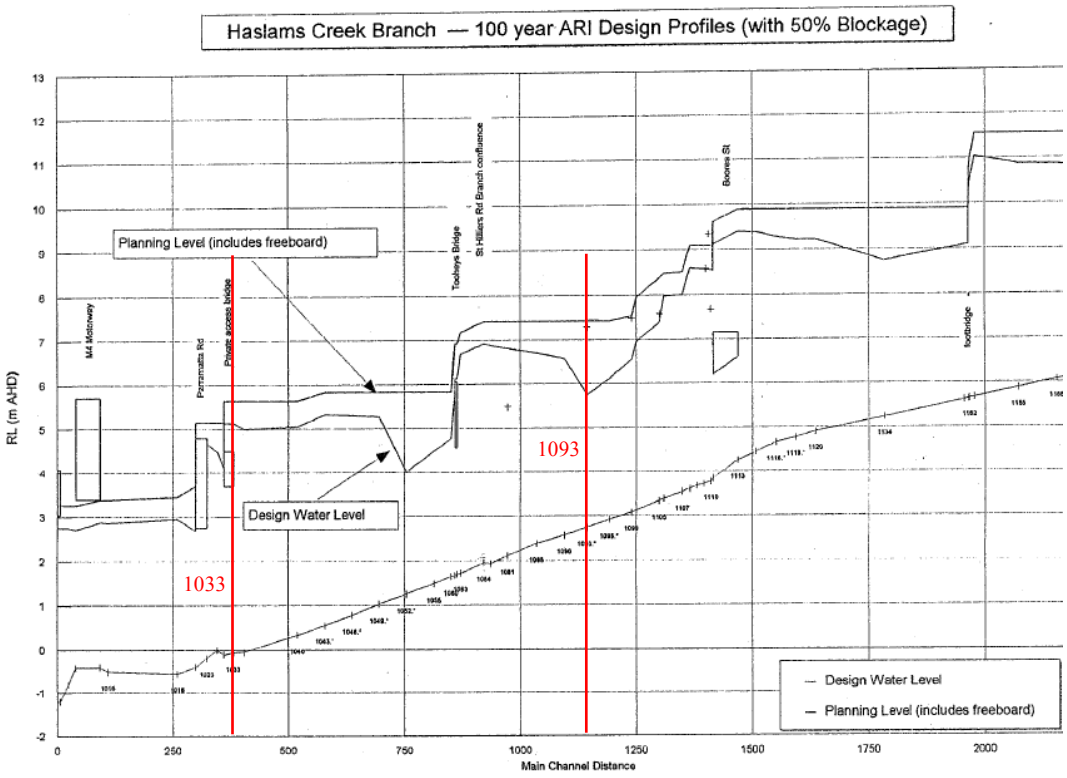


Figure 3: 100 year ARI Design Profile for Haslams Creek Branch with 50% blockage

Reproduced from 'Haslams Creek Floodplain Risk Management Study and Plan – Appendices to Final Report'

The FPL of 7.4mAHD is also based on a 50% blockage of structures scenario. Figure 3 indicates that the Tooheys bridge has a significant impact on flood behaviour. However, it should be noted that this long profile is based on a former version of the Tooheys bridge, and has not been updated to reflect the existing bridge. Nevertheless, blockage of this structure is likely to contribute to flooding and therefore new development should not further increase flood levels in this location.

4 Planning Considerations

4.1 Development Control Plan

As a state significant approval the individual requirements of the Auburn Development Control Plan do not necessarily apply to the site. However, for the purposes of this assessment, consideration has been given to the controls outlined in Section 18 *'Stormwater Drainage'* of the Auburn Development Control Plan 2010. Within this document Section 6.0 *'Flood risk management'* lists the controls for a proposed land use category within a specific floodplain.

The proposed development is within the Haslams Creek floodplain and the land use falls within the commercial and industrial category. Based on a medium flood risk there are significant planning considerations, relevant to this modification in plant elevation, to be taken into account which are outlined in the following sections.

