Woolacotts.
CONSULTING ENGINEERS

Proposed Alterations and Additions to

The Existing Freshwater Surf Life Saving Club Building

Stormwater Management Report

23-25 15 June 2023

Contents

Document control

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C	14.06.23	Re-Issued for Review	JC		LN

1. Introduction

Alterations and additions are proposed to the existing Freshwater Surf Life Saving Club building – hereafter referred to as 'The Site'.

This report has been prepared to address stormwater management issues associated with the proposed development, including the proposed stormwater drainage network, infiltration tank, water quality, overland flow, and sediment and erosion control.

The Site is located within the Northern Beaches Council (LGA). As such, this report has been prepared in accordance with the Water Management for Development Policy (WMDP) and Department of Planning and Environment's (DPE's) Local Plan Making Guidelines. Refer to figure 1 for the site location.

Figure 1: Site Location

2. Existing Conditions

The existing site is occupied by a three-storey building comprising of freshwater surf club and associated storage/public amenities, and a café.

3. Proposed Development

The development involves:

- To the existing 1935 building
    - refurbishment of and improvements to the existing internal and external building fabric.
    - extension of the existing Level 2 decking.
- To the 1986 Clubhouse extension
    - Level 1 - expansion of the existing basement storage area.
    - Level 2 - removal of existing public changerooms and amenities, increase in size recreation hall, provision of a restaurant and café, and new toilet facilities for use in conjunction with the clubhouse public spaces.
    - Level 3 - new training rooms, gymnasium, and refurbished Caretaker's Apartment.
    - Installation of a new roof, a passenger lift serving all three levels and other alterations to provide equitable access.
- Existing 2009 Clubhouse Entry and Heritage Room
    - Demolition of existing structure and construction of a new infill building to provide a new club entry along with a multi-purpose hall, a double height space to be used for functions and exhibitions, including as a Museum of Surf in the northern beaches of Australia.

Refer to Figure 2 for the proposed floor plan.

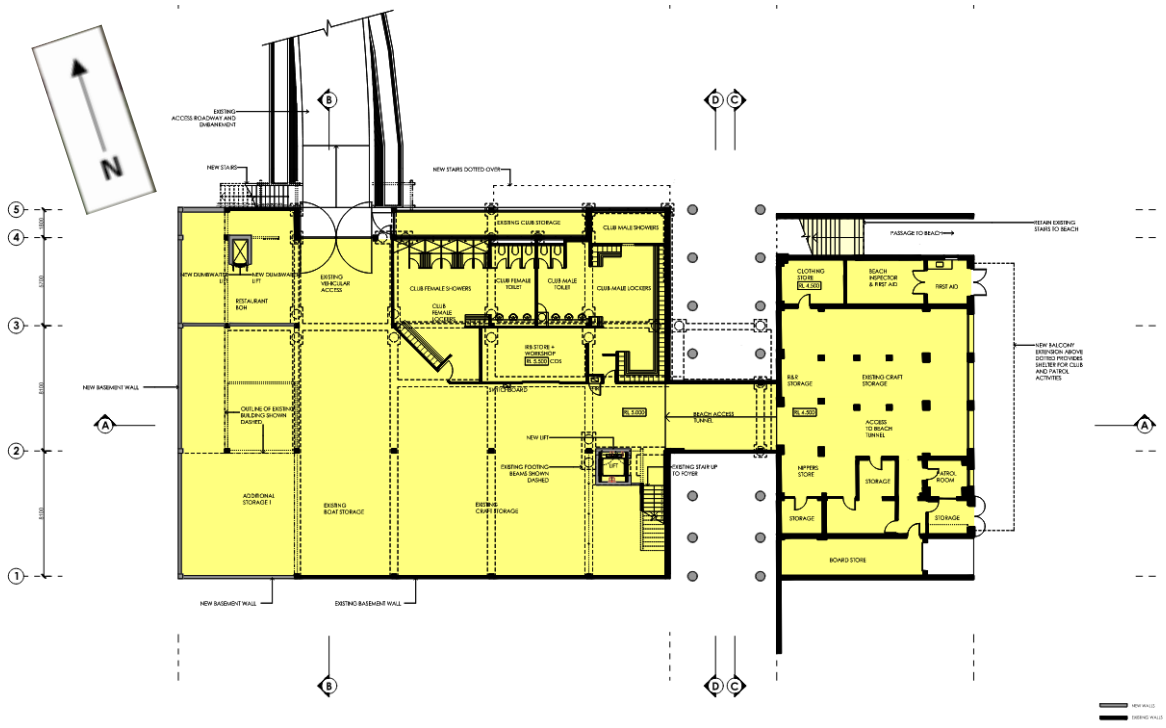


Figure 2: Proposed Level 1 Layout

(SOURCE DOCUMENT Bonus + Associate – Drawing DA 207 with Revision P1 Dated 09.12.2022).

