



FLOOD IMPACT ASSESSMENT REPORT

221213 - Altis Compass Centre, Bankstown 2200

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QUALITY CONTROL REGISTER

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1 Document Summary

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2 INTRODUCTION

This Flood Impact Assessment Report is submitted to the City of Canterbury-Bankstown Council (Council) on behalf of Barings Real Estate Australia (Barings) in support of a development application (DA) for a mixed-use development at the Compass Centre site, located at 83-99 North Terrace, Bankstown (the site).

This DA seeks approval for:

- Site preparation and early works, including demolition of all existing structures, bulk excavation, any required remediation and tree removal.
- Construction and use of a five (5) storey mixed use podium and three towers, comprising:
 - a 19-storey hotel tower in the south-west corner of the site;
 - a 24-storey residential tower in the south-east corner of the site;
 - a 24-storey residential tower in the north-east corner of the site;
 - ground floor retail activating the ground plane;
 - a gym at the southeastern corner of levels 1 and 2;
 - a metro supermarket at the west of level 1;
 - provision of common residential amenity spaces at the north of levels 2 to 3;
 - a childcare use at the North eastern corner of the podium rooftop;
 - ancillary uses associated with the hotel in the hotel tower's podium rooftop;
 - medical centre uses in the southeast tower's podium rooftop;
 - provision of a through site link connecting The Mall in the north to North Terrace in the South, as well as additional links from Fetherstone Street and The Appian Way, providing connections to both The Mall and North Terrace; and
 - Car parking on levels 1, 2 and 3 of the podium, which are to be appropriately sleeved through façade activation, active uses, landscaping and active mezzanine floors.
- Construction and use of a two (2) level basement car park accommodating car, bicycle, motorcycle and loading spaces.
- Vehicular access from Fetherstone Street to the West of the site.
- Inclusion of landscaping throughout the site.
- Extension and augmentation of services and utilities to the development as required.

2.1 SITE ANALYSIS

2.1.1 SITE LOCATION AND CONTEXT

The site is located at 83-99 North Terrace, Bankstown within the City of Canterbury Bankstown local government area (LGA). It is located to the north of Bankstown railway station, to the south of Paul Keating Park and forms part of the street block bounded by The Mall (north), The Appian Way (east), North Terrace (south), and Fetherstone Street (west), however does not comprise a street frontage to The Mall, given that its northern boundary interfaces with the former Bankstown City Library site and Phil Engisch Reserve.

It is located within the Bankstown City Centre, surrounded by a mix of civic, retail, office, business and residential uses. It is situated in a location that is highly serviced by public transport, being approximately 60m to the north of Bankstown railway station and the future Bankstown metro station, and within the immediate proximity of the Bankstown bus interchange. It is also situated directly south of Paul Keating Park, Western Sydney University Bankstown Campus, the contemporary Bankstown Library and Knowledge Centre, Bryan Brown Theatre and Function Centre, and immediately west of the Bankstown Central Shopping Centre. The site's locational context is shown in Figure 1. An aerial photograph of the site is also provided at Figure 2.



Figure 1 - Site Context Map (Source: Hatch)



Figure 2 - Site Aerial Map (Source: Nearmap, Ethos Urban)

2.1.2 DETAILED SURVEY

A detailed survey was conducted by "Craig and Rhodes" dated 22nd June 2023, REF No. 136-23G T01 [05] - 002 and can be found in Appendix A.

The survey shows The Appian Way falling towards the south and both North Terrace and The Mall falling towards the east. Fetherstone Street falls towards the north and the survey indicates a sag point within the existing carpark to the south east of the former Central Library that will trap runoff approaching from Fetherstone Street and Phil Engisch Reserve.



Figure 3 - Car Park Sag Point



Figure 4 - Phil Engisch Reserve



Figure 5 - The Appian Way (Looking North)



Figure 6 - Fetherstone Street (Looking North)



Figure 7 - The Mall (Looking East)



Figure 8 - North Terrace (Looking East)

2.2 EXISTING STORMWATER NETWORK

The detail survey plan records indicate significant stormwater infrastructure surrounding the site, with a large number of kerb inlet pits located on The Mall at the north east and north west corners of the site.

Sydney Water DBYD plans (Appendix B) indicates two major Concrete and Masonry Box culverts running from north to south along the Appian Way. The box culverts measure 2400X1220mm and 2290x1750mm. The two box culverts converge into a concrete open channel that runs east alongside North Terrace before turning south and crossing the railway bridge.

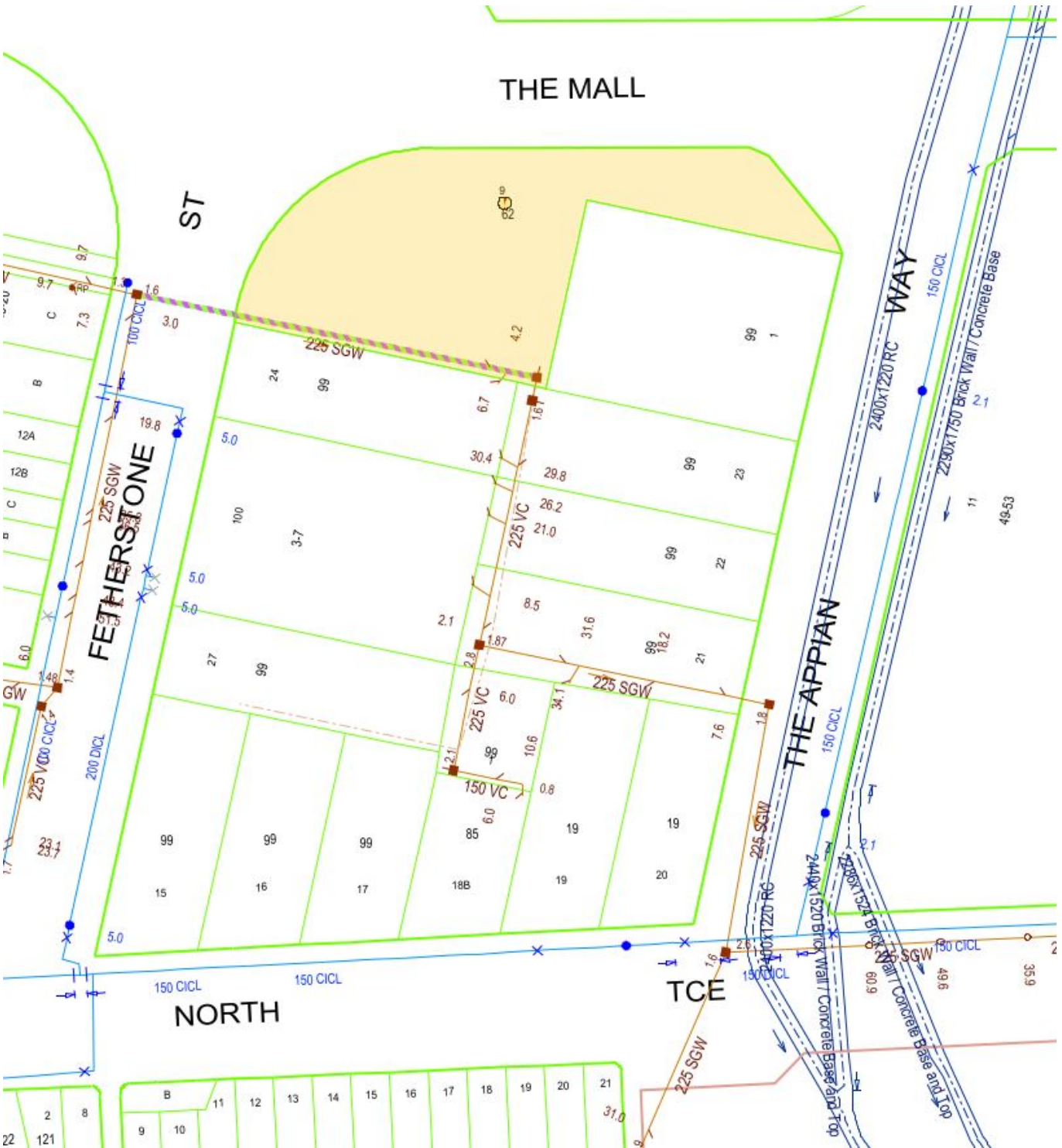


Figure 9 - Sydney Water Box Culverts

2.3 EXISTING FLOODING

The site is included in the Salt Pan Creek flood study, completed by BMT WBM and Bewsher in 2007 with an addendum in 2009. The study analysed the catchment of Salt Pan Creek upstream of Canterbury Road and covered an area of approximately 8.9km²

A TUFLOW rainfall-on-grid model was built to analyse the catchment and utilised a 5m grid size to achieve reasonable run times and a 0.1m cutoff value was applied to runoff depths.

The 1 year, 2 year, 5 year, 10 year, 20 year, 50 year, 100 year and PMF event were analysed as part of the study and the 2 hour storm event was determined to be the critical storm duration as it produced the highest flood levels across 94% of the catchment. Refer to Appendix C for selected results from the Salt Pan Creek flood study.

The study included all stormwater infrastructure within the study area and has assumed a 50% blockage factor for bridges, box culverts, or pipe culverts where the clear opening is less than 6m and blockage factors of 20% and 50% to all lintel pit openings and grated pits respectively.

Subsequently, Council has provided flood hydrographs extracted from the 2007 Salt Pan Creek flood study for the 20-Year, 100-Year and PMF 2 Hour events.

The figures below show selected flood maps for the 1% AEP event provided by Council. It is noted that the 1% AEP flood depth map (Figure 12) shows no runoff on Fetherstone Street and North Terrace. This is likely due to the presence of only shallow depths of runoff and the study not mapping stormwater runoff with depths less than 0.1m, which indicates that the Salt Pan Creek flood study does not flag Fetherstone Street and North Terrace as being flood affected during the 1% AEP storm since stormwater runoff with depths of less than 0.1m can be conveyed by the street kerb and gutter and will not overtop the kerb.

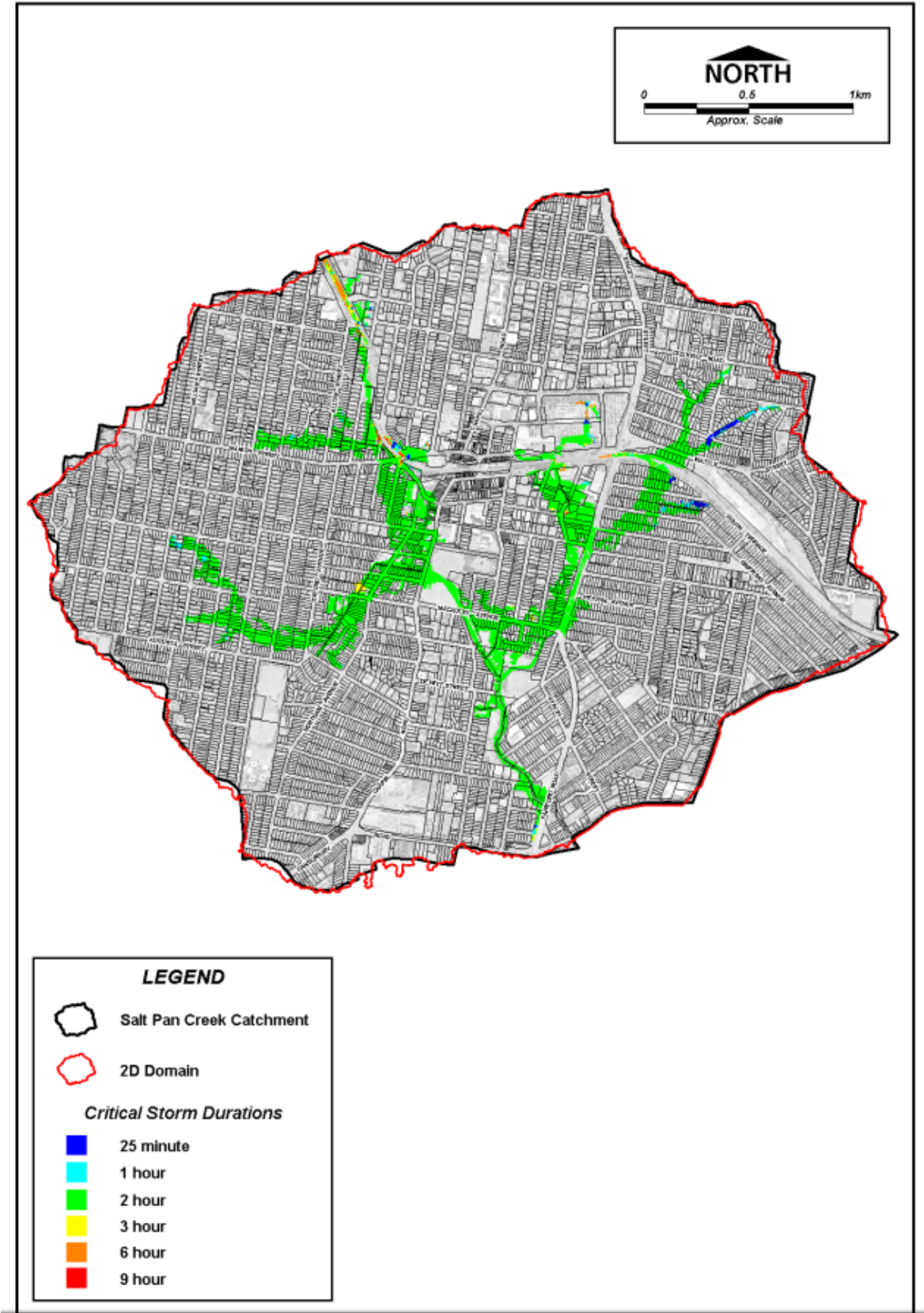


Figure 10 - Critical Storm Durations for Salty Pan Creek (Source: Salt Pan Creek Stormwater Catchment Study)

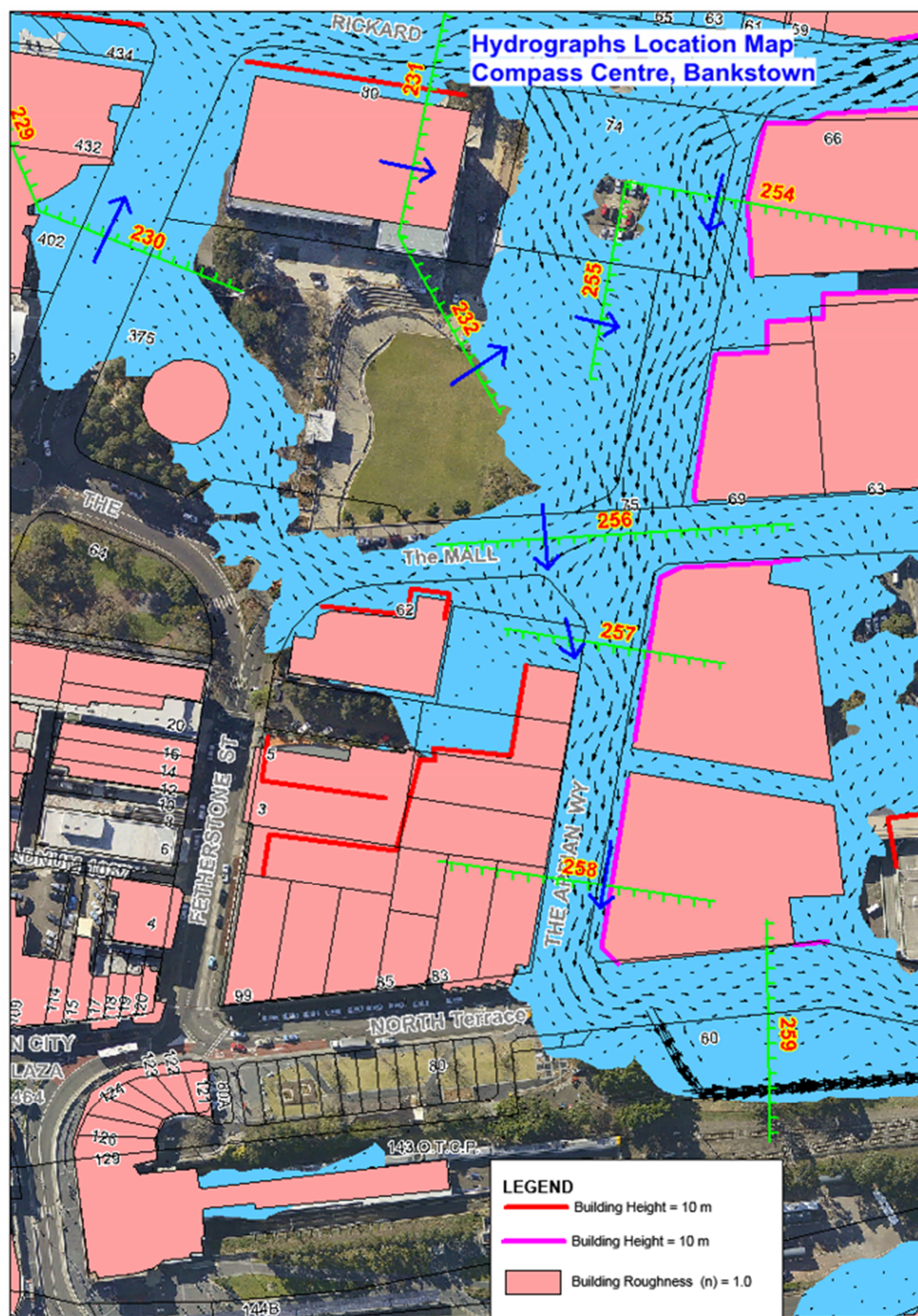


Figure 11 - Hydrograph Locations Map (Source: Provided by Council)

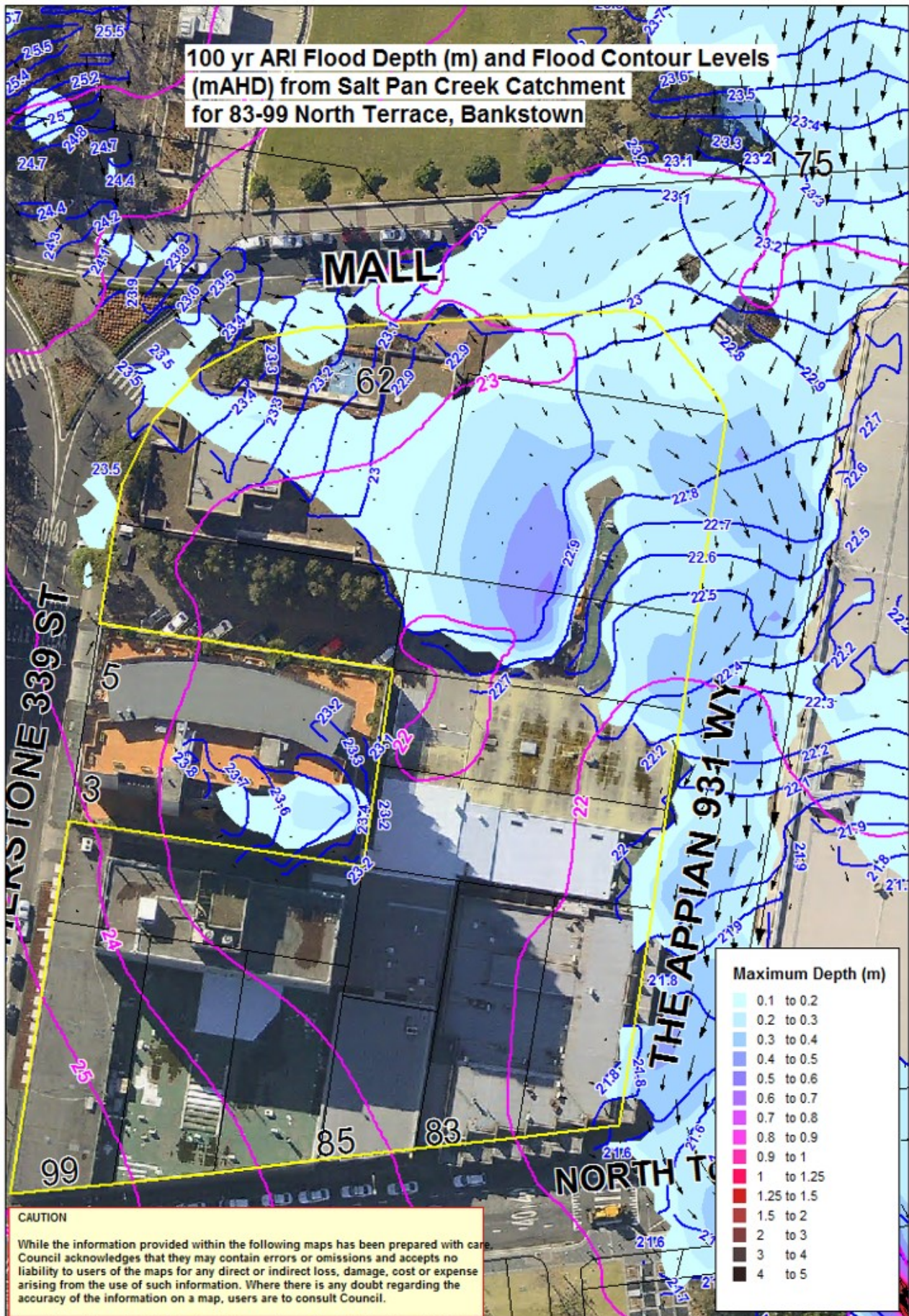


Figure 12 - 100 Year Flood Depths (Source: Provided By Council)

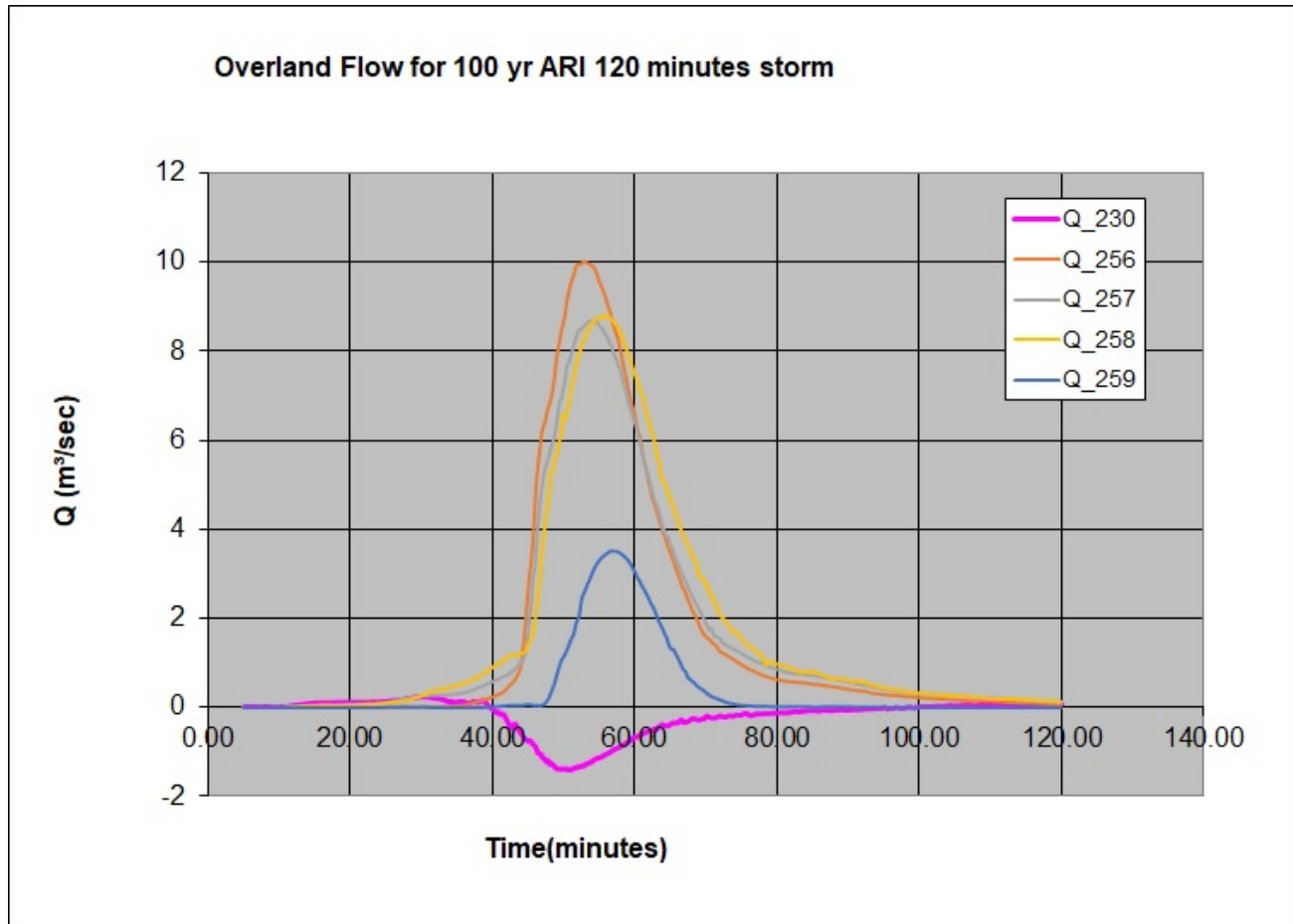


Figure 13 - 100 Year Inflow Hydrographs (Source: Provided By Council)

2.4 PROPOSED DEVELOPMENT

The existing Compass Centre and Car park will be demolished and redeveloped into a mixed-use development featuring two high-rise residential towers (Buildings B and C), one high-rise Hotel (Building A), retail premises across the ground floor and two basement levels.

Vehicular access to the basement will be provided through two ramps off Fetherstone Street while pedestrian access will be to the retail premises from the four frontages.

A number of lifts have been on the ground floor to provide access to the towers. Similar lifts and stairwells provide pedestrian access from the ground floor to the basement levels.



Figure 14 - Architectural Ground Floor Plan

2.4.1 PROPOSED STORMWATER UPGRADES

The following advice has been provided by Council during the Pre-DA phase:

"The subject site is impacted by flooding and stormwater flows through the Bankstown City Centre, which will result in an undesirable retail/ground level interface with the Appian Way due to the need to raise finished floor levels to be above flood levels. It is encouraged that the applicant work with Council on its broader City Centre capital works to improve stormwater flow and flood levels, which would allow for improved street interface for the Compass Centre and reduced finished floor levels. This can be achieved through a concurrent process any forthcoming Development Application. Furthermore, subject to further discussions and design resolution, it is encouraged that the applicant continues to work with Council on the Appian Way interface, given the planned significance of this north-south link upon completion of Sydney Metro works at Bankstown Station."

Subsequently, Council has provided a plan, dated 21 July 2021, showing stormwater upgrades along The Appian Way (See Appendix D)

The upgrades include the decommissioning of the existing 2400x1220mm and 2290x1750mm box culverts running under The Appian Way and utilising a Twin 3000x1500mm box culvert in their place. The upgrades also include the addition/removal of other minor pits and pipes.

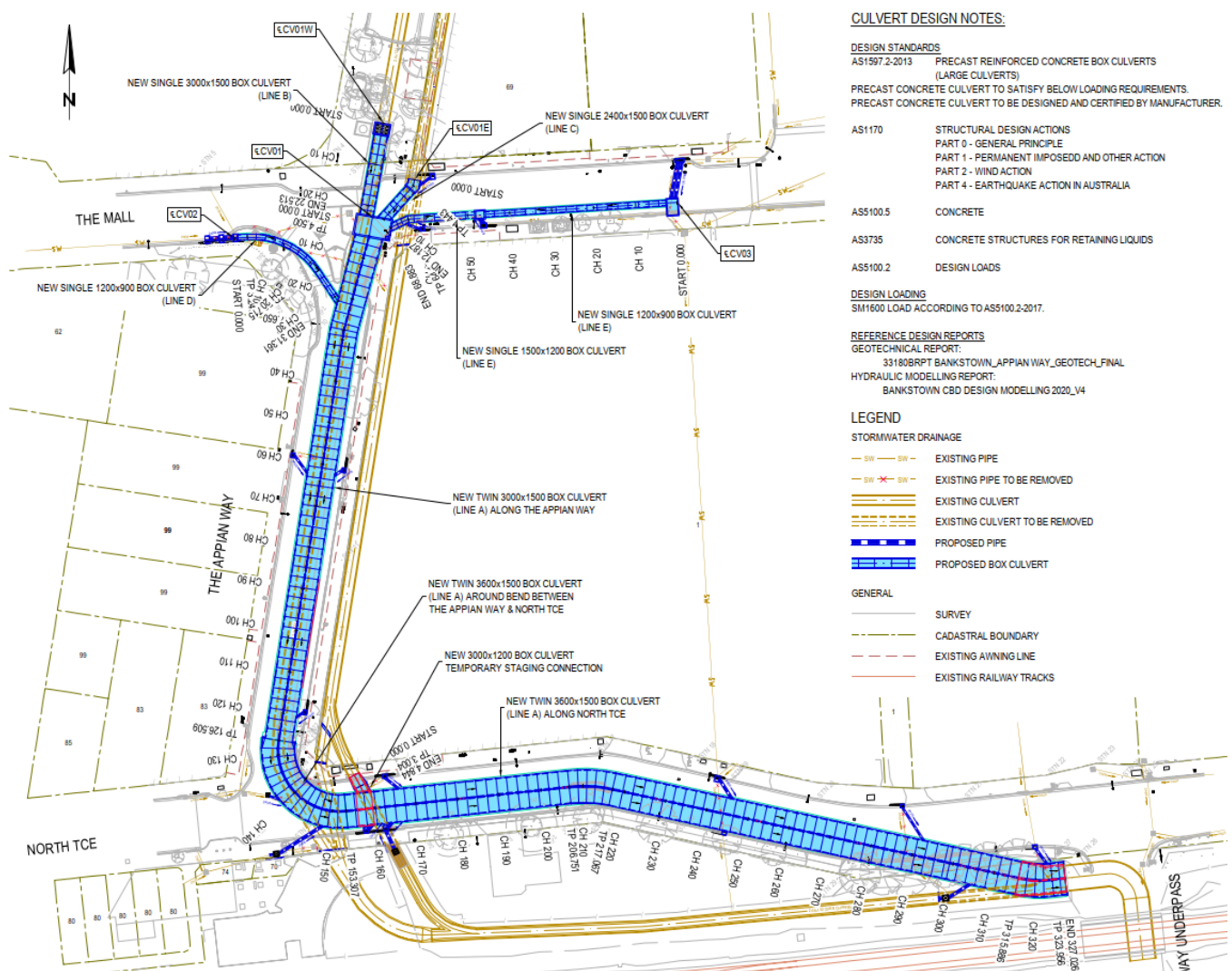


Figure 15 - Council Proposed Culvert Upgrades

3 Flood Modelling

3.1 HYDROLOGIC MODEL

A 2D TUFLOW model has been set up to determine the flood levels and analyse the impacts of the development for the 5% AEP, 1% AEP and PMF Flood events.

