Stormwater Assessment

Carrington Square
21-23 Victoria Avenue, Castle Hill

Prepared for Spotlight Property Group / 27 July 2023

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Taylor Thomson Whitting (NSW) Pty Ltd (ACN 113 578 377)
as trustee for the Taylor Thomson Whitting NSW Trust
(ABN 59 514 956 558) I Consulting Engineers
Level 3, 48 Chandos Street, St Leonards NSW 2065

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Contents

1.0 Introduction

Taylor Thomson Whitting Pty. Ltd. (TTW) has been engaged by Spotlight Property Group to prepare a Stormwater Assessment Report for the proposed mixed use commercial development at 21 – 23 Victoria Avenue, Castle Hill in support of a planning proposal application to Hills Shire Council.

1.1 Site

The site is located south of the Showground Road and bordered by Victoria Avenue to the west, Salisbury Road to the north and Carrington Road to the south as shown in Figure 1. The project is within the Hills Shire Local Government Area (LGA).

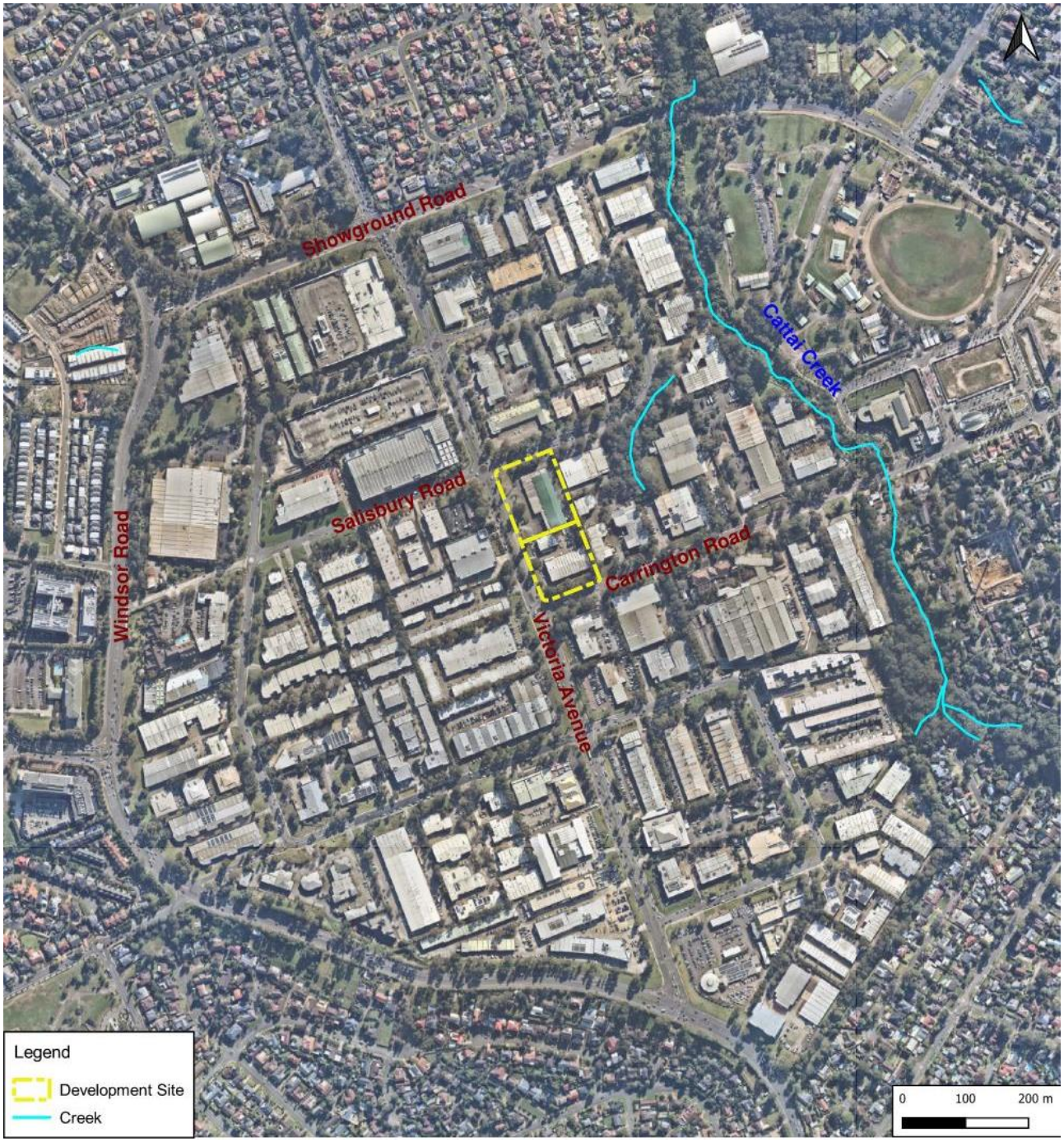

Figure 1: Site Location Plan

1.2 Reference Documents

- The Hills Shire Council Design Guidelines 2011
- The Hills Development Control Plan (DCP) 2012
- Architectural Drawings prepared by Bates Smart Pty Ltd. October 2020
- Survey by LTS, Ref 5120002DT February 2022
- Upper Parramatta River Catchment Trust (UPRCT) on-site detention handbook

2.0 Proposed Works

Architectural plan prepared by BatesSmart (July 2023) indicate that the proposed is a multi-storey mixed-use commercial development including two building blocks linked by 20-25m wide linear park which provides pedestrian connectivity, overland flow, and outdoor amenity.

