

**Hydraulic Design**  
**Including OSD Calculations,**  
**Overland Flow Path Details,**  
**Aboveground RWT/OSD Tanks Details,**  
**Silt Arrestor Pit Details,**  
**Orifice Details,**  
**Elevation Details,**  
**Roof Plan**  
  
**and**  
**Stormwater Systems**  
**for**  
**Proposed Single Residential Development at**

**Lot A, DP 161572,**  
**(H/No. 71) George Street,**  
**AVALON BEACH**

**3 September 2019**

**Northern Beaches (Old Pittwater) Council**  
**Our Job Number: D3817**

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**OSD Requirement Table-Pittwater Council's DCP 2014****Hydraulic Details:**

<b>1. Notes, Calculations &amp; Pits Details</b>	<b>1</b>
<b>2. Drainage Plan (1 in 200)</b>	<b>2</b>
<b>3. Roof Plan &amp; Elevation Details (1 in 100)</b>	<b>3</b>
<b>4. RWT/OSD Tanks &amp; Orifice Details</b>	<b>4</b>

**IMPORTANT NOTES:**

**The following hydraulic plans should be read in conjunction with:**

- 1. Architectural Plans from Rawson Homes Job No. A009118 Issue C dated 12 August 2019 (Phone: 02 8765 5500).**
- 2. Northern Beaches (Old Pittwater) Council Policy on Stormwater Requirements for Residential Developments & BASIX Requirements.**

## REQUIREMENTS FOR SIZE AND ALLOWABLE DISCHARGE FROM ON-SITE DETENTION SYSTEMS

Additional Hard (Impervious) Surface Area (square metres)	Minimum Capacity of On-Site Detention Tank (Litres)	Discharge Rate Litres/Sec
0 - 50	Nil	Nil
>50 - 75	4,500	2
>75 - 100	6,000	3
>100 - 150	9,000	4
>150 - 200	12,000	6
>200 - 250	15,000	7
>250 - 300	18,000	9
>300 - 400	24,000	12
>400 - 500	30,000	15
>500 - 600	36,000	18
>600 - 700	42,000	21
>700 - 800	48,000	24
>800 - 900	54,000	27
>900 - 1,000	60,000	30
>1,000*	A minimum storage capacity of 60 litres per m <sup>2</sup> of additional hard/impervious surface area, and a discharge rate which replicates the discharge from the site were it to be undeveloped.	

\*Developments exceeding 1,000 square metres of additional hard (impervious) surface area must also provide with the Water Management Plan, an Integrated Water Management Strategy prepared by a suitably qualified and experienced Water Engineer, demonstrating that stormwater flows discharged from the site is to be no greater than what would have occurred predevelopment, and that Water Sensitive Urban Design principles have been practically maximised within the proposed development.

The discharge from the outlet of the OSD facility shall be controlled by an orifice plate set into the discharge line to control the rate of flow from the system. The required size of orifice plate is set out in Appendix 11 - Stormwater Management Technical Data - Table 1.

The orifice plate is to be located at the invert of all storage facilities to avoid stagnant water (silt traps will not be permitted).

A high-level outlet to the OSD facility is to be provided to cater for surcharge/overflow during major storm events and/or blockages.

Surface flow paths, including the provision of an emergency overflow to cater for blockage of the system must be provided between the OSD facility and the point of stormwater discharge from the land.

All habitable floor levels are to be a minimum of 300mm above and garage floor levels are to be a minimum of 150mm above the maximum design storage water surface level and flow path levels.

The OSD facility may be an underground storage facility as follows:

1. Underground Storage facility:
  - Storage tank located underground provided with a maintenance access hatch
  - A stainless or galvanised mesh screen is to be installed a minimum of 300mm from the outlet to prevent blockage of the orifice by debris
  - Discharge orifice plate installed
  - High level outlet for discharge during a major storm event
  - Venting of the storage tank to prevent the build up of gases
2. Landscaped OSD storage facility:
  - Storage volumes in landscaping areas shall include an allowance for 10 percent additional storage for vegetation growth and construction inaccuracies
  - Discharge orifice plate installed
  - A stainless or galvanised mesh screen is to be installed a minimum of 300mm from the outlet to prevent blockage of the orifice by debris
  - High level outlet for discharge during a major storm event
  - The desirable minimum surface slope to the discharge outlet is 1.5 percent, with the absolute minimum being 1.0 percent
  - Subsoil drainage should be provided in landscaped areas to prevent the ground becoming saturated during prolonged wet weather