4. Water Cycle Management

The stormwater management requirements for the site were obtained from the WMDP.

The following sections address the stormwater management items associated with the proposed drainage network, infiltration tank, stormwater quality, overland flow and sediment and erosion control.

4.1 Stormwater Drainage Network.

The property is categorised as a low-level property which is unable to connect to a council stormwater drainage system because the land falls naturally away from the council stormwater drainage system.

The roof area is directed to the proposed infiltration trench located at the rear of the site. Overflow from the trench discharges directly to Freshwater Beach.

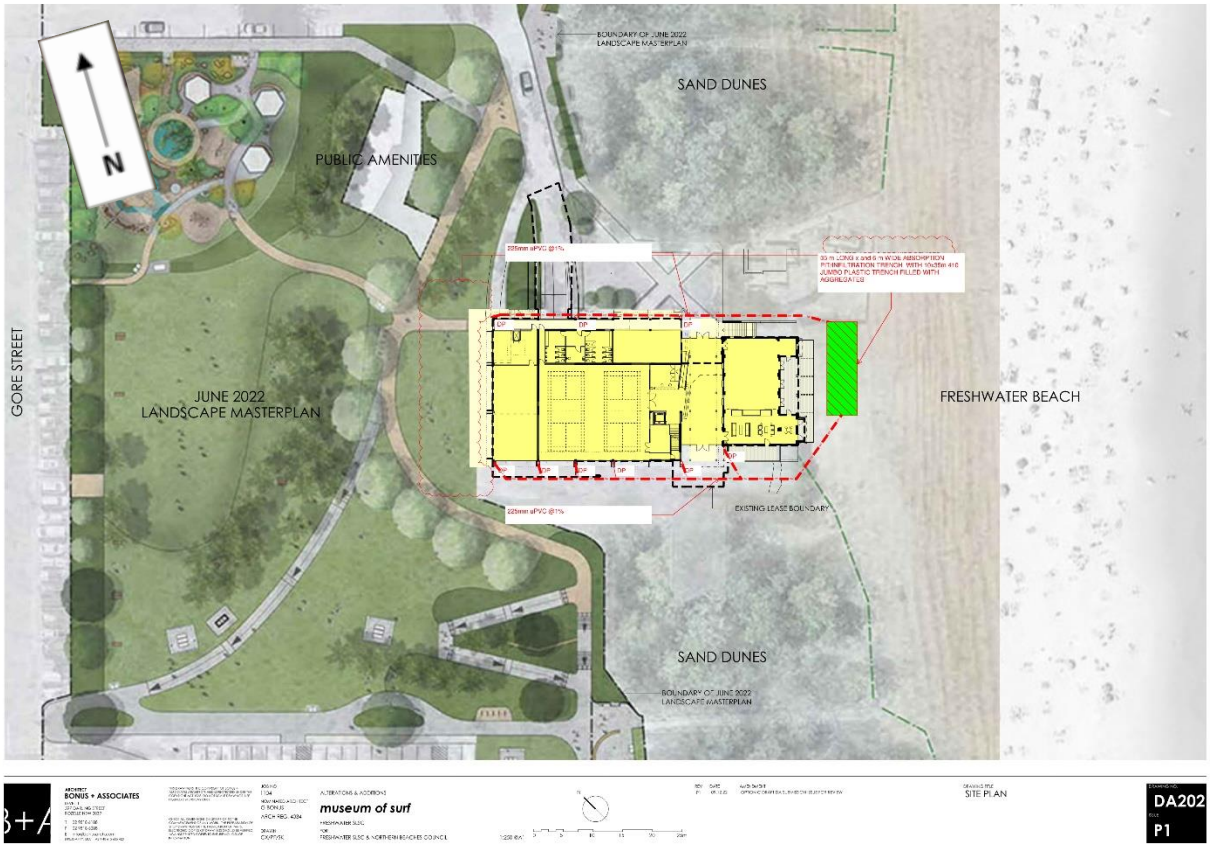


Figure 3: Infiltration Trench

4.2 Infiltration trenches

In the section 5.5 of WMDP, the property is required to have an on-site absorption system to cater for stormwater generated from the development during the 2% AEP storm events.

An infiltration report is not available, therefore Woolacotts will adopt the recommended infiltration rate of 270mm/hr which is the mean value of recommended hydraulic conductivity of sand to conduct calculations for the infiltration trench. Refer to figure 4 below for the typical range of saturated hydraulic conductivities for homogeneous soils.

