

Attachment A14-1

Flood Assessment and Stormwater Management Report

Concept and Planning Proposal Flood Assessment and Stormwater Management Report

Meriton, 118-130 Epsom Road, Zetland

Prepared for Karimbla Construction Services (NSW) Pty Ltd / 06 July 2022

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1.0 Introduction

Taylor Thomson Whitting (NSW) Pty. Limited has been engaged by Karimbla Construction Services (NSW) Pty Ltd to prepare a Flood Planning Assessment and Stormwater Concept to address the Stage 1 Concept DA and Planning Proposal for the proposed development at 118-130 Epsom Road, Zetland, NSW 2017 (the site).

1.1 Development Site

The development site falls within the City of Sydney Council LGA (Council) and zoned as B4 (mixed-use) based on Sydney Local Environmental Plan 2012. The site located within the Epsom Park Precinct of the wider Green Square Urban Renewal project by City of Sydney Council.

The site is located in Zetland and is bounded by Link Road to the east and Epsom Road to the south and residential/commercial buildings to the west and north, as shown in Figure 1. The site is currently occupied by industrial and commercial buildings and is surrounded by existing and proposed commercial and industrial property.



Figure 1 - Site Location (Near map)

The site area is 4.04ha (Approx.) with the highest level of 22.5 m AHD at the intersection of Link Road and Epsom Road at the north-eastern boundary, falling to 19m AHD towards the north-western boundary. With an existing easement and section of open channel running through the southern part of the Site.

1.2 Reference Documents

In preparing this report the following reference documents were used:

- Australian Rainfall and Runoff Data (2019)
- Rainfall datasets sourced from BoM
- Sydney Local Environmental Plan 2012
- Sydney Development Control Plan 2012
- Floodplain Development Manual, NSW Government 2005
- Alexandra Canal Catchment Flood Study and Floodplain Risk Management Plan, Cardno 2014
- Alexandra Canal Catchment Flood Study Model Update, WMA 2018
- City of Sydney Interim Floodplain Management Policy, 2014
- City of Sydney Epsom Park Precinct Public Domain Concept Design, 2016
- City of Sydney Epsom Park Precinct Infrastructure Concept Design, 2016

2.0 Proposed Development

The proposed development site is part of the wider Epsom Park Precinct within the Green Park Urban Renewal by City of Sydney Council.

The proposed development will include demolition of the existing buildings and development of mixed use multi-storey buildings and open space across several blocks within the site. The stage 1 concept and reference design is shown in figure 2. The development layout of the blocks is based on the concept public domain design completed by City of Sydney Council for the Epsom Park Precinct, refer to figure 3.



Figure 2 – Proposed Stage 1 Concept and Reference Design Site Layout (Mako Architecture)

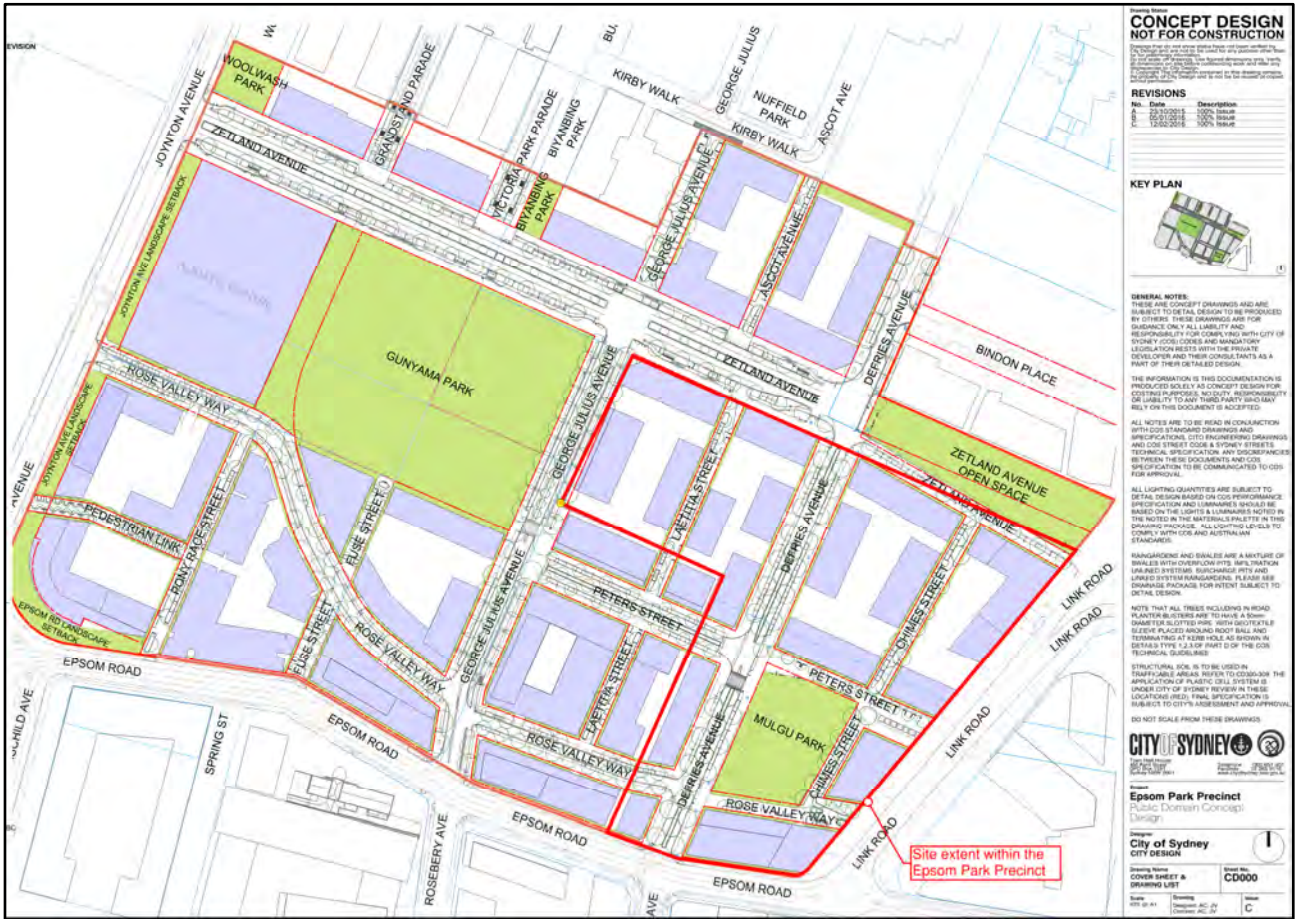


Figure 3 – Epsom Park Precinct Public Domain Concept Design Extract (City of Sydney)

3.0 General Design Principles

The stormwater and flooding concept is to be designed and constructed to comply with:

- The relevant current Australian Standards, Building Code of Australia and Design Codes
- The requirements of all relevant statutory authorities and local regulations including City of Sydney Council and Sydney Water requirements and specifications

The stormwater design and flooding planning is based on the concept design of the public domain and infrastructure design completed by City of Sydney, this includes the Green Square Trunk drainage upgrades from Fuse Street to Link Road. The City of Sydney precinct wide road design and overland flow concept is shown in figure 4 and the stormwater drainage concept is shown in figure 5, an Extract of the Green Square Trunk Drainage Design is shown in Figure 6. These figures are also included in Appendix A.

