669-683 Old South Head Road, Vaucluse

Stormwater Management Plan

Prepared For:	OSHR At Vaucluse Holdings Pty Ltd
Date:	December 2023
Prepared By:	I. Harris
Project Ref:	0333

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1 Introduction

Enscape studio have been commissioned by OSHR At Vaucluse Holdings Pty Ltd to prepare this Stormwater Management Report (SMR) in support of the Development Application for the proposed development at 669-683 Old South Head Road, Vaucluse.

This SMR outlines the conceptual DA level stormwater design for the proposed development on the site.

This SMR illustrates that the proposed development complies with the Waverley Council's DCP, Australian Rainfall and Runoff, Australian Standards and best engineering practise.

The purpose of this SMR is to evaluate the quantity and quality of stormwater associated with the proposed development plan so as to demonstrate to Council that an appropriate stormwater management strategy has been adopted.

The SMR specifically addresses the following items for both the construction and operational phases of the development:

- Stormwater runoff volumes and detention (Stormwater Quantity);
- Stormwater quality treatment measures (Stormwater Quality),
- Erosion and Sedimentation Control.

The following will be achieved with the correct application of this SMR:

- Appropriate standards to be maintained on all aspects of stormwater within the site,
- Pollution control to be maintained,
- Establishment of a unified, clear and concise stormwater management strategy.

2 Existing Site Characteristics

2.1 Property Detail

Address:	669-683 Old South Head Road, Vaucluse.
Total Site Area:	4,345.03m^2 (0.4345Ha)

The proposed development can be seen on the Bates Smart DA drawings for the project and the stormwater management drawings in Appendix A of this report.

The proposed development is situated within the Waverley Council LGA and will consist of a multistorey Seniors Living development with two levels of basement.

The site is bounded by:

- Old South Head Road to the west,
- Residential development to the north and east;
- Oceanview Avenue to the south.

Refer to locality plan in figure 1.

Figure 1: Site Location Plan (Source: Nearmaps 2023)

2.2 Topography

The southern section of the site general falls from south east to north west towards the Old South Head Road public road corridor. Falls are generally steep with an approximate fall of 2m from the back of the site to the front.

The northern portion of the site falls from west to east, draining to the rear of the properties. Across this section of the site falls range between 1.5m and 2m from the front boundary of the site to the rear.

2.3 Stormwater Catchments

Old South Head Road runs along the crest in topography between Rose Bay and the Ocean. As a result there are no upstream catchments impacting on the development site.

The catchments to the south of the site are collected by the council road drainage network and conveyed past the site in the Oceanview Avenue and Old South Head Road road carriageways.

Figure 2: Upstream Catchment Plan (Source: Mosaic 2023)

2.4 Existing Stormwater Discharge

Currently the buildings on the site discharge rainfall runoff to Old South Head Road via kerb connectors along the length of the street frontage.

The nearest in ground public drainage infrastructure is located across Old South Head Road north of the sites northern boundary outside 42 Old South Head Road.

Figure 3: Nearest Council Drainage (Source: Google Maps 2023)

3 Local Authority Requirements

The stormwater requirement of the subject site is governed by the Waverley Council Water Management Technical Manual – October 2021. A summary of the key requirements for the development of the Stormwater management system for this development are summarized below.

3.1 Stormwater Conveyance Requirements

Council's Engineering Guide for Development states that the following design storm Average Recurrence Intervals ARI's should be allowed for when designing the Stormwater runoff conveyance systems for the development.

Table 1: Stormwater Drainage Serviceability

Design Parameter	Design Storm AEP (%)	Conveyance Method
Minor Drainage System	5	In Ground (Piped)
Major Drainage System	1	Overland

3.2 On Site Detention Requirements

With reference to Waverley Council Water Management Technical Manual – October 2021:

- The permissible site discharge (PSD) is limited to the maximum discharge from the site during the 20% AEP for a 5 minute storm event under the undeveloped site conditions.

Further discussion on the On Site Detention design for the site is included in Section 5.0 of this report.

3.3 Stormwater Quality Treatment

With reference to Waverley Council Water Management Technical Manual – October 2021:

Water quality measures are installed that meet the following environmental targets for stormwater runoff leaving the site:

- 90% removal of gross pollutants (> 5mm);
- 85% removal of total suspended solids;
- 55% removal of total phosphorous; and
- 40% removal of total nitrogen.

Further discussion on the Water Quality Treatment design for the site is included in Section 6.0 of this report.

4 Stormwater Conveyance

This section of the report discusses the systems proposed to allow for stormwater to be conveyed across the site to the legal point of discharge.

As discussed in Section 3.1 of this report Council have set minimum design parameters for the flows they require to be conveyed through the in ground drainage system and what they will allow to be conveyed in a controlled manner overland across the site.

4.1 Surface Drainage

The surface areas will be drained through a variety of methods, discussed below, in accordance with AS3500.3:2015 and Council's stormwater drainage guidelines.

4.1.1 In-Ground Drainage

The in-ground drainage has been designed to meet the following criteria:

- In the minor design storm event (5% AEP) there will be no surcharging of the in ground drainage system and;
- In the major design storm event (1% AEP) there will be no uncontrolled discharge from the site onto the residential properties to the east of the site.

Surface runoff from the development sites will be directed to stormwater inlet structures using the design topography of these elements. The inlet structures have been designed to adequately convey the surface runoff into the in ground drainage network.

The runoff will then be conveyed underground across the site through a pit and pipe system and then to the legal point of discharge using gravity and the geometric falls of the pipe system.

4.2 Legal Point of Discharge

It is proposed that a mains extension will be constructed running from the sites north western boundary to the existing council drainage network on the opposite side of Old South Head Road outside 42 Old South Head Road. The connection will be made directly into the existing council drainage pit.

Further details on the proposed connection can be seen in the stormwater management drawings included in Appendix A of this report.

5 Stormwater Attenuation

As discussed in Section 3.2 of this report, council's technical manual states that the permissible site discharge (PSD) is limited to the maximum discharge from the site during the 20% AEP for a 5 minute storm event under the undeveloped site conditions.

The site is currently developed with 60% impermeable area and calculations undertaken using DRAINS hydraulic modelling software confirms that the Permissible Site Discharge rate for the site is 112L/s.

The proposed development will increase the impermeable catchment for the development to 82% of the total site area. Table 2 below summarises the unattenuated discharge flows following development.

It is proposed that the runoff from the development will be attenuated for all design storm events up to and including the 1% AEP storms. The peak discharge rate for all events will be attenuated back to 112L/s.

Table 2: On Site Detention Results

Design Storm AEP (%)	Post Development Unattenuated Flow (L/s)	Post Development Attenuated Flow (L/s)
20%	153	66
1%	206	111

Modelling indicates that a total on site detention volume of 110.20m³ is required to attenuate the flows back to the Permissible Site Discharge rate.

It is proposed that this volume will be provided via two tanks on the site, one below the port cochere and one below the basement driveway. Both tanks combined will provide 120.60m³ of stormwater detention storage.

The discharge rates from the detention tanks will be controlled via the construction of orifice plates on each of the tanks.

The modelled outcome of the provision of the storage is summarised in Table 2 above. This clearly identifies that the requirement set by council can be met by the provision of the on site stormwater detention as indicated in the stormwater management drawings included in Appendix A of this report.

The overflow weirs in the tanks have been set to ensure that they will overtop before there is any surcharge in the pits within the site including the sunken courtyards. This has been modelled in the DRAINS model prepared for the project. The modelling indicates that during 100 year storm there will be 320mm freeboard from the water level in the pit to the internal building floor level.

6 Stormwater Quality

This section of the report demonstrates the Stormwater Quality Improvement Devices (SQID's) to be implemented to reduce the flow of pollutants from the site.

6.1 Potential Pollutants

There are a wide range of potential stormwater pollutant sources which occur from urbanised catchments, many which can be managed through appropriate stormwater quality treatment. Typical urban pollutants may include:

- Atmospheric deposition
- Erosion (including that from subdivision and building activities)
- Litter and debris
- Traffic emissions and vehicle wear
- Animal droppings
- Pesticides and fertilisers
- Application, storage and wash-off of car oil, detergents and other household and commercial solvents and chemicals
- Solids accumulation and growth in stormwater systems
- Weathering of buildings

These pollutants in urban stormwater can be placed into various categories as follows. The pollutants underlined below are able to be readily modelled:

- Suspended Solids
- Litter
- Nutrients such as Nitrogen and Phosphorous
- Biological oxygen demand (BOD) and chemical oxygen demand (COD) materials
- Micro-organisms
- Toxic organics
- Trace metals
- Oils and surfactants

While only the key pollutants underlined above will be examined within the modelling, the stormwater Quality Improvement Devices implemented are expected to assist in reducing a wide range of pollutants. For example, heavy metals are commonly associated with, and bound to fine sediments. Thus reducing the discharge of fine sediment during the construction and operational phases will reduce the discharge of heavy metals to existing stormwater systems.

6.2 Pollutant Reduction System

In order to reduce the pollutants a series of treatment devices are proposed, which together, form a treatment train. The diagram below shows the proposed treatment train for this development.

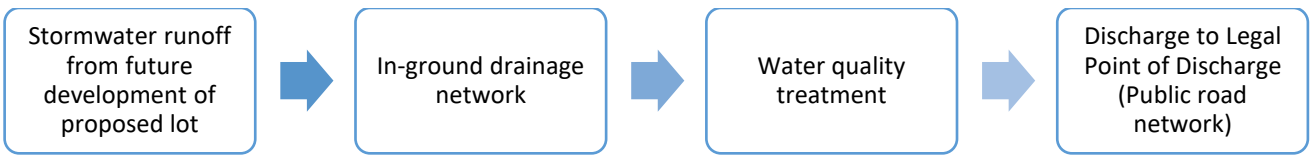

Figure 4: Proposed Water Quality Treatment Train

Further discussion on each element of this treatment train is provided below.