Soil Type	Saturated Hydraulic Conductivity	
	m/s	mm/hr
Coarse Sand	>1 x 10-4	>360
Sand	>5 x 10-5 to 1-10-4	180 to 360
Sandy Loam	1 x 10-5 to 5 x 10-5	36 to 180
Sandy Clay	1 x 10-6 to 1 x 10-5	3.6 to 36
Medium Clay	1 x 10-7 to 1 x 10-6	0.36 to 3.6
Heavy Clay	1 x 10-7	0.0036 to 0.36

Figure 4: Typical Soil Type and Associated Saturate Hydraulic Conductivity (Source: Engineer Australia 2006)

An infiltration trench of 23.94 m³ is proposed at the rear of the site. The trench comprises 10x35m 410 Jumbo plastic trenches filled with aggregates. Refer Figure 3.

Roof guttering, downpipes and associated pipework are to be sized for the 2% AEP storm event and piped to the infiltration trench, or alternatively provide for surface collection of guttering overflows into the absorption system.

When considering available storage volumes for the storage design methods, a maximum of 20% voids in the base aggregate is used.

The infiltration trench should not be located within 3m of the side or rear boundary, or 3m from any on-site building/structure.

4.3 Stormwater Quality

In part 4.0: Protecting the Environment of WMDP, MUSIC modelling shall be undertaken to ensure the stormwater pollutant reduction targets have been achieved. These targets are summarised below:

- 45% reduction in Total Nitrogen (TN)
- 65% reduction in Total Phosphorus (TP)
- 85% reduction in Total Suspended Solids (TSS)
- 90% reduction in Gross Pollutants

The infiltration trenches were modelled in MUSIC to determine the overall effectiveness of the proposed treatment train. The treatment rate achieved by the system is:

- Gross pollutants – 100% average annual load reduction
- Total suspended solids – 98.2% average annual load reduction
- Total Phosphorous – 97.7% average annual load reduction
- Total Nitrogen – 97.4% average annual load reduction

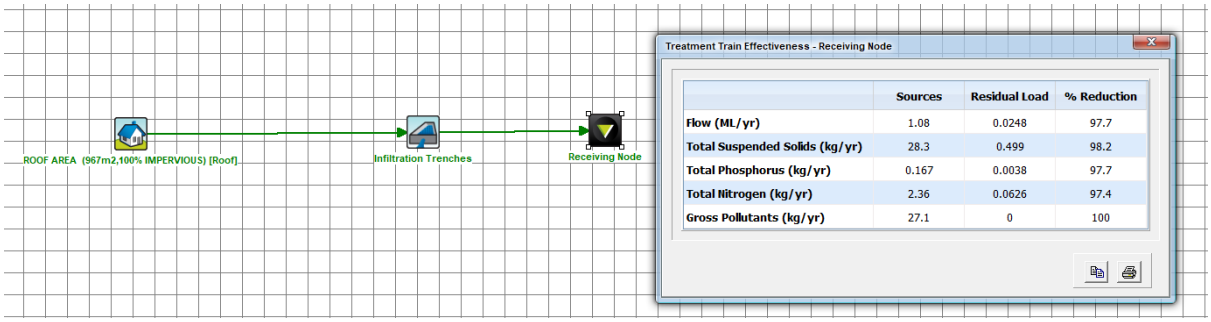


Figure 5: MUSIC Model Treatment Train

4.4 Soil and Water Management (Erosion and Sediment Control)

Erosion and sediment control measures will be provided during construction in accordance with the *Blue Book (Managing Urban Stormwater – Soils and Construction 4th Edition)*. Measures to be provided include:

- Silt fences on the low side of the site.
- Construction entry/exit.
- Silt traps at Council pits.

5. Overland Flow Flooding

The recent council flood map indicated that the site was not located within the flood planning area. The figure 6 below shows the location of the site with reference to the council flood planning area.