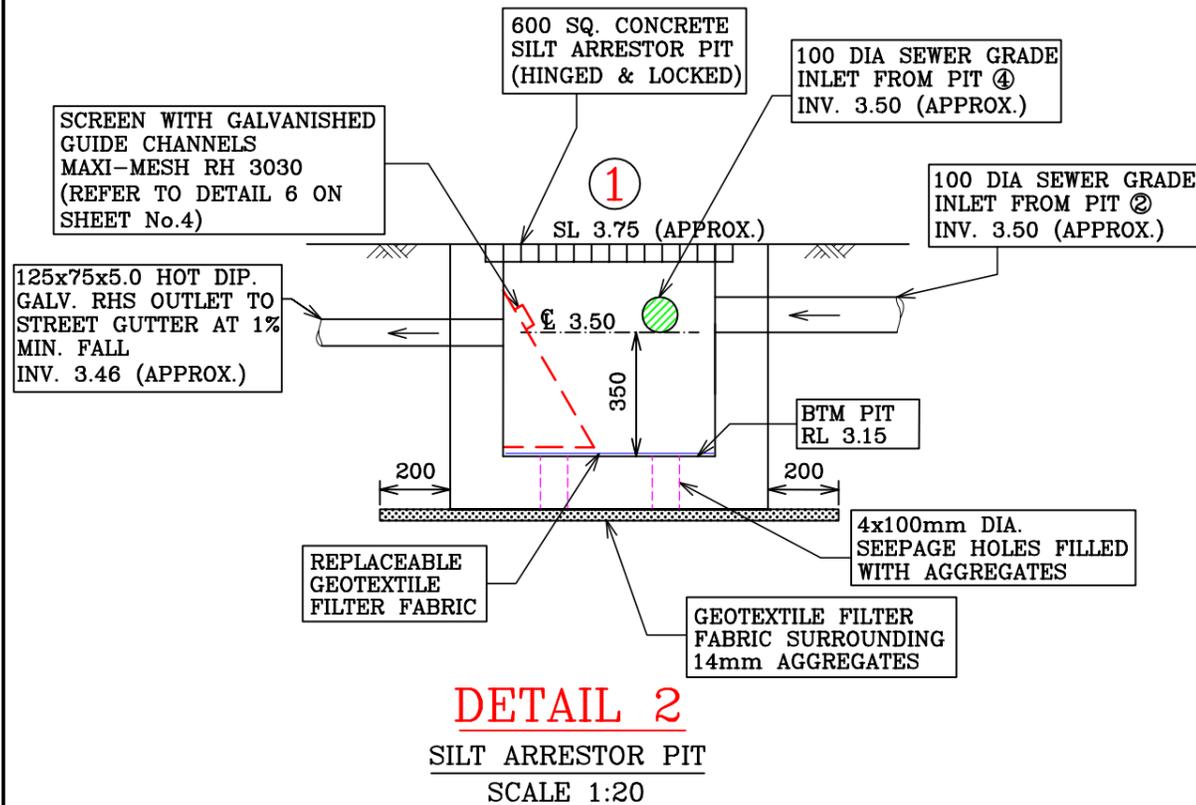
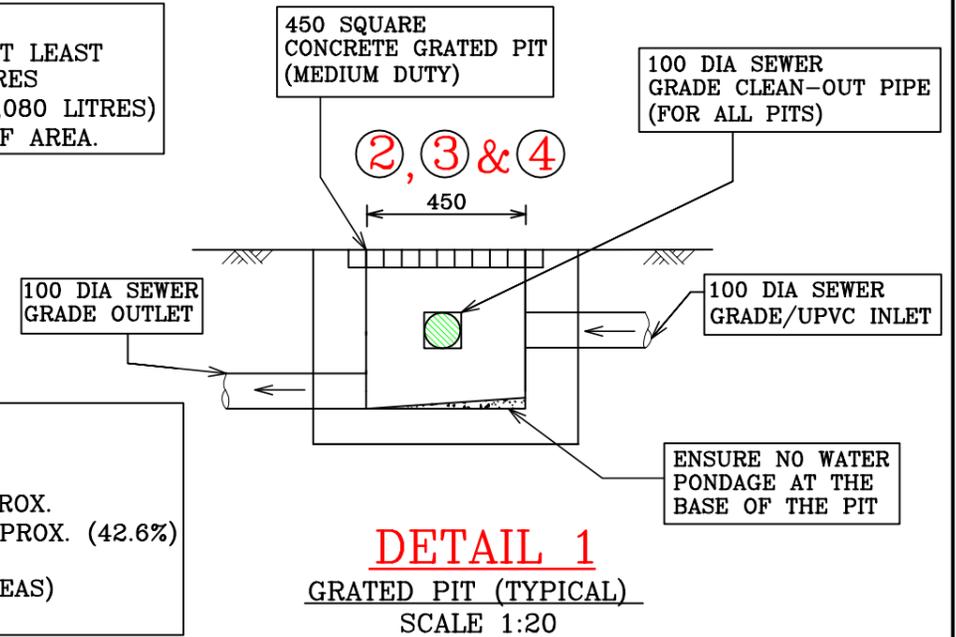
**GENERAL NOTES:**

