

Flood Impact and Risk Assessment

A Flood Impact and Risk Assessment prepared to assess overland flow behaviour at 51-55 Archer Street

Prepared for:
AB Chatswood Pty Ltd

14 May 2026

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Project/File:
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Revision schedule

Revision No.	Date	Description	Prepared by	Reviewed by	Approved by
001	14/05/2026	Final for SSD	FG	JL	JL

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Flood Impact and Risk Assessment

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Executive summary

This flood impact and risk assessment is prepared to support Chatswood Residential Development at 51-55 Archer Street, Chatswood.

The assessment addresses the Secretary's Environmental Assessment Requirements (SEARs), relevant flood-related requirements of the *Willoughby Development Control Plan 2023* (DCP) and *Willoughby Local Environmental Plan 2012* (LEP).

The site is located near the upper reach of the Scott's Creek catchment and is not identified as being affected by mainstream flooding (floodwaters breaking the bank of the waterway) associated with the creek. The assessment therefore focuses on local overland flow behaviour, which is associated with surface water rising while it concentrates along flow paths. A 1D/2D hydraulic model was prepared using TUFLOW software to assess baseline and post-development flood conditions for the 20% annual exceedance probability (AEP), 1% AEP events and the Probable Maximum Flood (PMF).

The modelling indicates that the proposed development will not result in detrimental flood impacts on surrounding properties. Predicted off-site flood level increases are generally minor and localised, mainly within the Archer Street road reserve. The flood hazard classification is not expected to increase as a result of the development.

Flood mitigation measures have been incorporated into the design, including a 900 mm x 900 mm grated inlet pit, a 700 mm x 700 mm box culvert, an outlet connection to the neighbouring development's vertical opening, and localised grading of landscaped areas to maintain overland flow conveyance and manage flood storage.

Flood planning levels have been identified based on the 1% AEP flood level plus 500 mm freeboard. The proposed basement ramp crest level is RL 90.10 m AHD, which is above the PMF flood level but below the 1% AEP level plus 500 mm freeboard. This is considered a practical design outcome due to site constraints, ramp design requirements and waste vehicle access requirements.

A climate change sensitivity assessment was also undertaken. The results indicate that the adopted 500 mm freeboard is sufficient to account for the assessed climate change scenario. Safe occupation of the development is supported by residential floor levels being located above the PMF level. Given the short-duration nature of the overland flooding, a shelter-in-place / vertical evacuation strategy is considered appropriate.

Overall, the proposed development is considered to appropriately manage flood risk, satisfy the relevant flood planning objectives, and avoid unacceptable impacts on neighbouring properties, public evacuation conditions or flood behaviour.



1 Introduction

1.1 Background

This report has been prepared to support a State Significant Development Application (SSDA) SSD-94409457 for the site at 51-55 Archer Street, Chatswood.

The Minister for Planning, or delegate, is the consent authority for the SSDA and this application is lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI) for assessment.

This report has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) dated 20 October 2025, as set out below.

Declaration		
Qualified Professional Name	Jacob Lee	
Qualified Professional Qualifications	MIEAust CPEng (Environmental & Civil) NER	
	The undersigned declares that this flood impact and risk assessment has been prepared in response to the following SEARs requirements issued for the Project on 20 October 2025 for SSD-94409457:	
SEARs item no.	SEARs Issue and Assessment Requirement	Relevant Section of this Report that addresses SEARs Requirement
21	Identify the flood planning area and level as set out in the relevant EPI and other supporting documents.	Sections 3.4.4&3.4.5
	Determine the flood extent and velocity up to the Probable Maximum Flood and risk on-site, having regard to adopted flood studies and floodplain risk management studies and plans.	Sections 3.3 & Appendix D
	Determine the site access and egress routes.	Section 3.4.6
	Consider the potential effects of climate change.	Sections 3.1.2&3.4.3
	Consider any relevant provisions of the NSW Flood Risk Management Manual and any other relevant guidelines.	Sections 1.3&3.5&3.6
	Where the development is occurring on flood prone land, prepare a flood impact and risk assessment (FIRA) having regard to the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01.	Through the report
	When determining the scope and category of the FIRA, consider the requirements outlined in the FIRA guide.	Through the report
	Detail any flood risk management measures to be incorporated as part of the development, including design solutions, flood modification measures, property modification measures, operational procedures or a Flood Emergency Response Plan.	Sections 3.4
Dated	14/05/2025	



1.2 Project description

The proposal seeks development consent and concurrent rezoning for the construction of a residential flat building including affordable housing.

Specifically, the SSDA includes:

- Demolition of the existing buildings and structures on site;
- Site excavation and other preparatory site works;
- Construction of a 45-storey residential flat building including:
 - » 114 dwellings including 51 affordable housing dwellings,
 - » Shared amenities and communal open space on ground level including a swimming pool,
 - » Car parking and servicing within the basement,
 - » Vehicular and loading access from Archer Street,
- Associated site landscaping,
- Utility and services augmentation as required, and
- Amalgamation of existing allotments to create one consolidated lot.

The concurrent rezoning application will amend the Willoughby Local Environmental Plan 2012 (WLEP 2012) as follows:

- insert 'residential flat building' as an additional permitted use,
- increase the maximum building height and floor space ratio, and
- amendment to active street frontages and non-residential floor space provisions.

1.2.1 The Site

The site is located at 51-55 Archer Street, Chatswood and is in the Willoughby Local Government Area (LGA). The site has an area of 1,767 sqm and comprises four lots with a primary frontage of approximately 46m to Archer Street.

The site is located approximately 800m walking distance from Chatswood Transport Interchange which offers Metro, trains and bus services. The site is also within 400m walking distance from major shopping centres and community infrastructure, which provide local shops and community services that meet the needs of the surrounding residential areas.

The Chatswood CBD is an evolving strategic centre reflecting long term strategy work by Willoughby City Council and the State Government. The periphery of the Chatswood CBD is undergoing transformation from low to medium density residential developments to high density mixed use developments supporting housing delivery in the Willoughby LGA. The Chatswood CBD is subject to a variety of mixed use and residential developments, including State Significant Developments under the in-fill affordable housing and Housing Delivery Authority (HDA) pathways. Notably, proximate to the subject site on Archer Street are four major mixed use developments with building heights up to 32 storeys.

The location of the site is illustrated in Figure 1-1.



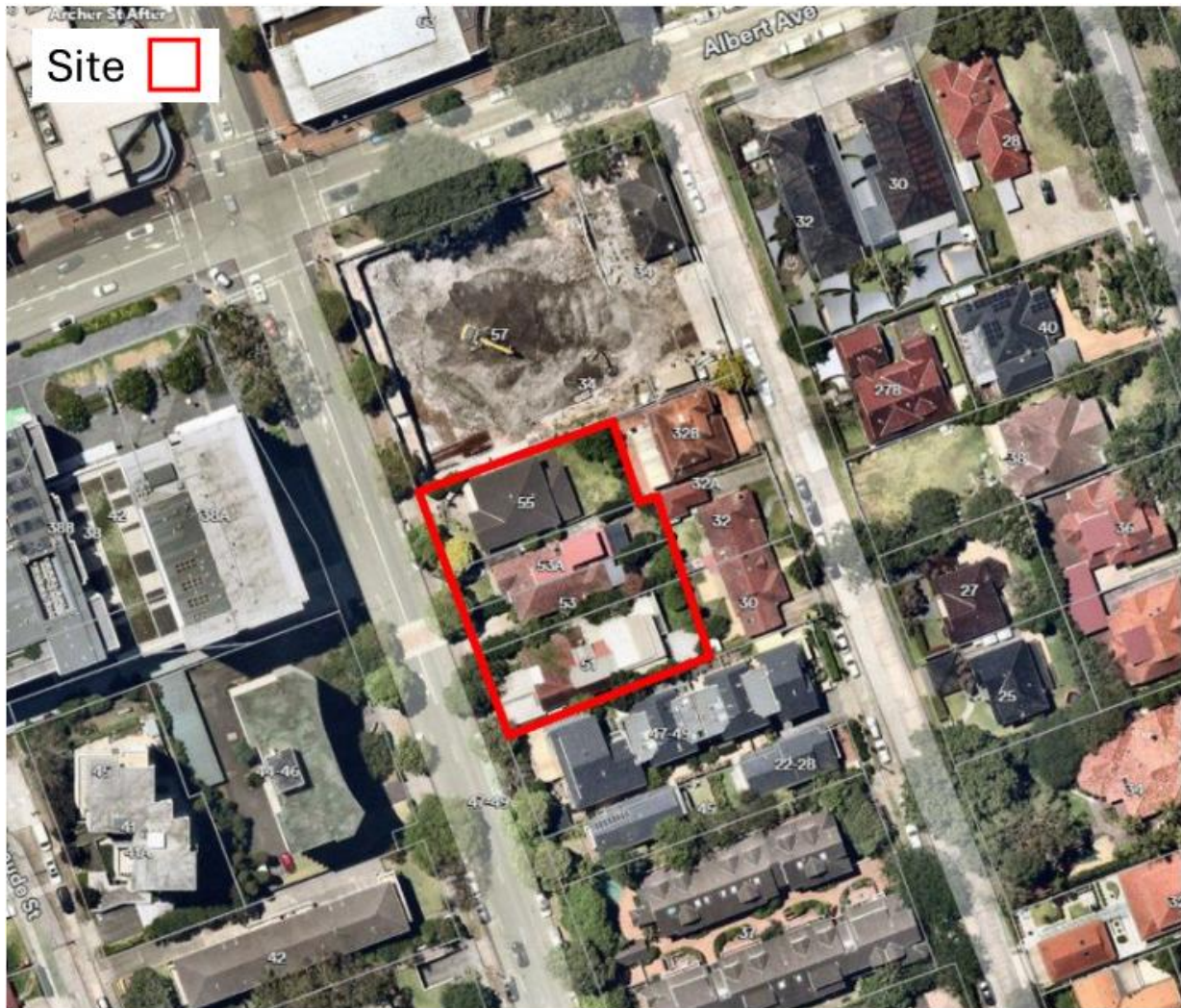


Figure 1-1 Site plan (source: Nearmap)

1.2.2 Background

As part of the recent NSW Government reforms to accelerate the delivery of housing in line with the National Housing Accord, the HDA was created to recommend major housing proposals to the Minister to be declared State Significant Development.

An expression of interest (EOI 244110) was submitted to the HDA on 4 March 2025. The proposal (SSD-94409457) was recommended by the HDA on 15 July 2025 to be declared SSD. The proposal was declared SSD by the Minister in State Significant Development Declaration Order (No 11) 2025 on 23 July 2025.

A SEARs for the HDA SSD was issued on 20 October 2025.

1.2.3 Vision

The proposal responds to the NSW Government's commitment to delivering 377,000 new dwellings by 2029 under the National Housing Accord, as well as the vision of the Chatswood CBD - Planning and Urban Design Strategy 2036, which recognises the need for residential development in the periphery of the Chatswood CBD. The proposal will provide new market and affordable housing, which will contribute to the housing supply to help Willoughby City Council meet the housing targets of 3,400 by 2029.



2 Methodology

The following activities have been carried out as part of the assessment:

- Review of Council's DCP, LEP 2012 and other available flood-related information.
- Development of a 1D/2D flood model for existing conditions using site survey data.
- Simulation of the 20% AEP, 1% AEP and Probable Maximum Flood (PMF) events for both pre- and post-development scenarios.
- Determination of flood levels and flood planning levels for the proposed development.
- Assessment of climate change sensitivity.
- Assessment of flood impacts resulting from the proposed development.
- Development of appropriate flood emergency and evacuation strategies.
- Assessment of the proposal against relevant DCP and LEP requirements.



3 Available information

3.1 Scott's Creek Flood Study (2008)

The current flood study for the catchment is the Scott's Creek Flood Study (2008), which assessed flood behaviour in the urbanized catchment, modelling flows and levels for events up to the Probable Maximum Flood (PMF). The assessment used DRAINS and HEC-RAS software to prepare a hydrology and hydraulic model in accordance with the 1987 revision of *Australian Rainfall and Runoff* (ARR1987). It identified vulnerabilities in residential and commercial areas and evaluated the impact of detention basins on flood management, providing recommendations for risk mitigation and improved floodplain management. A newer draft Floodplain Risk Management Study with an updated hydraulic model is in progress but is unpublished at the time of this report.

3.2 LiDAR

The 2013 1-meter Digital Elevation Model (DEM) sourced from the Elevation Information System (ELVIS), with a vertical accuracy of 0.3m and a horizontal accuracy of 0.8m (95% confidence interval), was utilized for sub-catchment delineation and as the basis for the hydraulic model DEM.