The hydrographs provided by Council (See Section 0) provide most of the inflow to the model, however, to ascertain that Fetherstone Street and North Terrace are not affected by flooding as indicated in the 2007 Salt Pan Creek flood study maps, a minor catchment of approximately 1.62Ha discharging to Fetherstone Street and North Terrace has been analysed in DRAINS and the flows were added to the flood model. This does mean that this minor catchment area is being “double counted” as it already forms part of the catchment analysed in the 2007 Salt Pan Creek flood study, therefore, the results provided will give a conservative estimate of flooding on Fetherstone Street and North Terrace.

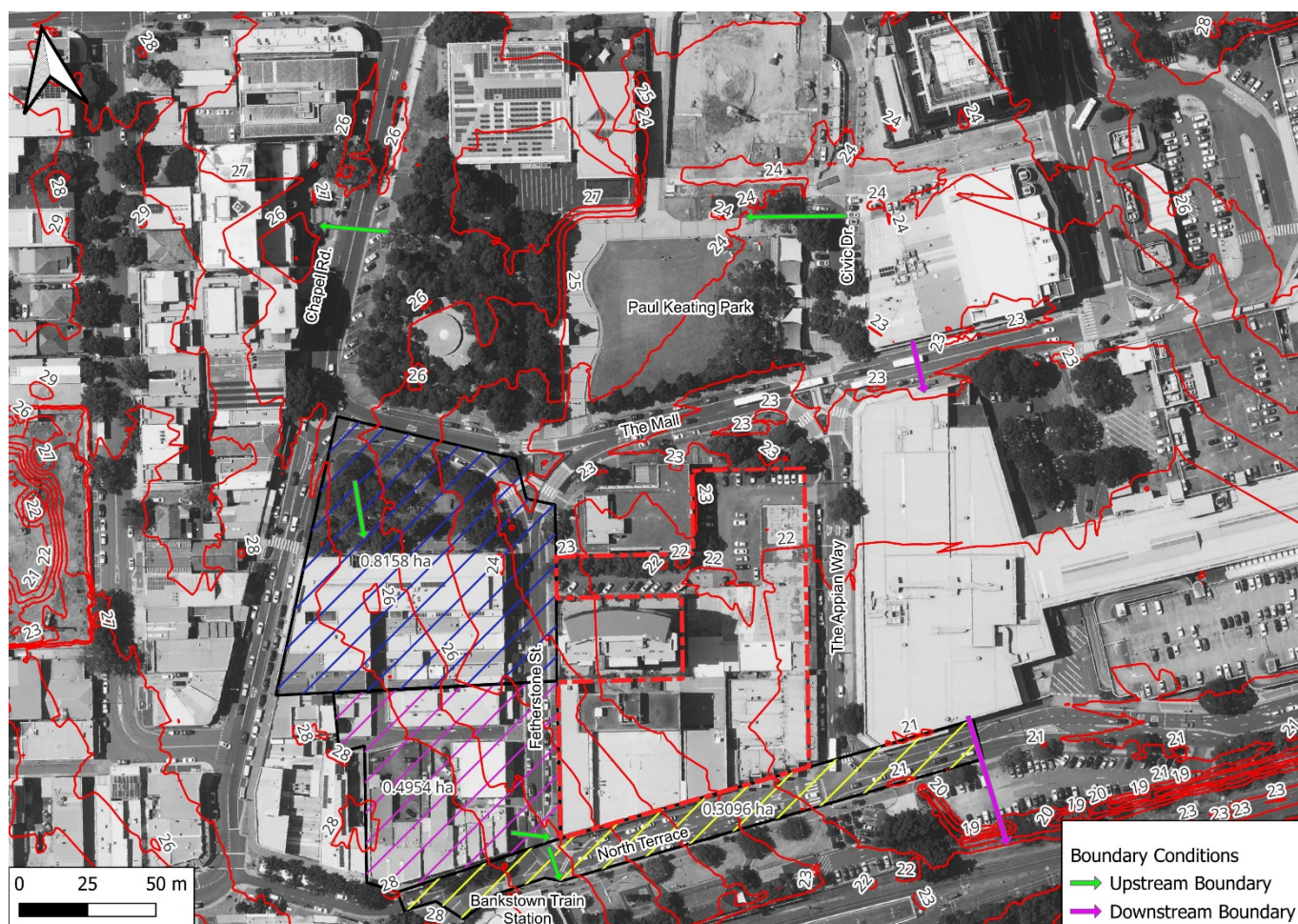


Figure 16 - Boundary Conditions and Additional Catchments

3.2 HYDRAULIC MODEL

3.2.1 DIGITAL ELEVATION MODEL (DEM)

A 1 metre DEM obtained from NSW Spatial Services and used with a 2m grid size in TUFLOW to represent the existing ground surface for the hydraulic model. This resolution is fine enough to represent roads and overflow paths and did not result in excessive run times. Surface levels immediately surrounding and within the site have been read from the detail survey (Appendix A) and proposed surface levels within the site were incorporated into the proposed scenario run.

3.2.2 LAND USE

Land use throughout the site has been determined through satellite imagery and land use maps. The following land uses, and corresponding manning's roughness coefficients were modelled in TUFLOW:

Table 1 - Land use

Land Use	Manning's n
Roads	0.02
Grass (Maintained)	0.03
Urban Residential	0.04

3.2.3 BUILDINGS

Adjoining development footprints to the proposed site were determined from satellite imagery and have been modelled as "ineffective areas".

3.2.4 EXISTING STORMWATER DRAINAGE INFRASTRUCTURE

Existing stormwater drainage infrastructure has been modelled as 50% blocked in TUFLOW. Pit and pipe sizes and layout have been obtained from the survey found in Appendix A and Sydney Water DBYD plans found in Appendix B.

3.2.5 UPSTREAM BOUNDARY CONDITION

Council has provided flood hydrographs extracted from the 2007 Salt Pan Creek flood study as shown in Figure 11. Hydrograph locations "230" and "256" were deemed to be the most appropriate inflow locations for this site-specific assessment. These hydrographs, in addition to the minor catchment described in Section 3.1, were used as inputs for the TULFOW model. The upstream boundaries were modelled as 2d QT (Flow vs. Time) boundaries and were placed upstream of the site along flow paths. Refer to Figure 11 for the locations of the digitised upstream boundary conditions.

3.2.6 DOWNSTREAM BOUNDARY CONDITION

Two 2D HQ (Stage vs. Discharge) boundary were digitised, one 60m downstream of the site on North Terrace and another 45m east of The Mall and The Appian Way intersection as shown in Figure 11 for the 2D component of runoff. A similar 1D HQ boundary was digitised for the main box culverts at the same location. The HQ boundary utilizes a stage-discharge curve based on the underlying topography or conduit characteristics.

4 FLOOD ASSESSMENT

The flood maps for the 1% AEP, 5% AEP and PMF scenario can be found in Appendix E. The depth and elevation results at several key points are summarised in the tables below:

Label	5% AEP				
	Existing Depths	Proposed Depths	Existing Levels	Proposed Levels	Difference
A	0.041	0.021	22.593	22.562	-0.032
B	0.206	0.121	22.363	22.296	-0.067
C	0.221	0.186	22.109	22.075	-0.034
D	0.044	0.011	21.723	21.690	-0.033
E	0.093	0.038	21.547	21.510	-0.037
F	0.061	0.026	21.535	21.500	-0.035
G	0.003	0.000	22.468	0.000	0.003
H	0.000	0.000	0.000	0.000	0.000
I	0.000	0.000	0.000	0.000	0.000
J	0.000	0.000	0.000	0.000	0.000
K	0.041	0.039	23.501	23.500	-0.001
L	0.015	0.014	24.587	24.586	-0.001
M	0.018	0.018	25.283	25.283	0.000
N	0.030	0.031	23.069	23.070	0.001
O	0.019	0.020	21.667	21.668	0.001

Table 2 - Existing/Proposed Results Comparison - 5% AEP Storm

Label	1% AEP				
	Existing Depths	Proposed Depths	Existing Levels	Proposed Levels	Difference
A	0.058	0.121	22.618	22.679	0.061
B	0.294	0.246	22.451	22.422	-0.029
C	0.319	0.312	22.208	22.200	-0.008
D	0.133	0.125	21.812	21.804	-0.008
E	0.196	0.173	21.649	21.649	0.000
F	0.160	0.154	21.634	21.629	-0.006
G	0.068	0.322	22.533	22.972	0.439
H	0.000	0.000	0.000	0.000	0.000
I	0.020	0.023	23.185	23.192	0.007
J	0.393	0.006	22.544	23.007	0.463
K	0.049	0.046	23.509	23.507	-0.003
L	0.022	0.019	24.596	24.593	-0.003
M	0.030	0.030	25.295	25.295	0.000
N	0.040	0.042	23.080	23.082	0.002
O	0.029	0.031	21.677	21.679	0.002

Table 3 - Existing/Proposed Results Comparison - 1% AEP Storm

Label	PMF				
	Existing Depths	Proposed Depths	Existing Levels	Proposed Levels	Difference
A	0.686	0.670	23.250	23.229	-0.021
B	0.603	0.680	22.760	22.856	0.096
C	0.744	0.718	22.633	22.606	-0.026
D	0.711	0.510	22.390	22.189	-0.201
E	0.709	0.661	22.163	22.138	-0.025
F	0.690	0.650	22.165	22.124	-0.041
G	0.898	0.840	23.363	23.490	0.128
H	0.559	0.510	23.372	23.461	0.088
I	0.163	0.410	23.342	23.590	0.247
J	1.219	0.327	23.369	23.344	-0.025
K	0.104	0.134	23.564	23.594	0.029
L	0.066	0.054	24.654	24.639	-0.015
M	0.060	0.066	25.324	25.331	0.006
N	0.092	0.097	23.132	23.138	0.006
O	0.553	0.511	22.201	22.158	-0.043

Table 4 - Existing/Proposed Results Comparison - PMF Storm



Figure 17 - Flood Depth/Level Sampling Points

4.1 EXISTING FLOOD BEHAVIOUR

The flood model results for the existing 1% AEP scenario show floodwaters approaching from the Council Chambers and Civic Drive then flowing through The Mall and continuing south through The Appian Way.

Flood waters approaching from the Council Chambers follow the existing topography and split around the former Central Library, where a portion of runoff continues east along The Mall and a portion flows south and enters the existing car park before ponding at the sag point shown in Figure 3.

Flows approaching from Civic Drive split around the intersection with The Mall. From here, the majority of runoff continues south along The Appian Way. A minor portion of runoff splits off east to continue down The Mall, while the remainder pond at a sag point within and in front of Phil Engisch Reserve, which continues to build up before overflowing into the sag point within the existing car park.

The Appian Way is fully inundated during the 1% AEP event where flood waters reach a maximum depth of 0.45m. Flood waters then continue east along North Terrace or overtop into the existing open channel along the railway.

Runoff originating from the minor catchment and running through the Fetherstone Street and North Terrace have been found to be inconsequential with depths generally remaining below 50mm for the 1% AEP and are therefore not considered as flood affected.

Hazard for the 1% AEP event across the site and surrounding area is generally low (H1-H2) with some localised areas on The Appian Way reach high hazard (H5) due to localised increases in velocities. At the existing car park sag point, flood hazard is medium (H3) due to high depths but low velocities.

The 5% AEP event shows similar flood behaviour to the 1% AEP event albeit with shallower depths and lower hazards.

In the PMF event, flooding depths approach 1m along The Appian Way and are approximately 1.3m in the car park sag point and flood hazard is High (H5) for the entirety of The Appian Way fronting the development.

Runoff on Fetherstone Street and North Terrace remain low for the PMF event with depths below 150mm. Fetherstone Street and North Terrace can therefore safely convey all storm events in the kerb and gutter and are not flood affected in the existing scenario.

4.2 PROPOSED FLOOD BEHAVIOUR

The stormwater upgrades provided by Council (see Appendix D) have been included in the proposed flood model and were assumed to be 50% blocked. The main impact of the proposed development is that flood waters can no longer enter and pond at the sag point of the existing car park.

Similar to the existing scenario, runoff on Fetherstone Street and North Terrace are shallow, with depths generally below 50mm for the 1% AEP and below 150mm for the PMF event. Fetherstone Street and North Terrace are therefore not considered as flood affected and the floor levels and driveways are not subject to Council's flood controls.

Flood waters run along the southern face of the former library to the location of the former carpark. To prevent excessive flood level increases along the Southern face of the former library, it is proposed that the vehicle ramp closest to the former library (rising up to the first floor) to be suspended on piers to allow for the passage and storage of flood waters under ramp. Stormwater pits are to be provided by the stormwater engineer under the ramp to drain the area once flooding has subsided. The northern edge of the on grade part of the ramp is also to have a kerb installed to prevent runoff from entering the ramp going down to the basement level from the side.

An analysis of stormwater flows on Fetherstone Street and North Terrace has been prepared in the Stormwater Management Report by Robert Bird Group assessing flows in the gutters and nominating street interface levels and driveway crest levels for Fetherstone Street and North Terrace.

Floodwaters that previously entered and inundated the existing carpark from Phil Engisch reserve are now impeded by the proposed development footprint and levels and as a result, largely diverted into the streets.

The 1% AEP flood map shows that very shallow flood waters enter the development from The Mall. This runoff reaches a maximum depth of 50mm and will flow along Compass Way and be captured by proposed internal stormwater pits.

To reduce negative flood level impacts additional stormwater pits have been proposed outside the site boundary on the Appian Way (refer to Figure 18). Upgrades include the addition of three new pits, with pipes of minimum diameters of 0.525m and 0.675m, to connect to the proposed twin culvert.

The 1% AEP Hazard within the road is largely unchanged in the proposed scenario, remaining low (H1-H2), and as ponding no longer occurs within the site, hazard is low within the site.



Figure 18 - Flood Protection Measures

4.3 FLOOD IMPACT

Flood impacts were assessed by comparing peak flood levels of both existing and proposed scenarios, and are shown in Appendix E.

For the 1% AEP event, there are extensive reductions in flood levels at the sag point on The Mall due to stormwater upgrades. A similar reduction is observed south east of the site on North Terrace.

Flood levels on The Appian Way remain almost unchanged except for a few areas that see increases of less than 15mm. A localised increases in flood levels of around 50mm is observed between the former library and the proposed ramp. This flood levels increase affects only a minor area far from any ingress points into the library and has been deemed acceptable.

An increase in flood levels is observed at the interface of the Phil Engisch Reserve with the development, however flood level afflux quickly drops to less than 20mm in The Appian Way. As the increase of flood waters is contained within the edge of the reserve, it is not considered that this flood level increase will have any negative impact on the surrounding areas and therefore the flood level increase in Phil Engisch reserve is considered acceptable.

For the 5% AEP event, flood levels show a decrease on The Mall and The Appian Way due to the stormwater upgrades while for the PMF event, the new development footprint causes an increase in levels on The Mall and parts of The Appian Way.

4.4 FLOOD PLANNING LEVELS

The Canterbury-Bankstown flood control matrix (explained in further detail in Section 4.5) lists the minimum floor level requirements for different land use types. For the purpose of this development, the following criteria has been used to set the minimum floor levels:

- Non-Habitable and Retail Floors: 5% AEP Flood Level
- Habitable Floor Levels any access points leading to the basement (lifts, stairwells, driveways etc.): 1% AEP Flood Level + 500mm freeboard.

Since Fetherstone Street and North Terrace are not classified as flood affected (See “Low Flood Risk Precinct” in Section 4.5), flood controls do not apply to retail spaces and driveways on their frontages.

On The Mall and The Appian way, the 5% AEP flood levels at potential Ingress points (See Appendix F) were used to set the minimum retail floor levels.

The parts of the Building B and Building C lobby with no access to the lift have been set to a minimum of the 5% AEP Levels.

No habitable floors are affected by the 1% AEP Flood Level + freeboard since the lowest commercial habitable floor is located at RL 32.15 (Level 2) while the lowest residential habitable floor is at RL 43.0 (Level 5). Therefore, the main items controlled by the 1% AEP + freeboard criteria are the ingress points to the basement.

Within the site, the proposed 1% AEP Flood Map shows minor runoff on Compass Way with a maximum flood level of 23.01 mAHD, Lifts and stairwells connecting with Compass Way are required to be protected to a minimum level of the 1% AEP + freeboard. This has been achieved by providing self-activating flood barriers that rise to a level of 23.55 mAHD in case of a storm event. Flood barriers have been proposed as flood waters within Compass Way are very shallow and raising the lifts and stairwells to the 1% AEP + freeboard levels is impractical from an accessibility perspective.

4.5 FLOOD CONTROLS

Canterbury-Bankstown DCP 2023 defines three flood risk precincts: High, Medium and Low.

- a) High Flood Risk Precinct:
“High Flood Risk Precinct is the area of land below the 100-year flood that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties.”
- b) Medium Flood Risk Precinct:
“Medium Flood Risk Precinct is land below the 100-year flood that is not subject to a high hydraulic hazard and where there are no significant evacuation difficulties”.
- c) Low Flood Risk Precinct:
“Low Flood Risk Precinct is defined as all other land within the floodplain (within the extent of the probable maximum flood) but not identified within either the High Flood Risk or the Medium Flood Risk Precinct.”

Flood Precinct	Low							Medium							High									
	Critical Uses and Facilities	Sensitive Uses and Facilities	Subdivision	Residential	Commercial and Industrial	Tourist Related Development	Recreation and Non-Urban	Concessional Development	Critical Uses and Facilities	Sensitive Uses and Facilities	Subdivision	Residential	Commercial and Industrial	Tourist Related Development	Recreation and Non-Urban	Concessional Development	Critical Uses and Facilities	Sensitive Uses and Facilities	Subdivision	Residential	Commercial and Industrial	Tourist Related Development	Recreation and Non-Urban	Concessional Development
Floor Level												1,2 6	1,3 6	4,6	1,2 6	5,6							1,7	5,6
Building Components												1	1	1	1	1							1	1
Structural Soundness												1	1	1	2	1							3	4
Flood Effects											1,3	2,3	2,3	2,3	2,3	2,3							2,3	2,3
Parking and Driveway Access											1	2,3 4,5 6	2,3 4,5 6	2,3 4,5 6	3,5 6,7 8	5,6 9							3,5 6,7 8	5,6 9
Evacuation											1	2,6	3,6	3,6	4,6	5							4,6	5
Management and Design											1		2,3 4	2,3 4	2,3 4	2,3 4							2,3 4	2,3 4

 = POTENTIALLY UNSUITABLE LAND USE = Not relevant

Figure 19 - Flood Control Matrix (Canterbury-Bankstown DCP 2023 Chapter 2.2, Schedule 5)

The 1% AEP Flood Hazard map (Appendix E) shows that the hazards on The Mall and The Appian Way in the proposed scenario are H1 or H2, which are low hazard categories. Therefore, the parts of development along The Mall and The Appian Way are within the Medium flood risk precinct.

Fetherstone Street and North Terrace are not affected by the 1% AEP flood event and therefore are within the Low flood risk precinct,

Figure 19 shows the Canterbury-Bankstown Council flood control matrix and lists the controls to be applied to different development types. The proposed site is a mixed-use development with commercial and residential spaces and the relevant flood controls have been highlighted on the matrix. As Fetherstone Street and North Terrace are classified as Low flood risk precinct, no flood controls apply to the parts of the proposed development along Fetherstone Street and North Terrace.

Compliance with the flood controls for the parts of the site fronting The Appian Way and The Mall is demonstrated below:

Table 5 - Application of Flood Related Controls

Ref No.	CONTROLS	RESPONSE TO CONTROL
FLOOR LEVEL		
1	Non-habitable floor levels should be no lower than the 20-year flood unless justified by a specific assessment.	As per section 4.4, retail floor levels have been set no lower than the 20-year flood level at ingress points.
2 (Residential Only)	All habitable floor levels to be equal to or greater than the 100-year flood level plus freeboard.	The lowest residential habitable floor is at RL 43.0 (Level 5) and therefore exceeds the 100-year flood level plus freeboard requirement.
3 (Commercial Only)	The level of habitable floor areas to be equal to or greater than the 100-year flood level plus freeboard. If this is impractical for development in a business zone the floor level should be as high as possible.	The lowest commercial habitable floor is at RL 32.15 (Level 2) and therefore exceeds the 100-year flood level plus freeboard requirement.
6	A restriction on the use of the land is to be registered on the Certificate of Title where the lowest floor level is elevated more than 1.5m above finished ground level, requiring that the undercroft area is not to be enclosed. The use of roller shutters, hit and miss brickwork and similar methods is however permissible where there is no significant flood impact. Non-habitable uses	A restriction on the use of land is to be provided for the area under the ramp closest to the former library allowing passage of flood waters as per Section 4.2

	(laundry, toilet, bathroom and similar uses) can be enclosed where there is no significant flood impact.	
BUILDING COMPONENTS		
1	All structures to have flood compatible building components below the 100-year flood level plus freeboard.	All proposed structures below the 100-year flood level plus freeboard shall have flood compatible material as per Section 5 of this report.
STRUCTURAL SOUNDNESS		
1	Applicant to demonstrate that the structure can withstand the forces of floodwater, debris, and buoyancy up to and including a 100-year flood plus freeboard, or up to the probable maximum flood (PMF) if required to satisfy the evacuation requirement (see below); an engineer's report may be required.	A Structural Engineer's certificate is to be provided at CC stage certifying all structures to have flood compatible building components below the 100-year flood level plus 500mm freeboard or the PMF, whichever is higher.
FLOOD EFFECTS		
2	Applicant to demonstrate to Council's satisfaction (by way of an engineer's report if requested) that the development will not increase flooding effects elsewhere, having regard to loss of flood storage; changes in flood levels, flows and velocities; the cumulative impacts of multiple developments in the vicinity. The report should also identify the presence of any "major overland flow paths". Note: Where major overland flow paths are present, this may result in restrictions of the proposed development to maintain the functioning of the flowpath, and/or to manage the impacts of development on properties.	Refer to Section 4.3 for assessment of flood impact.
3	Council may require that the creation of an easement, or that a restriction be placed on the Title Certificate identifying the location of "major overland flow paths" or locations of significant backwater flooding.	The major overland flow path is contained within The Appian Way, therefore an easement is not expected for this development.
PARKING AND DRIVEWAY ACCESS		
2	The minimum surface level of open car parking spaces or carports shall be as high as practical, and not below: (a) the 20-year flood level; or (b) the level of the crest of the road at the location where the site has access (whichever is the lower). In the case of garages, the minimum surface level shall be as high as practical but no lower than the 20-year flood. Surface levels should also be determined having regard to the control Number 4 below relating to depths of inundation over driveways.	Not Applicable. No open car parking spaces or carports are provided for this development.
3	Garages capable of accommodating more than three vehicles on land zoned for urban purposes, or enclosed car parking must be protected from inundation from the 100-year flood.	Not Applicable. Access to the underground car park is provided through Fetherstone Street, which is in the Low flood risk precinct category.
4	The level of the driveway providing access between the road and the parking spaces should be as high as practical, and not lower than 0.3m below the 100-year flood level. However, Council may consider a lower level for the driveway in the following circumstances, where risk to human life is not compromised:	Not Applicable. Access to the underground car park is provided through Fetherstone Street, which is in the Low flood risk precinct category.

	(a) Where the road is lower than the parking space, no part of the driveway should be inundated to a greater depth than the roadway. (b) Where the car parking space is lower than the road, the depth of inundation over the driveway must not be greater than the car park inundation depth, and the driveway must rise continuously in an egress direction. (c) Where the car parking space and road are both below the 100-year flood level, the depth of inundation over the driveway must not be greater than the depth at either the car parking space or the road. Where feasible, the driveway should rise continuously in the egress direction.	
5	Enclosed car parking and car parking areas capable of accommodating more than three vehicles (other than on rural zoned land with a floor level below the 20-year flood level or more than 0.8m below the 100-year flood level shall have adequate warning signs, signage and exits.	Not Applicable. Access to the underground car park is provided through Fetherstone Street, which is in the Low flood risk precinct category.
6	Restraints or vehicle barriers to be provided to prevent floating vehicles leaving the site in a 100-year flood.	Not Applicable. No open car parking spaces or carports are provided on ground level therefore there is no risk of vehicles leaving the site.
EVACUATION		
2 (Residential Only)	Reliable access for pedestrians or vehicles is required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF. Such a refuge may comprise a minimum of 20% of the gross floor area of the dwelling being above the PMF level. An engineer's report may be required.	The lowest habitable residential levels is at RL 43.0 mAHd (Level 5), which is considerably higher than the PMF level which is in the range of 22.2 to 23.5 mAHd
3 (Commercial Only)	Reliable access for pedestrians or vehicles is required. An engineer's report may be needed to address this matter and should consider access for pedestrians or vehicles to a publicly accessible location above the 100-year flood level. Where feasible, an area of refuge within the building or development site that is above the PMF level, and which is equal to 20% of the gross floor area of the development, or such other area capable of accommodating the number of people likely to require evacuation.	The retail spaces located on the ground floors of Buildings B and C along The Appian Way are affected by the 100-Year flooding. Levels 1 to 4 of Buildings B and C (RL 28 to 38.5 mAHd), which are comprised of car parks, communal use spaces, a gym, a childcare centre and a medical centre presents publicly accessible spaces for refuge above the PMF Levels (RL 22.2 to 23.5 mAHd). The combined gross floor area of these levels is many times larger than the gross ground floor area affected by the 1% AEP Flooding.
6	The development should be consistent with any flood evacuation strategy, flood plan or similar strategy that has been adopted by Council.	A flood evacuation plan has been presented in Section 6 of this report.

MANAGEMENT AND DESIGN		
2 (Commercial Only)	A Site Emergency Response Flood Plan is required where floor levels are below the prescribed floor level (which is the floor level that applies to that particular type of development).	A Site Emergency Response Flood Plan has been included in Appendix H
3 (Commercial Only)	Applicant to demonstrate that there is an available area above the 100-year flood level plus freeboard to store goods.	The three towers have ample floors above the 1%AEP+Freeboard for the storage of goods.
4 (Commercial Only)	No storage of materials below the prescribed floor level which may cause pollution or be potentially hazardous during floods.	The retail spaces will store no hazardous material below the prescribed floor level.

5 Construction Materials

The proposed development may adopt the following materials, deemed to be flood compatible, for structures below the 100-year flood level plus freeboard.

Building component	Flood compatible material
Doors	• solid panel with waterproof adhesives • flush door with marine ply filled with closed • painted metal construction • aluminium or galvanised steel frame
Floor covering	• clay tiles • concrete, precast or in situ • concrete tiles • epoxy, formed-in-place • mastic flooring, formed-in-place • rubber sheets or tiles with chemical-set adhesives • silicone floors formed-in-place • vinyl sheets or tiles with chemical-set adhesive • ceramic tiles, fixed with mortar or chemical-set adhesive • asphalt tiles, fixed with water resistant adhesive
Flooring and sub-floor structure	• concrete slab-on-ground monolith construction • suspension reinforced concrete slab
Insulation	• foam (closed cell types)
Windows	• aluminium frame with stainless steel rollers or similar corrosion and water resistant material
Nails, bolts, hinges and fittings	• brass, nylon or stainless steel • removable pin hinges • hot dipped galvanised steel wire nails or similar
Roofing structure (for situations where the relevant flood level is above the ceiling)	• reinforced concrete construction • galvanised metal construction
Wall structure	• solid brickwork, blockwork, reinforced, concrete or mass concrete
Wall and ceiling linings	• fibro-cement board • brick, face or glazed • clay tile glazed in waterproof mortar • concrete • concrete block • steel with waterproof applications • stone, natural solid or veneer, waterproof grout • glass blocks • glass • plastic sheeting or wall with waterproof adhesive

Ducting	All ductwork located below the relevant flood level should be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a watertight wall or floor below the relevant flood level, the ductwork should be protected by a closure assembly operated from above relevant flood level.
Equipment	All equipment installed below or partially below the relevant flood level should be capable of disconnection by a single plug and socket assembly.
Fuel	Heating systems using gas or oil as a fuel should have a manually operated valve located in the fuel supply line to enable fuel cut-off.
Heating and air conditioning systems	Heating and air conditioning systems should, to the maximum extent possible, be installed in areas and spaces of the house above the relevant flood level. When this is not feasible every precaution should be taken to minimise the damage caused by submersion according to the following guidelines.
Installation	The heating equipment and fuel storage tanks should be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks should be vented to an elevation of 600mm above the relevant flood level.
Main power supply	Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, shall be located above the relevant flood level. Means shall be available to easily disconnect the dwelling from the main power supply.
Reconnection	Should any electrical device and/or part of the wiring be flooded it should be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.
Wiring	All wiring, power outlets, switches and the like should, to the maximum extent possible, be located above the relevant flood level. All electrical wiring installed below the relevant flood level should be suitable for continuous submergence in water and should contain no fibrous components. Earth core linkage systems (or safety switches) are to be installed. Only submersible-type splices should be used below the relevant flood level. All conduits located below the relevant designated flood level should be so installed that they will be self-draining if subjected to flooding.

6 Flood Emergency and Evacuation

In case of a flood emergency residents are to shelter in place within their units since all are located above the PMF level. Retail employees and patrons are to shelter within Levels 01 to Level 05 as they contain publicly accessible car parks and spaces.