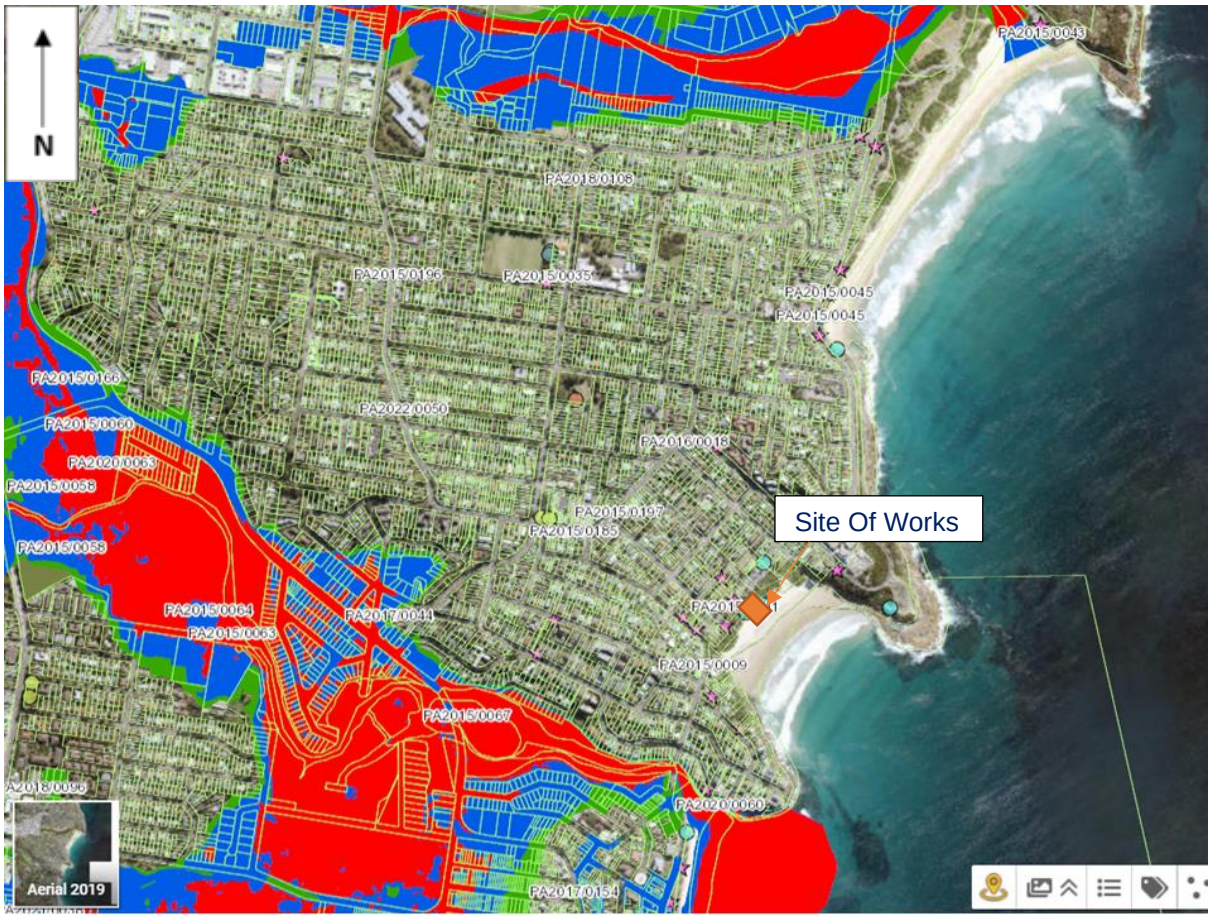


Figure 6: Flood Planning Map

Woolacotts conducted an analysis on the existing drainage network to determine the local overland flooding issues. The extent of the existing drainage network is shown in Figure 7 below.