3.3 Detailed survey

A detailed site survey, conducted by Stuart De Nett Land Surveyors on 23 April 2024, includes 3D ground surface data, building outlines, and details of solid walls and fences. This survey was utilized and superseded the LiDAR data within its extents.

Refer Appendix A

3.4 Adjoining 57-61 Archer Street Development

The adjoining development at 57–61 Archer Street and 34 Bertram Avenue, Chatswood, has been approved under SSD-72891212. Relevant approval documentation is provided in Appendix B.

The approved development includes proposed stormwater mitigation works, including culverts, vertical openings and pits. These works have been incorporated into the baseline scenario of the flood model, including the proposed building footprint, service lane, and associated flood mitigation infrastructure.

3.5 Proposed Development

The proposed development involves demolishing the existing residential buildings, clearing the site, and constructing a 34-story high-rise tower comprising residential and commercial spaces, including four basement levels. The ground floor and Level 1 will house retail and commercial spaces, while the upper levels will be dedicated to residential living.

Primary vehicular access to the basement, which will include car and bike parking as well as storage spaces, is planned via Archer Street at ground level. Refer to **Appendix C** for the proposed ground floor plans.



4 Flood assessment

4.1 Hydrology

4.1.1 Inputs

A hydrology model was developed using DRAINS software to generate hydrographs for use in the hydraulic model, utilizing the RAFTS Storage Routing hydrological method within the DRAINS interface. The current revision of *Australian Runoff and Rainfall* (ARR2019) was adopted to estimate design rainfall flowrates, applying zero initial and continuing losses as a conservative approach. IFD data (refer Figure 4-1) was sourced from the ARR Data Hub and is presented below.

The catchments (refer Figure 4-2) were sub-delineated based on the ELVIS LiDAR DEM. A 100% imperviousness assumption was adopted for the catchment due to the highly urbanised nature of the area and to provide a conservative assessment.

Copyright Commonwealth of Australia 2016 Bureau of Meteorology (ABN 92 637 533 532)																					
All Design Rainfall Depth (mm)																					
Issued: 1-Nov-24																					
Location Label:																					
Requester Latitude		-33.797			Longitude			151.181													
Nearest gr Latitude		33.7875 (S)			Longitude			151.1875 (E)													
Exceedance Annual Exceedance Probability (AEP)																					
Duration	Duration	12EY	6EY	4EY	3EY	2EY	63.20%	50%	0.5EY	20%	0.2EY	10%	5%	2%	1%	1 in 200	1 in 500	1 in 1000	1 in 2000		
1 min	1	1.07	1.22	1.47	1.66	1.93	2.42	2.71	3.01	3.65	3.72	4.31	4.98	5.89	6.6	7.13	8.06	8.78	9.5		
2 min	2	1.89	2.14	2.56	2.86	3.28	4.02	4.46	4.95	5.88	6	6.89	7.92	9.39	10.6	11.6	13.2	14.4	15.6		
3 min	3	2.58	2.93	3.52	3.94	4.54	5.57	6.19	6.87	8.21	8.38	9.64	11.1	13.2	14.8	16.2	18.3	20	21.7		
4 min	4	3.16	3.6	4.35	4.89	5.66	6.99	7.79	8.64	10.4	10.6	12.2	14.1	16.7	18.8	20.4	23.1	25.1	27.3		
5 min	5	3.67	4.19	5.09	5.73	6.65	8.26	9.22	10.2	12.3	12.6	14.6	16.8	19.9	22.3	24.2	27.4	29.8	32.3		
10 min	10	5.49	6.31	7.76	8.82	10.3	13.1	14.7	16.3	19.8	20.2	23.4	27.1	32	35.9	38.6	43.6	47.5	51.3		
15 min	15	6.71	7.72	9.54	10.9	12.8	16.3	18.3	20.3	24.8	25.3	29.3	33.8	40	44.8	48.2	54.5	59.3	64.2		
20 min	20	7.62	8.79	10.9	12.4	14.7	18.7	21	23.3	28.4	29	33.6	38.8	45.8	51.3	55.4	62.6	68.2	73.8		
25 min	25	8.36	9.65	11.9	13.6	16.1	20.7	23.2	25.7	31.3	31.9	36.9	42.6	50.4	56.5	61	69	75.1	81.4		
30 min	30	8.99	10.4	12.9	14.7	17.4	22.3	25	27.7	33.6	34.3	39.7	45.8	54.1	60.7	65.7	74.3	80.9	87.7		
45 min	45	10.5	12.1	15	17.1	20.3	26.1	29.1	32.3	39	39.8	46	53	62.8	70.5	76.4	86.5	94.2	102		
1 hour	60	11.6	13.4	16.6	19	22.5	28.9	32.2	35.8	43	43.9	50.7	58.5	69.3	77.9	84.5	95.7	104	113		
1.5 hour	90	13.4	15.4	19.1	21.9	25.9	33.3	37.1	41.2	49.4	50.4	58.1	67.1	79.6	89.8	97.3	110	120	130		
2 hour	120	14.8	17.1	21.2	24.2	28.7	36.9	41	45.6	54.6	55.6	64.3	74.2	88.3	99.7	108	122	133	144		
3 hour	180	17.1	19.7	24.5	28	33.3	42.9	47.6	52.9	63.3	64.6	74.8	86.6	103	117	126	142	155	167		
4.5 hour	270	19.8	22.9	28.6	32.7	38.9	50.3	55.9	62	74.5	76	88.2	102	122	139	149	168	183	197		
6 hour	360	22.1	25.6	32	36.7	43.7	56.6	63	69.9	84.4	86.1	100	117	140	158	170	191	208	224		

Figure 4-1 BOM IFD



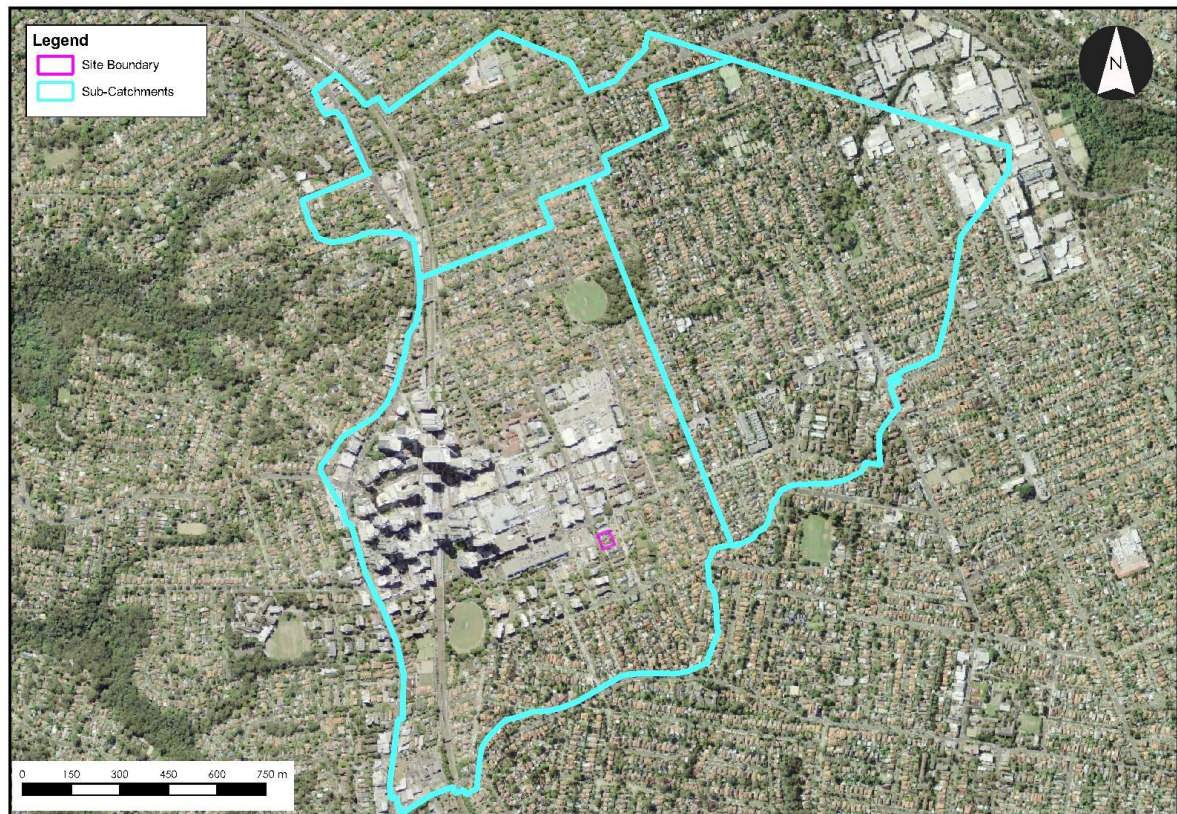


Figure 4-2 Sub-Catchment Plan

4.1.2 Climate Change Assessment

The climate change assessment was conducted in accordance with the latest ARR guidelines (dated 27/08/24). The worst-case scenario, SSP5-RCP8.5 projection for 2100, was assumed, accounting for an 86% increase in rainfall (refer to Figure 4-3). The increased IFDs were applied to critical storm events (less than 1-hour duration) to calculate the elevated 1% AEP flood level around the proposed building as part of a sensitivity check.

Flood Impact and Risk Assessment

4 Flood assessment

SSP5-8.5

Year	<1 hour	1.5 Hours	2 Hours	3 Hours	4.5 Hours	6 Hours	9 Hours	12 Hours	18 Hours	>24 Hours
2030	1.2	1.18	1.17	1.16	1.14	1.13	1.13	1.12	1.11	1.11
2040	1.26	1.24	1.22	1.2	1.18	1.17	1.16	1.15	1.14	1.14
2050	1.34	1.31	1.29	1.26	1.24	1.23	1.21	1.2	1.18	1.18
2060	1.42	1.38	1.35	1.32	1.29	1.28	1.26	1.24	1.22	1.21
2070	1.52	1.47	1.43	1.4	1.36	1.34	1.31	1.29	1.27	1.26
2080	1.63	1.57	1.52	1.48	1.43	1.4	1.37	1.35	1.33	1.31
2090	1.77	1.69	1.64	1.58	1.52	1.49	1.45	1.42	1.39	1.37
2100	1.86	1.77	1.71	1.64	1.58	1.54	1.5	1.47	1.43	1.41

Figure 4-3 Climate Change factor (Source: ARR Datahub)

4.1.3 PMF Assessment

The PMF was assessed using the GSDM methodology to verify the required basement entry level as specified by the DCP. The PMP rainfall was calculated and manually input into the drains model (refer to Figure 4-4). The critical duration for the PMF is 15 minutes.

If area < 1 km ² ,				for the particular catchment area.						Check - Depths taken from Figure 4						
Catchment Area (km ²)	1			Duration (h)	Smooth Depth (mm)	Rough Depth (mm)	Averaged Depth (mm)	Adjusted Depth (mm)	Rounded Depth (mm)	Point Value (Smooth) (mm)	Point Value (Rough) (mm)	Point Value (Smooth) (mm)	Point Value (Rough) (mm)			
Percent Rough (%)	0	Section 4.2		0.25	245	245	245	172	170	250	245	250	245			
Elevation of Catchment (m)	100	Section 4.3		0.5	350	350	350	245	250	360	350	360	350			
Moisture Adjustment Factor (%)	70	Figure 3		0.75	440	440	440	308	310	460	440	460	440			
				1	510	510	510	357	360	570	510	570	510			
				1.5	580	655	580	406	410	640	580	740	655			
				2	647	770	647	453	450	710	647	880	770			
				2.5	690	852	690	483	480	760	690	990	852			
				3	722	938	722	505	510	810	722	1090	938			
				4	793	1065	793	555	560	900	793	1250	1065			
				5	856	1176	856	599	600	960	856	1360	1176			
				6	900	1242	900	630	630	1000	900	1450	1242			
2. Transfer the results from either of the above procedures to the coloured columns below.				Note: Depths are calculated from those in Bulletin 53 corresponding to zero area and to 1 km ² .												
Adjusted Depth (mm)				3. The intensities in the coloured columns given below can be transferred directly to the rainfall data base in DRAINS. Using your mouse, select the numbers in the pairs of columns required and choose Copy from the View menu. Go to the DRAINS rainfall data base using the Project -> Rainfall Data... option in DRAINS. Click the Add a New Storm button. When the new window appears, click the Paste button. The numbers and accompanying graph will appear. Enter a suitable title. Repeat the process as required.												
250				15 Minute Pattern			30 Minute Pattern			45 Minute Pattern			60 Minute Pattern			
360	Time (minutes)	intensities (mm/h)	percentages (%)	Time (minutes)	intensities (mm/h)	percentages (%)	Time (minutes)	intensities (mm/h)	percentages (%)	Time (minutes)	intensities (mm/h)	percentages (%)	Time (minutes)	intensities (mm/h)	percentages (%)	
460	0	1320	44	0	864	20	0	662	12	0	547	8	0	547	8	
570	5	1140	38	5	1037	24	5	938	17	5	821	12	5	821	12	
740	10	540	18	10	864	20	10	828	15	10	821	12	10	821	12	
880	15			15	778	18	15	773	14	15	821	12	15	821	12	
990				20	518	12	20	718	13	20	752	11	20	752	11	
1090				25	259	6	25	607	11	25	684	10	25	684	10	
1250							30	497	9	30	616	9	30	616	9	
1360								35	331	6	35	547	8	35	547	8
1450								40	166	3	40	479	7	40	479	7
								45			45	342	5	45	342	5
											50	274	4	50	274	4
											55	137	2	55	137	2
											60			60		

Figure 4-4 PMP calculation



4.1.4 Critical Duration

Median TP of multiple durations were run through the flood model. The worst duration were selected as critical duration for subsequent assessment. The selected TP and critical duration are presented below

Table 4-1 Critical Duration

Storms	Median TP	Critical Duration
20% AEP	TP04	45 minutes
1% AEP	TP09	45 minutes
PMF	N/A	15 minutes



4.2 Hydraulic model

4.2.1 Model set-up

The TUFLOW 1D/2D model was utilized for the hydraulic assessment of the study area. A 2D model was chosen to accurately simulate overland flow paths and street surface drainage, providing a better representation of the complex hydraulics in highly urbanized areas.

