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## FLOOD MANAGEMENT PLAN FOR PROPOSED DEVELOPMENT AT 74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

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## **Contents**

<b>1.0 INTRODUCTION.....</b>	<b>4</b>
<b>2.0 DESCRIPTION OF SITE .....</b>	<b>4</b>
<b>3.0 THE SITE AND THE SURROUNDING CONTEXT.....</b>	<b>6</b>
<b>4.0 PROJECT DESCRIPTION .....</b>	<b>7</b>
<b>5.0 HYDRAULIC MODELLING .....</b>	<b>7</b>
<b>5.1 74 EDINBURGH ROAD FLOOD MODEL PARAMETERS .....</b>	<b>7</b>
<b>6.0 EXISTING FLOOD AND DRAINAGE BEHAVIOUR.....</b>	<b>8</b>
<b>7.0 PROPOSED DEVELOPMENT FLOOD BEHAVIOUR .....</b>	<b>8</b>
<b>7.1 PROPOSED FLOOD DIVERSION/DETENTION MEASURES.....</b>	<b>8</b>
<b>7.2 POST DEVELOPMENT FLOOD BEHAVIOUR .....</b>	<b>8</b>
<b>7.2.1 FLOOD DEPTH AND VELOCITY .....</b>	<b>9</b>
<b>7.2.2 FLOOD HAZARD .....</b>	<b>9</b>
<b>8.0 PROPOSED DEVELOPMENT FLOOD PROTECTION MEASURES .....</b>	<b>10</b>
<b>9.0 IMPACT OF PROPOSED DEVELOPMENT ON FLOOD DEPTHS ON ADJACENT LANDS .....</b>	<b>11</b>
<b>10.0 EVACUATION OF SITE.....</b>	<b>12</b>
<b>10.1 EVACUATION ROUTE .....</b>	<b>12</b>
<b>10.2 STAFF EDUCATION.....</b>	<b>13</b>
<b>10.3 PATRONS INFORMATION .....</b>	<b>13</b>
<b>10.4 ACTIVATION.....</b>	<b>13</b>
<b>11.0 CONCLUSION .....</b>	<b>14</b>
<b>12.0 GLOSSARY.....</b>	<b>14</b>
<b>13.0 ABBREVIATIONS .....</b>	<b>15</b>
<b>APPENDIX A. PRE DEVELOPMENT FLOOD MODEL RESULTS .....</b>	<b>16</b>
<b>APPENDIX A.1 PRE DEVELOPMENT 2 YR ARI FLOOD .....</b>	<b>16</b>
<b>APPENDIX A.2 PRE DEVELOPMENT 20% AEP FLOOD .....</b>	<b>18</b>
<b>APPENDIX A.3 PRE DEVELOPMENT 10% AEP FLOOD .....</b>	<b>20</b>
<b>APPENDIX B. POST DEVELOPMENT FLOOD MODEL RESULTS.....</b>	<b>26</b>
<b>APPENDIX B.1 POST DEVELOPMENT 2 YR ARI FLOOD.....</b>	<b>26</b>
<b>APPENDIX B.2 POST DEVELOPMENT 20% AEP FLOOD.....</b>	<b>28</b>
<b>APPENDIX B.3 POST DEVELOPMENT 10% AEP FLOOD.....</b>	<b>30</b>
<b>APPENDIX C. CHANGE IN FLOOD DEPTH .....</b>	<b>36</b>

## **Table of Figures**

Figure 1 Aerial view of the Site (Source: SixMaps) .....	5
Figure 2 The Site: Location of proposed warehouse and CFC (Source: Nettleton Tribe) .....	6
Figure 3 Extract of Stormwater concept plan DWG C01 .....	8
Figure 4 Provisional Flood Hazard (NSWG, 2005) .....	10
Figure 5 1% AEP flood depth extract (Refer Figure 33 for wider extent) .....	11
Figure 6 Change in 1% AEP flood depth (Refer Appendix C for wider extent) .....	11
Figure 7 Flood Evacuation Route (Extract, Cardno 2017) .....	12
Figure 8 Flood Evacuation Route – Closeup of area around the site (Extract, Cardno 2017) .....	13
Figure 9 Pre Development 2yr ARI Flood Depth (m) .....	16
Figure 10 Pre Development 2yr ARI Flood Velocity (m/s) .....	16
Figure 11 Pre Development 2yr ARI Flood Hazard Category .....	17
Figure 12 Pre Development 20% AEP Flood Depth (m) .....	18
Figure 13 Pre Development 20% AEP Flood Velocity (m/s) .....	18
Figure 14 Pre Development 20% AEP Flood Hazard Category .....	19
Figure 15 Pre Development 10% AEP Flood Depth (m) .....	20
Figure 16 Pre Development 10% AEP Flood Velocity (m/s) .....	20
Figure 17 Pre Development 10% AEP Flood Hazard Category .....	21
Figure 18 Pre Development 1% AEP Flood Depth (m) .....	22
Figure 19 Pre Development 1% AEP Flood Velocity (m/s) .....	22
Figure 20 Pre Development 1% AEP Flood Hazard Category .....	23
Figure 21 Pre Development PMF Flood Depth (m) .....	24
Figure 22 Pre Development PMF Flood Velocity (m/s) .....	24
Figure 23 Pre Development PMF Flood Hazard Category .....	25
Figure 24 Post Development 2yr ARI Flood Depth (m) .....	26
Figure 25 Post Development 2yr ARI Flood Velocity (m/s) .....	26
Figure 26 Post Development 2yr ARI Flood Hazard Category .....	27
Figure 27 Post Development 20% AEP Flood Depth (m) .....	28
Figure 28 Post Development 20% AEP Flood Velocity (m/s) .....	28
Figure 29 Post Development 20% AEP Flood Hazard Category .....	29
Figure 30 Post Development 10% AEP Flood Depth (m) .....	30
Figure 31 Post Development 10% AEP Flood Velocity (m/s) .....	30
Figure 32 Post Development 10% AEP Flood Hazard Category .....	31
Figure 33 Post Development 1% AEP Flood Depth (m) .....	32
Figure 34 Post Development 1% AEP Flood Velocity (m/s) .....	32
Figure 35 Post Development 1% AEP Flood Hazard Category .....	33
Figure 36 Post Development PMF Flood Depth (m) .....	34
Figure 37 Post Development PMF Flood Velocity (m/s) .....	34
Figure 38 Post Development PMF Flood Hazard Category .....	35
Figure 39 Post Development change in 2yr ARI flood depth (m) .....	36
Figure 40 Post Development change in 5% AEP flood depth (m) .....	36
Figure 41 Post Development change in 10% AEP flood depth (m) .....	37
Figure 42 Post Development change in 1% AEP flood depth (m) .....	37

## 1.0 INTRODUCTION

Richmond and Ross Pty Ltd, Consulting Engineers, has been commissioned by Woolworths Group Limited (the Applicant) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD- 10468 for the design, construction and operation of a warehouse and distribution centre with associated offices at 74 Edinburgh Road, Marrickville (the Site).

The warehouse will be fitted out for the purposes of a speculative warehouse(s) and Customer Fulfillment Centre which will service the inner west and city suburbs.

The requirements for the SEARs issued for SSD 10468 and where these requirements have been addressed are outlined in the table below:

**Table 1 Secretary's environmental assessment requirements (SEARs)**

Ref.	SEARs	Where addressed
<b>9</b>	An assessment of flood risk on site and consideration of any relevant provisions of the NSW Floodplain Development Manual (DIPNR, 2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. The assessment must consider:	
<b>a</b>	the flood hazard in the area	Flood hazard pre development has been discussed in Section 6.0 whereas the post development flood hazard has been discussed in Sec 7.2.2
<b>b</b>	the impact of flooding on the proposed development	Post development flood impact has been addressed in Sec 7.2.2
<b>c</b>	the development's impact (including filling) on flood behavior of the site and adjacent lands	Flood impacts are addressed in Sec 9.0
<b>d</b>	adequate egress and safety procedures during a flood event	Evacuation of the site has been addressed in Sec 10.0

## 2.0 DESCRIPTION OF SITE

The Site is legally described as Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969, commonly known as 74 Edinburgh Road, Marrickville (see Figure 1). The Site has an area of approximately 27,315sqm and has frontages to both Edinburgh Road (north) and Sydney Steel Road (east).

The key elements within and surrounding the Site include:

- The Site is located within the industrial area of Marrickville and currently accommodates several large freestanding industrial buildings and associated car parking and loading areas;
- Vehicular access to the Site is via an existing entry and exit driveway at the Edinburgh Road frontage. Access is also available from Sydney Steel Road;



- The Site contains minimal vegetation which is fragmented by buildings and areas of hardstand surfaces. Vegetation is limited to scattered trees and shrubs within the Site and planted within the nature strip;
- Is located within 1km of Sydenham Railway Station, which is currently being upgraded as part of the Sydney Metro Chatswood to Bankstown metro line; and
- The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville.



**Figure 1 Aerial view of the Site (Source: SixMaps)**



**Figure 2 The Site: Location of proposed warehouse and CFC (Source: Nettleton Tribe)**

### 3.0 THE SITE AND THE SURROUNDING CONTEXT

The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville. The Site is located on the northern periphery of the Sydenham Precinct which is part of the Sydenham to Bankstown Urban Renewal Corridor, earmarked for significant employment growth.

The Site also forms part of a large industrial precinct bounded by Edinburgh Road to the north, Railway Parade and the railway line to the east, Marrickville Road/the railway line to the south and Meeks Road/Farr Street/Shepherd Street to the west. The Industrial precinct includes:

- Large free standing industrial buildings;
- Industrial estates including smaller individual warehouse buildings to the south and east;
- Manufacturing, freight and logistics uses and includes storage facilities, car smash repairs, warehousing and factories.

The Marrickville Metro Shopping Centre also lies to north of the Site. Residential uses are well separated from the Site to the south and east. The Site is also physically separated from residential dwellings to the north and north-west by Edinburgh Road.