1. ALL HYDRAULIC WORKS TO BE IN ACCORDANCE WITH THE NORTHERN BEACHES (OLD PITTWATER) COUNCIL'S STANDARD SPECIFICATIONS AND TO THE SUPERVISING ENGINEER'S SATISFACTION.
2. THESE PLANS ARE TO BE READ IN CONJUNCTION WITH ARCHITECTURAL PLANS FROM RAWSON HOMES JOB No. A009118 ISSUE C DATED 12 AUGUST 2019 (PHONE: (02) 8765 5500).
3. ALL STORMWATER PIPES TO BE 100 DIA. UPVC UNLESS NOTED OTHERWISE. PIPES UNDER DRIVEWAY TO BE SEWER GRADE.
4. DEPTH AND LOCATION OF SEWER & SERVICES TO BE CONFIRMED PRIOR TO COMMENCEMENT OF DRAINAGE WORKS.
5. THE CONTRACTOR SHALL IMPLEMENT EROSION AND SEDIMENTATION CONTROL MEASURES AS NECESSARY AND TO THE SATISFACTION OF COUNCIL PRIOR TO COMMENCEMENT OF CONSTRUCTION AND DURING CONSTRUCTION.
6. ENSURE FINISHED GROUND LEVELS ARE SLOPING AWAY FROM THE DEVELOPMENT & INTO PITS OR YARD SUMPS, AS SHOWN ON THE ATTACHED DRAINAGE PLAN.
7. HYDRAULIC PLANS ARE SUBJECT TO COUNCIL APPROVAL.

**BASIX REQUIREMENTS (29.08.2019):**  
 3,000 LITRES CAPACITY RAINWATER TANK FOR AT LEAST 231.00 m<sup>2</sup> OF ROOF AREA. PROVIDED 3,030 LITRES RETENTION WITHIN 8,160 LITRES CAPACITY (2x4,080 LITRES) ABOVEGROUND RWT/OSD TANKS FOR TOTAL ROOF AREA.

OSD REQUIRED = 4.500 m<sup>3</sup>  
 PSD = 2 l/sec  
 RWT = 3.0 m<sup>3</sup>  
 PROVIDED 8,160 LITRES (EFFECTIVE 7,580 LITRES) TANKS WITH 3,030 LITRES FOR RETENTION & 4,550 LITRES FOR DETENTION SYSTEM.

**CALCULATIONS:**  
 TOTAL SITE AREA = 690.10 m<sup>2</sup>  
 TOTAL ROOF AREA = 231.00 m<sup>2</sup>  
 TOTAL EXISTING IMPERVIOUS AREA = 242.00 m<sup>2</sup> APPROX.  
 TOTAL PROPOSED IMPERVIOUS AREA = 294.50 m<sup>2</sup> APPROX. (42.6%)  
 INCREASE IN IMPERVIOUS AREA = 52.50 m<sup>2</sup>  
 (INCLUDING ROOF, GARAGE, DRIVEWAY AND PAVED AREAS)  
 \* OSD IS REQUIRED.