In case an evacuation order is issued, The Appian Way is to be avoided due to deep floodwaters and evacuation is to be facilitated through Fetherstone Street towards Hume Highway via the route indicated in Appendix G.

Appendix H contains the Site Emergency Response Flood Plan SERFP for the development to help owners in preparing an SES Home Emergency Plan for their individual residential unit.. The plan should be tailored to specific units and should include critical information such as emergency contacts and any occupant specific requirements (e.g. medical needs, children, and pets).

7 Conclusion

This Flood Impact Assessment Report is submitted to the City of Canterbury-Bankstown Council (Council) on behalf of Barings Real Estate Australia (Barings) in support of a development application (DA) for a mixed-use development at the Compass Centre site, located at 83-99 North Terrace, Bankstown

Inflow hydrographs were provided by Council and additional minor catchments were modelled in TUFLOW for the 5% AEP, 1% AEP and PMF events. Council stormwater upgrades along The Appian Way were included in the flood model and were assumed to be 50% blocked.

Flood modelling shows that The Appian Way and The Mall are affected by flooding while Fetherstone Street and North Terrace are not.

The finish floor levels for the retail spaces fronting the flood affected roads have been set to a minimum of the 5% AEP level while all building components providing access to the lifts have been set to a level of 1% AEP + 500 mm freeboard. Flood level within the site along Compass Way were very shallow and flood barriers were provided to the lifts and stairs with ingress points from Compass Way. All habitable residential and commercial floors are located above the PMF level and are not affected by flooding.

Flood afflux maps shows no increase in flood levels on the streets for the 1% AEP event.

Flood level increases are observed within Phil English reserve. This increase in flood levels does not extend beyond the reserve and causes no negative impacts on neighbouring properties and is therefore deemed acceptable. Minor flood levels increases were also observed between the former library and proposed ramp. This flood level increase is isolated at the corner of the library away from any ingress points and is therefore deemed acceptable.

During a flood event, residents are advised to shelter in place while retail employees and patrons are advised to shelter within the publicly open spaces on Levels 01 to 05.

Kind regards,

Ali Akel

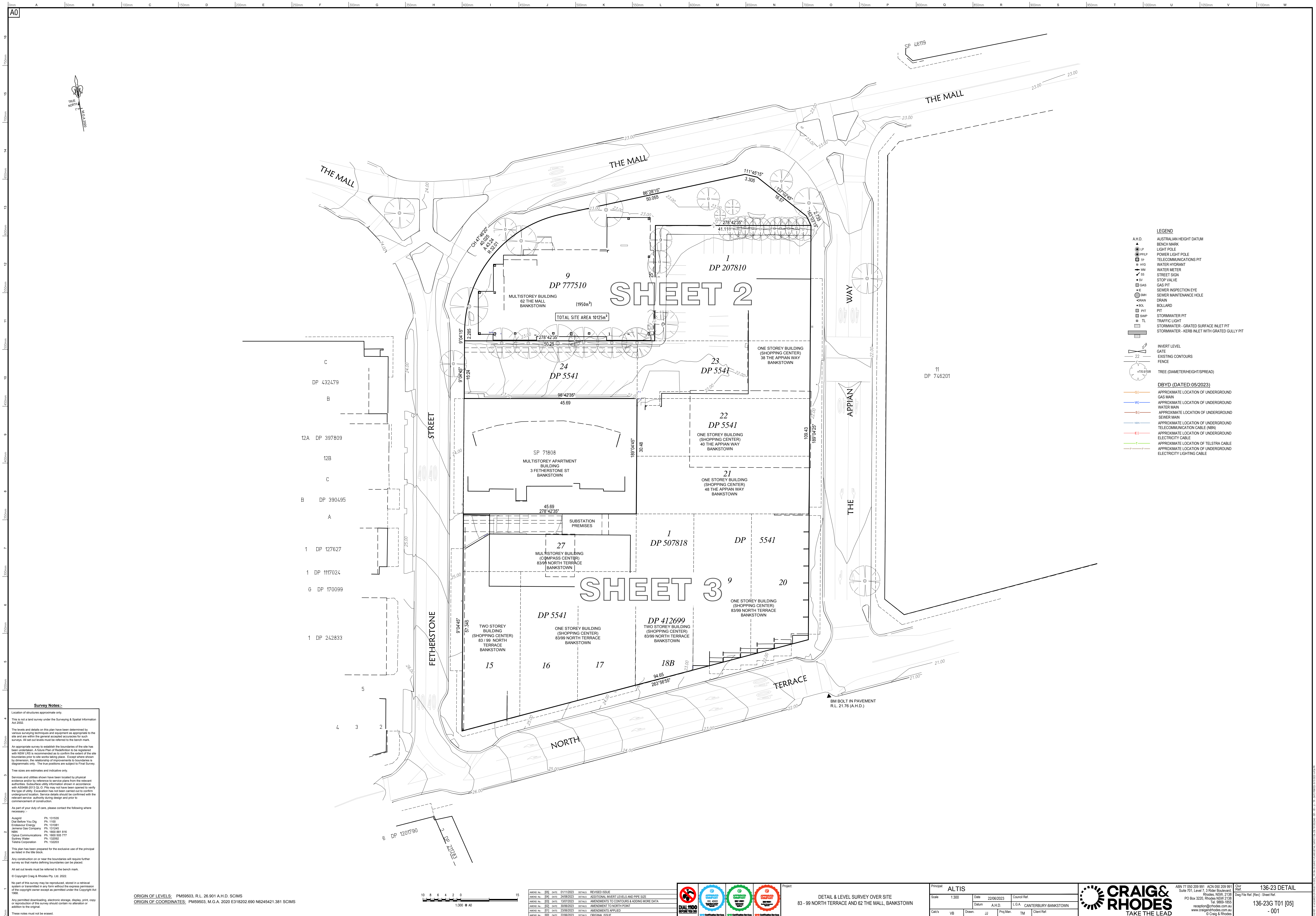


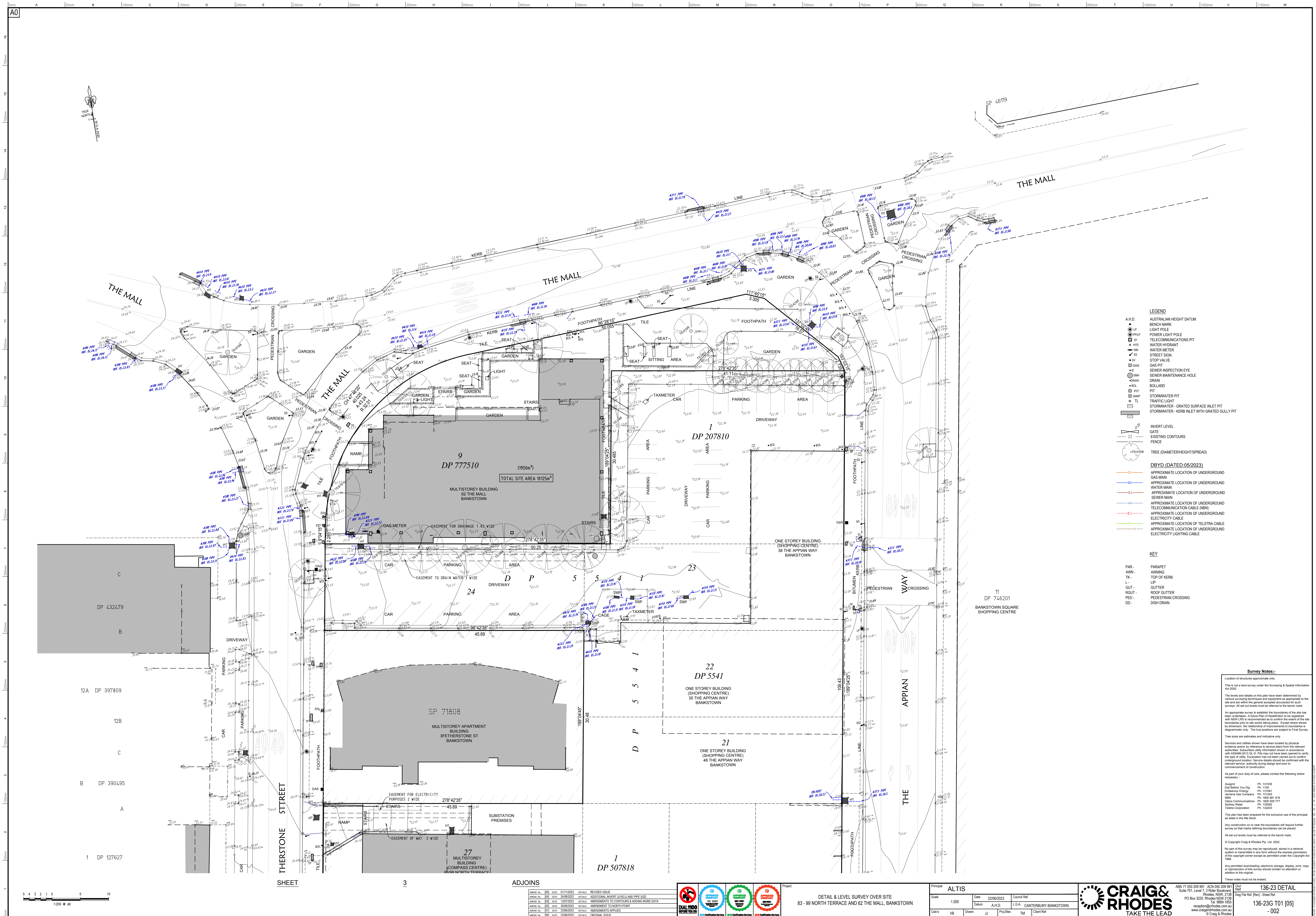
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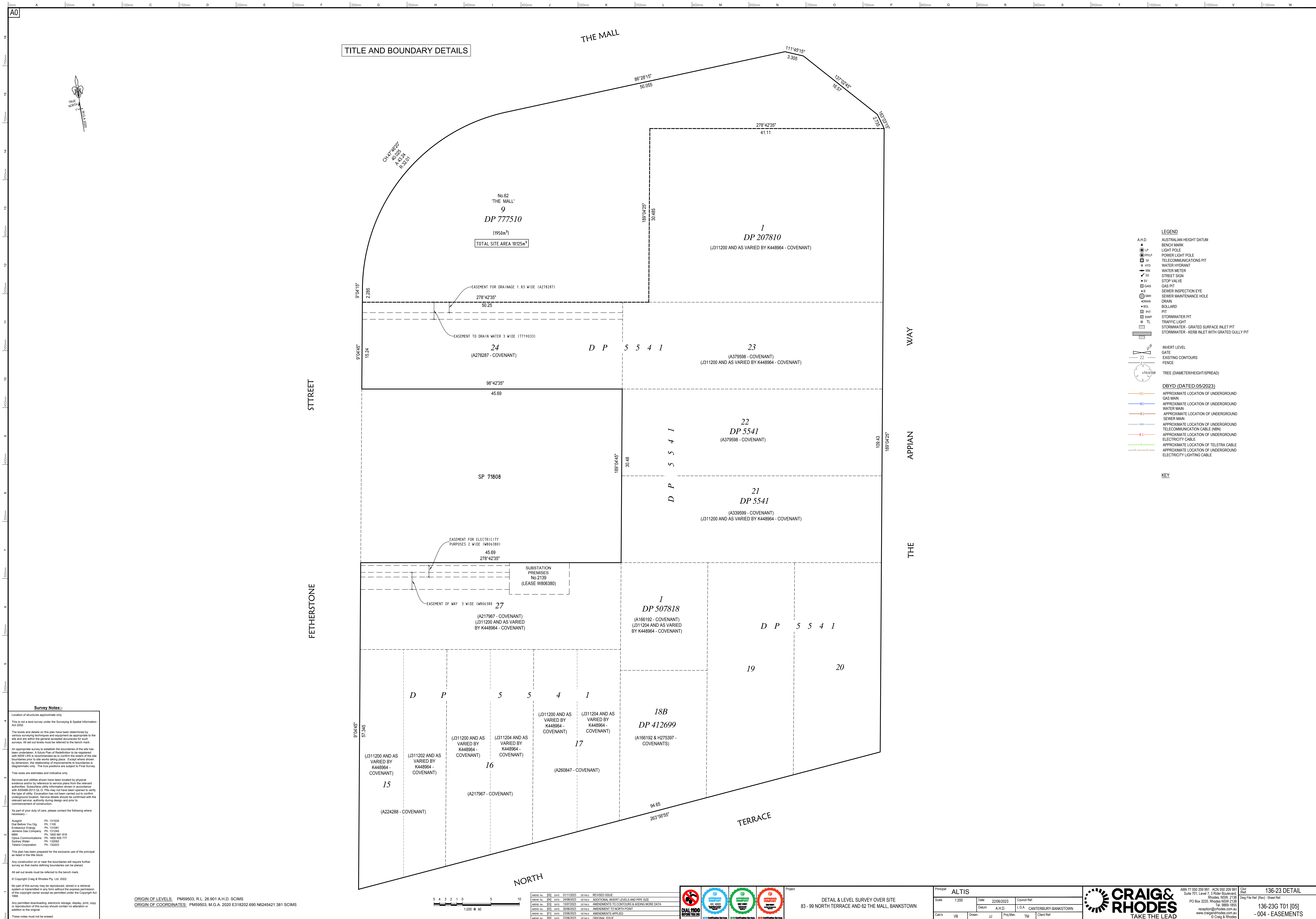
BE (Civil) MIEAust

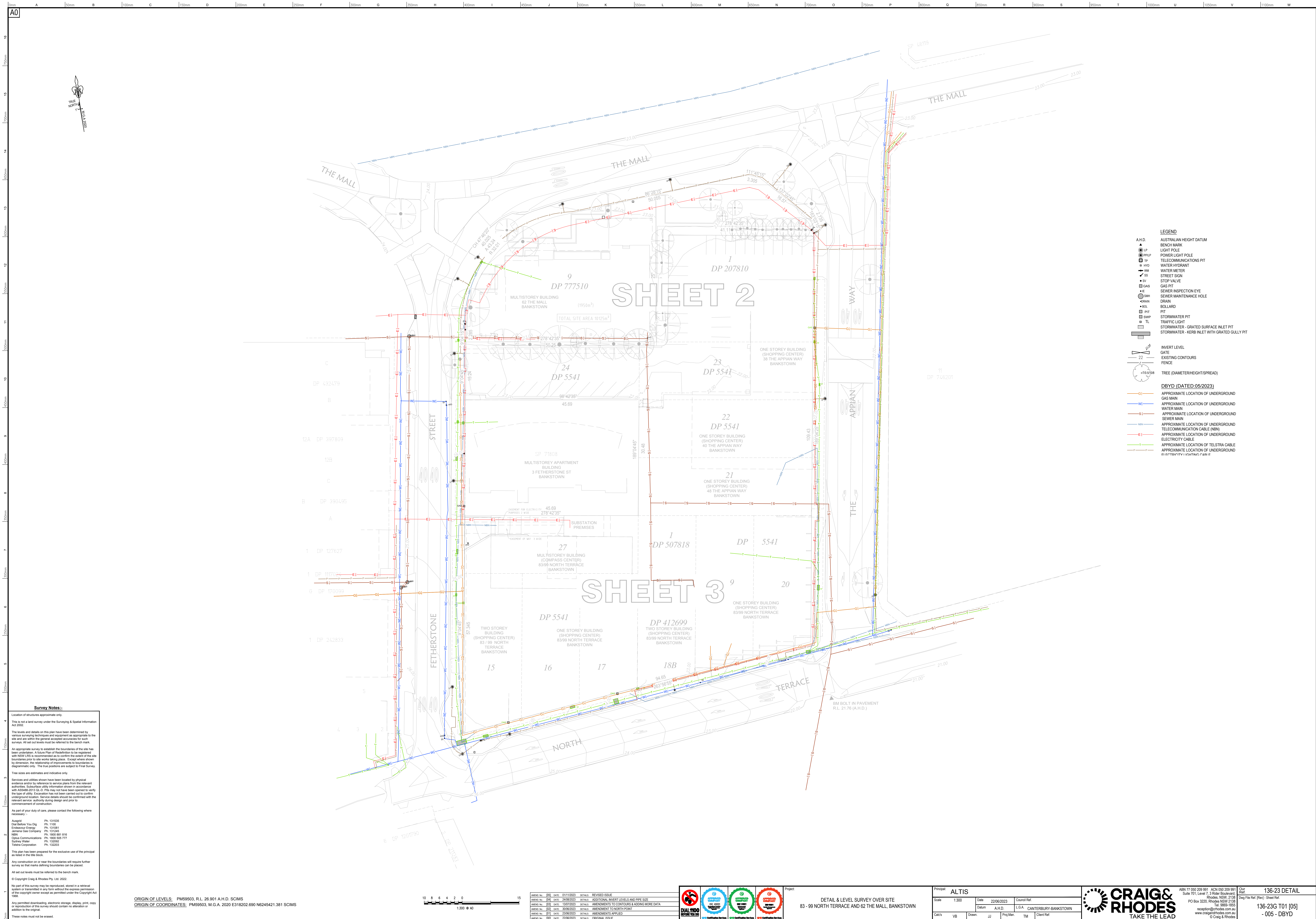
Appendix

7.1 APPENDIX A - SURVEY

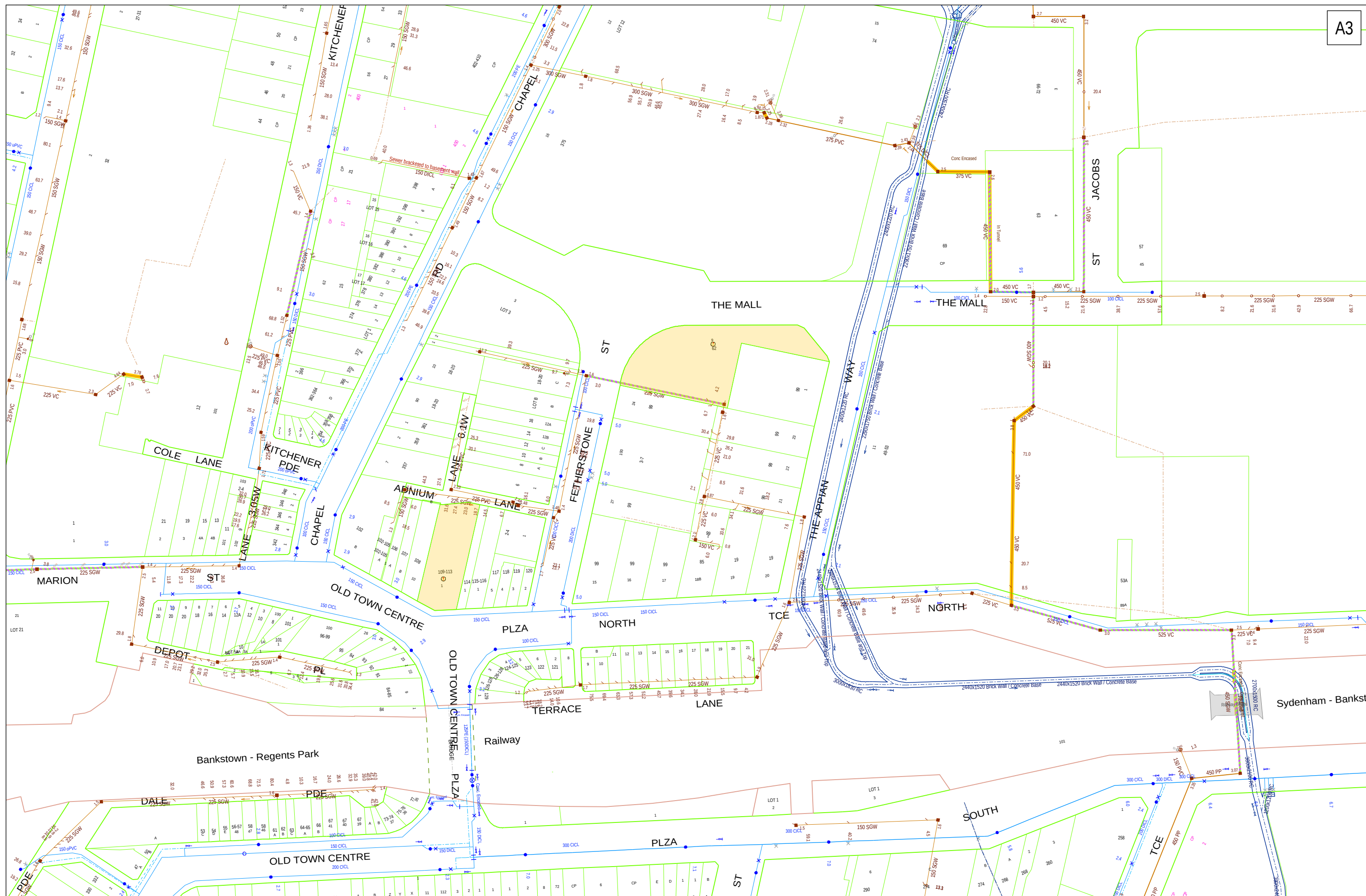








7.2 APPENDIX B – SYDNEY WATER DBYD



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3 Fetherstone Street
Bankstown NSW 2200

DBYD Job No: 35656245

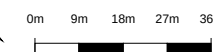
DBYD Sequence No: 233236259

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SYDNEY WATER CORPORATION

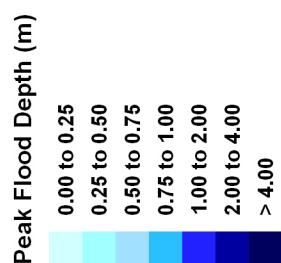
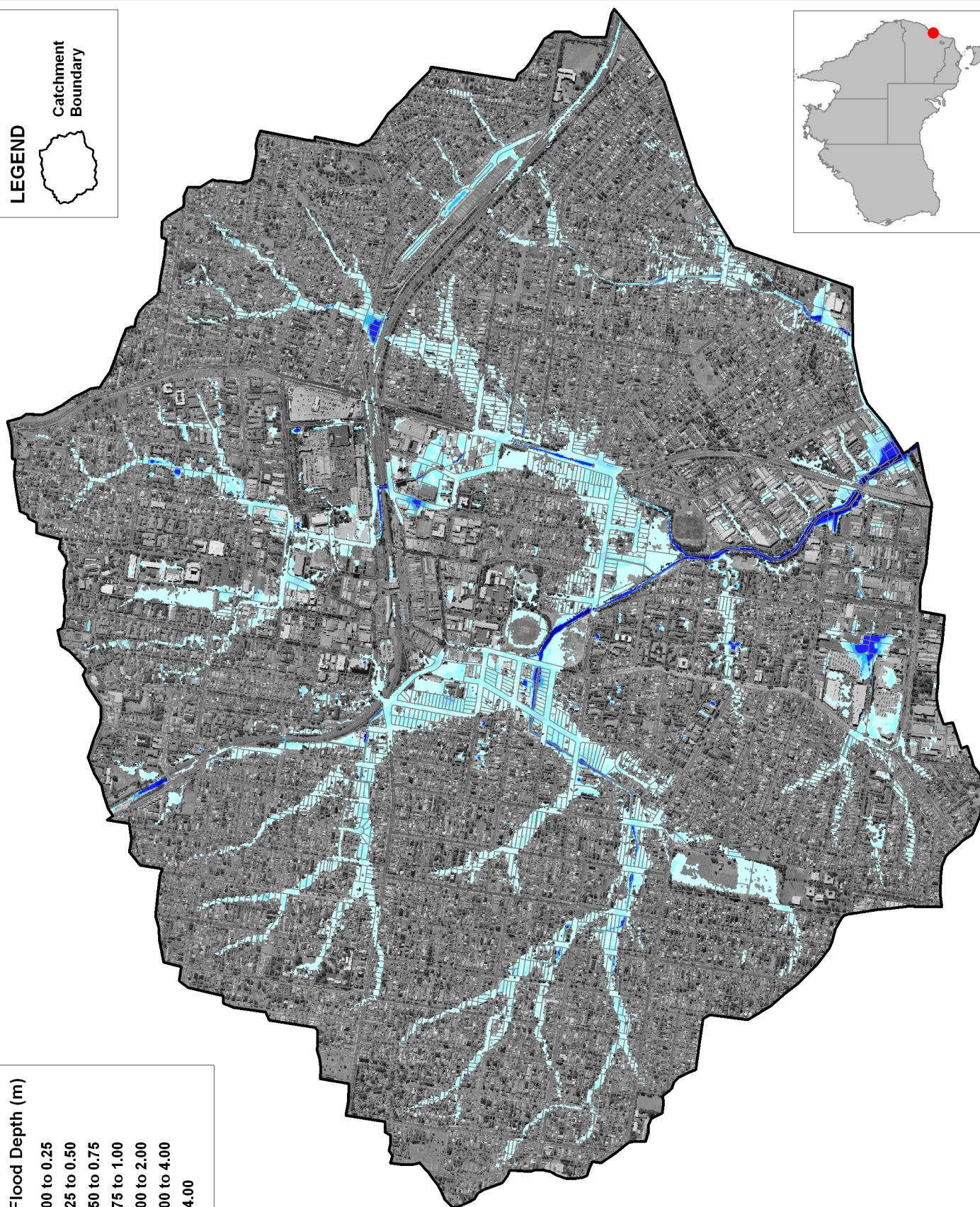
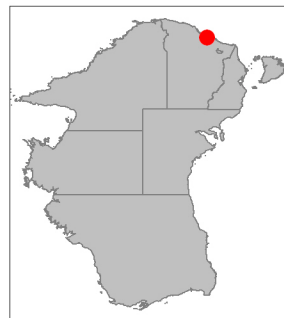
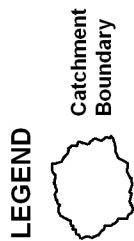
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Plan 1 of 1



7.3 APPENDIX C – SELECTED FLOOD RESULTS FROM SALT PAN CREEK FLOOD STUDY



Title:

Modelled Peak Flood Depths 20 year ARI Design Storm Event

Figure:

B-1

Rev:

A

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

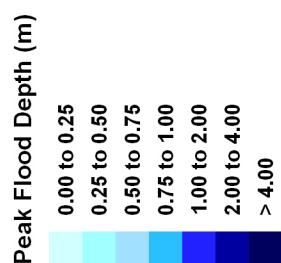
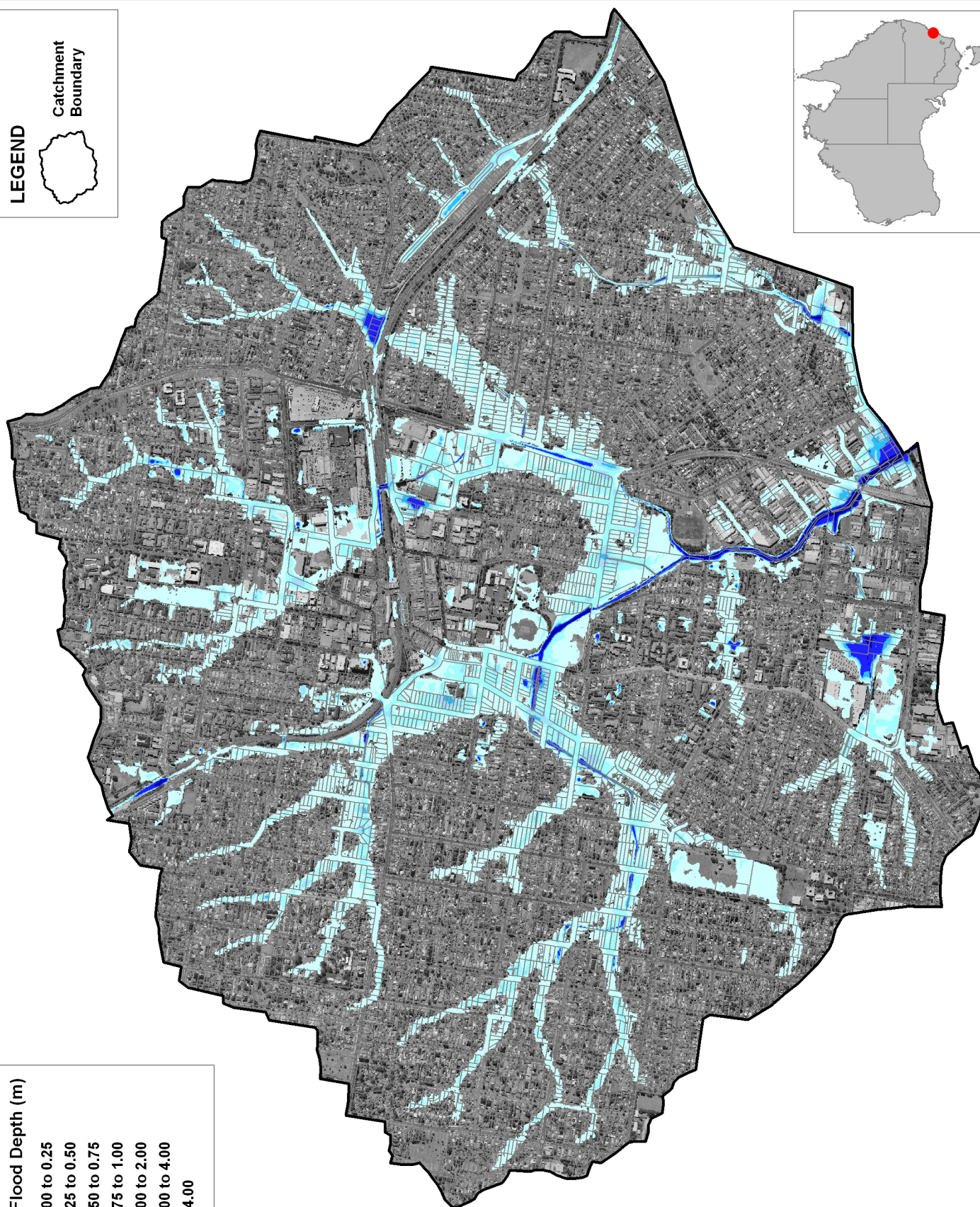
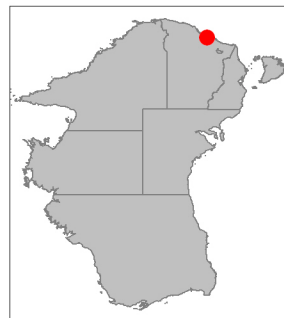
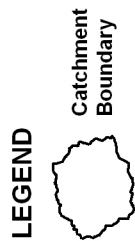