4.2.2 Model geometry and extent

The model geometry was established using a 2 m resolution mesh, with a 0.5 m Quadtree mesh adopted in the vicinity of the site to capture detailed local features. The DEM and model extent are shown in Figure 4-5.



Figure 4-5 TUFLOW Model Extent, DEM and Quadtree Mesh Extent

4.2.3 Model boundary conditions

Similar to the direct rainfall approach, the 'SA ALL' polygon was applied across the entire model extents to evenly distribute water from the hydrology model's hydrograph into the TUFLOW model. This method enables TUFLOW to map overland flow paths more effectively compared to the standard 'SA' approach. Selecting the median temporal pattern (TP) from the hydrology model reduces the number of storm runs required in TUFLOW while ensuring a reasonable and objective representation of actual flow paths.



4.2.4 Model roughness

Existing roughness conditions were mapped using a combination of aerial photography and cadastre data. Material coverage mapping is shown in Figure 4-6, while the Manning's values assigned to each material type are detailed the map legend. The default material coverage adopted in the model was road reserve.



Figure 4-6 Roughness mapping

4.2.5 Other structures

Additional features (refer Figure 4-7 and Figure 4-8), including brick walls, fences, and existing and proposed buildings within the site and neighbouring properties, were incorporated into the TUFLOW model.

The existing street pit and pipe drainage system was assumed to be 100% blocked as a conservative approach.

The neighbouring development's culverts and vertical openings were incorporated into the baseline model scenario. In the proposed development scenario, the proposed mitigation culverts and grated 900 mm x 900 mm pit were modelled in the 1D network layer, with 50% blockage applied to the pit opening.

Flood Impact and Risk Assessment 4 Flood assessment



Figure 4-7 Modelled structures – Baseline

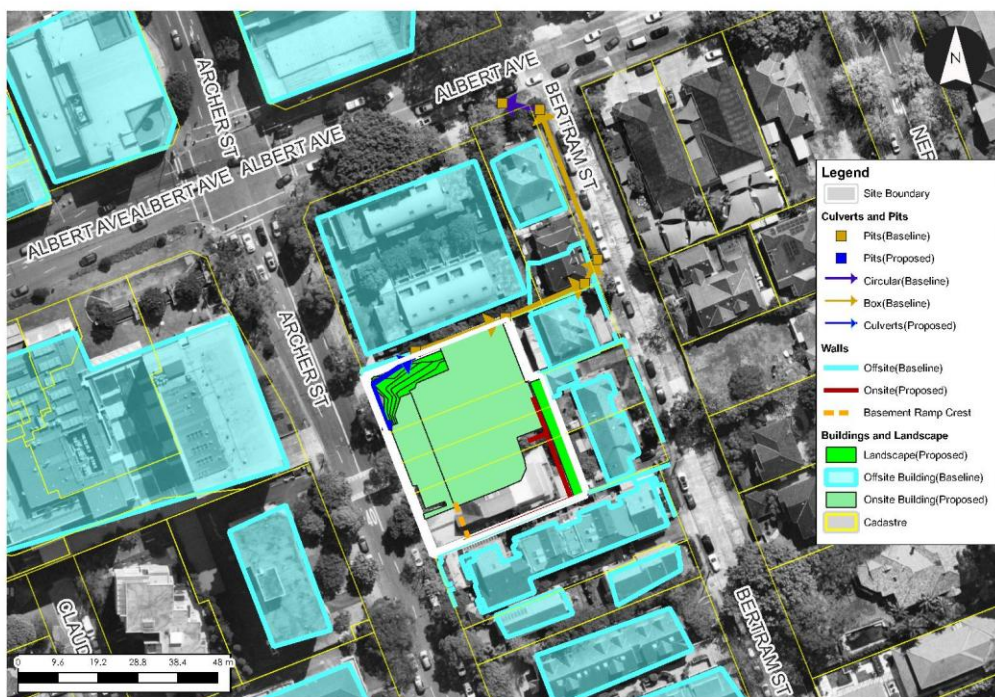


Figure 4-8 Modelled structures – Proposed



4.3 Hydraulic model results

4.3.1 Baseline

4.3.1.1 Flood Depth

Flood depths on Archer Street are generally between 50 mm and 100 mm in the 20% AEP event. In the 1% AEP event, flood depths are generally between 100 mm and 200 mm, with localised areas up to approximately 400 mm. In the PMF event, flood depths are generally between 300 mm and 400 mm, with depths of up to approximately 800 mm at the worst-affected location.

Within the site, flood depths at the worst-affected location are up to approximately 600 mm in the 20% AEP event, 800 mm in the 1% AEP event, and 1.6 m in the PMF event.

4.3.1.2 Flood Velocity

Flood velocities on Archer Street are generally less than 1 m/s in the 20% AEP event, up to approximately 1.6 m/s in the 1% AEP event, and up to approximately 3.0 m/s in the PMF event.

Within the lots, flood velocities are generally less than 0.5 m/s.

4.3.1.3 Flood Hazard

Flood Hazard (refer Figure 4-9) was assessed in the study. For the 20% AEP event, the site and adjacent streets are predominantly within **H1** with localized areas of **H2** to the east of the site. During the 1% AEP event, portions of the site and adjacent lots show **H2** with some areas increasing to **H3**, particularly toward Bertram Street. Under PMF conditions, the hazard levels escalate significantly, with Archer Street and Bertram Street and the surrounding lots experiencing **H4** and portions reaching **H5**

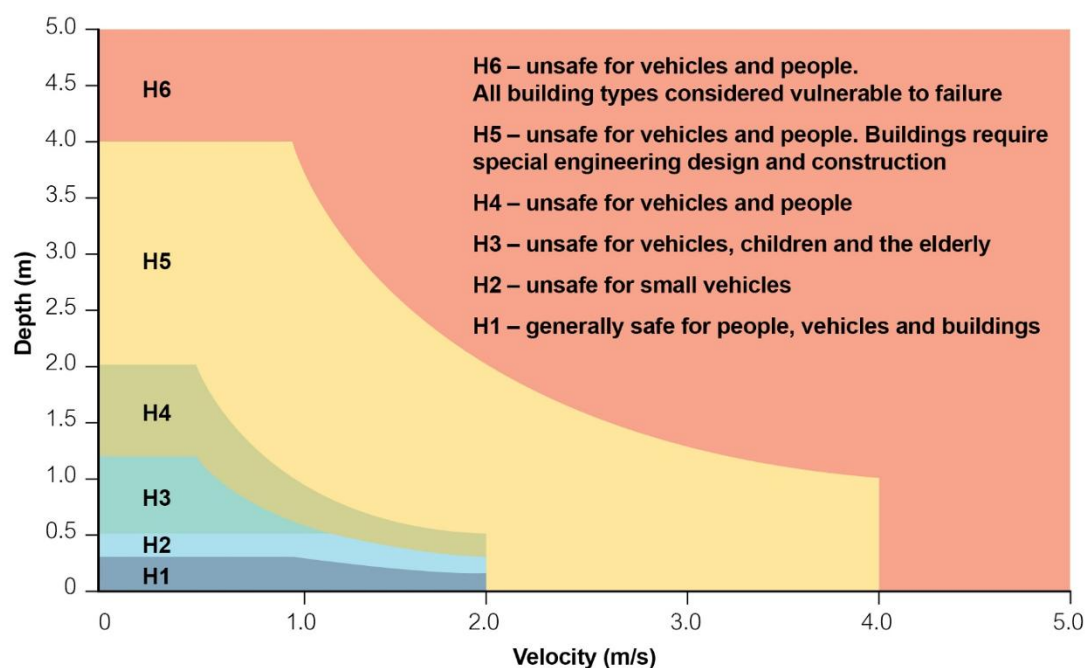


Figure 4-9 Flood hazard classifications (AIDR, 2017)



4.3.2 Post-development

4.3.2.1 Flood Depth

Flood depths generally remain mostly unchanged within the Archer street, with localised increases of up to 22 mm in the 20% AEP event and 30 mm in the 1% AEP event. Minor reductions of up to 60 mm are predicted within neighbouring properties.

Within the site boundary, flood level increases of up to 250 mm are predicted in both the 20% AEP and 1% AEP events.

In the PMF event, some redistribution of floodwater is predicted along Archer Street fronting the site, with increases between 27 mm and 200 mm within the road reserve. Flood levels within neighbouring properties generally decrease by between 50 mm and 220 mm.

It is noted that the flood hazard classification remains unchanged for all three assessed events.

4.3.2.2 Flood Velocity

Flood velocities on Archer Street generally remain below 1 m/s in the 20% AEP event, increase to up to approximately 1.6 m/s in the 1% AEP event, and reach up to approximately 3.0 m/s in the PMF event.

4.3.2.3 Flood Hazard

Under proposed conditions, the flood hazard of the surrounding streets and lots remains unchanged in the 20% AEP, 1% AEP and PMF.

4.3.3 Map outputs

Both baseline and proposed scenarios were assessed in the hydraulic model for the 20% and 1% AEP and the PMF flood events.

The hydraulic flood maps for the results listed in Table 4-2 are provided as **Appendix D**.

*Table 4-2 Hydraulic model results mapped as **Appendix D***

Scenario	Event	Result type
Baseline	• 20% AEP	• Level and depth
	• 1% AEP	• Velocity
	• PMF	• Hazard vulnerability classification (H1-H6)
Proposed	• 20% AEP	• Level and depth
	• 1% AEP	• Velocity
	• PMF	• Hazard vulnerability classification (H1-H6) • Flood impact



4.4 Flood-Related Development Controls and Discussion

4.4.1 Proposed flood mitigation measures

The following mitigation measures were tested, fine-tuned and incorporated into the final proposed development scenario:

- Provision of a 900 mm x 900 mm grated inlet pit or equivalent.
- Provision of a 700 mm x 700 mm box culvert or equivalent.
- Provision of an outlet connection to the neighbouring development's vertical opening, allowing overland flow to be conveyed through the site, or alternatively connecting directly to the neighbouring culverts. An approximately 450 mm x 450 mm grated pit is also required upstream of the connection to capture minor surface flows.
- Localised lowering of rear landscaped areas to compensate for minor flood storage loss associated with the flood training wall, which is proposed to prevent floodwater entering the rear basement area.

4.4.2 Flood Impacts Assessment

Flood impacts were assessed by comparing the proposed flood levels against existing conditions. The proposed mitigation measures were developed to reduce off-site impacts to acceptable levels.

The results indicate minor and localised flood level increases of up to 22 mm in the 20% AEP event and 30 mm in the 1% AEP event. These increases are generally confined to the road reserve and do not extend to surrounding building footprints or affect the floor levels of neighbouring properties.