## 4.0 PROJECT DESCRIPTION

The proposed works comprise the following:

- Demolition of the existing buildings, associated structures and landscaping;
- Construction of a two storey warehouse comprising a speculative warehouse at level 1 (ground level) and Customer Fulfillment Centre (CFC) at level 2;
- Construction of associated offices across five levels to be used by Woolworths in conjunction with the warehouse and CFC;
- Two storey car park adjacent to Edinburgh Road;
- Two storey hardstand loading and delivery area adjacent Sydney Steel Road;
- Private vehicle access from two points on Edinburgh Road;
- Heavy vehicle / loading vehicle access from four points on Sydney Steel Road; and,
- Tree removal and landscaping works.

Use of the warehouse will be on a 24-hour, 7-day basis, consistent with surrounding operations.

## 5.0 HYDRAULIC MODELLING

A previous flood study prepared for the project catchment has been used as an input into the 74 Edinburgh Road flood model. This flood study was originally prepared by WMAwater in 2013 and later updated by Cardno in 2017. The model was obtained from council and consisted of a 1D-2D TufLOW hydraulic model.

### 5.1 74 EDINBURGH ROAD FLOOD MODEL PARAMETERS

The 74 Edinburgh Road Flood Study incorporated the following parameters:

- Hydrologic Inputs – 1D network as provided within the Marrickville Valley flood study
- TUFLOW Version – 2013\_12-AE – Version used to create the Marrickville Valley flood study and therefore the same version has been used for the flood model for 74 Edinburgh Rd to maintain compatibility with the findings from the Marrickville Valley flood study
- Roughness Values – As per the Marrickville Valley flood study.
- Building footprints – As per the Marrickville Valley flood study with modifications to suit building footprints within the subject development site.
- Events simulated – The 74 Edinburgh Road flood model has been run for the 2yr, 5yr, 10yr and the 100yr average recurrence interval. The critical storm duration for these storms is as per the Marrickville Valley flood study ie 2hrs. A PMF event has also been simulated to determine the impact of the development during a worst case scenario including potential increase in rainfall due to climate change. The critical storm duration for the PMF is also as per the Marrickville Valley flood study ie 60mins.

## 6.0 EXISTING FLOOD AND DRAINAGE BEHAVIOUR

Floodwaters enter the site via Edinburgh road as well as surcharge from a pit on the Sydney Water owned drainage culvert passing through the site. The site is subject to flood inundation during storm event greater than the 2yr average recurrence interval. Once flood inundation has occurred, the flows continue along the North Western Boundary and eventually flow into adjoining properties via a dedicated overland flow path. During a 1% AEP storm event, the maximum depth of flow within the site is less than 500mm. The flood hazard categorization of the existing site is “low hazard”. See Sec 7.2.2 - Flood Hazard for more details regarding the hazard categorization used.

During the PMF flood event, the site experiences significant inundation with peak flow depth exceeding 2m and is categorized as a high hazard flood area.

Refer to Appendix A - Pre Development Flood Model Results, for images showing the expected flood depths, velocities and hazard for the pre development conditions for the various storm events.

## 7.0 PROPOSED DEVELOPMENT FLOOD BEHAVIOUR

### 7.1 PROPOSED FLOOD DIVERSION/DETENTION MEASURES

It is proposed to collect the flood flow via a network of pit inlets and divert it to an underground flood detention chamber via twin 1200x600 underground box culverts. The flood detention chamber is proposed with a volume equal to the existing site’s above ground 1% AEP flood storage (Approx. 1200m<sup>3</sup>) and therefore there will be no net loss in available flood storage upto the 1% AEP storm event.

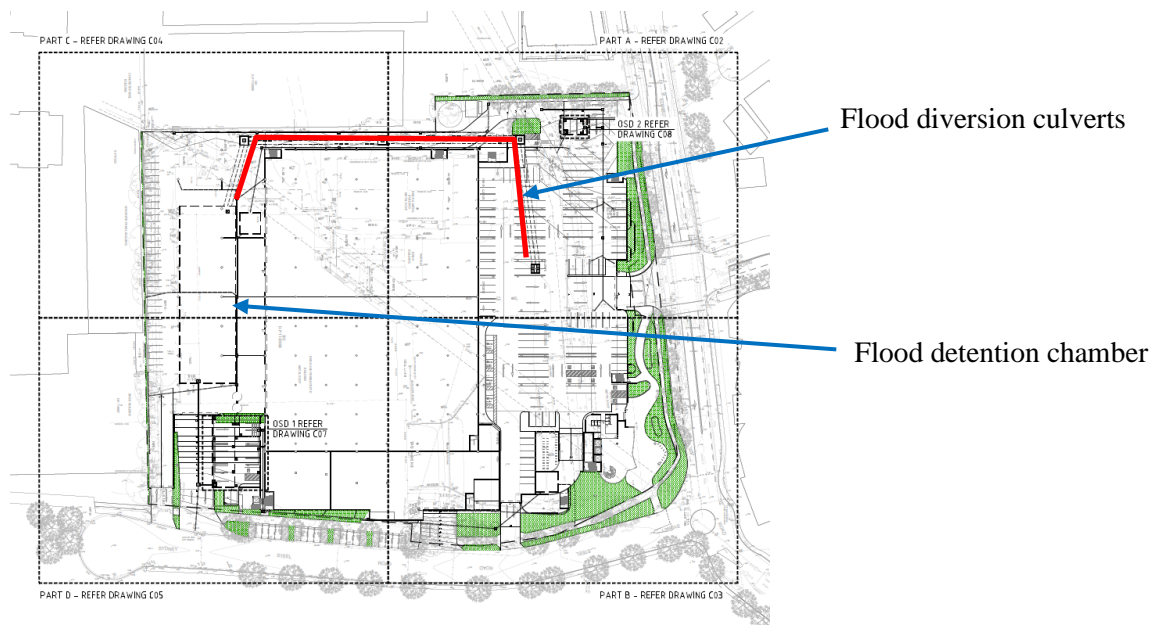


Figure 3 Extract of Stormwater concept plan DWG C01

### 7.2 POST DEVELOPMENT FLOOD BEHAVIOUR

The above-mentioned flood diversion/detention measures, expected post development topography and geometry amendments (proposed finished ground level and building extents within the site) were added to the Marrickville Valley flood study. Refer to Appendix B - Post Development Flood Model Results, for images showing the expected flood depths, velocities and hazard for the post development conditions. The flood level applicable to the site is 4.81mAHD.

### **7.2.1 FLOOD DEPTH AND VELOCITY**

Based on the model results, the expected flood depth during a 1% AEP storm event is less than 0.3m and is located around the inlet to the flood diversion structure within car parking area. The maximum velocity of flow during a 1% AEP storm event is less than 1.2m/s.

### **7.2.2 FLOOD HAZARD**

Flood hazard is defined as potential of a flood to cause damage to the community. With respect to the depth and velocity of floodwaters, it is referred to as provisional flood hazard. In this report, provisional flood hazard is categorized based on Figure 4 (Figure L2 of the NSWG Floodplain Development Manual, 2005) below.

The flooding within the site post development is categorised as low hazard during a 1% AEP storm event.

The site is subject to low hazard flooding during a PMF event being a reduction in hazard category for the post development scenario.

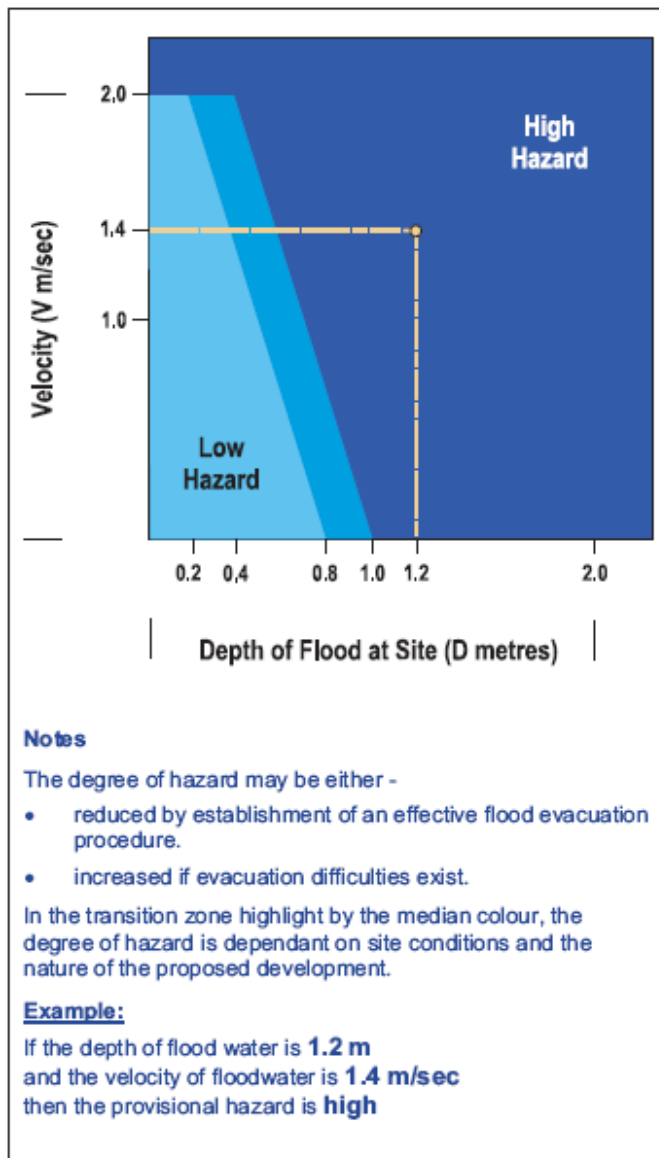
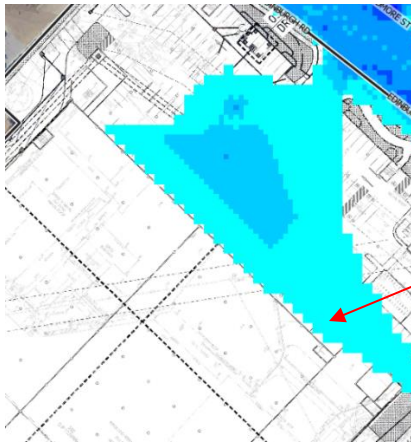


Figure 4 Provisional Flood Hazard (NSWG, 2005)

## 8.0 PROPOSED DEVELOPMENT FLOOD PROTECTION MEASURES

Referring to Council's DCP for flood management, Sec 2.22.5, control C13, "*Floor levels (except for access-ways) must be at least 500mm above the 1% AEP flood level, or the buildings must be flood-proofed to at least 500mm above the 1% AEP flood level. For areas of minor overland flow (a depth of 300mm or less or overland flow of 2cum/sec or less) a lower freeboard of 300mm may be considered on its merits.*" Based on the modelled flood extent, the area in the immediate vicinity of the building has less than 100mm of flood depth and therefore is considered an area of minor overland flow. The floor level of the proposed is 4.86mAHD while the 1% AEP flood level is 4.81mAHD. However, most of the building along the flood front is proposed to be block/precast panel wall and hence considered flood proof. The pickup area is proposed to have a glass wall frontage and therefore would require flood proofing to at least 300mm above the floor level. The proposal is to install flood barriers upto atleast 300mm above the floor level. Alternatively, the bottom 300mm of the wall to the pickup area can be constructed out of block wall or similar to provide flood-proofing to the pickup area.