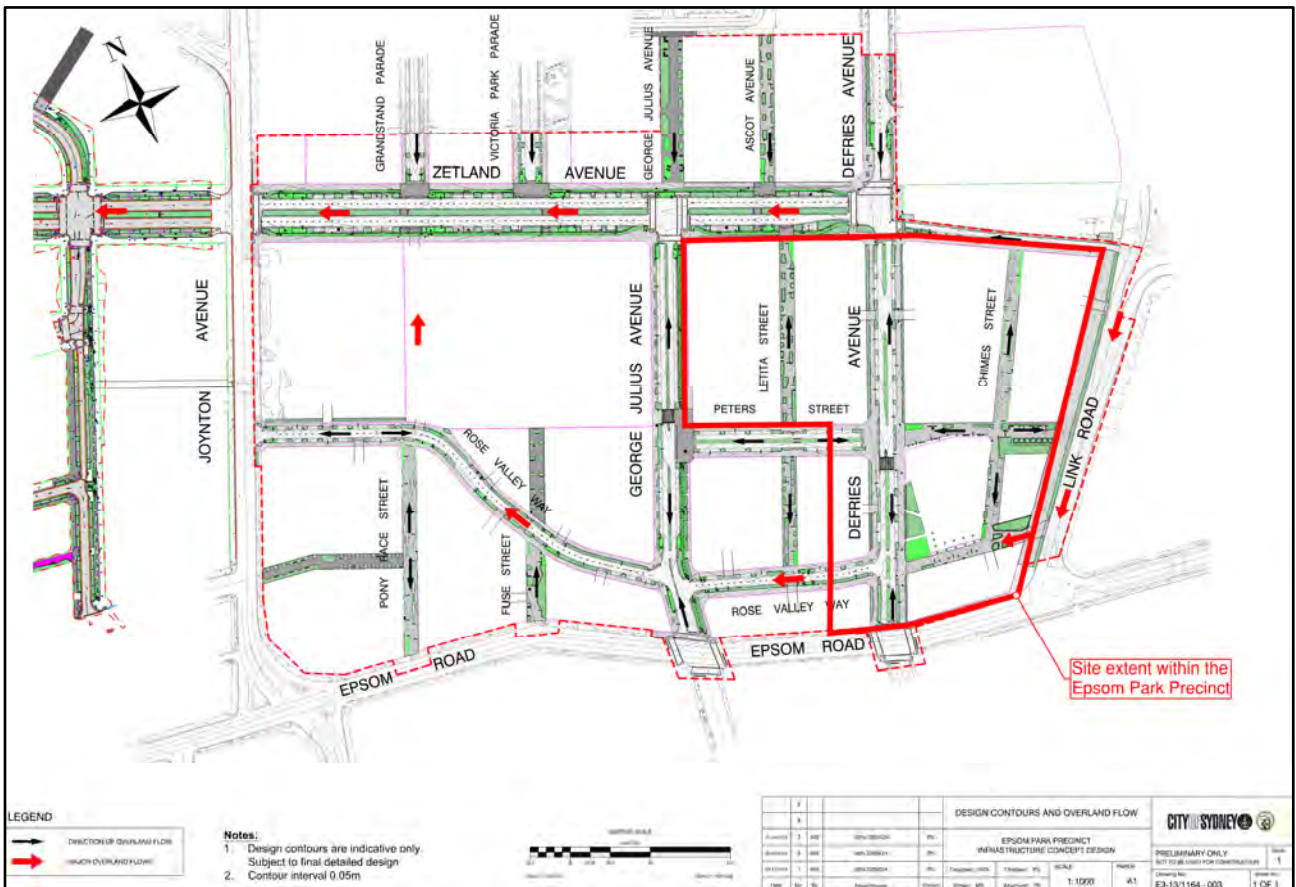


Figure 4 – Epsom Park Precinct Road and Overland Flow Concept Design (City of Sydney)