**IMPORTANT NOTES:**

1. THIS DEVELOPMENT IS TO CONSTRUCT A NEW SINGLE RESIDENTIAL DWELLING ONLY. ACCORDING TO COUNCIL'S DCP 2014, OSD SYSTEM IS REQUIRED FOR THIS DEVELOPMENT.
2. THIS SITE IS FLOOD AFFECTED. THE HABITABLE & NON-HABITABLE FLOOR LEVELS ARE ABOVE THE FLOOD LEVELS (ALSO REFER TO FLOOD IMPACT & RISK MANAGEMENT REPORT FROM NASSERI ASSOCIATES JOB No. D3817 DATED 3 SEPTEMBER 2019).
3. SITE INSPECTION WAS CARRIED OUT ON 16 AUGUST 2019 TO CHECK EXISTING GULLY PIT IN FRONT AND OVERALL DRAINAGE PATTERN OF THE AREA.
4. ALL ROOF WATER IS COLLECTED INTO TWO ABOVEGROUND RAINWATER TANKS WITH TOTAL CAPACITY OF 8,160 LITRES (EFFECTIVE STORAGE CAPACITY 7,580 LITRES) OR 2x4,080 LITRES (EFFECTIVE STORAGE CAPACITY 3,790 LITRES EACH) PLACED ON SOUTHERN SIDE OF THE DWELLING TO ACT AS A COMBINED RETENTION AND DETENTION SYSTEM. THE LOWER PORTION OF THE TANKS WITH TOTAL CAPACITY OF 3,030 LITRES IS USED FOR RAINWATER RETENTION ONLY FOR RE-USE SUCH AS TOILET FLUSHING, LAUNDRY & IRRIGATION SYSTEM. THE UPPER PORTION OF THE TANKS WITH TOTAL CAPACITY OF 4,550 LITRES IS FOR DETENTION. 100 DIA SEWER GRADE OVERFLOW/OUTLET PIPE FROM OSD/RWT1 TO BE CONNECTED SEPARATELY TO PIT 4 AT 1% MIN. FALL (REFER TO DRAINAGE PLAN ON SHEET No.2).
3. SURFACE WATER AROUND THE DWELLING INCLUDING DRIVEWAY AND OVERFLOW/OUTLET FROM OSD/RWT1 TO BE DRAINED TO SILT ARRESTOR PIT 1 IN FRONT PRIOR TO BE DISCHARGING TO STREET GUTTER IN JOSEPH STREET VIA 125x75x5.0 HOT DIP. GALV. RHS OUTLET AT 1% MIN. FALL (REFER TO DRAINAGE PLAN ON SHEET No.2).
4. LEVELS ARE CRITICAL. PRIOR TO ANY CHANGES CONTACT ENGINEER.
5. PRIOR TO BACKFILLING STORMWATER PIPES AND CONNECTION TO STREET GUTTER IN FRONT, CONTACT ENGINEER FOR AN INSPECTION.
6. AFTER COMPLETION OF ALL HYDRAULIC WORKS, FINAL WORK-AS-EXECUTED INSPECTION WILL BE CARRIED OUT AND COMPLIANCE CERTIFICATE WILL BE ISSUED IF APPROPRIATE.

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 BE, FIEAust.,  
 NPER, CPEng.  
 DATE: 03/09/2019

**SYMBOLS & NOTATIONS**

---	STORMWATER LINES	SL	FINISHED SURFACE LEVEL
o	DOWNPIPE	FFL	FINISHED FLOOR LEVEL
⊙	100 DIA YARD SUMP	FPL	FINISHED PLATFORM LEVEL
▤	225x100 GRATED BOX DRAIN	---	SEDIMENT CONTROL BARRIER
INV	INVERT LEVEL (PIPE / PIT)	---	PROPOSED BOUNDARY
---		-s-	SEWER

ISSUE	AMENDMENTS	DATE
CLIENT: RAWSON HOMES (MR. M.J. EVANS & MS. J.R. EVANS)		
LOT A (H/No. 71) GEORGE STREET, AVALON BEACH		
DESIGNED PC	DRAWN PC	CHECKED JN
SCALE AS SHOWN		

HYDRAULIC DETAILS		
NOTES, CALCULATIONS & PITS DETAILS		
CAD REF. ENG/RAWSON	JOB No. D3817	SHEET No. 1

LOT A  
690.10 m<sup>2</sup>

CREATE A SWALE OR EARTH MOUND TO DIVERT SURFACE WATER TO PITS ③, ② & FRONT OF THE PROPERTY (REFER TO DETAIL 3)