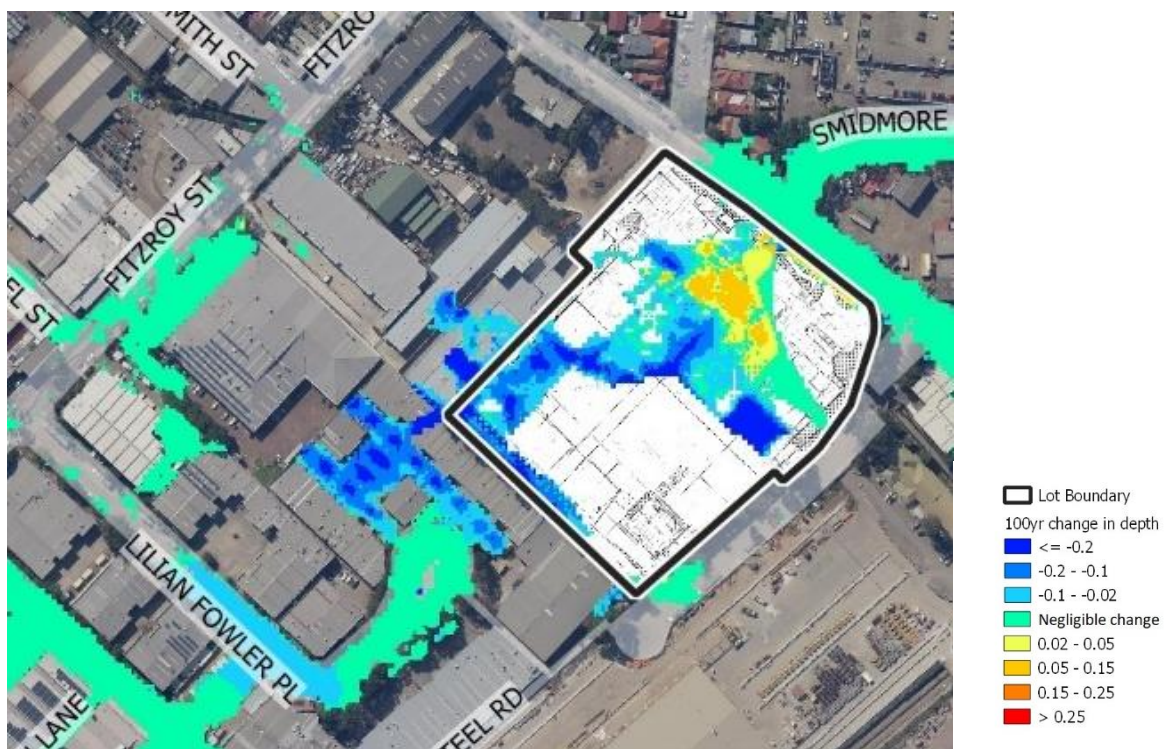


Pickup area to be flood proofed up to a minimum 300mm above the flood level

**Figure 5 1% AEP flood depth extract (Refer Figure 33 for wider extent)**

## **9.0 IMPACT OF PROPOSED DEVELOPMENT ON FLOOD DEPTHS ON ADJACENT LANDS**

The proposed development will result in a negligible increase in the flood depths during a 1% AEP storm event. A greater than 200mm reduction in flood depths can be expected within the neighbouring property 10-14 Lilian Fowler Place. The impact of the project on the flood depths on adjacent lands can be seen in Figure 6 below.



**Figure 6 Change in 1% AEP flood depth (Refer Appendix C for wider extent)**

## 10.0 EVACUATION OF SITE

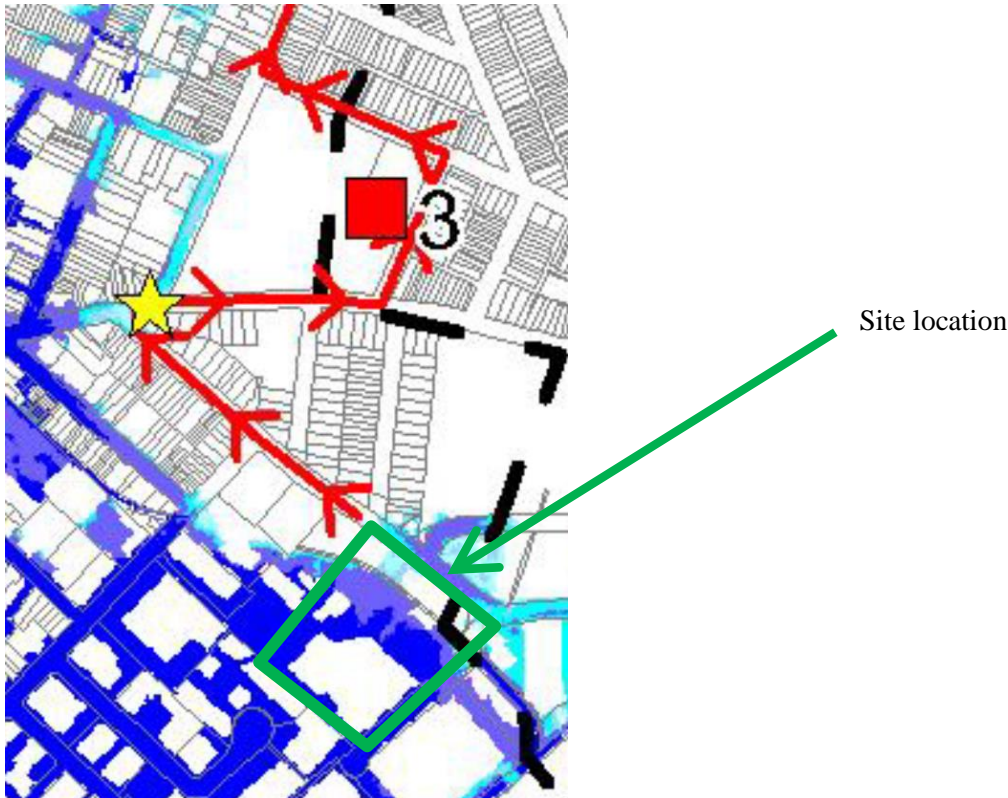
### 10.1 EVACUATION ROUTE

Referring to the Marrickville Valley Floodplain Risk Management Study, evacuation from the Marrickville Industrial area of which the site is a part will be very difficult as the area is expected to be significantly inundated within 30mins of the onset rainfall for both 1% AEP and PMF flood events. The site is located within the outer regions of the Industrial area and therefore evacuation of the occupants within the site is feasible. Occupants with vehicles should exit the site via the North Western Driveway and head further northwest towards Victoria Road. At the intersection, vehicles can continue West onto Victoria Road and left onto Black Street and continue along the flood evacuation route shown in Figure 7 below. Pedestrian traffic can evacuate via the North Western driveway and towards Bourne street and eventually continue North towards Black Street. It should be noted that there is no dedicated pedestrian crossing facility to cross Edinburgh Road at the driveway and no kerb ramp access onto Bourne Street. Evacuation from the site should be carried out in safe and organised manner and undertaken early within the flood event (prior flood waters isolating the area). Do not try to evacuate via flood waters. If all evacuation could not be carried out on time and the development has been flooded, it is safer to stay within the site at a high-level refuge as the site is expected to be a low hazard area including during a PMF flood event. If people do become trapped by rising flood waters without access to a flood refuge, emergency evacuation will be required. In this case, contact State Emergency Services (SES) on 13 25 00.



Figure 7 Flood Evacuation Route (Extract, Cardno 2017)





**Figure 8 Flood Evacuation Route – Closeup of area around the site (Extract, Cardno 2017)**

## **10.2 STAFF EDUCATION**

All staff is to be informed and made aware of the evacuation route mentioned above. This plan will form part of the site induction for the proposed development site.

The site Occupational Health and Safety (OH&S) committee will be responsible for:

- a) Liaising with other services such as NSW Police and State Emergency Services (SES)
- b) Directing flood monitoring
- c) Damage minimisation measures
- d) Co-ordination of evacuation as required.

## **10.3 PATRONS INFORMATION**

A designated member of staff to inform and direct patrons towards the Flood Evacuation Paths in the event of emergency. Furthermore, copies of the Evacuation Plan shall be displayed throughout the tenancies in full view of customers.

## **10.4 ACTIVATION**

The OH&S committee shall activate this plan based on the Flood Warning Announcement from the local authority. The Flood Wardens are required to monitor SES, Council announcements and local radio in an event of severe weather forecast.

