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CLIFTON YAMBA MHE

STORMWATER MANAGEMENT INSPECTION AND MAINTENANCE PLAN

Manufactured Housing Estate (MHE) Development
110 – 120 Carrs Drive Yamba
LOT 2 DP733507 and Lot 32 DP1280863

FOR:
CLIFTON YAMBA LAND PTY LTD
ATF YAMBA LAND TRUST

JANUARY 2024

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Manage-Design-Engineer DOCUMENT CONTROL

Project: YAMBA MHE

Client: CLIFTON YAMBA LAND PTY LTD

ATF YAMBA LAND TRUST

Author: Andrew Smith

REVISION HISTORY

Revision	Date	Checked By	Signature
0	**23/01/24**	**Troy Ryden**	

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CONTENTS

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1.0 Purpose

This plan is intended to be a practical tool to aid in the inspection and maintenance of stormwater management devices within the proposed Clifton Yamba Land Pty Ltd Manufactured Housing Estate development. It is the responsibility of the contractor (during the construction phase) and site manager (during the operational phase) to inspect and maintain stormwater management devices incorporated into the development.

Regular inspection and maintenance of Stormwater management devices will ensure the efficient and effective operation of those devices to ensure the required stormwater quality and quantity discharge targets are achieved.

2.0 Proposed Stormwater Management Devices

The proposed Yamba MHE development includes a number of water sensitive urban design features which ensure that the site complies with the requirements of the Clarence Valley Council Residential Zones Development Control Plan 2011 Part H – Sustainable Water Controls.

In its ultimate form, the MHE Estate will incorporate the following stormwater management features to treat and detain stormwater runoff generated during rainfall events:

- 4 Vegetated Bioretention Basins
- 2 Buried on site detention tanks
- 31 SQID pit inserts fitted to stormwater pits

The location of each of these features is detailed in the Stormwater Management Plan Drawings included in Appendix A. Specific details of the products proposed for use in the construction of the buried detention tanks and SQID pit inserts has been included in Appendix B.

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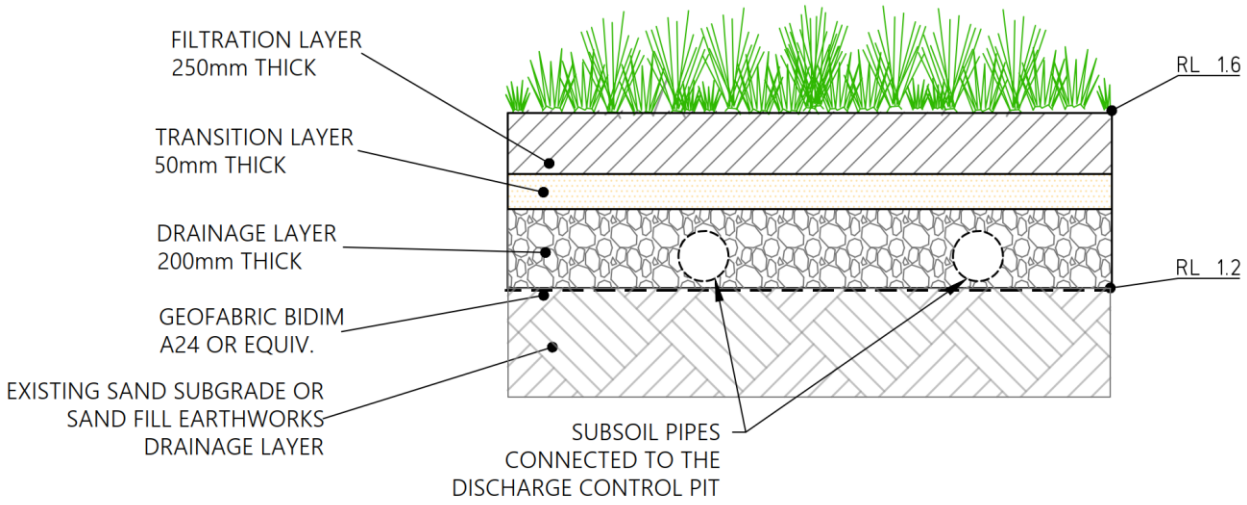
2.1 Bio Retention Basins

A total of four bio retention basins have been incorporated into the design of the proposed MHE estate. The Bio Retention basins fulfill two roles – detention of peak stormwater discharge flows from the site as well as retention and treatment of stormwater pollutants which are transported within the site via stormwater runoff flows.

The following image shows the typical section through the floor of the proposed bio basins. As detailed, the basins incorporate vegetated filter media over a drainage layer which works to filter out and absorb nurtrients from stormwater runoff prior to discharge of stormwater to the existing open channel.



TYPICAL BIO-FILTRATION ZONE PROFILE
(400mm THICK)
N.T.S

To ensure that these bio basins operate efficiently and effectively, regular inspections and ongoing maintenance of the basins is essential.

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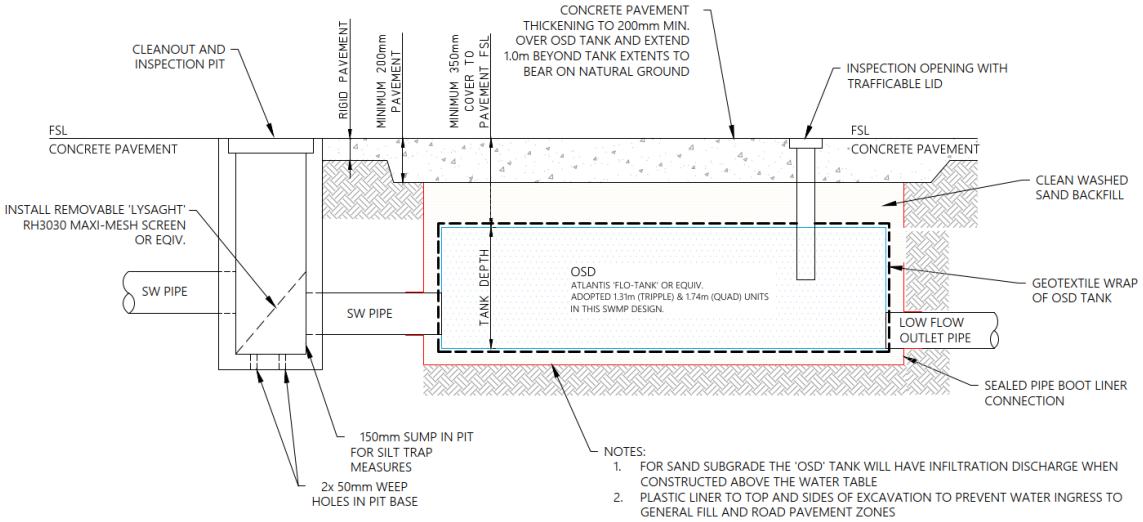
2.2 Buried Detention Tanks

Buried Detention Tanks are primarily a form of on site stormwater detention, however they also perform a stormwater treatment function where infiltration of detained stormwater into the ground below the tanks can be achieved. There are a total of two buried detention tanks within the proposed Yamba MHE development to supplement the detention achieved within the bio basins.

Appendix B contains details of the proposed Atlantis Flo Tanks to be used for the construction of the buried detention cells. A typical detail of the cells has also been included below. It is important to note the inclusion of an Inspection Opening near the outlet of the tank and the placement of a cleanout and inspection pit immediately upstream of the Atlantis Cells.



TYPICAL DETAIL - SECTION VIEW
OSD ATLANTIS 'FLO-TANK'
N.T.S

2.3 SQID Pit Inserts

SQID pit inserts are a form of pollutant trap designed with or retrofitted to stormwater inlet pits. The proposed development design specifies SPEL Stormsack pit inserts to be installed in specific stormwater inlet pits within the roadways. Predominantly, these pits capture stormwater flows that discharge to the buried detention tanks described in 2.2 above.

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The nominated SPEL product provides filtration of solid pollutants and other debris and has been demonstrated to reduce the transport of gross pollutants, suspended solids, phosphorus and nitrogen when properly installed and maintained.

Appendix B contains additional information on the SPEL Stormsack product and it's features, including pollutant reduction efficiencies.

3.0 Inspection

All stormwater quality devices must be routinely inspected and maintained to ensure they continually function as designed. If proper maintenance is not provided, adverse environmental impacts such as the discharge of pollutants into ground and surface waters may occur. In extreme cases, the structural integrity of detention basin berms or control structures can be compromised resulting in failure.

Regularly conducted inspections are crucial to ensure effective performance. As a guideline, the following should be undertaken at a minimum. Significant storm events may necessitate more frequent inspections.

- General Site Conditions - Monthly
- Emptying of trash racks / SQID pit inserts – Monthly and following each rain event
- Structural/Mechanical Components – Annually
- Earthworks - Annually
- Vegetation – Biannually

An inspection checklist is provided in Appendix C of this report and is to be completed by the asset owner or their nominated representative during each inspection. The following is a list of problems that may be encountered during an inspection:

(a) General Site Conditions

- Trash and debris
- Evidence that water remains in the basin longer than 5 days. The presence of wetland vegetation is a good indicator that water is remaining in the basin longer

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than intended. Where slow discharge rates are observed, basin subsoil drains should be flushed to remove any blockages
- Animal burrows
- Vandalism

(b) Structural/Mechanical

- Obstructions of the inlet or outlet devices by rubbish, debris, and vegetative growth
- Cracks and deterioration of inlets, outlet structures, pipes, and catch basins
- Outlet protection buried with silt and sediment
- Damaged or sediment laden low flow channels
- Water seepage or ponding

(c) Vegetation

- Bare ground void of vegetation
- Weeds and woody vegetation
- Invasive plant species
- Trees and other woody vegetation on the berm

(d) Earthworks

- Excessive erosion or sedimentation, particularly in emergency spillways and swales.
- Cracks or settling in the embankment or berms
- Deterioration of downstream channels

3.1 Safety Considerations

Safety considerations must be a constant focus during stormwater treatment device inspections. Prior to conducting the inspection, anticipate any potential hazards based on recent or current conditions (i.e., flooding after a heavy rain). Always avoid hazardous conditions and document them on the inspection checklist.

Common safety considerations when performing stormwater control inspections include:

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- Never conduct inspections of confined spaces alone, without proper training and recovery equipment.
- Take precautions around standing water; depths are likely unknown and the ground may be unstable.
- Park in areas that provide safe entrance and exit of work area; do not create potential conflicts with other vehicles/equipment operating in the work area and provide maximum protection for workers entering and exiting the vehicle along roadways.
- Always wear protective clothing, boots, and safety vests.
- Be aware of large vertical drops and avoid standing on retaining walls or other structures that present a fall hazard. Make a note of hazard areas on the inspection form.
- If toxic, hazardous or unknown substances are discovered in the area, leave the vicinity and report the findings by contacting the relevant authority
- Be aware of loose material, excavation drop-off, tripping hazards, uneven ground, and other obstructions.
- Be aware of poisonous plants, insects, and wildlife.

3.2 Reporting and Record Keeping

Observations made at the time of inspection pertaining to the status of the stormwater control shall be documented. All inspection findings and maintenance activities should be noted on the appropriate inspection form in Appendix C. Completed inspection forms are to be retained by the entity responsible for maintaining the stormwater management system and then distributed to authoritative parties as required.

4.0 Stormwater Device Maintenance

Stormwater devices require two basic types of maintenance: (1) routine maintenance and (2) emergency maintenance. All routine maintenance and/or emergency repair needs found at the time of inspection should be identified and reported. Visual observations, contacts made, maintenance performed, and any maintenance recommended at the time of inspection must be documented.

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If emergency maintenance needs are found, the inspector should either take immediate action to correct the issues or alert the responsible parties of maintenance and/or repair needs. A follow-up inspection should be made to ensure that corrective actions have been satisfactorily completed and normal operation has been restored. All correspondence and corrective actions shall be documented.

4.1 Routine Maintenance

Routine maintenance is any procedure performed on a regular basis to maintain the proper working order of a stormwater device. Tasks associated with routine maintenance include, but are not limited to, the following:

- Periodic maintenance of grasses, trees, shrubs, and other desirable plant species within detention / retention basins
- Removal of undesirable plant species
- Removal of trash and debris
- Upkeep of mechanical/structural components

Care should be taken to avoid using equipment that can cause soil compaction in or around stormwater controls. Heavy equipment with narrow tracks or narrow tyres, rubber tyres with large lugs, or high-pressure tyres can cause excessive compaction resulting in reduced infiltration and damage to underdrain systems.

For buried detention tanks, removal of silt and sediment from within the base of the tank should be undertaken using a vacuum excavation equipment.

4.2 Emergency Maintenance

Emergency maintenance is a non-routine repair performed to correct a problem and restore a stormwater control to its proper working order. Tasks associated with emergency maintenance include, but are not limited to:

- Gross pollutant & Sediment removal
- Structural repair
- Erosion repair/bank stabilization

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4.3 Vegetative Maintenance

Desirable vegetation is an important component of any detention basin or drainage channel. Vegetation is used to help control erosion, provide structural stability and remove pollutants from stormwater runoff. Some have native/ornamental grasses, trees, shrubs, and herbaceous plants around their outside perimeter. Desirable vegetation can also enhance the aesthetic appeal of stormwater controls and enable them to blend into the landscape.

Periodic maintenance of desirable vegetation is required to ensure that it remains healthy and established. Climatic conditions, lack of proper maintenance, storm events, vehicular/equipment traffic, and vandalism can have a detrimental effect on plant material. If plant species are found to be decreased they shall be replaced with a new equivalent

4.4 Trash and Debris Removal

Trash and other debris can pollute surface waters and damage stormwater control devices. The removal of floating trash and other debris will not only improve water quality, it will reduce the potential for outlet clogging during storm events and improve the overall aesthetic appeal of a stormwater management basin. Trash should be removed on a routine basis as part of the maintenance activities. Remove trash and debris from outlet orifices, trash racks, basin and swale floors and side slopes, and other components, as well as from the area surrounding the basin.

4.5 Mechanical and Structural Component Maintenance

Mechanical/structural components need to be maintained regularly to ensure that they remain functional at all times. All mechanical components, including valves, sluice gates, pumps, fences, gates, trash racks, and access hatches, should be operated during each inspection to ensure that they function properly.

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Mechanical/structural repairs should be made promptly by qualified personnel. Equipment, materials, and personnel should be readily available to perform repairs on short notice.

4.5.1 Trash Racks

Positioned above the outlet control structure and in front of any weir or orifice, the trash rack protects the flow through the outlet structure from becoming clogged with debris. Inspect the trash rack for debris and excessive corrosion. Remove trash and debris. Replace the trash rack if it is corroded or otherwise damaged. The replacement trash rack should be consistent with the original design specifications.

4.5.2 Outlet Drainage System

The outlet drainage system conveys water from the outlet control structure through the embankment to a swale or other open channel. Inspect the inside of the outlet box and pipe(s) for sediment and debris. Inspect the ground surface above buried pipes and structures for depressions or other signs that might indicate pipe breakage or separation. Inspect ditches for signs of erosion and undesirable vegetation.