Northern block includes:

- Two lower ground level car parks on level B1 (RL83.4m) and level B2 (RL80.4m) with vehicle access through Victoria Avenue (entrance level of 86.26m) as well as through Salisbury Road (entrance level of 87.7m).
- Retails on level 00 (RL 86.4) and level 01 (RL 91.4) including loading a dock on level 00.
- a proposed childcare on level 01.
- Upper ground car parks (levels 02 to 06).

Southern block includes:

- Two lower ground level car parks on level B1 (RL79.7m) and level B2 (RL82.7m) with vehicle access through Carrington Road.
- Retail and business premises on level 00 (RL88.5m & RL85.7).
- Upper level commercial / business spaces (levels 01 to 11).

The proposed ground floor (level 00), lower ground floor car park plans provided by Bates Smart as shown in Figure 2, Figure 3 and Figure 4 respectively.

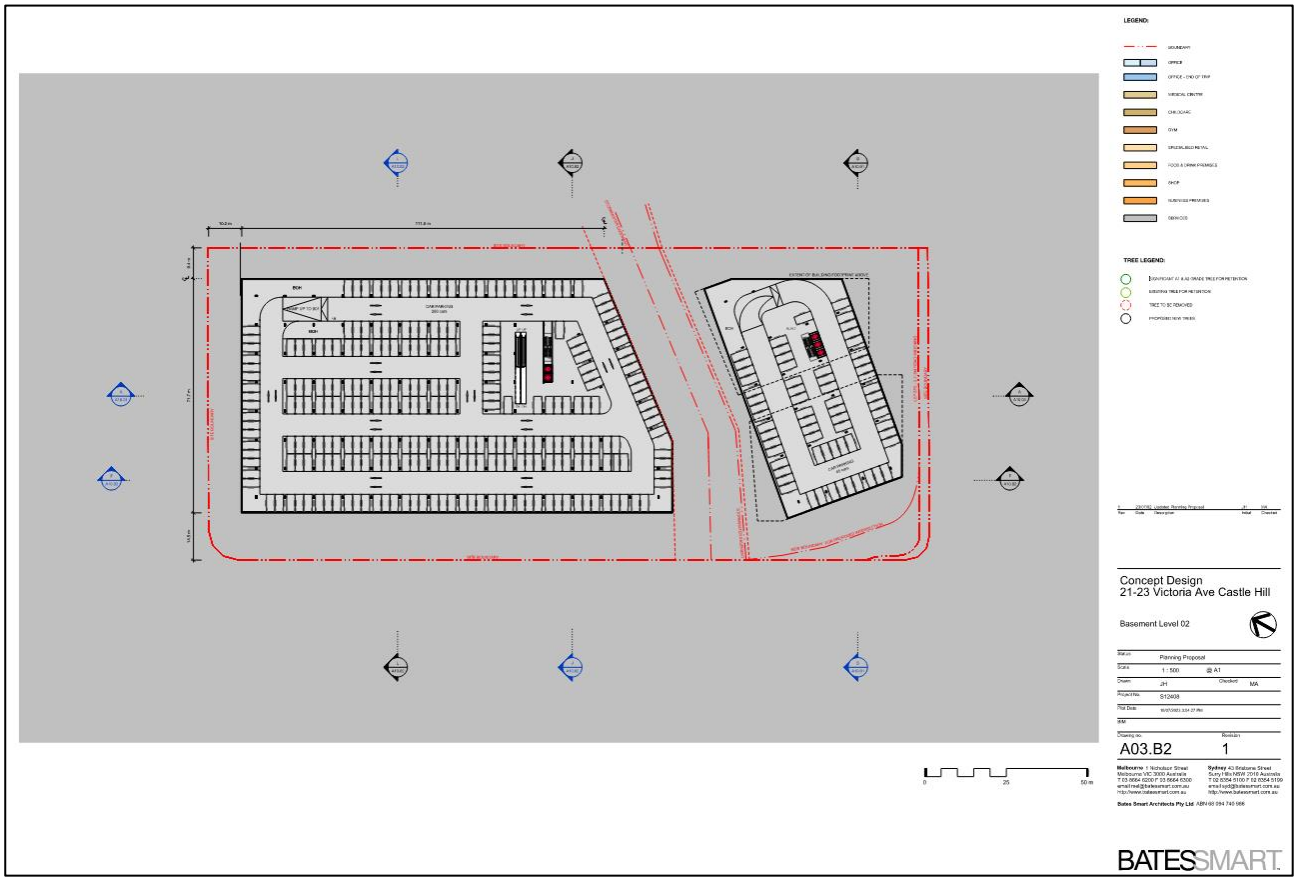

Figure 2 – Proposed Architectural Plan (Level B2)