The OH&S committee is to carry out the following tasks once the plan is activated:

- a) Monitor flooding and water levels in the area, on Edinburgh Rd, ground level parking area within the site along Edinburgh rd., and along the site boundaries
- b) Maintain contact with SES.
- c) Using information obtained make decision on the following:
  - Install floodgates/barriers in designated areas where infrastructure may be at risk.
  - Evacuate personnel and patrons away from the flood zone

## 11.0 CONCLUSION

Subject to the implementation of the following flood mitigation measures:

- Flood flow diversion channels and detention chambers and
- Flood proofing of habitable areas along the flood front to 300mm above the finished floor level (Floor level being 4.86mAHD)

We advise that the new development:

- can be constructed at the proposed minimum FFL 4.86mAHD and meet council's flood control requirements,
- will have no significant impact on current flood volumes, flood depths and existing flood hazard categories upto the 1% AEP storm event,
- will not result is any additional private properties being inundated during a 1% AEP flood event because of the development,
- proposes flood mitigation measures that minimize the increase in 1% AEP flood depth as far as practicable especially within private properties.

## 12.0 GLOSSARY

Term	Definition
<b>The Site</b>	74 Edinburgh Road, Marrickville (Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969)
<b>The Project</b>	Demolition and the construction of a new warehouse and distribution centre with associated offices.
<b>Customer Fulfilment Centre</b>	The purpose built Woolworths occupied warehouse and distribution facility located on Level 2.
<b>Associated Office</b>	When referring to the office component of the development

### 13.0 ABBREVIATIONS

<b>Abbreviation</b>	<b>Meaning</b>
<b>AEP</b>	Annual Exceedance Probability
<b>AHD</b>	Australian Height Datum
<b>ARI</b>	Average Recurrence Interval
<b>Council</b>	Inner West Council
<b>DCP</b>	Development Control Plan
<b>FFL</b>	Finished Floor Level
<b>OH&amp;S</b>	Occupational Health and Safety
<b>OSD</b>	On Site Detention
<b>PMF</b>	Probable Maximum Flood
<b>SES</b>	State Emergency Services

**APPENDIX A.**  
**APPENDIX A.1**

**PRE DEVELOPMENT FLOOD MODEL RESULTS**  
**PRE DEVELOPMENT 2 YR ARI FLOOD**

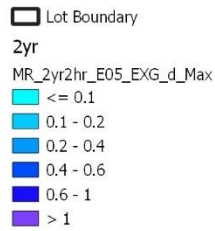


Figure 9 Pre Development 2yr ARI Flood Depth (m)

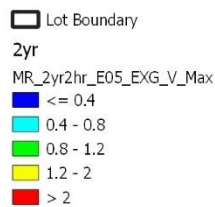


Figure 10 Pre Development 2yr ARI Flood Velocity (m/s)



- Lot Boundary
- 2yr
- MR\_2yr2hr\_E05\_EXG\_Z1\_Max
- Low hazard
- Intermediate Hazard
- High Hazard



Figure 11 Pre Development 2yr ARI Flood Hazard Category

## APPENDIX A.2 PRE DEVELOPMENT 20% AEP FLOOD



Figure 12 Pre Development 20% AEP Flood Depth (m)

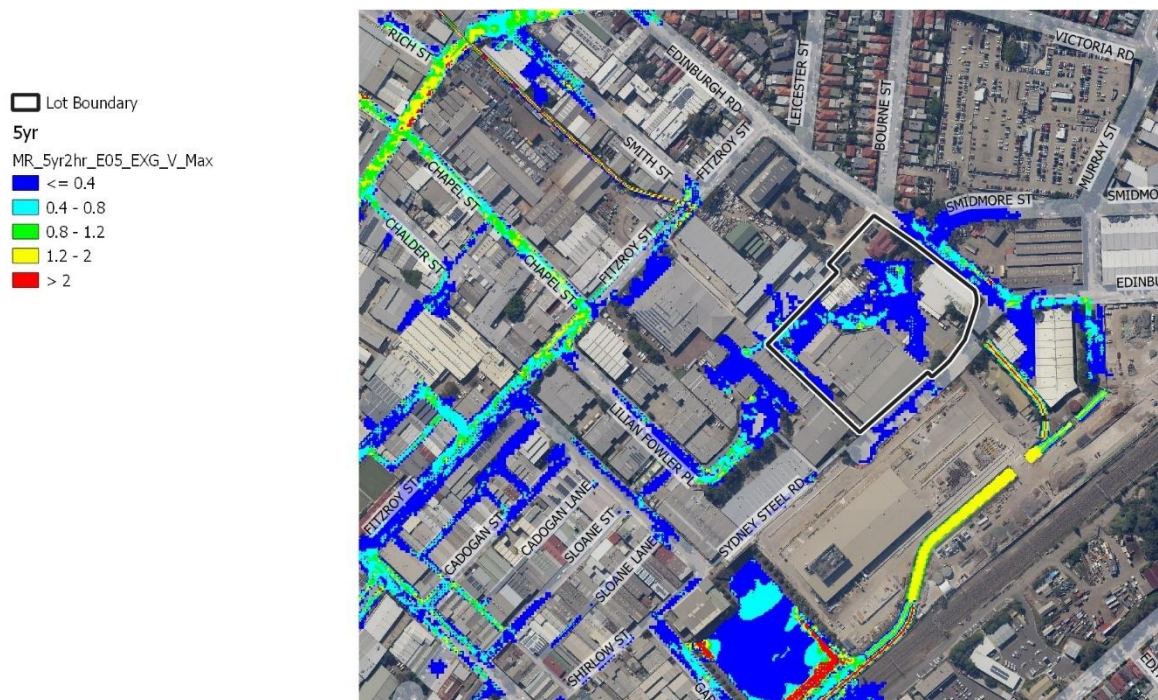


Figure 13 Pre Development 20% AEP Flood Velocity (m/s)



Lot Boundary  
 5yr  
 MR\_5yr2hr\_E05\_EXG\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard



Figure 14 Pre Development 20% AEP Flood Hazard Category

### APPENDIX A.3 PRE DEVELOPMENT 10% AEP FLOOD



Figure 15 Pre Development 10% AEP Flood Depth (m)

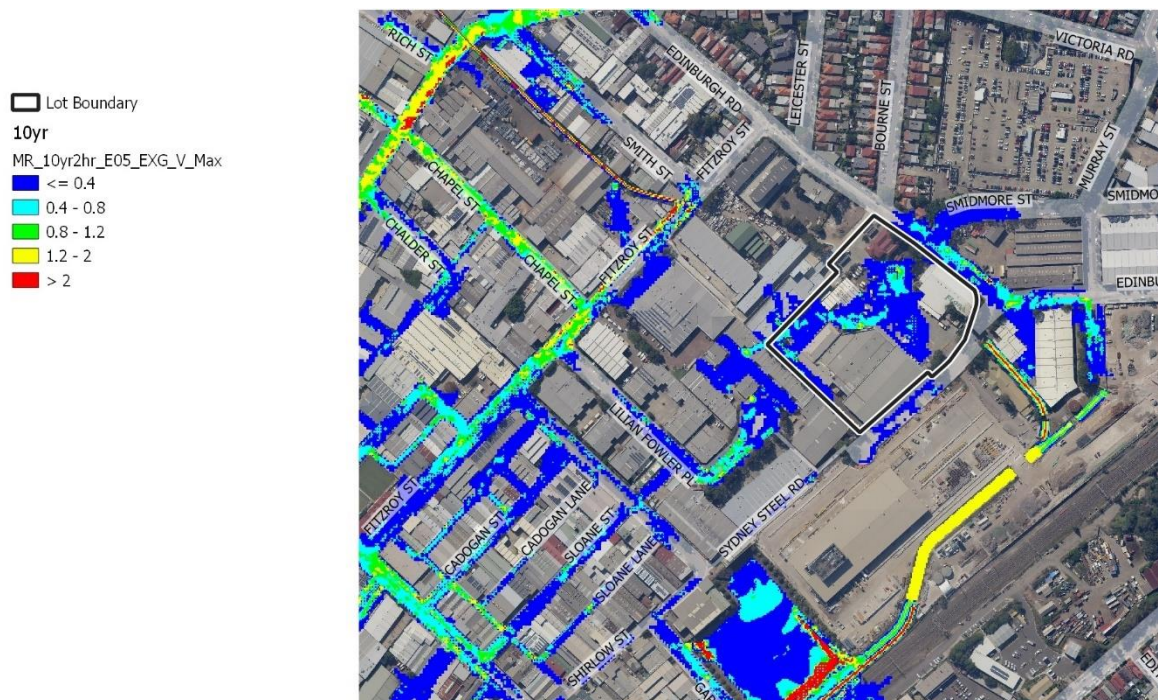


Figure 16 Pre Development 10% AEP Flood Velocity (m/s)



Lot Boundary  
 10yr  
 MR\_10yr2hr\_E05\_EXG\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard



Figure 17 Pre Development 10% AEP Flood Hazard Category

## APPENDIX A.4 PRE DEVELOPMENT 1% AEP FLOOD

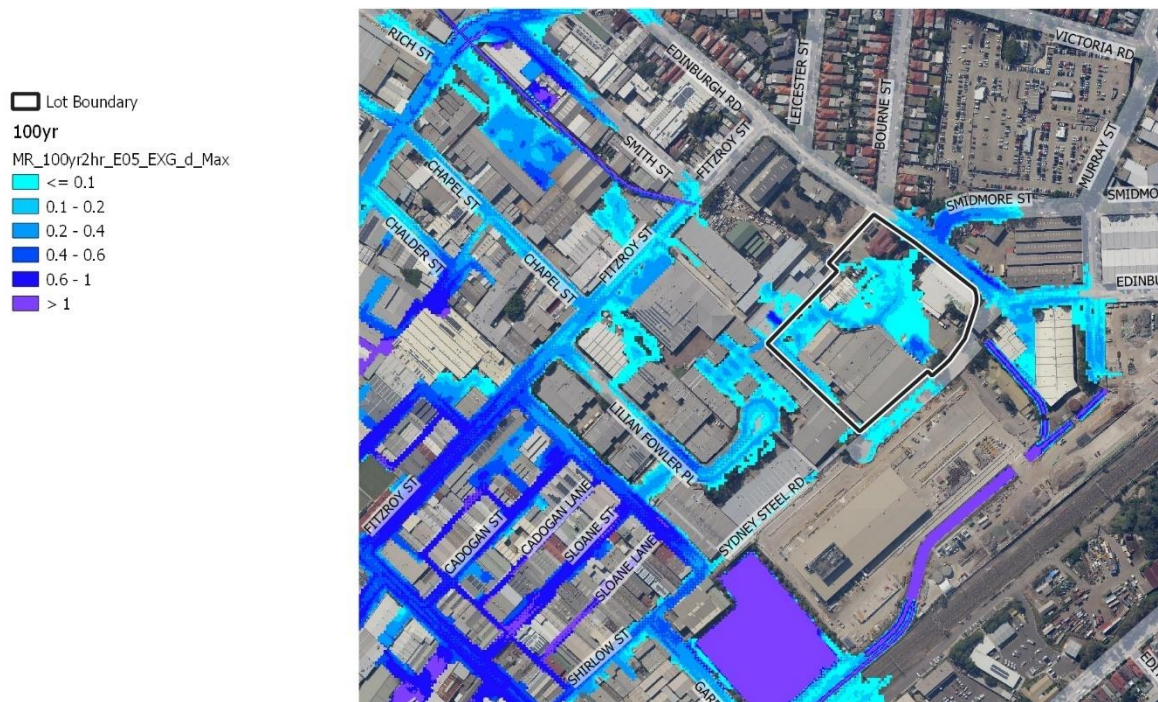


Figure 18 Pre Development 1% AEP Flood Depth (m)