6.2.1 Pollutant Reduction Results

A number of management measures have been considered with a focus on reducing polluted runoff volumes from the site. The WSUD principals proposed for stormwater treatment includes:

- 25 x690mm Psorb Stormfilter Cartridges;
- 1 x Oceanguard Sack and
- 1 x 10kL Rainwater Tank with irrigation reuse

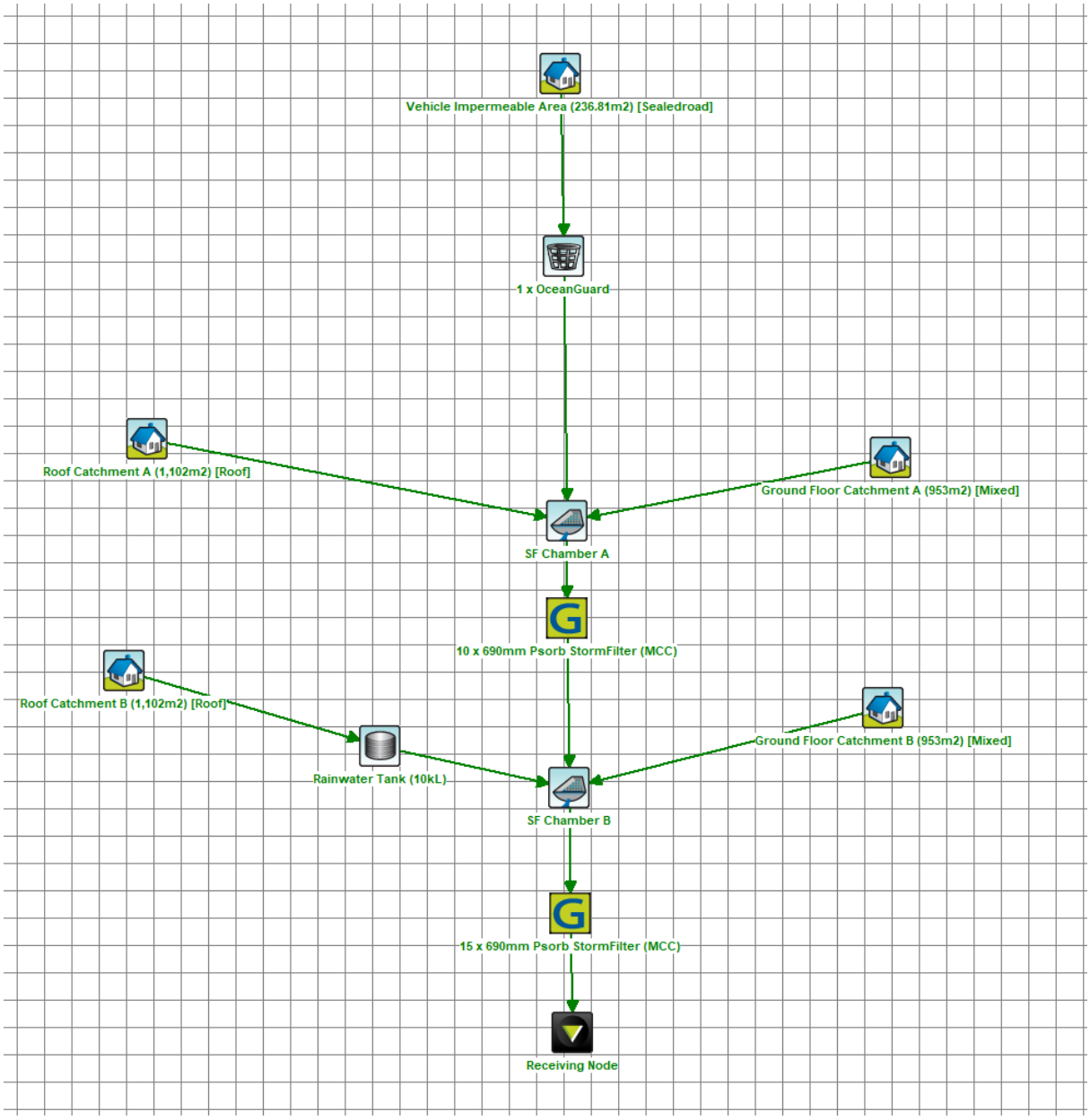

Figure 5 MUSIC Model

MUSIC Output

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.35	5.13	4.1
Total Suspended Solids (kg/yr)	590	79.6	86.5
Total Phosphorus (kg/yr)	1.49	0.268	82
Total Nitrogen (kg/yr)	13.1	4.98	61.9
Gross Pollutants (kg/yr)	132	0	100

Figure 6 MUSIC Results

The effectiveness of the treatment device proposed in the above section has been modelled using MUSIC with the overall treatment train efficiency results shown in Table 7 below.

Table 3: Treatment Train Efficiencies

Indicator	Total Site Reduction	Site Targets	Target Achieved
Gross Pollutants	100	90%	Yes
Total Suspended Solids (TSS)	86.5	85%	Yes
Total Phosphorus (TP)	82	55%	Yes
Total Nitrogen (TN)	61.9	40%	Yes

From the results presented above it can be seen that the proposed SQID's mean that the stormwater quality treatment meets with the reduction targets set for the development.

7 Erosion & Sedimentation Control

Landcom have published a design guide entitled "Managing Urban Stormwater - Soils and Construction" which is regarded as the standard to which erosion and sedimentation control should be designed to within NSW. Waverley Council specifies compliance with the Landcom design guide in there Stormwater and Floodplain Management Technical Manual.

The control of erosion and sedimentation describes the measures incorporated during and following construction of a new development to prevent the pollution and degradation of the downstream watercourse.

Stormwater Drainage Infrastructure Inlets

Risk:

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:

- The sediment will then be conveyed into the downstream waterbody by stormwater runoff, contaminating the waterbody.
- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:

- Sandbag protection will be installed surrounding all existing stormwater drainage infrastructure inlets to prevent sediment entering the system.

Maintenance:

- Frequent inspection of the sandbags to ensure they are arranged in a manner that prevents sediment from accessing the drainage system. If sediment is building up on the sandbags they should be cleared of sediment and re-established.

Construction Exit Protection

Risk:

- Spoil such as soil being conveyed from the site on the wheels of vehicles.

Consequence:

- Spoil being tracked onto the public road corridors where it is then washed into the existing stormwater drainage infrastructure and is then washed downstream polluting the downstream waterbody.
- Spoil being tracked onto the public road creating dangerous driving conditions for other road users.

Mitigation:

- A shaker grid and wash down facility will be installed at all exits from the construction site. All vehicles leaving the site will have their wheels washed down and pass over the shaker grid to remove any spoil collected on their wheels and retaining the spoil on site.

Maintenance:

- Frequent inspection of the shaker grid to ensure it is clean and still functioning.

Downstream Site Boundaries

Risk:

- Rainfall runoff falling on the site collecting sediment from the construction site and conveying it overland onto downstream properties and waterbodies.

Consequence:

- Sediment discharge polluting downstream properties and waterbodies.

Mitigation:

- Installation of sediment fences on all downstream boundaries of the site to collect sediment and prevent it discharging onto downstream properties or waterbodies.

Maintenance:

- Regular inspection of the sediment fences to ensure they are functioning correctly and are intact.
- If sediment build up is present it should be removed to ensure correct functionality of the fences.

A Soil and Water Management Plan has prepared as part of the development application documentation and is included in Appendix A of this report.

The maintenance of these control measures throughout their intended lifespan will ensure that the risk of erosion and sedimentation pollution of the downstream watercourse will be minimized.

Appendix A – Stormwater Management Drawings

CIVIL ENGINEERING WORKS

DEVELOPMENT APPLICATION

SITE LOCATION PLAN
SCALE 1:500

PROJECT SUMMARY

SITE ADDRESS:	669-683 OLD SOUTH HEAD ROAD, VAUCLUSE
LOCAL GOVERNMENT AREA:	WAVERLEY COUNCIL
SITE AREA:	4,345.03m²
DEVELOPMENT DESCRIPTION:	MULTI-STOREY SENIORS LIVING DEVELOPMENT WITH TWO LEVELS OF BASEMENT.

OSHR AT VAUCLUSE HOLDINGS PTY LTD — CLIENT

669-683 OLD SOUTH HEAD ROAD — PROJECT

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ABN 91 649 181 171

0333 — PROJECT No

C-01 — DRAWING No

A — REV

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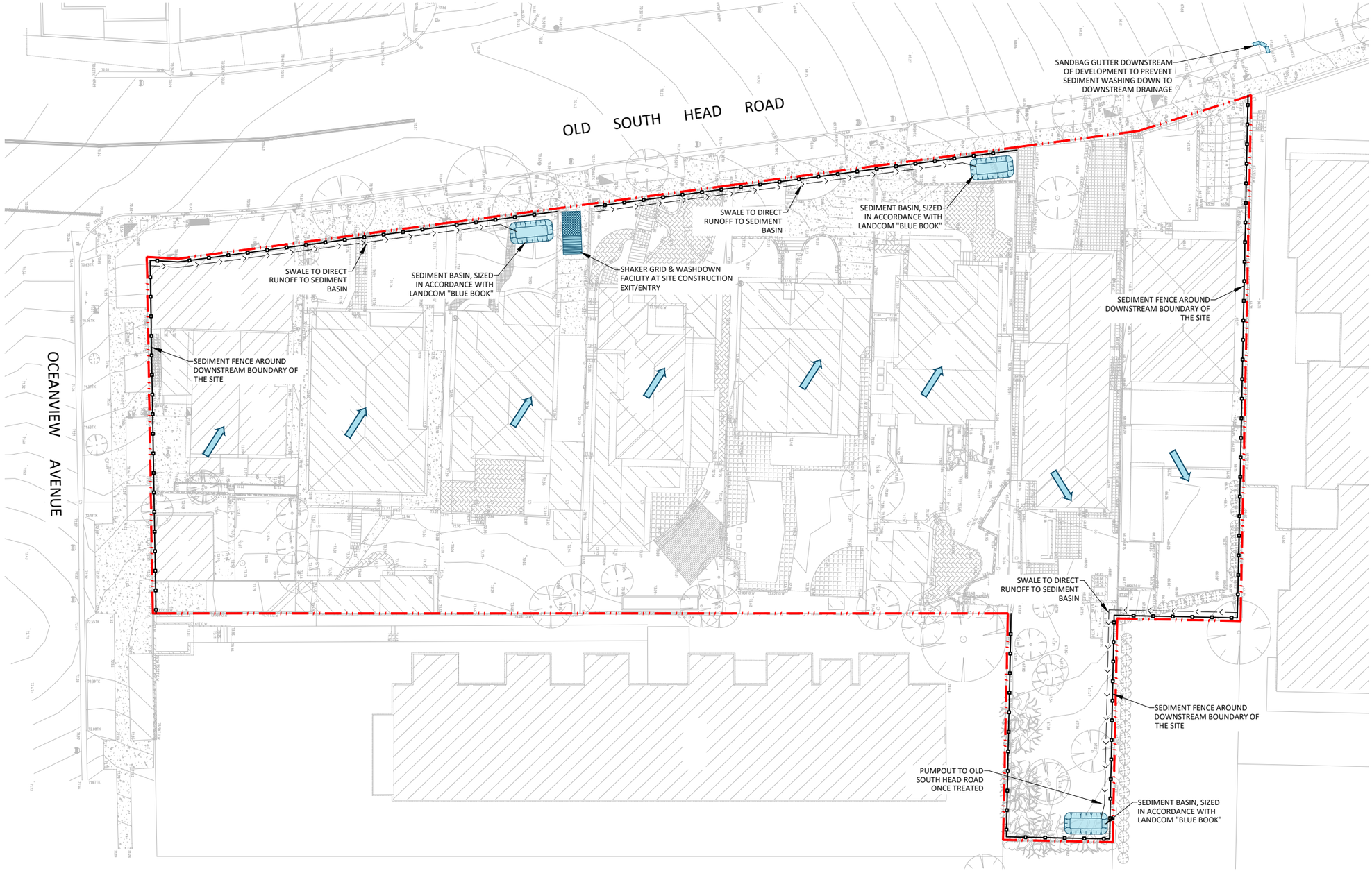