The magnitude of the predicted increases is small and is not expected to result in a material change to flood behaviour, flood hazard, flood duration, property flood affectation, or emergency response conditions. On this basis, the proposed development is not expected to result in detrimental flood impacts on surrounding properties for the assessed 20% AEP and 1% AEP events.

In the PMF event, flood level increases of between 27 mm and 200 mm are predicted within the road reserve on the Archer Street carriageway. The existing PMF hazard on Archer Street is primarily classified as H5, and the predicted increase does not elevate the hazard classification. As the impact is contained within the road reserve and does not materially worsen public flood evacuation conditions, the predicted PMF impact is not considered detrimental.



Flood Impact and Risk Assessment

4 Flood assessment

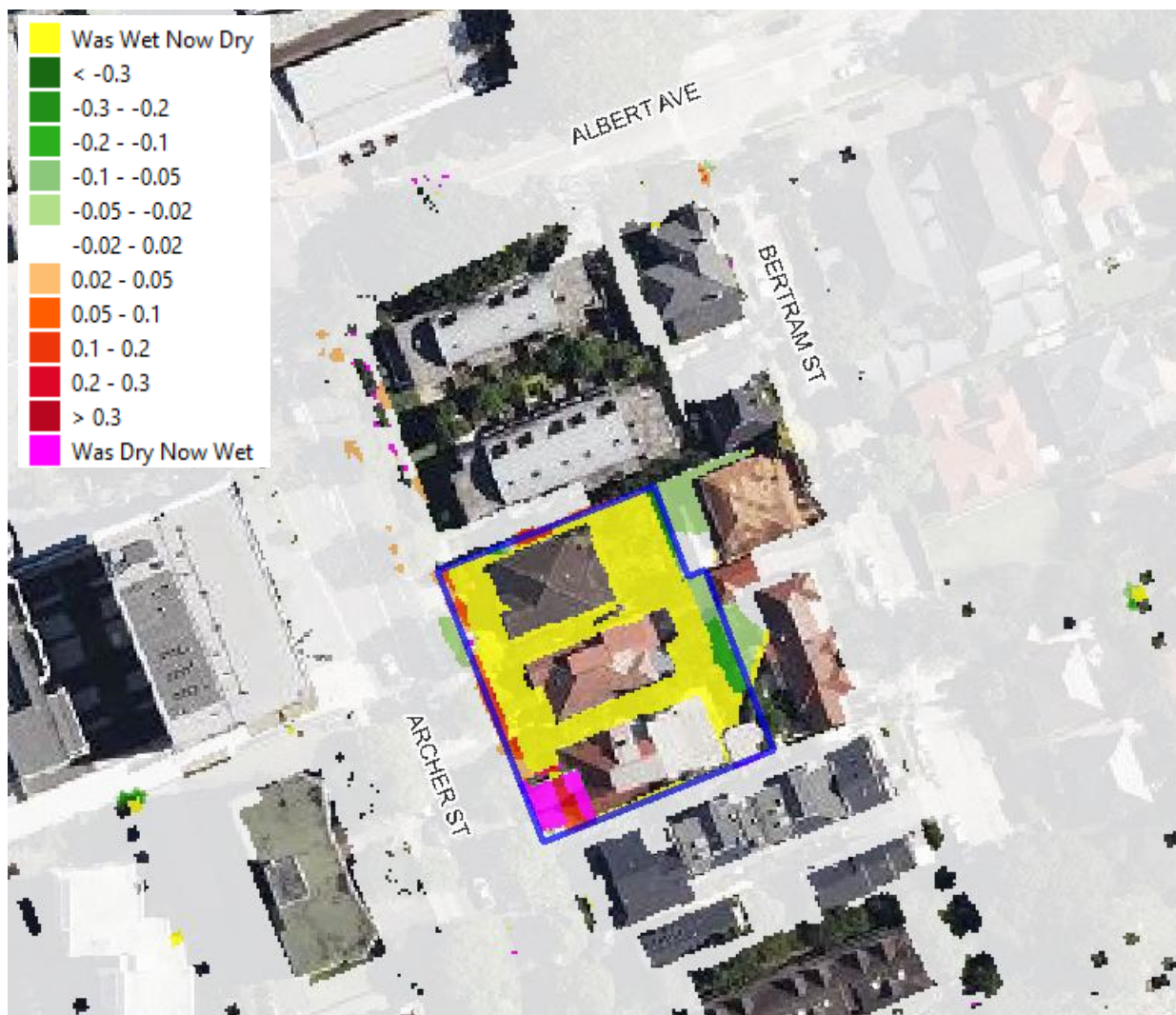


Figure 4-10 Proposed Flood Impacts - 20% AEP



Flood Impact and Risk Assessment

4 Flood assessment

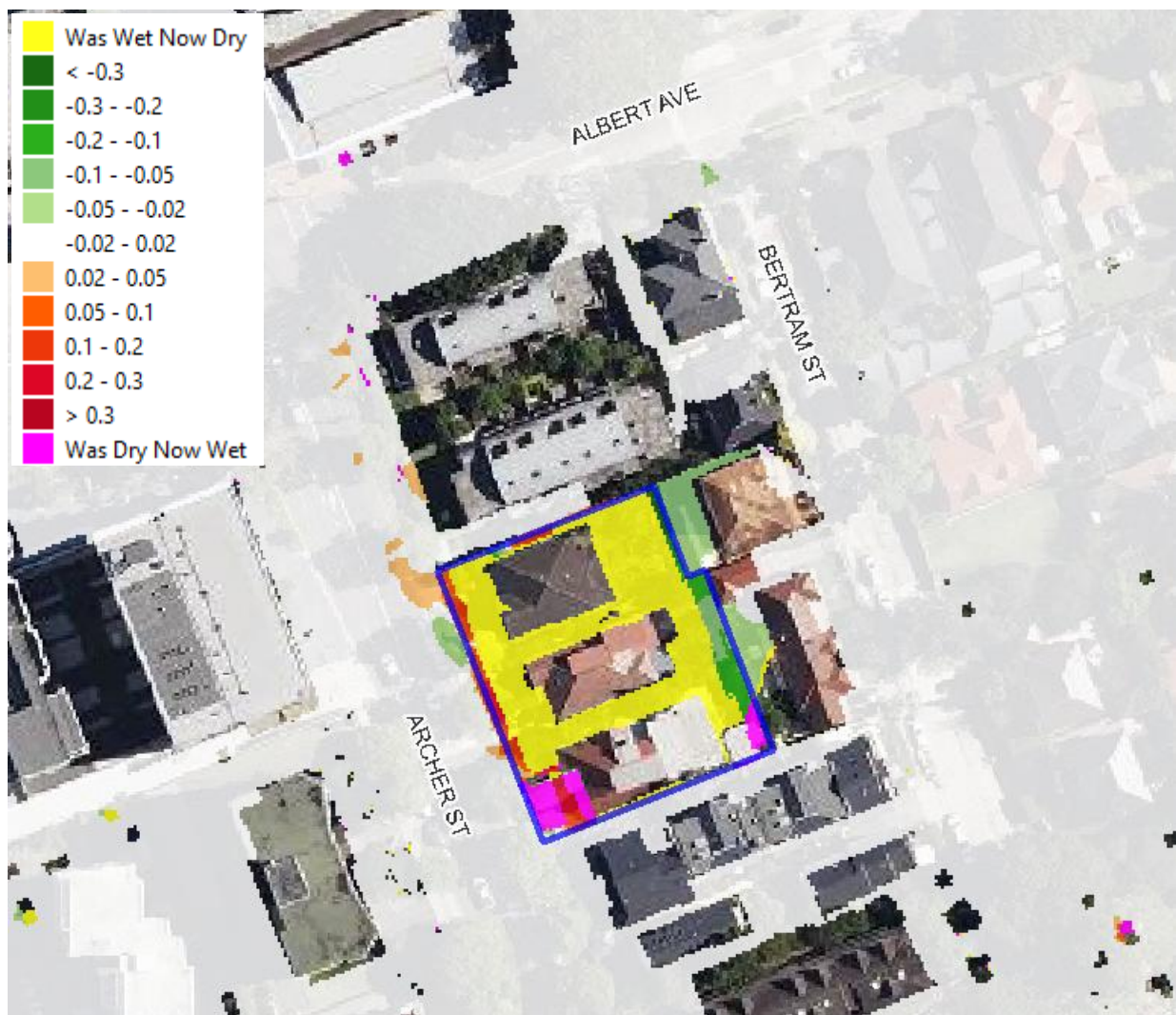


Figure 4-11 Proposed Flood Impacts - 1% AEP

Flood Impact and Risk Assessment

4 Flood assessment



Figure 4-12 Proposed Flood Impacts - PMF

4.4.3 Climate Change Sensitivity

The climate change assessment was undertaken in accordance with the latest ARR guidelines. The results (refer to Figure 4-13) indicate that the climate change scenario results in a water level increase of up to 144 mm near the proposed building and 66 mm in front of the proposed basement ramp, when compared with the corresponding scenario without climate change. On this basis, the adopted 500 mm freeboard is considered sufficient to account for the assessed worst-case climate change scenario projected to the year 2100.



Flood Impact and Risk Assessment

4 Flood assessment



Figure 4-13 Water Level Difference Between Climate Change and Non-Climates Change – 1% AEP

4.4.4 Flood Planning Levels

Willoughby City Council have specified the design flood planning levels required in the DCP and are noted below:-

- Habitable Floor Levels to be set at a minimum of the 1% AEP flood level + 500mm freeboard, and;
- All access points to the basement are at or above the 1%AEP water level + 500mm of the PMF, whichever is higher
- Non-Habitable Floor Levels to be set at a minimum of the 1% AEP flood level, and;
- Critical Infrastructure to be set at a minimum of the 1% AEP flood level + 500mm freeboard.

Based on the flood results, the required Flood Planning Levels (FPL) are:

- North West: 89.23 m AHD (1% AEP water level: 88.73 m + 500 mm freeboard)
- North East: 88.12 m AHD (1% AEP water level: 87.62 m + 500 mm freeboard)
- South West: 90.37 m AHD (1% AEP water level: 89.87 m + 500 mm freeboard)



- South East: 88.70 m AHD (1% AEP water level: 88.2 m + 500 mm freeboard)
- The minimum crest level for the driveway to the basement car park is RL 90.37 m AHD. This is based on the higher of the PMF flood level of RL 90.05 m AHD and the 1% AEP flood level plus 500 mm freeboard (90.37 m AHD).

4.4.5 Proposed Basement Parking Crest Level

It is noted that the proposed basement ramp crest level is RL 90.10 m AHD, which is above the PMF level. However, the crest level does not achieve the 1% AEP flood level plus 500 mm freeboard (RL 89.87 m AHD + 0.50 m) due to the following practical constraints:

- Flattening or further modifying the basement ramp gradient is constrained by the need to comply with AS 2890 car parking and access design requirements.
- Altering the garbage truck access arrangement is not preferred, as the access arrangement is required to satisfy Council's waste collection requirements.

On this basis, the proposed RL 90.1 m AHD crest level is considered a practical design outcome, noting that it remains above the PMF level.

The likelihood of floodwater entering the basement is also considered to be low for the following reasons:

- Flooding at this location is expected to be associated with overland flash flooding, which would generally be of short duration.
- Archer Street grades naturally towards the north. As such, overland flow is expected to continue downslope along the road reserve, rather than ponding sufficiently to overtop the basement ramp crest.
- The proposed crest level is above the PMF level, providing a high level of flood protection against the assessed flood condition.
- The 1% AEP overland flash flooding is shallow, with a peak depth of approximately 170 mm above the top of kerb. Applying a 500 mm freeboard to this shallow overland flow condition is considered unreasonable and overly conservative.

Therefore, while the adopted crest level does not achieve the 1% AEP flood level plus 500 mm freeboard, it is considered to provide a reasonable and practical level of flood protection for the basement access, having regard to the site constraints and local overland flow behaviour.

4.4.6 Flood Evacuation

Given the short duration and nature of the overland flow, and noting that all residential floor levels are located above the PMF level, a shelter-in-place / vertical evacuation strategy is considered an appropriate flood emergency response for the proposed development.



4.5 DCP Flood Related Compliance

The majority of the flood control requirements are met and addressed in Section 3.4. The exception is the basement crest level, for which a dispensation is required from Council. The reasons and justification are detailed in **Section 3.4.5**.

4.6 LEP Flood Planning Compliance

The LEP flood-related requirements are consolidated and summarised below.