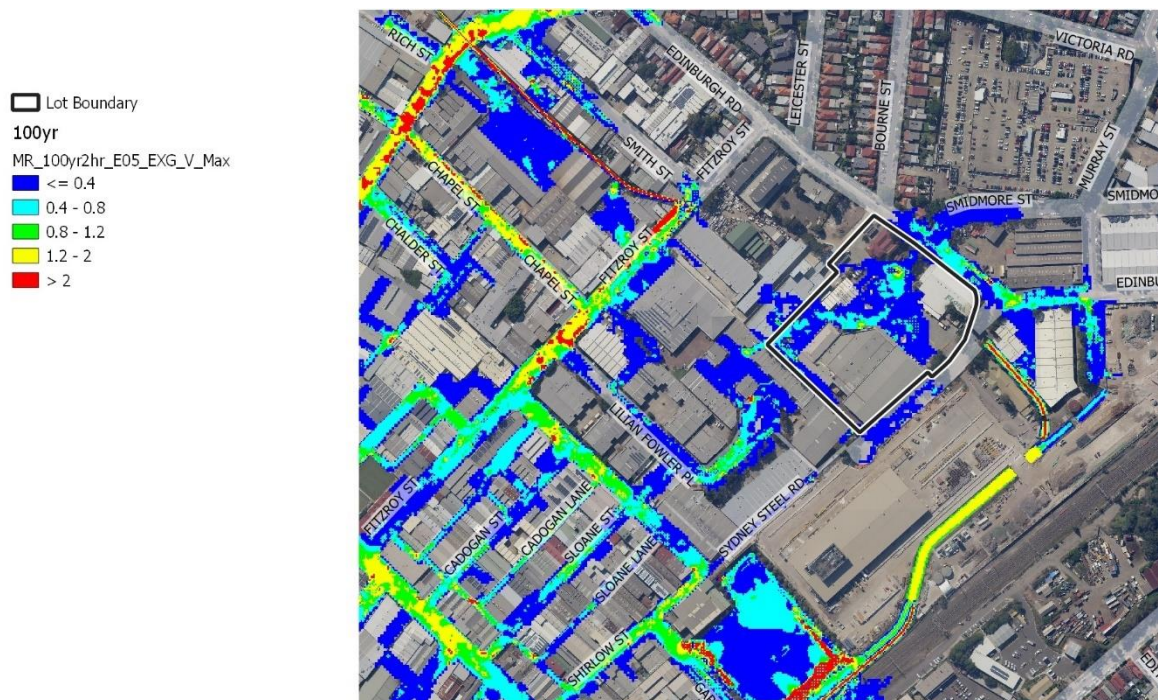


Figure 19 Pre Development 1% AEP Flood Velocity (m/s)



Lot Boundary  
 100yr  
 MR\_100yr2hr\_E05\_EXG\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard



Figure 20 Pre Development 1% AEP Flood Hazard Category

## APPENDIX A.5 PRE DEVELOPMENT PMF



Figure 21 Pre Development PMF Flood Depth (m)

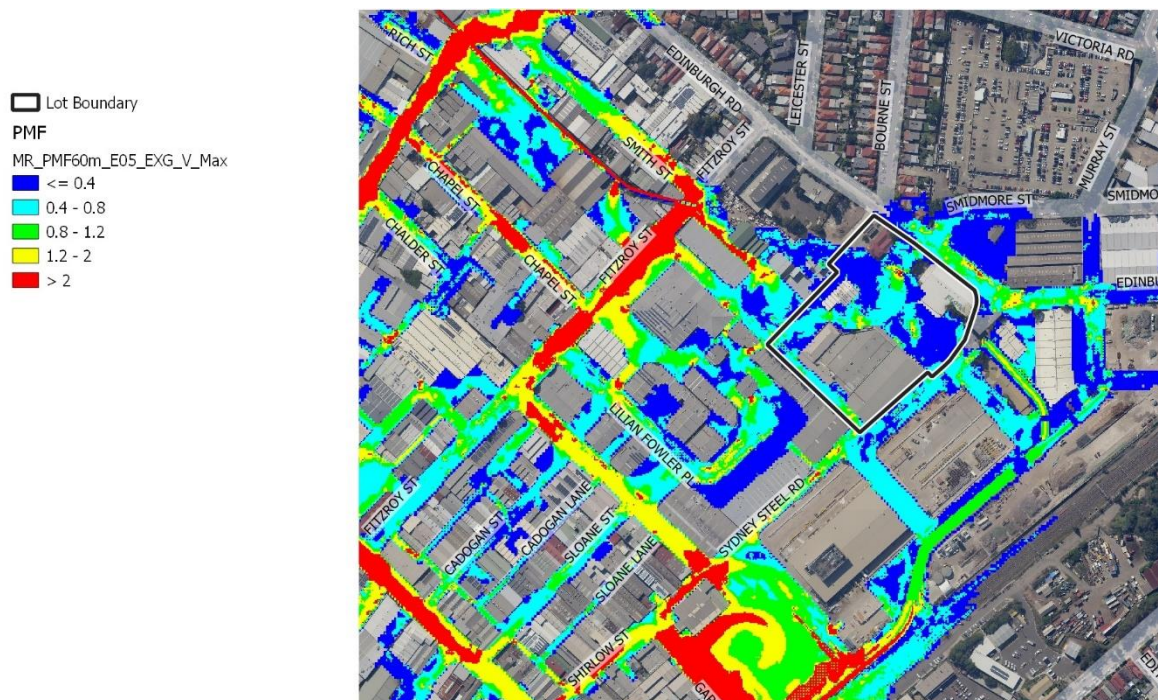


Figure 22 Pre Development PMF Flood Velocity (m/s)



- Lot Boundary  
 PMF  
 MR\_PMF60m\_E05\_EXG\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard

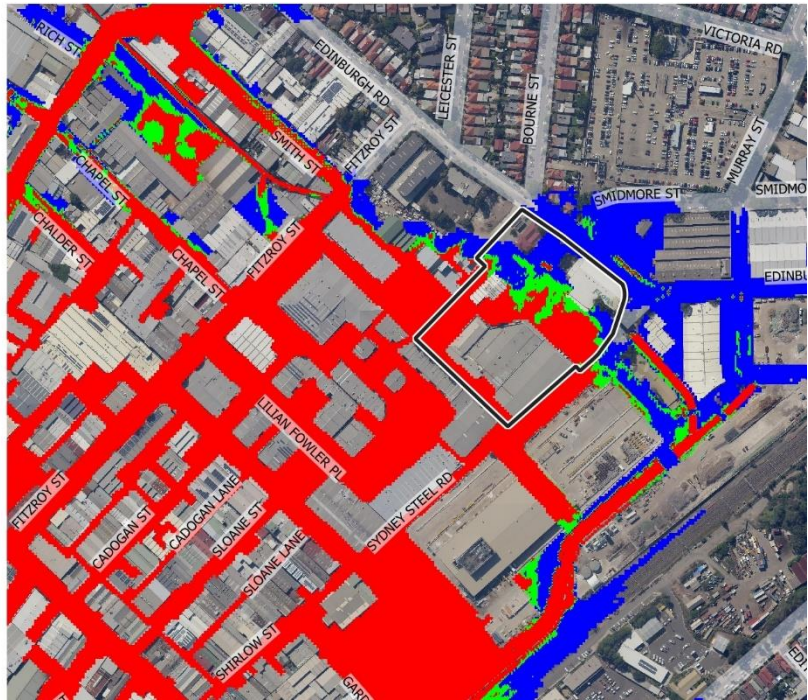


Figure 23 Pre Development PMF Flood Hazard Category

**APPENDIX B.**  
**APPENDIX B.1**

**POST DEVELOPMENT FLOOD MODEL RESULTS**  
**POST DEVELOPMENT 2 YR ARI FLOOD**

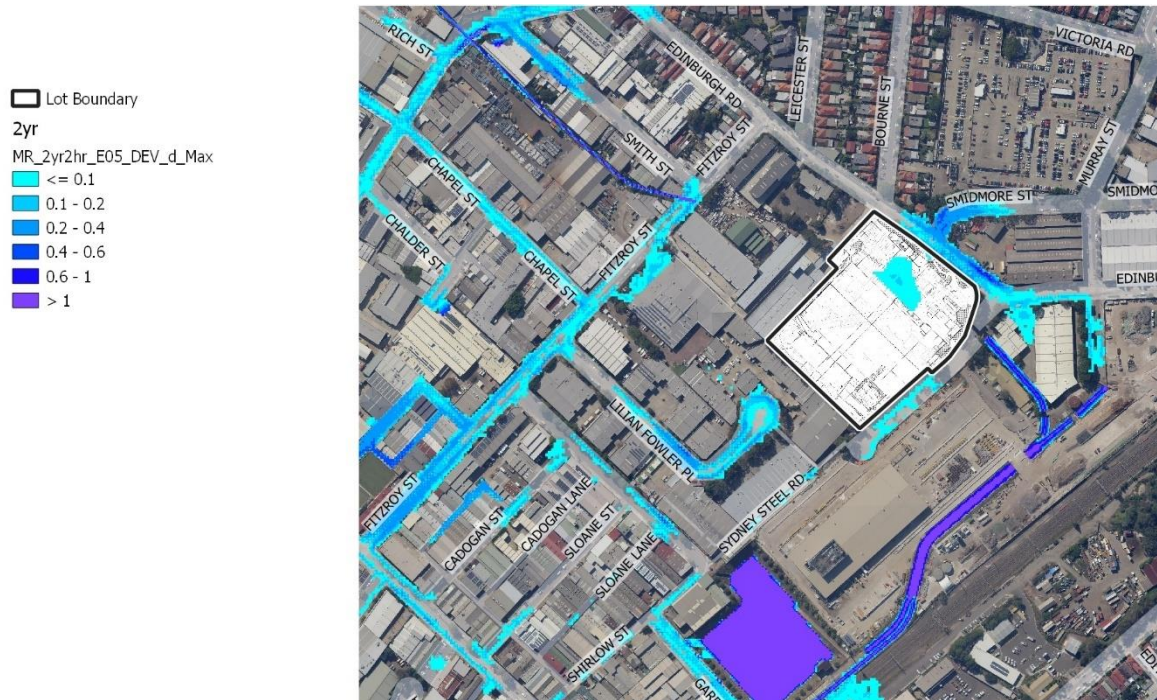


Figure 24 Post Development 2yr ARI Flood Depth (m)

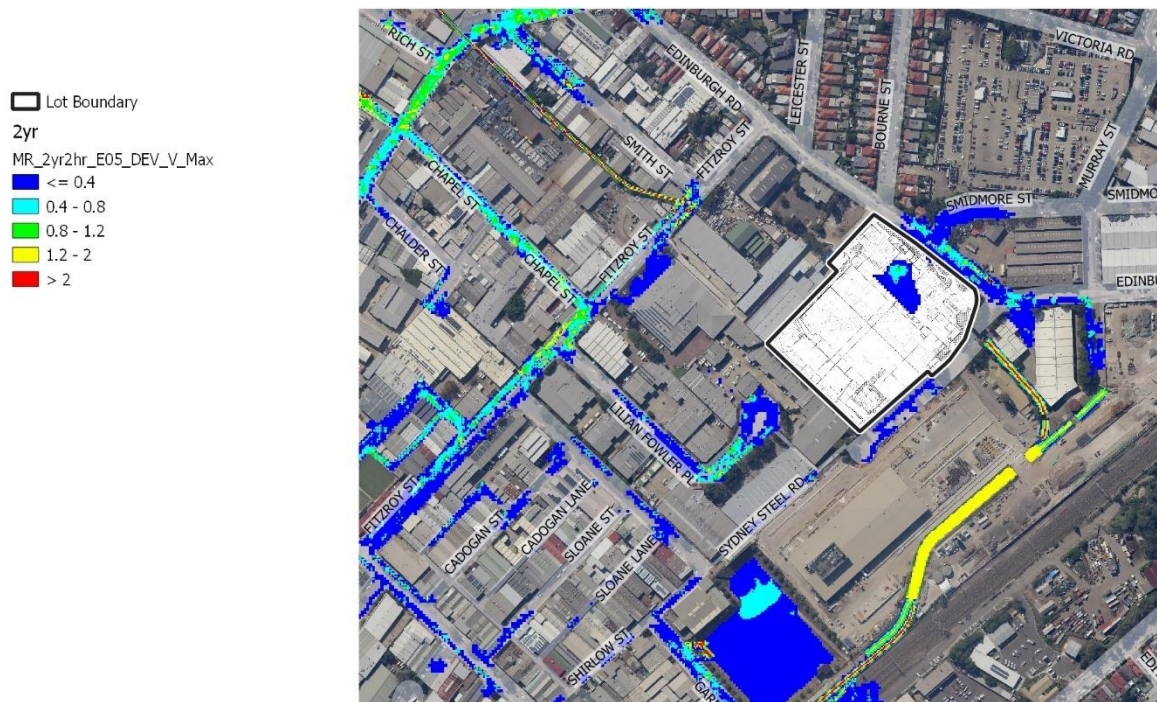


Figure 25 Post Development 2yr ARI Flood Velocity (m/s)



Lot Boundary  
 2yr  
 MR\_2yr2hr\_E05\_DEV\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard

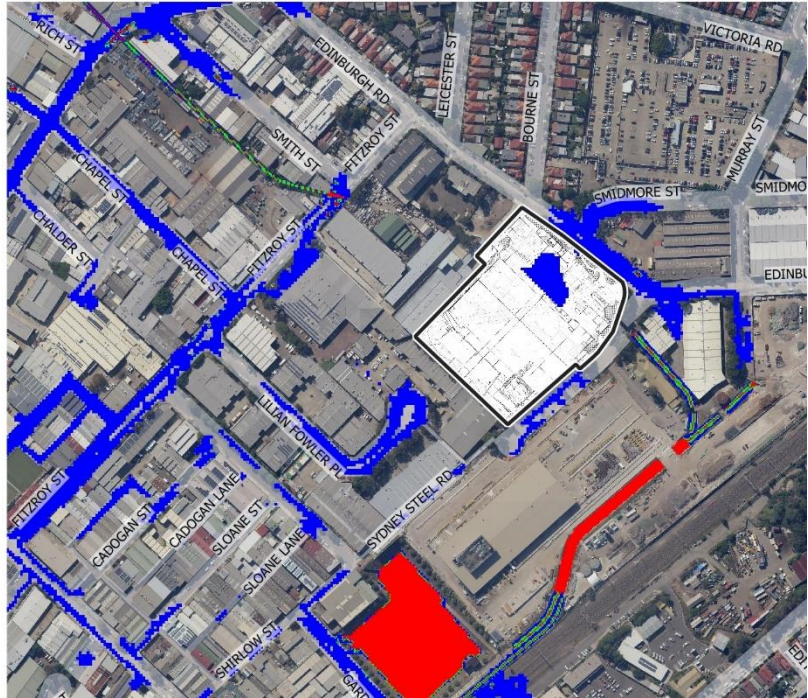


Figure 26 Post Development 2yr ARI Flood Hazard Category

## APPENDIX B.2 POST DEVELOPMENT 20% AEP FLOOD

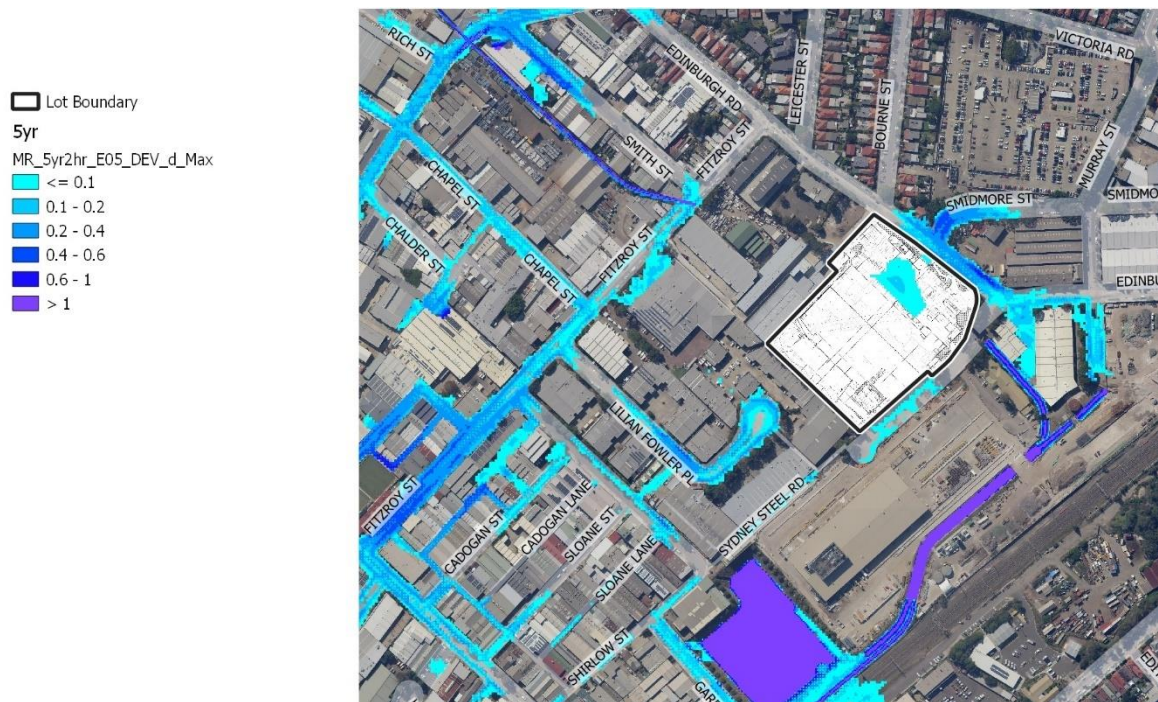


Figure 27 Post Development 20% AEP Flood Depth (m)