Remove any sediment or debris that is accessible. Repair eroded areas and damaged pipes. Replace outlet protection materials (i.e., riprap) as necessary.

4.6 Sediment Removal

Sediment will eventually accumulate in every type of stormwater control. The degree to which it accumulates will depend on the upstream sediment source, rainfall intensity, and the amount of runoff that a device receives. Any sediment found blocking the inlet or outlet of a stormwater control should be removed. If sediment buildups are allowed to block inlets or outlets, stormwater may be diverted to areas not designed for concentrated water flow and cause these areas to erode.

Outlet protection areas of rip rap or gabions are most prone to collection of sediment. When clogged with sediment, these features no longer dissipate the water energy discharged from the pipe resulting in potential downstream erosion. Similarly low flow channels may collect sediment over time impeding the full and complete drainage of the

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basin creating ponding conditions. Ponding conditions are known to promote mosquito breeding.

Sediment that has accumulated and is inhibiting the function of a basin must be removed. Sediment can be flushed from the outlet protection with the use of a high pressure hose. The dredged or removed sediment must be transferred to a waste pile or area that is protected from stormwater flows. Make sure the removed sediment is not left in the vicinity of the basin where stormwater could come into contact with it and transport it back to the basin or nearby receiving waters.

4.7 Erosion Repair & Soil Stabilisation

It is necessary that a uniform vegetative cover be maintained to prevent soil loss, to maintain structural integrity, and to enhance the pollutant removal benefits of a stormwater management basin. Failure to maintain a uniform vegetative cover could result in structural failure and sediment loss.

Take corrective actions when erosion is found. Repair activities should be tailored to the specific site conditions, grass type, and seasonal variations.
Repair may include the use of one or a combination of the following measures:
erosion control blankets, riprap, matting, sodding, planting and/or seeding and mulching.

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Appendix A – Stormwater Management Plan Drawings

Horizontal Scale 1:600 (A1)
1:1200 (A3)

ARCHITECTURAL INFORMATION FOR CLUB HOUSE SUPPLIED BY MARK SHAPIRO ARCHITECTS
DRAWING NUMBER DA1002WIP REV 2

PRELIMINARY PLANS FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

PLANS TO BE PRINTED IN COLOUR

GENERAL ARRANGEMENT PLAN
SCALE 1:600

LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- DESIGN CONTOURS
- PROPOSED STORMWATER DRAINAGE
- RETAINING WALL
- PROPOSED LOW PRESSURE SEWER Ø40mm LINE
- PROPOSED LOW PRESSURE SEWER Ø50mm LINE
- PROPOSED LOW PRESSURE SEWER Ø63mm LINE
- PROPOSED LOW PRESSURE SEWER Ø90mm LINE
- GRAVITY SEWER Ø150mm
- WATERMAIN Ø100mm
- LOW PRESSURE SEWER ISOLATION VALVE
- PROPOSED FLUSHING POINT
- SEWER HOUSE CONNECTION
- LOW PRESSURE SEWER FLOW METER
- LOW PRESSURE SEWER BOUNDARY KIT
- AQUATEC LOW PRESSURE SEWER CHAMBER
- WATER MAIN TEE
- WATER METER
- HEADWALL
- DUAL PILLAR HYDRANT
- SLUICE VALVE
- STORMWATER DRAINAGE PIT
- PROPOSED MHE ALLOTMENT
- NEW INTERNAL CONCRETE ROAD PAVEMENT
- NEW INTERNAL CONCRETE INTERSECTION TREATMENTS & DRIVEWAYS
- NEW 2.5m WIDE SHARED PATH WITHIN SITE BOUNDARY
- MHE BOUNDARY SETBACK 3m WIDE 'NO BUILD ZONE'
- MHE BOUNDARY SETBACK 10m WIDE 'NO BUILD ZONE'
- VISITOR AND RECREATIONAL VEHICLE PARKING
- SCOUR PROTECTION
- BIO-BASIN BREM
- BIO-BASIN GRASSED AREA
- BIO-BASIN WEIR
- BIO-BASIN FLOOR
- GRASSED AREA

ISSUE	DESCRIPTION	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION - AMENDED SITE FORMATION HEIGHTS	23.01.2024
0	ISSUED FOR DEVELOPMENT APPLICATION	08.09.2022

DESIGNED: T.RYDEN | DATE: JAN 2024
DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: MACRO SURVEYING | SHEET SIZE: A1

ISSUED FOR DEVELOPMENT APPROVAL
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CLIENT: CLIFTON YAMBA LAND PTY LTD

TITLE: 110 & 120 CARRS DRIVE, YAMBA
DEVELOPMENT APPLICATION CIVIL WORKS PLANS

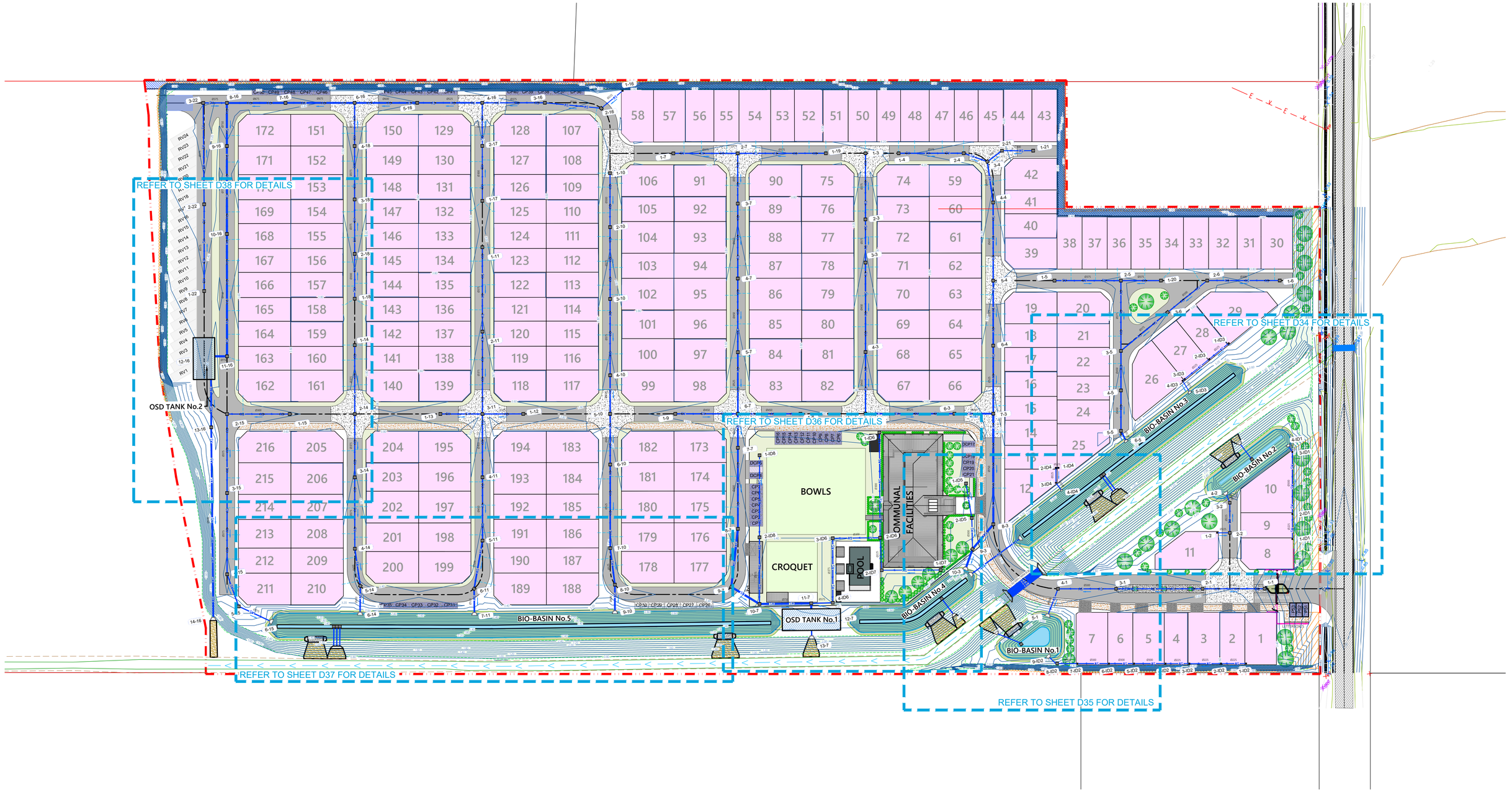
CLIFTON YAMBA

PROJECT: PROPOSED MHE DEVELOPMENT
110 & 120 CARRS DRIVE
YAMBA, NSW 2464
LOT 2 DP733507 & LOT 32 DP128863

DA CIVIL DRAWING

DRAWING TITLE: ROADWORKS & DRAINAGE PLAN

DWG No: D03 | SHEET: 03 OF 43 | REV: 1



20 10 0 10 20 30 40
Horizontal Scale 1:750 (A1)
1:1500 (A3)

STORMWATER MANAGEMENT PLAN
SCALE 1:750

PLANS TO BE PRINTED IN COLOUR

PRELIMINARY PLANS FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

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LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- PROPOSED STORMWATER DRAINAGE
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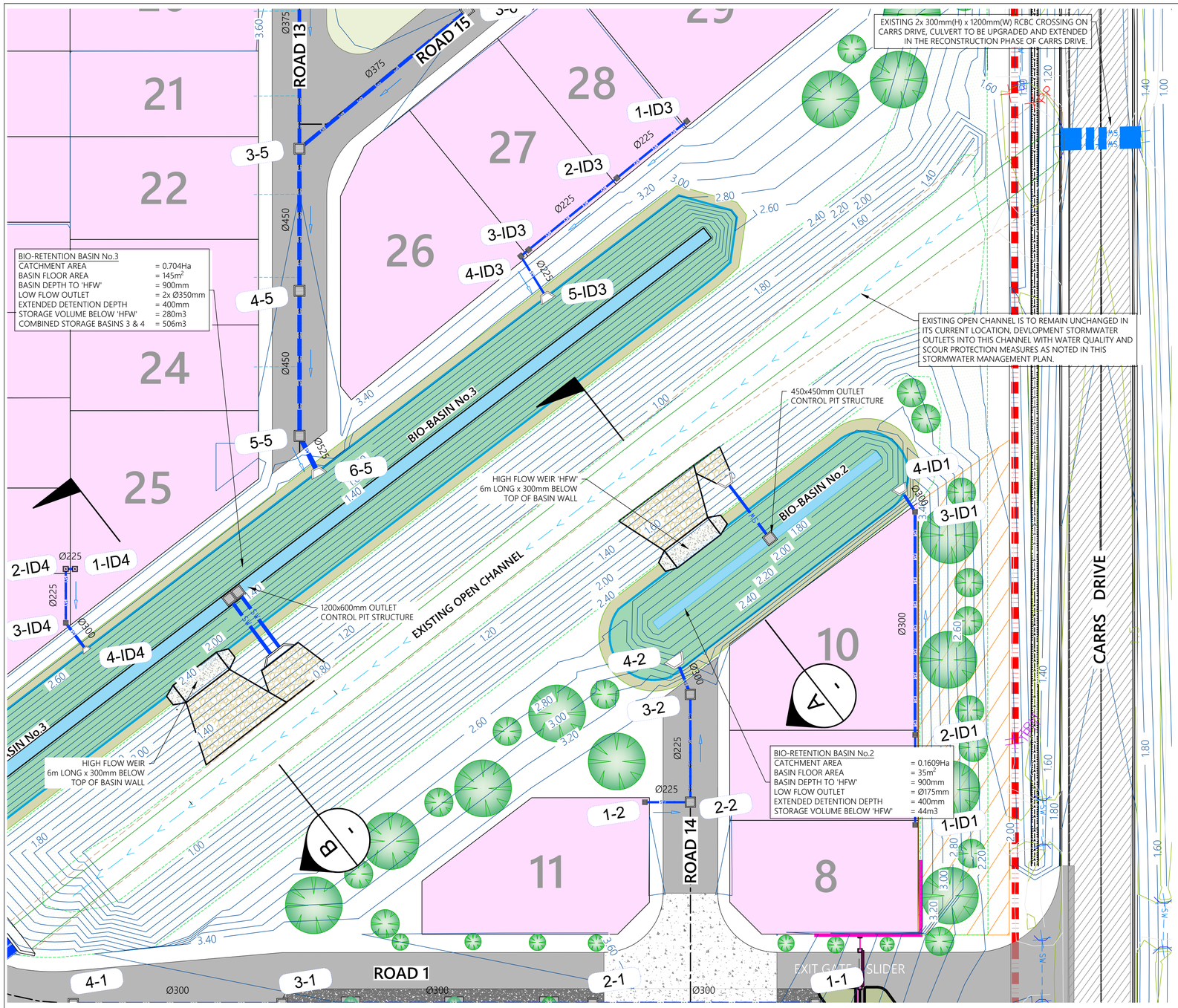
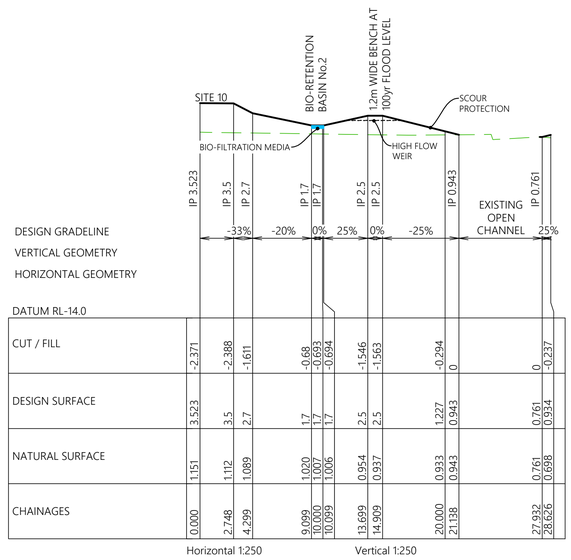
DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN

DWG No: D33 | SHEET: 33 OF 43 | REV: 1





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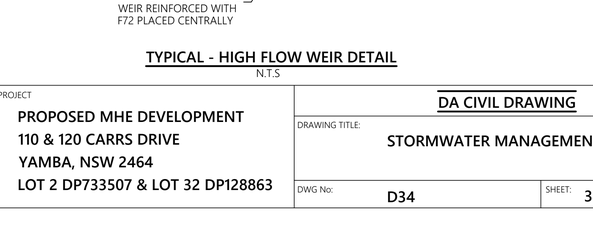
NATURAL SURFACE	1.151		1.112		1.089		1.020	1.007	1.006		0.954	0.937		0.933	0.943		0.761	0.698		
CHAINAGES	0.000		2.748		4.299		9.099	10.000	10.099		13.699	14.909		20.000	21.138		27.932	28.626		

Horizontal 1:250 Vertical 1:250

SECTION-A (BIO-BASIN No.2)