100 DIA YEAR SUMP OR 250 SQUARE GRATED PIT (TYPICAL) STARTING POINT SL 4.40 (APPROX.) INV. 4.25

450 SQ. CONCRETE GRATED PIT SL 4.45 (APPROX.) INV. 4.05 (REFER TO DETAIL 1 ON SHEET No.1)

100 DIA SEWER GRADE TO PIT ② AT 1% MIN. FALL

450 SQ. CONCRETE GRATED PIT SL 4.20 (APPROX.) INV. 3.75 (REFER TO DETAIL 1 ON SHEET No.1)

100 DIA SEWER GRADE CLEAN-OUT PIPE TO PIT ②

**PLEASE NOTE:**  
BOTH TANKS MUST BE PLACED AT THE SAME BASE LEVEL & MUST HAVE THE SAME HEIGHT.

**PLEASE NOTE:**  
1. THE EXACT LOCATION OF DOWNPIPES, STORMWATER LINE, PITS AND OSD/RWTS MAY ALTER DURING CONSTRUCTION, TO SUIT THE SITE CONDITION.  
2. ENSURE NO DAMAGE OCCURS TO EXISTING TREE ROOTS WHILE CONSTRUCTING THE STORMWATER SYSTEM.

**RWT/OSD (MODLINE TANKS):**  
8,160 LITRES (2x4,080) LITRES CAPACITY (3,000Lx 900Wx1,560H EACH) ABOVEGROUND RWT/OSD TANKS \*EFFECTIVE CAPACITY 7,580 LITRES (REFER TO ELEVATION A ON SHEET No.3)

100 DIA SEWER GRADE OVERFLOW/OUTLET PIPE FROM TOP OF OSD/RWT1 TO BE CONNECTED SEPARATELY TO PIT ④ AT 1% MIN FALL SL 4.35 (APPROX.) INV. 4.20

100 DIA SEWER GRADE CLEAN-OUT PIPE TO PIT ④

450 SQ. CONCRETE GRATED PIT SL 4.35 (APPROX.) INV. 3.90 (REFER TO DETAIL 1 ON SHEET No.1)

100 DIA SEWER GRADE TO PIT ① AT 1% MIN. FALL -THE EXACT LOCATION TO BE DETERMINED ON SITE DURING CONSTRUCTION

ELEVATION A

225 x 100 GRATED BOX DRAIN - 100 DIA SEWER GRADE OUTLET TO BE CONNECTED TO TOP OF PIT ① AT 1% MIN. FALL SL. 4.20 (APPROX.) INV. 4.10

NEW DRIVEWAY CROSSING IN ACCORDANCE WITH COUNCIL'S REQUIREMENTS

100 DIA SEWER GRADE TO TAKE ROOF WATER TO TOP OF OSD/RWT1 (ALL DOWNPIPES TO BE FULLY SEALED)

SERVICE FREE AREA FOR FUTURE POOL APPROX. 8000Lx2000Wx1200D BY OWNER AFTER HANDOVER

BM 37 NAIL IN KERB RL 3.52 (A.H.D) SL 3.52 (APPROX.) INV. 3.42

EXISTING GULLY PIT SL 3.70 (TOP KERB) SL 3.52 (GRATE) INV. 3.00 (APPROX.) (TO REMAIN)

**PLEASE NOTE:**  
SITE INSPECTION WAS CARRIED OUT ON 16 AUGUST 2019 TO CHECK EXISTING GULLY PIT IN FRONT & OVERALL DRAINAGE PATTERN OF THE AREA.