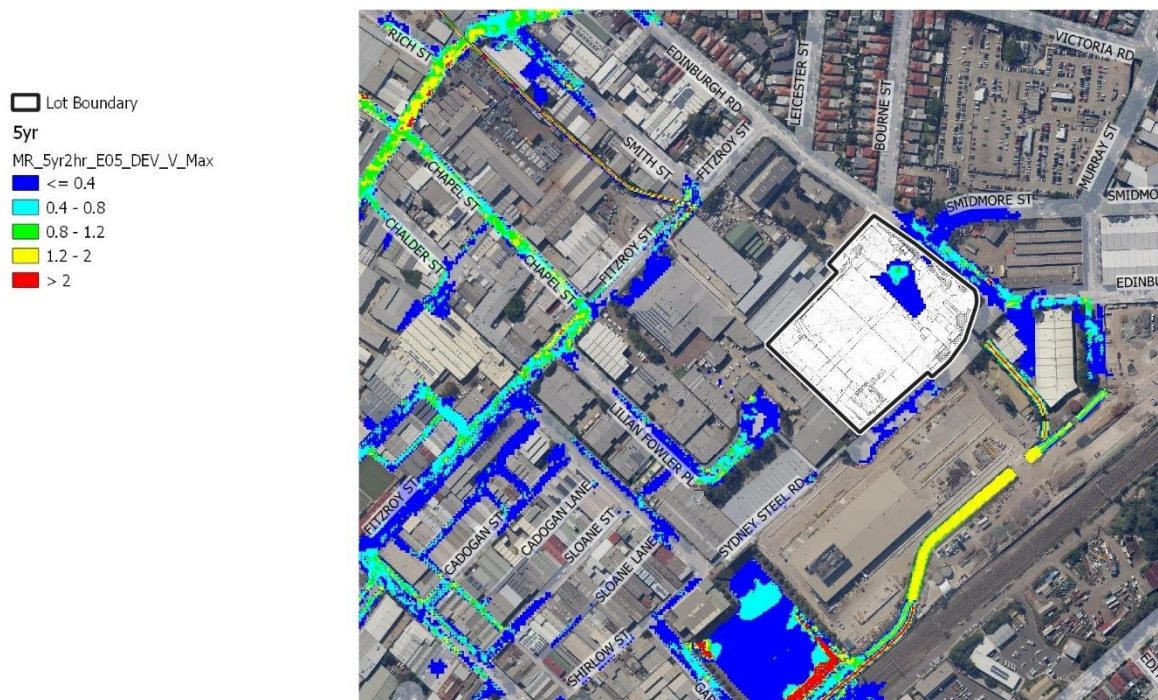


Figure 28 Post Development 20% AEP Flood Velocity (m/s)



- Lot Boundary
- 5yr
- MR\_5yr2hr\_E05\_DEV\_Z1\_Max
- Low hazard
- Intermediate Hazard
- High Hazard



Figure 29 Post Development 20% AEP Flood Hazard Category

## APPENDIX B.3 POST DEVELOPMENT 10% AEP FLOOD



Figure 30 Post Development 10% AEP Flood Depth (m)

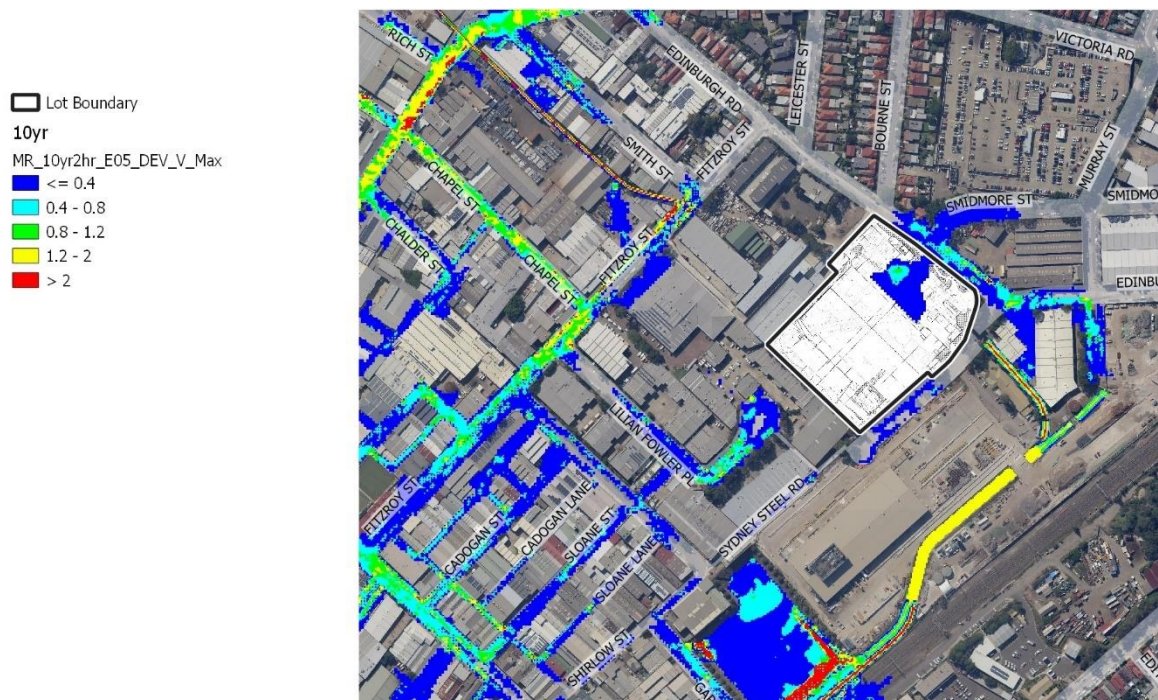


Figure 31 Post Development 10% AEP Flood Velocity (m/s)



Lot Boundary  
 10yr  
 MR\_10yr2hr\_E05\_DEV\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard



Figure 32 Post Development 10% AEP Flood Hazard Category

## APPENDIX B.4 POST DEVELOPMENT 1% AEP FLOOD



Figure 33 Post Development 1% AEP Flood Depth (m)

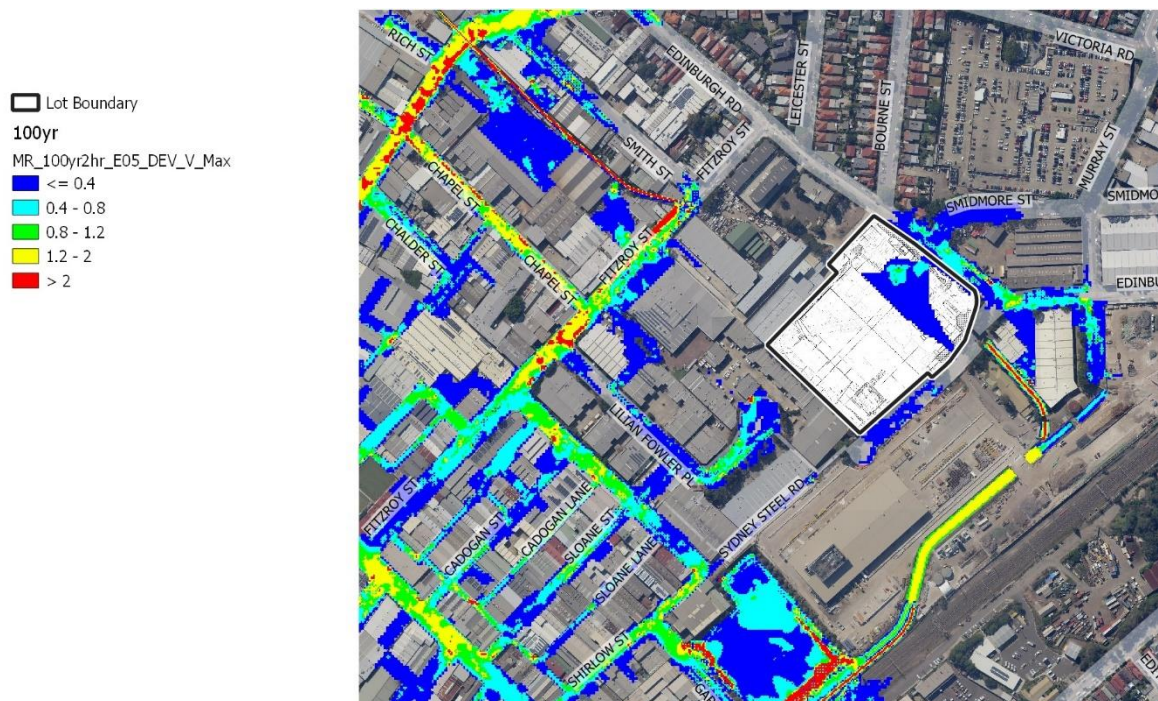


Figure 34 Post Development 1% AEP Flood Velocity (m/s)



Lot Boundary  
 100yr  
 MR\_100yr2hr\_E05\_DEV\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard



Figure 35 Post Development 1% AEP Flood Hazard Category

## APPENDIX B.5 POST DEVELOPMENT PMF

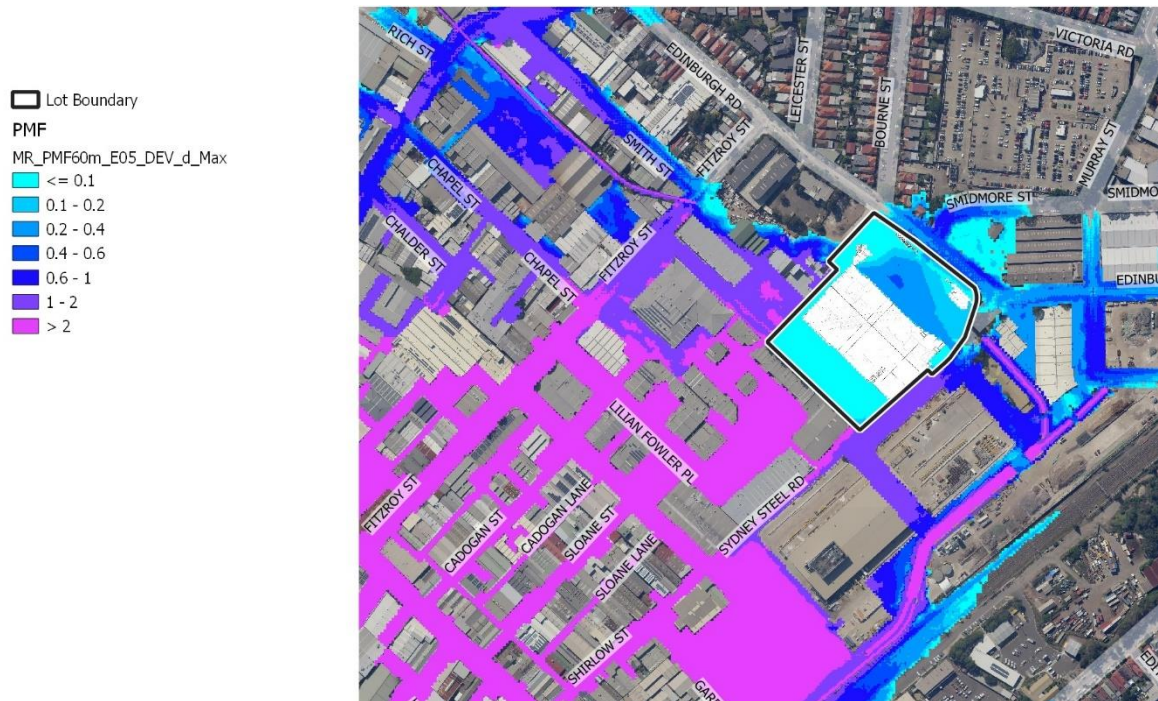


Figure 36 Post Development PMF Flood Depth (m)