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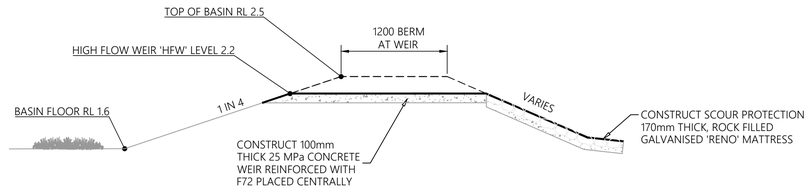
DESIGN SURFACE	0.884		0.652		1.642		2.5	2.53		1.33	1.33	1.451		2.83	3.5		3.5			
NATURAL SURFACE	0.884		0.652		0.723		0.747	0.756		0.746	0.671	0.651		0.676	0.703		0.719			
CHAINAGES	0.000		6.033		10.000		13.436	14.636		18.236	19.636	20.000		24.136	27.556		29.567			

Horizontal 1:250 Vertical 1:250

SECTION-B (BIO-BASIN No.3)



TYPICAL - HIGH FLOW WEIR DETAIL
N.T.S

LEGEND

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- BIO - BASIN TOP
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ARCHITECTURAL INFORMATION FOR CLUB HOUSE SUPPLIED BY MARK SHAPIRO ARCHITECTS DRAWING NUMBER DA1002WIP REV 2

ISSUE	DESCRIPTION	DATE
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0	ISSUED FOR DEVELOPMENT APPLICATION	08.09.2022

DESIGNED: T.RYDEN | DATE: JAN 2024
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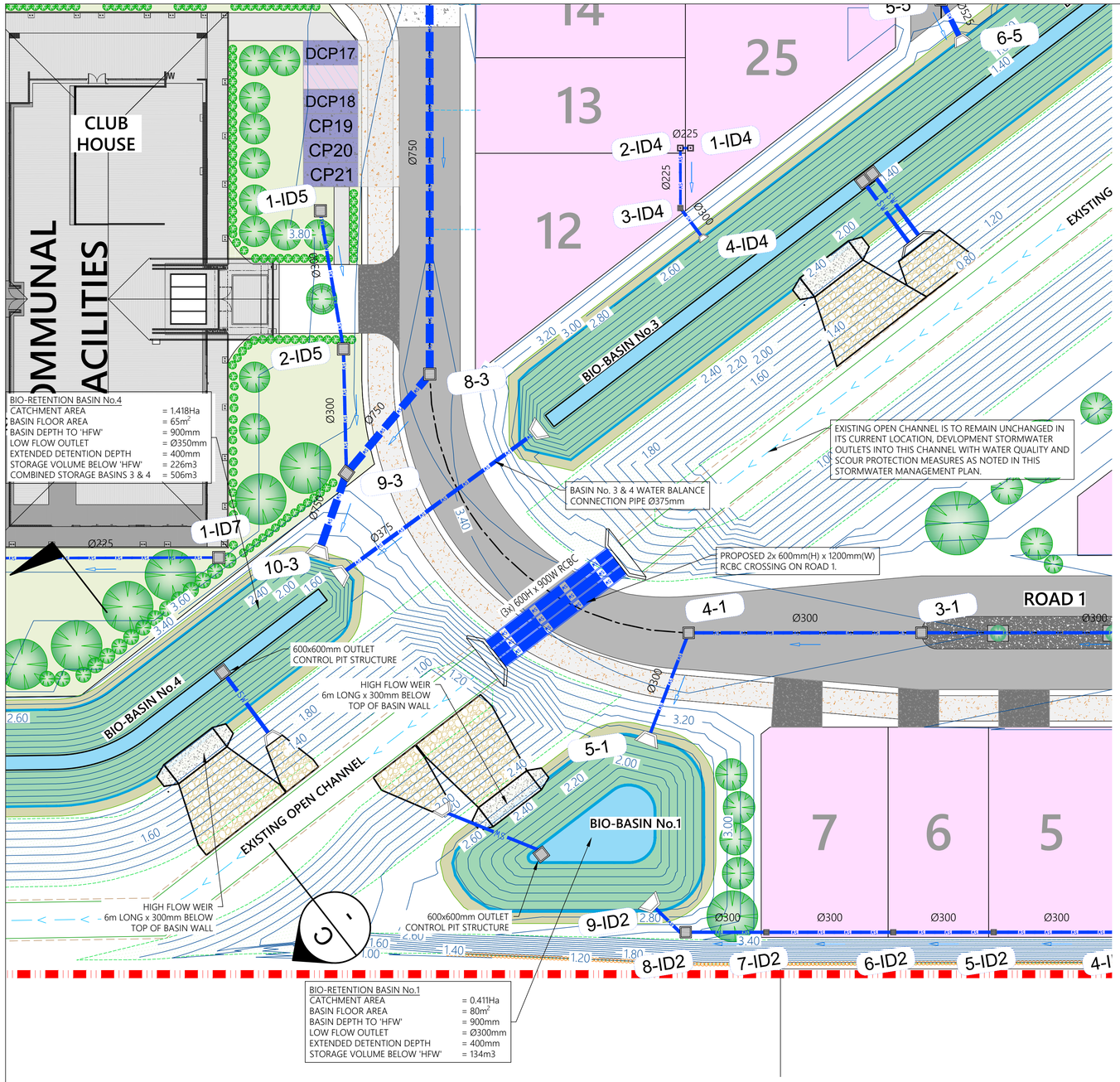
DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN - SHEET 1

DWG No: D34 | SHEET: 34 OF 43 | REV: 1



BIO-RETENTION BASIN No.4	
CATCHMENT AREA	= 1.418Ha
BASIN FLOOR AREA	= 65m²
BASIN DEPTH TO 'HFW'	= 900mm
LOW FLOW OUTLET	= Ø350mm
EXTENDED DETENTION DEPTH	= 400mm
STORAGE VOLUME BELOW 'HFW'	= 226m3
COMBINED STORAGE BASINS 3 & 4	= 506m3

BIO-RETENTION BASIN No.1	
CATCHMENT AREA	= 0.411Ha
BASIN FLOOR AREA	= 80m²
BASIN DEPTH TO 'HFW'	= 900mm
LOW FLOW OUTLET	= Ø300mm
EXTENDED DETENTION DEPTH	= 400mm
STORAGE VOLUME BELOW 'HFW'	= 134m3

Horizontal Scale 1:250 (A1)
1:500 (A3)

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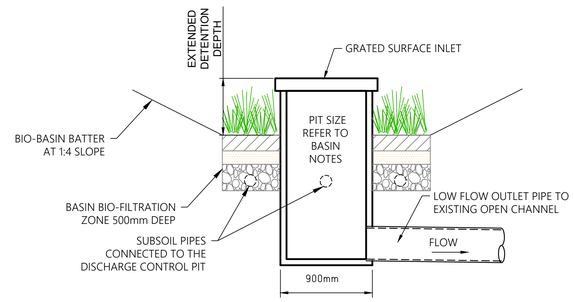
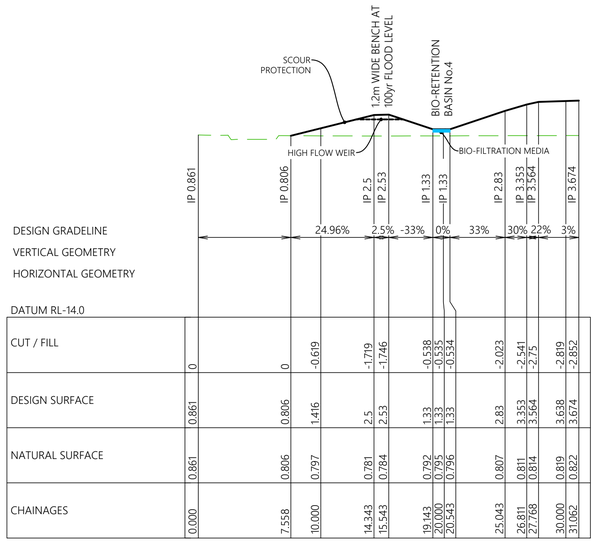
- MHE BOUNDARY SETBACK 3m WIDE 'NO BUILD ZONE'
- MHE BOUNDARY SETBACK 10m WIDE 'NO BUILD ZONE'
- VISITOR AND RECREATIONAL VEHICLE PARKING
- SCOUR PROTECTION
- BIO-BASIN BREM
- BIO-BASIN GRASSED AREA
- BIO-BASIN WEIR
- BIO-BASIN FLOOR
- GRASSED AREA



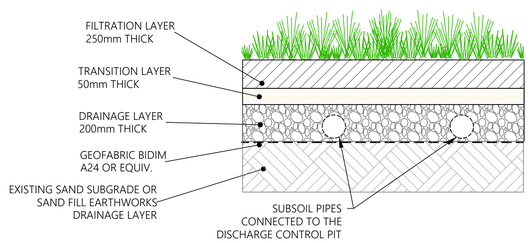
TYPICAL - BIO-RETENTION DISCHARGE CONTROL PIT
N.T.S



CUT / FILL	0		0		-0.619		-1.779	-1.746		-0.538	-0.535	-0.534		-2.023		-2.541	-2.75		-2.819	-2.852		
DESIGN SURFACE	0.861		0.806		1.416		2.5	2.53		1.33	1.33	1.33		2.83		3.353	3.564		3.638	3.674		
NATURAL SURFACE	0.861		0.806		0.797		0.781	0.784		0.792	0.795	0.796		0.807		0.811	0.814		0.819	0.822		
CHAINAGES	0.000		7.558		10.000		14.343	15.543		19.143	20.000	20.543		25.043		26.811	27.768		30.000	31.062		

Horizontal 1:250 Vertical 1:250

SECTION-C (BIO-BASIN No.4)



TYPICAL BIO-FILTRATION ZONE PROFILE (400mm THICK)
N.T.S

FILTER MEDIA - GENERAL DESCRIPTION

THE MATERIAL CAN BE OF SILICEOUS OR CALCAREOUS ORIGIN.
THE MATERIAL MUST BE TESTED FOR DESIRED HYDRAULIC CONDUCTIVITY USING THE AUSTRALIAN STANDARD (AS4419-2003).

REFER TYPICAL SPECIFICATION BELOW.

SPECIFICATION FOR BIORETENTION FILTER MEDIA:

BIORETENTION FILTER MEDIA SHALL COMPRISE OF TWO LAYERS

1. THE FILTRATION LAYER IS TO BE 250mm THICK AND CONFORM TO THE FOLLOWING SOIL SPECIFICATIONS.

pH	5.5 - 7.5	(pH 1:5 IN WATER)
ELECTRICAL CONDUCTIVITY (dS/cm)	< 1.2	
TOTAL SALTS (ppm)	< 600	
CLAY	2 - 4%	(<0.002mm)
SILT	4 - 8%	(0.002 - 0.05mm)
VERY FINE SAND	5 - 10%	(0.05 - 0.15mm)
FINE SAND	10 - 25%	(0.15 - 0.25mm)
MEDIUM TO COARSE SAND	60 - 70%	(0.25 - 1.0mm)
COARSE SAND	7 - 10%	(1.0 - 2.0mm)
FINE GRAVEL	< 3%	(2.0 - 3.4mm)
HYDRAULIC CONDUCTIVITY (mm/hr)	200 (+/- 20%)	

THE FILTRATION LAYER WILL BE AMELIORATED TO PROVIDE ADEQUATE INITIAL GROWTH. THIS LAYER IS TO CONSIST OF PREMIXED ZEOLITE 20% BY VOLUME PRIOR TO DELIVERY AND PLACEMENT. PRIOR TO PLANTING THE FOLLOWING SHALL BE PLACED INTO THE TOP 75MM.

AGRICULTURAL LIME - RATE TO BE DETERMINED DEPENDING ON SELECTED FILTER MATERIAL

	10-30 kg/100sq.m INDICATIVE RANGE
SUPERPHOSPHATE AT	2 kg/100sq.m
MAGNESIUM SULPHATE AT	3 kg/100sq.m
POTASSIUM SULPHATE AT	2 kg/sq.m
TRACE ELEMENTS MIX	1 kg/100sq.m
FERTILISER NPK16.4.14 AT	4 kg/100sq.m

2. TRANSITION LAYER IS TO BE 50mm THICK WELL GRADED COARSE SAND

3. THE DRAINAGE LAYER IS TO BE 200mm THICK WITH 5-7mm WASHED AGGREGATE

* THERE SHOULD BE NO GEOFABRIC INTERFACE BETWEEN THE TWO LAYERS, ONLY AT THE INTERFACE WITH THE SAND SUBGRADE

ISSUE	DESCRIPTION	DATE
1	ISSUED FOR DEVELOPMENT APPLICATION - AMENDED SITE FORMATION HEIGHTS	23.01.2024
0	ISSUED FOR DEVELOPMENT APPLICATION	08.09.2022

DESIGNED: T.RYDEN | DATE: JAN 2024
DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: MACRO SURVEYING | SHEET SIZE: A1