LEGEND

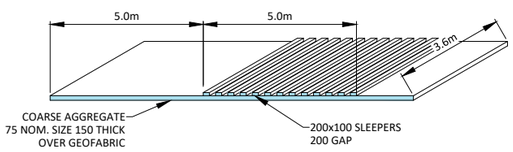
- SITE BOUNDARY
- PROPOSED SITE HOARDING
- VEHICLE SHAKEDOWN DEVICE
- PROPOSED SILT FENCE
- PROPOSED DIVERSION SWALE
- PROPOSED SEDIMENT BASIN
- PROPOSED SANDBAG PROTECTION

EROSION AND SEDIMENT CONTROL NOTES

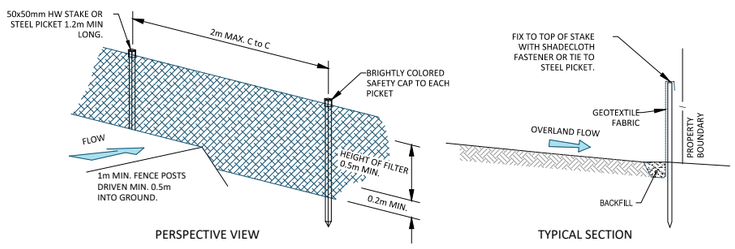
1. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE WITH:
   - LOCAL AUTHORITY REQUIREMENTS,
   - EPA - POLLUTION CONTROL MANUAL FOR URBAN STORMWATER,
   - DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT MANUAL- "URBAN EROSION & SEDIMENT CONTROL".
2. EROSION AND SEDIMENT CONTROL DRAWINGS AND NOTES ARE PROVIDED FOR THE WHOLE OF THE WORKS. SHOULD THE CONTRACTOR STAGE THESE WORKS THEN THE DESIGN MAY REQUIRE TO BE MODIFIED. VARIATION TO THESE DETAILS MAY REQUIRE TO BE APPROVED BY THE RELEVANT AUTHORITIES. THE EROSION AND SEDIMENT CONTROL PLAN SHALL BE IMPLEMENTED AND ADOPTED TO MEET THE VARYING SITUATIONS AS WORK ON SITE PROGRESSES.
3. MAINTAIN ALL EROSION AND SEDIMENT CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
4. WHEN STORMWATER PITS ARE CONSTRUCTED PREVENT SITE RUNOFF ENTERING THE PITS UNLESS SILT FENCES ARE ERECTED AROUND PITS.
5. MINIMISE THE AREA OF SITE BEING DISTURBED AT ANY ONE TIME.
6. PROTECT ALL STOCKPILES OF MATERIALS FROM SCOUR AND EROSION. DO NOT STOCKPILE LOOSE MATERIAL IN ROADWAYS, NEAR DRAINAGE PITS OR IN WATERCOURSES.
7. ALL SOIL AND WATER CONTROL MEASURES ARE TO BE PUT BACK IN PLACE AT THE END OF EACH WORKING DAY, AND MODIFIED TO BEST SUIT SITE CONDITIONS.
8. CONTROL WATER FROM UPSTREAM OF THE SITE SUCH THAT IT DOES NOT ENTER THE DISTURBED SITE.
9. ALL CONSTRUCTION VEHICLES SHALL ENTER AND EXIT THE SITE VIA THE APPROVED CONSTRUCTION ENTRY/EXIT ROUTE.
10. ALL VEHICLES LEAVING THE SITE SHALL BE CLEANED AND INSPECTED BEFORE LEAVING.
11. MAINTAIN ALL STORMWATER PIPES AND PITS CLEAR OF DEBRIS AND SEDIMENT. INSPECT STORMWATER SYSTEM AND CLEAN OUT AFTER EACH STORM EVENT.
12. CLEAN OUT ALL EROSION AND SEDIMENT CONTROL DEVICES AFTER EACH STORM EVENT.
13. ALL DISTURBED AREAS SHALL BE REVEGETATED AS SOON AS THE RELEVANT WORKS HAVE BEEN COMPLETED.

SEQUENCE OF WORKS

1. PRIOR TO COMMENCEMENT OF EXCAVATION THE FOLLOWING SOIL MANAGEMENT DEVICES MUST BE INSTALLED:
   - CONSTRUCT SILT CONTROL DEVICES BELOW THE SITE AND ACROSS ALL POTENTIAL RUNOFF SITES.
   - CO-ORDINATE CONSTRUCTION ENTRY/EXIT ROUTES WITH PROJECT MANAGER. ARRANGE SUITABLE LOCATION FOR THE INSPECTION OF TRUCKS PRIOR TO LEAVING SITE AND DIVERT RUNOFF TO SUITABLE CONTROL SYSTEM.
   - CONSTRUCT MEASURES TO DIVERT UPSTREAM FLOWS INTO EXISTING STORMWATER SYSTEM.
   - PROVIDE SANDBAG SEDIMENT TRAPS UPSTREAM OF EXISTING PITS.
   - LOCATE A 1.8 METRE CHAIN WIRE FENCE AROUND THE BOUNDARIES AND ATTACH HESSIAN CLOTH TO IT ON THE WINDWARD SIDE (TIES AT THE TOP CENTER AND BOTTOM AND AT 1 METRE INTERVALS.
2. DISTURBED AREAS ARE TO BE REGULARLY WATERED TO REDUCE DUST POLLUTION.
3. CONSTRUCT GEOTEXTILE FILTER PIT SURROUND AROUND ALL PROPOSED PITS AS THEY ARE CONSTRUCTED.
4. ON COMPLETION OF PAVEMENT PROVIDE SAND BAG KERB INLET SEDIMENT TRAPS AROUND PITS.
5. PROVIDE AND MAINTAIN A STRIP OF TURF ON BOTH SIDES OF ALL ROADS AFTER THE CONSTRUCTION OF KERBS.

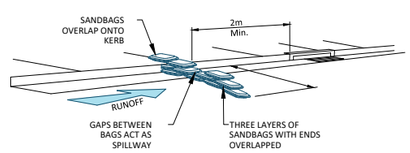


SHAKER GRID



PERSPECTIVE VIEW

TYPICAL SECTION



SANDBAG KERB INLET SEDIMENT TRAP

SEDIMENT FENCE DETAIL

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1:400 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA APPROVAL	IH	IH	15.12.23

CLIENT	ARCHITECT
OSHR AT VAUCLUSE HOLDINGS PTY LTD	BATES SMART

PROJECT	TITLE
669-683 OLD SOUTH HEAD ROAD VAUCLUSE	SEDIMENT & EROSION CONTROL PLAN

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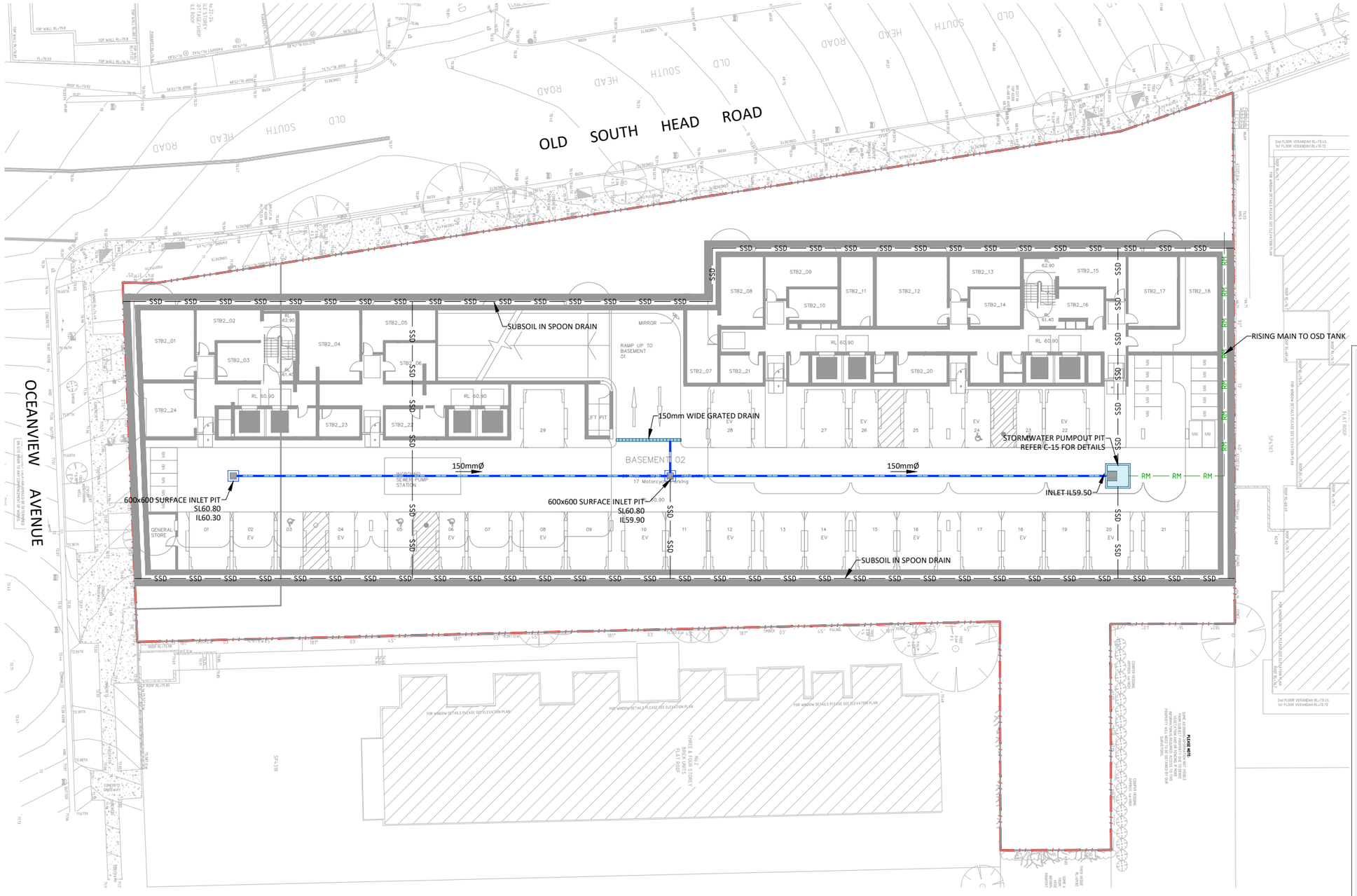
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0333	C-05	A



LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER PIPE
- PROPOSED GRATED PIT
- PROPOSED GRATED DRAIN
- STORMWATER PUMP OUT
- RAINWATER TANK
- 150Ø UPVC — PROPOSED PIPE SIZE AND FLOW DIRECTION
- DP — PROPOSED DOWNPIPE
- OVERLAND FLOW

STORMWATER MANAGEMENT NOTES

SITE INFORMATION

ADDRESS:	669-683 OLD SOUTH HEAD ROAD, VAUCLUSE
LOCAL GOVERNMENT AREA:	WAVERLEY COUNCIL
SITE AREA:	4,354.03m²

DEVELOPMENT CONTROL REQUIREMENTS

GOVERNING DOCUMENT:	WAVERLEY COUNCIL WATER MANAGEMENT TECHNICAL MANUAL - OCTOBER 2021
DESIGN STORMS:	MINOR = 5% AEP MAJOR = 1% AEP

DISCHARGE ATTENUATION REQUIREMENT:

1. THE PERMISSIBLE SITE DISCHARGE (PSD) IS LIMITED TO THE MAXIMUM DISCHARGE FROM THE SITE DURING THE 20% AEP FOR A 5 MINUTE STORM EVENT UNDER THE UNDEVELOPED SITE CONDITIONS.