4.1.1 Floor Levels

When considering floor levels the development control plan states:

- *Floor levels of open car parking areas to be equal to or greater than the 20 year ARI flood plus freeboard.*
- *Habitable floor levels to be equal to or greater than the 100 year ARI flood plus freeboard.*

The freeboard height in the Haslams Creek floodplain is variable primarily due to the implications of subcritical and supercritical flows caused by obstructions to the flowpath of flood waters. The freeboard can be determined by reference to a map and tables produced as part of the *'Haslams Creek Floodplain Risk Management Study and Plan'*. In the vicinity of the proposed wastewater treatment plant the freeboard in a 100 year ARI event is 0.5m.

4.1.2 Building Components

When considering building components the development control plan states:

- *All structures to have flood compatible building components below or at the 100 year ARI flood level.*

4.1.3 Structural Soundness

When considering structural soundness the development control plan states:

- *Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including a 100 year ARI flood.*

4.1.4 Flood Affectation

When considering flood affectation the development control plan states:

- *The impact of the development on flooding elsewhere to be considered.*

4.1.5 Evacuation

When considering evacuation the development control plan states:

- *Reliable access for pedestrians or vehicles is required from the dwelling, commencing at a minimum flood level equal to the lowest habitable floor level to an area of refuge above the PMF level, either onsite of offsite.*
- *Applicant to demonstrate that the development is to be consistent with any relevant DISPLAN or flood evacuation strategy.*

4.1.6 Management and Design

When considering management and design the development control plan states:

- *Site Emergency Response Flood plan required (except for single-dwelling houses) where floor levels are below the design flood level.*
- *Applicant to demonstrate that area available to store goods is above the 100 year ARI flood plus 0.5m (freeboard).*
- *No external storage of materials below design floor level which may cause pollution or be potentially hazardous during any flood.*

4.2 Local Environmental Plan

The Auburn Local Environmental Plan 2010 has also been considered. The Auburn Local Environmental Plan 2010 Flood Planning Map indicates that the Tooheys Brewery is within the flood planning area. The relevant flood planning map can be found in Appendix B.

As a result of being located within the flood planning area there are particular requirements that must be addressed. To obtain development consent the consent authority must be satisfied that the development:

(a) is compatible with the flood hazard of the land, and

(b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and

(c) incorporates appropriate measures to manage risk to life from flood, and

(d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and

(e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.

The Auburn Local Environmental Plan 2010 Foreshore Building Line Map indicates that the Tooheys Brewery is not within the foreshore building line area and therefore this provides no additional limitations to the proposed wastewater

treatment plant. The relevant foreshore building line map can be found in Appendix B.

5 Impacts of the Development on Flooding

The maximum 100 year ARI event flood level adjacent to the Tooheys site is 6.9 mAHD. At the location of the proposed WWTP there is an approximately 12 m wide section of floodplain at a lowest elevation of approximately 6.2 mAHD, and a typical elevation of 6.4 mAHD. The floodplain then slopes up to a level of approximately 7.6 mAHD. An indicative cross-section through the floodplain at this location is shown in Figure 4. The flood depths in a 100 year ARI event at the proposed WWTP location therefore range from 0.7 m to 0 m.

6 Mitigation of Flood Impacts

The risk of serious consequences from a flood on the Tooheys Brewery site can be mitigated by designing the new development to be resilient to flooding. The following recommendations for the wastewater treatment plant will result in minimal impact on future flooding on the Tooheys Brewery site and surrounding properties. The following recommendations also take into consideration the Auburn Council Development Control Plan and the Local Environmental Plan.

In order to retain the existing floodplain storage on the Tooheys site the proposed WWTP will be set at a minimum elevation of 6.9 mAHD. Where the existing ground level is lower than this level the WWTP will be elevated using pier structures. In this way the existing volume of flood storage on the floodplain will be retained post construction (see Figure 4). The number and dimensions of the pier structures will be kept to a minimum, such that the total volume of structure within the floodplain will effectively be negligible. It will also be possible to excavate a portion of the existing floodplain below the elevated structure to act as compensation for the presence of the piers.