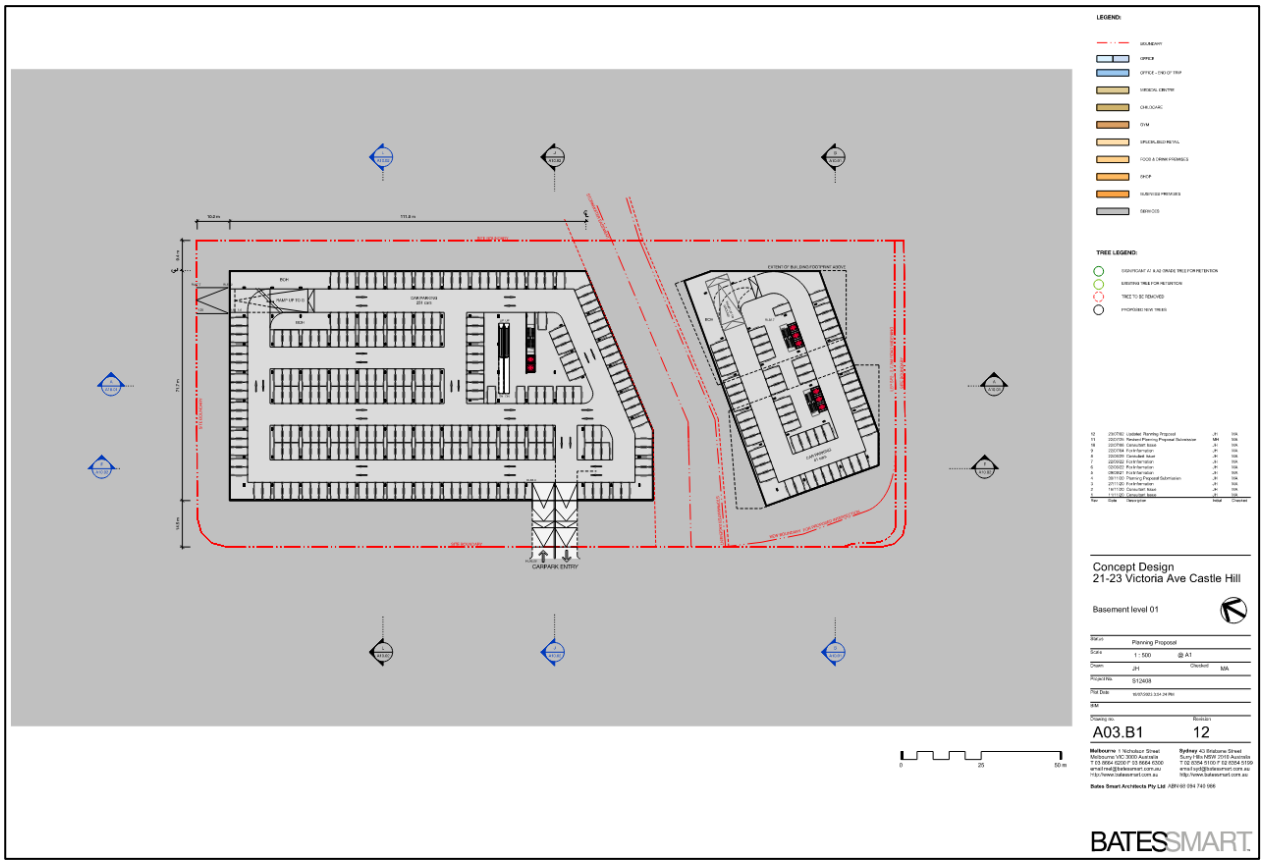

Figure 3 – Proposed Architectural Plan (Level B1)