WATER QUALITY TREATMENT REQUIREMENTS:

- 90% REMOVAL OF GROSS POLLUTANTS (> 5MM);
- 85% REMOVAL OF TOTAL SUSPENDED SOLIDS;
- 55% REMOVAL OF TOTAL PHOSPHOROUS; AND
- 40% REMOVAL OF TOTAL NITROGEN.

SITE ATTENUATION DESIGN

ALLOWABLE PEAK DISCHARGE RATE:	20% AEP	= 112L/s
UNATTENUATED POST DEVELOPMENT DISCHARGE RATES:	20% AEP 1% AEP	= 153L/s = 206L/s
ATTENUATED POST DEVELOPMENT DISCHARGE RATES:	20% AEP 1% AEP	= 69L/s = 110L/s

REFER TO DRAINS CALCULATIONS BY ENSCAPE STUDIO FOR MORE INFORMATION.

OSD DESIGN SUMMARY

OSD VOLUME REQUIRED:	109.60m³
OSD VOLUME PROVIDED:	112.50m³

OSD DIMENSIONS:

TANK A

WIDTH	3.0m	
LENGTH	8.4m	
DEPTH	2.58m	
VOLUME	64.50m³	
INVERT OF OUTLET:		68.00m AHD
ORIFICE PLATE DIAMETER:		115mm

TANK B

WIDTH	6.0m	
LENGTH	8.5m	
DEPTH	1.1m	
VOLUME	56.10m³	
INVERT OF OUTLET:		66.15m AHD
ORIFICE PLATE DIAMETER:		250mm

1:200 2 0 2 4 6 8 10 A1
1:400 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA APPROVAL	IH	IH	15.12.23

CLIENT: OSHR AT VAUCLUSE HOLDINGS PTY LTD
ARCHITECT: BATES SMART

PROJECT: 669-683 OLD SOUTH HEAD ROAD VAUCLUSE
TITLE: STORMWATER MANAGEMENT PLAN BASEMENT 02

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PRELIMINARY
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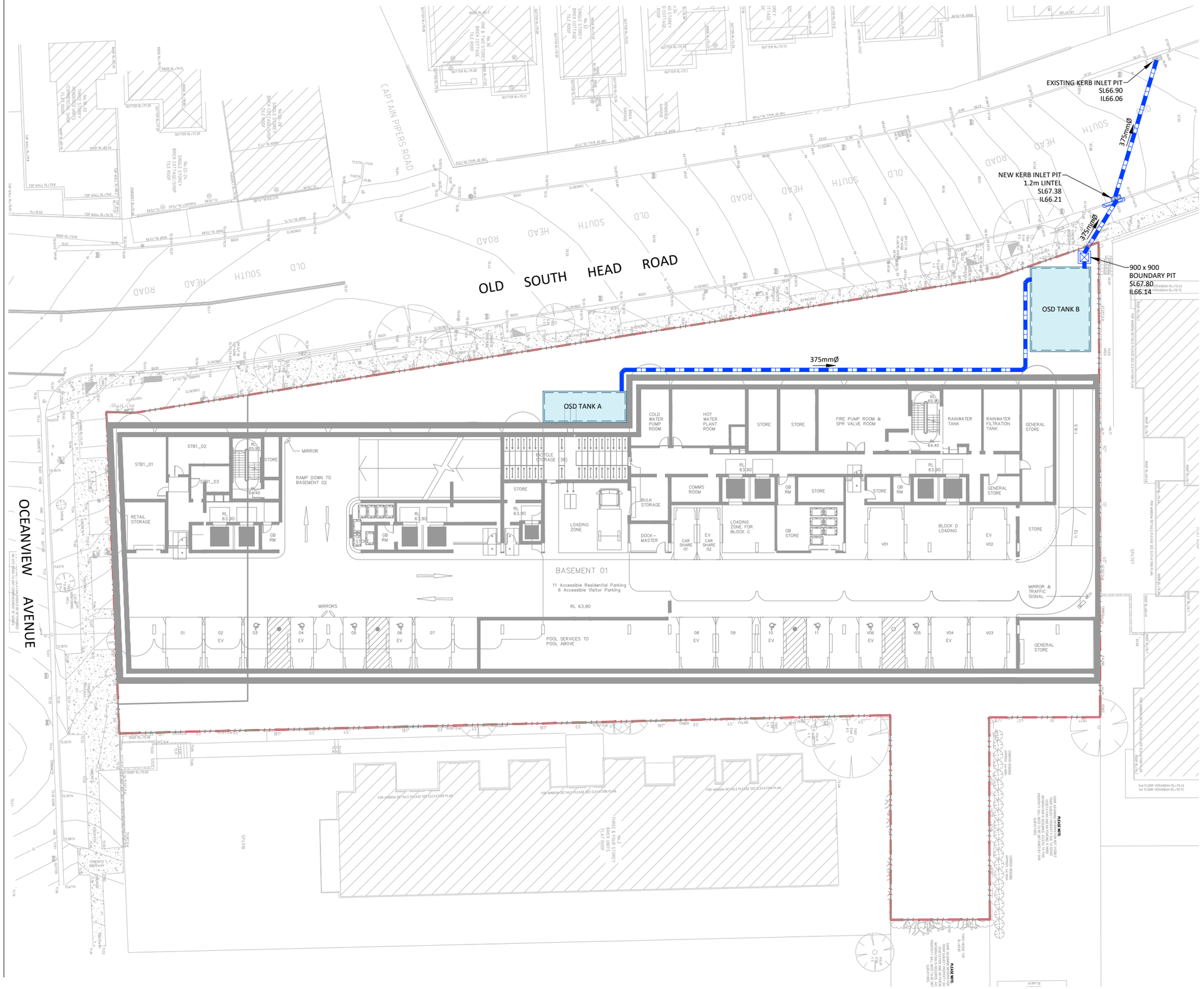

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INVERT OF OUTLET:		68.00m AHD
ORIFICE PLATE DIAMETER:		115mm

TANK B

WIDTH	6.0m	
LENGTH	8.5m	
DEPTH	1.1m	
VOLUME	56.10m³	
INVERT OF OUTLET:		66.15m AHD
ORIFICE PLATE DIAMETER:		250mm

1:200 2 0 2 4 6 8 10 A1
1:400 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA APPROVAL	IH	IH	15.12.23

OSHR AT VAUCLUSE HOLDINGS PTY LTD — BATES SMART
CLIENT — ARCHITECT

669-683 OLD SOUTH HEAD ROAD VAUCLUSE — STORMWATER MANAGEMENT PLAN BASEMENT 01
PROJECT — TITLE

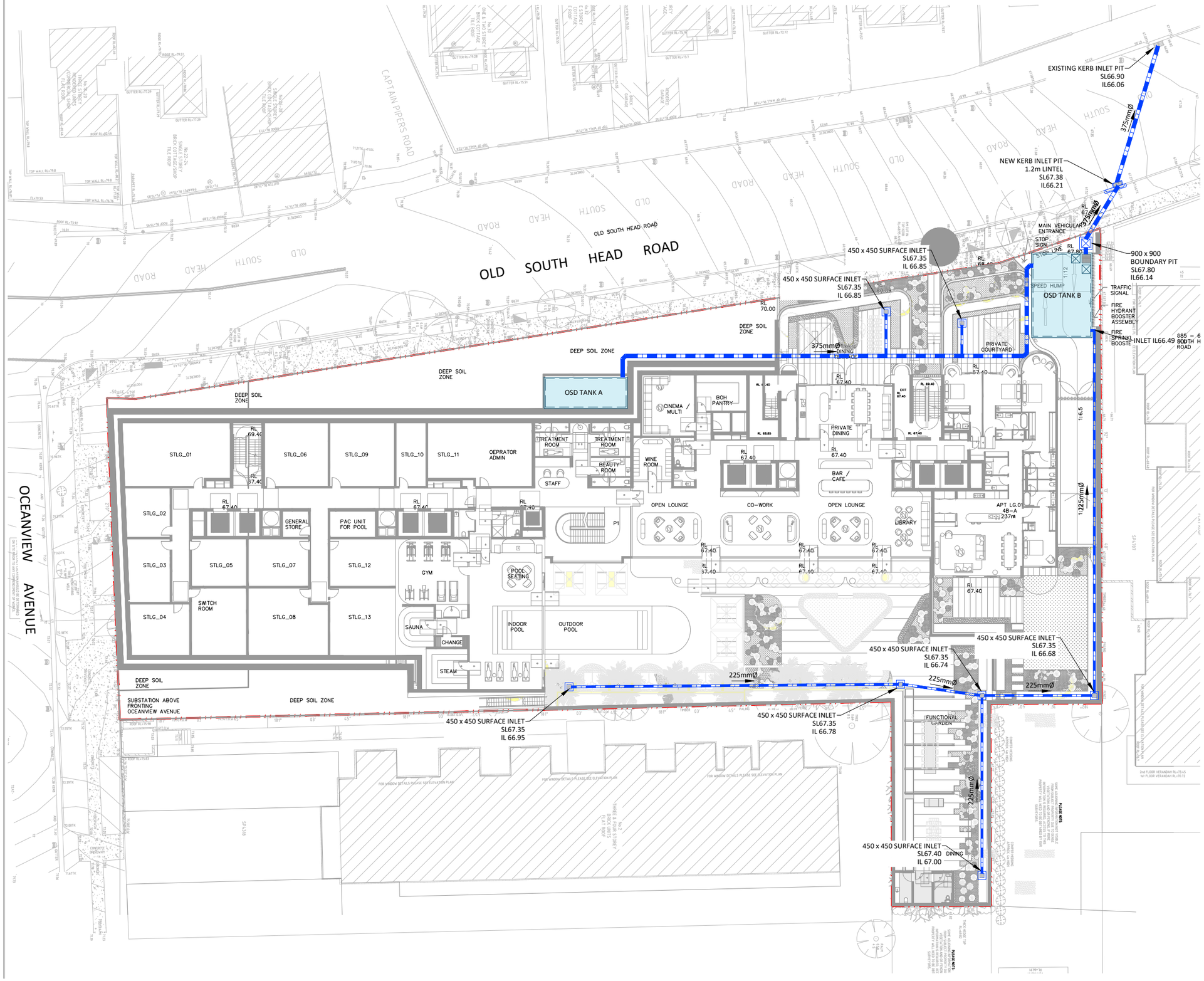
0333-C-11.dwg

enscape studio
tel 0411 267 151
info@enscapestudio.com.au
ABN 91 649 181 171

PRELIMINARY
NOT FOR CONSTRUCTION

SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0333	C-11	A

15/12/2023 11:07:48 AM



LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED STORMWATER PIPE
- RM —— RM PROPOSED STORMWATER PIPE
- PROPOSED GRATED PIT
- PROPOSED GRATED DRAIN
- STORMWATER PUMP OUT
- RAINWATER TANK
- 150Ø UPVC PROPOSED PIPE SIZE AND FLOW DIRECTION
- ◦DP PROPOSED DOWNPIPE
- OVERLAND FLOW

STORMWATER MANAGEMENT NOTES

SITE INFORMATION

ADDRESS:	669-683 OLD SOUTH HEAD ROAD, VAUCLUSE
LOCAL GOVERNMENT AREA:	WAVERLEY COUNCIL
SITE AREA:	4,354.03m²

DEVELOPMENT CONTROL REQUIREMENTS

GOVERNING DOCUMENT:	WAVERLEY COUNCIL WATER MANAGEMENT TECHNICAL MANUAL - OCTOBER 2021
DESIGN STORMS:	MINOR = 5% AEP MAJOR = 1% AEP

DISCHARGE ATTENUATION REQUIREMENT:

1. THE PERMISSIBLE SITE DISCHARGE (PSD) IS LIMITED TO THE MAXIMUM DISCHARGE FROM THE SITE DURING THE 20% AEP FOR A 5 MINUTE STORM EVENT UNDER THE UNDEVELOPED SITE CONDITIONS.