Although the WWTP will be constructed so that any suspended slab is at a minimum elevation of 6.9 mAHD, the plant itself will be protected, using a raised bund, to a level of at least 7.4 mAHD. This will provide the recommended freeboard allowance contained within the *'Haslams Creek Floodplain Risk Management Study and Plan'*.

The *'Flood Study for 17 to 19 Percy Street'* undertaken by Buckton Lysenko in August 2006 states that the flood modelling carried out by Bewsher Consulting in 2003, from which the design level of 7.4mAHD was derived from, was carried out using HEC-RAS, a one-dimensional model. In 2006, DHI Water and Environment Pty Ltd undertook two-dimensional flood modelling using Mike11 on behalf of Buckton Lysenko in the vicinity of Tooheys Brewery. They determined that the previous modelling of Haslams Creek had overestimated the peak water levels on a portion of the site by approximately 0.6m. Based on this, adopting a minimum elevation of 6.9 mAHD for the proposed WWTP is a relatively conservative approach to minimise the impact of future flooding both on the plant and surrounding.

It is worth noting that the 100 year ARI event peak flood level of 6.9mAHD does not include an allowance for climate change. It is likely that the *'Haslams Creek Floodplain Risk Management Study and Plan'* undertaken in January 2003 predates any formal climate change allowances. The provision of a protective flood bund up to a level of 7.4 mAHD will provide for a degree of protection against future impacts of climate change.

Locating the wastewater treatment plant above the 100 year ARI flood level will significantly reduce the impacts upon the wastewater treatment plant structure in the event of a flood. To achieve the structural soundness required by the Auburn Council Development Control Plan an assessment will be required by a structural engineer. In such a case, the assessment is likely to need to demonstrate the structure can withstand the forces of floodwater, debris and buoyancy up to and including the 100 year ARI flood. For these assessments it is worth noting the results of the two dimensional flood modelling undertaken by DHI Water and Environment Pty Ltd. *'Figure 6 Existing Case – 1:100 year AEP Flood – Speed Map'* from Appendix A1 of *'Flood Study for 17 to 19 Percy Street'* indicates that the velocity of Haslams Creek is to be greater than 2m/s in the 100 year Annual Exceedance Probability flood event. This can be found in Appendix C.

The proposed WWTP is not a habitable dwelling and therefore is not required to meet any specific Auburn Council Development Control Plan evacuation standards.