ISSUED FOR DEVELOPMENT APPROVAL
NOT FOR CONSTRUCTION

MDE Manage Design Engineer

www.md-engineer.com.au

CLIENT: CLIFTON YAMBA LAND PTY LTD

TITLE: 110 & 120 CARRS DRIVE, YAMBA
DEVELOPMENT APPLICATION CIVIL WORKS PLANS

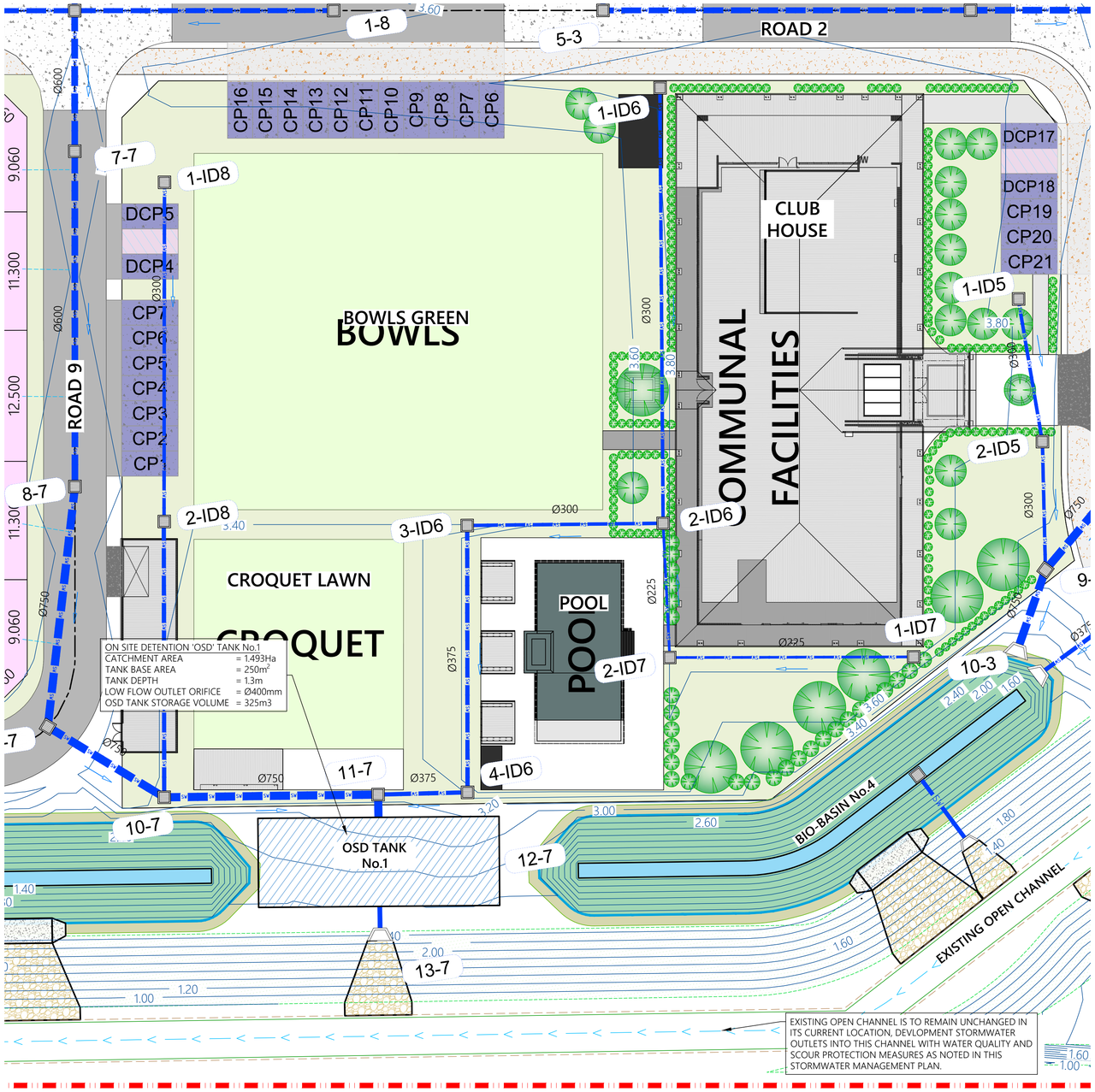
CLIFTON YAMBA

PROJECT: PROPOSED MHE DEVELOPMENT
110 & 120 CARRS DRIVE
YAMBA, NSW 2464
LOT 2 DP733507 & LOT 32 DP128863

DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN - SHEET 2

DWG No: D35 | SHEET: 35 OF 43 | REV: 1



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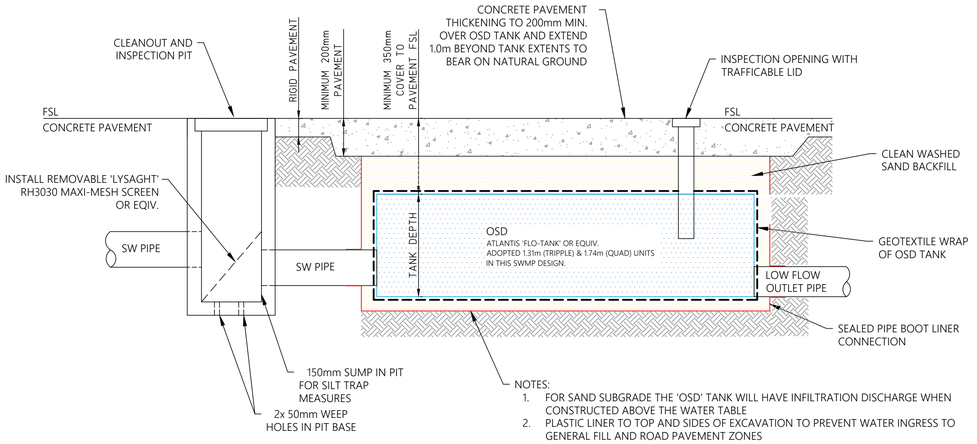

TYPICAL DETAIL - SECTION VIEW
OSD ATLANTIS 'FLO-TANK'
N.T.S

PLANS TO BE PRINTED IN COLOUR

PRELIMINARY PLANS FOR DA PURPOSES ONLY NOT FOR CONSTRUCTION

ARCHITECTURAL INFORMATION FOR CLUB HOUSE SUPPLIED BY MARK SHAPIRO ARCHITECTS DRAWING NUMBER DA1002WIP REV 2

LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- PROPOSED STORMWATER DRAINAGE
- RETAINING WALL
- STORMWATER DRAINAGE PIT
- HEADWALL
- PROPOSED MHE ALLOTMENT
- NEW INTERNAL CONCRETE ROAD PAVEMENT
- NEW INTERNAL CONCRETE INTERSECTION TREATMENTS & DRIVEWAYS
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ISSUED FOR DEVELOPMENT APPROVAL
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DESIGNED: T.RYDEN | DATE: JAN 2024
DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: MACRO SURVEYING | SHEET SIZE: A1

MDE Manage Design Engineer

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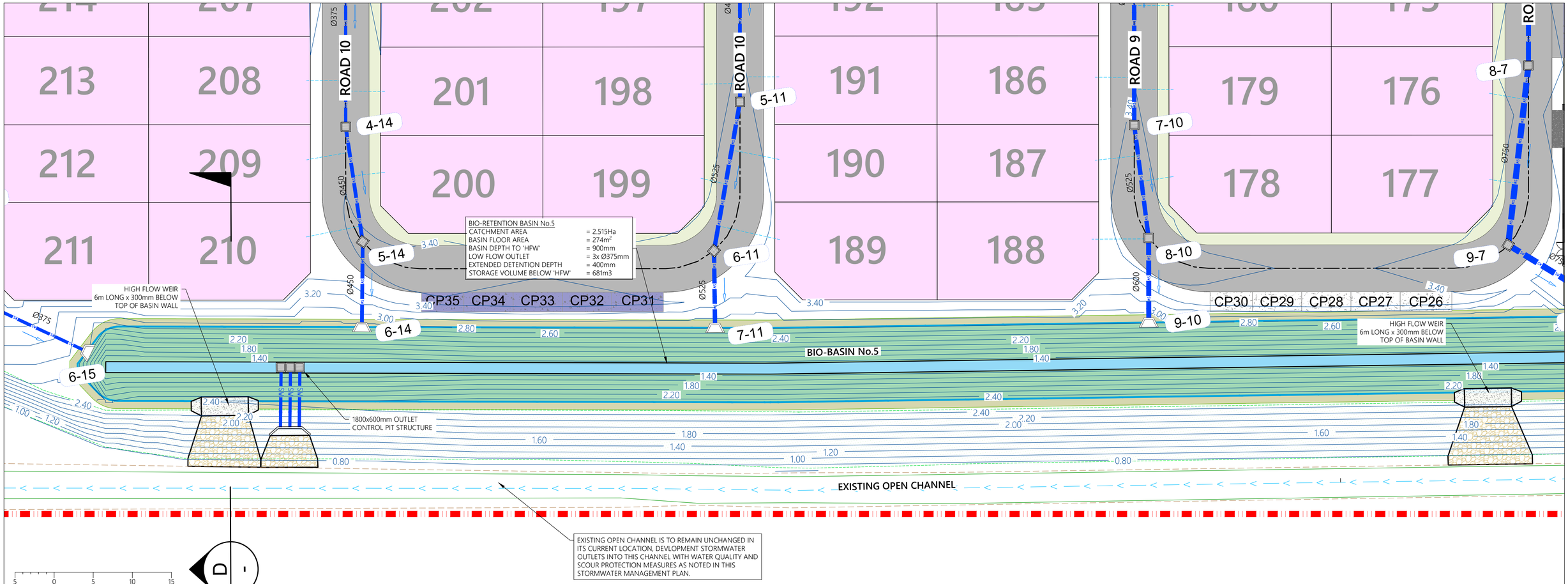
DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN - SHEET 3

DWG No: D36 | SHEET: 36 OF 43 | REV: 1



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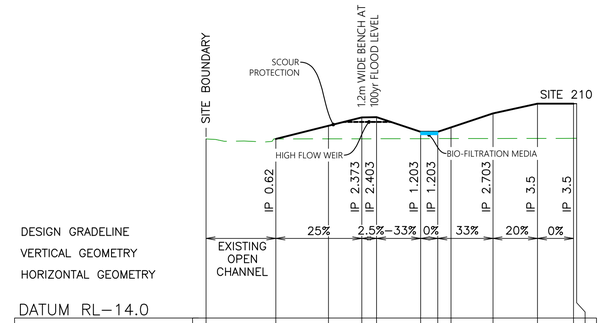
1:500 (A3)



	IP 0.62	IP 2.373	IP 2.403	IP 1.203	IP 1.203	IP 2.703	IP 3.5	IP 3.5
DESIGN GRADELINE / VERTICAL GEOMETRY / HORIZONTAL GEOMETRY								
DATUM RL-14.0								
CUT / FILL	0	-1.067	-1.739	-1.767	-0.559	-0.557	-0.914	-2.048	-2.837	-2.831
DESIGN SURFACE	0.62	1.695	2.373	2.403	1.203	1.203	1.563	2.703	3.5	3.5
NATURAL SURFACE	0.620	0.629	0.634	0.637	0.644	0.647	0.649	0.655	0.663	0.669	0.669
CHAINAGES	0.000	5.699	10.000	12.711	13.921	17.521	18.921	20.000	23.421	27.057	30.000	30.257

Horizontal 1:250 Vertical 1:250

SECTION-D (BIO-BASIN No.5)

LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- PROPOSED STORMWATER DRAINAGE
- RETAINING WALL
- STORMWATER DRAINAGE PIT
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DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: MACRO SURVEYING | SHEET SIZE: A1

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CLIFTON YAMBA

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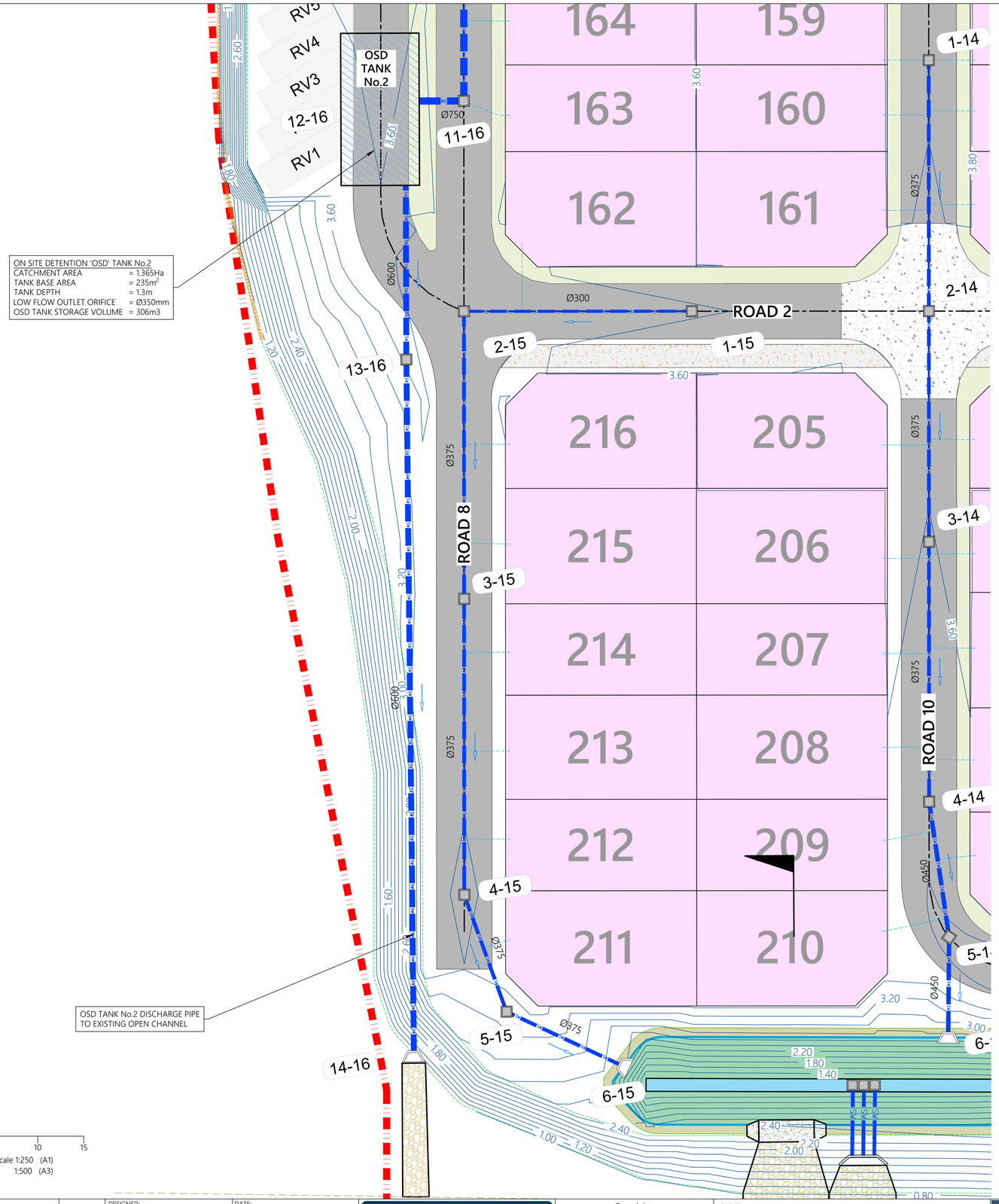
YAMBA, NSW 2464
LOT 2 DP733507 & LOT 32 DP128863

DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN - SHEET 4

DWG No: D37 | SHEET: 37 OF 43 | REV: 1



LEGEND

- DEVELOPMENT BOUNDARY
- INTERNAL LOT BOUNDARY
- BIO - BASIN TOP
- CHANNEL TOP OF BANK
- CHANNEL CENTRE LINE
- PROPOSED STORMWATER DRAINAGE
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DESIGNED: T.RYDEN | DATE: JAN 2024
DRAWN: A.SCHMID | SCALE: AS SHOWN
SURVEYING: MACRO SURVEYING | SHEET SIZE: A1