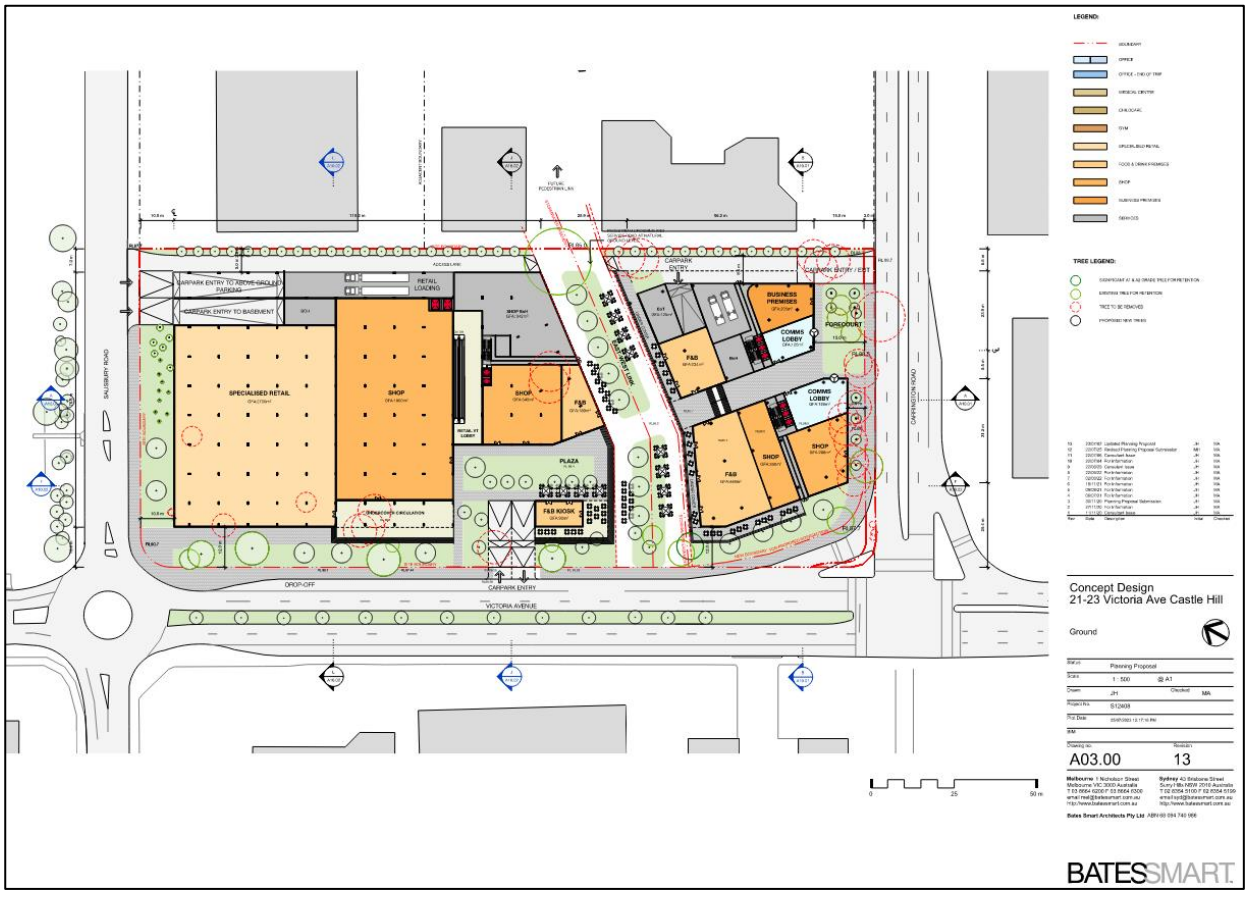

Figure 4 – Proposed Architectural Plan (Level 00)

3.0 Stormwater Quantity

3.1 Current Stormwater

The existing site is currently occupied by commercial buildings and is considered approximately 80% impervious. Current peak stormwater discharge from the site for the 5% AEP (20 year) storm event is 888 l/s and for the 1% AEP (100 year) peak discharge is 1213 l/s.

There is an existing stormwater easement which conveys stormwater flow through twin 1.8m diameter pipes across the development site from the low point in Victoria Ave towards Cattai Creek, approximately 450m to the east of the site. An overland flow path exists along this easement which conveys overland flow from Victoria Avenue to the east of the site, refer to separate Flood impact Assessment by TTW for further details.

3.2 Proposed Stormwater Design

On-site detention tank (OSD)

The proposed development includes approximately 11,430 m^2 of roof catchment, 2,500 m^2 of landscape area and 7,118 m^2 paved area. The development proposal increases the impermeable area to nearly 90% of the development area. The increase in impervious area potentially increases the peak discharge for the 5% AEP storm event (20 year) to 911 l/s and the 1% AEP (100 year) event to 1245 l/s.

The site is in the Hawkesbury River catchment and on-site tank detention is required in accordance with Council's DCP and design guidelines. It is unknown if there is existing OSD within the site.

Two on site detention tanks have been proposed to capture the site runoff and have been designed in accordance with the Upper Parramatta River Catchment Trust (UPRCT) on-site detention handbook and spreadsheet provided by Council's engineer Rashad Abboud in September 2020 as shown in Appendix A.

OSD Tank 1 (South):

The total OSD storage volume will be 290m^3 and the tank will have an orifice of 132mm and include a high early discharge chamber. The designed peak discharge for the OSD is:

- 48 l/s during 5% AEP (20 year) event
- 55 l/s during a 1% AEP (100 year) event

The OSD has been designed to capture runoff from the catchment south of the existing easement. The OSD tank will be located under the lower ground level and connect to the existing easement as shown in Figure 5. The peak water level during the 1% AEP (100 year) event will be 84.84m which is higher that the HGL of the existing pipes in the easement at the connection point (84.20m).