Table 4-3 LEP Flood planning compliance

LEP Clause / Matter	Consolidated Requirement	Response	Reference
Flood Planning - Flood risk to life and property	Minimise flood risk to life and property and manage risk to life during a flood.	Flood risk has been assessed and managed through flood modelling, mitigation works, basement protection, flood planning levels and shelter-in-place.	Sections 3.4
Flood Planning - Compatibility with flood behaviour	Ensure the development is compatible with flood function and behaviour including climate change effects.	The proposal is considered compatible with the assessed overland flow behaviour, including the climate change sensitivity assessment.	Sections 3.1.2&3.4.3
Flood Planning - Off-site and cumulative impacts	Avoid adverse or cumulative impacts on flood behaviour and neighbouring properties.	Flood impacts are minor and localised, generally within the road reserve, and are not considered detrimental to surrounding properties.	Sections 3.4.2
Flood Planning - Safe occupation and evacuation	Enable safe occupation and efficient evacuation without worsening evacuation conditions.	Safe occupation is supported by residential levels above the PMF and a shelter-in-place / vertical evacuation strategy. The proposal is not expected to materially worsen evacuation conditions.	Sections 3.4.6
Special Flood Considerations - Application	Consider whether the site is subject to special flood considerations including PMF risk and safety considerations.	The proposal is not identified as sensitive or hazardous development; however, PMF conditions, basement protection and emergency response have been assessed.	N/A
Special Flood Considerations - Emergency facilities and critical infrastructure	Protect emergency response facilities and critical infrastructure during flood events.	No impact on emergency facilities is identified. Critical infrastructure flood planning levels are noted in the report.	Sections 3.4
Special Flood Considerations - Hazardous development	Avoid adverse flood-related environmental effects from hazardous development.	The proposal is not identified as hazardous development.	N/A



4.7 SEARs Flood Compliance

The SEARs flood-related requirements are addressed and summarised in Table 4-4 below.

Table 4-4 SEARs Flood compliance

Requirement	Response	Flood Report Reference
Identify the flood planning area and level as set out in the relevant EPI and other supporting documents.	Flood planning levels have been identified based on the 1% AEP flood level plus 500 mm freeboard. The basement crest requirement has also been assessed.	Sections 3.4.4&3.4.5
Determine the flood extent and velocity up to the Probable Maximum Flood and risk on-site, having regard to adopted flood studies and floodplain risk management studies and plans.	Flood extent, depth, velocity and hazard have been assessed for the 20% AEP, 1% AEP and PMF events.	Sections 3.3 & Appendix D
Determine the site access and egress routes.	Flood evacuation and access considerations have been assessed. Shelter-in-place / vertical evacuation is proposed due to short-duration overland flow and residential levels being above PMF.	Section 3.4.6
Consider the potential effects of climate change.	Climate change sensitivity has been assessed. The 500 mm freeboard is considered sufficient for the adopted climate change scenario.	Sections 3.1.2&3.4.3
Consider any relevant provisions of the NSW Flood Risk Management Manual and any other relevant guidelines.	Relevant flood planning and LEP/DCP flood requirements have been considered in the assessment.	Sections 1.3&3.5&3.6
Where the development is occurring on flood prone land, prepare a flood impact and risk assessment (FIRA) having regard to the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01.	The site is not classified as flood-prone land; however, a site-specific overland flow flood assessment has been prepared for the proposed development. The assessment is considered to be aligned with Flood Risk Management Guide LU01.	Through the report
When determining the scope and category of the FIRA, consider the requirements outlined in the FIRA guide.	The report scope includes hydrology, hydraulic modelling, flood impacts, climate change, flood planning levels and evacuation response.	Through the report
Detail any flood risk management measures to be incorporated as part of the development, including design solutions, flood modification measures, property modification measures, operational procedures or a Flood Emergency Response Plan.	Flood risk management measures include a grated inlet pit, box culvert, outlet connection, localised landscape lowering, basement crest assessment and shelter-in-place / vertical evacuation strategy.	Sections 3.4



5 Conclusion

It is concluded that:

- The flood assessment considered overland flow flooding for the 20% AEP, 1% AEP and PMF events.
- The proposed development is not expected to cause detrimental flood impacts to surrounding properties.
- Flood impacts are generally minor, localised and mostly limited to the Archer Street road reserve.
- Proposed mitigation measures include a grated inlet pit, box culvert, outlet connection and localised landscape grading.
- Required flood planning levels have been identified based on the 1% AEP flood level plus 500 mm freeboard.
- The proposed basement ramp crest is above the PMF level, but below the 1% AEP + 500 mm requirement; this is justified based on site and design constraints.
- Climate change impacts have been assessed, and the 500 mm freeboard is considered sufficient.
- Residential levels are above the PMF level, supporting a shelter-in-place / vertical evacuation strategy.
- Overall, the development is considered to appropriately address flood risk and relevant flood planning requirements.



Appendices

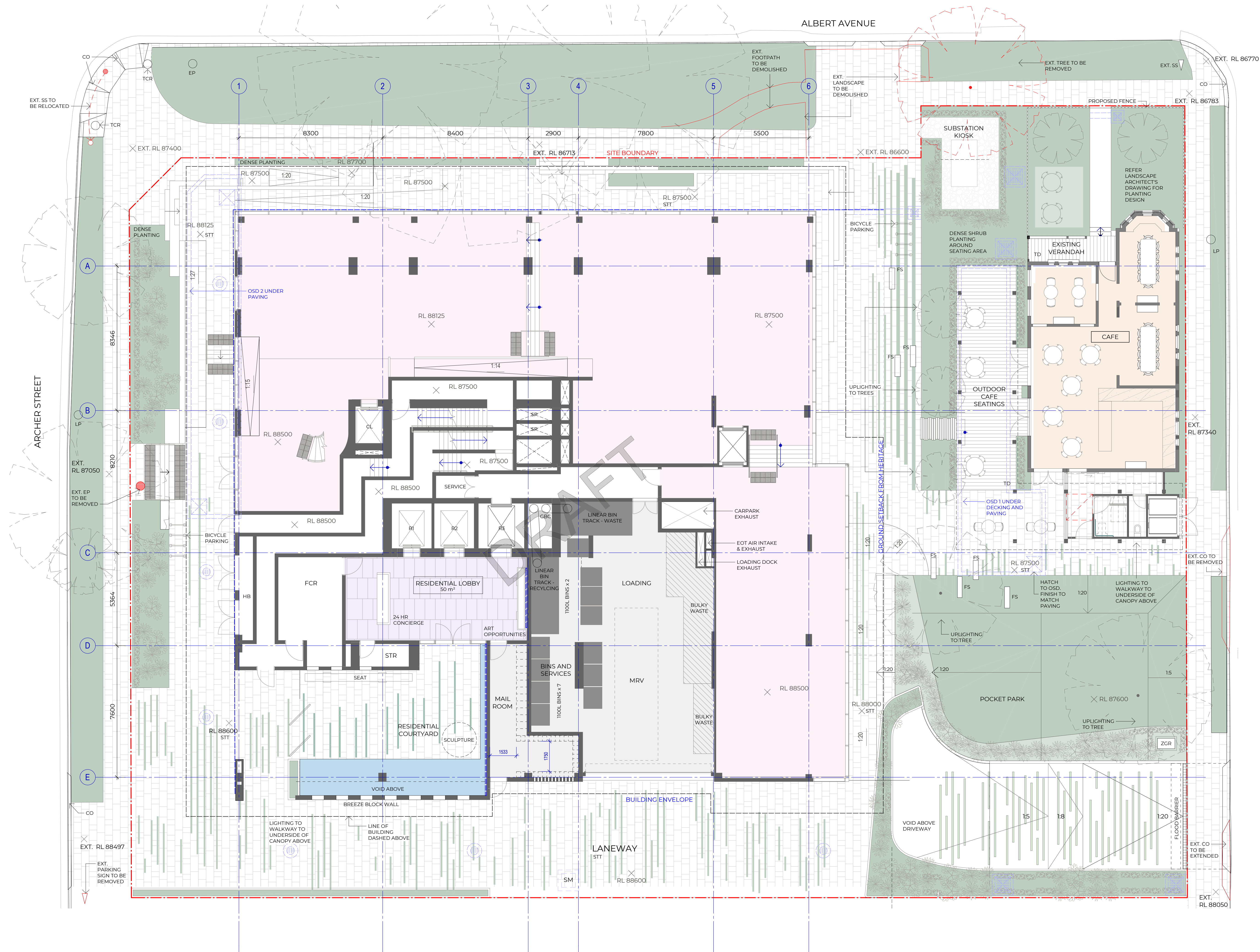


Appendix A Detailed Survey



Appendix B Adjoining 57-61 Archer Street Design Document





Recent revision history		
#	Status	Description
1	ISSUE FOR DA	19/12/23
2	PRELIMINARY - FOR SUBMISSION TO OBTAIN SEARS ONLY	02/07/24
3	DRAFT SSDA	14/08/24

Notes
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Contractor must verify all dimensions on site before commencing work or preparing shop drawings.
Do not scale drawings.

LEGEND

BASEMENT

DP	Drainage Pipe
LD	Linear Drain
SD	Spoon Drain
ADL	Adaptable Loading Area
ADP	Adaptable Parking Space
EOT	End-of-Trip Facility
MP	Motorcycle Parking Space
VP	Visitor Parking Space

GROUND

CO	Crossover
EP	Electric Pole
FS	Furniture - Seat
HB	Hydrant Booster
LP	Power and Light Pole
SS	Street Sign
TCR	Traffic Control Pole
ZGR	Zone for Gas Regulator
SM	Sewer Manhole

TOWER

C	Comms. Cupboard
E	Electrical Cupboard
F	High Pressure Fire Pipes Riser
GT	Gate
GTL	Louvered Gate
H	Hydraulic Riser
LR	Stair Relief
M	Meter Room
PB	Planter Box
SCN	Privacy Screen with Dense Planting
SCR	Screen
SK	Skylight
SP	Stair Press
SPS	Precast Spandrel Shading Device
VRV	Centralised VRF Plant Room
FE	Fire Extinguisher
RF	Refrigerant Riser

BL	Balustrade
CL	Commercial Lift
FCR	Fire Control Room
GBC	Garbage Chute
LTR	Lockable Storage
RI-RS	Residential Lift
STR	Storage

STP	Stone Paving
STT	Stone Tile Paving
TD	Timber Deck
TL	Tile

NOTE:

The final facade profile of the proposed design may be subjected to change based on the client's inputs or the availability of facade modules by the supplier.