125x75x5.0 HOT DIP. GALV. RHS OUTLET TO STREET GUTTER AT 1% MIN. FALL (THE EXACT LOCATION TO BE DETERMINED ON SITE DURING CONSTRUCTION)

600 SQ. CONCRETE SILT ARRESTOR PIT SL 3.75 (APPROX.) INV. PIT 3.15 INV. OUTLET 3.46 (REFER TO DETAIL 2 ON SHEET No.1)

SCREW CAP INSPECTION RISER/FLUSHING POINT (FOR MAINTENANCE ONLY) SL 4.00 (APPROX.) INV. 3.85

100 DIA SEWER GRADE TO PIT ④ AT 1% MIN. FALL -THE EXACT LOCATION TO BE DETERMINED ON SITE DURING CONSTRUCTION

EXISTING VEHICLE CROSSING (IN FRONT OF THIS PROPERTY ONLY) TO BE REMOVED & REPLACED WITH NEW CONCRETE KERB & GUTTER IN ACCORDANCE WITH COUNCIL'S SPECIFICATIONS



**LEGEND:**

	CONCRETE/ PAVED AREA
	100 DIA UPVC OR SEWER GRADE FOR SURFACE WATER DRAINAGE
	100 DIA SEWER GRADE FOR ROOF WATER DRAINAGE ONLY

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**SYMBOLS & NOTATIONS**

	STORMWATER LINES	SL	FINISHED SURFACE LEVEL
	DOWNPIPE	FFL	FINISHED FLOOR LEVEL
	100 DIA YARD SUMP	FPL	FINISHED PLATFORM LEVEL
	225x100 GRATED BOX DRAIN	-x-	SEDIMENT CONTROL BARRIER
INV	INVERT LEVEL (PIPE / PIT)	- - -	PROPOSED BOUNDARY
-s-	SEWER		

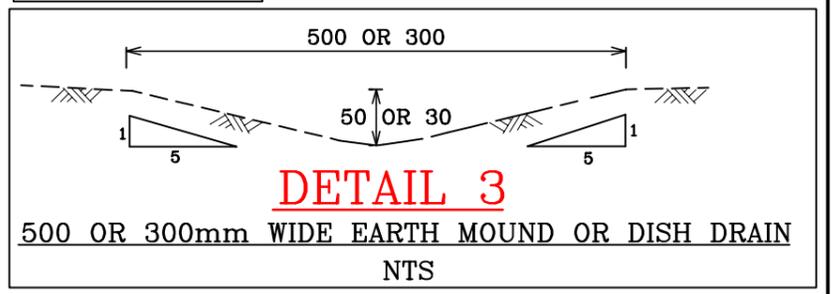
ISSUE	AMENDMENTS	DATE
CLIENT:	RAWSON HOMES (MR. M.J. EVANS & MS. J.R. EVANS)	
LOT A (H/No. 71) GEORGE STREET, AVALON BEACH		
DESIGNED	PC	DRAWN
PC	PC	CHECKED
JN	SCALE	AS SHOWN

**HYDRAULIC DETAILS**

**DRAINAGE PLAN**

CAD REF. ENG/RAWSON	JOB No. D3817	SHEET No. 2
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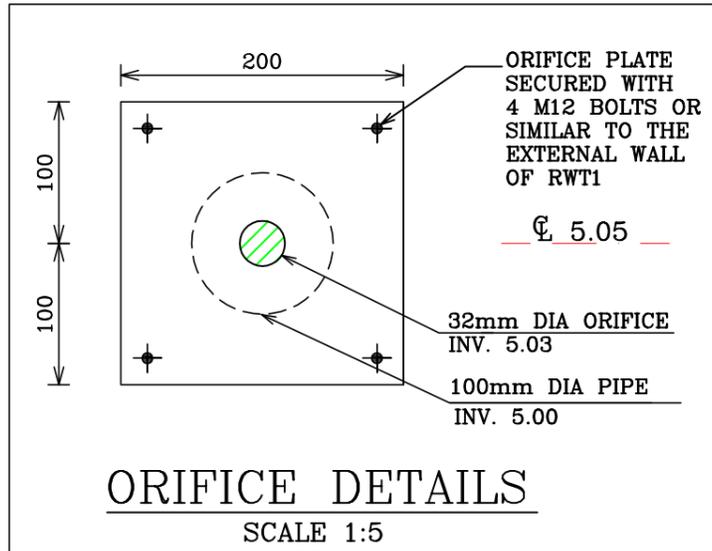
**JOSEPH STREET DRAINAGE PLAN**  
SCALE 1:200



GEORGE STREET



EACH MODLINE TANK: 3000L x 900W x 1560H



FIRST FLUSH DEVICE (REFER TO DETAIL 5)