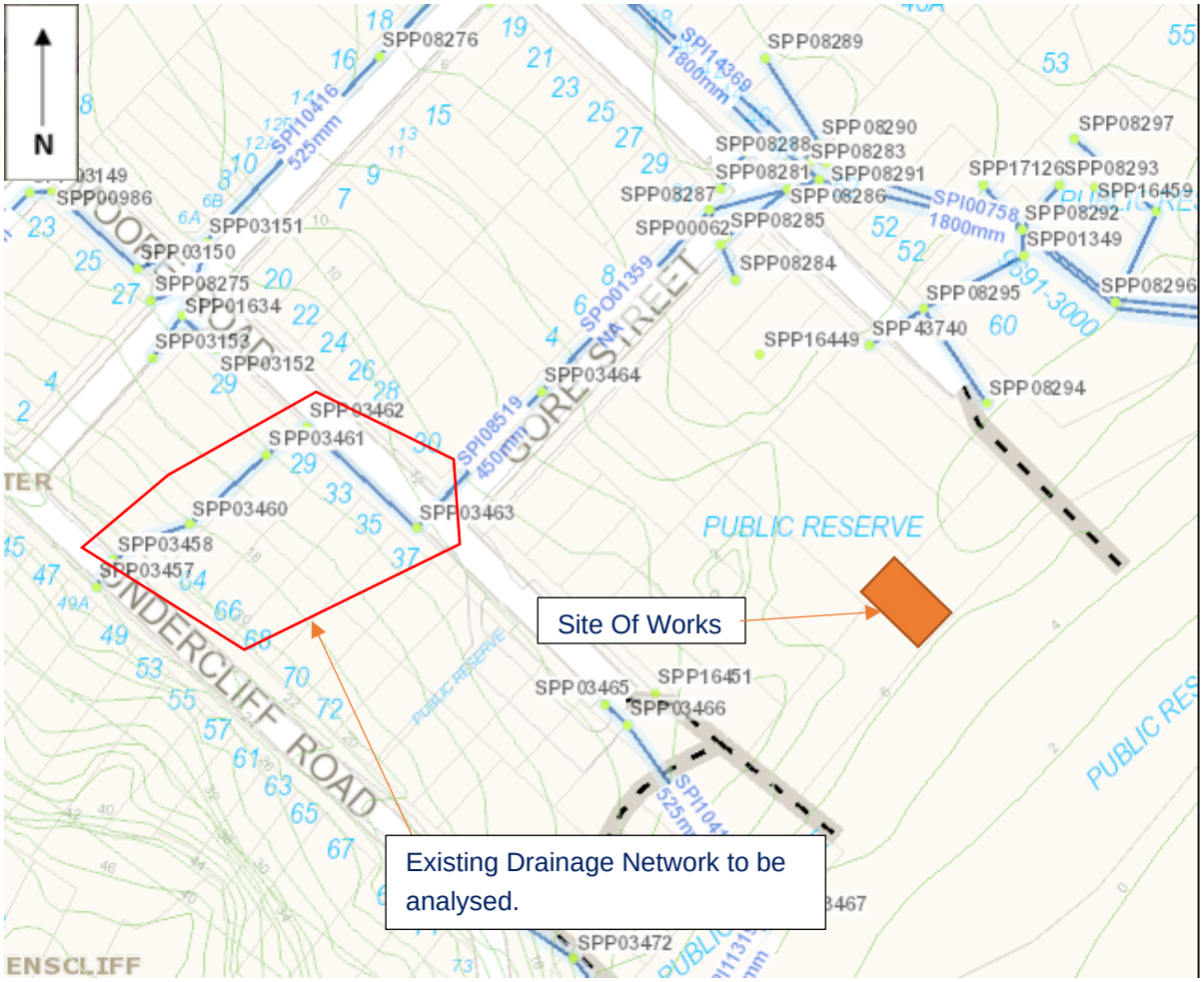


Figure 7: Existing Drainage Networks

Based on aerial map and 1m interval contour ASC files obtained from ELVIS NSW, the existing drainage network can cater for 1.83ha upstream catchment which is mostly covered by impervious area (approximately 70% of the catchment area).

Figure 8: Upstream Catchment

DRAINS software was employed to analyse the pipe flow and overflow route of the existing drainage network. The pit blockage factor of 0.5 or 50% blockage was adopted in the calculations. The other input parameters are listed in the table below.

Impervious Area Initial Loss (mm)	0
Impervious Area Continuing Loss (mm)	0
Pervious Area Initial Loss (mm)	28
Pervious Area Continuing Loss (mm)	0.64

Table 1 Initial Loss and Continuing Loss

The catchment peak flow during the 1% AEP was 0.951m3/s which is larger than the capacity of the existing 450mm pipe going through Gore Street and being connected to another drainage system in Kooloora Avenue. The excessive water will form an overland flow path through Gore Street and the flow is approximately 0.536m3/s. The overland flow will inundate Gore street and the ponding depth is approximately 0.18m which is 30mm higher than the kerb -see Figure 9