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Approx. Scale



www.wbmpl.com.au

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Title:

Modelled Peak Flood Depths 100 year ARI Design Storm Event

Figure:

B-3

Rev:

A

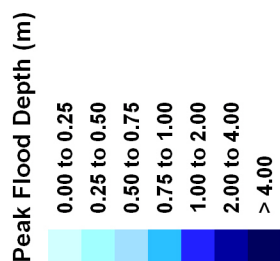
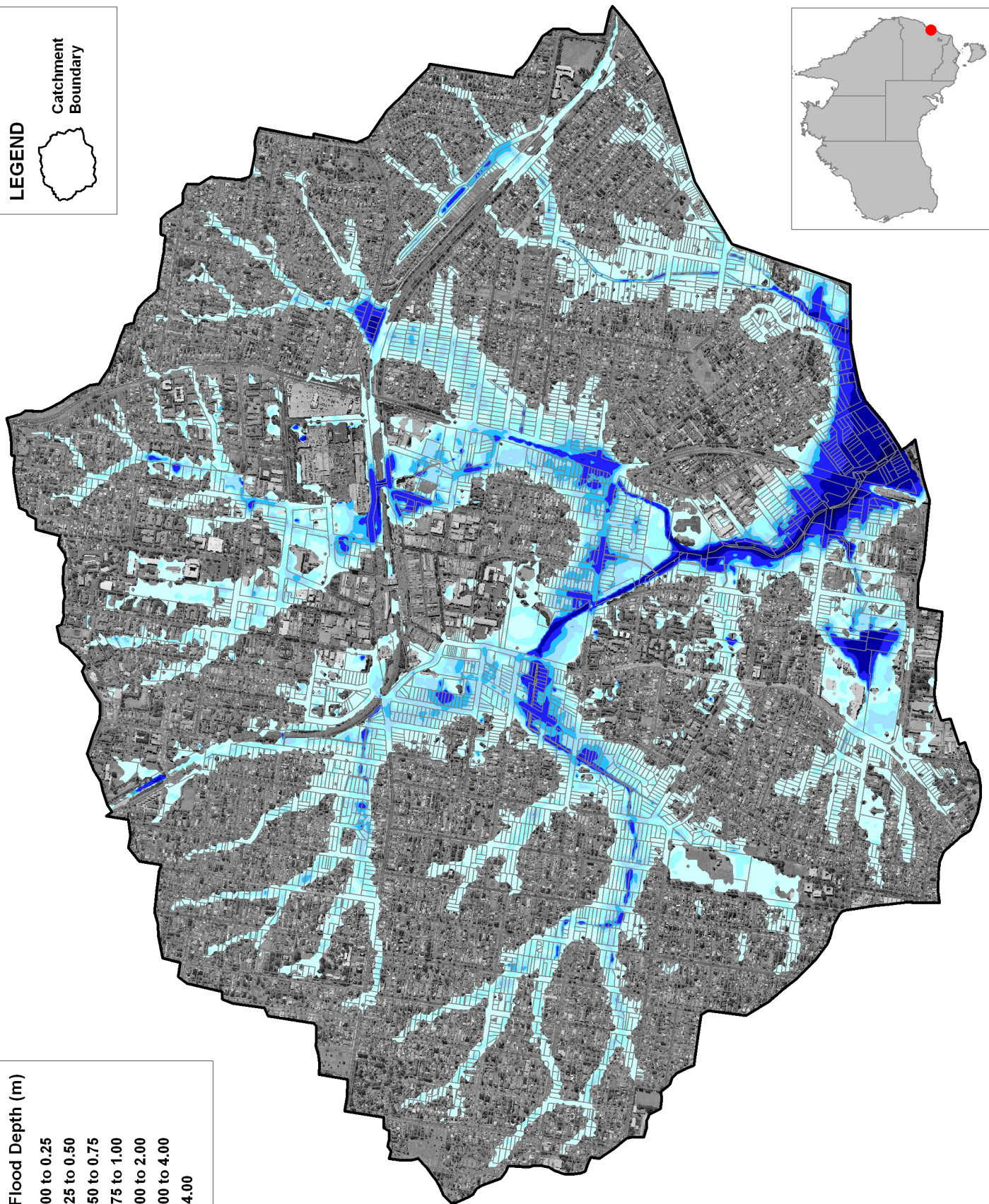
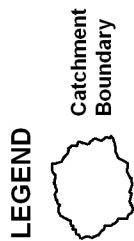
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Approx. Scale



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Title:

Modelled Peak Flood Depths PMF Design Storm Event

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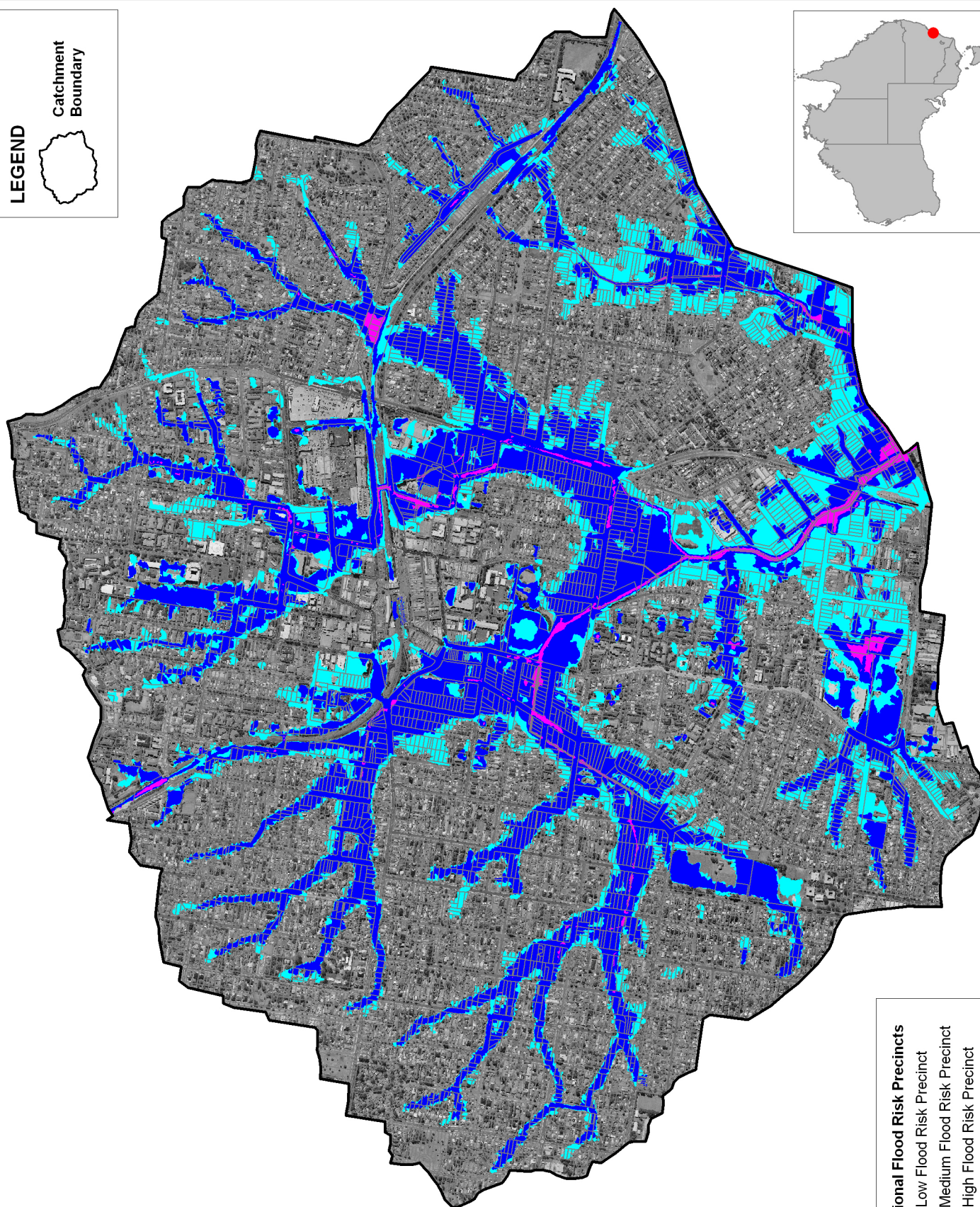
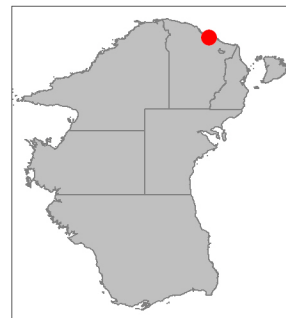
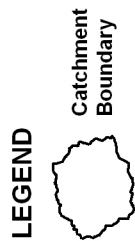
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Approx. Scale

Figure:
B-4

Rev:
A



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Provisional Flood Risk Precincts

Low Flood Risk Precinct

Medium Flood Risk Precinct

High Flood Risk Precinct

Title:

Provisional Flood Risk Precinct Map Salt Pan Creek Catchment

Figure:
D-1

Rev:
A

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0 400 800m

Approx. Scale



Filepath : I:\B14677.i.gis\DRG\FPA_138_091022_C17_provisional_risk.WOR

7.4 APPENDIX D – THE APPIAN WAY STORMWATER UPGRADES

U:\Projects\North Terrace\North Tce Culvert Duplication Stage 1\dwg\05 Construction (L3)\CBC01007_North Tce_IFI Compass Centre_Issue_1(Sbmmwater).dwg



**CANTERBURY
BANKSTOWN**

Ph: (02) 9707 9642
Fax: (02) 9707 9557
Post: PO Box 8
BANKSTOWN, NSW 1885

 SURVEY
 CADASTRAL BOUNDARY
 EXISTING AWNING LINE
 EXISTING RAILWAY TRACKS

OTHER NOTES

CONTRACTOR TO LOCATE ALL UNDERGROUND SERVICES PRIOR TO COMMENCEMENT OF WORK.

CONTRACTOR TO MAKE SURE THEY DO NOT DAMAGE ANY UNDERGROUND SERVICES DURING CONSTRUCTION WORK.

CONTRACTOR TO MAKE SURE THAT THEY DO NOT CAUSE ANY DAMAGE TO EXISTING STRUCTURE WHEN EXCAVATING NEAR EXISTING PROPERTIES.

CONTRACTOR TO MAKE SURE THAT THEY DO NOT CAUSE ANY UNNECESSARY DAMAGE TO EXISTING STRUCTURE WHEN EXCAVATING NEAR EXISTING PUBLIC INFRASTRUCTURE.

DURING ANY STAGE OF PROJECT IF ANY CHANGES ARE REQUIRED TO CURRENT STRUCTURAL DETAILS THEN SEEK ADVICE FROM STRUCTURAL ENGINEER PRIOR TO CHANGES ON SITE.

IT IS THE CONTRACTOR'S RESPONSIBILITY TO CHECK AND VERIFY THE BUILDABILITY OF THE DESIGN AS DOCUMENTED IN THESE DRAWINGS. REPORT ANY STRUCTURAL ISSUES OR CONCERNS BACK TO COUNCIL ENGINEER PRIOR TO CONSTRUCTION.

ALL DIMENSIONS IN THESE DRAWINGS ARE IN MILLIMETRES UNLESS SPECIFIED OTHERWISE.

THESE DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT STANDARD DRAWINGS AND SPECIFICATIONS.

QUALITY OF FILL MATERIAL, BACKFILLING AND COMPACTION REQUIREMENT TO SYDNEY WATER / CBC SPECIFICATIONS.



**CANTERBURY
BANKSTOWN**

CBC PROJECT No. CBC01007		PARTIAL
ISSUE STATUS	SHEET No.	ISSUED
ISSUED FOR INFORMATION	SM-0501	A

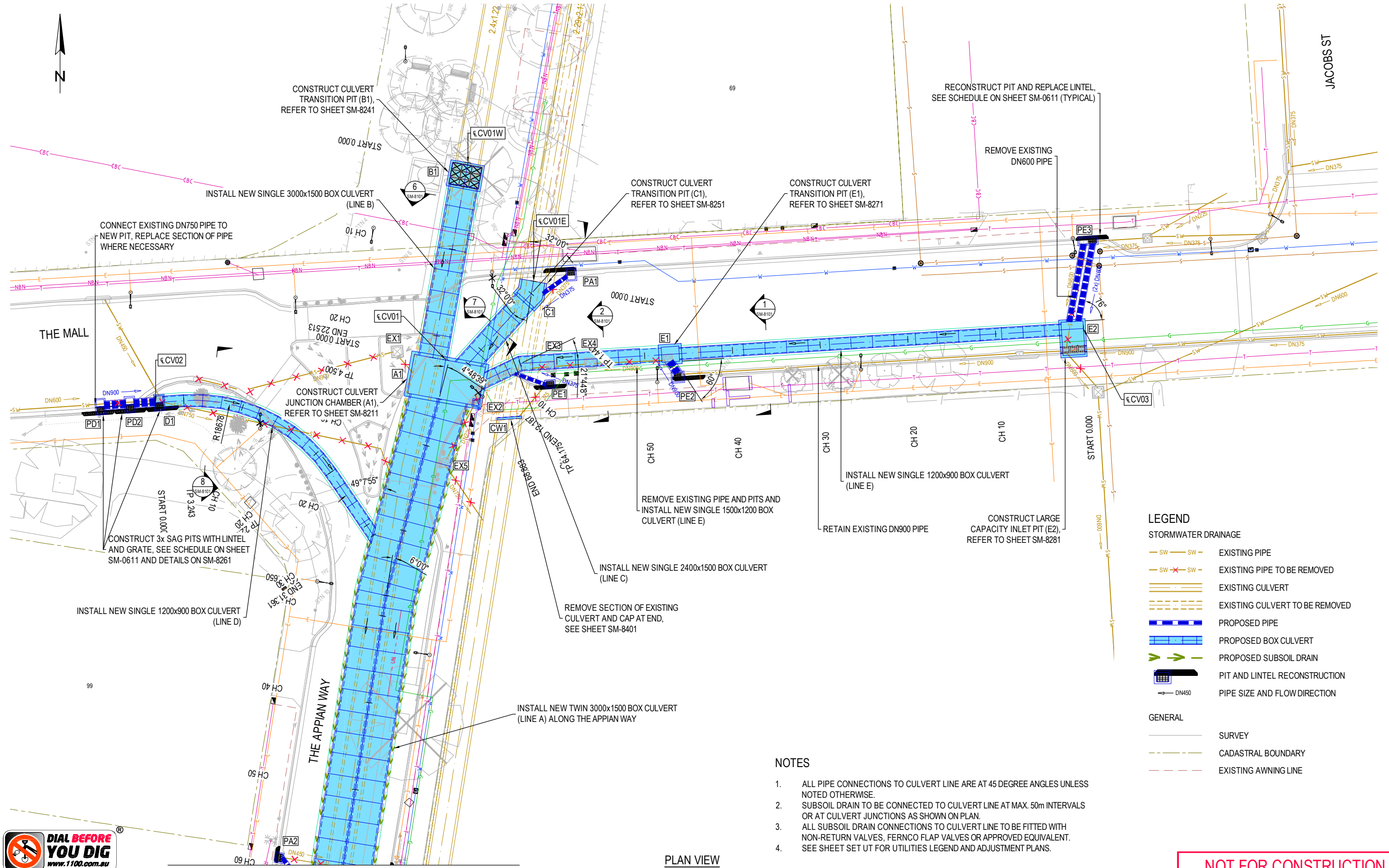
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ART
-
SSUE
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U:\Projects\North Terrace\North Terrace Culvert Duplication Stage 1\dwg\05 Construction (3)\CBC01007_North Terrace Culvert Duplication Stage 1 (Stormwater).dwg

50mm ON A3 SIZE ORIGINAL



PLAN VIEW
SCALE 1:400



REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY	TITLE	NAME	DATE	CLIENT	CITY OF CANTERBURY BANKSTOWN THE APPIAN WAY & NORTH TERRACE, BANKSTOWN CULVERT UPGRADE AND ROAD WORKS	A3
A	29.02.24	ISSUED FOR INFORMATION	K.Y.	1:400		SURVEYED	Y. LIU	10.12.19			
						DRAWN	J. WANG	21.07.21			
						DRAWING CHECK	K. YIP / E. CHOWDHURY	21.07.21			
						DESIGN	J. WANG / T. KHOR	21.07.21			
						DESIGN CHECK	K. YIP / E. CHOWDHURY	21.07.21			
						PROJECT OFFICER	R.DUDLEY	N/A			
						CLIENT / ASSET OWNER	CBCITY / SYDNEY WATER	-			
										CITY OF CANTERBURY BANKSTOWN CITY ASSETS ASSET SYSTEMS & PLANNING	
										STORMWATER MANAGEMENT DETAIL DRAINAGE PLAN	SHEET 1 OF 3
										CBC PROJECT No. CBC01007	PART -
										ISSUE STATUS ISSUED FOR INFORMATION	ISSUE A
										SHEET No. SM-0601	

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

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50mm ON A3 SIZE ORIGINAL



REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL
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SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY
1:400	
CO-ORDINATE SYSTEM MGA ZONE 56 (GDA94)	HEIGHT DATUM AHD



CIVIC TOWER
LEVEL 1
66 - 72 RICKARD ROAD
BANKSTOWN, NSW 2200

Ph: (02) 9707 9642
Fax: (02) 9707 9557
Post: PO Box 8
BANKSTOWN, NSW 1885

TITLE	NAME	DATE	CLIENT
SURVEYED	Y. LIU	10.12.19	
DRAWN	J. WANG	21.07.21	
DRAWING CHECK	K. YIP / E. CHOWDHURY	21.07.21	
DESIGN	J. WANG / T. KHOR	21.07.21	
DESIGN CHECK	K. YIP / E. CHOWDHURY	21.07.21	
PROJECT OFFICER	R.DUDLEY	N/A	
CLIENT / ASSET OWNER	CBCITY / SYDNEY WATER	-	



PLAN VIEW
SCALE 1:400

LEGEND

STORMWATER DRAINAGE

- SW — SW — EXISTING PIPE
- SW — X SW — EXISTING PIPE TO BE REMOVED
- — — EXISTING CULVERT
- — — EXISTING CULVERT TO BE REMOVED
- — — PROPOSED PIPE
- — — PROPOSED BOX CULVERT
- — — PROPOSED SUBSOIL DRAIN
- — — PIT AND LINTEL RECONSTRUCTION
- — — PIPE SIZE AND FLOW DIRECTION

GENERAL

- — — SURVEY
- — — CADASTRAL BOUNDARY
- — — EXISTING AWNING LINE

NOTES

- ALL PIPE CONNECTIONS TO CULVERT LINE ARE AT 45 DEGREE ANGLES UNLESS NOTED OTHERWISE.
- SUBSOIL DRAIN TO BE CONNECTED TO CULVERT LINE AT MAX. 50m INTERVALS OR AT CULVERT JUNCTIONS AS SHOWN ON PLAN.
- ALL SUBSOIL DRAIN CONNECTIONS TO CULVERT LINE TO BE FITTED WITH NON-RETURN VALVES, FERNCO FLAP VALVES OR APPROVED EQUIVALENT. SEE SHEET SET UT FOR UTILITIES LEGEND AND ADJUSTMENT PLANS.
-

INSTALL NEW TWIN 3000x1500 BOX CULVERT (LINE A) ALONG THE APPIAN WAY

CAP EXISTING CULVERT AT BURIED JUNCTION UNDER EXISTING BUILDING, SEE SHEET SM-8403

FILL DECOMMISSIONED CULVERT SECTION WITH SAND OR APPROVED FILL MATERIAL

REMOVE SECTION OF EXISTING CULVERT AND CAP AT END, SEE SHEET SM-8401

NEW TWIN 3600x1500 BOX CULVERT (LINE A) AROUND BEND BETWEEN THE APPIAN WAY & NORTH TCE

STAGING CONNECTION TO EXISTING CULVERT (S1)

INSTALL NEW 3000x1200 BOX CULVERT FOR STAGING CONNECTION

RECONSTRUCT PIT AND REPLACE LINTEL, SEE SCHEDULE ON SHEET SM-0611 (TYPICAL)

ALTERNATIVE DESIGN: REFER TO SHEET SM-9011 TO SM-9015 FOR CAST-IN-PLACE STAGING CONNECTION

INSTALL NEW TWIN 3600x1500 BOX CULVERT (LINE A) ALONG NORTH TCE

BACKFILL EXISTING OPEN CHANNEL, SEE SHEET SM-8402

REMOVE SECTION OF EXISTING CULVERT AND CAP AT ENDS, SEE SHEET SM-8401

NOT FOR CONSTRUCTION

CITY OF CANTERBURY BANKSTOWN
THE APPIAN WAY & NORTH TERRACE, BANKSTOWN
CULVERT UPGRADE AND ROAD WORKS

STORMWATER MANAGEMENT
DETAIL DRAINAGE PLAN

CBC PROJECT No. **CBC01007**

ISSUE STATUS
ISSUED FOR INFORMATION

SHEET 2 OF 3

SHEET No. **SM-0602**

A3

PART -
ISSUE
A

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

U:\Projects\North Terrace\North Terrace Culvert Duplication Stage 1.dwg\05 Construction (3)\CBC01007_North Terrace Compass Centre Issue 1 (Stormwater).dwg

50mm ON A3 SIZE ORIGINAL



REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL
A	29.02.24	ISSUED FOR INFORMATION	K.Y.

PLOT DATE / TIME	PLOT BY
29/02/2024 10:34:26 AM	931797

SCALES ON A3 SIZE DRAWING	CO-ORDINATE SYSTEM	HEIGHT DATUM
1:400	MGA ZONE 56 (GDA94)	AHD

DRAWINGS / DESIGN PREPARED BY	CIVIC TOWER	Ph:
	LEVEL 1	(02) 9707 9642
	66 - 72 RICKARD ROAD	Fax: (02) 9707 9557
	BANKSTOWN, NSW 2200	Post: PO Box 8
		BANKSTOWN, NSW 1885

TITLE	NAME	DATE
SURVEYED	Y. LIU	10.12.19
DRAWN	J. WANG	21.07.21
DRAWING CHECK	K. YIP / E. CHOWDHURY	21.07.21
DESIGN	J. WANG / T. KHOR	21.07.21
DESIGN CHECK	K. YIP / E. CHOWDHURY	21.07.21
PROJECT OFFICER	R.DUDLEY	N/A
CLIENT / ASSET OWNER	CBCITY / SYDNEY WATER	-

CLIENT	PREPARED FOR
	CITY OF CANTERBURY BANKSTOWN
	CITY ASSETS
	ASSET SYSTEMS & PLANNING

CITY OF CANTERBURY BANKSTOWN THE APPIAN WAY & NORTH TERRACE, BANKSTOWN CULVERT UPGRADE AND ROAD WORKS	A3
STORMWATER MANAGEMENT DETAIL DRAINAGE PLAN	SHEET 3 OF 3
CBC PROJECT No. CBC01007	PART -
ISSUE STATUS ISSUED FOR INFORMATION	ISSUE A
SHEET No. SM-0603	

NOTES

- ALL PIPE CONNECTIONS TO CULVERT LINE ARE AT 45 DEGREE ANGLES UNLESS NOTED OTHERWISE.
- SUBSOIL DRAIN TO BE CONNECTED TO CULVERT LINE AT MAX. 50m INTERVALS OR AT CULVERT JUNCTIONS AS SHOWN ON PLAN.
- ALL SUBSOIL DRAIN CONNECTIONS TO CULVERT LINE TO BE FITTED WITH NON-RETURN VALVES, FERNCO FLAP VALVES OR APPROVED EQUIVALENT.
- SEE SHEET SET UT FOR UTILITIES LEGEND AND ADJUSTMENT PLANS.

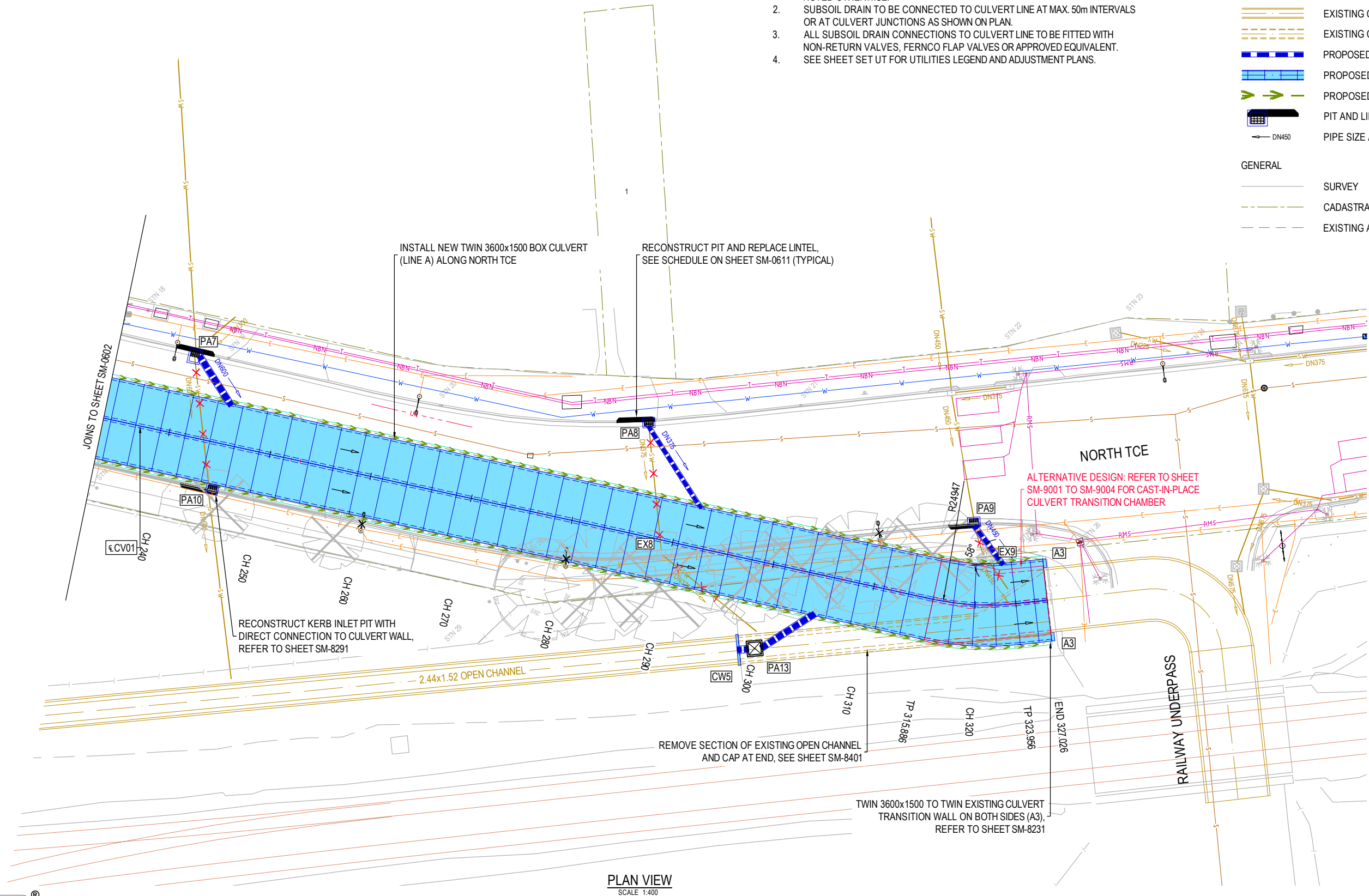
LEGEND

STORMWATER DRAINAGE

- EXISTING PIPE
- EXISTING PIPE TO BE REMOVED
- EXISTING CULVERT
- EXISTING CULVERT TO BE REMOVED
- PROPOSED PIPE
- PROPOSED BOX CULVERT
- PROPOSED SUBSOIL DRAIN
- PIT AND LINTEL RECONSTRUCTION
- PIPE SIZE AND FLOW DIRECTION