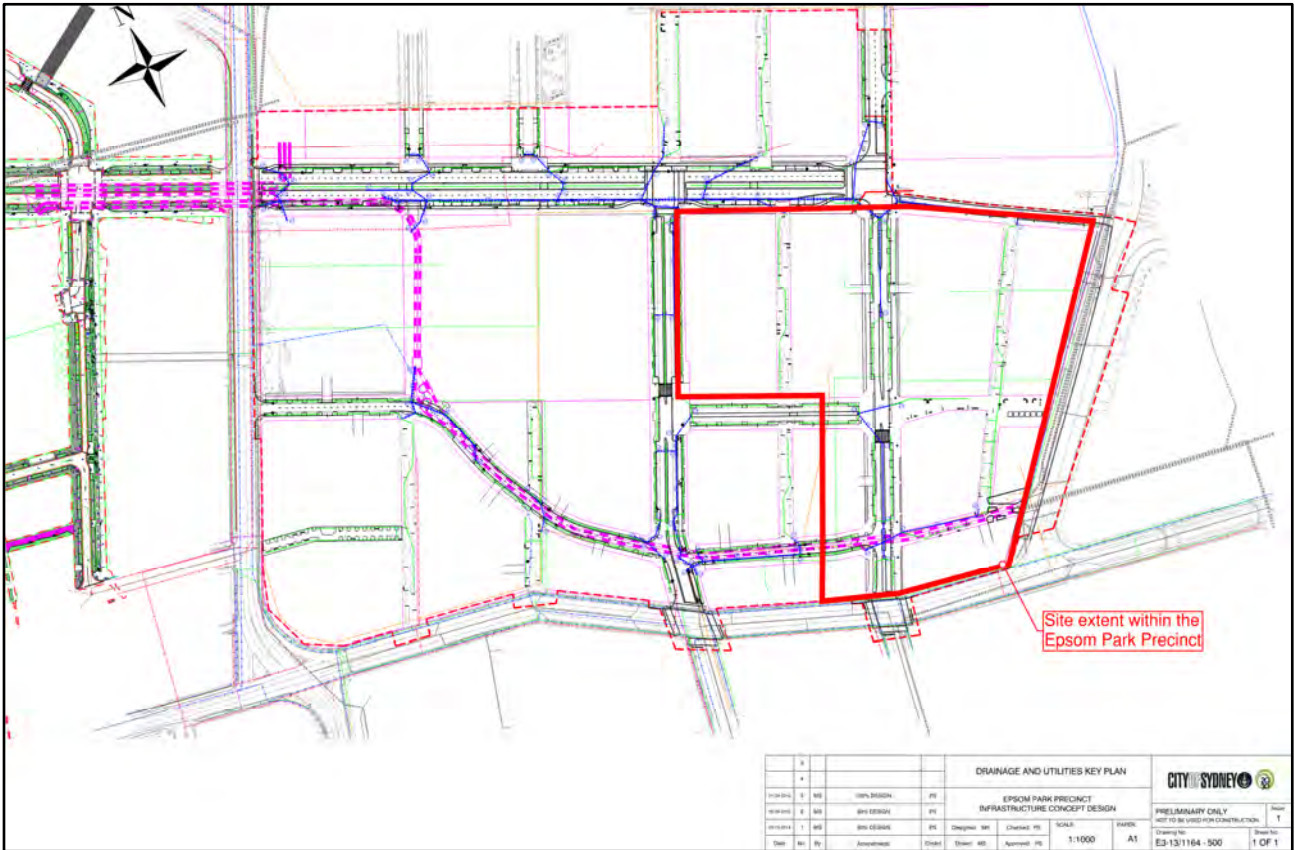


Figure 5 – Epsom Park Stormwater Concept Design (City of Sydney)

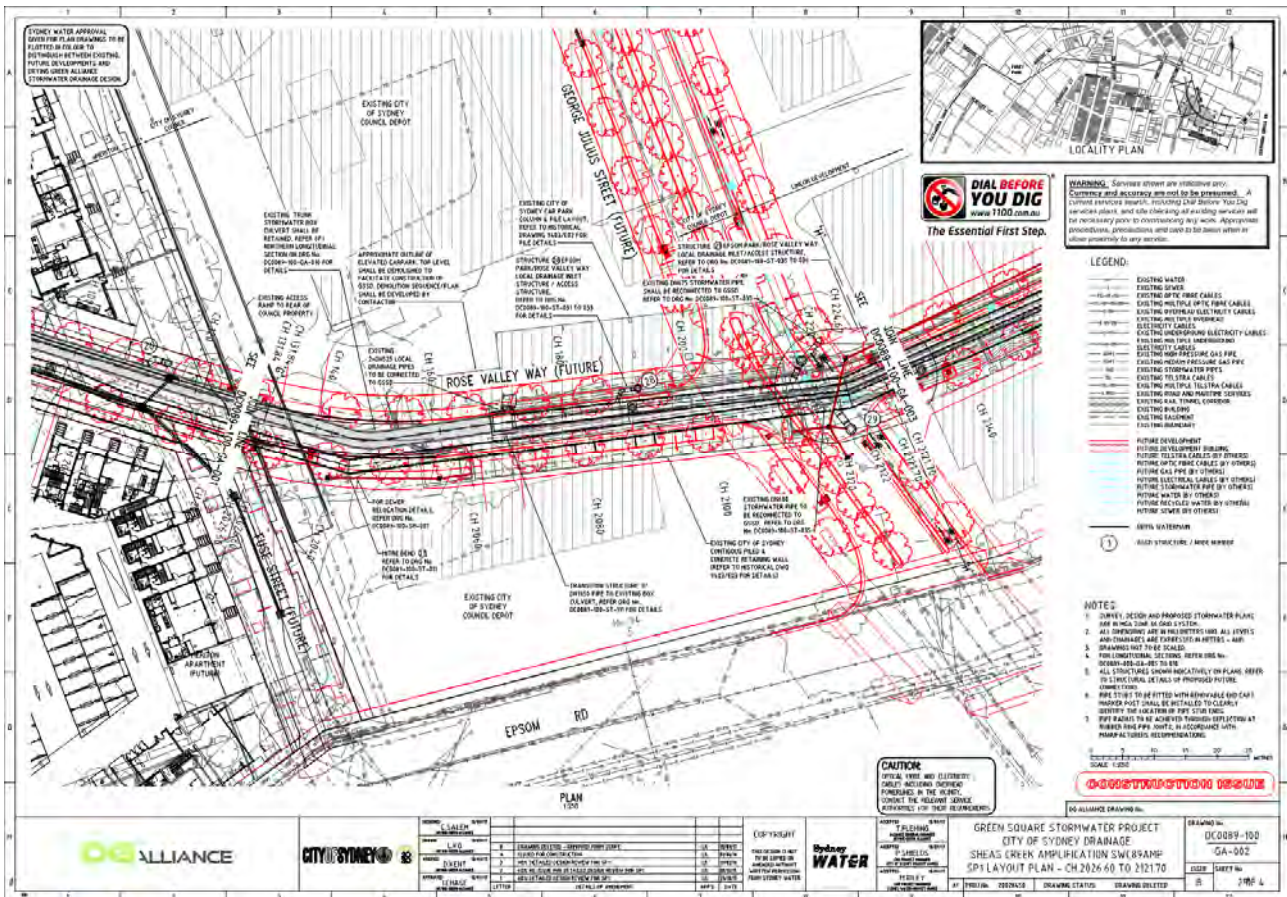


Figure 6 – Extract of Green Square Trunk Drain from Fuse Street to Link Road Design (City of Sydney)

4.0 Stormwater Concept

4.1 Proposed Sub-Catchments

The concept road and stormwater design has already been completed by Council as part of the Epsom Park Precinct Concept, refer to Section 3.0. The proposed stormwater concept refers to the private parcels of land within the development site and does not include the public domain areas.