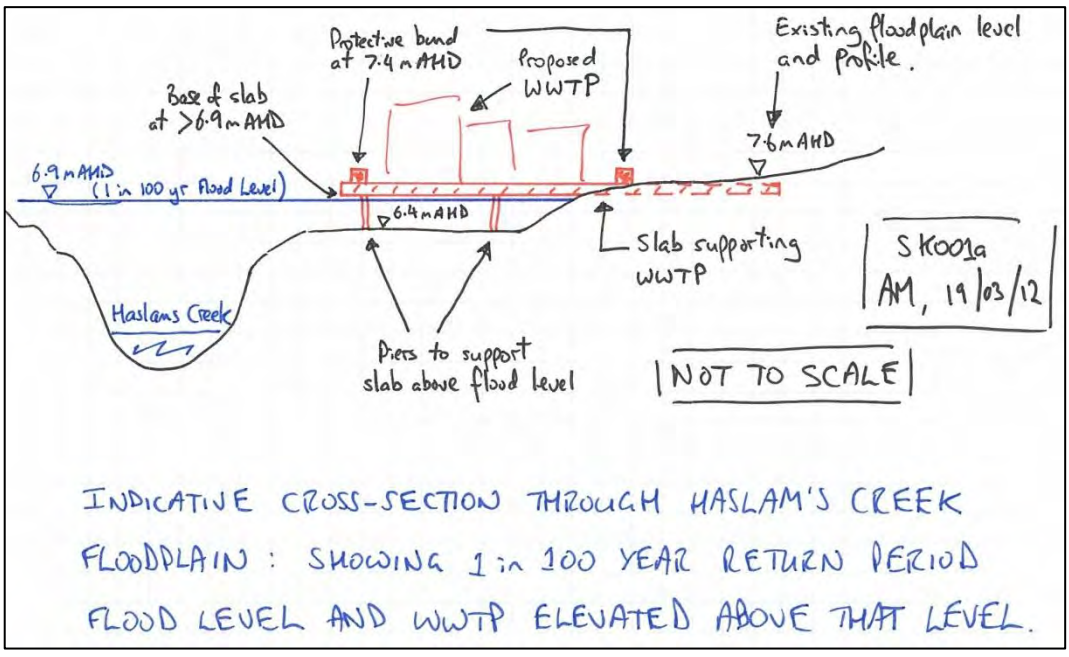


Figure 4 Indicative cross-section through Haslam's Creek floodplain, showing flood mitigation proposal.

Appendix A

Haslams Creek Floodplain Risk Management Study and Plan

Figure 4.2 100 year and probable maximum flood extents along open channel systems
Figure 4.4 Flood risk precincts along open channel systems