GENERAL

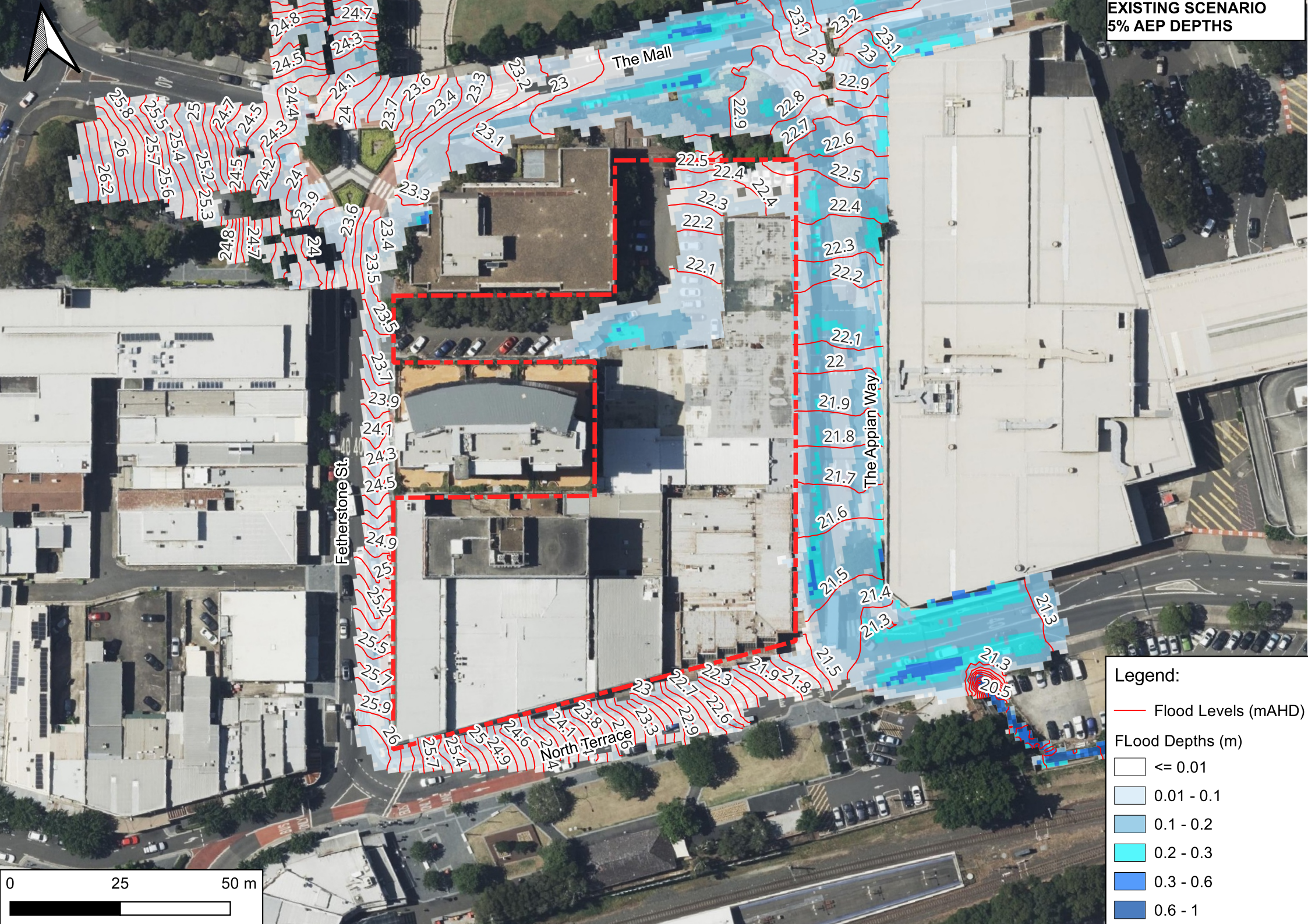
- SURVEY
- CADASTRAL BOUNDARY
- EXISTING AWNING LINE



PLAN VIEW
SCALE 1:400

NOT FOR CONSTRUCTION

7.5 APPENDIX E – FLOOD MAPS



— Flood Levels (mAHD)

☐ ≤ 0.01

0.01 - 0.1

0.2 - 0.3

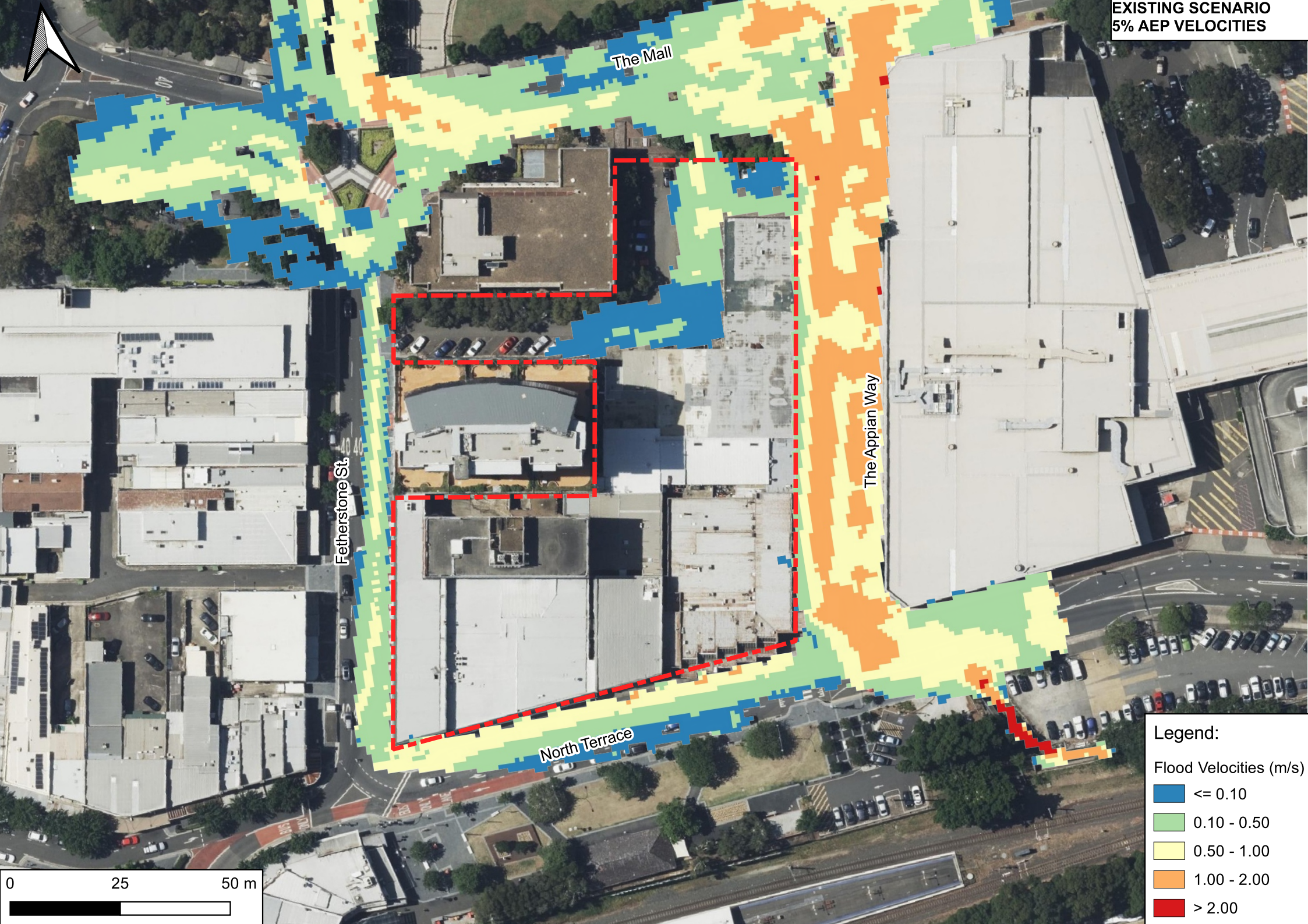
0.3 - 0.6

0.6 - 1

0 25 50 m



EXISTING SCENARIO
5% AEP VELOCITIES



Legend:

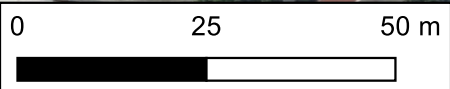
Flood Velocities (m/s)

- ≤ 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- > 2.00

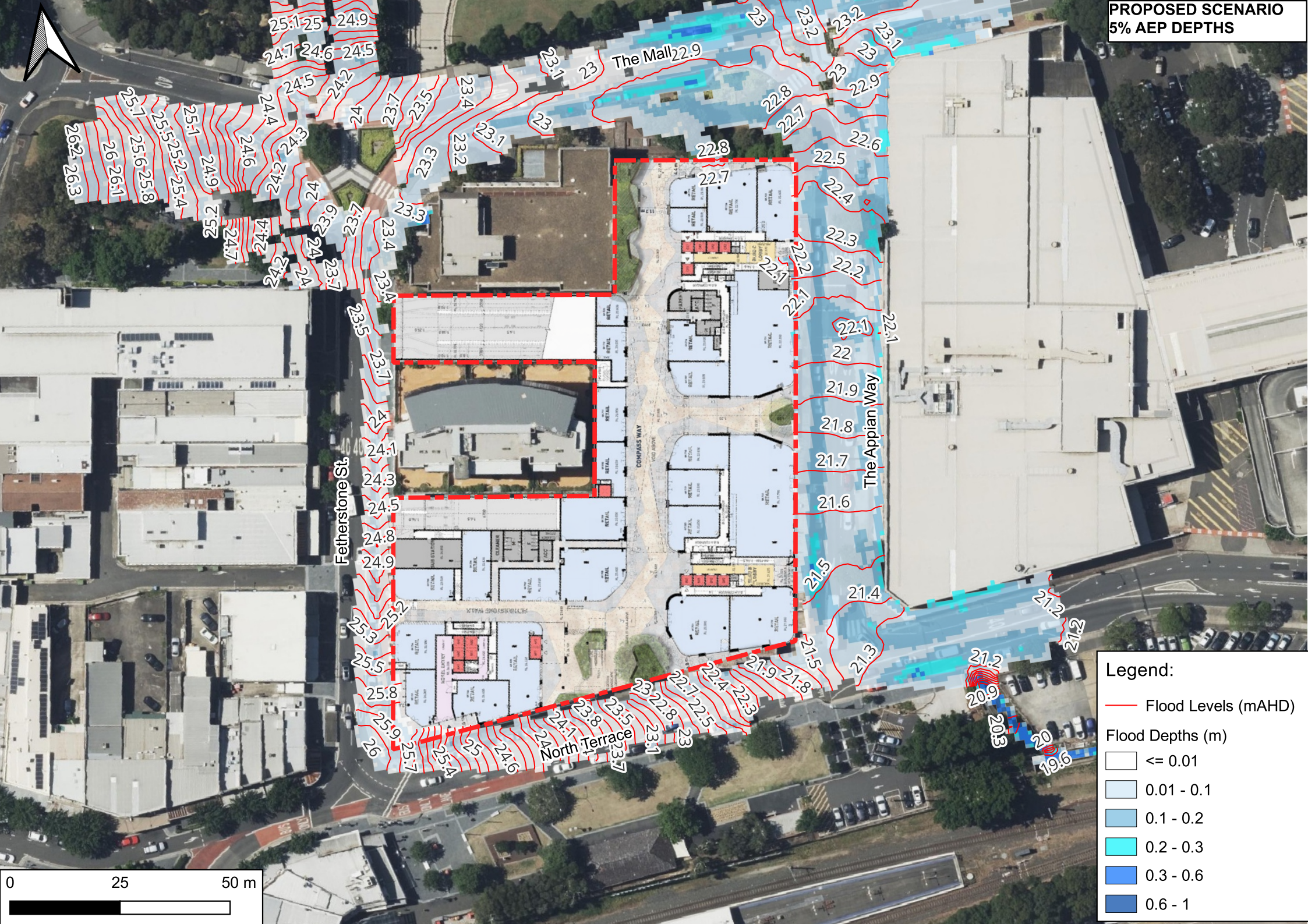


Legend:

- H1 - General safe for people, vehicles and buildings.
 - H2 - Unsafe for small vehicles.
 - H3 - Unsafe for vehicles, children and the elderly.
 - H4 - Unsafe for people and vehicles.
 - H5 - Unsafe for vehicles and people.
 - H6 - Unsafe for vehicles and people.
- All buildings vulnerable to structural damage.
Some less robust building types vulnerable to failure.
All building types considered vulnerable to failure.



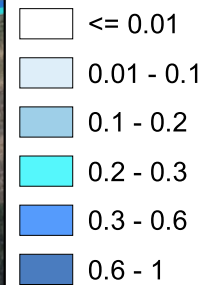
PROPOSED SCENARIO
5% AEP DEPTHS

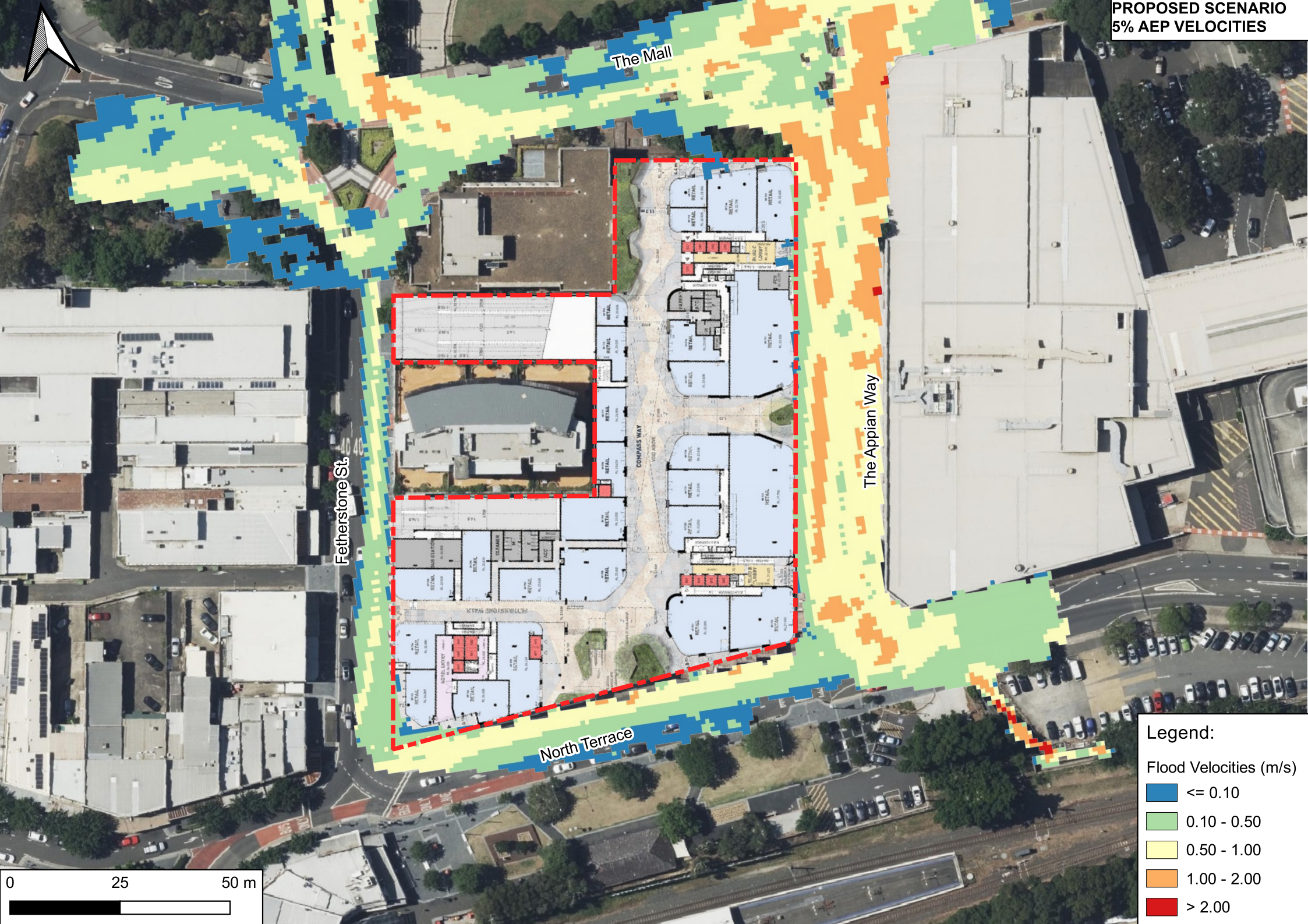


Legend:

— Flood Levels (mAHD)

Flood Depths (m)

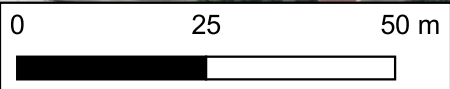


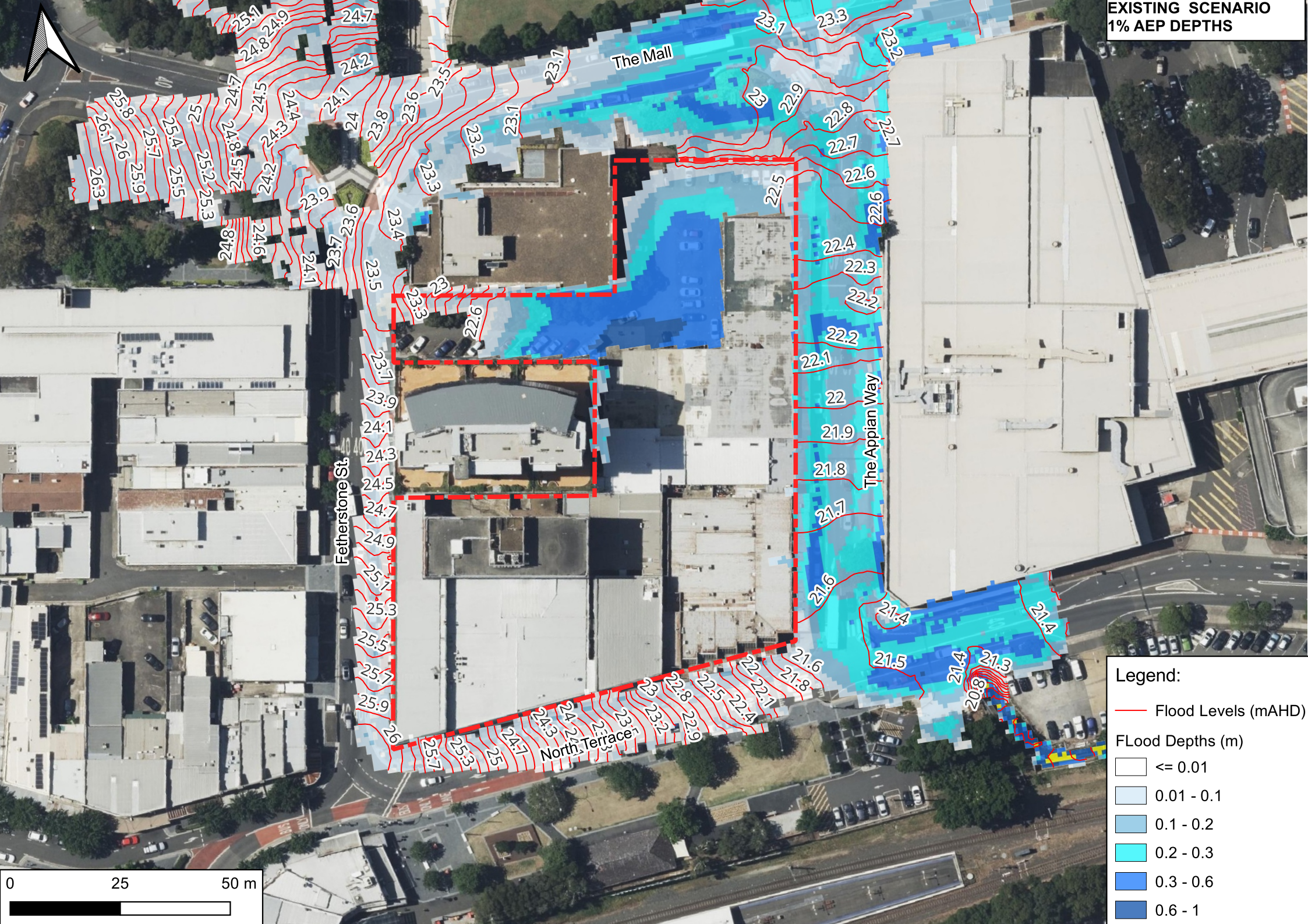


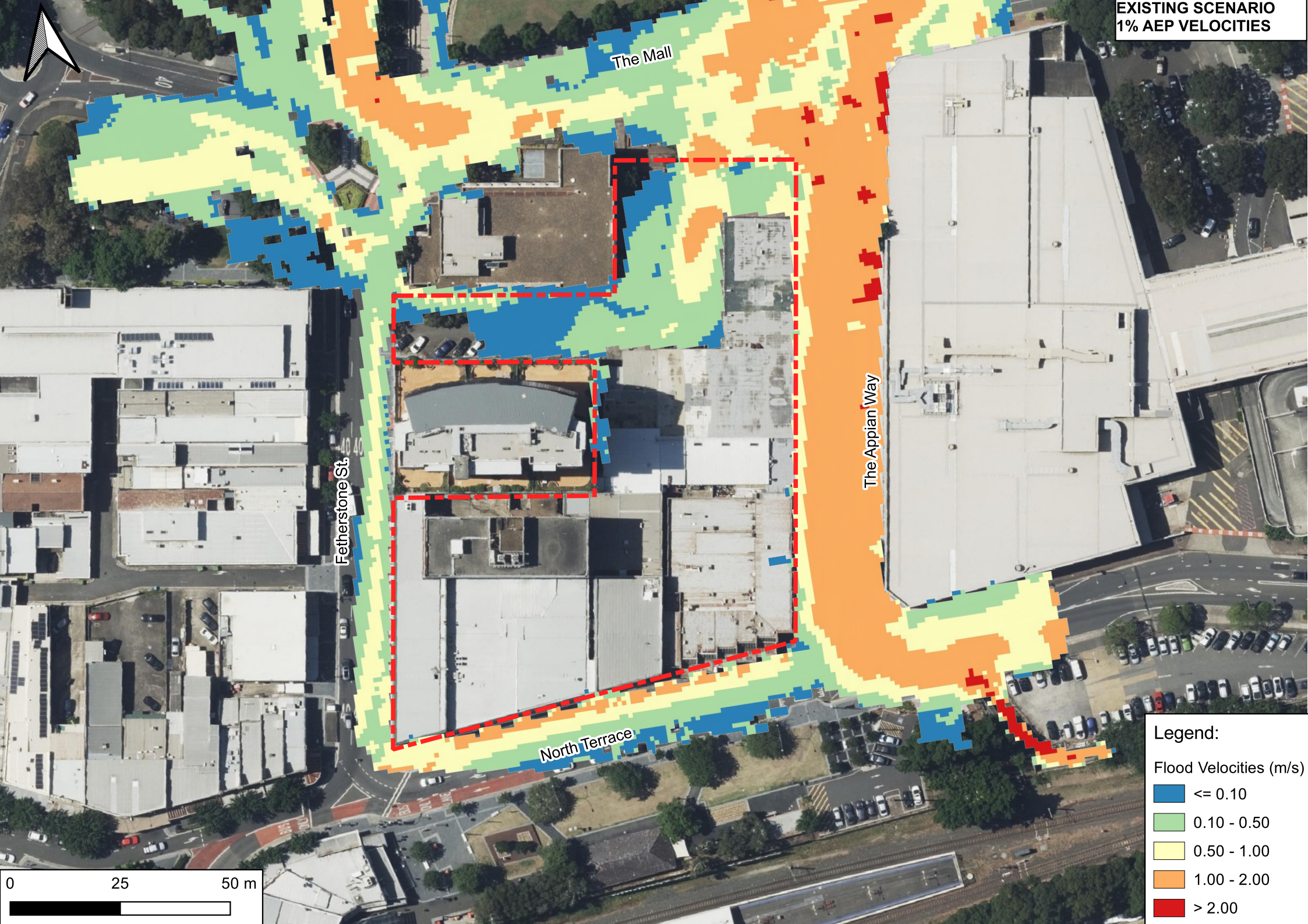


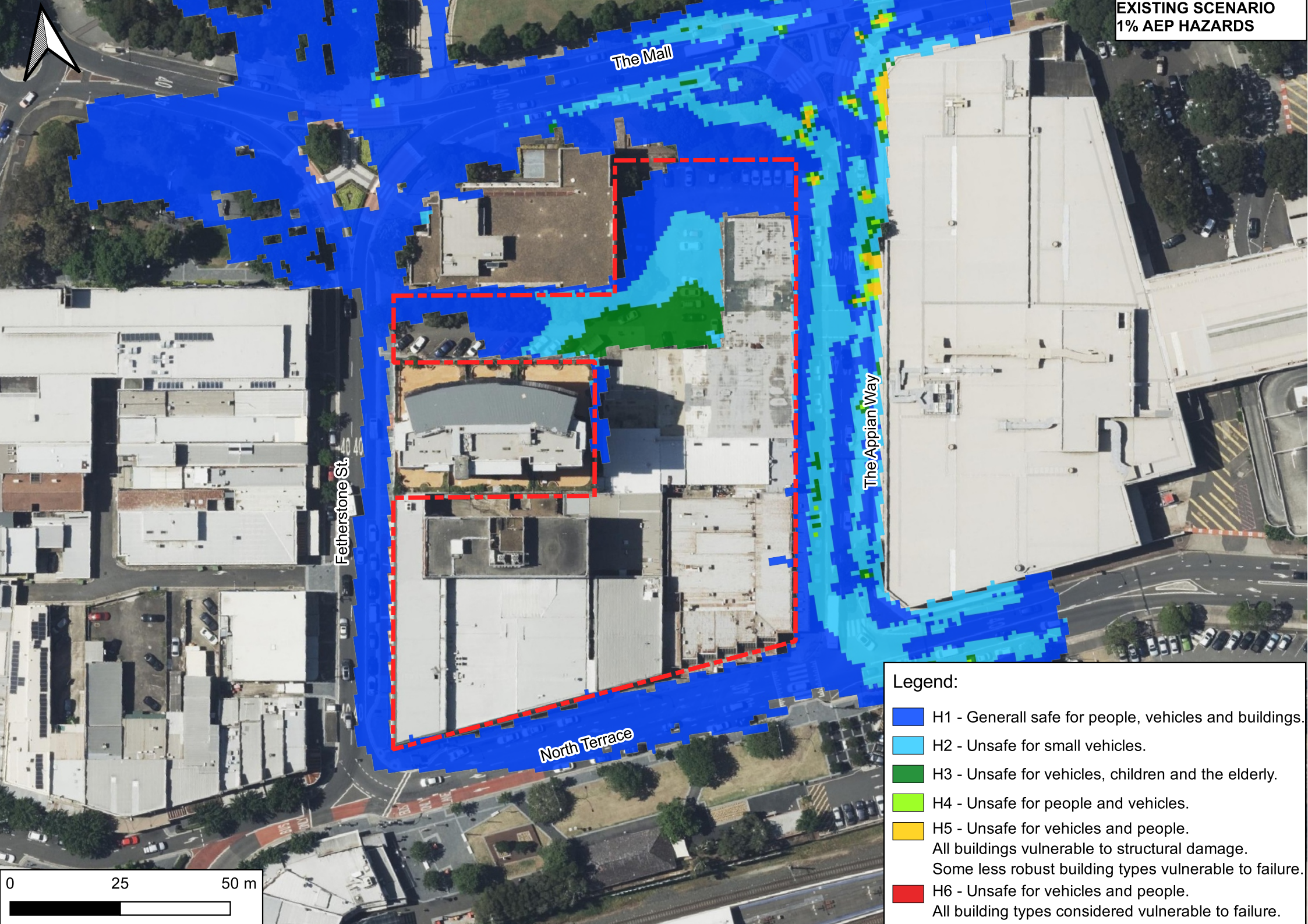
Legend:

- H1 - General safe for people, vehicles and buildings.
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 - H6 - Unsafe for vehicles and people.
- All buildings vulnerable to structural damage.
Some less robust building types vulnerable to failure.
- All building types considered vulnerable to failure.



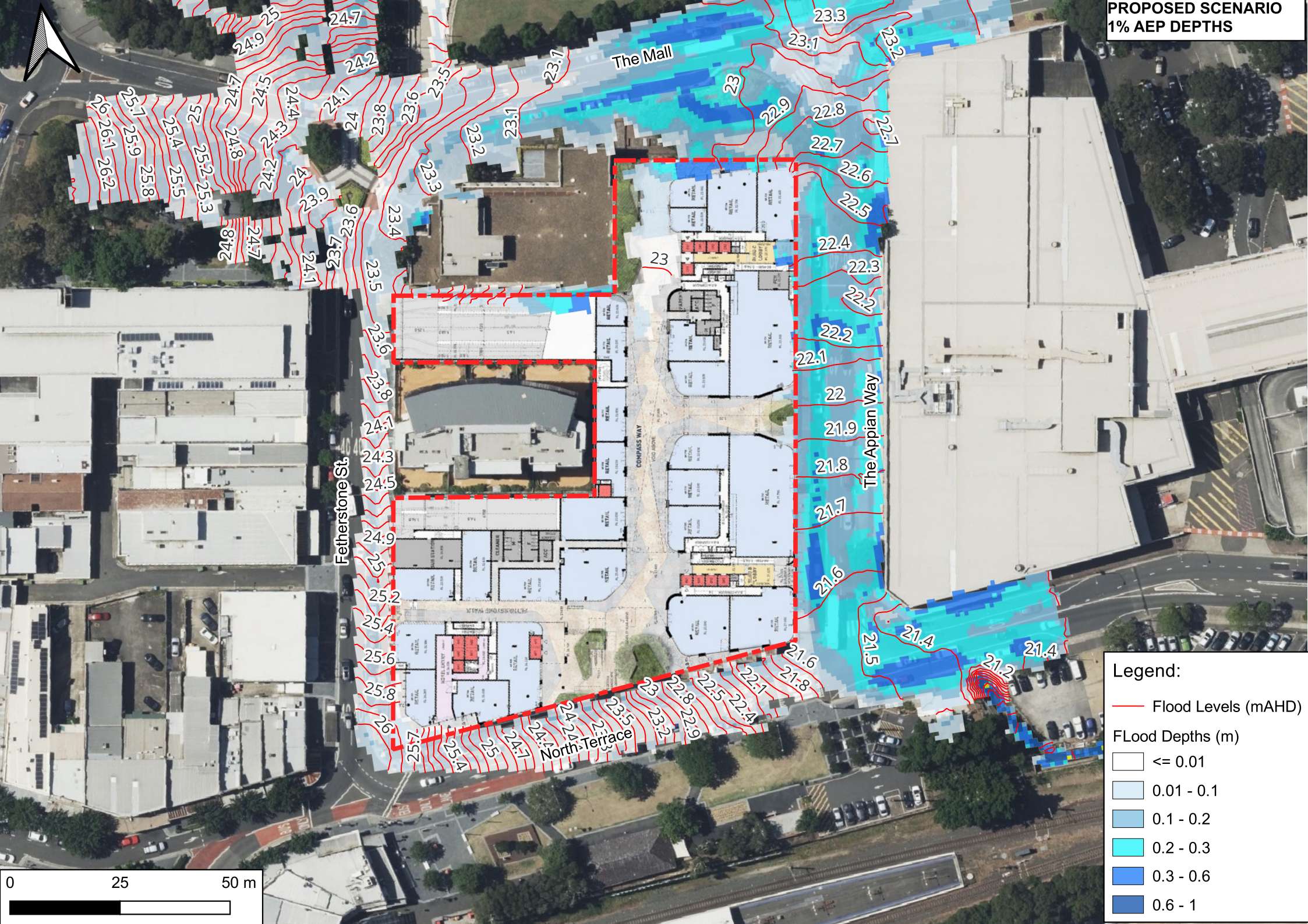






Legend:

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All buildings vulnerable to structural damage.
Some less robust building types vulnerable to failure.
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All building types considered vulnerable to failure.