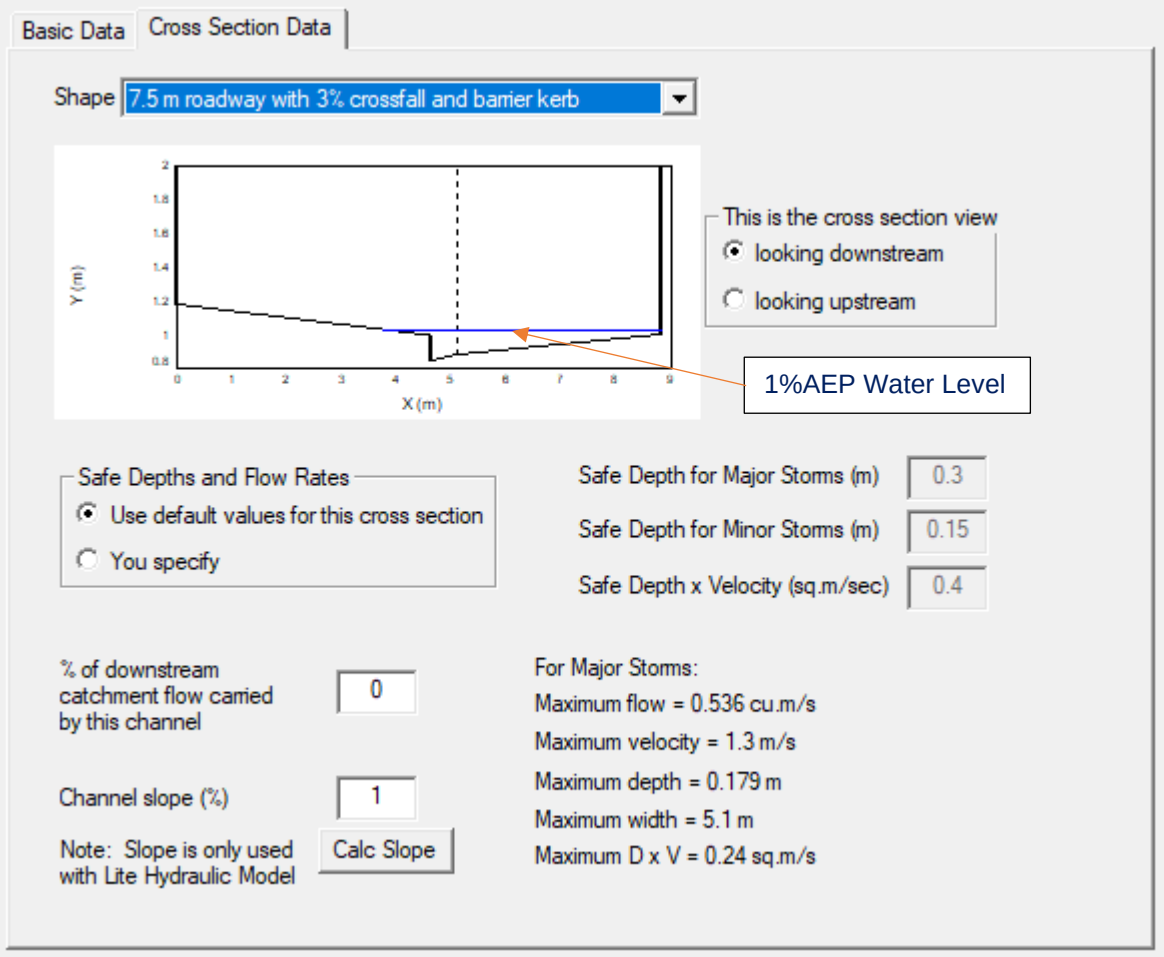


Figure 9: Street Cross Section Profile

There is an existing mound located to West of the site and is approximately 2m height. The mound will prevent the excessive flood water from entering the property. Therefore, the property is not impacted by the local overland flow path during the 1% AEP Storm events.

Figure 10: Existing Mount

6. Risk associated with Landslide

Water runoff generated from the development is channelled to the infiltration trench which is designed to cater for any storm event up to and including 2% AEP storm events. The infiltration trench is located at the downstream end of the development. Therefore, in our opinion, the risk associated with landslide due to water runoff derived from the development is insignificant and the development will not impact / affect the existing subsurface flow conditions.

7. Conclusion

The proposed stormwater management measures for The Site include a pipe network and an infiltration trench. The system is designed to cater for roof runoff during 2% AEP storm events.

The site is not located within the council flood planning area and is not affected by overland flooding. Soil and water management measures will be provided in accordance with the “Blue Book”.

In our opinion, the risk associated with landslide due to water runoff derived from the development is insignificant and the development will not impact / affect the existing subsurface flow conditions.

Appendix A: Calculations for Infiltration Tanks/Trenches

INFILTRATION SIZING

Project	Location
20230025	Freshwater Surf Life Saving Club

Area (m^2)	967.0
Design infiltration rate (mm/hr)	270
$L/m^2/s$	0.0750
C	0.90

Safety factor	1	Nominal Absorption rate (mm/hr) (ARd)	0.0750
Void Ratio	0.20	Infiltration Surface (m^2) (IS)	210.0

Rainfall Intensity Table (1:50year ARI)

Duration (min) (T)	Duration (sec)	Intensity (mm/hr) (I)	CxIxTxA Runoff volume (m^3)	CxIxA/3600 Runoff (L/s) (R)	ISxARdxTx60/1000 Infiltration Volume (m^3) (IV)	Vs (m^3) Difference
5	300	237	17.19	57.29	4.725	12.46
10	600	193	27.99	46.66	9.450	18.54
15	900	162	35.25	39.16	14.175	21.07
20	1200	139	40.32	33.60	18.900	21.42
25	1500	122	44.24	29.49	23.625	20.62
30	1800	109	47.43	26.35	28.350	19.08
45	2700	84	54.63	20.23	42.525	12.11
60	3600	69	59.79	16.61	56.700	3.09
90	5400	52	67.75	12.55	85.050	-17.30
120	7200	43	74.15	10.30	113.400	-39.25
180	10800	33	84.85	7.86	170.100	-85.25
270	16200	25	98.69	6.09	255.150	-156.46
360	21600	21	111.22	5.15	340.200	-228.98
540	32400	17	133.16	4.11	510.300	-377.14
720	43200	15	152.48	3.53	680.400	-527.92
1080	64800	12	184.85	2.85	1020.600	-835.75
1440	86400	10	210.96	2.44	1360.800	-1149.84
1800	108000	9	234.46	2.17	1701.000	-1466.54
2160	129600	8	253.78	1.96	2041.200	-1787.42
2880	172800	7	284.48	1.65	2721.600	-2437.12
4320	259200	5	323.96	1.25	4082.400	-3758.44
5760	345600	4	345.89	1.00	5443.200	-5097.31
7200	432000	3	357.17	0.83	6804.000	-6446.83
8640	518400	3	363.44	0.70	8164.800	-7801.36
10080	604800	2	364.06	0.60	9525.600	-9161.54