Project
ARCHER & ALBERT

Client
CORONATION PROPERTY

Issuer
W-B
WOODS BAGOT

Project number
121876

Checked Approved Sheet size Scale
- - A1 1:100

Sheet title

GROUND FLOOR PLAN

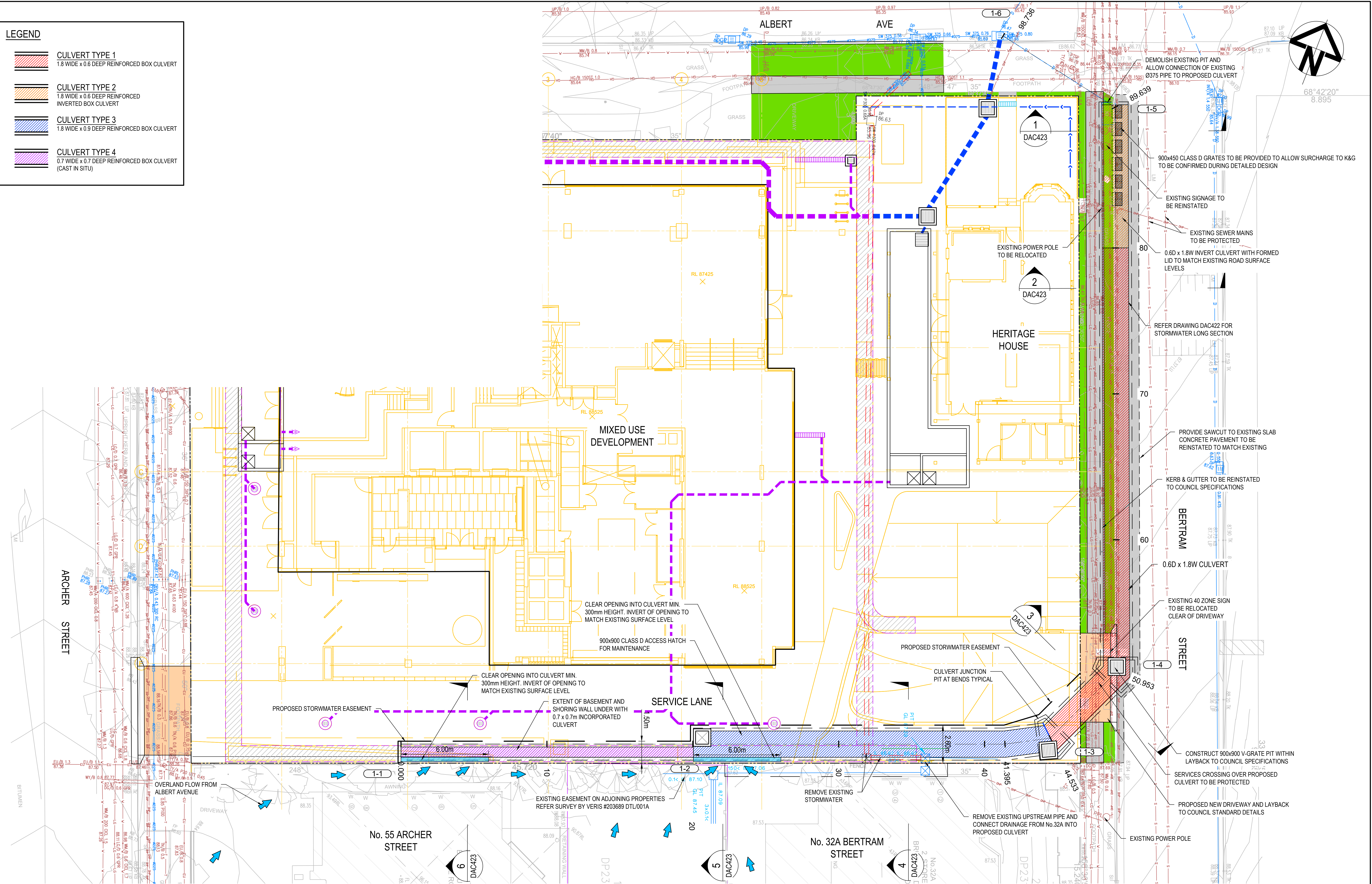
Sheet number
DA-2210

Status
FOR DEVELOPMENT APPLICATION

Revision
3

LEGEND

- CULVERT TYPE 1**
1.8 WIDE x 0.6 DEEP REINFORCED BOX CULVERT
- CULVERT TYPE 2**
1.8 WIDE x 0.6 DEEP REINFORCED
INVERTED BOX CULVERT
- CULVERT TYPE 3**
1.8 WIDE x 0.9 DEEP REINFORCED BOX CULVERT
- CULVERT TYPE 4**
0.7 WIDE x 0.7 DEEP REINFORCED BOX CULVERT
(CAST IN SITU)



0 2 4 6 8 10m

1:100 @ A1 1:200 @ A3

THIS DRAWING CANNOT BE
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OTHER PURPOSE OTHER THAN
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Client
CORONATION

Architect
W-B
WOODS BAGOT

Scales
AS SHOWN

Grid
GDA2020

Height
Datum
AHD

Drawn
Designed
Checked
Approved

JCA
NT
NT
AT

ARCHER & ALBERT
CHATSWOOD

CULVERT PLAN

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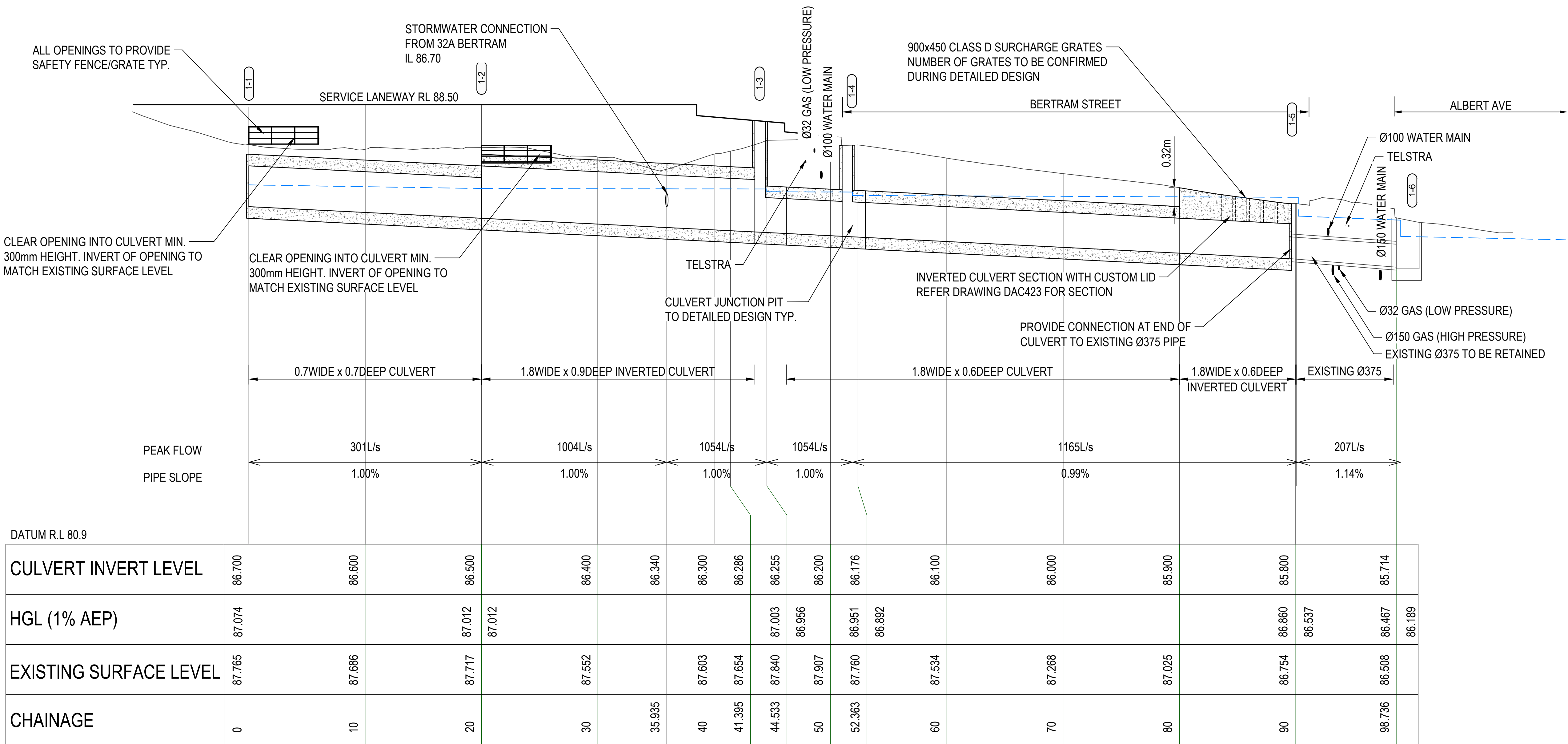
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Status
FOR SSDA APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Project - Drawing No.
24-1218-DAC421