— Flood Levels (mAHD)

$$\square \leq 0.01$$

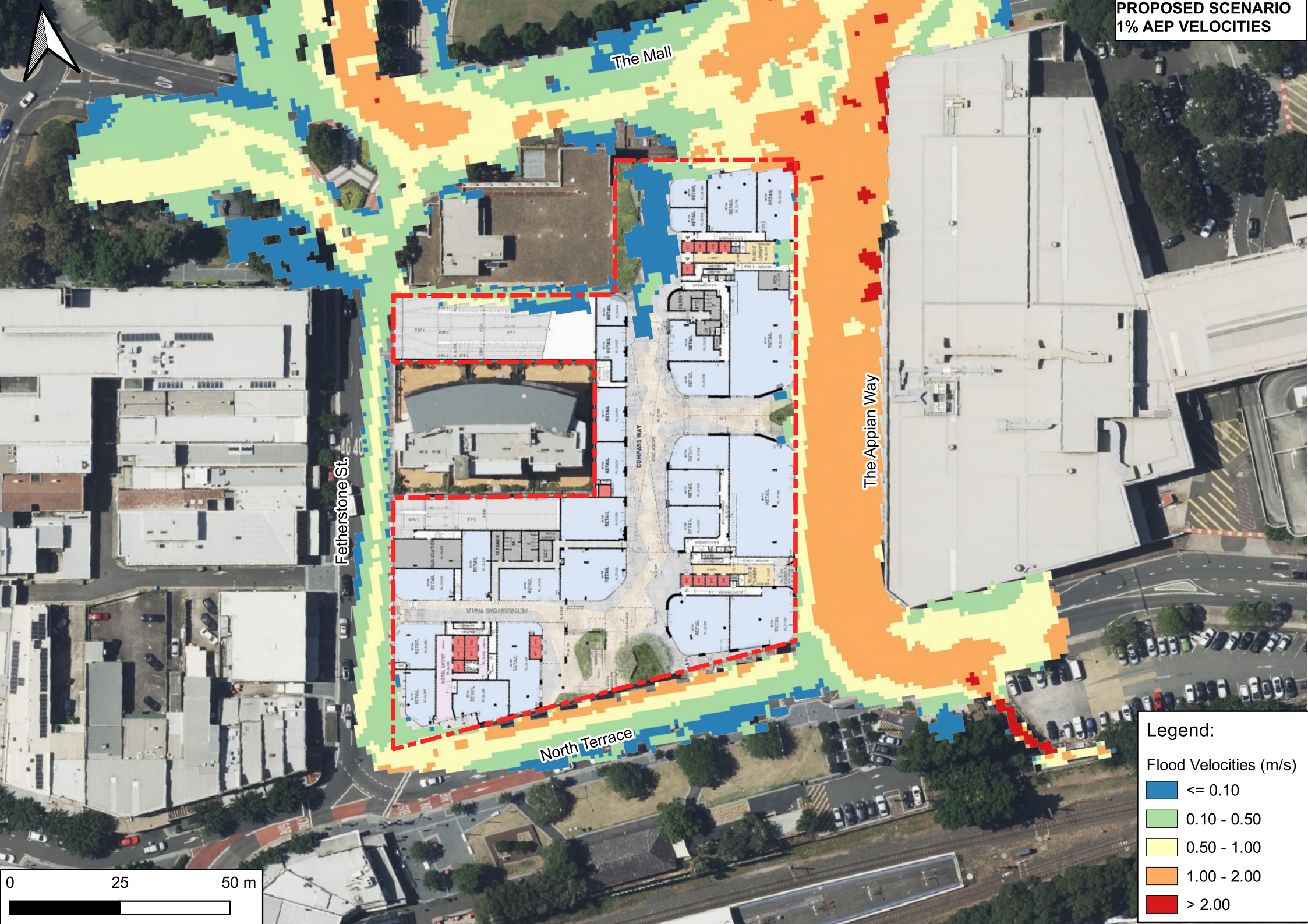
	0.1	0.2
0.1	0.1	0.2
0.2	0.2	0.4

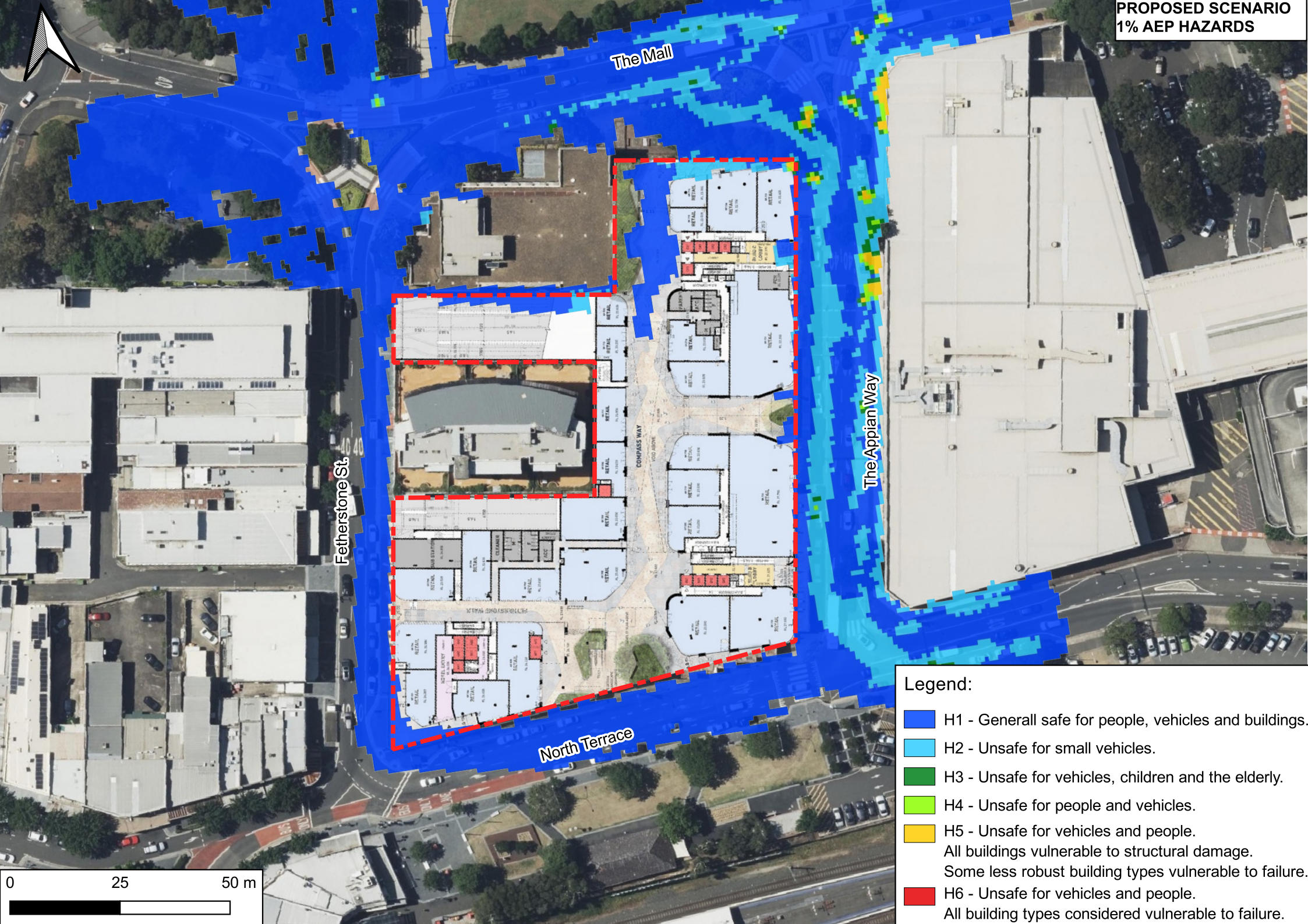
 0.2 - 0.3

0.6 - 1

0 25 50 m



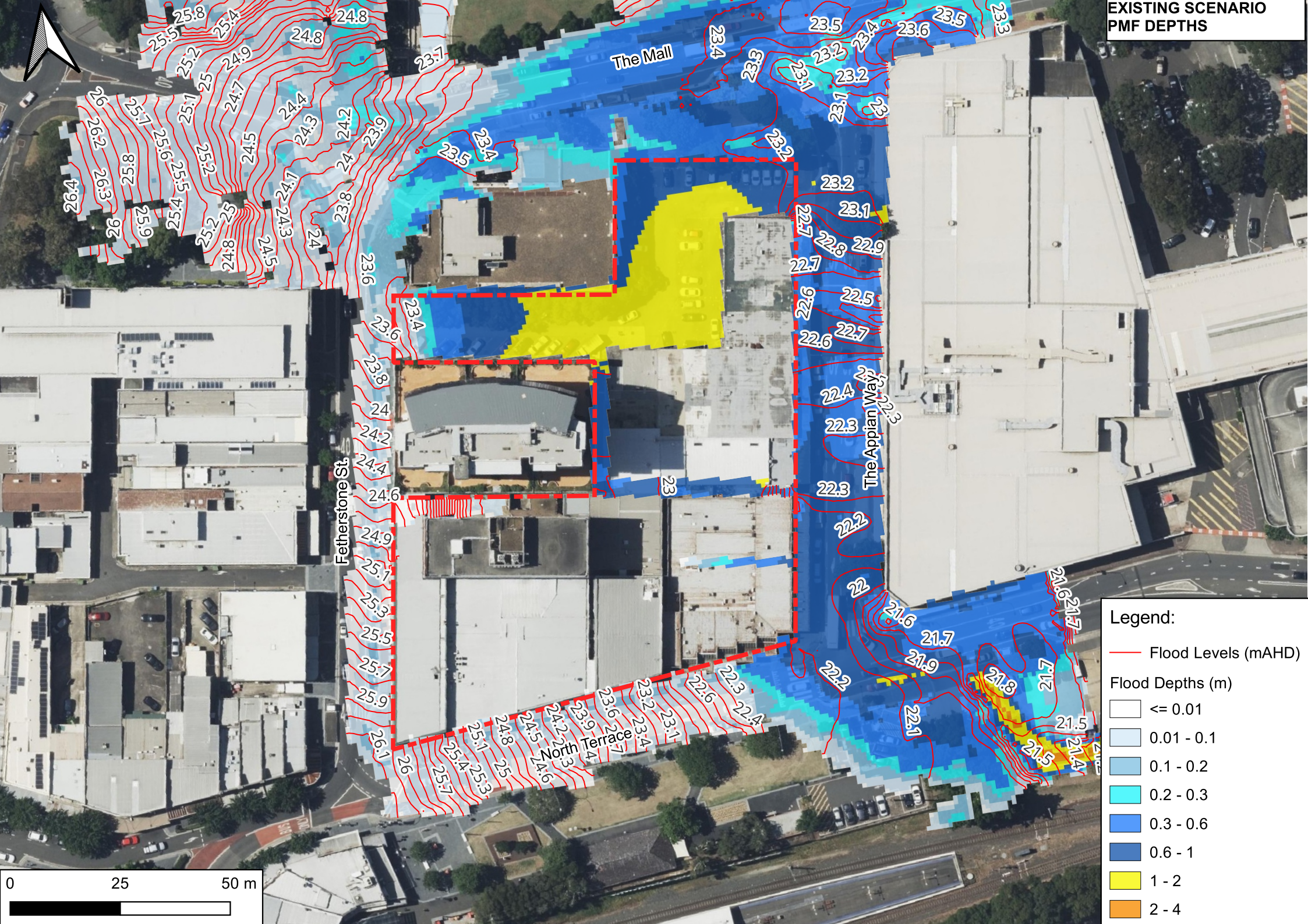




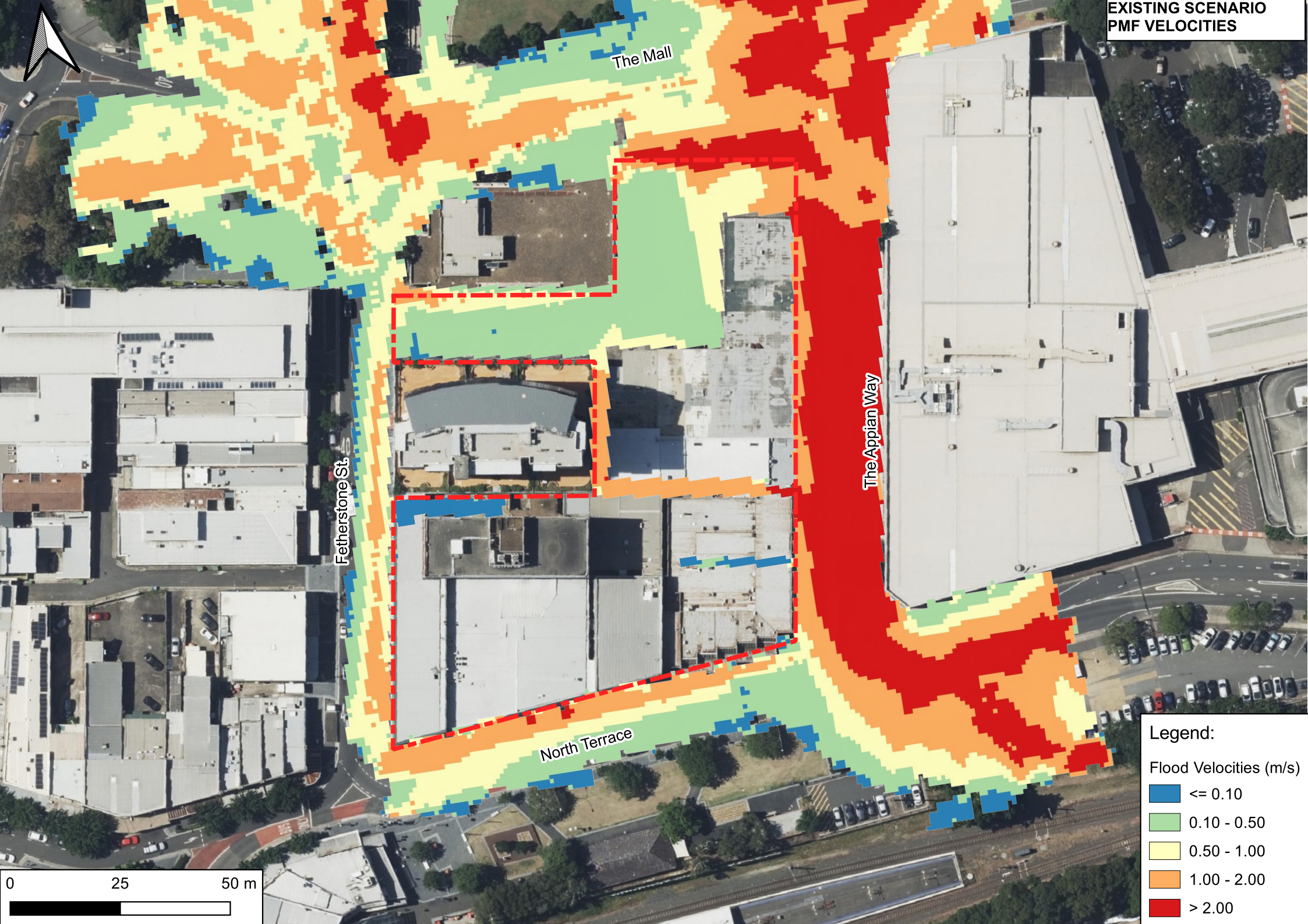
Legend:

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- H6 - Unsafe for vehicles and people.
All building types considered vulnerable to failure.

EXISTING SCENARIO
PMF DEPTHS



EXISTING SCENARIO
PMF VELOCITIES

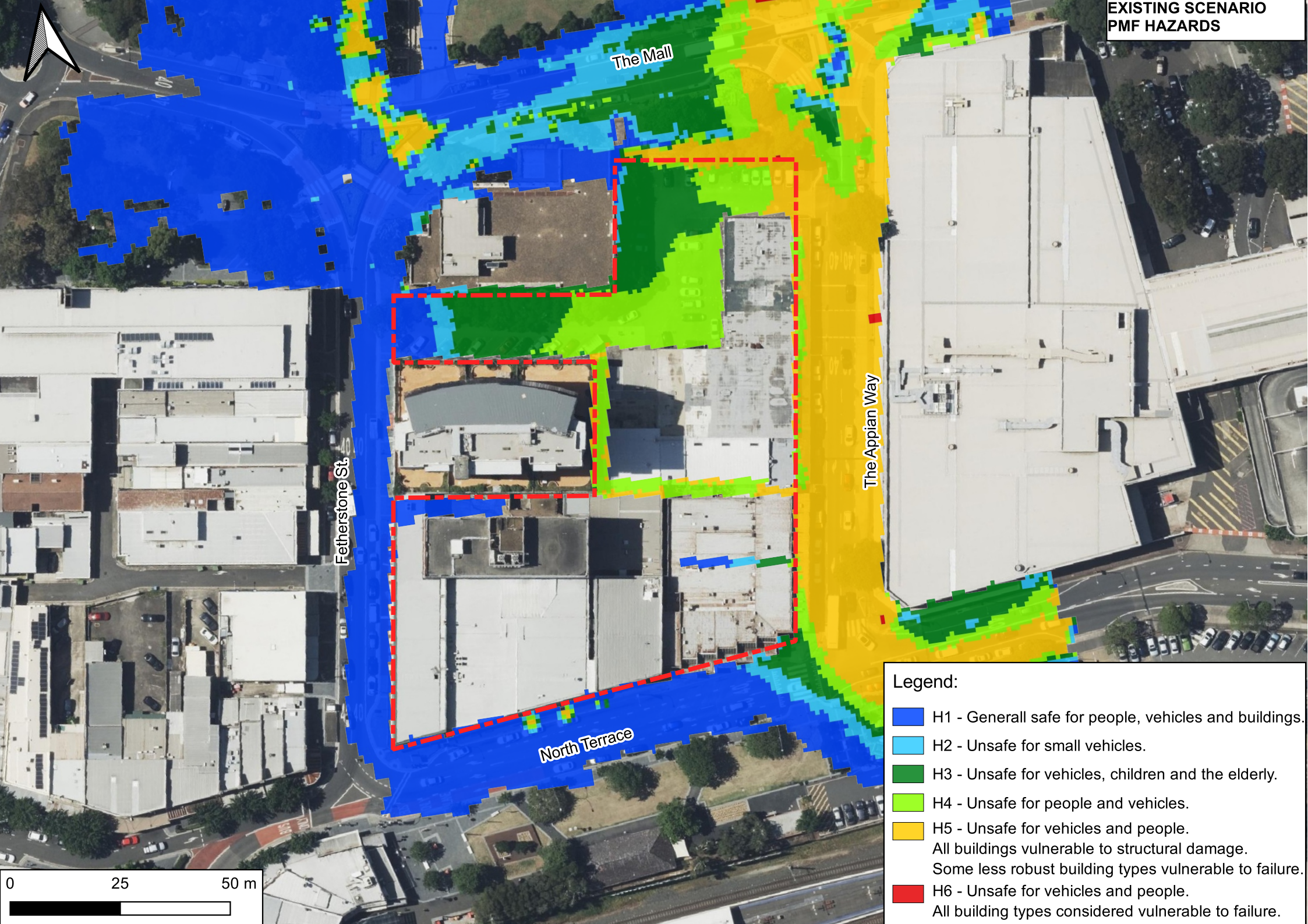


Legend:

Flood Velocities (m/s)

- ≤ 0.10
- $0.10 - 0.50$
- $0.50 - 1.00$
- $1.00 - 2.00$
- > 2.00

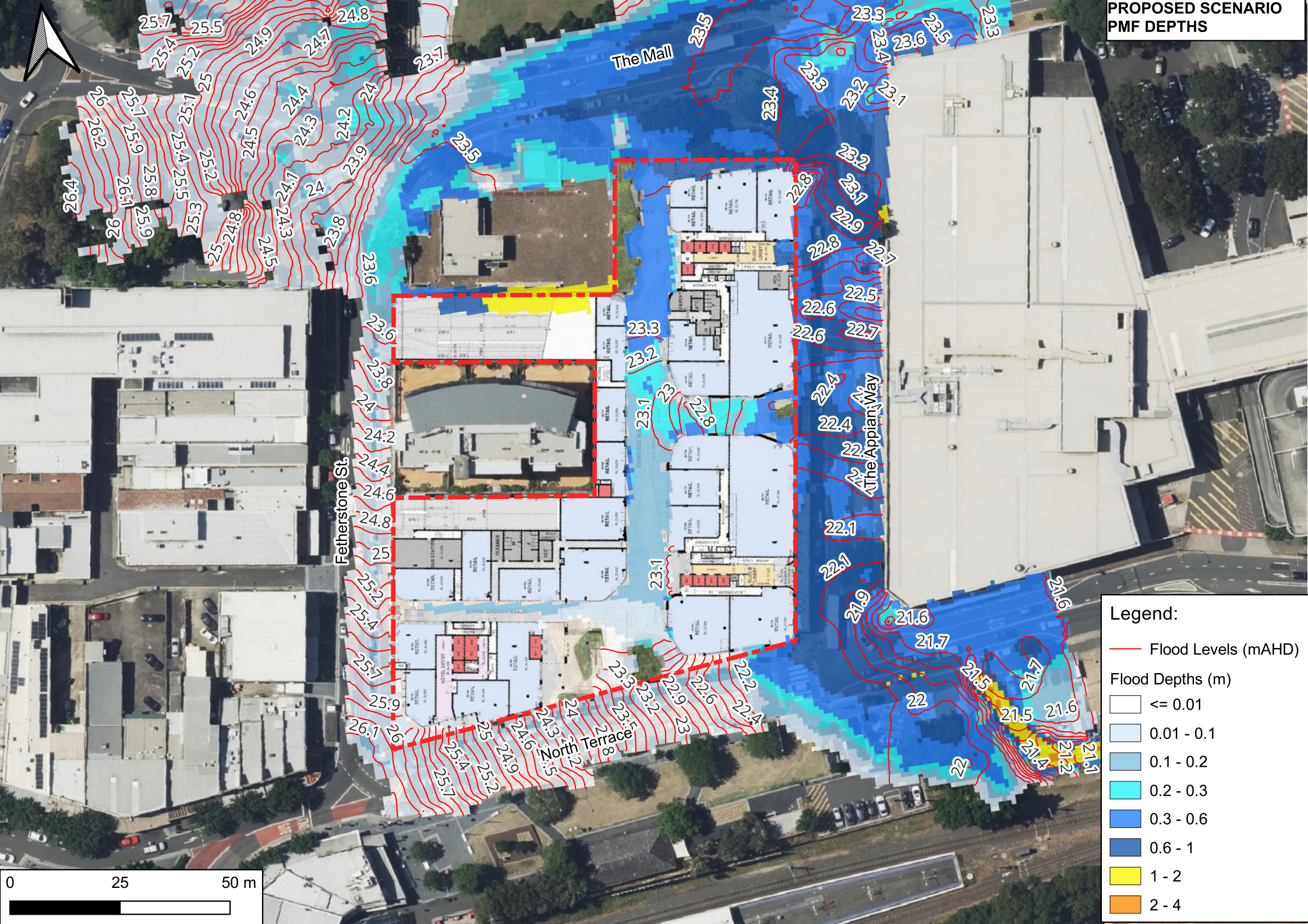
0 25 50 m



Legend:

- H1 - General safe for people, vehicles and buildings.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
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- H5 - Unsafe for vehicles and people.
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Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people.
All building types considered vulnerable to failure.

PROPOSED SCENARIO
PMF DEPTHS

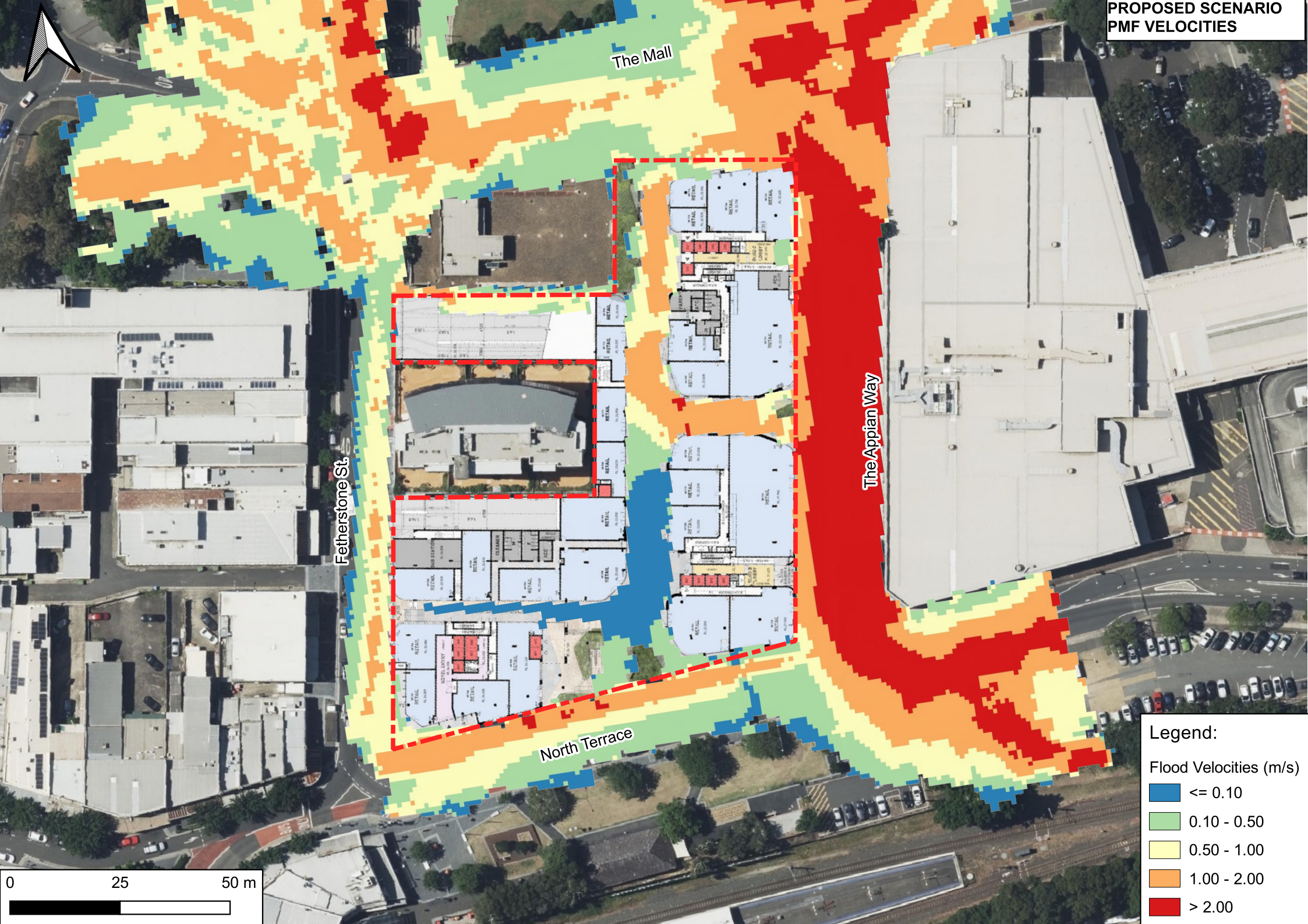


Legend:

— Flood Levels (mAHD)

Flood Depths (m)

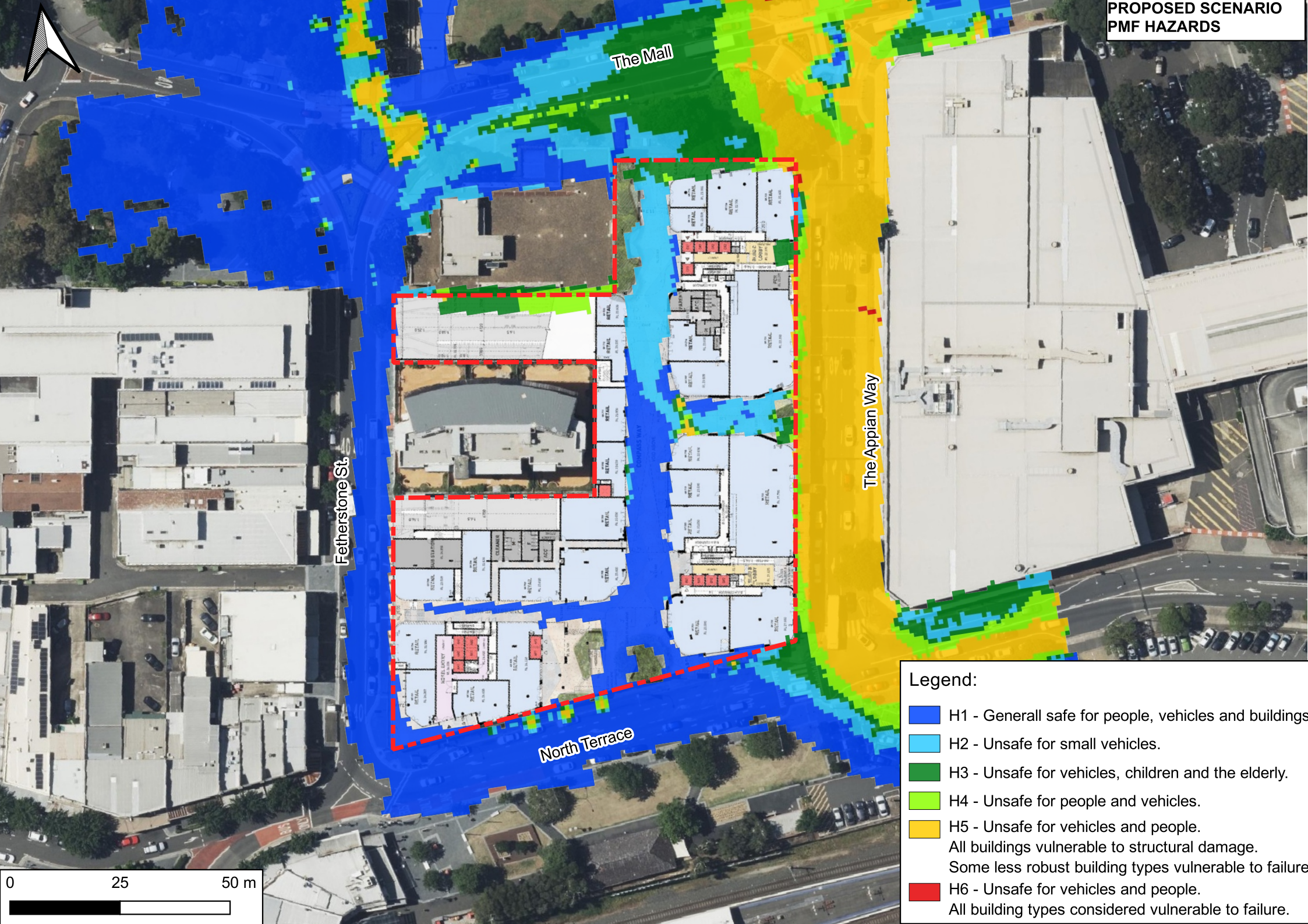
≤ 0.01
0.01 - 0.1
0.1 - 0.2
0.2 - 0.3
0.3 - 0.6
0.6 - 1
1 - 2
2 - 4