ABSORPTION TRENCH SYSTEM CALCULATIONS

No of pits	10	
Storage volume of each pit	0.35	m3
Total length of Jumbo pipes	12	m
Width of **each** trench	0.6	m
Total length of trenches	350	m
Total trench area	210	m2
Jumbo pipe diameter	0.41	m
Assumed void ratio of gravel backfill	20	%
Thickness of gravel layer above Jumbo	0.2	m
Thickness of gravel layer below Jumbo	0.25	m
Storage capacity of 410 jumbo pipes	1.58	m3
Volume of void in gravel layer above Jumbo	8.40	m3
Volume of void in gravel layer below Jumbo	10.50	m3
Total storage volume of pits	3.46	m3
TOTAL AVAILABLE STORAGE VOLUME	**23.94**	m3

Appendix B: Drawings

GENERAL NOTES

G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER CONSULTANTS DRAWINGS, SPECIFICATIONS AND AS1100 TECHNICAL DRAWING.

G2 ANY DISCREPANCIES SHALL BE REFERRED TO THE AUTHORISED PERSON FOR DECISION BEFORE PROCEEDING WITH THE WORK.

G3 DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.

G4 ANY SET OUT DIMENSIONS SHOWN ON THE DRAWING SHALL BE VERIFIED BY THE BUILDER.

G5 DURING CONSTRUCTION THE CONTRACTOR SHALL MAINTAIN THE WORKS IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED.

G6 ALL WORK SHALL COMPLY WITH THE BUILDING CODE OF AUSTRALIA, CONDITIONS OF THE DEVELOPMENT CONSENT AND RELEVANT AUSTRALIAN STANDARD CODES.

DRAINAGE NOTES

D1 ALL WORKS SHALL BE IN ACCORDANCE WITH AS3500.3

D2 FOR PIPE DIAMETERS NOT EXCEEDING 150mm, USE:
- VITRIFIED CLAY PIPE TO AS1741 OR
- SEWER GRADE UPVC TO AS1260 OR
- CLASS 2 FIBRE REINFORCED CONCRETE TO AS4139

D3 FOR PIPE DIAMETERS EXCEEDING 150mm, USE:
- CLASS 2 REINFORCED CONCRETE PIPE TO AS4058 OR
- CLASS 2 FIBRE REINFORCED CONCRETE PIPE TO AS4139

D4 PVC PIPES SHALL BE SOLVENT WELDED. ALL OTHER PIPES SHALL BE RUBBER RING JOINTED UNLESS NOTED OTHERWISE.

D5 UNLESS SPECIFIED OTHERWISE, BED & BACKFILL SHALL BE COMPACTED SAND TO 100mm ABOVE THE PIPE. REMAINDER OF BACKFILL SHALL BE COMPACTED EXCAVATED MATERIAL. WHEN UNDER VEHICULAR PAVEMENT, REMAINDER OF BACKFILL SHALL BE COMPACTED BASECOURSE.

D6 LOADS ON PIPES DURING CONSTRUCTION SHALL NOT EXCEED THE REQUIREMENT OF AS3725, OR THE RECOMMENDATIONS OF THE PIPE MANUFACTURER.

D7 TRENCH WIDTHS SHALL BE IN ACCORDANCE WITH AS3500, BUT NOMINALLY THE GREATER OF 1.5 PIPE DIAMETER OR PIPE DIAMETER PLUS 300.

EROSION CONTROL NOTES

E1 INSTALL SILT FENCES ON LOW SIDE OF SITE AND AS REQUIRED BY LOCAL COUNCIL PRIOR TO COMMENCEMENT OF TOPSOIL STRIPPING.

E2 INSTALL DRAINAGE SYSTEM AND SILT FENCES AROUND PITS AS SOON AS PRACTICABLE.

E3 REINSTATE GRASS COVER AS SOON AS PRACTICABLE.