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MDE Manage Design Engineer

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CLIFTON YAMBA

PROJECT: PROPOSED MHE DEVELOPMENT
110 & 120 CARRS DRIVE
YAMBA, NSW 2464
LOT 2 DP733507 & LOT 32 DP128863

DA CIVIL DRAWING

DRAWING TITLE: STORMWATER MANAGEMENT PLAN - SHEET 5

DWG No: D38 | SHEET: 38 OF 43 | REV: 1

MDE Manage Design Engineer

1/64 Ballina Street
(PO Box 44)
Lennox Head NSW 2478
www.mde.au

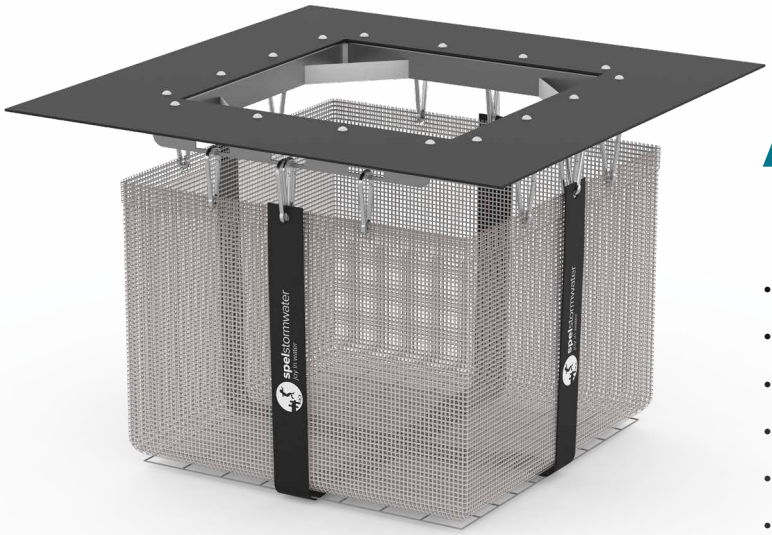
Appendix B – Stormwater Quality Device Product Information

SPEL Stormsack

At Source Gross Pollutant Trap

spelstormwater
joy in water

spel.com.au



APPLICATIONS

- Council storm drain retrofits
- Commercial / retail / residential
- Litter prone urban areas
- Scrap metal / solid waste / oil storage
- Part of treatment train
- Construction sediment / erosion

BENEFITS

- Can be modelled in MUSIC in conjunction with bio-retention
- Low cost gross pollutant capture
- Quick & easy installation
- Simple maintenance
- At source capture
- Adjusts to custom pit sizes

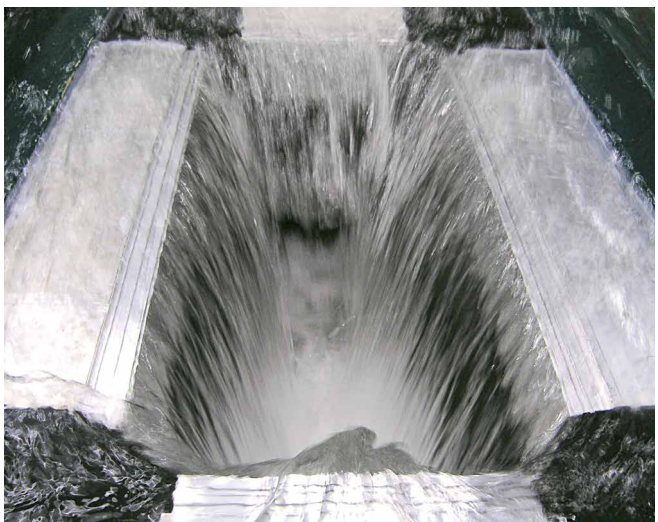
The SPEL Stormsack is specifically designed for the capture of gross pollutants: sediment, litter, and oil and grease. Ideally suited for storm drain retrofits, the SPEL Stormsack's unique design allows maintenance to be performed using conventional vacuum suction equipment.

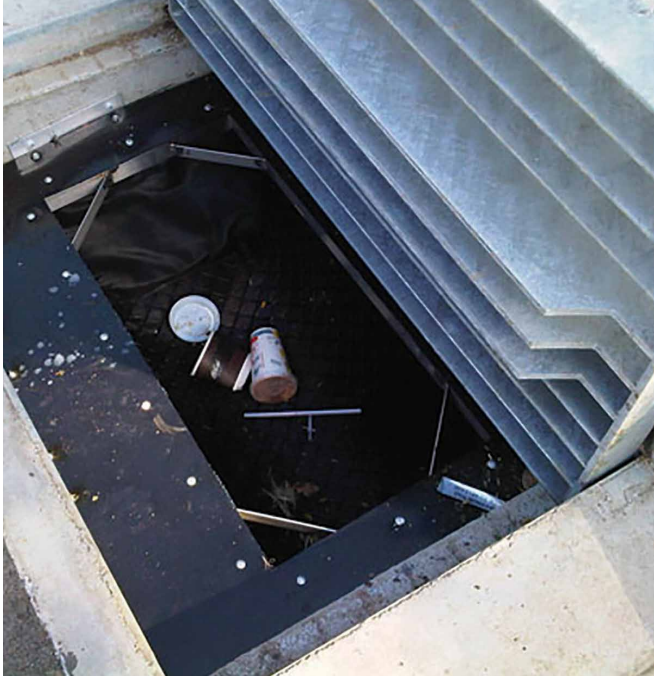
SPEL Stormsack filtration solutions are highly engineered water quality devices that are deployed directly in the stormwater system to capture contaminants close the surface for ease of maintenance. Easily retrofitted into new or existing structures, SPEL Stormsack filtration technology is a decentralized approach to stormwater treatment that essentially repurposes traditional site infrastructure and customizes it to meet specific site water quality goals. In this way, it satisfies important objectives of today's LID (Low Impact Development) criteria.

From an operations perspective, catch basins with SPEL Stormsack filters are also easier and quicker to clean out because pollutants are trapped just under the grate.

The SPEL Stormsack was introduced to the Australian market in 2012 and field testing is underway at several locations in South-east Queensland. Laboratory testing has shown capture of 99.99% of gross pollutants up to the bypass flow rate.* Further results will be provided as they become available.

Recommended minimum clearance from bottom of SPEL Stormsack to inside bottom of vault is 50mm. Typical frame adjustability range of 127mm in each direction.





HOW IT WORKS

This technology is a post developed stormwater treatment system. The SPEL Stormsack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising the existing or new storm drain infrastructure. The Stormsack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.

Installation procedures shall include removing the storm grate, cleaning the ledge of debris and solids, measuring catch basin clear opening and adjusting flanges to rest on grate support ledge. Install SPEL Stormsack with splash guard under curb opening so the adjustable flanges are resting on the grate support ledge. Install corner filler pieces. Reinstall storm grate directly on support flanges rise shall be no more than 3mm.

Maintenance: Typically the SPEL Stormsack is serviceable from the street level, and therefore maintenance does not require confined space entry into the catch basin structure. The unit is designed to be maintained in place with a vacuum hose attached to a sweeper or a vactor truck. Use only SPEL replaceable parts.

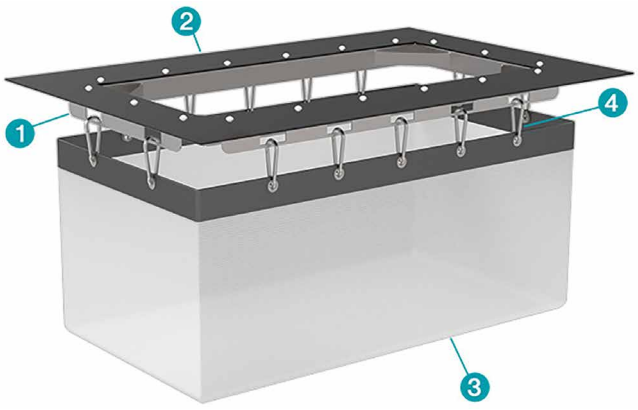
FEATURES

Pollutant	Efficiency
Gross Pollutants (GP)	100%
Total Suspended Solids (TSS)	61%
Total Phosphorus (TP)	28%
Total Nitrogen (TN)	45%

*Contact Spel to confirm approved performance for the project LGA

Application	Regulatory Issue	Target Pollutants
Council Storm Drain Retrofits	At-source litter capture	Sediment, Litter, O&G
Commercial/Retail/Residential	Stormwater Compliance	Sediment, Litter, O&G
Litter Prone Urban Areas	Cost effective litter control	Litter ≥ 5 mm
Scrap Metal/Solid Waste/Oil Storage/Etc	Industrial Multi-Sector General Permit	Gross Pollutants, O&G
Part of Treatment Train	Council Stormwater Quality Improvement Targets	Sediment, Litter, O&G
Construction Sediment/Erosion	Sediment Control Plan	Sediment/Erosion Control

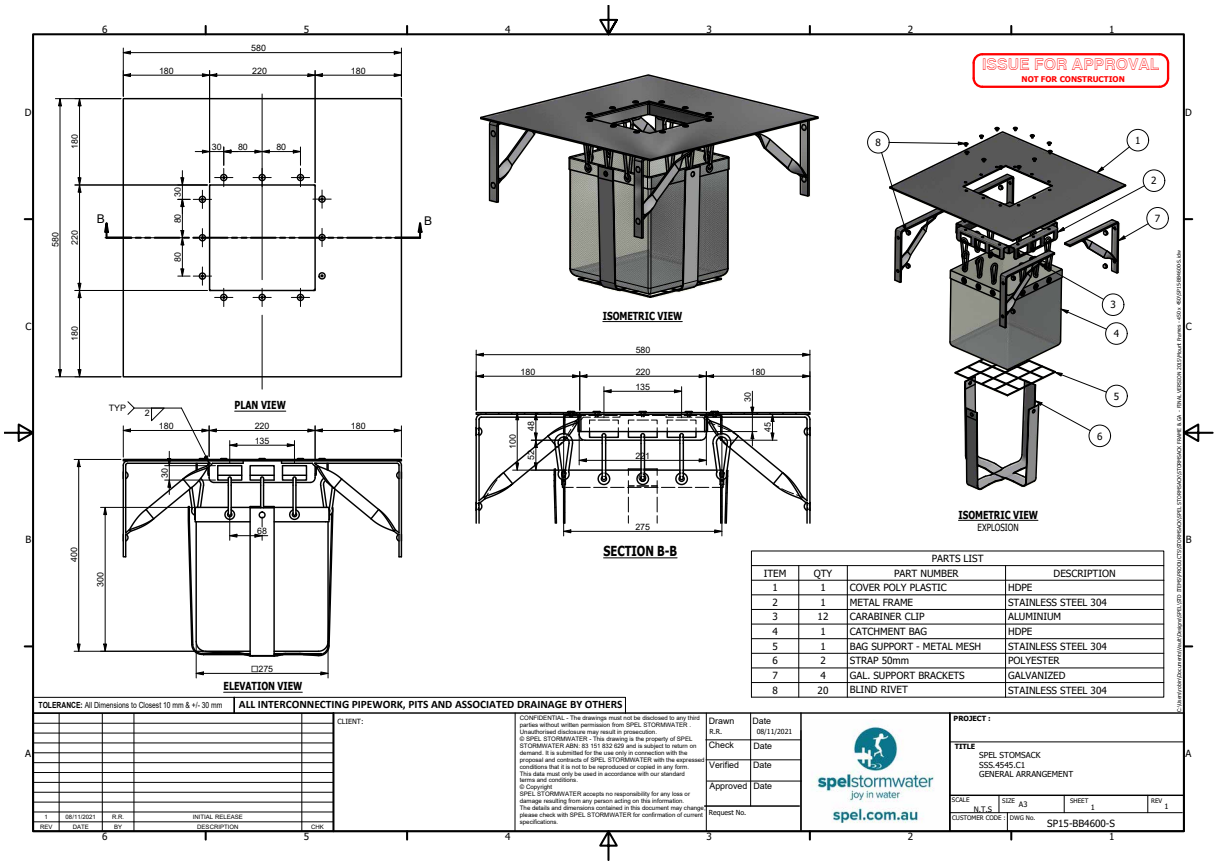
Features	
1.	1. Ultra-Durable Aluminium Frame • Available in 450x450mm, 600x600mm, 600x900mm and 900x900mm sizes • Custom pit arrangements upon request
2.	Black Poly Surround riveted to Frame • Can be cut to suit on site
3.	Reinforced Stormsack Bag • Bag has sewed eyelets • Square bottom design for even distribution
4.	Karabiners attach Bag to Frame for easy service & replacement
5.	5. Aluminium Support Angles & Fixings

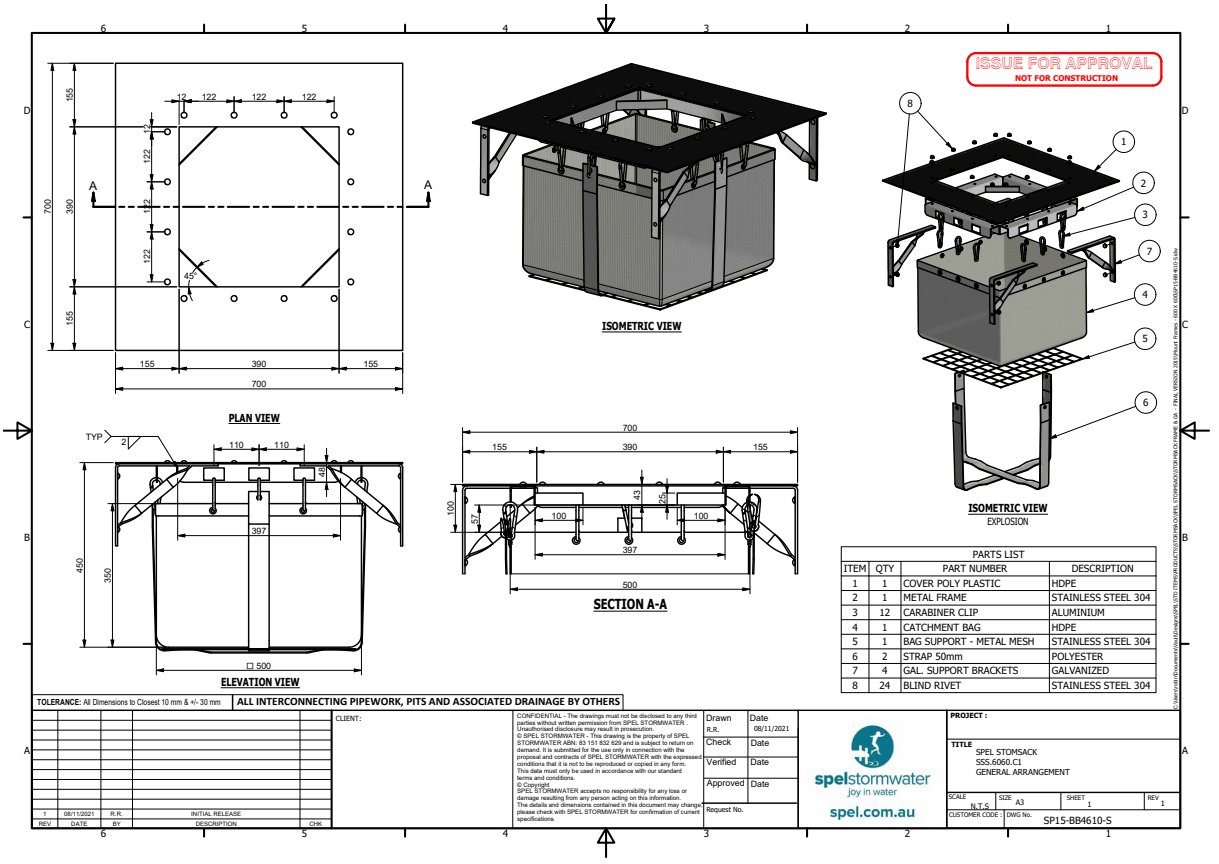


Standard SPEL Stormsack to suit Pit Sizes
450x450mm
600x600mm
900x600mm
900x900mm