WATER QUALITY TREATMENT REQUIREMENTS:

- 90% REMOVAL OF GROSS POLLUTANTS (> 5MM);
- 85% REMOVAL OF TOTAL SUSPENDED SOLIDS;
- 55% REMOVAL OF TOTAL PHOSPHOROUS; AND
- 40% REMOVAL OF TOTAL NITROGEN.

SITE ATTENUATION DESIGN

ALLOWABLE PEAK DISCHARGE RATE:	20% AEP	= 112L/s
UNATTENUATED POST DEVELOPMENT DISCHARGE RATES:	20% AEP 1% AEP	= 153L/s = 206L/s
ATTENUATED POST DEVELOPMENT DISCHARGE RATES:	20% AEP 1% AEP	= 69L/s = 110L/s

REFER TO DRAINS CALCULATIONS BY ENSCAPE STUDIO FOR MORE INFORMATION.

OSD DESIGN SUMMARY

OSD VOLUME REQUIRED:	109.60m³
OSD VOLUME PROVIDED:	112.50m³

OSD DIMENSIONS:

TANK A

WIDTH	3.0m
LENGTH	8.4m
DEPTH	2.58m
VOLUME	64.50m³
INVERT OF OUTLET:	68.00m AHD
ORIFICE PLATE DIAMETER:	115mm

TANK B

WIDTH	6.0m
LENGTH	8.5m
DEPTH	1.1m
VOLUME	56.10m³
INVERT OF OUTLET:	66.15m AHD
ORIFICE PLATE DIAMETER:	250mm

1:200 2 0 2 4 6 8 10 A1
1:400 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA APPROVAL	IH	IH	15.12.23

CLIENT: OSHR AT VAUCLUSE HOLDINGS PTY LTD
ARCHITECT: BATES SMART

PROJECT: 669-683 OLD SOUTH HEAD ROAD VAUCLUSE
TITLE: STORMWATER MANAGEMENT PLAN LOWER GROUND

0333-C-12.dwg

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SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0333	C-12	A

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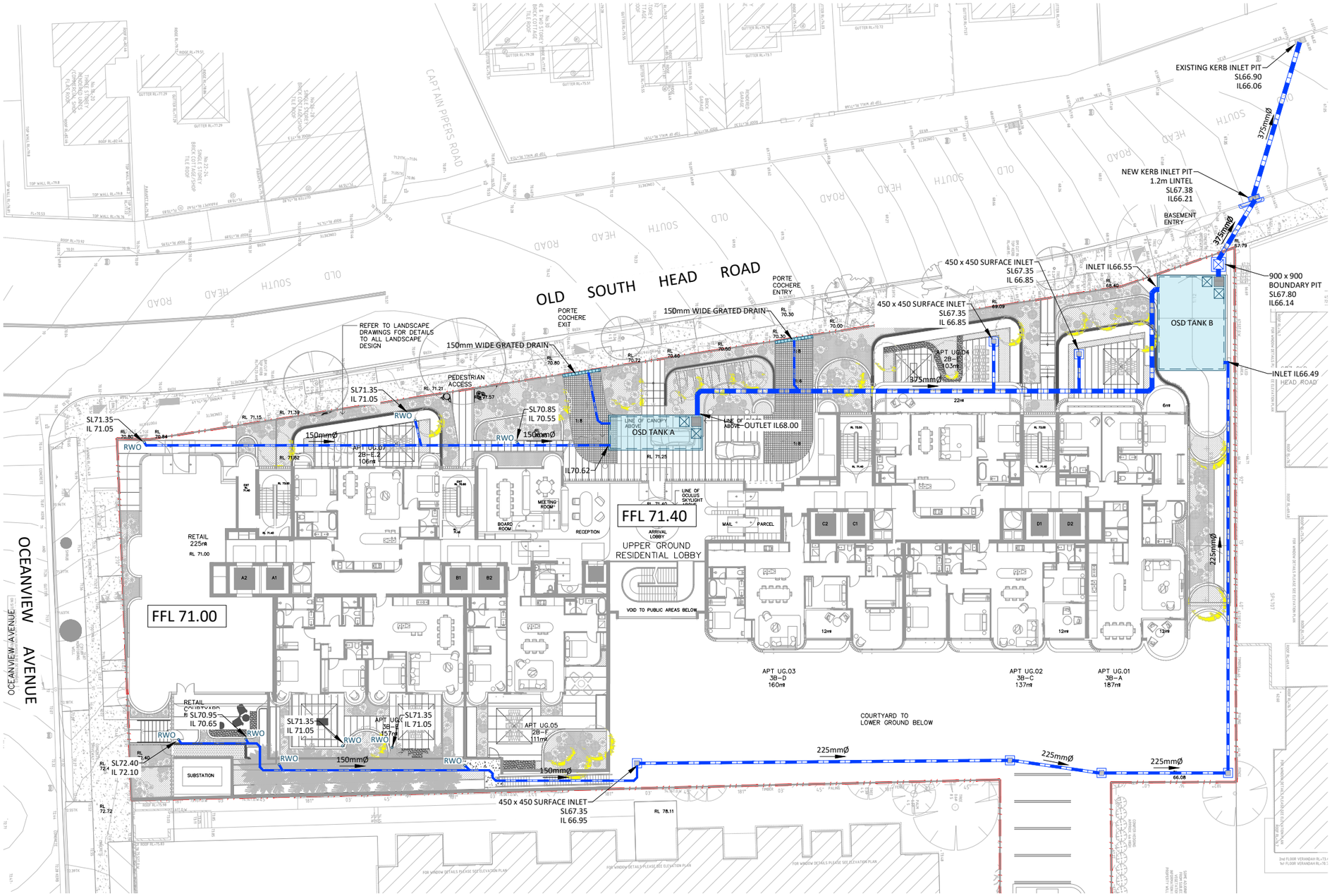

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER PIPE (RM — RM)
- PROPOSED GRATED PIT
- PROPOSED GRATED DRAIN
- STORMWATER PUMP OUT
- RAINWATER TANK
- 150Ø UPVC — PROPOSED PIPE SIZE AND FLOW DIRECTION
- ◦DP — PROPOSED DOWNPIPE
- OVERLAND FLOW

STORMWATER MANAGEMENT NOTES

SITE INFORMATION

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LOCAL GOVERNMENT AREA:	WAVERLEY COUNCIL
SITE AREA:	4,354.03m²

DEVELOPMENT CONTROL REQUIREMENTS

GOVERNING DOCUMENT:	WAVERLEY COUNCIL WATER MANAGEMENT TECHNICAL MANUAL - OCTOBER 2021
DESIGN STORMS:	MINOR = 5% AEP MAJOR = 1% AEP

DISCHARGE ATTENUATION REQUIREMENT:

1. THE PERMISSIBLE SITE DISCHARGE (PSD) IS LIMITED TO THE MAXIMUM DISCHARGE FROM THE SITE DURING THE 20% AEP FOR A 5 MINUTE STORM EVENT UNDER THE UNDEVELOPED SITE CONDITIONS.

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- 90% REMOVAL OF GROSS POLLUTANTS (> 5MM);
- 85% REMOVAL OF TOTAL SUSPENDED SOLIDS;
- 55% REMOVAL OF TOTAL PHOSPHOROUS; AND
- 40% REMOVAL OF TOTAL NITROGEN.

SITE ATTENUATION DESIGN

ALLOWABLE PEAK DISCHARGE RATE:	20% AEP	= 112L/s
UNATTENUATED POST DEVELOPMENT DISCHARGE RATES:	20% AEP 1% AEP	= 153L/s = 206L/s
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OSD VOLUME REQUIRED:	109.60m³
OSD VOLUME PROVIDED:	112.50m³

OSD DIMENSIONS:

TANK A

WIDTH	3.0m	
LENGTH	8.4m	
DEPTH	2.58m	
VOLUME	64.50m³	
INVERT OF OUTLET:		68.00m AHD
ORIFICE PLATE DIAMETER:		115mm

TANK B

WIDTH	6.0m	
LENGTH	8.5m	
DEPTH	1.1m	
VOLUME	56.10m³	
INVERT OF OUTLET:		66.15m AHD
ORIFICE PLATE DIAMETER:		250mm

1:200 2 0 2 4 6 8 10 A1
1:400 A3

REV	DESCRIPTION	DRAWN	APP'D	DATE
A	ISSUED FOR DA APPROVAL	IH	IH	15.12.23

OSHR AT VAUCLUSE HOLDINGS PTY LTD — CLIENT
BATES SMART — ARCHITECT

669-683 OLD SOUTH HEAD ROAD VAUCLUSE — PROJECT
STORMWATER MANAGEMENT PLAN UPPER GROUND — TITLE

0333-C-13.dwg
15/12/2023 11:17:05 AM

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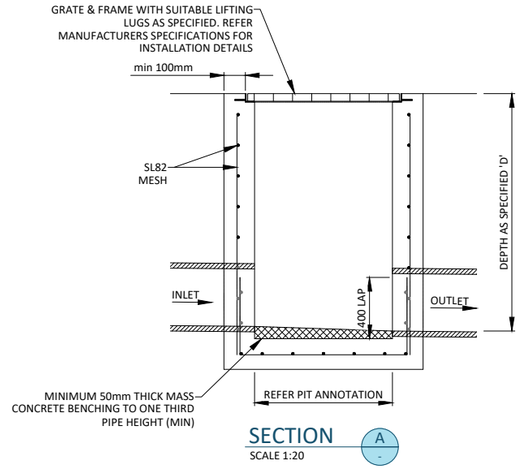
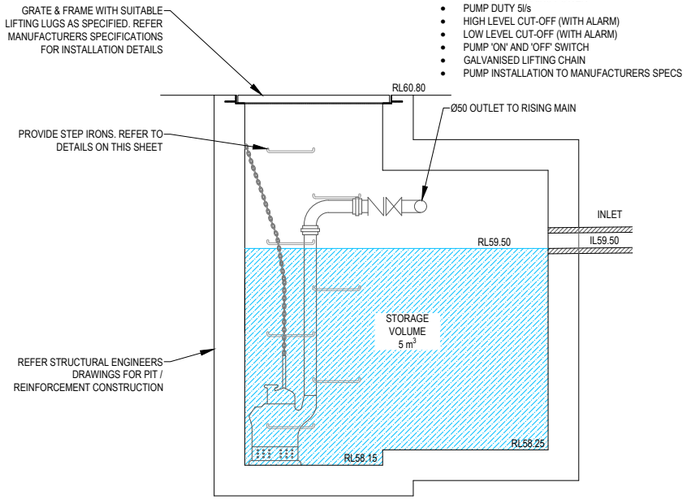
SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0333	C-13	A