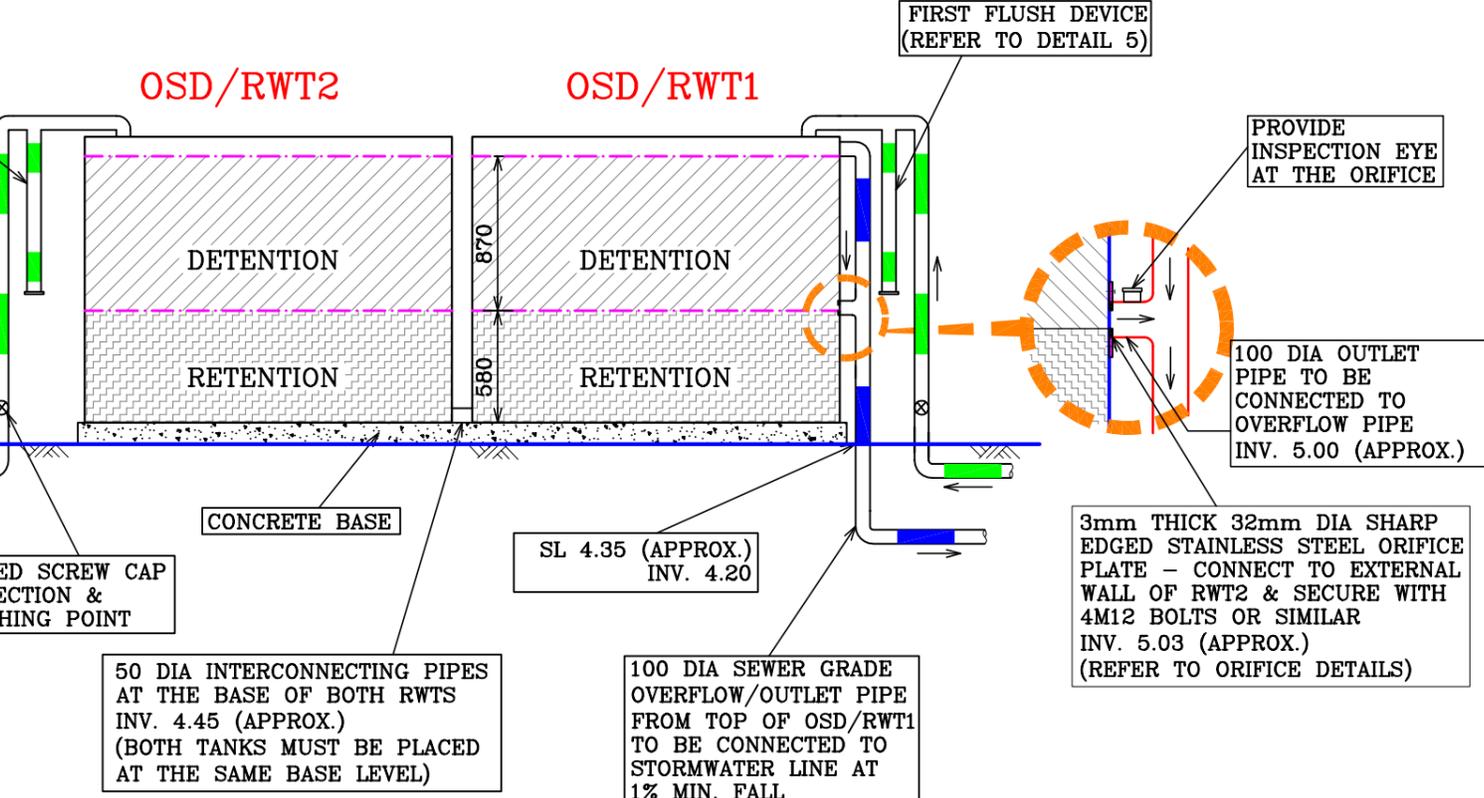
TOP RWT RL 6.01 (APPROX.)  
INV. OVERFLOW RL 5.90 (APPROX.)

DETENTION VOLUME = 4.550m<sup>3</sup> (APPROX.)

INV. ORIFICE RL 5.03 (APPROX.)

RETENTION VOLUME = 3.030m<sup>3</sup> (APPROX.)

INV. RWT RL 4.45 (APPROX.)