The proposed development site will consist of smaller sub-catchments as shown in Figure 7. The proposed development includes 10 sub-catchments with 10 separate discharge points into the Council stormwater system. The discharge points for each sub-catchment are located at the low points of each catchment and connect to Council's stormwater system based on Council's Epsom Park Precinct Concept design.



Figure 7 – Proposed Sub-Catchment Plan and Points of Discharge to the Council Stormwater System

4.2 Stormwater Quantity

On Site Detention (OSD) and Permissible Site Discharge (PSD) requirements have been received from Sydney Water upon request (refer to Appendix B), and are based on the proposed sub-catchment plan and areas shown in figure 6. Further refinement and updates to these values will be required during the future design development stages.

The stormwater concept assumes that each sub-catchment will have its own dedicated OSD tank. Piped connections from the OSD tanks will be connected to the proposed pits located at the downstream of each catchment as shown in Figure 6 (Blue arrows). OSD tanks are to be designed to contain and control the site discharge flow from the site for storms up to and including the 100-year ARI storm, with an overflow from the tank to the street system in the event of blockage or storms exceeding the 1% AEP.

Table 1 - Catchment Areas with OSD & PSD Requirements

	Impervious (sq.m)	Pervious(sq.m)	Catchment Area (sq.m)	OSD/PSD Requirement	
				OSD (cu m)	PSD (L/s)
Cat1	2096	524	2620	23	91
Cat2	1117	279	1396	13	48
Cat3	408	3671	4079	102	108
Cat4	1585	396	1981	18	69
Cat5	3850	962	4812	42	167
Cat6	2191	548	2739	24	95
Cat7	73	18	91	45	179
Cat8	4161	1040	5201	46	181
Cat9	4732	1183	5915	52	206
Cat10	459	115	574	6	20
Total	20670	8737	29407	371	1164
Existing Total	26466 (approx.)	2941 (approx.)	29407		

4.3 Stormwater Quality

Stormwater management for the proposed development will have a net beneficial effect on run-off quality as compared with existing conditions. The existing developed site consists of mostly impervious catchments with no known stormwater quality improvement devices. Approximately 90% of the total existing site area consists of roof area and external parking and roads which have high pollutant loads including oils and hydrocarbons. The proposed development will reduce the impermeable areas within the development site from approximately 26,466 sq.m to 20,670 sq.m. This will effectively reduce the source pollutant loads produced within the development site. The development is required to meet Council's Stormwater Quality targets as shown in Figure 8 below.

Pollutant	Average annual pollutant load reduction objective (%) ¹
Gross pollutants (>5 mm)	90
Total suspended solids	85
Total phosphorous	60
Total nitrogen	45

Figure 8 – City of Sydney Council Stormwater Quality Treatment Targets

4.3.1 MUSIC Modelling

The effectiveness of the combination of treatment train measures has been assessed using the numerical modelling within MUSIC. MUSIC simulates the performance of a group of stormwater management measures, configured in series or in parallel to form a “treatment train” against historic rainfall event data sets. It is the industry-standard water quality modelling software developed by the MUSIC development team of the Cooperative Research Centre for Catchment Hydrology (CRCCH).

MUSIC modelling has been completed for each sub catchment to confirm the WSUD measures required to achieve Council’s water quality targets prior to discharge to the Council stormwater system. The Music model schematic is show in Figure 9. The MUSIC modelling will require updating during future design development stages to align with updated catchments and impervious areas, and proposed landscape and consideration of other WSUD methods available (e.g. green roofs, bioretention basins, rainwater tanks etc)

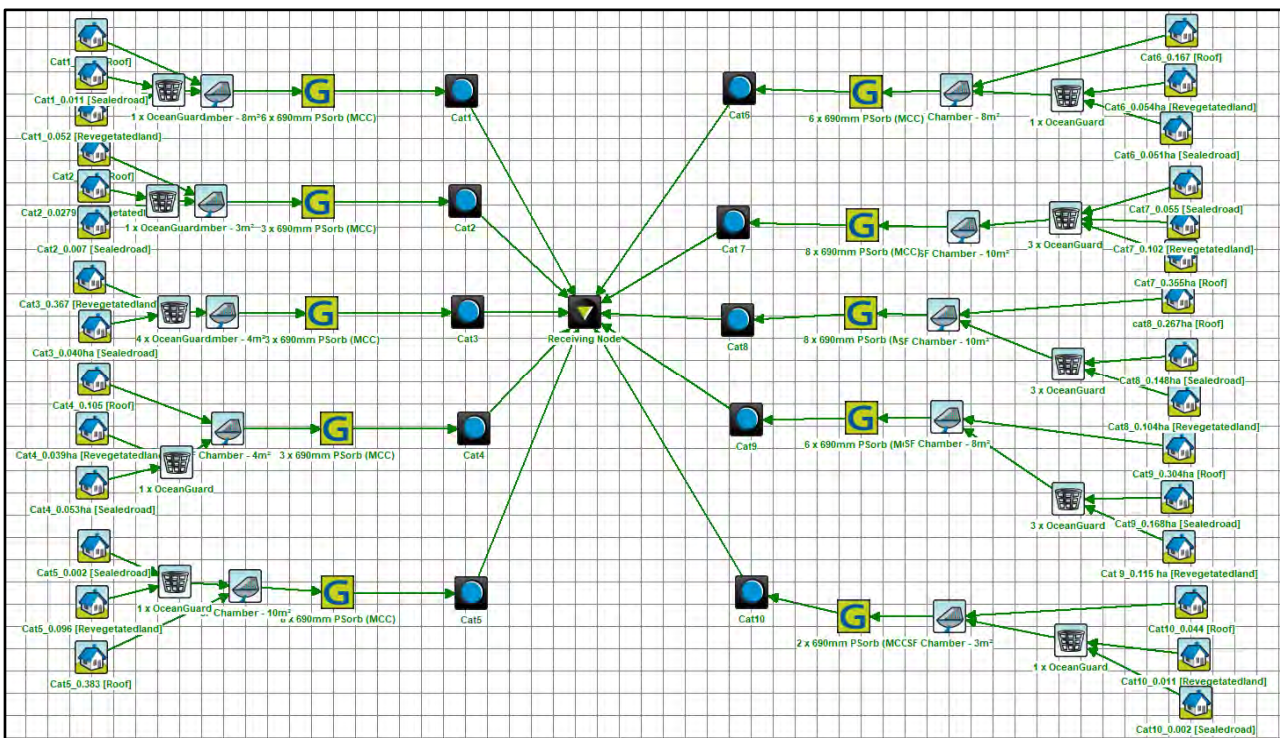


Figure 9 – MUSIC Model Schematic

Table 2 shows the number of WSUD measures required, using gross pollutant traps and stormwater filter cartridges, for each sub catchment. The combined water treatment results extracted from MUSIC model are shown in Figure 10.