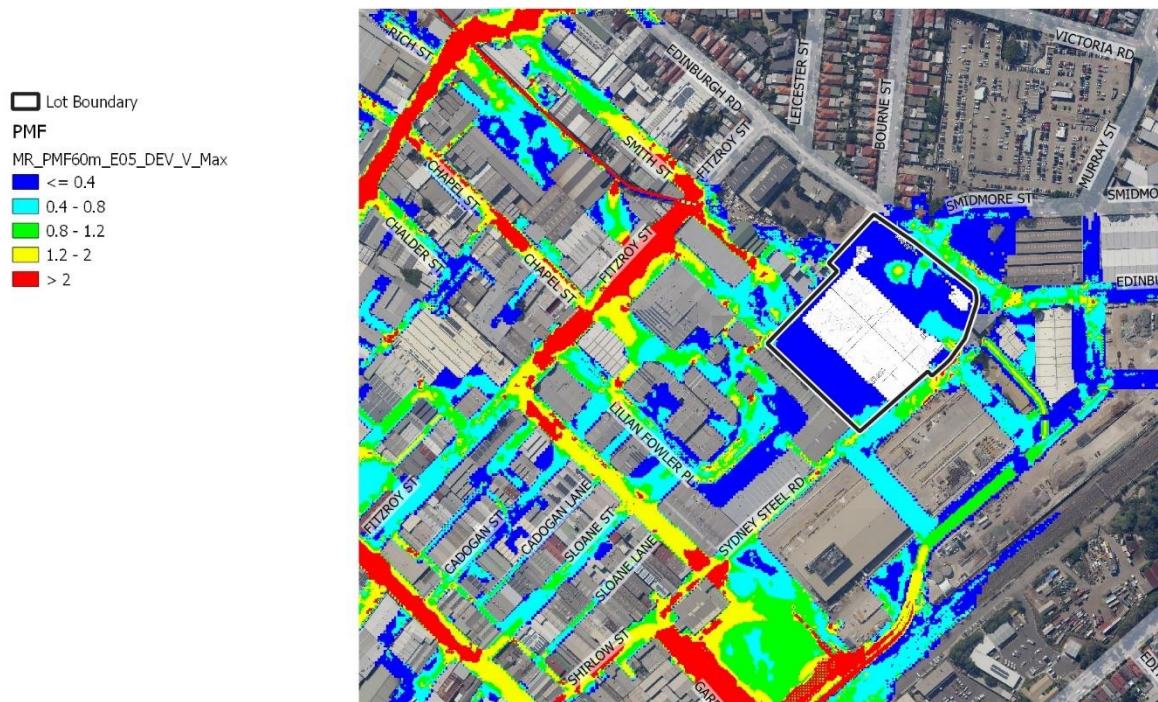


Figure 37 Post Development PMF Flood Velocity (m/s)



Lot Boundary  
 PMF  
 MR\_PMF60m\_E05\_DEV\_Z1\_Max  
 Low hazard  
 Intermediate Hazard  
 High Hazard

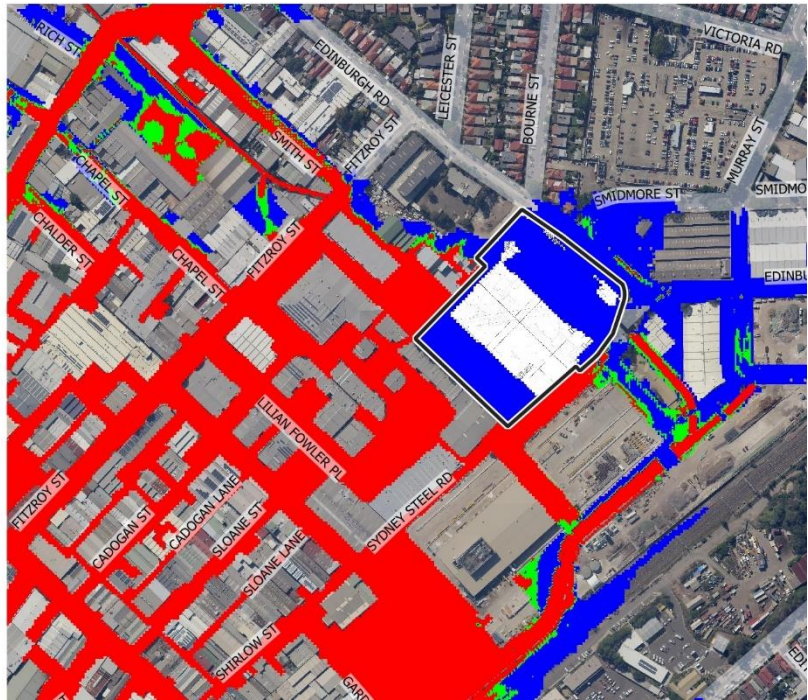


Figure 38 Post Development PMF Flood Hazard Category

## APPENDIX C.

### APPENDIX C.1

## CHANGE IN FLOOD DEPTH

### 2YR ARI CHANGE IN FLOOD DEPTH

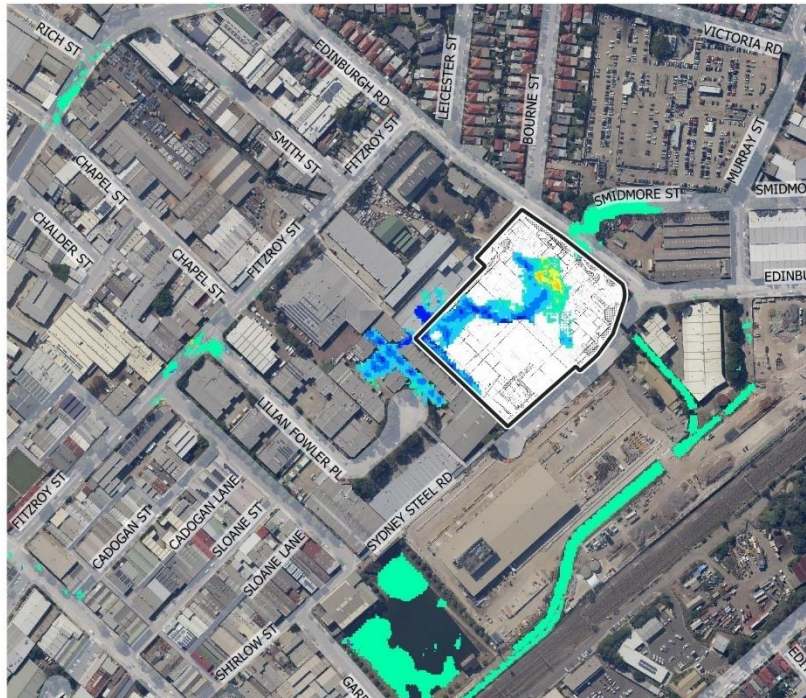
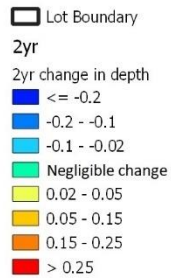


Figure 39 Post Development change in 2yr ARI flood depth (m)

## APPENDIX C.2

## 5% AEP CHANGE IN FLOOD DEPTH

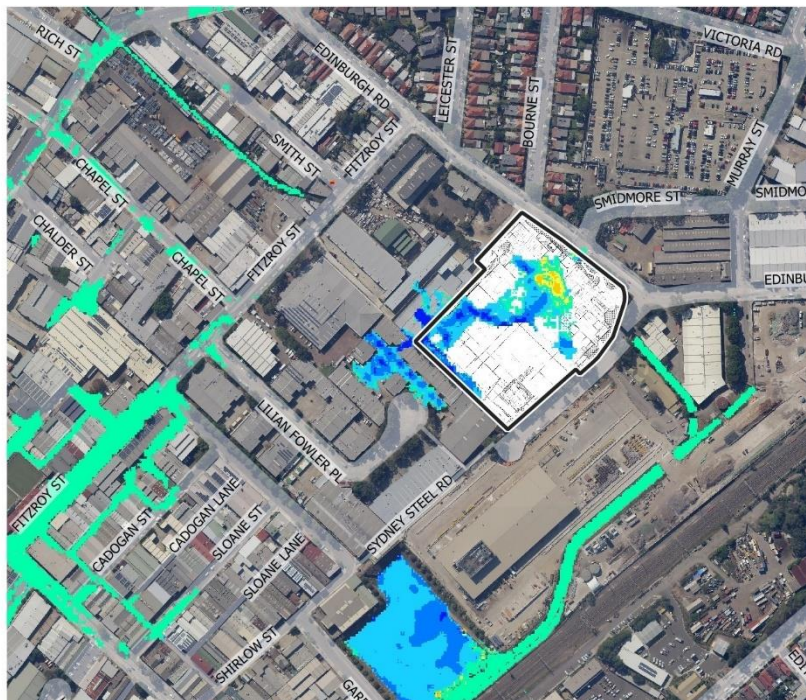
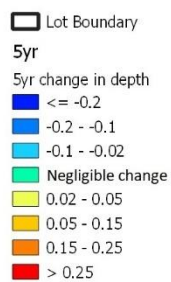


Figure 40 Post Development change in 5% AEP flood depth (m)



### APPENDIX C.3 10% AEP CHANGE IN FLOOD DEPTH



Figure 41 Post Development change in 10% AEP flood depth (m)

### APPENDIX C.4 1% AEP CHANGE IN FLOOD DEPTH



Figure 42 Post Development change in 1% AEP flood depth (m)