OSD Tank 2 (North):

The OSD has been designed to capture the runoff from the catchment north of the existing easement. The total OSD storage volume will be 630m^3 and the OSD tank will have an orifice of 195mm and include a high early discharge chamber. The designed peak discharge for the OSD is:

- 105 l/s during 5% AEP (20 year) event
- 116 l/s during 1% AEP (100 year) event

The OSD tank will be located under the lower ground level and connect to the existing easement as

shown in Figure 5. The peak water level during the 1% AEP (100 year) event will be 84.84m which is higher that the HGL of the existing pipes in the easement at the connection point (84.20m).

The on-site detention tanks and outlet controls reduce the total peak flow from the site as followings:

- 153 l/s during 5% AEP (20 year) event, 83% less than the existing state (888 l/s).
- 171 l/s during a 1% AEP (100 year) event, 86% less than the existing state (1213 l/s).

The total peak flow during a 1% AEP (100 year) event is 171l/s which is less than the site permissible site discharge (PSD) of 184l/s.

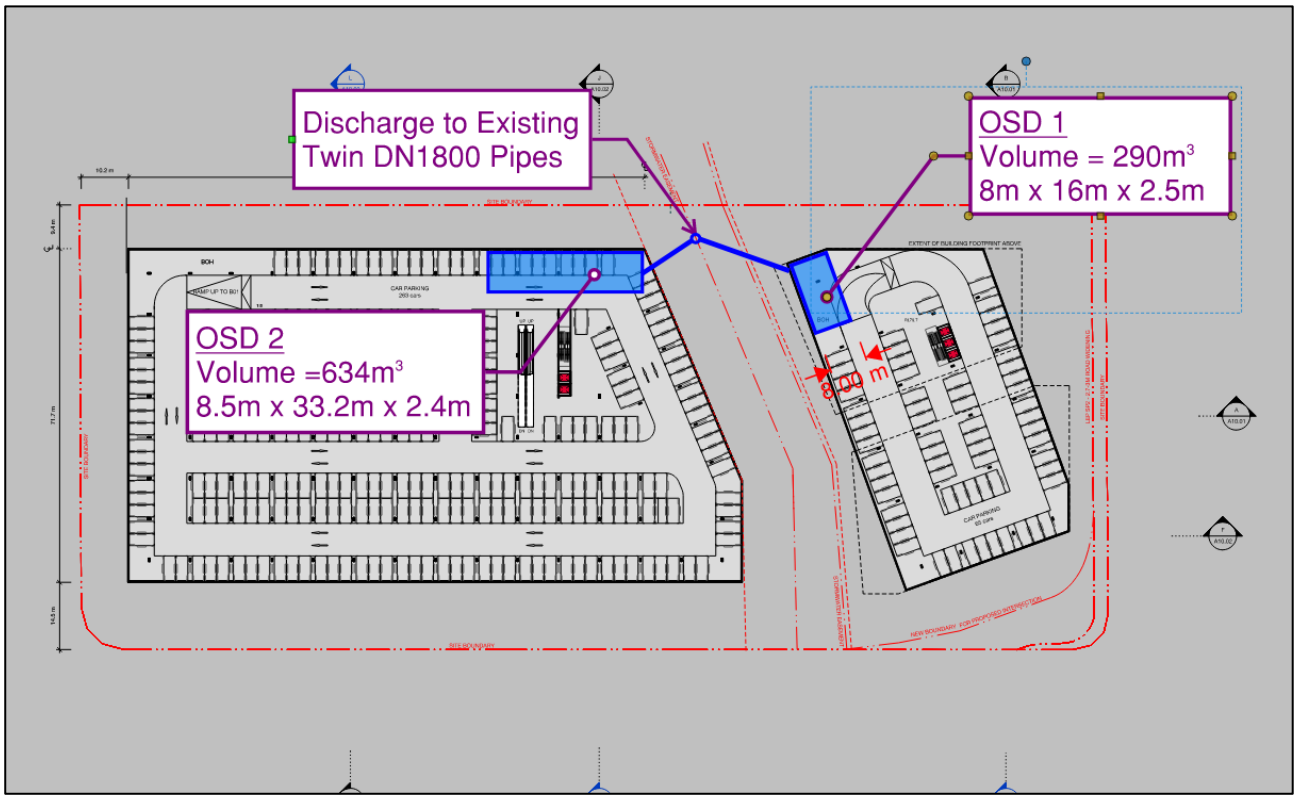

Figure 5: Proposed on-site detention tank locations at lower ground floor level.

Rainwater tank:

The Hills Shire Council Design Guidelines states that “All proposals are to incorporate WSUD measures”. The document refers to Water Sensitive Urban Design Technical Guidelines for Western Sydney (NSW Government Stormwater Trust and UPRCT, May 2004) for the requirements of WSUD measures.

WSUD infrastructure recommended for implementation includes the rainwater tank along with the water quality treatment devices as discussed in section 4.0.

To allow the re-use of the collected rainwater, it is recommended the use of rainwater tank at the proposed development which will help reduce the use of potable water and help achieve Green Star requirements.

Overland flow path

In accordance with the TTW Flood Impact Assessment, December 2020, the existing overland flow path through the site is to be maintained within the proposed link park as shown in Figure 6.