Table 2 - Recommended WSUD measures

Recommended WSUD Measures (Ocean Protect or equivalent)		
	Ocean Guard (High Flow Bypass of 20 L/s per each)	Storm Filter (690mm PSorb)
Cat 1	1	6
Cat 2	1	3
Cat 3	4	3
Cat 4	1	3
Cat 5	1	8
Cat 6	1	6
Cat 7	3	8
Cat 8	3	8
Cat 9	3	6
Cat 10	1	2
Total	19	53

	Sources	Residual Load	% Reduction
Flow (ML/yr)	34.2	34.2	0
Total Suspended Solids (kg/yr)	3020	378	87.5
Total Phosphorus (kg/yr)	7.88	2.48	68.6
Total Nitrogen (kg/yr)	73.4	39.6	46
Gross Pollutants (kg/yr)	731	0	100

Figure 10 – MUSIC Model Combined Treatment Train Result

4.4 Proposed Stormwater Concept Plan

A summary of the proposed stormwater quantity and stormwater quality concept as discussed in Sections 4.2 and 4.3 is shown on the stormwater concept plan in figure 10 below and also included in Appendix C.



Figure 11 – Proposed Stormwater Concept Plan

5.0 Flood Assessment

5.1 Available Data and Flood Study

This flood assessment is based on the *Alexandra Canal Catchment Flood Study, Cardno 2014* and flood model provided by City of Sydney. This 2014 flood study was updated to include significant, infrastructure and development planned under several urban renewal projects within the catchment. The update also assessed the cumulative impact of recent completed development to determine the flood behaviour under the Ultimate Development 2017 Scenario. The updated flood model and report *WMA Alexandra Canal Catchment – Flood Study Model Update* was completed by WMA in 2018. This flood study and flood model provides the basis for the flood assessment within this report.

The site is located toward the eastern and upper area of the Alexandra Canal Catchment, refer to figure 12. The existing Council Flood model shows that the development site is flood affected by overland flow approaching the site from the east. However, the existing model does not include major infrastructure planned as part of City of Sydney urban renewal projects as discussed in the following section. The existing Council 1% AEP flood depths around the development site are shown in figure 13.

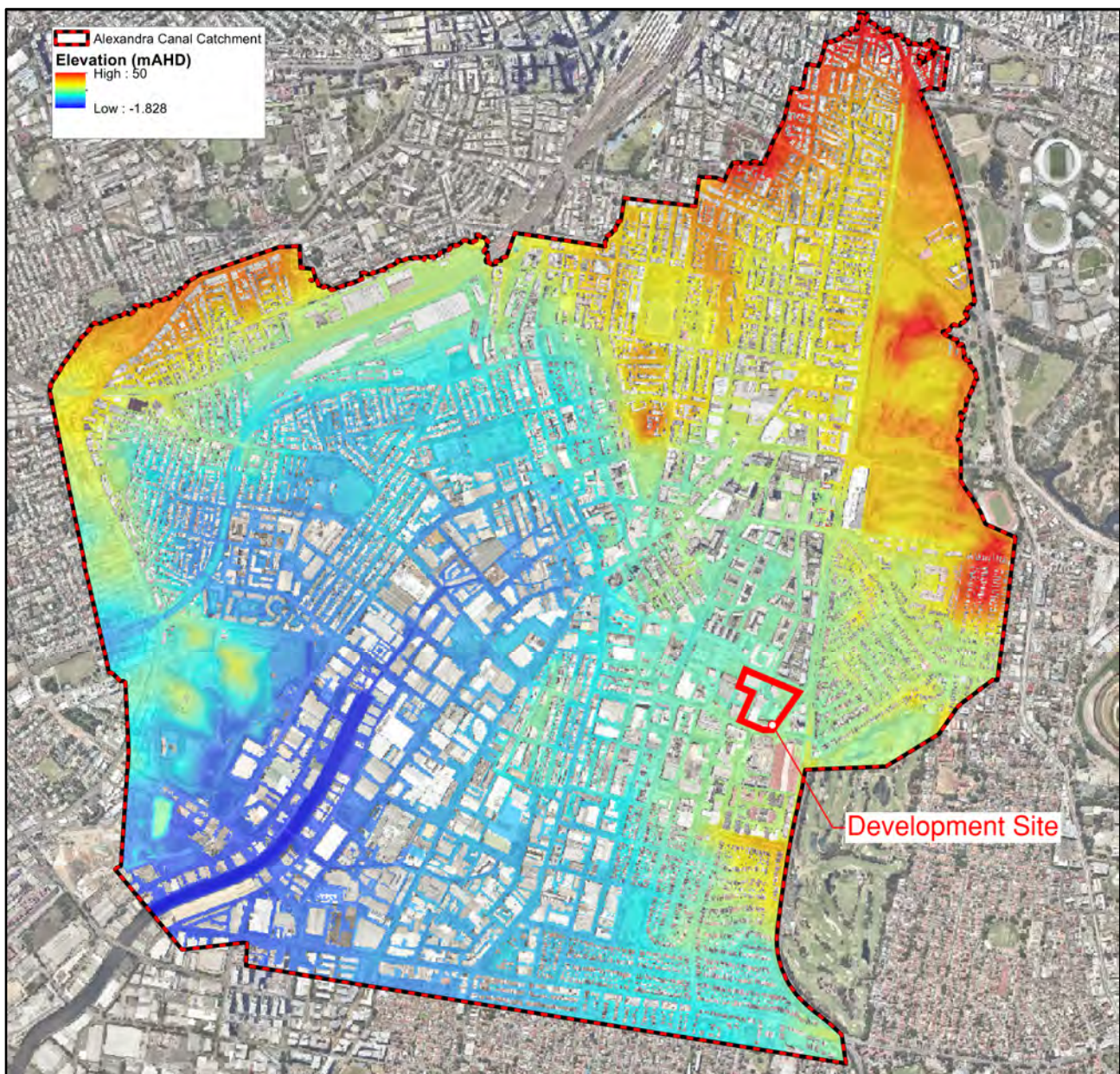


Figure 12. Extract of Fig 4b From 2018 Alexandra Canal Flood Study Showing Site Location and Catchment Topography



Figure 13. Existing Council 1% AEP Flood Depths Around The Development Site

5.2 Updates to Council's Alexandra Canal Flood Study

The 2018 updated flood study included several planned urban renewal projects including Epsom Park Precinct. However, the extent of the Epsom Park Precinct considered in the 2018 flood study excluded the south eastern area including this development site, refer to figure 14. The study also excluded the full length of the Green Square Trunk Drainage (GSTD) Upgrade.