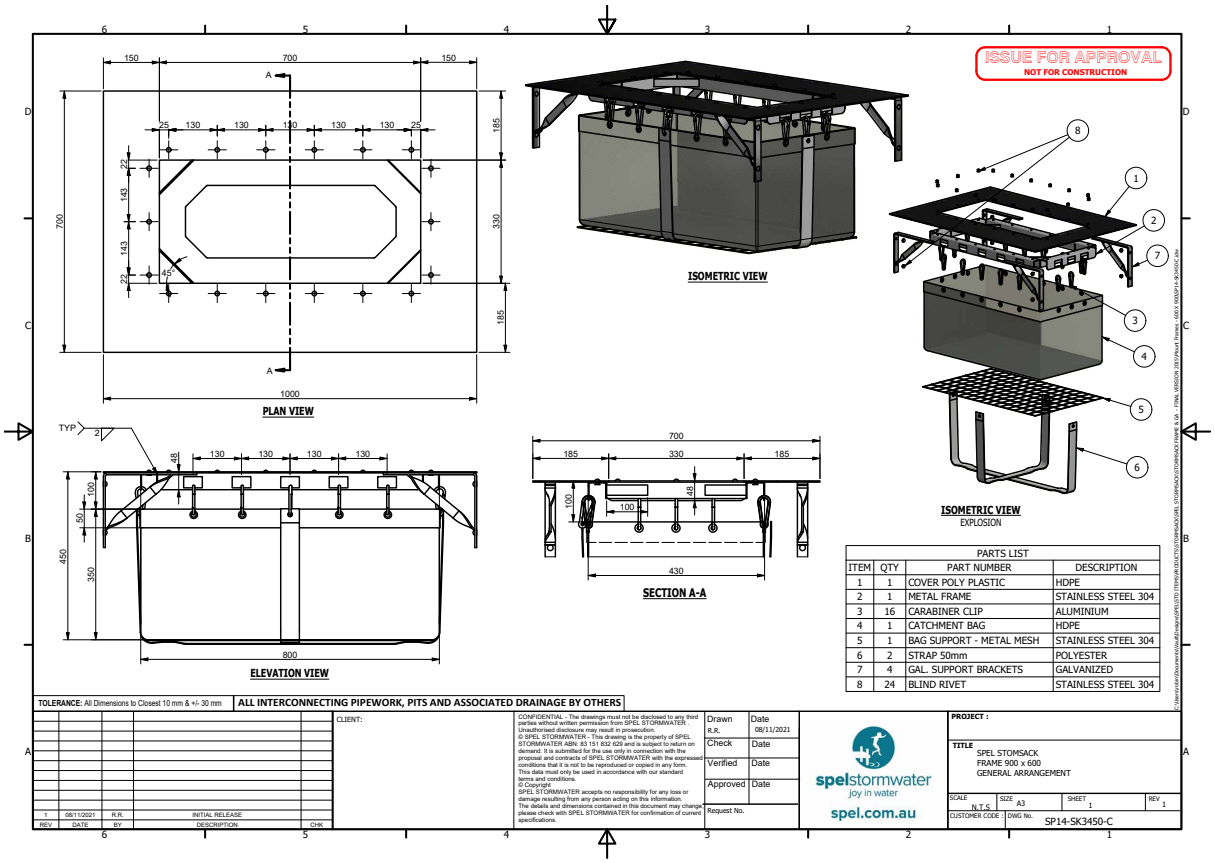
Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times

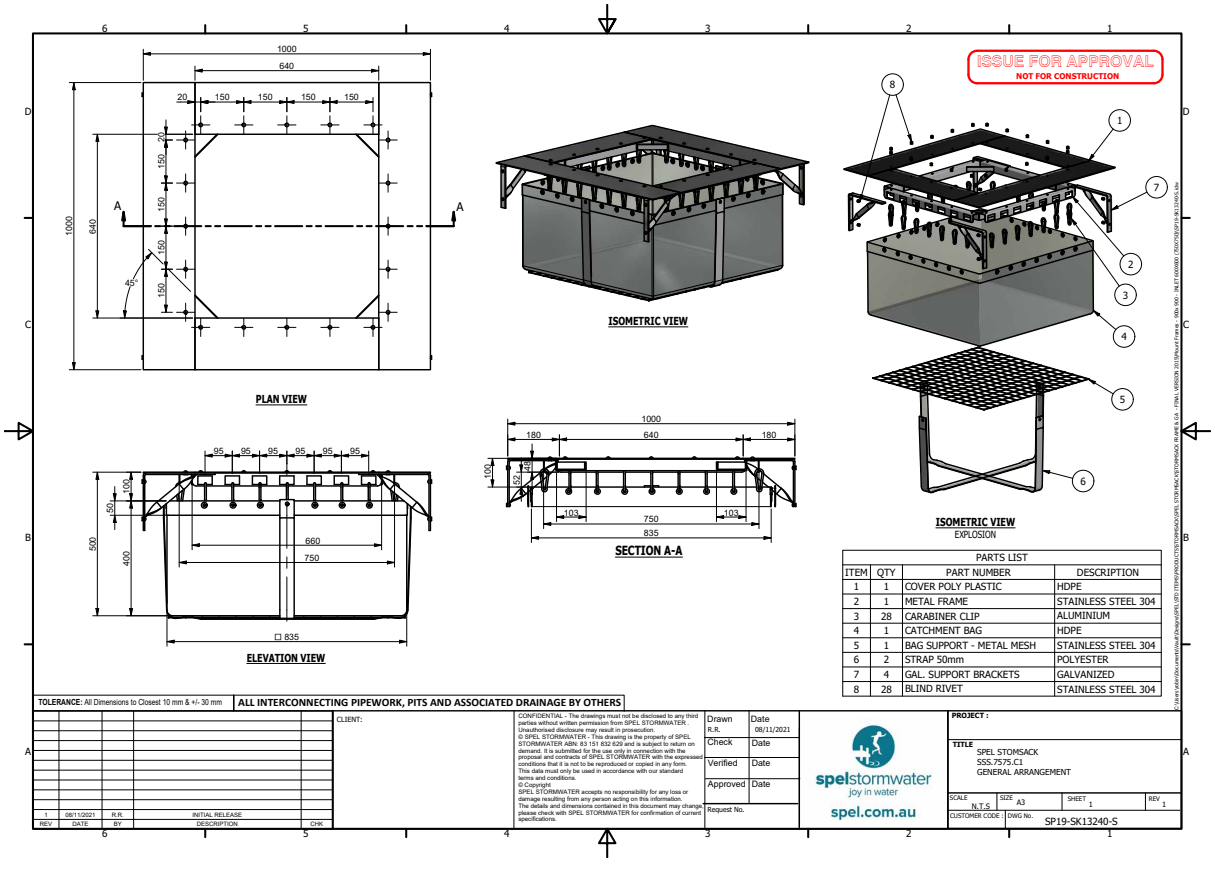
TECHNICAL DRAWINGS



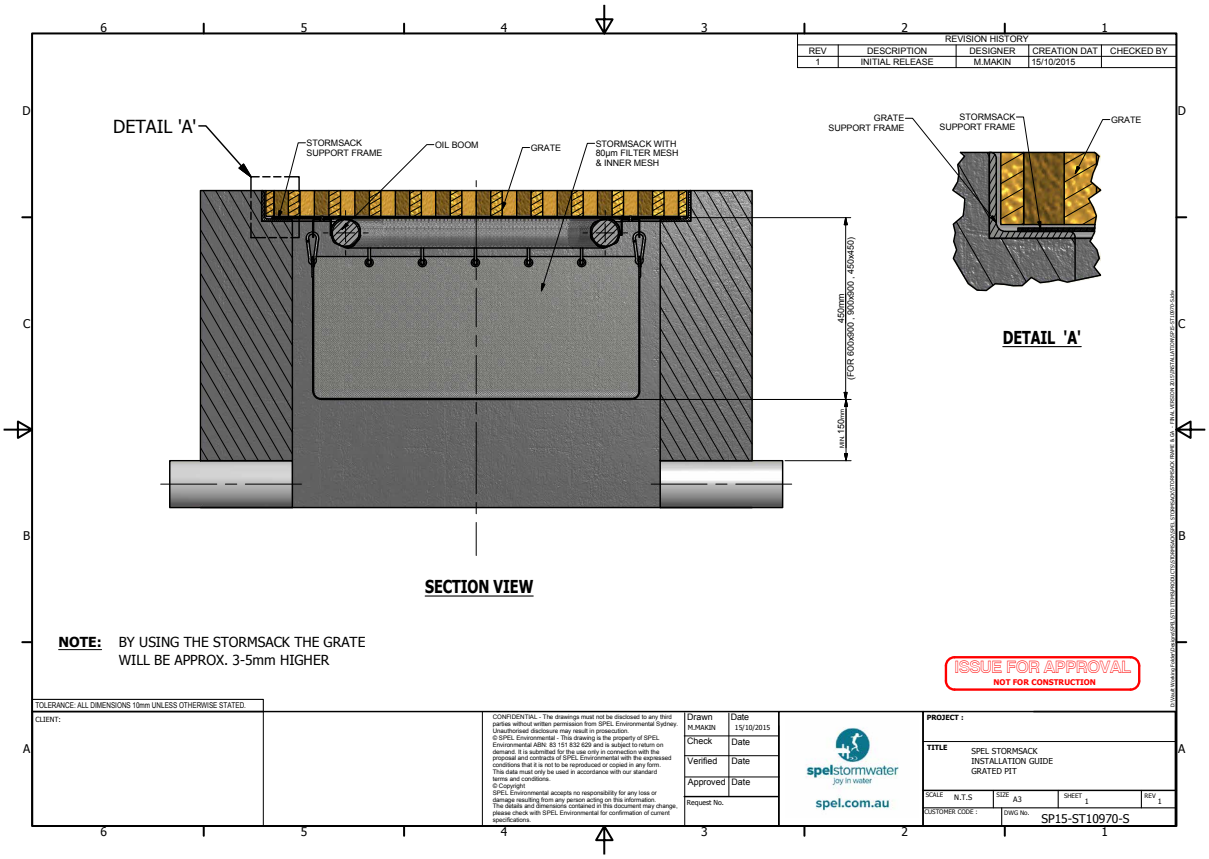


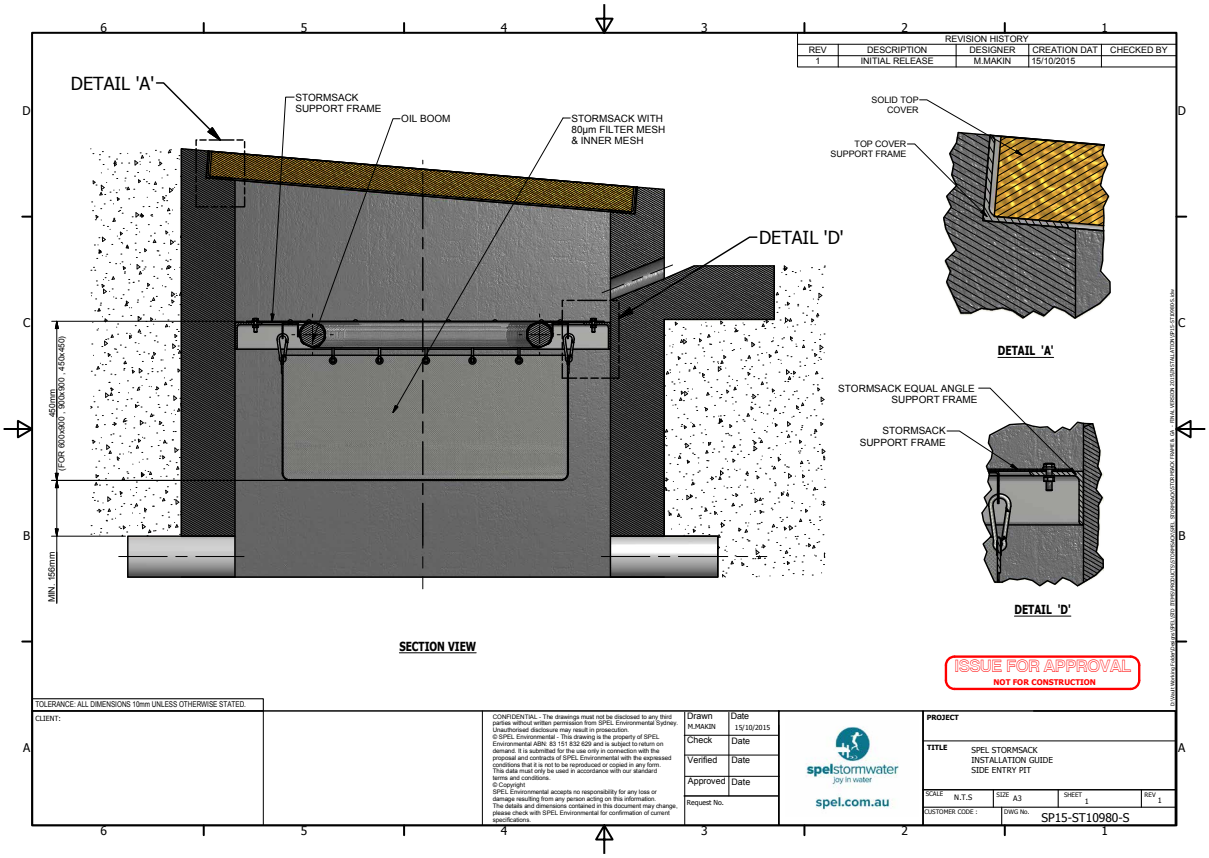
TECHNICAL DRAWINGS





INSTALLATION DETAILS





SPEL Stormsack

At Source Gross Pollutant Trap

NSW HEAD OFFICE 100 Silverwater Rd, Silverwater NSW 2128 PO Box 7138, Silverwater NSW 1811 P: +61 2 8705 0255 P: 1300 773 500 E: nsw.sales@spel.com.au	**QLD MAIN OFFICE** 130 Sandstone Pl, Parkinson QLD 4115 P: +61 7 3271 6960 P: 1300 773 500 I E: qld.sales@spel.com.au **QLD SUNSHINE COAST BRANCH** 19-27 Fred Chaplin Circuit, Bells Creek, QLD 4551 P: 1300 773 500 I E: qld.sales@spel.com.au	**VIC & TAS OFFICE** 897 Wellington Rd Rowville VIC 3178 P: +61 3 5274 1336 P: 1800 810 139 I E: sales@spel.com.au **VIC GEELONG BRANCH** 70 Technology Close, Corio, P: +61 3 5274 1336 P: 1800 810 139 I E: sales@spel.com.au
SA OFFICE 9 Hampden Road, Mount Barker SA 5251 P: 1300 773 500 E: sales@spel.com.au	**WA OFFICE** 2 Modal Crescent Canning Vale WA 6155 P: +61 8 9350 1000 P: 1800 335 550 E: sales@spel.com.au	**NZ OFFICE AUCKLAND** 100 Montgomerie Road Airport Oaks P: +64 9 276 9045 E: sales@spel.com.au
NZ OFFICE WANGANUI 43 Heads Road Wanganu New Zealand P: +64 6 349 0088 I E: sales@spel.com.au	**NZ OFFICE WELLINGTON** 41 Raiha St Porirua Wellington New Zealand P: +64 4 239 6006 I E: sales@spel.com.au	**PHILIPPINES OFFICE METRO MANILA** Unit 2210 Lumiere Residences Pasig Boulevard, Pasig City P: +61 2 8705 0255 P: 1300 773 500 E: sales@spel.com.au
SINGAPORE OFFICE 512 Chai Chee Lane, #06-04 Bedok Industrial Estate, Singapore 469028 P: +61 2 8705 0255 P: 1300 773 500 I E: sales@spel.com.au	**UK OFFICE UNITED KINGDOM** Lancaster Rd Shrewsbury SY1 3NQ UK P: +44 (0)1743 445200 I E: sales@spel.com.au	**USA OFFICE CLEVELAND** 4548 Industrial Parkway Cleveland, Ohio 44135 P: +61 2 8705 0255 P: 1300 773 500 E: sales@spel.com.au