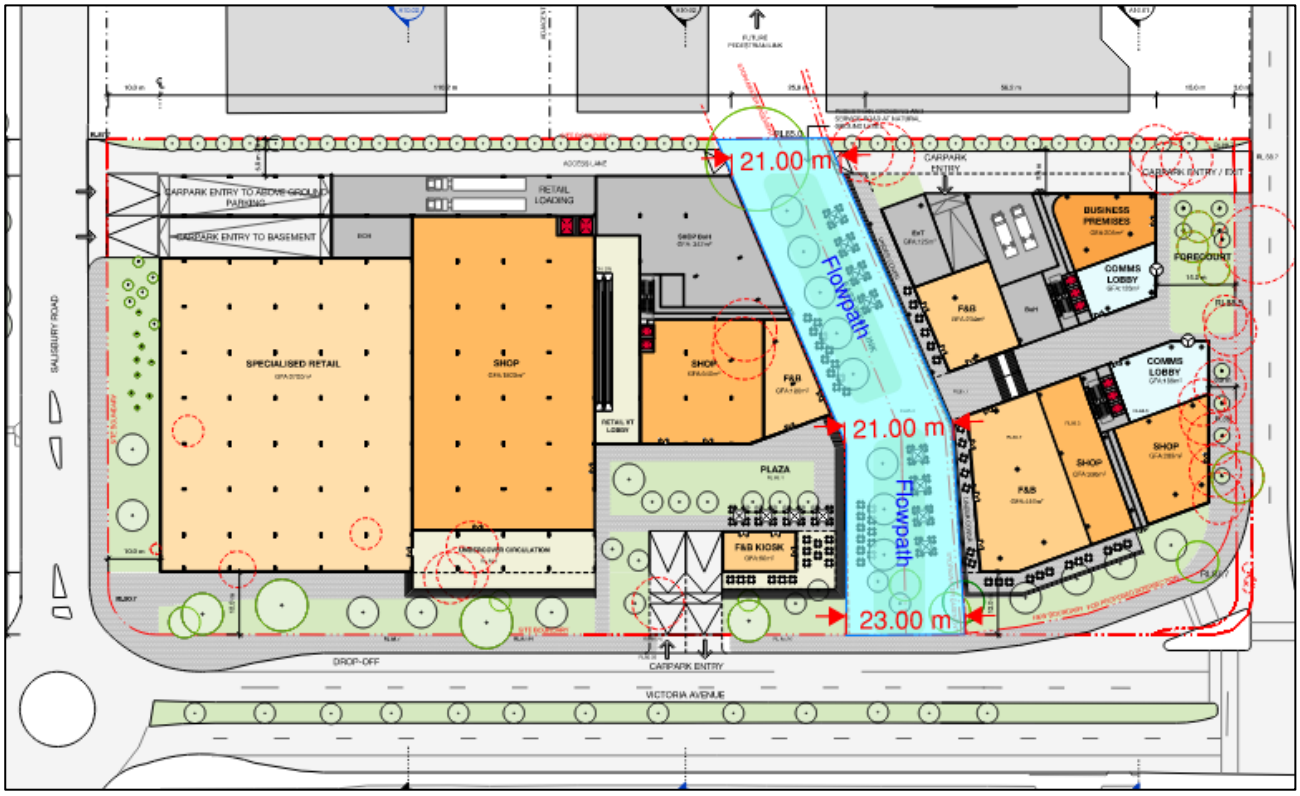

Figure 6. Proposed Overland Flow Path

4.0 Stormwater Quality Control

The water quality performance objectives with reference to Table 3 of the Showground Station DCP are summarised in the Table 1 below:

POLLUTANT	AVERAGE ANNUAL POLLUTANT LOAD REDUCTION OBJECTIVE (%)
Gross pollutants (>5mm)	90
Total suspended solids	85
Total Phosphorus	65
Total Nitrogen	45

Table 1 Stormwater Quality Targets (Extract from Showground Precinct DCP, Table 3)

5.0 Proposed Treatment Train

The proposed catchments north and south of the existing easement have been modelled in MUSIC to demonstrate that the proposed stormwater treatment devices achieve the required stormwater treatment targets.

5.1 Water treatment devices for the northern catchment

The stormwater treatment train includes the following (schematic shown in Figure 7):

- 4x Ocean protect Enviropod (or equivalent)
- 22x 690mm Psorb Ocean protect Stormfilter (or equivalent) within a stormfilter chamber

5.2 Water treatment devices for the southern catchment

The stormwater treatment train includes the following (schematic shown in Figure 8):

- 2x OceanGuard (or equivalent)
- 12x 690mm Psorb Ocean protect Stormfilter (or equivalent) within a stormfilter chamber.

The MUSIC modelling of the proposed treatment train is shown in Figure 7 with results as detailed in table 2.