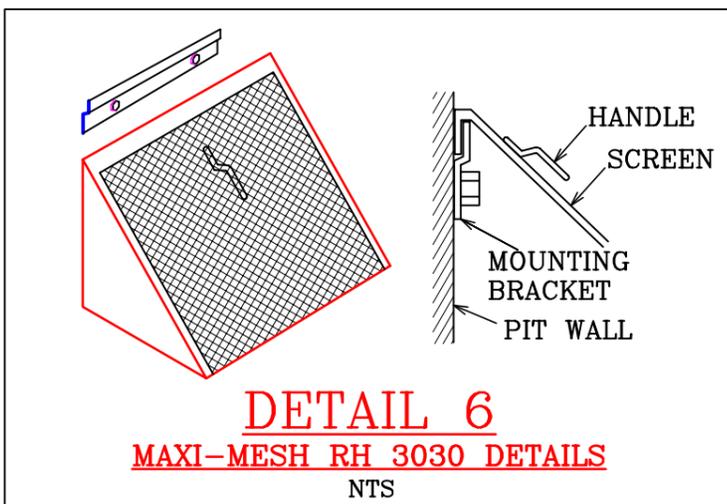
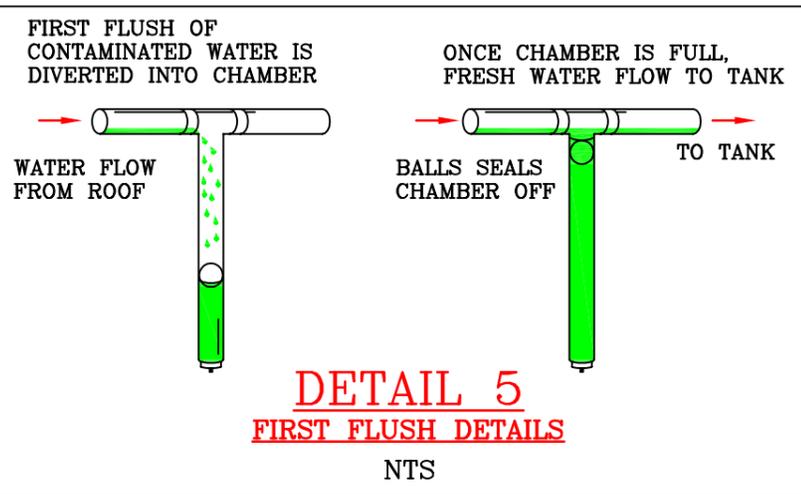


- IMPORTANT NOTES:**
1. RAINWATER TANK IS FROM KINGSPAN WATER OR SIMILAR. PH: 1300 736 562
  2. A FIRST FLUSH DEVICE IN ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS SHALL BE FITTED TO THE SYSTEM TO DIVERT THE FIRST 0.5mm OF RUN-OFF FROM THE AREA DRAINING AWAY FROM THE STORAGE TANK. (eg.0.5 l/m<sup>2</sup>)
  3. BOTH TANKS MUST BE PLACED AT THE SAME BASE LEVEL AND MUST HAVE THE SAME HEIGHT.
  4. 50-DIA INTERCONNECTING PIPE MUST BE PLACED AT THE BASE OF THE TANKS.

# DETAIL 4

## OSD/RWT DETAILS

N.T.S.



**CALCULATIONS:**

RWT VOLUME = 2x4,080 LITRES = 8,160 LITRES

EFFECTIVE VOLUME = (1.450/1.560)x8,160 = 7,580 LITRES (APPROX.)

RETENTION VOLUME = (0.58x7,580)/1.45 = 3,030 LITRES (APPROX.)

DETENTION VOLUME = (0.87x7,580)/1.45 = 4,550 LITRES (APPROX.) > 4,500 LITRES.....OK

PSD = 2 l/sec

ORIFICE = 32 mm

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▤	225x100 GRATED BOX DRAIN	-x-	SEDIMENT CONTROL BARRIER
INV	INVERT LEVEL (PIPE / PIT)	---	PROPOSED BOUNDARY
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DESIGNED	PC	DRAWN	PC	CHECKED	JN	SCALE	AS SHOWN
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**HYDRAULIC DETAILS**

RWT/OSD TANKS & ORIFICE DETAILS

CAD REF. ENG/RAWSON	JOB No. D3817	SHEET No. 4
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