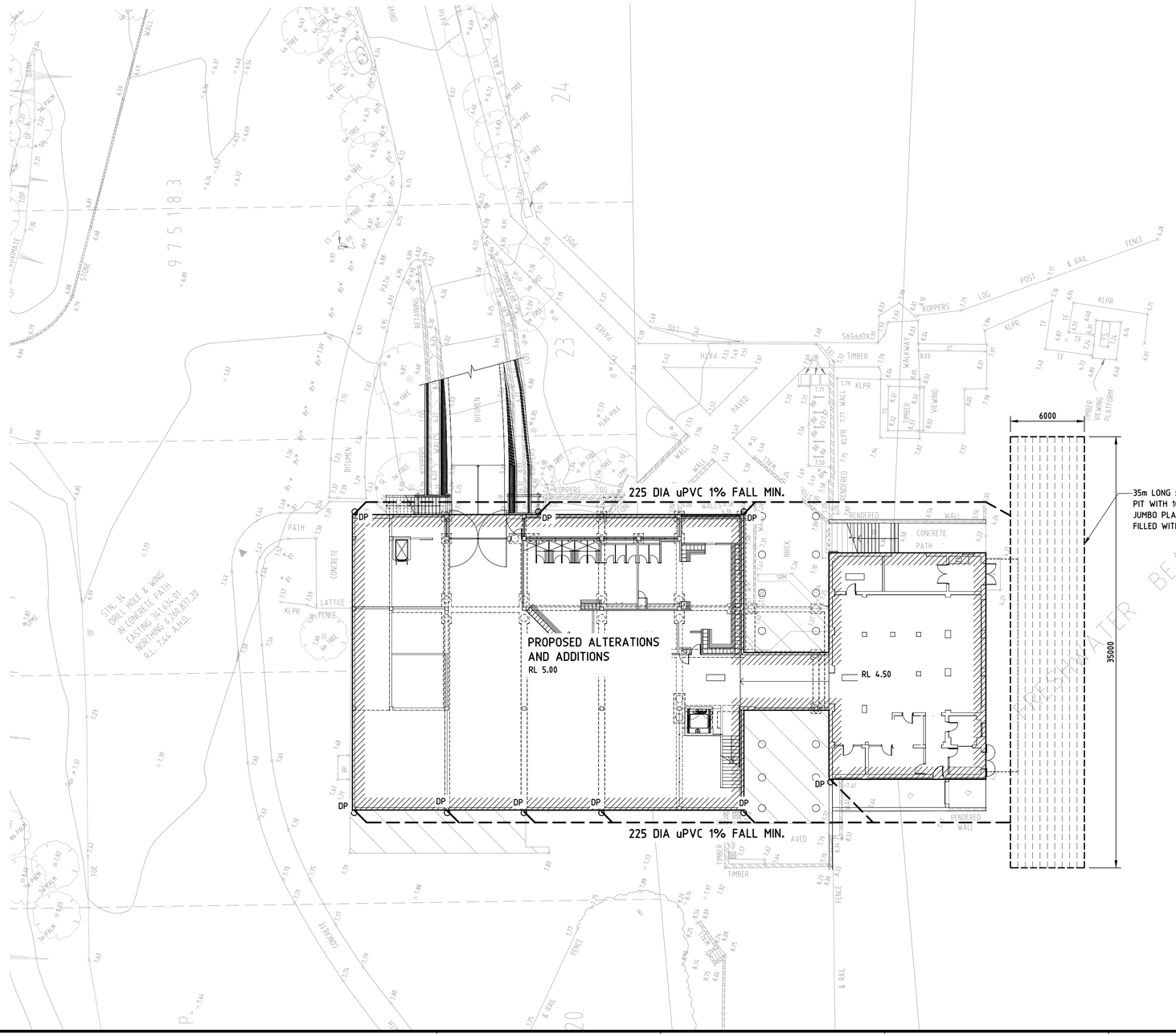
ABSORPTION TRENCH SYSTEM CALCULATIONS	
NO OF PITS	10
STORAGE VOLUME OF EACH PIT	0.35 m^3
TOTAL LENGTH OF JUMBO PIPES	12 m
WIDTH OF EACH TRENCH	0.6 m
TOTAL LENGTH OF TRENCHES	350 m
TOTAL TRENCH AREA	210 m^2
JUMBO PIPE DIAMETER	0.41 m
ASSUMED VOID RATIO OF GRAVEL BACKFILL	20 %
THICKNESS OF GRAVEL LAYER ABOVE JUMBO	0.2 m
THICKNESS OF GRAVEL LAYER BELOW JUMBO	0.25 m
STORAGE CAPACITY OF 410 JUMBO PIPES	1.58 m^3
VOLUME OF VOID IN GRAVEL LAYER ABOVE JUMBO	8.40 m^3
VOLUME OF VOID IN GRAVEL LAYER BELOW JUMBO	10.50 m^3
TOTAL STORAGE VOLUME OF PITS	3.46 m^3
TOTAL AVAILABLE STORAGE VOLUME	23.94 m^3

LEGEND

— — — NEW STORMWATER PIPE

○DP NEW DOWNPIPE

NOTE:
- ALL PIPES ARE 150 DIA uPVC UNLESS NOTED OTHERWISE.
- THE INFILTRATION TRENCHES ARE DESIGNED TO CATER FOR NEW ROOF ONLY.



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ALTERATIONS AND ADDITIONS
FRESHWATER SURF LIFE SAVING CLUB

STORMWATER MANAGEMENT PLAN AND NOTES

Date	Approved	Verified	Prepared
FEBRUARY 2023			
Scale @ A1: 1:200			
Job number: 23-25	Drawing number: SW1		Amendment: P1