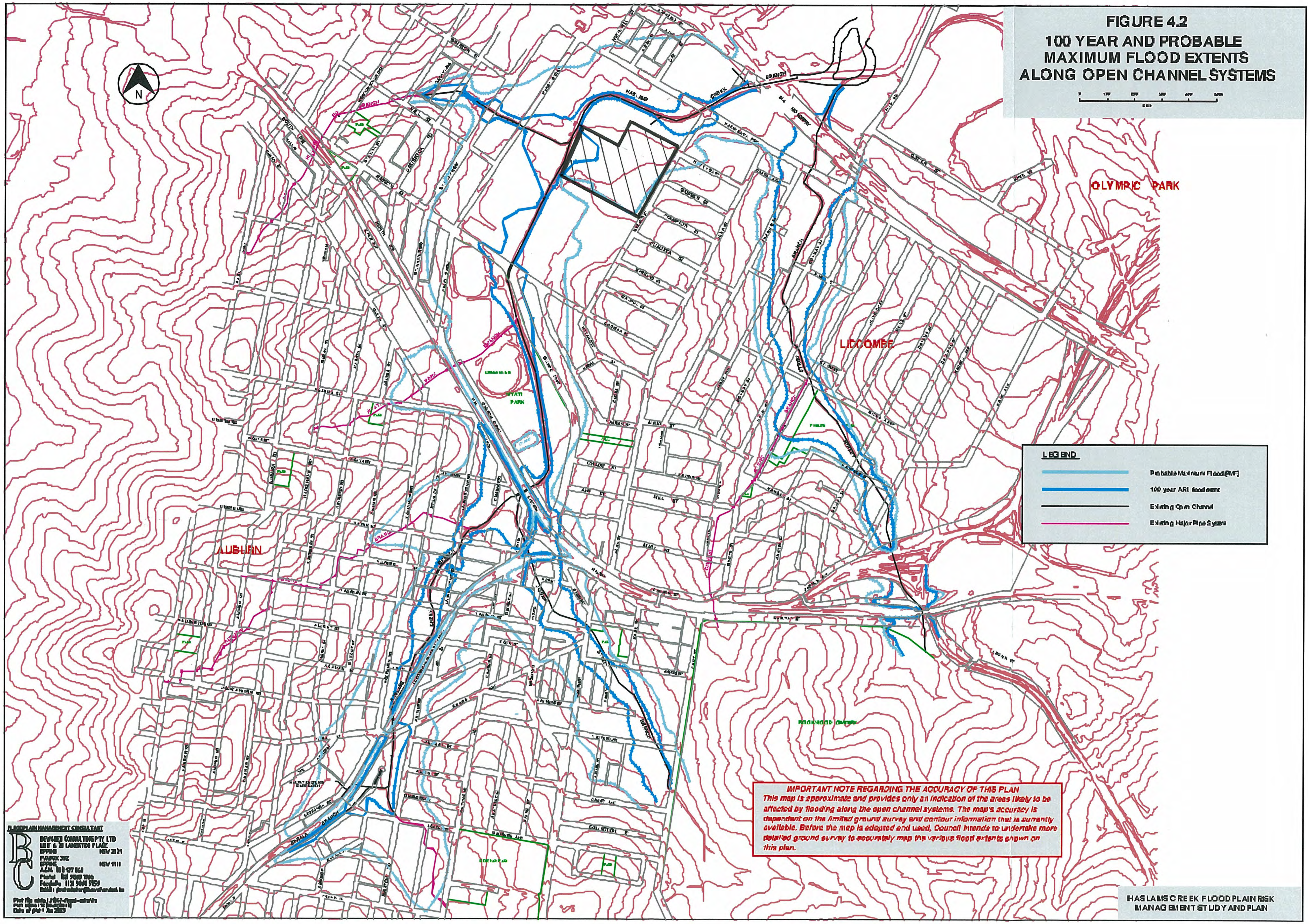
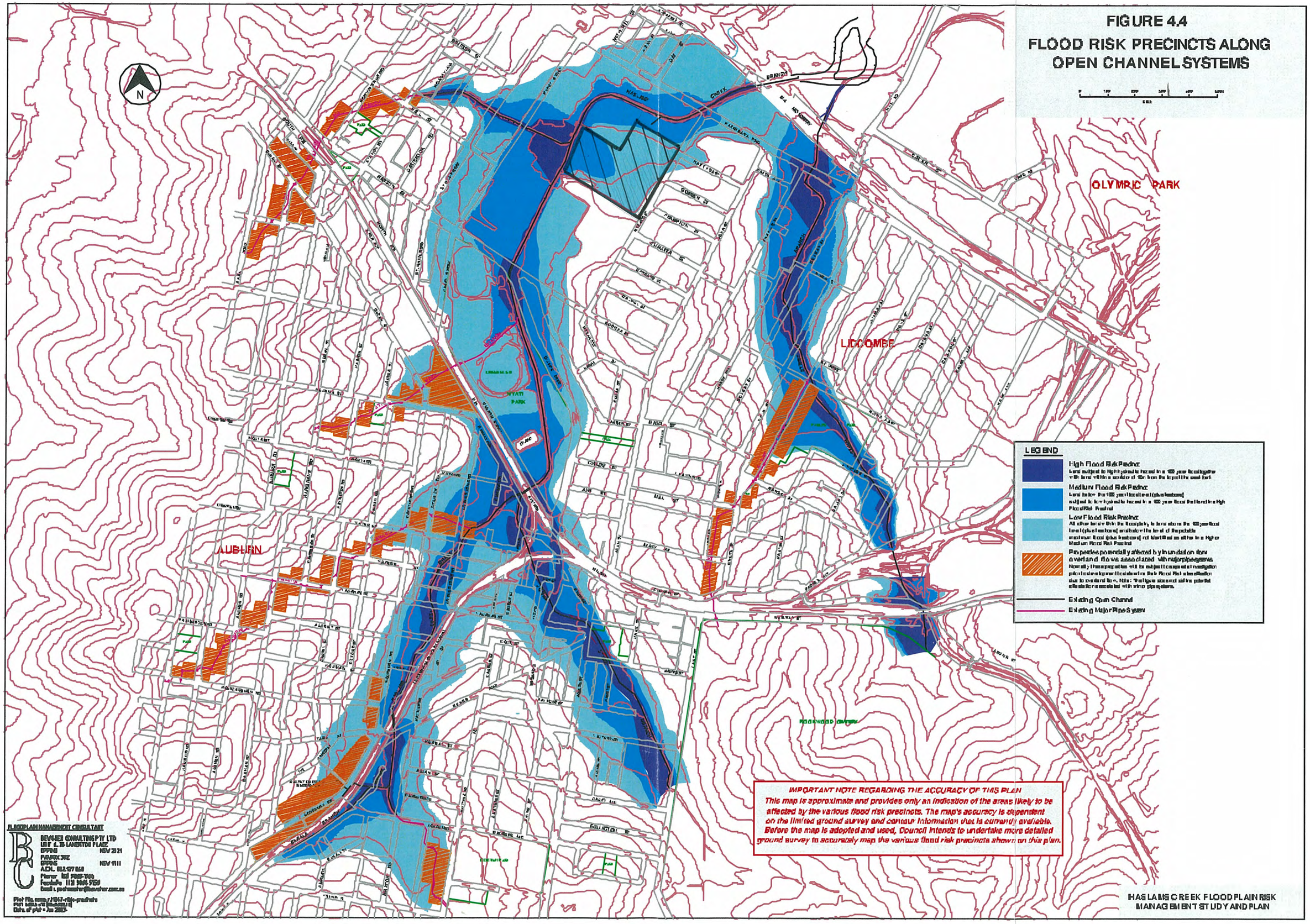