We believe clean water is a right not a privilege and we work to ensure a joy in water experience for you with your children and grandchildren.

spelstormwater
joy in water

100 Silverwater Rd, Silverwater NSW 2128 Australia
Phone: (02) 8705 0255
Email: sales@spel.com.au
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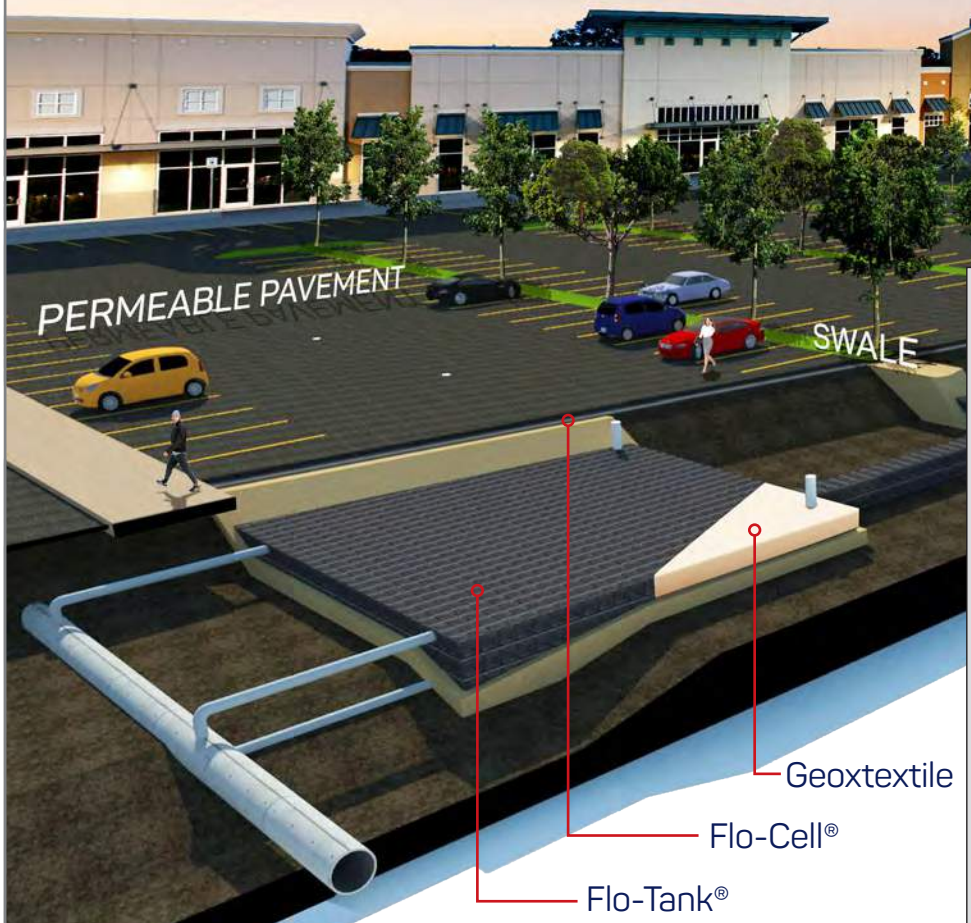
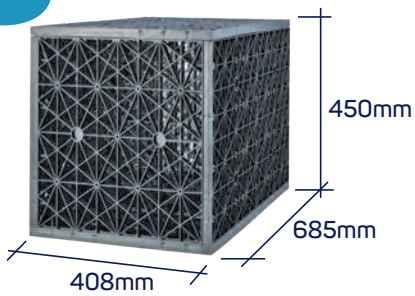
MODULAR UNDERGROUND TANK SYSTEM

Infiltration · Detention · Rainwater Harvesting



ADVANTAGES



- FLEXIBLE
- MODULAR
- SUB-SURFACE
- COMPLETLEY SCALABLE
- OPTIMAL WATER RETENTION CONDITIONS
- MACRO & MICRO POLLUTANT REMOVAL
- FREES UP VALUABLE SPACE
- IDEAL FOR PARKING LOTS & LANDSCAPING

INSTALLATION PROCEDURE

Installing the Flo-Tank modules. Modular design allows flexibility.

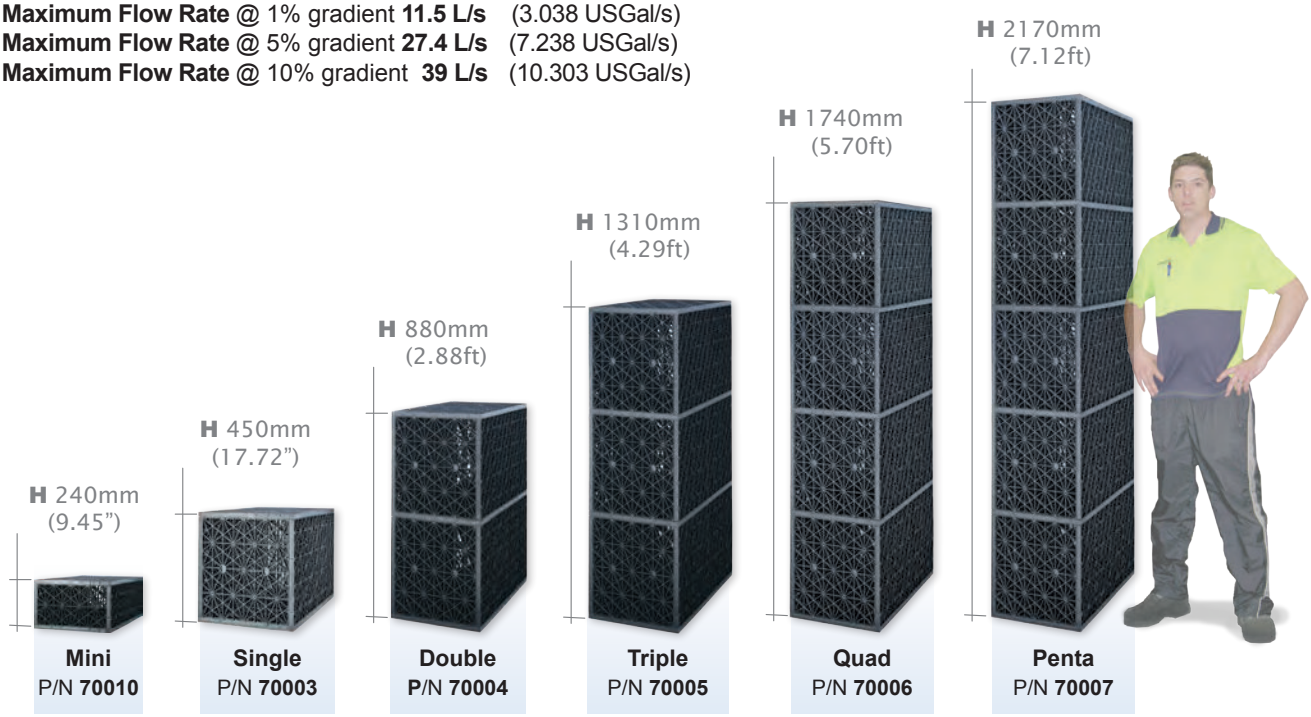
Wrapping the tank in geotextile fabric.

Completed tank with swale and permeable pavement infiltration.

Flo-Tank® Module Specificatios

Surface Area :	95% Void
Material :	85% recycled Polypropylene + 15% Atlantis selected materials.
Colour :	Black
Biological & Chemical Resistance :	Unaffected by moulds and algae, soil-bourne chemicals, bacteria and bitumen.
Service Temperature :	-30^{0}C to 120^{0}C (-22^{0}F to 248^{0}F)
Approximate Life Expectancy:	100 years+ *(Note: With underground installations)*

Maximum Flow Rate @ 1% gradient **11.5 L/s** (3.038 USGal/s)
Maximum Flow Rate @ 5% gradient **27.4 L/s** (7.238 USGal/s)
Maximum Flow Rate @ 10% gradient **39 L/s** (10.303 USGal/s)



Code	Module	Modules / m^3	Gross Volume	Storage Capacity	Weight	Height	Width	Length
70003	Single	7.95	0.126 m^3	119 Litres	7.1 kg	450 mm	408 mm	685 mm
70004	Double	4.06	0.246 m^3	234 Litres	13.53 kg	880 mm	408 mm	685 mm
70005	Triple	2.73	0.366 m^3	348 Litres	19.80 kg	1310 mm	408 mm	685 mm
70006	Quad	2.03	0.486 m^3	462 Litres	26 kg	1740 mm	408 mm	685 mm
70007	Penta	1.65	0.606 m^3	576 Litres	32.30 kg	2170 mm	408 mm	685 mm

For further technical details, please contact our technical department: *technical@atlantiscorp.com.au*

ATLANTIS CORPORATION AUSTRALIA PTY LTD
PHONE: + 612 9417 8344
FAX: + 612 9417 8311
EMAIL: info@atlantiscorp.com.au
WEB: www.atlantiscorp.com.au

Atlantis®
GREEN CITIES FOR LIFE

Product Version

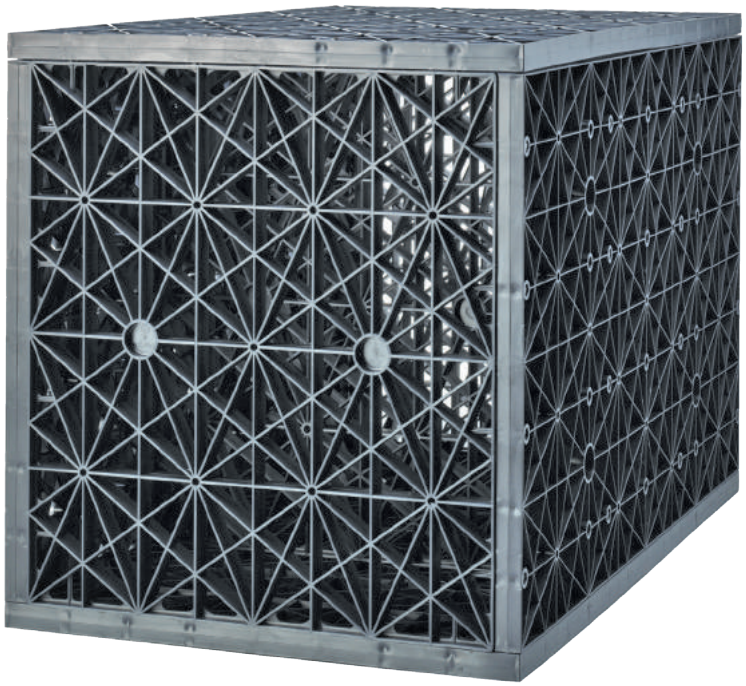
Flo-Tank® XD

Document ID

15-05-2017 PM/CU

Flo-Tank®

MODULAR UNDERGROUND TANK SYSTEM



APPLICATIONS COVERED:

- Infiltration Tanks
- Re-use Tanks (Rainwater Harvesting Tank)
- O.S.D (On site Detention Tanks)

Assembly & Installation Guide

2017

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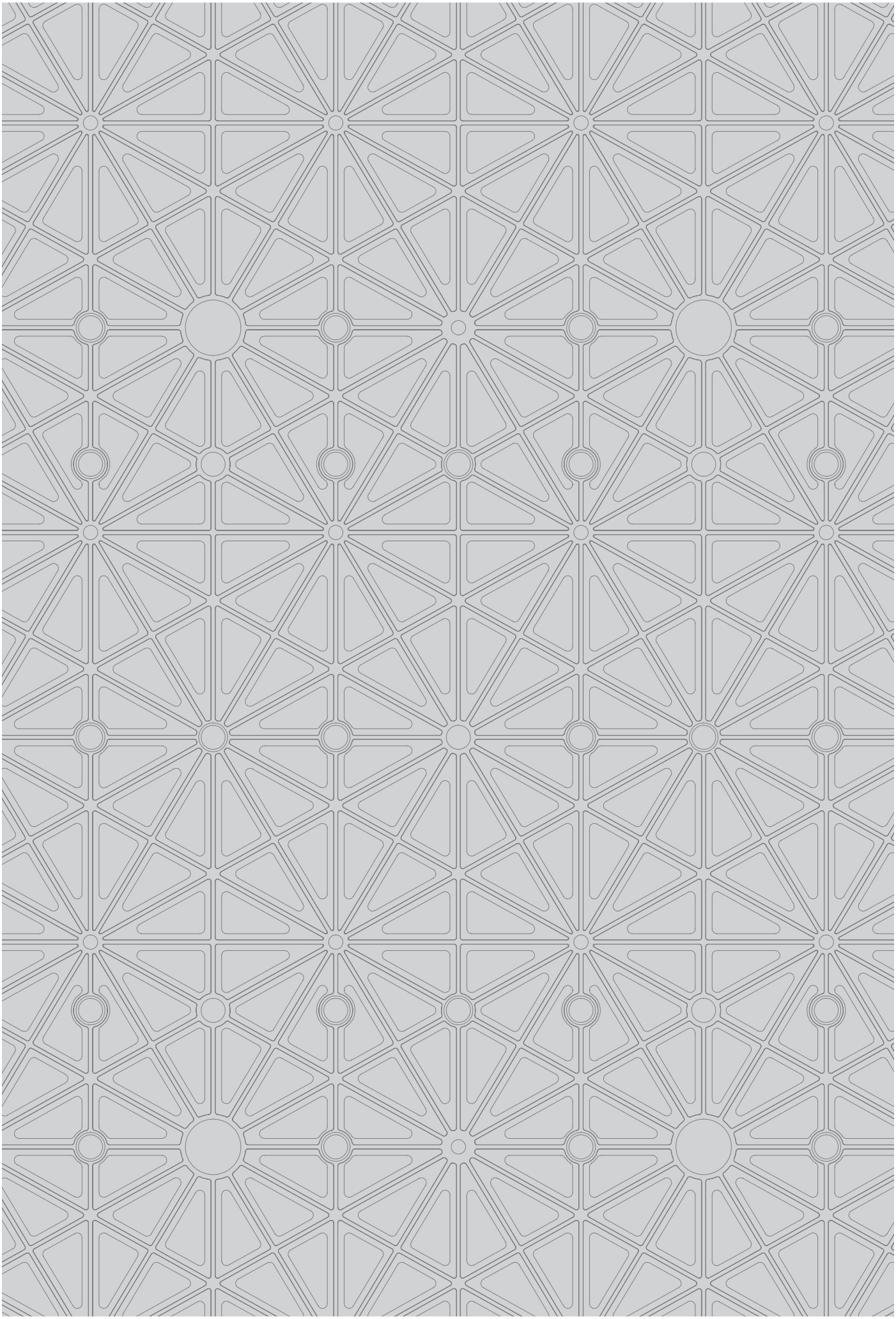


Contents

Additional Materials Required

Backfill Materials

- Washed River Sand (Technical specifications available upon request)
- Aggregate / Gravel 20mm (3/4”) (Technical specifications available upon request)
- Growing Media, in accordance to local guidelines.