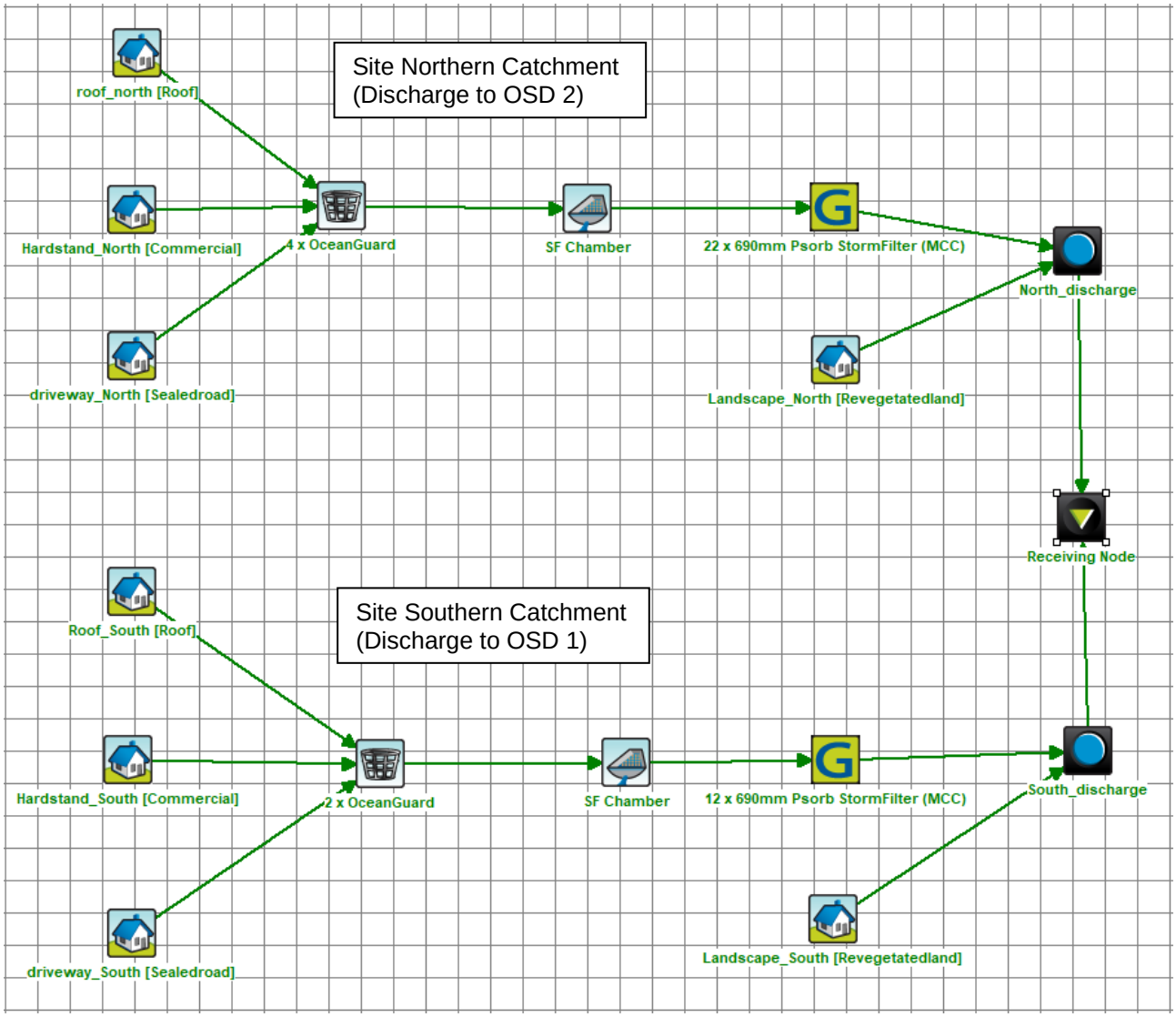

Figure 7: Proposed Stormwater treatment Train

	Sources	Residual Load	% Reduction
Flow (ML/yr)	14.70	14.70	0.00
Total Suspended Solids (kg/yr)	1,140.00	167.00	85.30
Total Phosphorus (kg/yr)	2.90	0.83	71.60
Total Nitrogen (kg/yr)	29.50	14.30	51.40
Gross Pollutants (kg/yr)	386.00	0.00	100.00

Table 2: Water Quality Treatment Train Effectiveness

6.0 Construction Phase Stormwater Management

Construction works to be carried out in accordance with the "Blue Book" erosion and sediment control requirements. The exact controls will vary depending on construction methodology and timing, but will typically consist of:

- Sediment fences;
- A sediment basin;
- Sediment trap;
- Vehicle shaker grid and wash down; and
- Sand bags surrounding existing pits.

7.0 Conclusion and Recommendations

The following conclusion and recommendations are made:

- Two on-site detention tanks with storage volumes of 290m^3 and 630m^3 are required.
- Stormwater quality improvement objectives are achievable through the proposed stormwater treatment train consisting of:
  - 6 x OceanGuard (or equivalent)
  - 34 x 690mm Psorb Ocean protect Stormfilters (or equivalent) within two stormfilter chambers.