FIGURE 4.2
100 YEAR AND PROBABLE
MAXIMUM FLOOD EXTENTS
ALONG OPEN CHANNEL SYSTEMS
OLYMPIC PARK
LIDCOMBE
AUBURN
LEGEND
Probable Maximum Flood (PMF)
100 year ARI flood event
Existing Open Channel
Existing Major Pipe System
IMPORTANT NOTE REGARDING THE ACCURACY OF THIS PLAN
This map is approximate and provides only an indication of the areas likely to be affected by flooding along the open channel systems. The map's accuracy is dependent on the limited ground survey and contour information that is currently available. Before the map is adopted and used, Council intends to undertake more detailed ground survey to accurately map the various flood extents shown on this plan.
FLOODPLAIN MANAGEMENT CONSULTANT
HASLAMS CREEK FLOODPLAIN RISK
MANAGEMENT STUDY AND PLAN

FIGURE 4.4

FLOOD RISK PRECINCTS ALONG OPEN CHANNEL SYSTEMS



HASLAMS CREEK FLOOD PLAIN RISK MANAGEMENT STUDY AND PLAN

Appendix B

Auburn Local Environmental Plan 2010

Flood Planning Map
Foreshore Building Line Map

Auburn Local Environmental Plan 2010

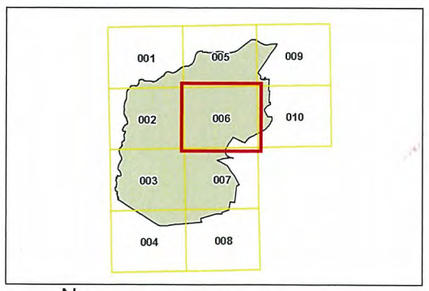
Flood Planning Map
Sheet FLD_006

Flood Planning Land

Flood Planning Area

Cadastre

Cadastre 25/05/10 © LPMA NSW



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STRATHFIELD COUNCIL

AUBURN CITY COUNCIL
MANY CULTURES ONE COMMUNITY

Auburn Local Environmental Plan 2010

Foreshore Building Line Map
Sheet FBL_006

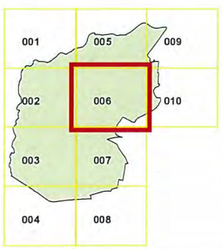
Foreshore building line

Foreshore building line

Land below foreshore building line

Cadastre

Cadastre 25/05/2010 © LPMA NSW



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Map identification number:

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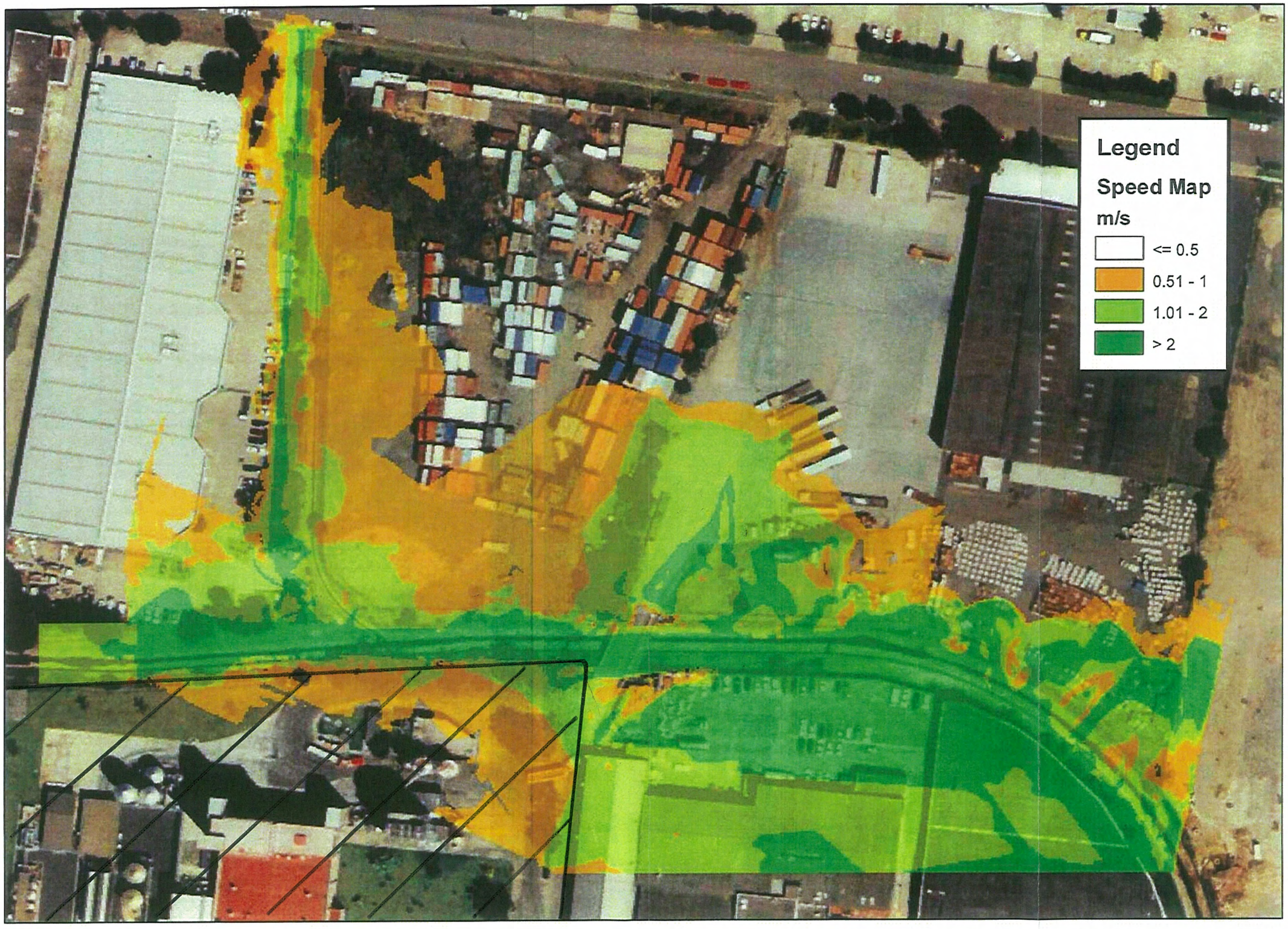
STRATHFIELD COUNCIL

Appendix C

Flood Study for 17 to 19 Percy Street, Auburn

Figure 6 Existing Case – 1:100 year AEP Flood – Speed Map



Existing Case - 1:100 year AEP Flood - Speed Map
Figure 6