Legend:

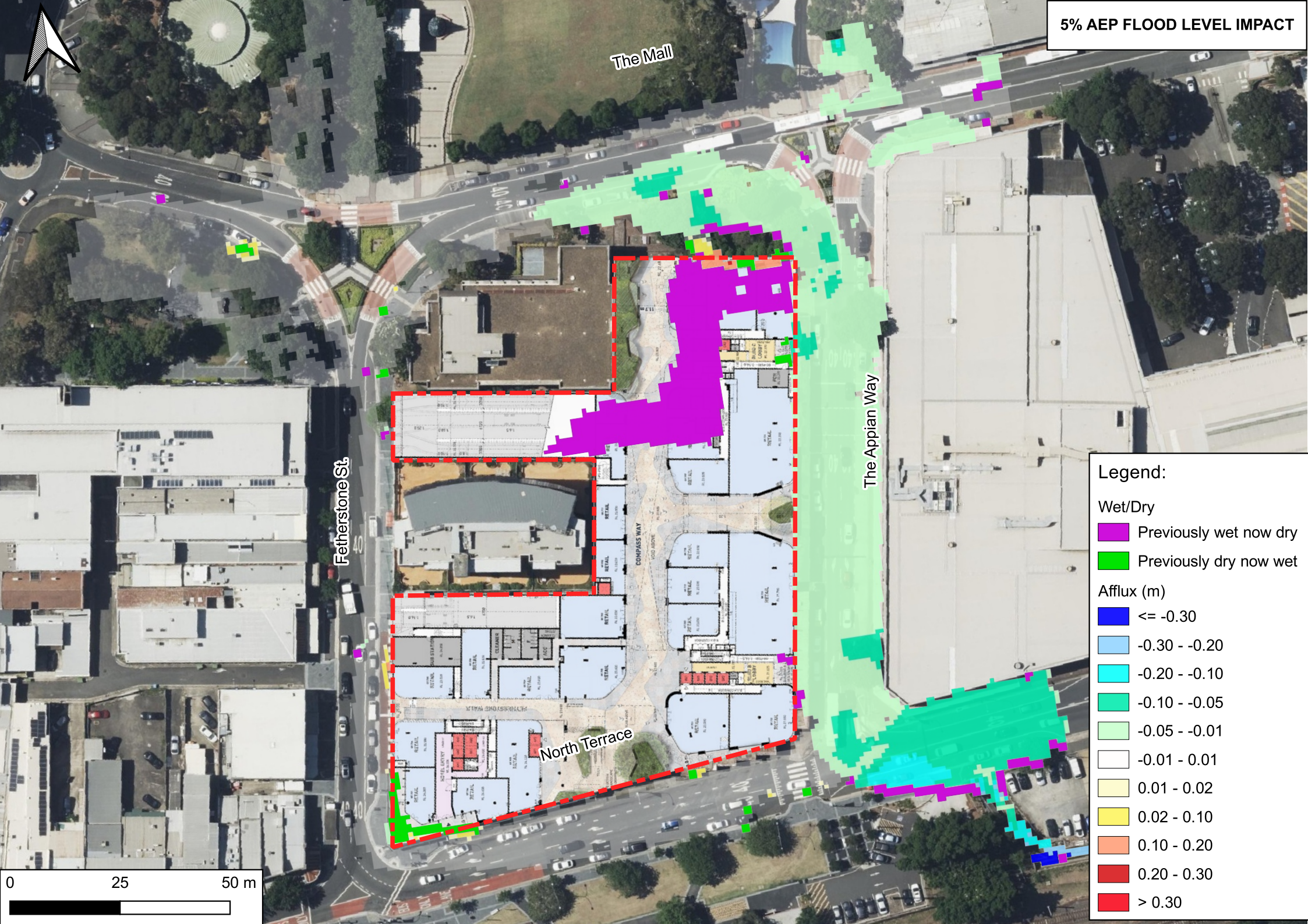
Flood Velocities (m/s)

- ≤ 0.10
- 0.10 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- > 2.00



Legend:

- H1 - General safe for people, vehicles and buildings
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for vehicles, children and the elderly.
- H4 - Unsafe for people and vehicles.
- H5 - Unsafe for vehicles and people.
All buildings vulnerable to structural damage.
Some less robust building types vulnerable to failure
- H6 - Unsafe for vehicles and people.
All building types considered vulnerable to failure.



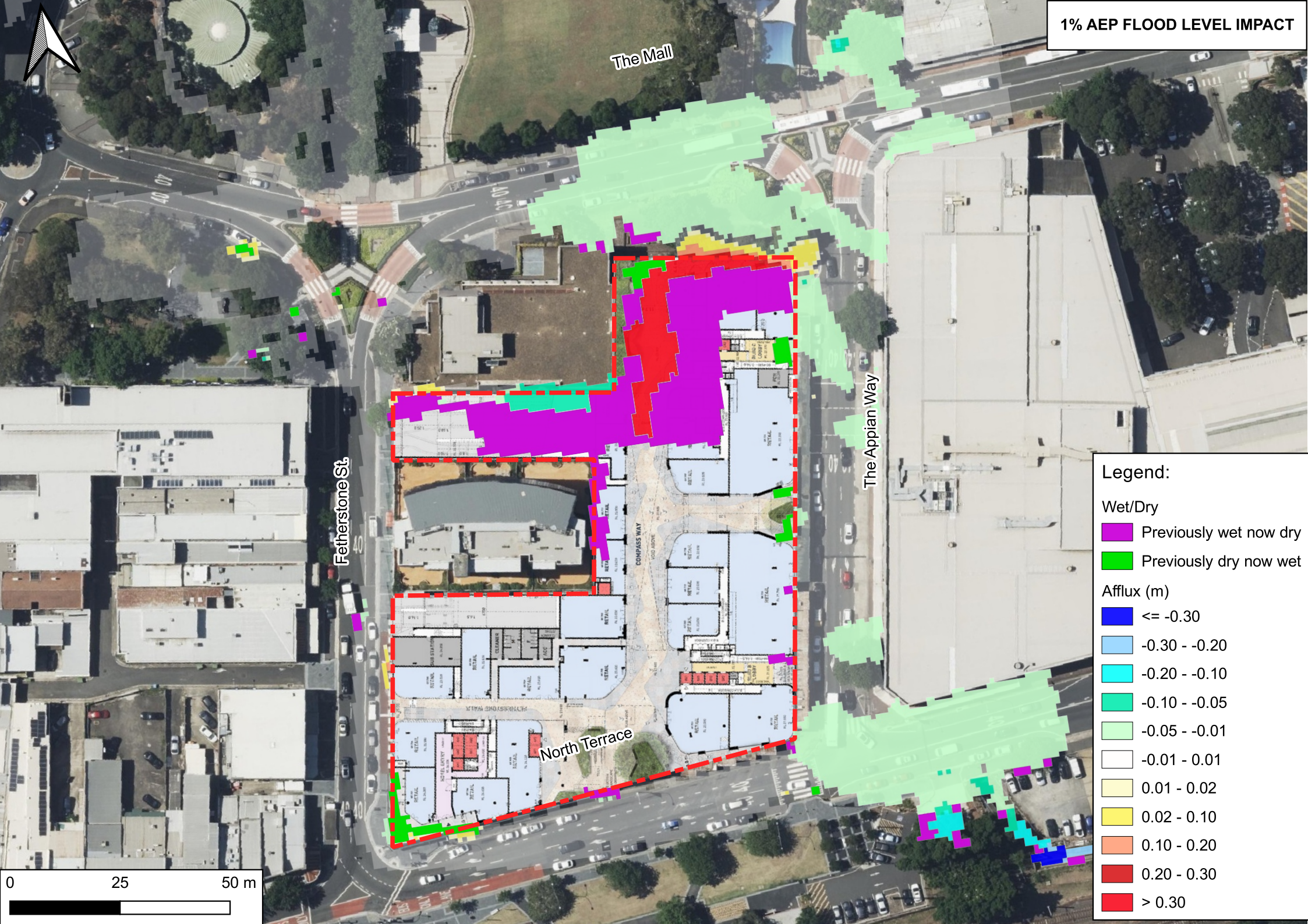
Legend:

Wet/Dry

- Previously wet now dry
- Previously dry now wet

Afflux (m)

- ≤ -0.30
- 0.30 - -0.20
- 0.20 - -0.10
- 0.10 - -0.05
- 0.05 - -0.01
- 0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- > 0.30



The Mall

Fetherstone St.

The Appian Way

North Terrace

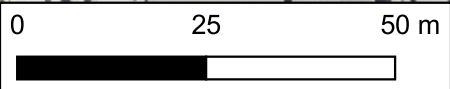
Legend:

Wet/Dry

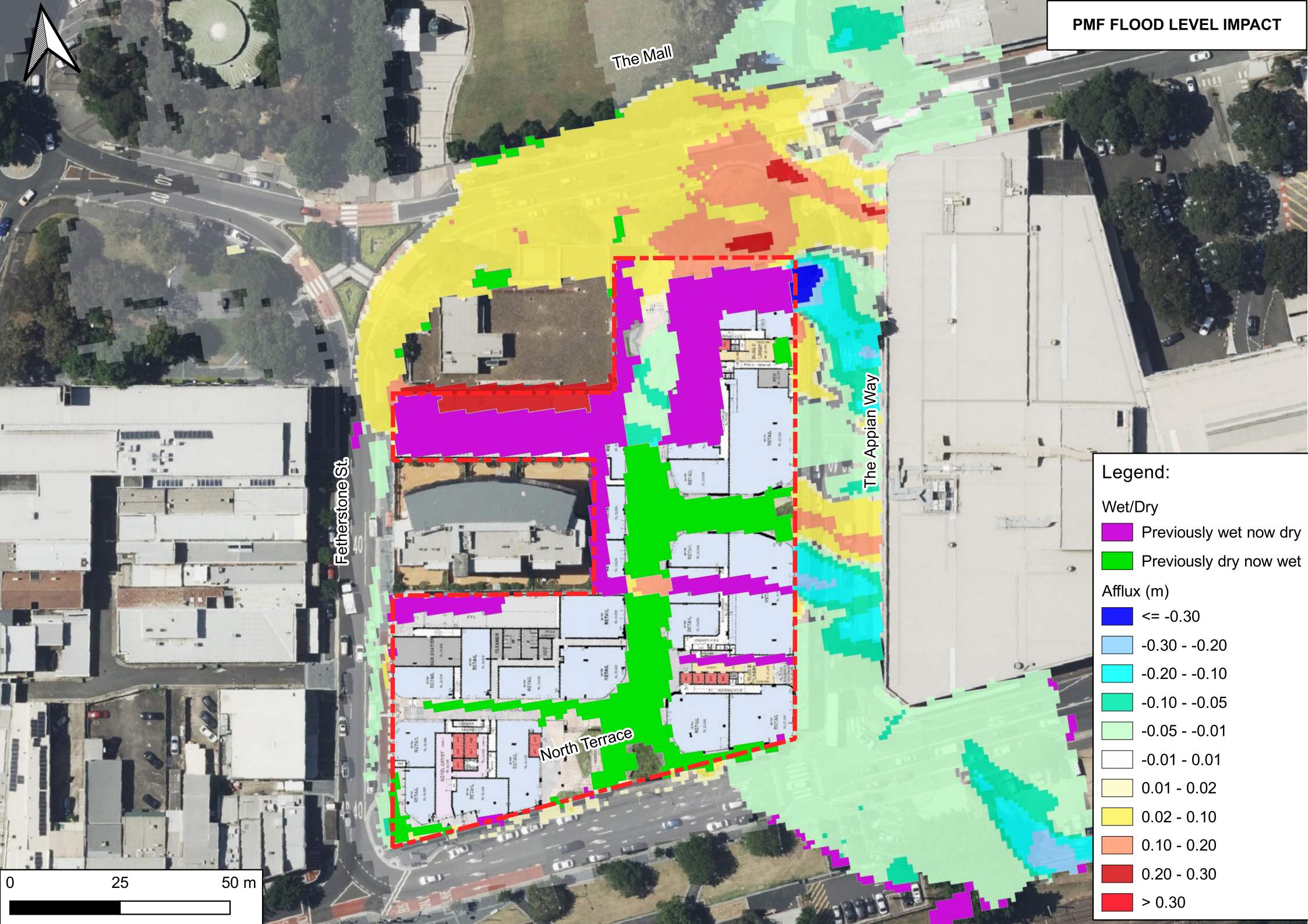
- Previously wet now dry
- Previously dry now wet

Afflux (m)

- ≤ -0.30
- 0.30 - -0.20
- 0.20 - -0.10
- 0.10 - -0.05
- 0.05 - -0.01
- 0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- > 0.30



PMF FLOOD LEVEL IMPACT



Legend:

Wet/Dry

- Previously wet now dry
- Previously dry now wet

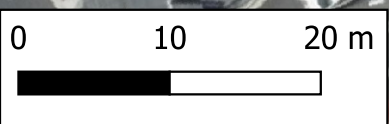
Afflux (m)

- ≤ -0.30
- 0.30 - -0.20
- 0.20 - -0.10
- 0.10 - -0.05
- 0.05 - -0.01
- 0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- > 0.30

7.6 APPENDIX F – FLOOD PLANNING LEVEL

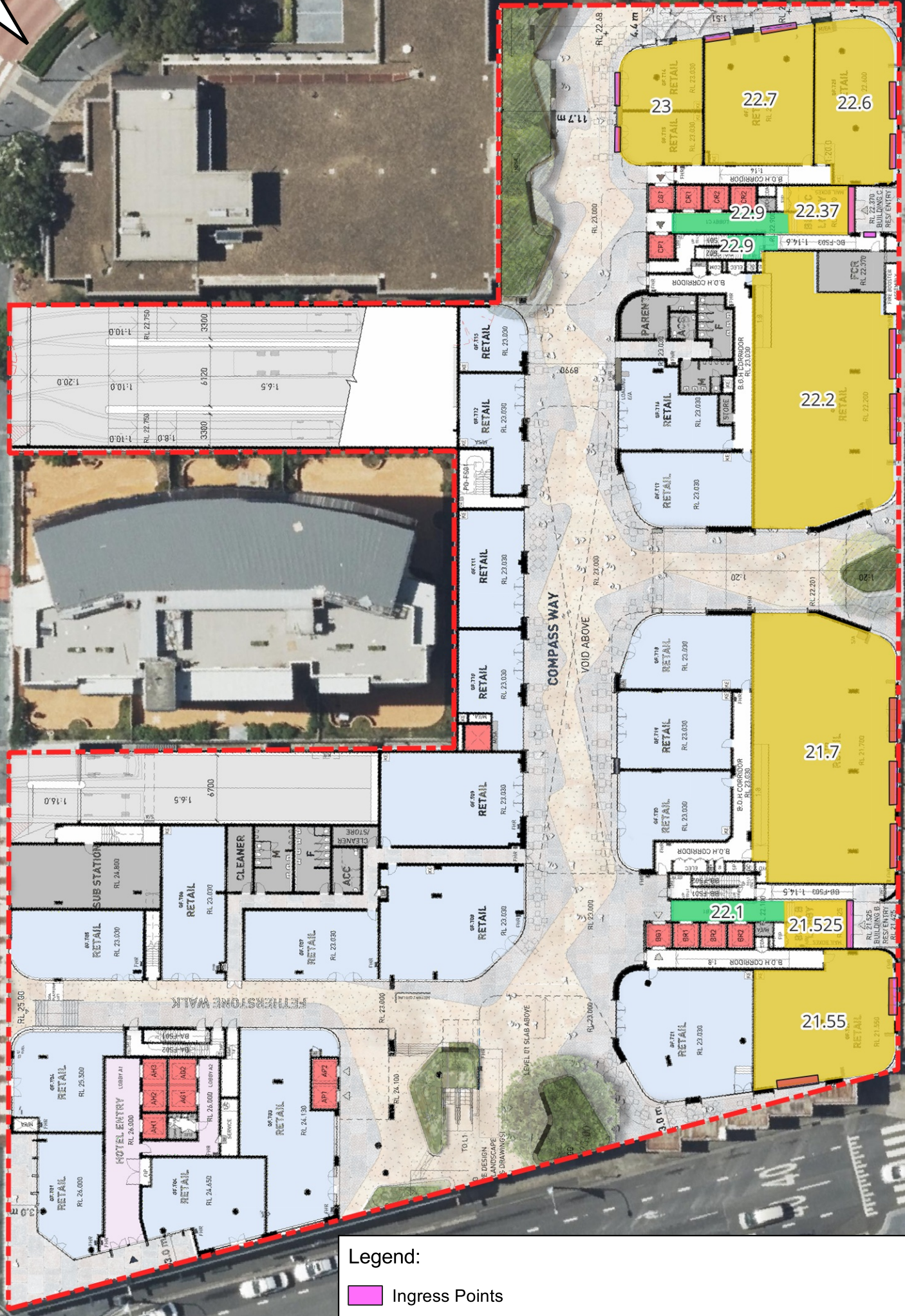
Fetherstone St.

The Appian Way



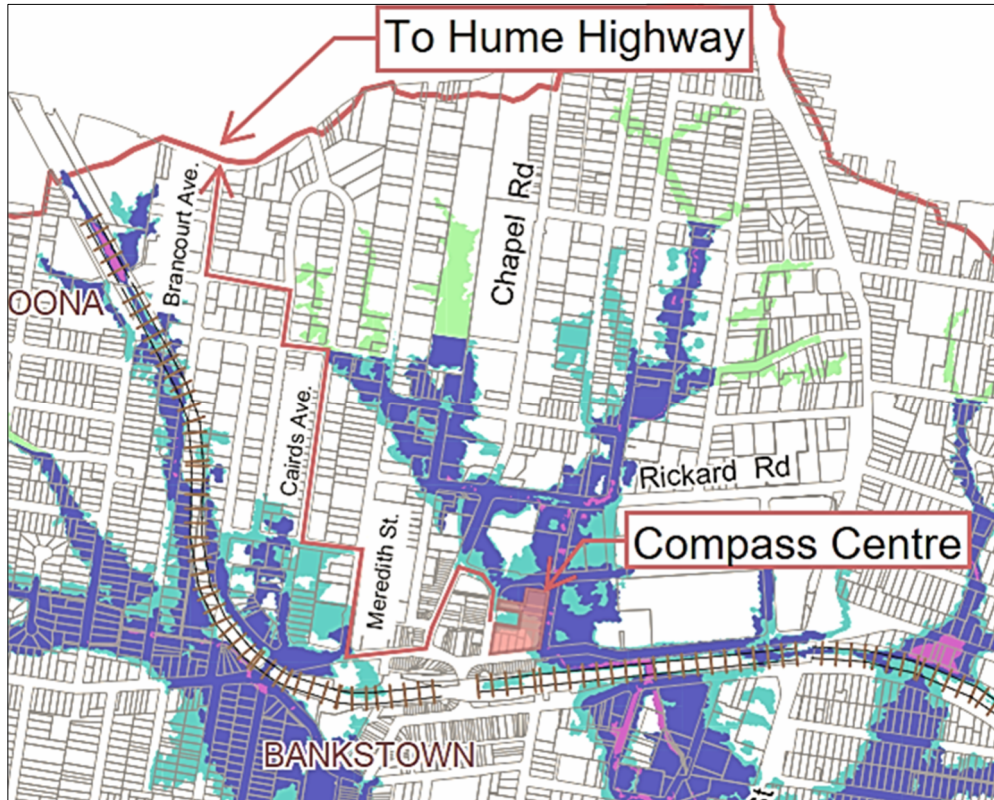
Legend:

-  Ingress Points
- FPL
 -  FPL determined from highest of 1% AEP+500mm or PMF Flood Level
 -  FPL determined from 5% AEP Flood Level



7.7 APPENDIX G – DRAFT FLOOD EVACUATION PLAN

DRAFT FLOOD EVACUATION PLAN



Evacuation Route

To evacuate, head right onto Fetherstone St, then turn left onto The Mall. From The Mall, turn left again onto Chapel Rd and continue on Marion St, before proceeding towards Hume Highway.

In case of Flood Emergency:

Extreme storms with the capacity to affect the building and surrounding areas are expected to be rare. If they do occur, the operator of the building/event may deem it appropriate to take shelter in the building within your unit if you are a resident, or within Levels 1-5 if you are not.

Evacuation:

Alternatively, evacuation may be proposed. If evacuation is proposed, the evacuation routes shown on the plan are preferred. In the case that flood waters reaches depths of 200mm in the basement and cause vehicles to become unstable, evacuate the basement carpark and take shelter in the building.



7.8 APPENDIX H – SITE EMERGENCY RESPONSE FLOOD PLAN

Home Emergency Plan

2024

To help your household
prepare for floods, storms
and tsunami



FOR EMERGENCY HELP IN FLOOD,
STORM AND TSUNAMI CALL

132 500

In life-threatening emergencies call 000 (triple zero)



FloodSafe



StormSafe



TsunamiSafe



Welcome to your Home Emergency Plan

The NSW SES is responsible for the emergency management of floods, storms and tsunamis in NSW.

This Home Emergency Plan is specifically targeted to these events but the advice can be useful for other hazards.

Being prepared now can significantly reduce:

- Loss of life
- Loss of property
- Loss of possessions

Being prepared now can also help you respond better and recover faster when these events happen.



Possible Hazards

Possible hazards where I live:

- Storms
- Flash Floods

These hazards can have devastating impacts on people, property and possessions.

Even if you are not directly impacted by floods, storms or tsunamis, you may still be affected by these events as roads may be damaged or flooded, access to areas may be restricted, amenities may be lost, you may become isolated, areas you are planning to travel to may be impacted and family or friends may be affected.



Prepare NOW

8 tips you can do now to prepare for floods, storms and tsunami, as well as for other disasters:

1. Know your risk

- ☐ Know if where you live could be at risk from floods, storms or tsunami, as well as other disasters

Know your storm risk

- ☐ Visit the NSW SES StormSafe website www.stormsafe.com.au for StormSafe information and read the StormSafe Guide
- ☐ Talk with neighbours and people who have lived in the area for a while about the local storm history

Know your flood risk

- ☐ Find out about your local flood history and visit the NSW SES FloodSafe website www.floodsafe.com.au and read the FloodSafe Guides relevant to your area
- ☐ Talk with neighbours and people who have lived in the area for a while about the local flood history
- ☐ Know the heights your area is affected by floods. Your local council may be able to provide you with specific information on how floods affect your property
- ☐ Be aware of the natural signs of flooding such as heavy rainfall and rushing or pooling water



Prepare NOW

Know your tsunami risk

- ☐ Visit the Bureau of Meteorology website www.bom.gov.au to find out what a tsunami is, how they are generated, what warning systems are in place and what warning products exist
- ☐ Know what to do when these warnings are issued

To find out your bushfire risk, visit the NSW Rural Bushfire Service www.rfs.nsw.gov.au

To find out your urban fire risk, visit Fire and Rescue NSW www.fire.nsw.gov.au

For information on earthquakes, heat waves and other disasters, visit the Australian Emergency Management Institute [Emergency Management](#)

2. Know where to go

- ☐ Have a plan of where you will go if you need to evacuate

3. Know your plan

- ☐ Use this Home Emergency Plan to document what you will do before, during and after flood, storm and tsunami
- ☐ Practice and update your plan regularly

4. Get your kit together

- ☐ Put together an emergency kit which is suitable for your household needs



Prepare NOW

5. Check your insurance

- ☐ If insurance is available, check the cover is adequate for where you live and make sure it is current

6. Prepare now to act early

- ☐ Know the triggers for what you need to do and when you need to do it
- ☐ Practice your Home Emergency Plan regularly and keep it up-to-date
- ☐ Maintain a sufficient level of supplies in case you become isolated
- ☐ Know what to do if you have no amenities

7. Listen to local radio

- ☐ Know the local radio station you need to listen to for information, updates and advice
- ☐ Know the ABC radio frequency in your area

8. Know who to call

- Keep a list of emergency numbers near your phone, on your mobile or on your fridge



Know who to Call

NSW SES 132 500

Life-threatening emergencies 000

NSW SES Facebook www.facebook.com.au/NSW.SES

NSW SES twitter www.twitter.com.au/#!/NSWSES



#NSWSES



/NSWSES



/NSWSES

FOR EMERGENCY HELP IN FLOOD,
STORM AND TSUNAMI CALL

132 500

In life-threatening emergencies call 000 (triple zero)



Get your kit together.

Put together an emergency kit today!

An emergency kit can help save precious time in an emergency situation. It provides items you might need if you lose power or need to leave your home in a hurry.

Your emergency kit contents:

- ☐ Portable radio with spare batteries
- ☐ Torch with spare batteries
- ☐ First aid kit (with supplies necessary for your household)
- ☐ Candles and waterproof matches
- ☐ Important papers including emergency contact numbers
- ☐ Copy of any Home Emergency Plans
- ☐ Waterproof bag for valuables



When leaving or evacuating your property, place in your emergency kit:

- A good supply of required medications
- Any special requirements and supplies for babies, the disabled, infirm and/or elderly
- Appropriate clothing and footwear
- Fresh food and drinking water

Keep your emergency kit in a waterproof storage container.

There may be other items you need to place into your emergency kit depending on what risks there are in your area. Check with the NSW Rural Fire Service and Fire & Rescue NSW for specific items you may need to place in your emergency kit if you are at risk of bushfire or urban fire.

Check your emergency kit on a regular basis and remember to check use-by dates on batteries and gloves. Re-stock any items if you need to.



Notes

Use this page to detail any preparation notes you need to make.

These notes can include triggers for action, other actions specific to your situation, flood heights you need to be aware of or safe evacuation routes in your area.



Just BEFORE the emergency

BEFORE all emergencies:

Warnings are issued by the Bureau of Meteorology for floods, severe weather, thunderstorms, tropical cyclones and tsunami through their website www.bom.gov.au

- ☐ **Activate this emergency plan**
- ☐ **Listen to your local radio station for information, updates and advice**
- ☐ **Check to see if neighbours are aware of the warning and need assistance**
- ☐ **Locate and check your emergency kit**
- ☐ **Follow all advice and instructions given to you by emergency services**

It is safer to be away from areas which are going to be impacted by these events.

When flash flooding is likely the best action to take is to leave low-lying areas (evacuation) well before it may happen, but only if it is safe to do so. If you are trapped by rising floodwater, seek refuge in the highest part of a sturdy building. Stay there and call 000 (triple zero).



Just BEFORE the emergency

BEFORE Storms:

When a Severe Weather Warning or a Severe Thunderstorm Warning is issued by the Bureau of Meteorology:

- ☐ Secure or put away any loose items from around your home, property or balcony that could become dangerous in storms
- ☐ Stay indoors away from windows
- ☐ Park vehicles under solid shelter away from trees and power lines
- ☐ If driving, pull over to the side of the road away from gutters, drains, trees and power lines
- ☐ Reconsider non-essential travel

Sometimes there can be little or no warning of storm activity.





EVACUATING:

Evacuation Warnings and Evacuation Orders are issued by the NSW SES for floods, storms and tsunami through the NSW SES website www.ses.nsw.gov.au and local media.

When an Evacuation Warning is issued:

- ☐ **Locate important papers, valuables and mementos. Put them in your Emergency Kit**
- ☐ **Keep listening to your local radio station for information, updates and advice**
- ☐ **Follow instructions given to you by emergency services**

When an Evacuation Order is issued, staying inside a property, even one which you think is safe, may be very dangerous. If you are warned to evacuate it is always safest to move to a location away from the affected area early:

- ☐ **Turn off the electricity and gas at the mains before you leave and turn off and secure any gas bottles**
- ☐ **Take your emergency kit**
- ☐ **Take your pets with you**
- ☐ **Never enter or travel through floodwater**
- ☐ **Keep listening to your local radio station for information, updates and advice**
- ☐ **Follow your Home Emergency Plan or Business FloodSafe Plan**
- ☐ **Follow all instructions given to you by emergency services**
- ☐ **Wear appropriate clothing**

You should leave well before roads and evacuation routes are cut off or closed.