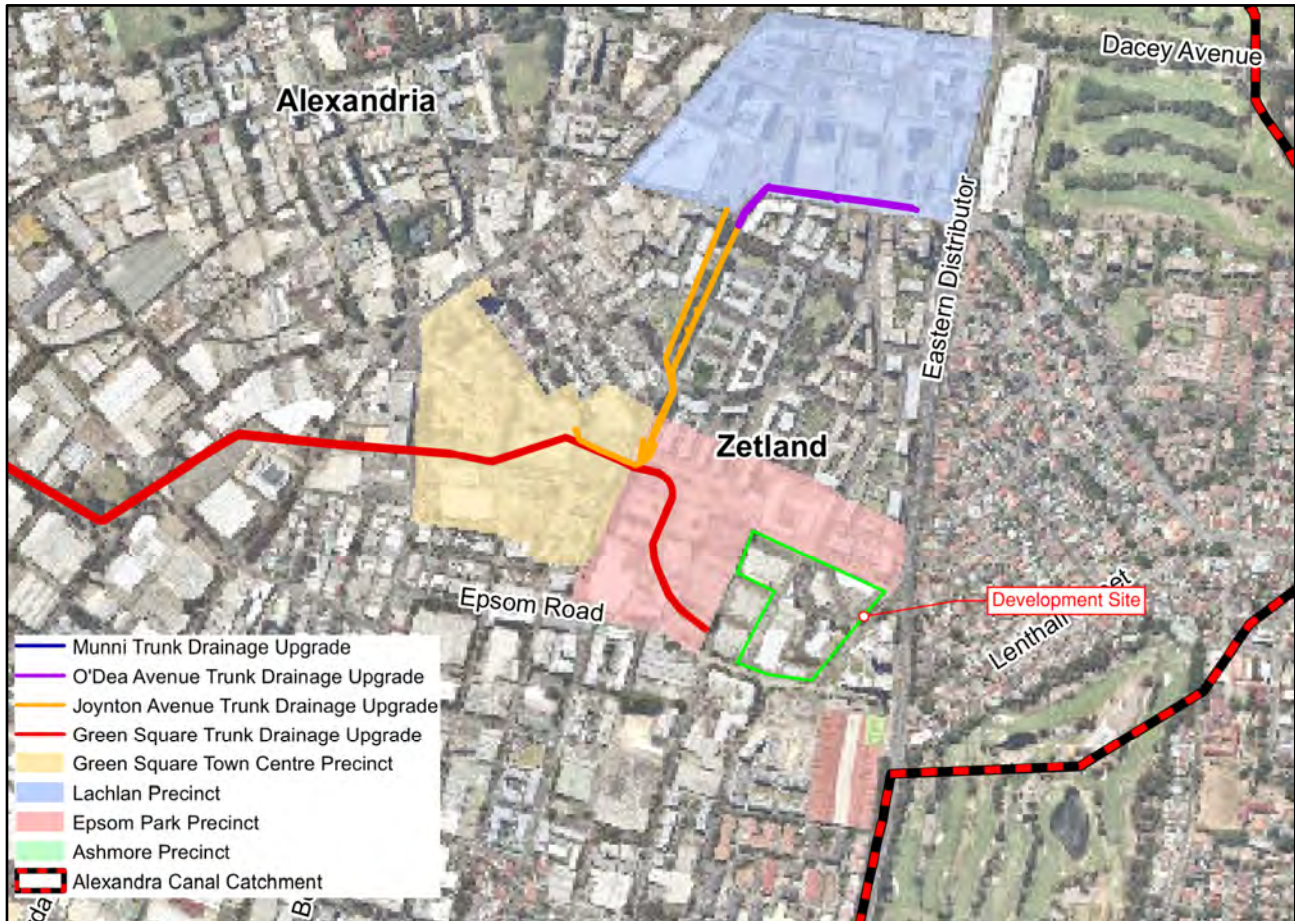


Figure 14. Extract of Fig 1. From 2018 Alexandra Canal Flood Study Showing Updated Precinct Areas and Major Infrastructure Included

Council have developed a concept design for the south eastern portion of Epsom Park Precinct including the road alignment and levels, stormwater and additional extent of the GSTD to the Link Road, refer to Section 3.0 and figures 4 and 5. This concept design forms the basis of this development and has been used to update the Council flood model. The 2018 WMA flood model has been specifically updated to include the following:

- New road layout, surface levels and land parcels as shown on City of Sydney Epsom Park Precinct Proposed Road & Drainage Layout drawings E3-13/116 000-109.
- The DEM of the Epsom Park Precinct concept road design was provided by City of Sydney and used in the updated model.
- Council's concept stormwater layout, pits and pipes within the road network were added to the Model
- Green Square Trunk Drainage from Fuse St (future) to Link Road, based on Councils drawings DC0089-100 GA-002 to GA010

5.3 Updated Flood Results

The existing Council flood model was updated as detailed in Section 5.2 and shows that there is significantly less flooding across the site in the 1% AEP. The reduced extent of flooding is mainly due to the provision of a continuous overland flow path through the road network from Link Road, and also due to the stormwater pipe capacity of the street drainage and the additional extent of the Green Square Trunk Drainage. The 1% AEP flood depths and levels are shown in figure 15. The PMF depths and levels are shown in figure 16.