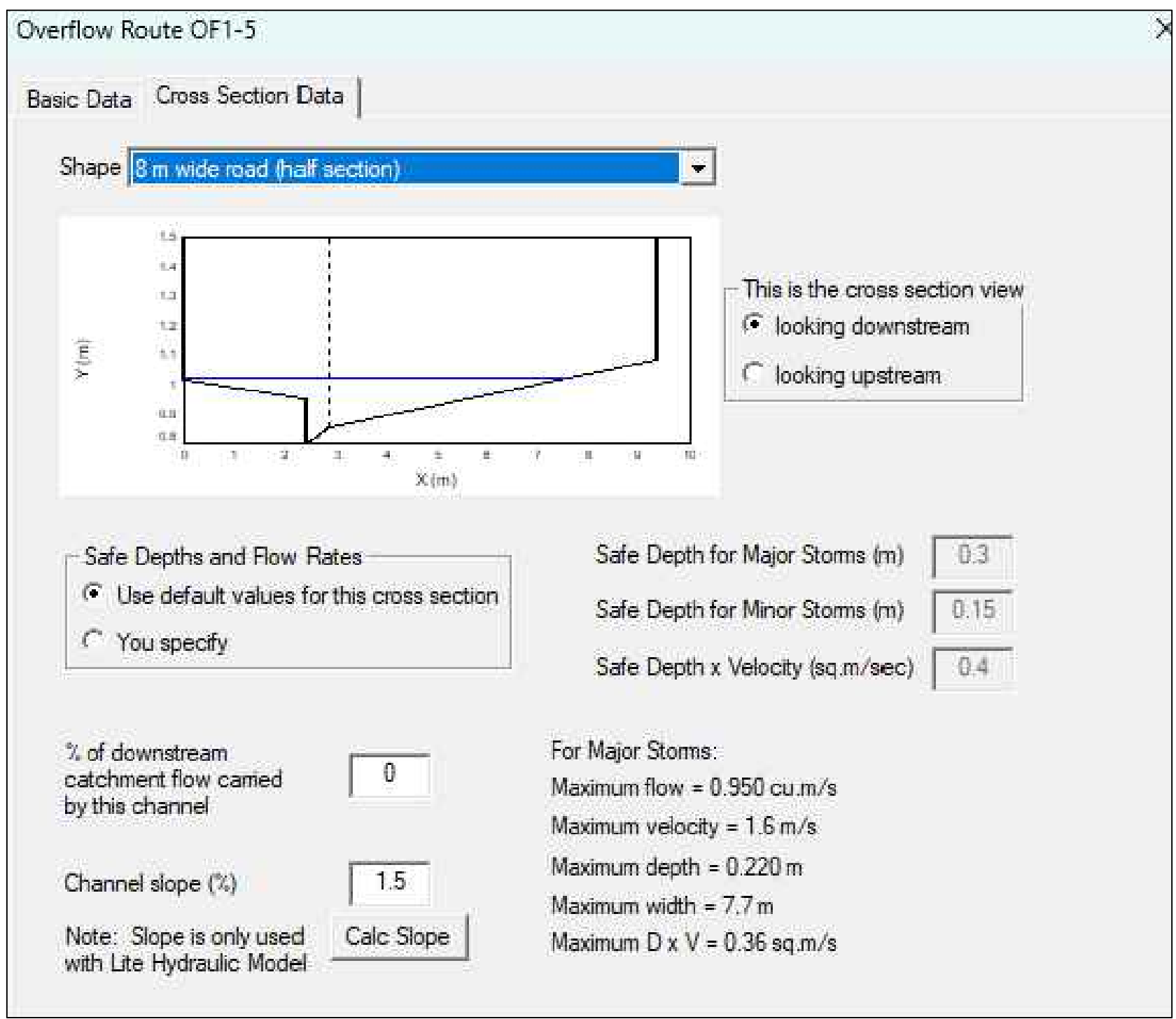
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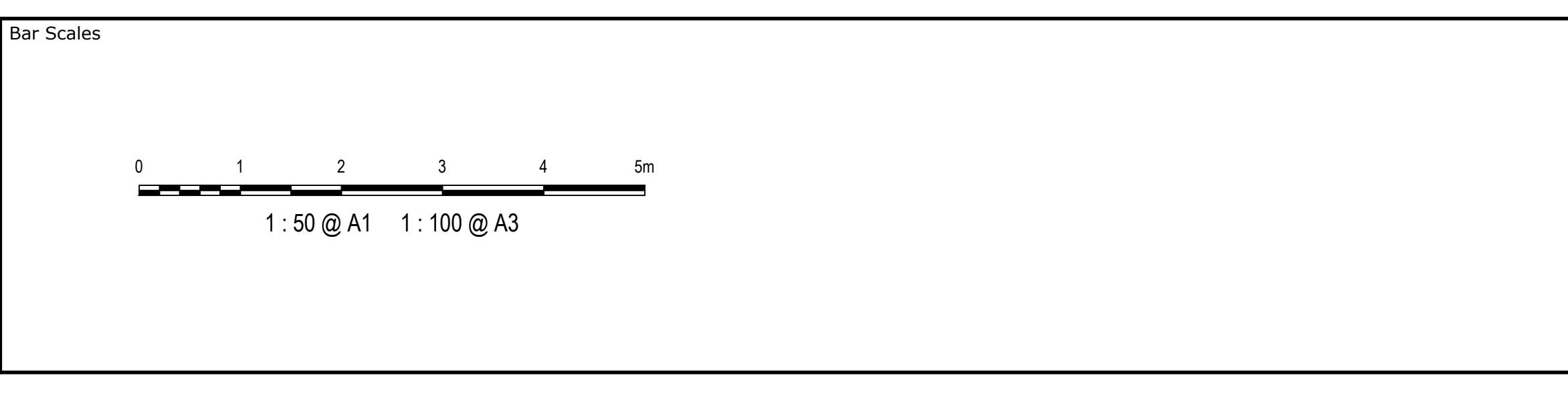
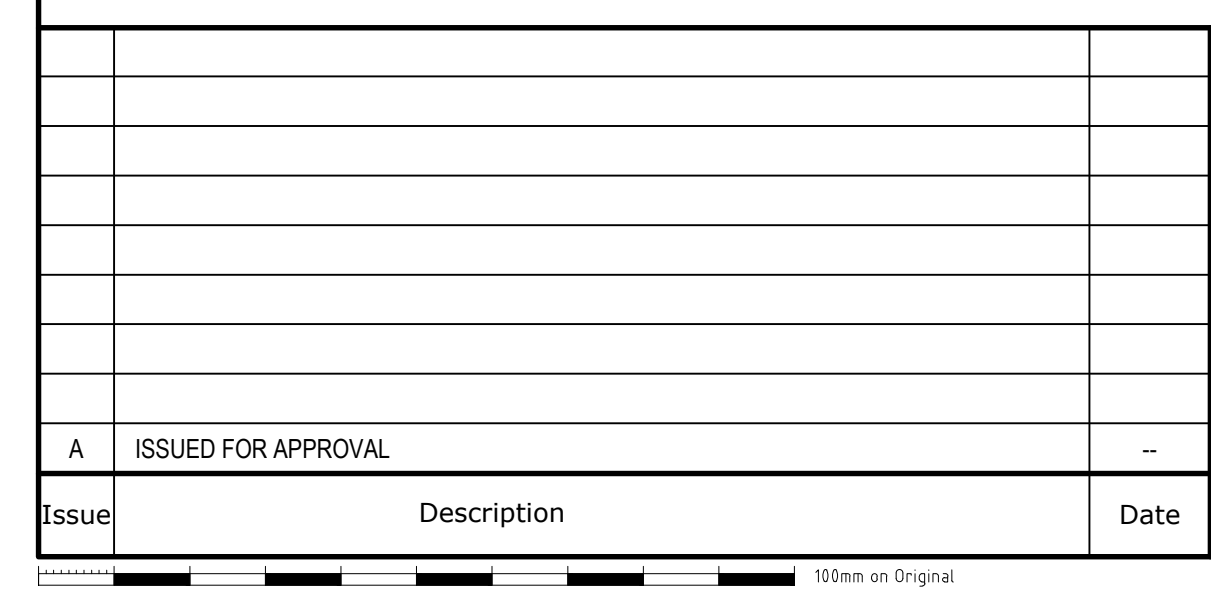
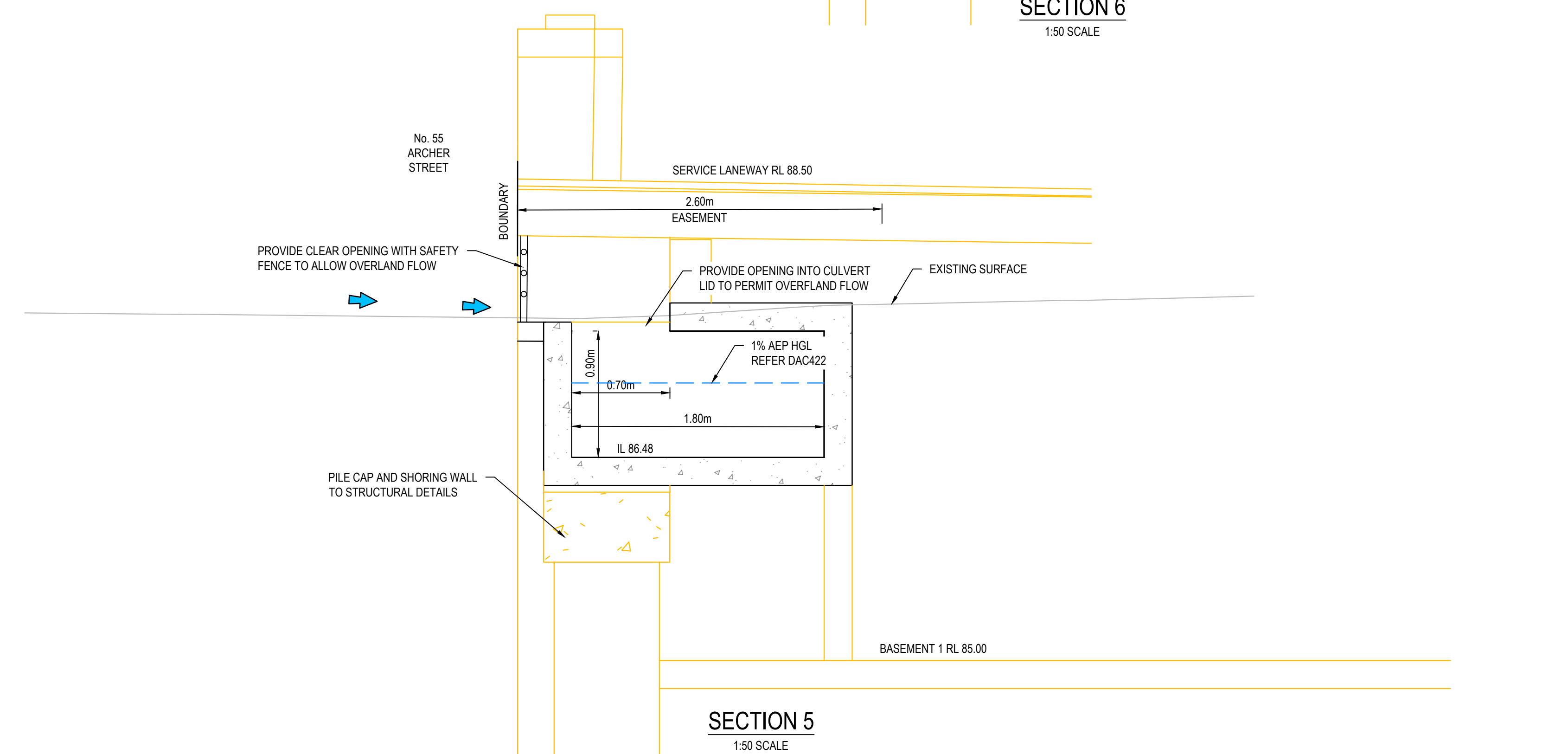
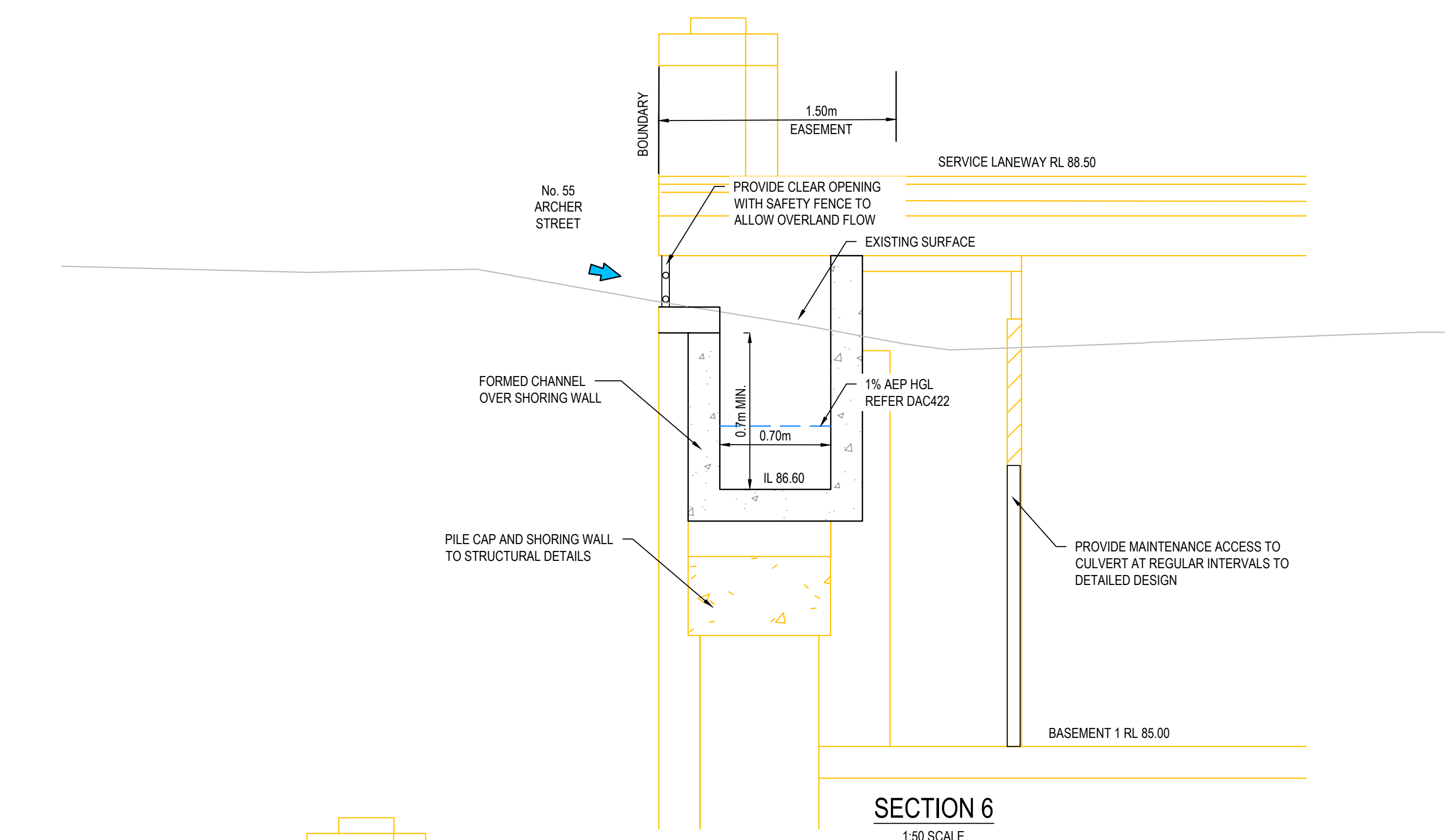
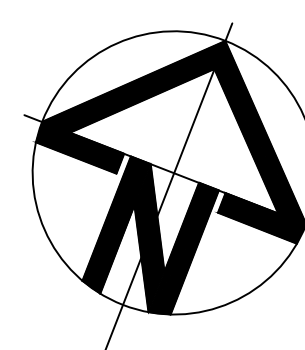
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1:50 VERT.



OVERLAND FLOW DOWNSTREAM OF 1-5

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PERMISSION OF AT&L

Client

CORONATION

Architect

W-B

WOODS BAGOT

Scales		AS SHOWN		Drawn		JCA		Project		Civil Engineers and Project Managers					
				Designed		NT		ARCHER & ALBERT CHATSWOOD							
Grid		GDA2020		Checked		NT				Level 7, 153 Walker Street North Sydney NSW 2060 P 02 9439 1777 E info@at.net.au www.at.net.au ABN 96 130 882 405					
Height Datum		AHD		Approved		AT									
								Title							
								CULVERT CROSS SECTIONS		Status		FOR SSDA APPROVAL		B1	
										NOT TO BE USED FOR CONSTRUCTION					
										Project - Drawing No.				Issue	
										24-1218-DAC423				A	
f:\24-1218 coronation chatswood\6.0 drgs\Civil\Final\24-1218-DAC423.dwg															

Appendix C Proposed Architecture Plan

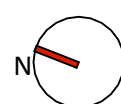


CONNECTING WITH COUNTRY ELEMENTS

1. Locally sourced sandstone paving
2. Sculptural landscaped
3. Landscape incorporating native plants attracting native birds and providing shade
4. Indigenous art integrated in to building external wall, underside of the awning, pool - tile design and landscape ridges.
5. Outdoor gathering/seating areas
6. Lighting instillation
7. Plaque to acknowledge elders knowledge holders

1 GROUND FLOOR PLAN
1 : 100 @A1

Key Plan:



Drawing Disclaimer:
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Verify all dimensions on site before commencing work.
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Note
PTW's responsibility for any external building element is strictly limited to that provided for by our relevant scope of Services. Others, including suitably qualified experts as may be required or as is appropriate, carry responsibility for any checking of or other work associated with any design, materials selection, construction or installation of any cladding, facade or external building element.