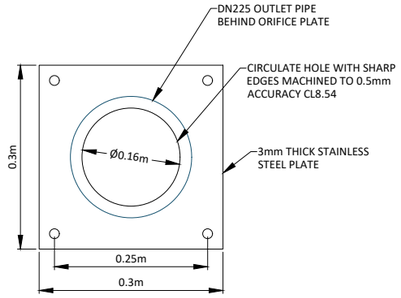
SECTION A

SCALE 1:20



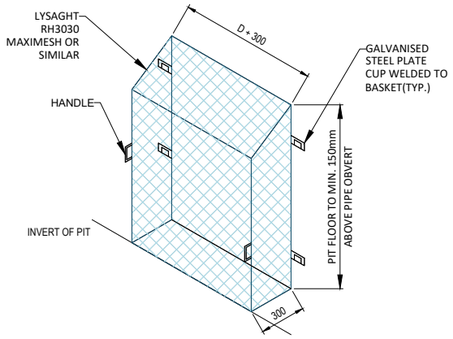
PUMP-OUT PIT DETAIL - DRIVEWAY DRAINAGE

SCALE 1:20



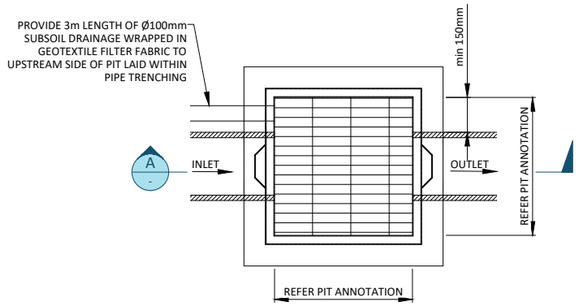
ORIFICE PLATE DETAIL

SCALE 1:5



SCREEN MESH DETAIL

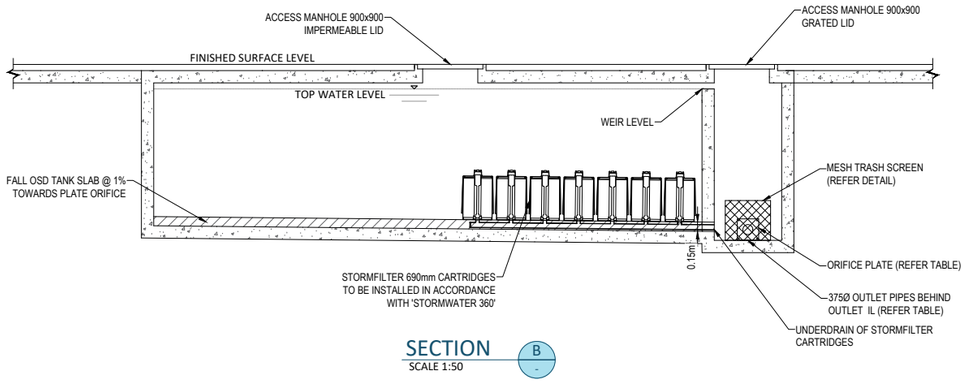
SCALE 1:20



GRATED PIT DETAIL

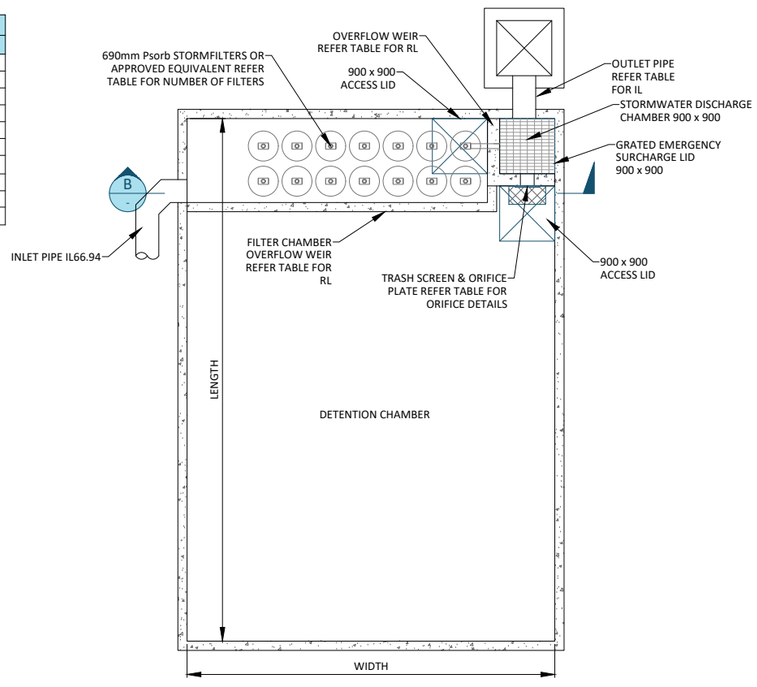
SCALE 1:20

OSD TANK INFORMATION		
ELEMENT	TANK A	TANK B
VOLUME	64.50m³	56.10m³
DEPTH	2.58m	1.1m
LENGTH	8.4m	8.5m
WIDTH	3.0m	6m
TOP OF TANK LEVEL (RL)	71.30m	67.80m
OUTLET INVERT LEVEL (IL)	68.00m	66.15m
OVERFLOW WEIR LEVEL	70.58m	67.15m
ORIFICE PLATE DIAMETER	115mm	250mm
ORIFICE PLATE ℄	68.06m	66.26m
No. OF FILTER CARTRIDGES	10	15



SECTION B

SCALE 1:50



OSD TANK DETAIL

SCALE 1:50

1:100 2 1 0 2 4 A1
1:200 A3
HORIZONTAL

1:40 0.4 0 0.4 0.8 1.2 1.6 2 A1
1:80 A3
VERTICAL

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OSHR AT VAUCLUSE HOLDINGS PTY LTD — BATES SMART

CLIENT — ARCHITECT

669-683 OLD SOUTH HEAD ROAD VAUCLUSE — STORMWATER MANAGEMENT DETAILS

PROJECT — TITLE

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SCALE @ A1	PROJECT No	DRAWING No	REV
AS NOTED	0333	C-15	A

0333-C-15.dwg

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Appendix B – DRAINS Output

DRAINS results prepared from Version 2023.06.8578.17142

PIT / NODE DETAILS Version 8

Name	Max HGL Constraint	HGL	Max Pond Flow Arriving (cu.m/s)	Max Surface Volume (cu.m)	Max Pond Freeboard (m)	Min Overflow (cu.m/s)
BNDY Pit		66.37	0.000			
OF Pit	67.08		0.000	0.27	0.000	None

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	EIA Max Q (cu.m/s)	Remaining Max Q (cu.m/s)	Tc (min)	EIA Tc (min)	RIA Tc (min)	PA (cu.m/s)	Due to Storm
Existing Catchment 2	0.224	0.195	0.069	5.00	2.00	6.00		1% AEP, 20 min burst, Storm
Tank A Catchment 1	0.134	0.134	0.000	5.00	2.00	6.00		1% AEP, 5 min burst, Storm
Tank B Catchment 1	0.134	0.134	0.000	5.00	2.00	6.00		1% AEP, 5 min burst, Storm

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
P1.000	0.042	1.27	70.167	67.067	1% AEP, 25 min burst, Storm 7
P1.001	0.110	1.56	66.479	66.369	1% AEP, 25 min burst, Storm 1
P2.000	0.002	0.10	67.077	67.067	1% AEP, 25 min burst, Storm 5

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OSD Tank A OF	0.040	0.035	1.402	0.026	0.04	4.00	2.84	1% AEP, 25 min burst, Storm 7
Tank B OF	0	0	1.497	0	0	0	0	
Pit OF	0	0	1.401	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol Total	Max Q Low Level	Max Q	Max Q High Level
OSD Tank A	70.54	63.4	0.082	0.042	0.040
OSD Tank B	67.07	46.8	0.110	0.110	0.000

Run Log for 0333_OSHR OSD Model - DRAINS run at 14:30:55 on 6/12/2023 using Watercom Drains v2023.06.8578.17142

{\colortbl;\red0\green0\blue0;\red192\green0\blue0;}Run Log for 0333_OSHR OSD Model - DRAINS run at 14:30:55 on 6/12/2023 using Watercom Drains v2023.06.8578.17142

No water upwelling from any pit.

Freeboard was adequate at all pits.

Flows were safe in all overflow routes.

Appendix C – MUSIC Output

Source nodes
Location,Vehicle Impermeable Area (236.81m2),Roof Catchment A (1_102m2),Ground Floor Catchment A (953m2),Roof Catchment B (1_102m2),Ground Floor Catchment B (953m2)
ID,1,2,3,9,12
Node Type,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode,UrbanSourceNode
Zoning Surface Type,Sealedroad,Roof,Mixed,Roof,Mixed
Total Area (ha),0.024,0.11,0.095,0.11,0.095
Area Impervious (ha),0.024,0.11,0.0661171641791045,0.11,0.0661171641791045
Area Pervious (ha),0,0,0.0288828358208955,0,0.0288828358208955
Field Capacity (mm),80,80,80,80,80
Pervious Area Infiltration Capacity coefficient - a,200,200,200,200,200
Pervious Area Infiltration Capacity exponent - b,1,1,1,1,1
Impervious Area Rainfall Threshold (mm/day),1,1,1,1,1
Pervious Area Soil Storage Capacity (mm),120,120,120,120,120
Pervious Area Soil Initial Storage (% of Capacity),25,25,25,25,25
Groundwater Initial Depth (mm),10,10,10,10,10
Groundwater Daily Recharge Rate (%),25,25,25,25,25
Groundwater Daily Baseflow Rate (%),5,5,5,5,5
Groundwater Daily Deep Seepage Rate (%),0,0,0,0,0
Stormflow Total Suspended Solids Mean (log mg/L),2.43,1.3,2.2,1.3,2.2
Stormflow Total Suspended Solids Standard Deviation (log mg/L),0.32,0.32,0.32,0.32,0.32
Stormflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Suspended Solids Serial Correlation,0,0,0,0,0
Stormflow Total Phosphorus Mean (log mg/L),-0.3,-0.89,-0.45,-0.89,-0.45
Stormflow Total Phosphorus Standard Deviation (log mg/L),0.25,0.25,0.25,0.25,0.25
Stormflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Phosphorus Serial Correlation,0,0,0,0,0
Stormflow Total Nitrogen Mean (log mg/L),0.34,0.3,0.42,0.3,0.42
Stormflow Total Nitrogen Standard Deviation (log mg/L),0.19,0.19,0.19,0.19,0.19
Stormflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Stormflow Total Nitrogen Serial Correlation,0,0,0,0,0
Baseflow Total Suspended Solids Mean (log mg/L),1.2,1.1,1.1,1.1,1.1
Baseflow Total Suspended Solids Standard Deviation (log mg/L),0.17,0.17,0.17,0.17,0.17
Baseflow Total Suspended Solids Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Suspended Solids Serial Correlation,0,0,0,0,0
Baseflow Total Phosphorus Mean (log mg/L),-0.85,-0.82,-0.82,-0.82,-0.82
Baseflow Total Phosphorus Standard Deviation (log mg/L),0.19,0.19,0.19,0.19,0.19
Baseflow Total Phosphorus Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic
Baseflow Total Phosphorus Serial Correlation,0,0,0,0,0
Baseflow Total Nitrogen Mean (log mg/L),0.11,0.32,0.32,0.32,0.32
Baseflow Total Nitrogen Standard Deviation (log mg/L),0.12,0.12,0.12,0.12,0.12
Baseflow Total Nitrogen Estimation Method,Stochastic,Stochastic,Stochastic,Stochastic,Stochastic