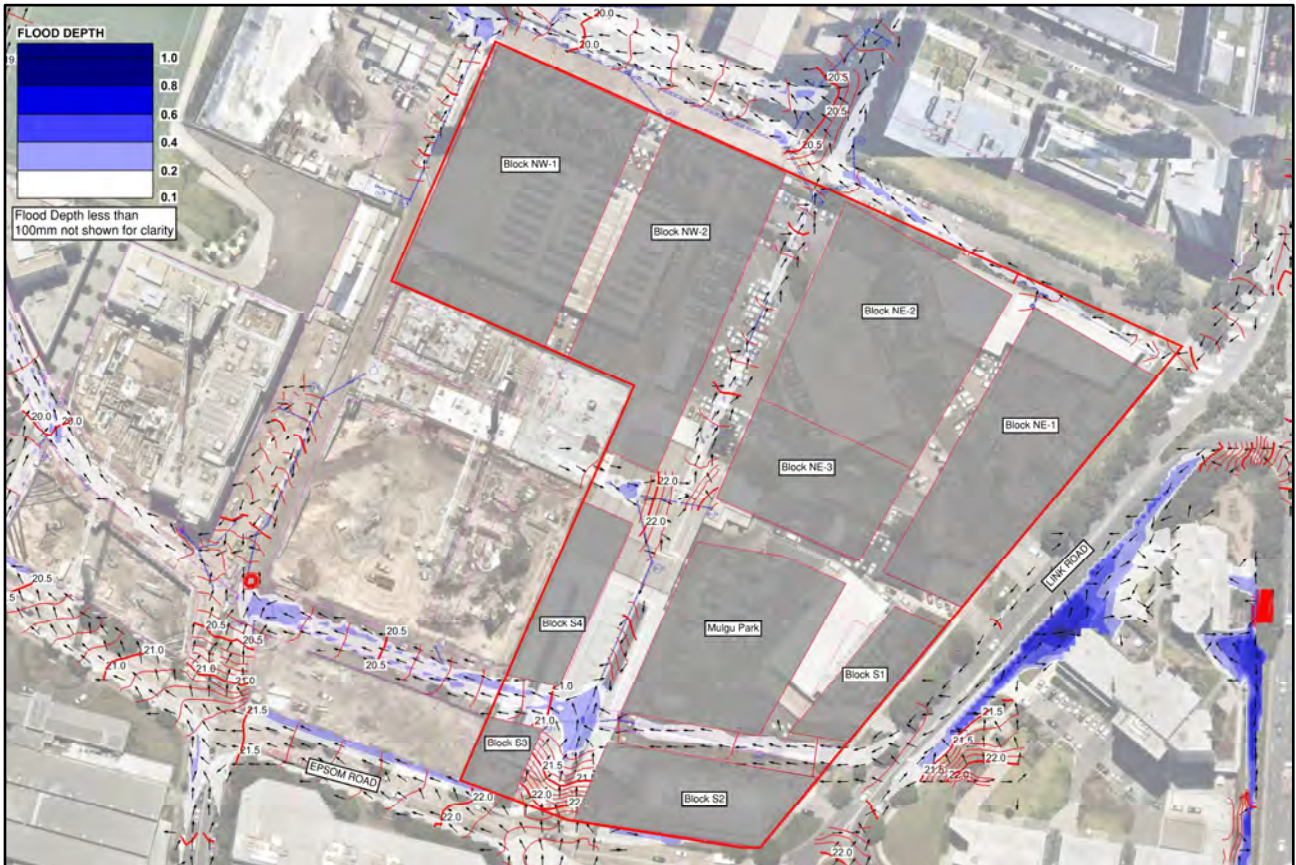


Figure 15. Updated 1% AEP Flood Depths and Levels Around The Development Site (Also included in Appendix D)

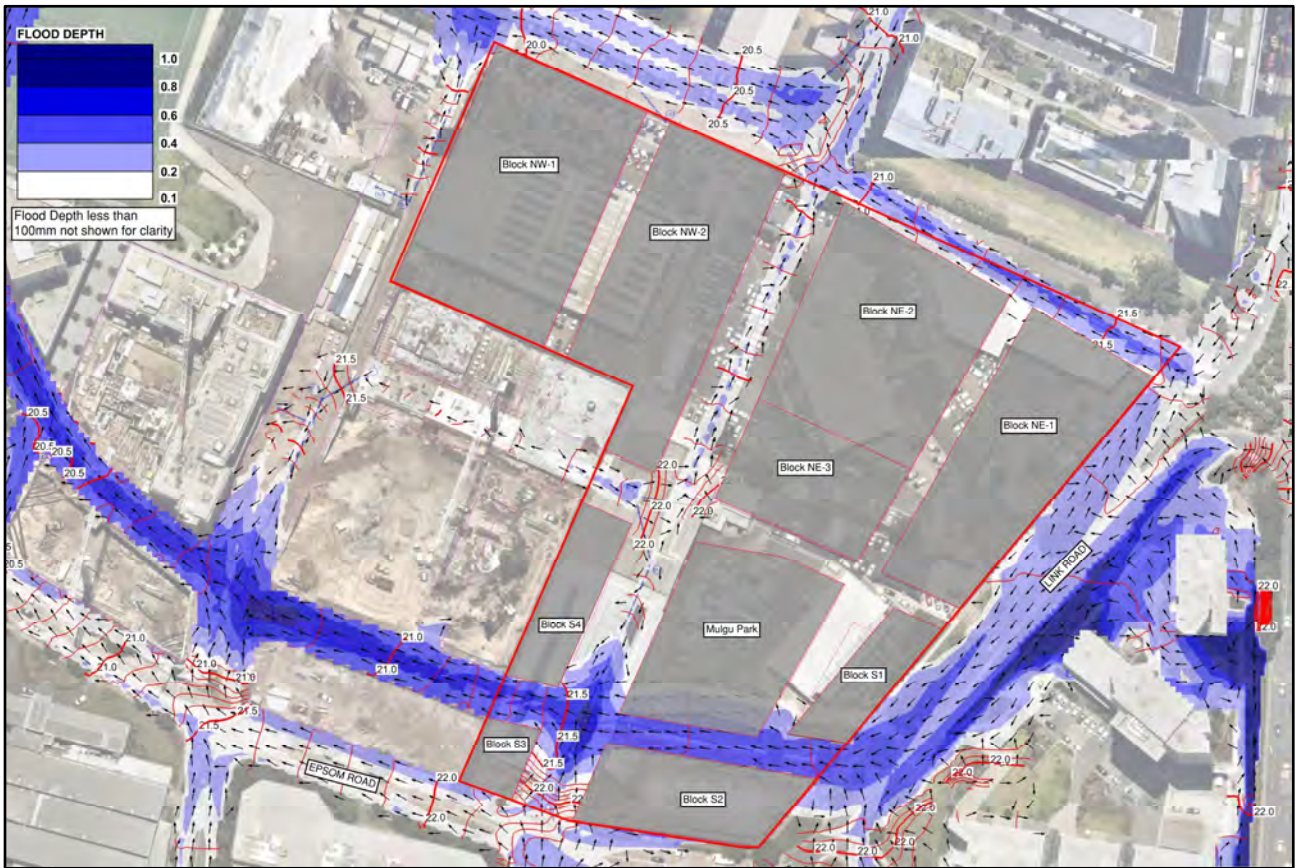


Figure 16. Updated PMF Depths and Levels Around The Development Site (Also included in Appendix D)

5.4 Flood Planning Requirements

Flood Planning Levels for the development site are set by the City of Sydney Interim Floodplain Management, 2014. The flood planning levels depend on the type of development and the flood level adjacent to building openings, as replicated in Table 3 below. At this stage of the development the exact floor usage and opening locations are not confirmed, and further assessment will be required during future stages to ensure that all building openings meet the required Flood Planning Levels. A summary of flood levels around the building blocks and flood planning requirements is included in Figure 17 and Appendix B.