EVACUATING:

Stay with family or friends away from the affected area. Evacuation centres may also be established by welfare services in your area. Help may include:

- Temporary accommodation
- Financial help
- Personal support
- Refreshments and meals
- Clothing and personal needs
- Help in contacting family and friends



DURING all emergencies:

Stay with family or friends away from the affected area. Evacuation centres may also be established by welfare services in your area. Help may include:

- Temporary accommodation
- Financial help
- Personal support
- Refreshments and meals
- Clothing and personal needs
- Help in contacting family and friends

DURING emergencies

- For emergency help in floods, storms and tsunamis, call the NSW SES on 132 500
- In life-threatening emergencies, call 000 (triple zero)
- Check that your neighbours have received all warnings and advice

☐

Keep listening to your local radio station for information, updates and advice

☐

Follow all advice and instructions given to you by emergency services



DURING all emergencies:

DURING storms:

- ☐ Stay clear of creeks, drains, causeways, gutters, streams, fallen trees, power lines and damaged buildings
- ☐ If driving, put on your hazard lights and pull over to the side of the road, keeping clear of drains, causeways, streams, creeks, trees and power lines
- ☐ If outdoors, seek secure shelter away from drains, causeways, streams, creeks, trees and power lines



AFTER an emergency

AFTER all emergencies:

If outside the impacted areas:

- Do not enter these areas until an official 'All Clear' has been issued

If inside impacted areas:

- Be aware of health and safety issues

- ☐ Keep listening to your local radio station for information, updates and advice
- ☐ Check to see if your neighbours need help
- ☐ Do not go sightseeing as this may hinder recovery efforts or put yourself and others at risk



AFTER an emergency

AFTER storms:



Check your house or property for damage

- Stay clear of creeks, drains, causeways, gutters, streams, fallen trees, power lines and any damaged buildings

The NSW SES can assist with temporary measures to make your property safer. Any damage needs to be assessed and repaired by qualified tradespeople.



RECOVERY

The aftermath of a natural hazard can affect people in different ways. Sometimes we may be exposed to things that are distressing.

The NSW SES has developed a Recovery Guide to assist people recover from floods, storms and tsunamis.

The guide is available from both the FloodSafe and StormSafe websites - www.floodsafe.com.au and www.stormsafe.com.au

Here are a few tips from the guide:

- If you can, contact family or friends to let them know that you are OK or if you need help
- Follow all instructions given to you by emergency services
- Update your plan with what you have learned from this disaster

NSW Rural Fire Service and NSW Fire and Rescue can also provide information on recovering from bushfire and urban fire - www.rfs.nsw.gov.au and www.fire.nsw.gov.au

Natural disasters can damage property and people, but they can also often help build a sense of community.

Talk to people in your community and help each other where possible. Seek out information and share it with those around you.



RECOVERY

As part of the recovery from natural disasters, communities and Government are also supported by the non-Government sector. Community partners such as the Salvation Army, ADRA, Anglicare, St Vincent De Paul and the Red Cross provide a range of assistance to support people and communities in time of need.

Disaster Recovery Centres may be established following some disasters. Recovery centres may provide a range of welfare services including financial assistance, personal support, organising temporary accommodation and providing information and referrals. If you have been affected by floods and require assistance, contact Disaster Welfare Services on 1800 018 444

7.9 APPENDIX I – COUNCIL FLOOD LETTER



Level 1, 66 - 72 Rickard Road, Bankstown NSW
PO Box 8, Bankstown NSW 1885
Tel: (02) 9707 9010 - Fax: (02) 9707 9408
DX 11220 BANKSTOWN
council@cbc.city.nsw.gov.au

CITY OF CANTERBURY BANKSTOWN

To: Xavier Knight Consulting Engineers
LEVEL 7
210 Clarence St
SYDNEY NSW 2000

STORMWATER SYSTEM REPORT 99 North Terrace, BANKSTOWN NSW 2200

Date: 05-Dec-2023
Ref: WP-SIAONL-2412/2023
Development type: Mixed use commercial/retail and residential

NO

FLOOD/OVERLAND FLOW STUDY REQUIRED

The site is affected by the following private and Council stormwater system components:

- A 1.83 m wide private drainage easement & 3 m wide Council drainage easement located within the site.
- Overland flowpath [floodway] for excess stormwater runoff from the upstream catchment and associated with the drainage system located north and east of the site.
- Stormwater inundation from excess stormwater runoff from the upstream catchment and associated with the drainage system through The Mall & The Appian Way.

The site will be subject to stormwater inundation from this overland flowpath during large storm events. Refer to the attached "**100 Year ARI Flood & PMF Extent Maps from Salt Pan Creek Catchment Study**" showing the flood contours to m AHD**. Provision should be made on site, and at boundary fences, for this stormwater runoff to pass unobstructed over the site. Stormwater flowing naturally onto the site must not be impeded or diverted.

For this development, a flood /overland flow study to determine the 100 year ARI* water surface level is not necessary provided that the **proposed development including floor levels, shall comply with the development controls specified in Chapter 2.2 (Flood Risk Management) Schedule 5, of Canterbury-Bankstown's Development Control Plan 2023 - Catchments Affected by Stormwater Flooding.**

The Development Application submission shall be based on an AHD datum for levels where sites are affected by overland flow / flooding. Refer Canterbury-Bankstown Council's *Development Engineering Standards June 2023**.**

Habitable floor levels are to be at least 500mm above the 100-year ARI* flood level at the site adjacent to the proposed buildings.

Runoff on the site, and naturally draining to it is to be collected and disposed of to Council's requirements detailed in Canterbury-Bankstown Council's *Development Engineering Standards****.

This report is given without the benefit of development plans or a site survey. Council may choose to vary some report requirements following evaluation of detailed plans when they are submitted.

This report relates to the exposure of the subject site to Council's stormwater system, both underground and overland. It does not assess the suitability or otherwise of this site for the proposed development.

* Average Recurrence Interval

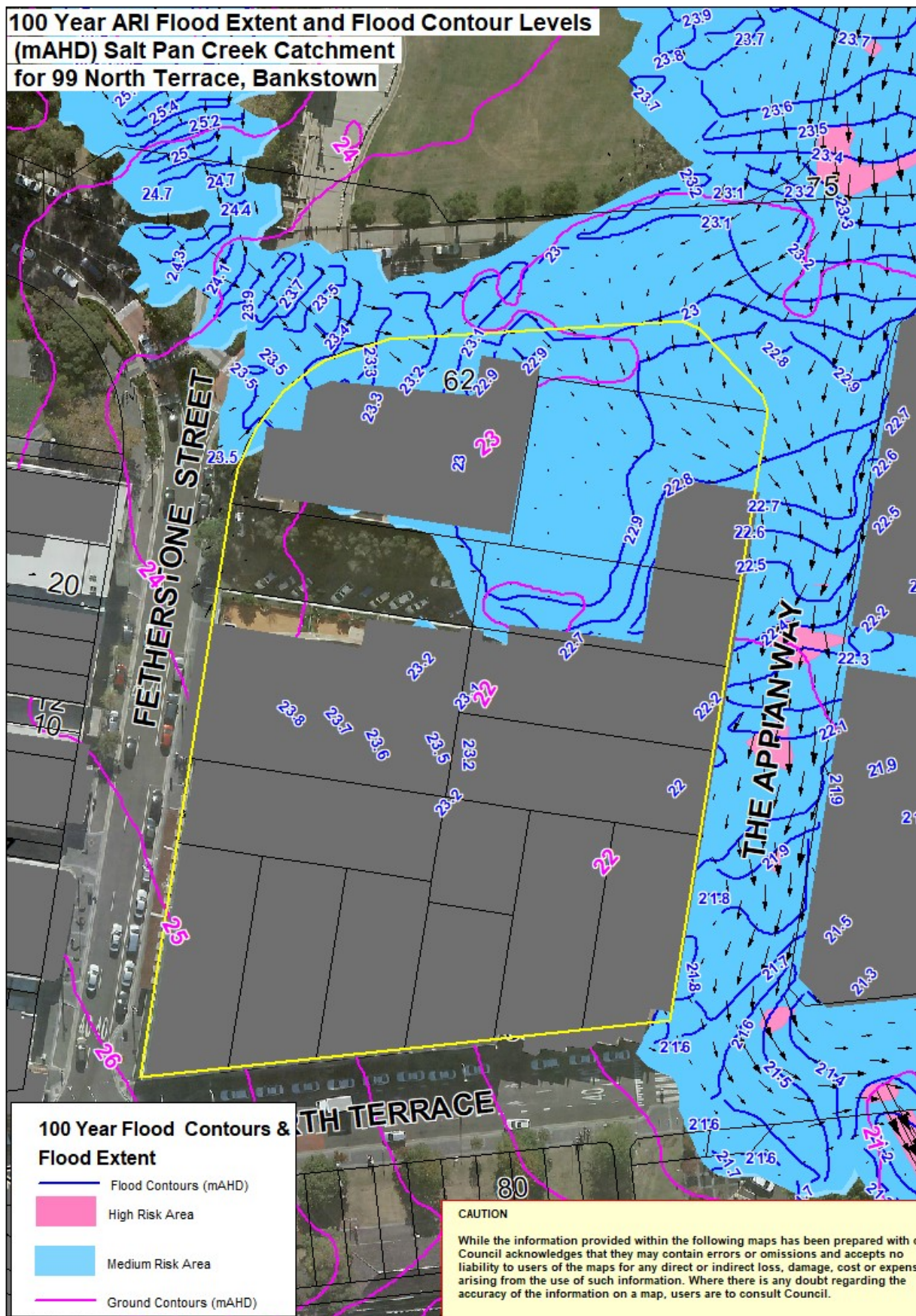
** Australian Height Datum

*** Canterbury Bankstown's Development Control Plan 2023 is available from Council's Customer Service Centre or Council Webpage.

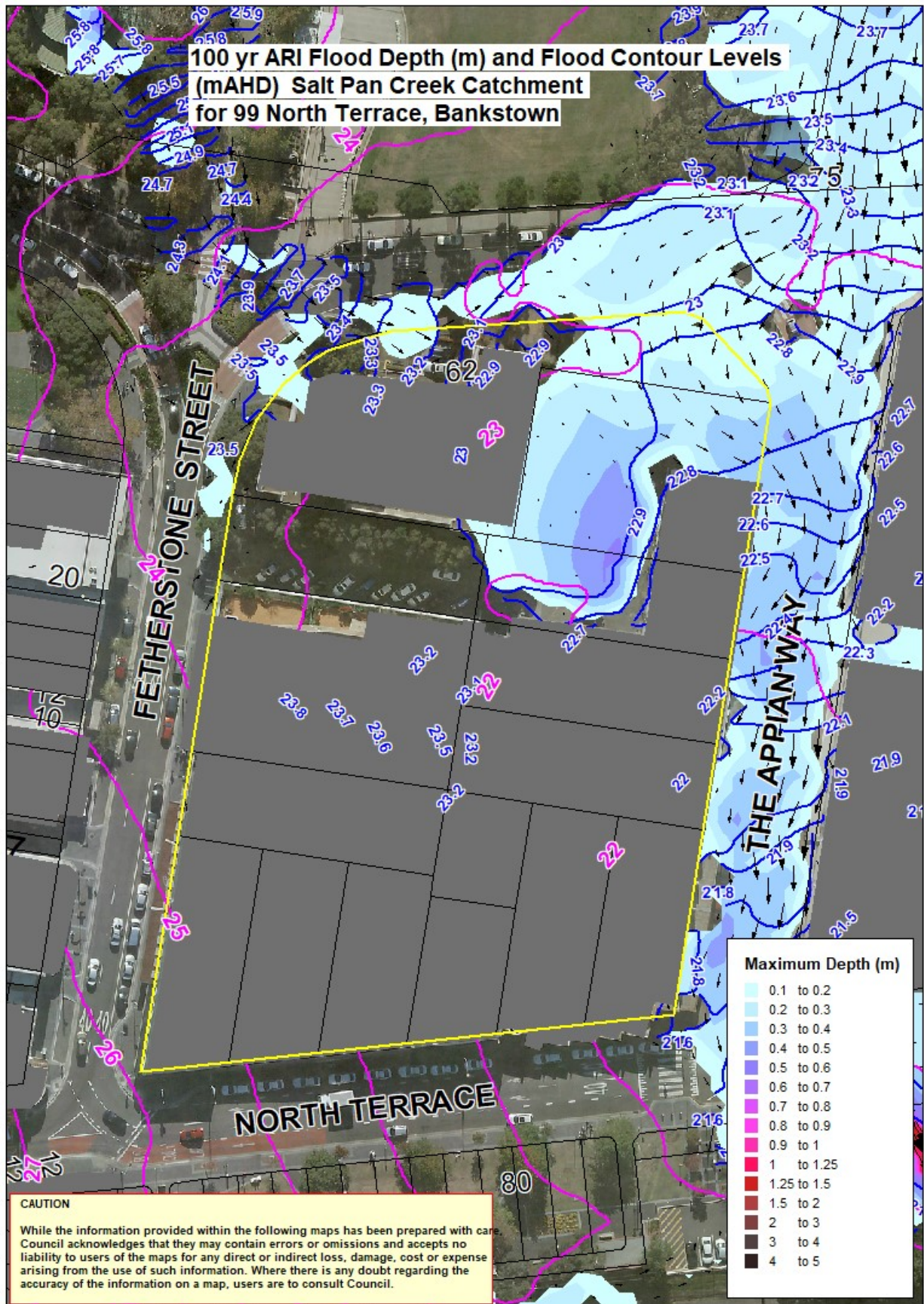
PMF Probable Maximum flood

Mustafa Ways
ENGINEER

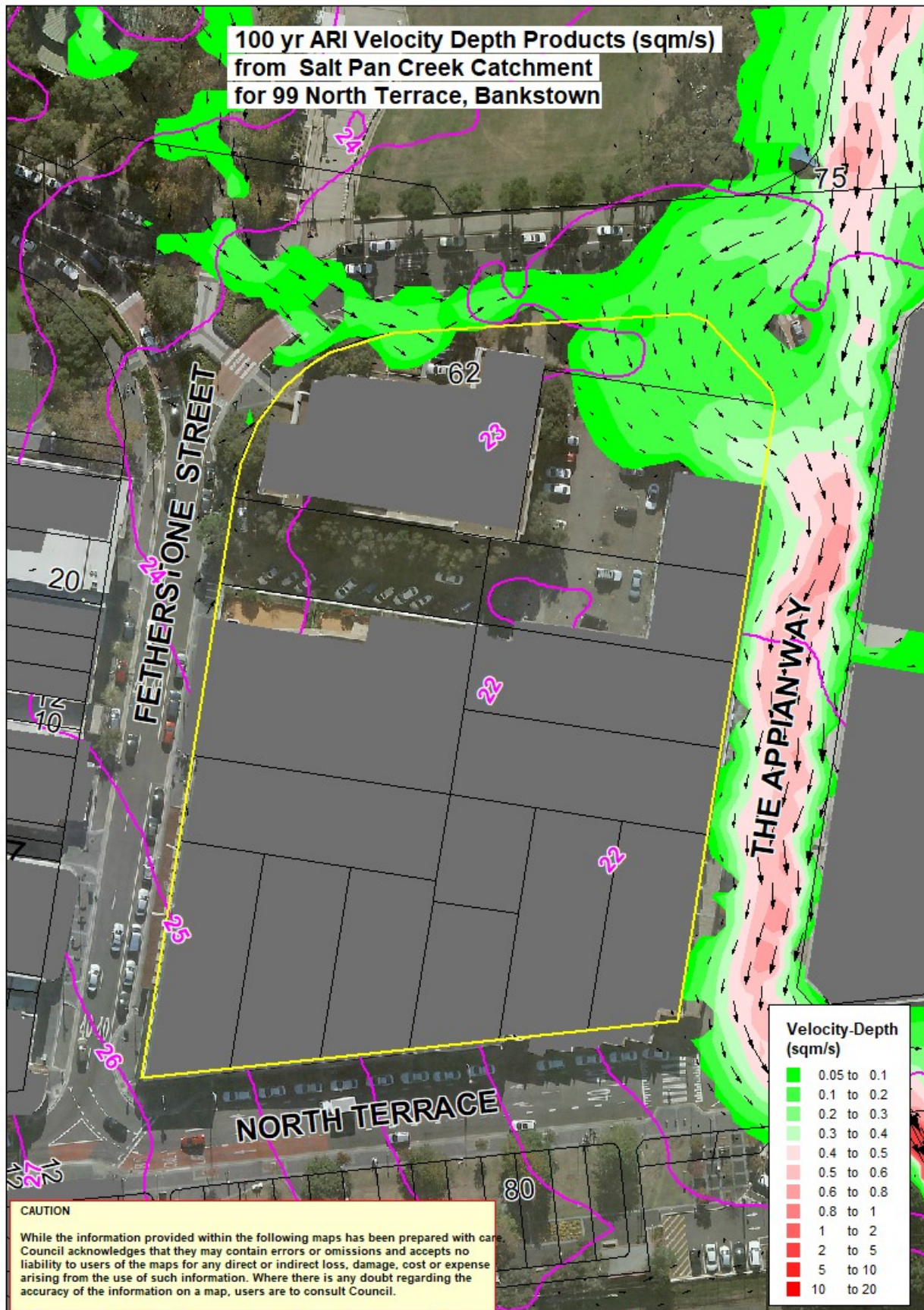
**100 Year ARI Flood Extent and Flood Contour Levels
(mAHD) Salt Pan Creek Catchment
for 99 North Terrace, Bankstown**



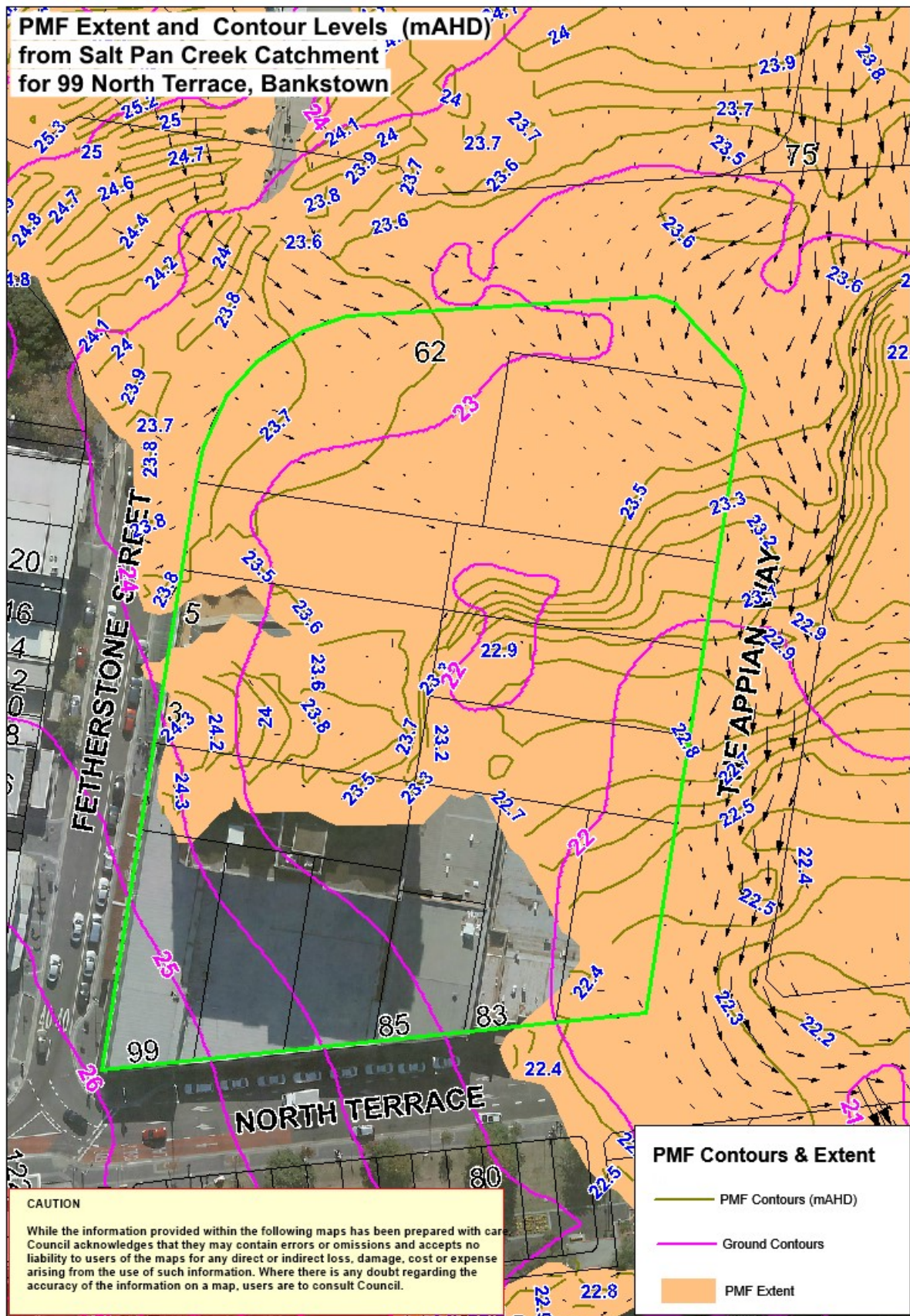
100 yr ARI Flood Depth (m) and Flood Contour Levels (mAHD) Salt Pan Creek Catchment for 99 North Terrace, Bankstown



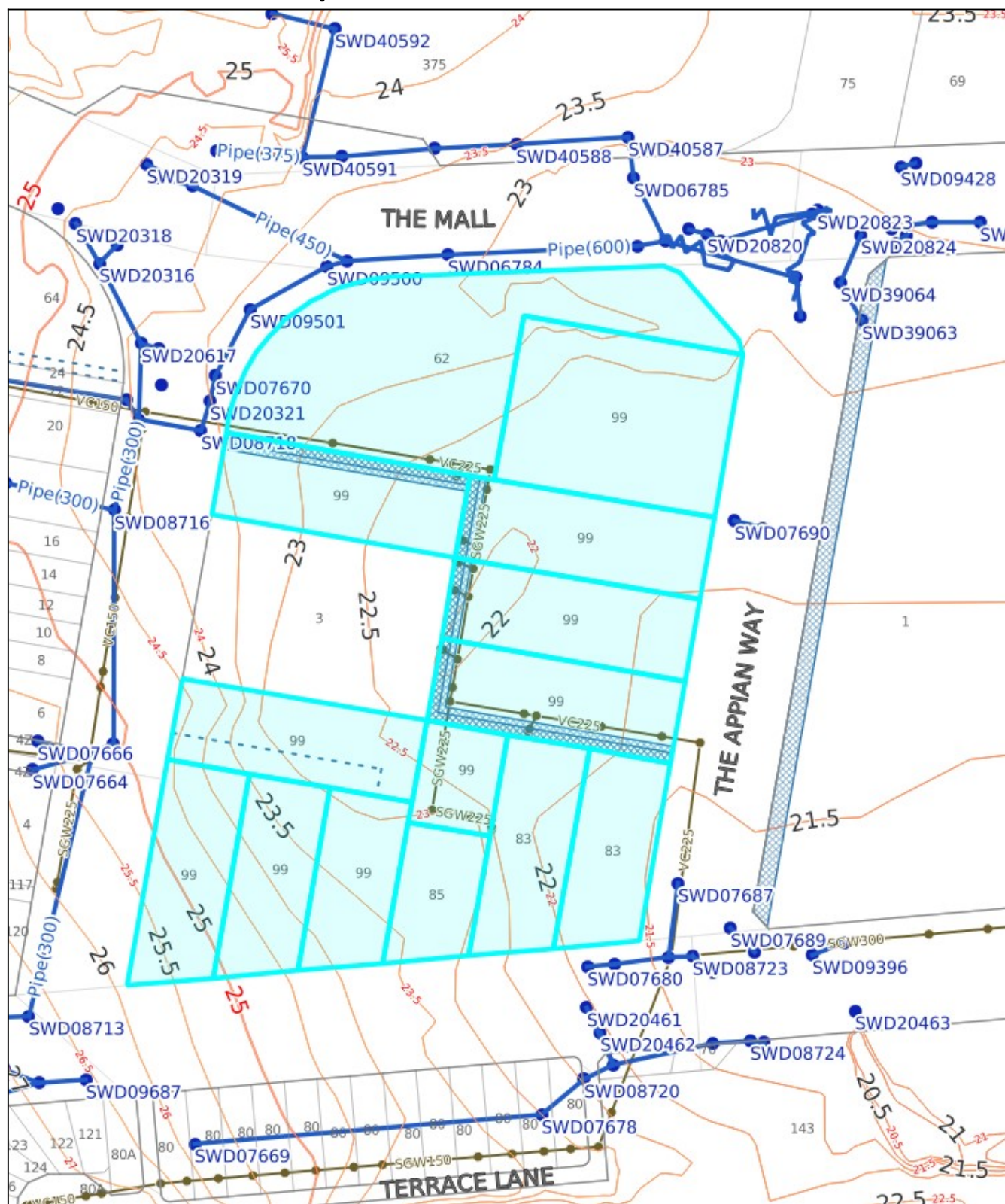
**100 yr ARI Velocity Depth Products (sqm/s)
from Salt Pan Creek Catchment
for 99 North Terrace, Bankstown**



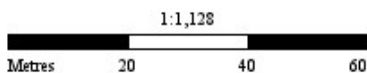
PMF Extent and Contour Levels (mAHD)
from Salt Pan Creek Catchment
for 99 North Terrace, Bankstown



GIS Map of 99 North Terrace, Bankstown



DATE: Dec 5, 2023, 9:42 AM

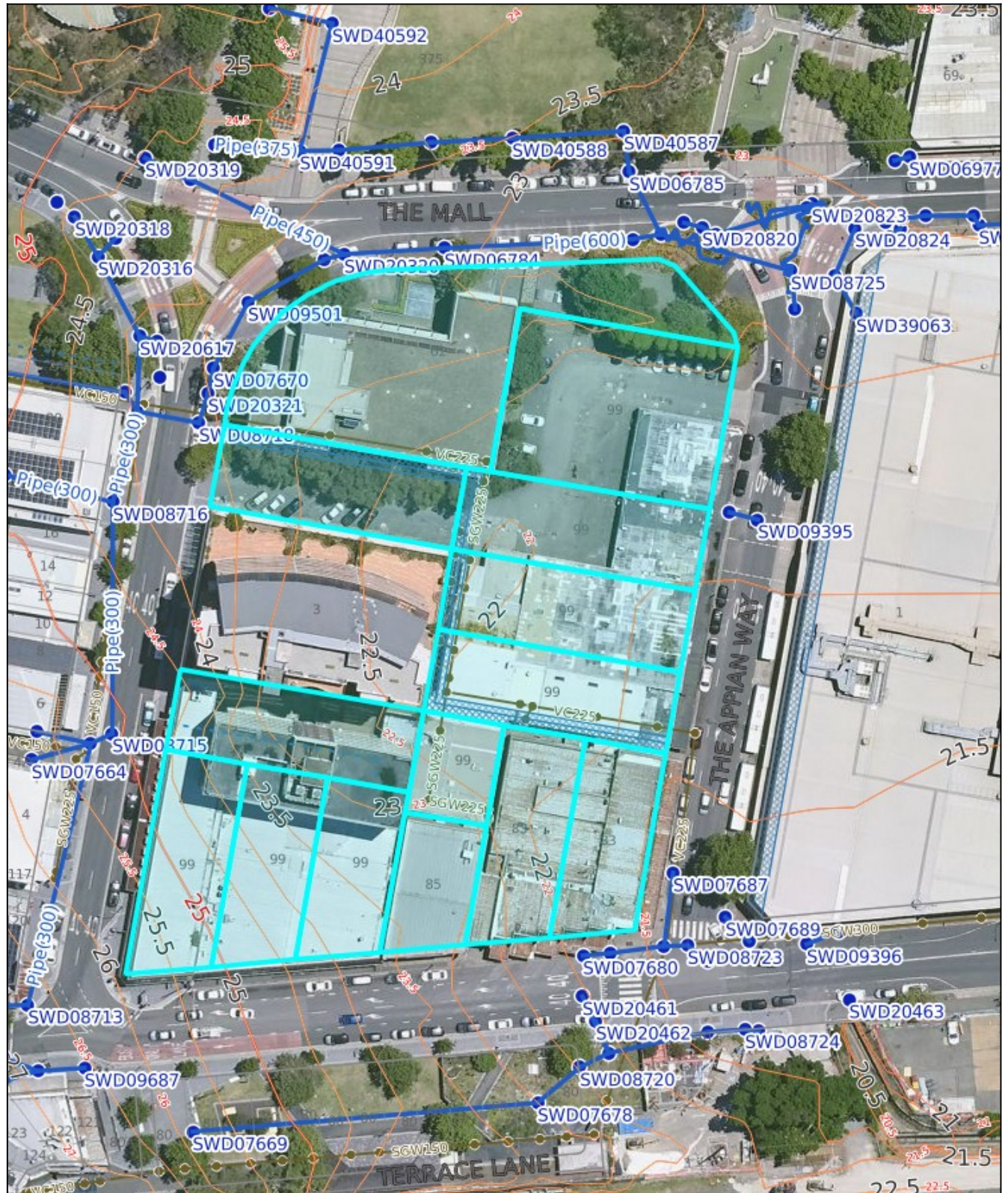


PREPARED BY: Mustafa

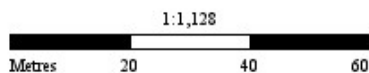
Whilst all care has been taken in the preparation of this base map, Council accepts no responsibility for the accuracy of any information shown. Users should rely on their own enquiries in order to validate information shown on this map. This information is for graphical presentation only.



Aerial Map of 99 North Terrace, Bankstown



DATE: Dec 5, 2023, 9:42 AM



PREPARED BY: Mustafa

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LEGEND

-  Canterbury Bankstown LGA
-  Surrounding LGA's

Jetty

-  Jetty

Parcel Associate

Parcel Frontage

-  Parcel Frontage

Parcel Boundary

-  Parcel Boundary

Parcel Easements (Line)

-  Parcel Easements (Line)

Parcel Easements (Polygon)

-  Parcel Easements (Polygon)

Contours (Major 10m)

-  Contours (Major 10m)

Contours (Intermediate 5m)

-  Contours (Intermediate 5m)

Contours (Minor <5m)

-  Contours (Minor <5m)

Drains

-  Drains

Pits

-  Pits