Prepared by
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST

ALI ATTAR
Senior Civil Engineer

Authorised By
TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
TAYLOR THOMSON WHITTING NSW TRUST

Stephen Brain
Technical Director

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Appendix A

OSD 1 Calculation (South)

HAWKESBURY RIVER CATCHMENT
COUNCIL O.S.D. CHECK SHEET

Site Address	= 21-23 Victoria Ave							
File No.	= 191928						Drowned Condition	
Site Area	.....	=	0.6636	Ha	[A]		0.6636	Ha
Site Slope	.....	=	2	%	[A1]		2	%
Site Storage Volume	= See Chart	=	412	m3/Ha	[A2]		412	m3/Ha
Permissable Discharge	= See Chart	=	87	l/s/Ha	[A3]		87	l/s/Ha
Basic Storage Volume	= [A2] x [A]	=	273.4	m3	[B]		273.4	m3
Basic Discharge	= [A3] x [A]	=	57.7	l/s	[C]		57.7	l/s
Area of Site Drained to Storage	.....	=	0.6636	Ha	[D]		0.6636	Ha
% of Total Site	= [D] / [A] x 100	=	100	%	[E]		100	%
Storage Per Ha.	= [B] / [D]	=	412.0	m3/Ha	[F]		412.0	m3/Ha
Permissable Discharge	= {([F] / 69.21)^ (-1.368)} x 1000	=	87.0	l/s/Ha	[G]		87.0	l/s/Ha
P.S.D.	= [G] x [D]	=	57.7	l/s	[H]		57.7	l/s
Maximum Head to Orifice Centre	.....	=	2.350	m	[K]		2.350	m
Selected Orifice Dia.	= {(0.464x[H]/1000)^0.5/[K]^0.5}x1000	=	132	mm	[J]		132	mm
Maximum Discharge	= [H]	=	57.8	l/s	[L]		57.8	l/s
Head for High Early Discharge	.....	=	1.700	m	[M]		1.700	m
High Early Discharge	= {[L] x ([M]/[K])^0.5}	=	49.1	l/s	[N]		49.1	l/s
Approx. Ave. Discharge	= {([L] + [N]) / 2}	=	53.5	l/s	[P]		53.5	l/s
Ave. Discharge per Ha.	= [P] / [D]	=	80.6	l/s/Ha	[Q]		80.6	l/s/Ha
Storage Volume	= 69.21 x ([Q] / 1000)^-0.731	=	436.3	m3/Ha	[R]		436.3	m3/Ha
Site Storage Volume	= [R] x [D]	=	**289.5**	m3	[S]		**289.5**	m3

Signature 09/12/20

OSD 2 Calculation (North)

HAWKESBURY RIVER CATCHMENT
COUNCIL O.S.D. CHECK SHEET

						Drowned Condition	
Site Address	= 21-23 Victoria Ave						
File No.	= 191928						
Site Area	..... =	1.4412	Ha	[A]		1.4412	Ha
Site Slope	..... =	2	%	[A1]		2	%
Site Storage Volume	= See Chart =	412	m3/Ha	[A2]		412	m3/Ha
Permissable Discharge	= See Chart =	87	l/s/Ha	[A3]		87	l/s/Ha
Basic Storage Volume	= [A2] x [A] =	593.8	m3	[B]		593.8	m3
Basic Discharge	= [A3] x [A] =	125.4	l/s	[C]		125.4	l/s
Area of Site Drained to Storage	..... =	1.4412	Ha	[D]		1.4412	Ha
% of Total Site	= [D] / [A] x 100 =	100	%	[E]		100	%
Storage Per Ha.	= [B] / [D] =	412.0	m3/Ha	[F]		412.0	m3/Ha
Permissable Discharge	= {([F] / 69.21)^ (-1.368)} x 1000 =	87.0	l/s/Ha	[G]		87.0	l/s/Ha
P.S.D.	= [G] x [D] =	125.4	l/s	[H]		125.4	l/s
Maximum Head to Orifice Centre	..... =	2.350	m	[K]		2.350	m
Selected Orifice Dia.	= {(0.464x[H]/1000)^0.5/[K]^0.5}x1000 =	195	mm	[J]		195	mm
Maximum Discharge	= [H] =	125.5	l/s	[L]		125.5	l/s
Head for High Early Discharge	..... =	1.700	m	[M]		1.700	m
High Early Discharge	= {[L] x ([M]/[K])^0.5} =	106.7	l/s	[N]		106.7	l/s
Approx. Ave. Discharge	= {([L] + [N]) / 2} =	116.1	l/s	[P]		116.1	l/s
Ave. Discharge per Ha.	= [P] / [D] =	80.6	l/s/Ha	[Q]		80.6	l/s/Ha
Storage Volume	= 69.21 x ([Q] / 1000)^-0.731 =	436.3	m3/Ha	[R]		436.3	m3/Ha
Site Storage Volume	= [R] x [D] =	**628.8**	m3	[S]		**628.8**	m3

Signature 26/10/20