Table 3 - City of Sydney Flood Planning Requirements

Development	Type of flooding	Flood Planning Level	
Residential	Habitable rooms	Mainstream flooding	1% AEP flood level + 0.5 m
		Local drainage flooding (Refer to Note 2)	1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m
	Outside floodplain	0.3 m above surrounding ground	
	Non-habitable rooms such as a laundry or garage (excluding below-ground car parks)	Mainstream or local drainage flooding	1% AEP flood level
Industrial or Commercial	Business	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level
	Schools and child care facilities	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level + 0.5m
	Residential floors within tourist establishments	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m
	Housing for older people or people with disabilities	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or a the PMF, whichever is the higher
	On-site sewer management (sewer mining)	Mainstream or local drainage flooding	1% AEP flood level
	Retail Floor Levels	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below-ground garage/ car park	Single property owner with not more than 2 car spaces.	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m
	All other below-ground car parks	Mainstream or local drainage flooding	1% AEP flood level + 0.5 m or the PMF (whichever is the higher) See Note 1
	Below-ground car park outside floodplain	Outside floodplain	0.3 m above the surrounding surface
Above ground car park	Enclosed car parks	Mainstream or local drainage flooding	1% AEP flood level
	Open car parks	Mainstream or local drainage	5% AEP flood level
Critical Facilities	Floor level	Mainstream or local drainage flooding	1% AEP flood level + 0.5m or the PMF (whichever is higher)
	Access to and from critical facility within	Mainstream or local drainage flooding	1% AEP flood level

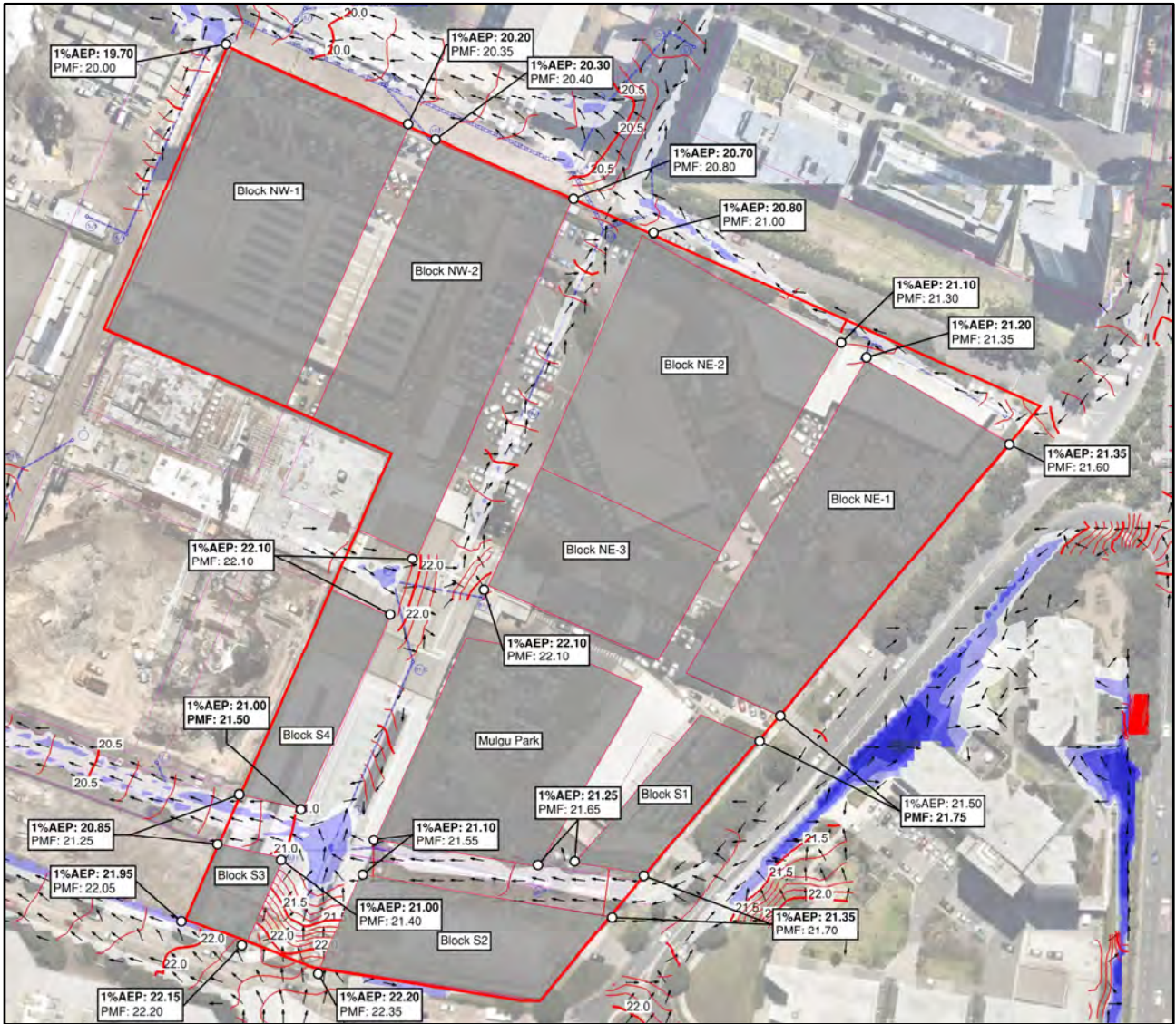


Figure 17 – Flood Levels at Building Block Corners for Flood Planning Levels (Overlaid on 1% AEP results)

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