Baseflow Total Nitrogen Serial Correlation,0,0,0,0,0
Flow based constituent generation - enabled,Off,Off,Off,Off,Off
Flow based constituent generation - flow file, , , , ,
Flow based constituent generation - base flow column, , , , ,
Flow based constituent generation - pervious flow column, , , , ,
Flow based constituent generation - impervious flow column, , , , ,
Flow based constituent generation - unit, , , , ,
OUT - Mean Annual Flow (ML/yr),0.324,1.48,1.03,1.48,1.03
OUT - TSS Mean Annual Load (kg/yr),117,39.5,190,39.5,205
OUT - TP Mean Annual Load (kg/yr),0.195,0.232,0.414,0.232,0.419
OUT - TN Mean Annual Load (kg/yr),0.767,3.26,2.87,3.26,2.90
OUT - Gross Pollutant Mean Annual Load (kg/yr),7.83,35.9,26.1,35.9,26.1
Rain In (ML/yr),0.357503,1.63855,1.41511,1.63855,1.41511
ET Loss (ML/yr),0.033893,0.155344,0.387259,0.155344,0.387259
Deep Seepage Loss (ML/yr),0,0,0,0,0
Baseflow Out (ML/yr),0,0,0.069391,0,0.069391
Imp. Stormflow Out (ML/yr),0.323609,1.48321,0.896667,1.48321,0.896667
Perv. Stormflow Out (ML/yr),0,0,0.061798,0,0.061798
Total Stormflow Out (ML/yr),0.323609,1.48321,0.958465,1.48321,0.958465
Total Outflow (ML/yr),0.323609,1.48321,1.02786,1.48321,1.02786
Change in Soil Storage (ML/yr),0,0,-1E-6,0,-1E-6
TSS Baseflow Out (kg/yr),0,0,0.941568,0,0.942163
TSS Total Stormflow Out (kg/yr),116.628,39.5064,188.575,39.5064,204.272
TSS Total Outflow (kg/yr),116.628,39.5064,189.516,39.5064,205.214
TP Baseflow Out (kg/yr),0,0,0.011556,0,0.011575
TP Total Stormflow Out (kg/yr),0.19521,0.231835,0.40223,0.231835,0.406945
TP Total Outflow (kg/yr),0.19521,0.231835,0.413786,0.231835,0.41852
TN Baseflow Out (kg/yr),0,0,0.150664,0,0.150512
TN Total Stormflow Out (kg/yr),0.767474,3.25734,2.72276,3.25734,2.75184
TN Total Outflow (kg/yr),0.767474,3.25734,2.87343,3.25734,2.90235
GP Total Outflow (kg/yr),7.83067,35.8905,26.2075,35.8905,26.2075

No Imported Data Source nodes

USTM treatment nodes
Location,Rainwater Tank (10kL),SF Chamber A,SF Chamber B
ID,4,5,10
Node Type,RainWaterTankNode,SedimentationBasinNode,SedimentationBasinNode
Lo-flow bypass rate (cum/sec),0,0,0
Hi-flow bypass rate (cum/sec),100,100,100
Inlet pond volume,0,0,0
Area (sqm),7.8,2.9,2
Initial Volume (m^3),0,0,0
Extended detention depth (m),0.2,0.77,0.77
Number of Rainwater tanks,1, ,
Permanent Pool Volume (cubic metres),10,0,0
Proportion vegetated,0,0,0
Equivalent Pipe Diameter (mm),50,75,91
Overflow weir width (m),10,2,2
Notional Detention Time (hrs),0.166,53.9E-3,25.3E-3
Orifice Discharge Coefficient,0.6,0.6,0.6
Weir Coefficient,1.7,1.7,1.7
Number of CSTR Cells,2,1,1
Total Suspended Solids - k (m/yr),400,1,1
Total Suspended Solids - C* (mg/L),12,20,20
Total Suspended Solids - C** (mg/L),12,20,20
Total Phosphorus - k (m/yr),300,1,1
Total Phosphorus - C* (mg/L),0.13,0.13,0.13

Total Phosphorus - C** (mg/L),0.13,0.13,0.13
Total Nitrogen - k (m/yr),40,1,1
Total Nitrogen - C* (mg/L),1.4,1.4,1.4
Total Nitrogen - C** (mg/L),1.4,1.4,1.4
Threshold Hydraulic Loading for C** (m/yr),0,3500,3500
Horizontal Flow Coefficient, , ,
Reuse Enabled,On,Off,Off
Max drawdown height (m),1.282, ,
Annual Demand Enabled,On,Off,Off
Annual Demand Value (ML/year),0.228, ,
Annual Demand Distribution,PET, ,
Annual Demand Monthly Distribution: Jan, , ,
Annual Demand Monthly Distribution: Feb, , ,
Annual Demand Monthly Distribution: Mar, , ,
Annual Demand Monthly Distribution: Apr, , ,
Annual Demand Monthly Distribution: May, , ,
Annual Demand Monthly Distribution: Jun, , ,
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Annual Demand Monthly Distribution: Sep, , ,
Annual Demand Monthly Distribution: Oct, , ,
Annual Demand Monthly Distribution: Nov, , ,
Annual Demand Monthly Distribution: Dec, , ,
Daily Demand Enabled,Off,Off,Off
Daily Demand Value (ML/day), , ,
Custom Demand Enabled,Off,Off,Off
Custom Demand Time Series File, , ,
Custom Demand Time Series Units, , ,
Filter area (sqm), , ,
Filter perimeter (m), , ,
Filter depth (m), , ,
Filter Median Particle Diameter (mm), , ,
Saturated Hydraulic Conductivity (mm/hr), , ,
Infiltration Media Porosity, , ,
Length (m), , ,
Bed slope, , ,
Base Width (m), , ,
Top width (m), , ,
Vegetation height (m), , ,
Vegetation Type, , ,
Total Nitrogen Content in Filter (mg/kg), , ,
Orthophosphate Content in Filter (mg/kg), , ,
Is Base Lined?, , ,
Is Underdrain Present?, , ,
Is Submerged Zone Present?, , ,
Submerged Zone Depth (m), , ,
B for Media Soil Texture,-9999,-9999,-9999
Proportion of upstream impervious area treated, , ,
Exfiltration Rate (mm/hr),0,0,0
Evaporative Loss as % of PET,0,0,0
Depth in metres below the drain pipe, , ,
TSS A Coefficient, , ,
TSS B Coefficient, , ,
TP A Coefficient, , ,
TP B Coefficient, , ,
TN A Coefficient, , ,
TN B Coefficient, , ,
Sfc, , ,

S*, , ,
Sw, , ,
Sh, , ,
Emax (m/day), , ,
Ew (m/day), , ,
IN - Mean Annual Flow (ML/yr),1.48,2.83,5.13
IN - TSS Mean Annual Load (kg/yr),39.5,250,281
IN - TP Mean Annual Load (kg/yr),0.232,0.782,0.808
IN - TN Mean Annual Load (kg/yr),3.26,6.74,9.05
IN - Gross Pollutant Mean Annual Load (kg/yr),35.9,62.0,26.1
OUT - Mean Annual Flow (ML/yr),1.27,2.83,5.13
OUT - TSS Mean Annual Load (kg/yr),29.3,248,290
OUT - TP Mean Annual Load (kg/yr),0.189,0.776,0.817
OUT - TN Mean Annual Load (kg/yr),2.70,6.73,9.08
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00,0.00
Flow In (ML/yr),1.4832,2.8346,5.12851
ET Loss (ML/yr),0,0,0
Infiltration Loss (ML/yr),0,0,0
Low Flow Bypass Out (ML/yr),0,0,0
High Flow Bypass Out (ML/yr),0,0,0
Orifice / Filter Out (ML/yr),0.947788,2.51261,4.37719
Weir Out (ML/yr),0.318244,0.322024,0.751204
Transfer Function Out (ML/yr),0,0,0
Reuse Supplied (ML/yr),0.217223,0,0
Reuse Requested (ML/yr),0.227988,0,0
% Reuse Demand Met,95.2783,0,0
% Load Reduction,14.6419,-0.00119946,0.00226187
TSS Flow In (kg/yr),39.5064,250.077,281.012
TSS ET Loss (kg/yr),0,0,0
TSS Infiltration Loss (kg/yr),0,0,0
TSS Low Flow Bypass Out (kg/yr),0,0,0
TSS High Flow Bypass Out (kg/yr),0,0,0
TSS Orifice / Filter Out (kg/yr),20.7106,220.516,231.628
TSS Weir Out (kg/yr),8.5447,27.8266,58.5513
TSS Transfer Function Out (kg/yr),0,0,0
TSS Reuse Supplied (kg/yr),3.03905,0,0
TSS Reuse Requested (kg/yr),0,0,0
TSS % Reuse Demand Met,0,0,0
TSS % Load Reduction,25.9479,0.693546,-3.26225
TP Flow In (kg/yr),0.231835,0.782268,0.807815
TP ET Loss (kg/yr),0,0,0
TP Infiltration Loss (kg/yr),0,0,0
TP Low Flow Bypass Out (kg/yr),0,0,0
TP High Flow Bypass Out (kg/yr),0,0,0
TP Orifice / Filter Out (kg/yr),0.140148,0.683643,0.65458
TP Weir Out (kg/yr),0.049299,0.0924583,0.162067
TP Transfer Function Out (kg/yr),0,0,0
TP Reuse Supplied (kg/yr),0.0292491,0,0
TP Reuse Requested (kg/yr),0,0,0
TP % Reuse Demand Met,0,0,0
TP % Load Reduction,18.2837,0.78831,-1.09332
TN Flow In (kg/yr),3.25734,6.73705,9.05174
TN ET Loss (kg/yr),0,0,0
TN Infiltration Loss (kg/yr),0,0,0
TN Low Flow Bypass Out (kg/yr),0,0,0
TN High Flow Bypass Out (kg/yr),0,0,0
TN Orifice / Filter Out (kg/yr),2.02584,5.9839,7.50654
TN Weir Out (kg/yr),0.673167,0.746293,1.56879