B SSDA SUBMISSION

Rev Amendment

DN SP 100426

By Chk* Date
Reg. Arch

ARCHER STREET

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Peddie Thorp & Walker P/L
ABN 23 000 454 624
Trading as PTW Architects

Nominated Architects
Simon Parsons NSW ARB 6098
Diane Jones NSW ARB 4778
Kathryn Loseby NSW ARB 6267

PTW

0 m 1 m 2 m 5 m 8 m
1:100 @A1

Project PA030594
**51-55 Archer Street,
Chatswood**

Phase
DEVELOPMENT APPLICATION

Title
B1-GENERAL ARRANGEMENT PLANS
GROUND FLOOR PLAN

Drawing Number
DA-B1GRD10

Revision
B

Key Plan:		Drawing Disclaimer: Do not scale from drawings. Verify all dimensions on site before commencing work. Copying or reproduction of this drawing is strictly prohibited without the consent of PTW Architects			
		Note PTW's responsibility for any external building element is strictly limited to that provided for by our relevant scope of Services. Others, including suitably qualified experts as may be required or as is appropriate, carry responsibility for any checking of or other work associated with any design, materials selection, construction or installation of any cladding, facade or external building element.			
B	SSDA SUBMISSION	DN	SP	100426	
Rev	Amendment	By	Chk* Reg. Arch	Date	

Consultants	

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Architect PTW Architects Gadigal Country Level 11, 88 Phillip Street Sydney NSW 2000 Australia T +61 2 9232 5877 ptw.com.au Peddie Thorp & Walker P/L ABN 23 000 454 624 Trading as PTW Architects	
Nominated Architects Simon Parsons NSW ARB 6098 Diane Jones NSW ARB 4778 Kathlyn Loseby NSW ARB 6267	

 1:150 @A1	
Project PA030594 51-55 Archer Street, Chatswood	
Phase DEVELOPMENT APPLICATION	

Title D1-SECTIONS SECTION 01 (EAST-WEST)	
Drawing Number	Revision
DA-D110010	B

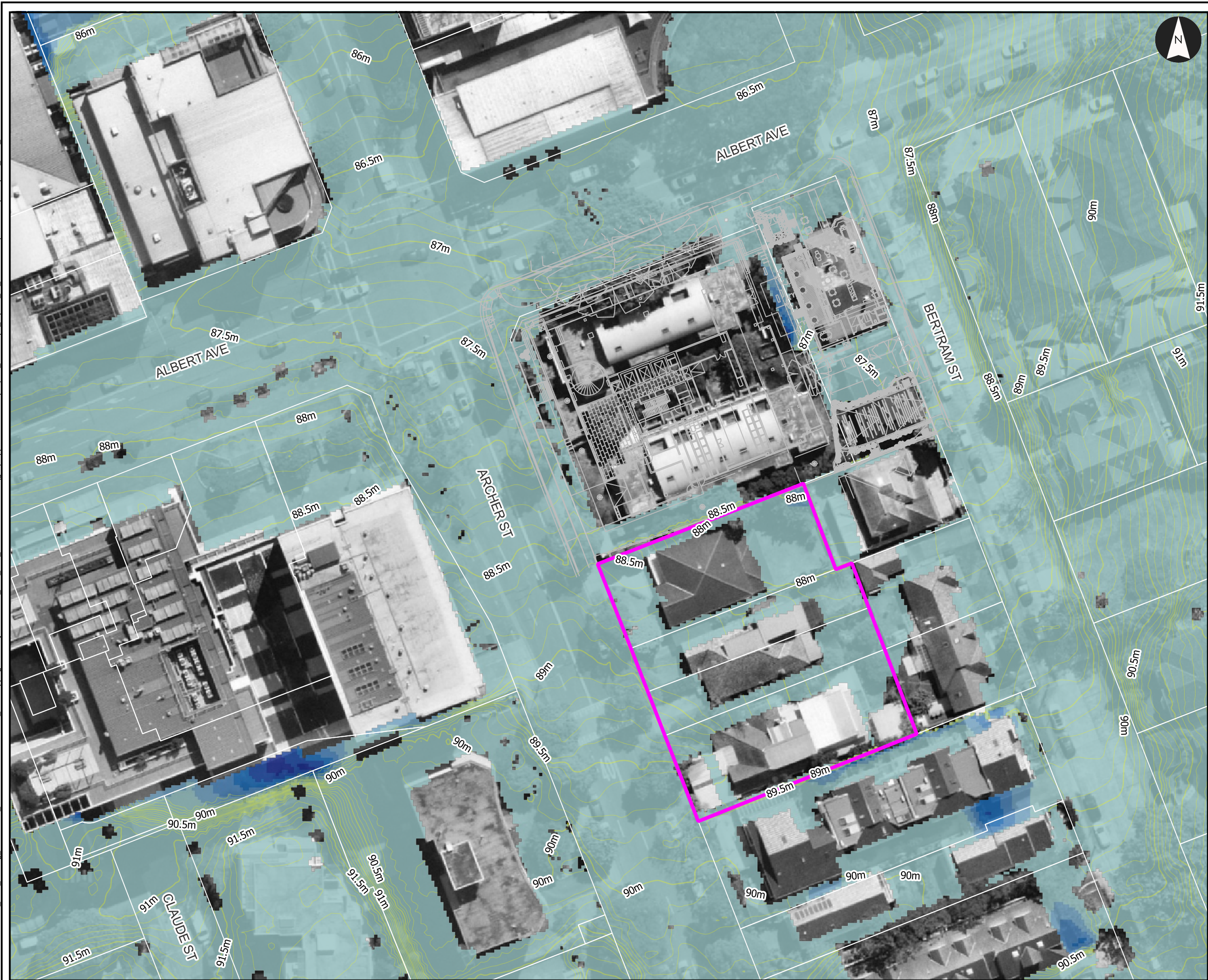
1 SECTION E-W
1 : 250 @A1



Appendix D Flood Maps



V:\3040\miscellaneous\ flood_working_1301351678_Archer Street Chatswood\2_GIS Mapping\2026May\301351678_STN_Q01_ArcherSt_OLFERMS.qgz | Appendix Flood Maps | A3_Landscape_Square_v3_20260505a | beta001 | Template Atlas 03



Baseline 20% AEP Flood Levels and Depth

51-55 Archer Street Chatswood

Project: Overland Flow Flood Risk Management Study
Client: Aqualand
Project Code: 301351678
Drawn By: FG, Checked By:
Date: 2026-05-07 Rev: 0
Figure No: A1

Legend

- Site Boundary
- 57-61 Archer St Development Layout
- Proposed Layout
- Flood Level Contour(mAHD)
- Cadastre

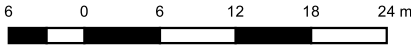
Flood Depth (m)

- 0 - 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.25
- 1.25 - 1.5
- >1.5

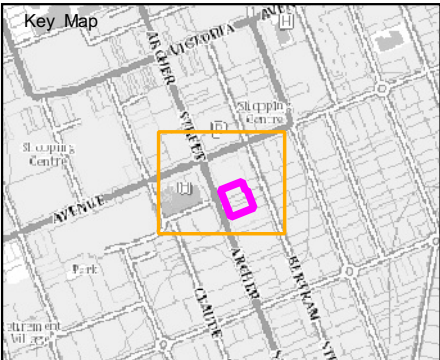
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA2020 / MGA zone 56

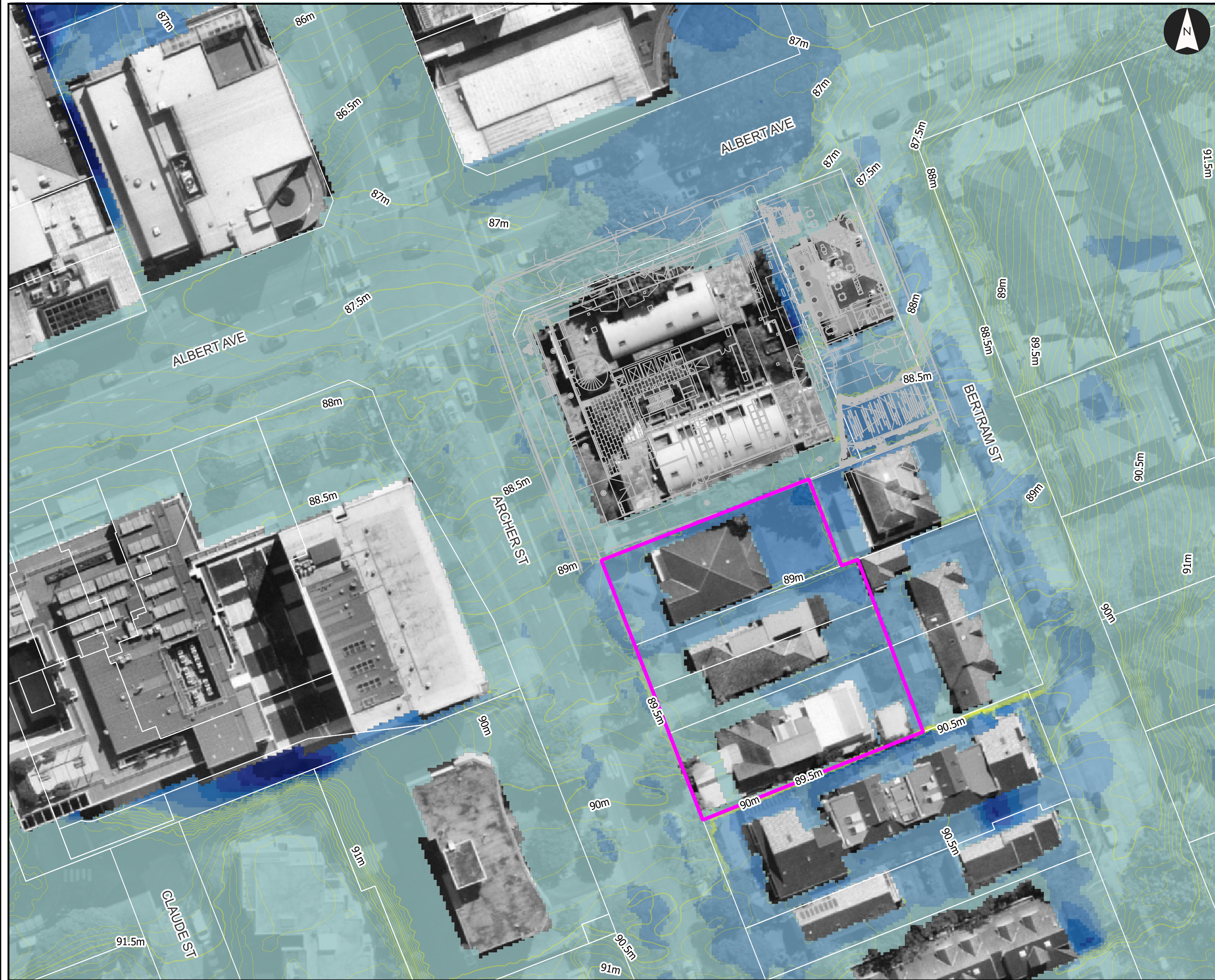
References:
1. Aerial photo: Nearmap



Scale at A3: 1:600



V:\3040\miscellaneous\ flood_working_1301351678_Archer Street Chatswood\2_GIS Mapping\2026May\301351678_STN_001_ArcherSt.O\FFRMS.qgz | Appendix Flood Maps | A3_Landscape_Square_v3_20260505a | beta001 | Template Atlas 03



Baseline PMF Flood Levels and Depth

51-55 Archer Street Chatswood

Project: Overland Flow Flood Risk Management Study
Client: Aqualand
Project Code: 301351678
Drawn By: FG, Checked By:
Date: 2026-05-07 Rev: 0
Figure No: A3

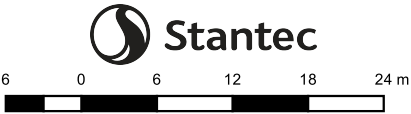
Legend

- Site Boundary
 - 57-61 Archer St Development Layout
 - Flood Level Contour(mAHD)
 - Cadastre
- Flood Depth (m)**
- 0 - 0.25
 - 0.25 - 0.5
 - 0.5 - 0.75
 - 0.75 - 1
 - 1 - 1.25
 - 1.25 - 1.5
 - >1.5

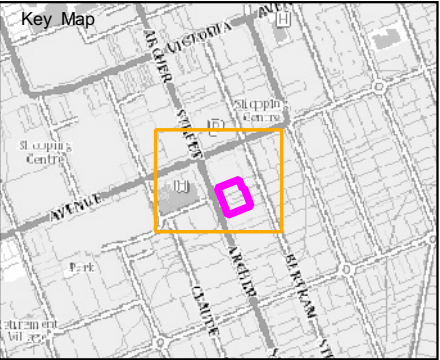
DRAFT - Not For Construction

Notes:
1. Map displayed in GDA2020 / MGA zone 56

References:
1. Aerial photo: Nearmap



Scale at A3: 1:600



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