TN Transfer Function Out (kg/yr),0,0,0
TN Reuse Supplied (kg/yr),0.405772,0,0
TN Reuse Requested (kg/yr),0,0,0
TN % Reuse Demand Met,0,0,0
TN % Load Reduction,17.1408,0.10178,-0.260613
GP Flow In (kg/yr),35.8905,61.9891,26.0985
GP ET Loss (kg/yr),0,0,0
GP Infiltration Loss (kg/yr),0,0,0
GP Low Flow Bypass Out (kg/yr),0,0,0
GP High Flow Bypass Out (kg/yr),0,0,0
GP Orifice / Filter Out (kg/yr),0,0,0
GP Weir Out (kg/yr),0,0,0
GP Transfer Function Out (kg/yr),0,0,0
GP Reuse Supplied (kg/yr),0,0,0
GP Reuse Requested (kg/yr),0,0,0
GP % Reuse Demand Met,0,0,0
GP % Load Reduction,100,100,100
PET Scaling Factor, , ,

Generic treatment nodes
Location,10 x 690mm Psorb StormFilter (MCC),1 x OceanGuard,15 x 690mm Psorb StormFilter (MCC)
ID,6,8,11
Node Type,GenericNode,GPTNode,GenericNode
Lo-flow bypass rate (cum/sec),0,0,0
Hi-flow bypass rate (cum/sec),0.009,0.02,0.0135
Flow Transfer Function
Input (cum/sec),0,0,0
Output (cum/sec),0,0,0
Input (cum/sec),10,10,10
Output (cum/sec),10,10,10
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Input (cum/sec), , ,
Output (cum/sec), , ,
Gross Pollutant Transfer Function
Enabled,True,True,True
Input (kg/ML),0,0,0
Output (kg/ML),0,0,0
Input (kg/ML),14.9393,14.7808,14.9393
Output (kg/ML),0,0,0
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,

Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Input (kg/ML), , ,
Output (kg/ML), , ,
Total Nitrogen Transfer Function
Enabled,True,True,True
Input (mg/L),0,0,0
Output (mg/L),0,0,0
Input (mg/L),100,50,100
Output (mg/L),44.1,39.5,44.1
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Total Phosphorus Transfer Function
Enabled,True,True,True
Input (mg/L),0,0,0
Output (mg/L),0,0,0
Input (mg/L),10,10,10
Output (mg/L),1.39,7,1.39
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Total Suspended Solids Transfer Function
Enabled,True,True,True
Input (mg/L),0,0,0

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Output (mg/L),0,0,0
Input (mg/L),1000,20.8,1000
Output (mg/L),66,8,66
Input (mg/L), ,40.3,
Output (mg/L), ,14.1,
Input (mg/L), ,60.6,
Output (mg/L), ,19.3,
Input (mg/L), ,79.3,
Output (mg/L), ,23.4,
Input (mg/L), ,99.9,
Output (mg/L), ,26.9,
Input (mg/L), ,121,
Output (mg/L), ,30,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
Input (mg/L), , ,
Output (mg/L), , ,
TSS Flow based Efficiency Enabled,Off,Off,Off
TSS Flow based Efficiency, , ,
TP Flow based Efficiency Enabled,Off,Off,Off
TP Flow based Efficiency, , ,
TN Flow based Efficiency Enabled,Off,Off,Off
TN Flow based Efficiency, , ,
GP Flow based Efficiency Enabled,Off,Off,Off
GP Flow based Efficiency, , ,
IN - Mean Annual Flow (ML/yr),2.83,0.324,5.13
IN - TSS Mean Annual Load (kg/yr),248,117,290
IN - TP Mean Annual Load (kg/yr),0.776,0.195,0.817
IN - TN Mean Annual Load (kg/yr),6.73,0.767,9.08
IN - Gross Pollutant Mean Annual Load (kg/yr),0.00,7.83,0.00
OUT - Mean Annual Flow (ML/yr),2.83,0.324,5.13
OUT - TSS Mean Annual Load (kg/yr),46.5,21.1,79.6
OUT - TP Mean Annual Load (kg/yr),0.200,0.137,0.268
OUT - TN Mean Annual Load (kg/yr),3.45,0.606,4.98
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00,0.00,0.00
Flow In (ML/yr),2.83459,0.323609,5.12845
ET Loss (ML/yr),0,0,0
Infiltration Loss (ML/yr),0,0,0
Low Flow Bypass Out (ML/yr),0,0,0
High Flow Bypass Out (ML/yr),0.372302,0,0.840016
Orifice / Filter Out (ML/yr),0,0,0
Weir Out (ML/yr),0,0,0
Transfer Function Out (ML/yr),2.46234,0.323609,4.28837
Reuse Supplied (ML/yr),0,0,0
Reuse Requested (ML/yr),0,0,0
% Reuse Demand Met,0,0,0
% Load Reduction,-0.00155225,0,0.00128694
TSS Flow In (kg/yr),248.336,116.628,290.156
TSS ET Loss (kg/yr),0,0,0
TSS Infiltration Loss (kg/yr),0,0,0
TSS Low Flow Bypass Out (kg/yr),0,0,0
TSS High Flow Bypass Out (kg/yr),32.2827,0,64.6871
TSS Orifice / Filter Out (kg/yr),0,0,0
TSS Weir Out (kg/yr),0,0,0
TSS Transfer Function Out (kg/yr),14.2594,21.0544,14.8818
TSS Reuse Supplied (kg/yr),0,0,0
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TSS Reuse Requested (kg/yr),0,0,0
TSS % Reuse Demand Met,0,0,0
TSS % Load Reduction,81.2584,81.9474,72.5772
TP Flow In (kg/yr),0.776087,0.19521,0.816626
TP ET Loss (kg/yr),0,0,0
TP Infiltration Loss (kg/yr),0,0,0
TP Low Flow Bypass Out (kg/yr),0,0,0
TP High Flow Bypass Out (kg/yr),0.106818,0,0.179471
TP Orifice / Filter Out (kg/yr),0,0,0
TP Weir Out (kg/yr),0,0,0
TP Transfer Function Out (kg/yr),0.093028,0.136647,0.088565
TP Reuse Supplied (kg/yr),0,0,0
TP Reuse Requested (kg/yr),0,0,0
TP % Reuse Demand Met,0,0,0
TP % Load Reduction,74.2495,30,67.1776
TN Flow In (kg/yr),6.73005,0.767473,9.07548
TN ET Loss (kg/yr),0,0,0
TN Infiltration Loss (kg/yr),0,0,0
TN Low Flow Bypass Out (kg/yr),0,0,0
TN High Flow Bypass Out (kg/yr),0.86295,0,1.74276
TN Orifice / Filter Out (kg/yr),0,0,0
TN Weir Out (kg/yr),0,0,0
TN Transfer Function Out (kg/yr),2.58737,0.606304,3.23361
TN Reuse Supplied (kg/yr),0,0,0
TN Reuse Requested (kg/yr),0,0,0
TN % Reuse Demand Met,0,0,0
TN % Load Reduction,48.7326,21,45.1669
GP Flow In (kg/yr),0,7.83066,0
GP ET Loss (kg/yr),0,0,0
GP Infiltration Loss (kg/yr),0,0,0
GP Low Flow Bypass Out (kg/yr),0,0,0
GP High Flow Bypass Out (kg/yr),0,0,0
GP Orifice / Filter Out (kg/yr),0,0,0
GP Weir Out (kg/yr),0,0,0
GP Transfer Function Out (kg/yr),0,0,0
GP Reuse Supplied (kg/yr),0,0,0
GP Reuse Requested (kg/yr),0,0,0
GP % Reuse Demand Met,0,0,0
GP % Load Reduction,100,100,100

Other nodes
Location,Receiving Node
ID,7
Node Type,ReceivingNode
IN - Mean Annual Flow (ML/yr),5.13
IN - TSS Mean Annual Load (kg/yr),79.6
IN - TP Mean Annual Load (kg/yr),0.268
IN - TN Mean Annual Load (kg/yr),4.98
IN - Gross Pollutant Mean Annual Load (kg/yr),0.00
OUT - Mean Annual Flow (ML/yr),5.13
OUT - TSS Mean Annual Load (kg/yr),79.6
OUT - TP Mean Annual Load (kg/yr),0.268
OUT - TN Mean Annual Load (kg/yr),4.98
OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00
% Load Reduction,4.06
TSS % Load Reduction,86.5
TN % Load Reduction,61.9
TP % Load Reduction,82.0

GP % Load Reduction,100

Links
Location,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link,Drainage Link
Source node ID,5,1,8,3,2,6,10,11,9,4,12
Target node ID,6,8,5,5,5,10,11,7,4,10,10
Muskingum-Cunge Routing,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed,Not Routed
Muskingum K, , , , , , , , , , ,
Muskingum theta, , , , , , , , , , ,
IN - Mean Annual Flow
(ML/yr),2.83,0.324,0.324,1.03,1.48,2.83,5.13,5.13,1.48,1.27,1.03
IN - TSS Mean Annual Load
(kg/yr),248,117,21.1,190,39.5,46.5,290,79.6,39.5,29.3,205
IN - TP Mean Annual Load
(kg/yr),0.776,0.195,0.137,0.414,0.232,0.200,0.817,0.268,0.232,0.189,0.419
IN - TN Mean Annual Load
(kg/yr),6.73,0.767,0.606,2.87,3.26,3.45,9.08,4.98,3.26,2.70,2.90
IN - Gross Pollutant Mean Annual Load
(kg/yr),0.00,7.83,0.00,26.1,35.9,0.00,0.00,0.00,35.9,0.00,26.1
OUT - Mean Annual Flow
(ML/yr),2.83,0.324,0.324,1.03,1.48,2.83,5.13,5.13,1.48,1.27,1.03
OUT - TSS Mean Annual Load
(kg/yr),248,117,21.1,190,39.5,46.5,290,79.6,39.5,29.3,205
OUT - TP Mean Annual Load
(kg/yr),0.776,0.195,0.137,0.414,0.232,0.200,0.817,0.268,0.232,0.189,0.419
OUT - TN Mean Annual Load
(kg/yr),6.73,0.767,0.606,2.87,3.26,3.45,9.08,4.98,3.26,2.70,2.90
OUT - Gross Pollutant Mean Annual Load
(kg/yr),0.00,7.83,0.00,26.1,35.9,0.00,0.00,0.00,35.9,0.00,26.1

Catchment Details
Catchment Name,0333_669-683 OSHR MUSIC Model
Timestep,6 Minutes
Start Date,1/01/1959
End Date,31/12/1959 11:54:00 PM
Rainfall Station, 66062 SYDNEY
ET Station,Monthly User Defined
Mean Annual Rainfall (mm), 1490
Mean Annual ET (mm), 1260

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