Other Materials

- Duct Tape
- Firestone Butyl Tape or equivalent (For pipe boot connections to liner)
- Stainless Steel Pipe Clamps
- PVC Pipes

Machinery

- Hand Held Compactor
- Excavation Machinery
- Equally distributed load light vehicle (PT-30/50 Terex or similar)

Geo Membranes

- Hydrophilic Geotextile
- Geo Grid, BX-1200 or equivalent if specified by engineer.
- Plastic Liner
  - 0.75 mm (0.03”) HDPE (Suitable for welding)
  - 1 mm (0.04”)HDPP (Suitable for welding)

Pre Filtration Devices

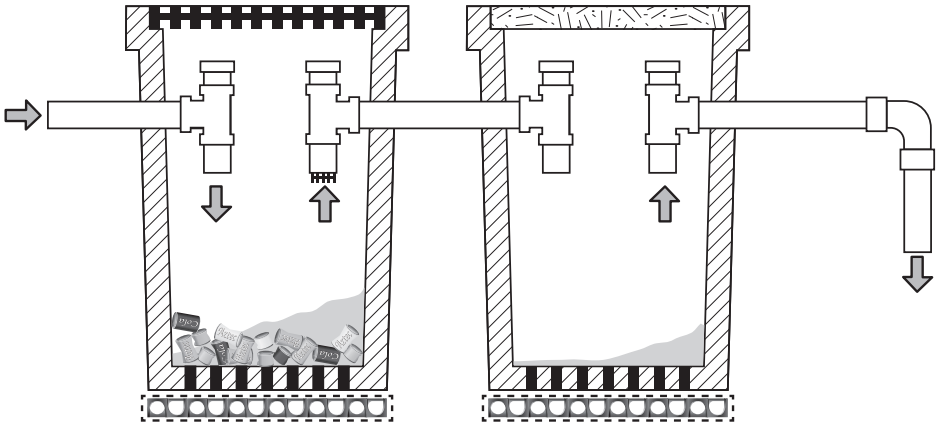
- Atlantis Flo-Screen® small
- Atlantis Flo-Screen® large
- Standard Sediment and Gross Pollutant Trap
- Expanded steel mesh, galv. /zinc coated (Maximesh RH3030 or equiv.)
- Proprietary Sediment, Grease and Gross Pollutant Traps from various manufacturers
- Infiltration Swales with Flo-Tank® or Flo-Channel® for optimum flush-out.

Atlantis Flo-Screen® filtration units

These in line filters are designed to remove gross pollutants, such as vegetation matter and silt from roofs and stormwater pits before allowing water to enter the Atlantis tank system.

Double Pit Design Sediment & Gross Pollutant Trap for Commercial Applications

This in line filter removes gross pollutants and sediments from entering the Atlantis modular tank system. It is assembled on site from standard stormwater components commonly available in the market place. This pit design is scalable to suit the flow requirements of the project.



1. THE DESIGN AND PRE-CONSTRUCTION PROCESS

I. ADHERENCE TO LOCAL DESIGN STANDARDS

The tank system has to be engineered to achieve the hydraulic function as per local requirements and national design standards (AS3500: Plumbing and Drainage for Australia and New Zealand). Hydraulic modelling and calculations are to be undertaken and the plans prepared and approved for construction.

Structural Engineering design plans must provide adequate Partial Factors of Safety for static and dynamic loads as relevant per AS4678: Earth Retaining Structures, AS2566: Buried Flexible Pipelines, AS5100: Bridge Design, AS1170: Structural Design Actions and all standards deemed appropriate for buried rainwater tanks or water channel systems. For International Design Guidelines refer to CIRIA C680: Structural design of modular geocellular drainage tanks.

For long term design strengths contact Atlantis for creep factors. Also for any other technical enquiry contact Atlantis Technical Department.

II. GEOTECHNICAL FACTORS

Geotechnical factors that must be taken into consideration include ground water tables that vary seasonally, those soils that are prone to liquefaction, ground slope stability and soil movements etc.

All necessary geotechnical testing must be done during the design stage, testing type of substrates, depth of substrate layers, slope stability, moisture content, groundwater level etc. All such documents and reports are to be provided to the design engineering team.

Where it is expected the site is contaminated with high concentrations of acid, hydrocarbons or any other chemicals of high concentration, a site specific soil test on the nature of the substrate should be undertaken. Contact Atlantis for the Material Safety Data Sheet to see if the product is suitable for the tested substrate.

III. STRUCTURAL DESIGN

The excavation for Atlantis tank modules is defined by depth and area:

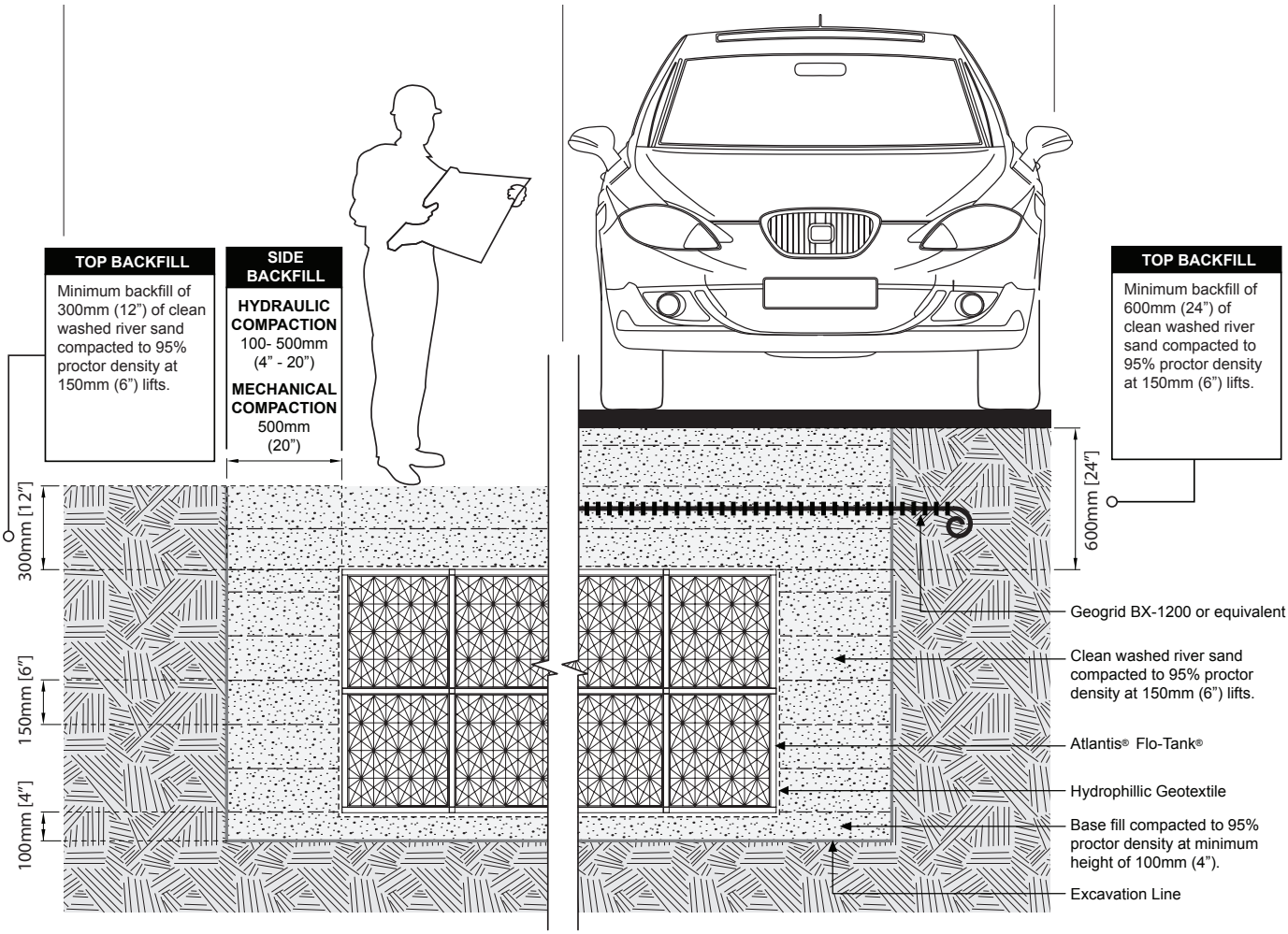
EXCAVATION DEPTH = Base Fill + Tank Height + Specified Backfill Height
EXCAVATION AREA = Tank Footprint + Minimum Side Backfill

Three factors influence the forces acting on a buried tank: i) type of load ii) the magnitude of the load and iii) the depth beneath ground level.

The soil weight and any permanent structure above the tank define the “dead load”. Traffic loads such as pedestrians, cars and trucks define the “live load”. A deeper excavation spreads the live load out more, however results in a heavier dead load due to more soil above. The shallower excavation although has a more concentrated live load will have less weight due to the soil. Looking at these factors (and several others factors in structural geotechnics), a safe working depth can be prepared.

The table below is a guideline for a standard 4 plate Atlantis Flo Tank. The traffic load is assumed for a 3 tonne, 2-axle car load. Please note that the Flo Tanks can be designed to easily withstand multiple axle trucks by increasing the top backfill depth and increasing the number of Internal plates in the Flo Tank. Please contact Atlantis Technical to help you design a system that caters for your site-specific requirements.

FILL	PEDESTRIAN TRAFFIC (MM	VEHICLE TRAFFIC (MM)
BASE	100	100
SIDE*	300	600
TOP BACKFILL**	300	600



***SIDE BACKFILL:**

For installations that have limited footprint available, 100mm (4") can be applied if approved by specifying engineer. Narrow side backfill must be compacted to 95%. For installations into reactive soils or clay a minimum of 500mm (20") side backfill is required.

****MAXIMUM BACKFILL:**

This depends on the type of Atlantis system used. Typically for a 9 plate Atlantis Flo Tank the maximum backfill is 4.0m, but there are other factors involved such as magnitude and type of load, type of backfill and its density etc. Please contact our technical department to take a look into your specific site requirements.

IV) ZONE OF INFLUENCE OF THE TANK

The zone of influence of the tank determines an area of soil, around the tank, that supports and influences it. For this reason it is important to look into the zone of influence and determine safe installation distances to structural footings and heavy traffic.

a) For Permanent surrounding structures.

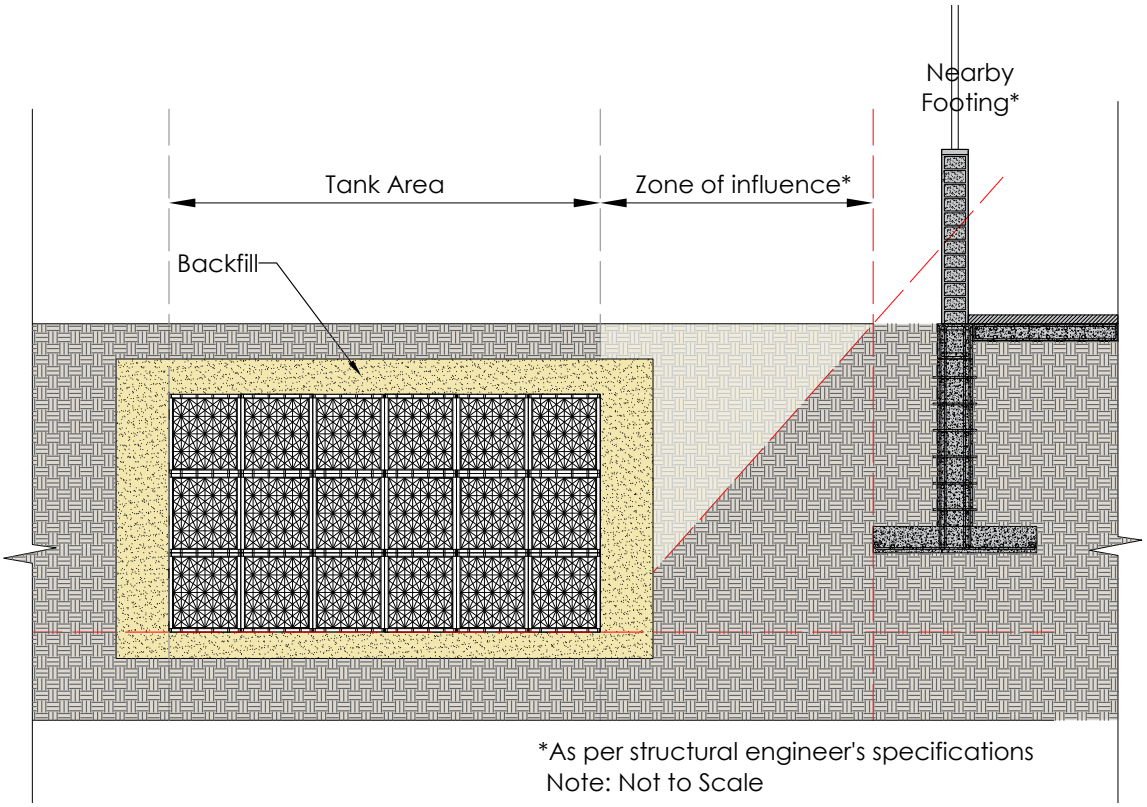
Before excavating please check soil types to determine the minimum distance of the excavation from existing structures. The table below provides a guideline for minimum setback to existing structures in different soil types. A structural engineer to be contracted to determine site specific setback between the tanks and the structural footing.

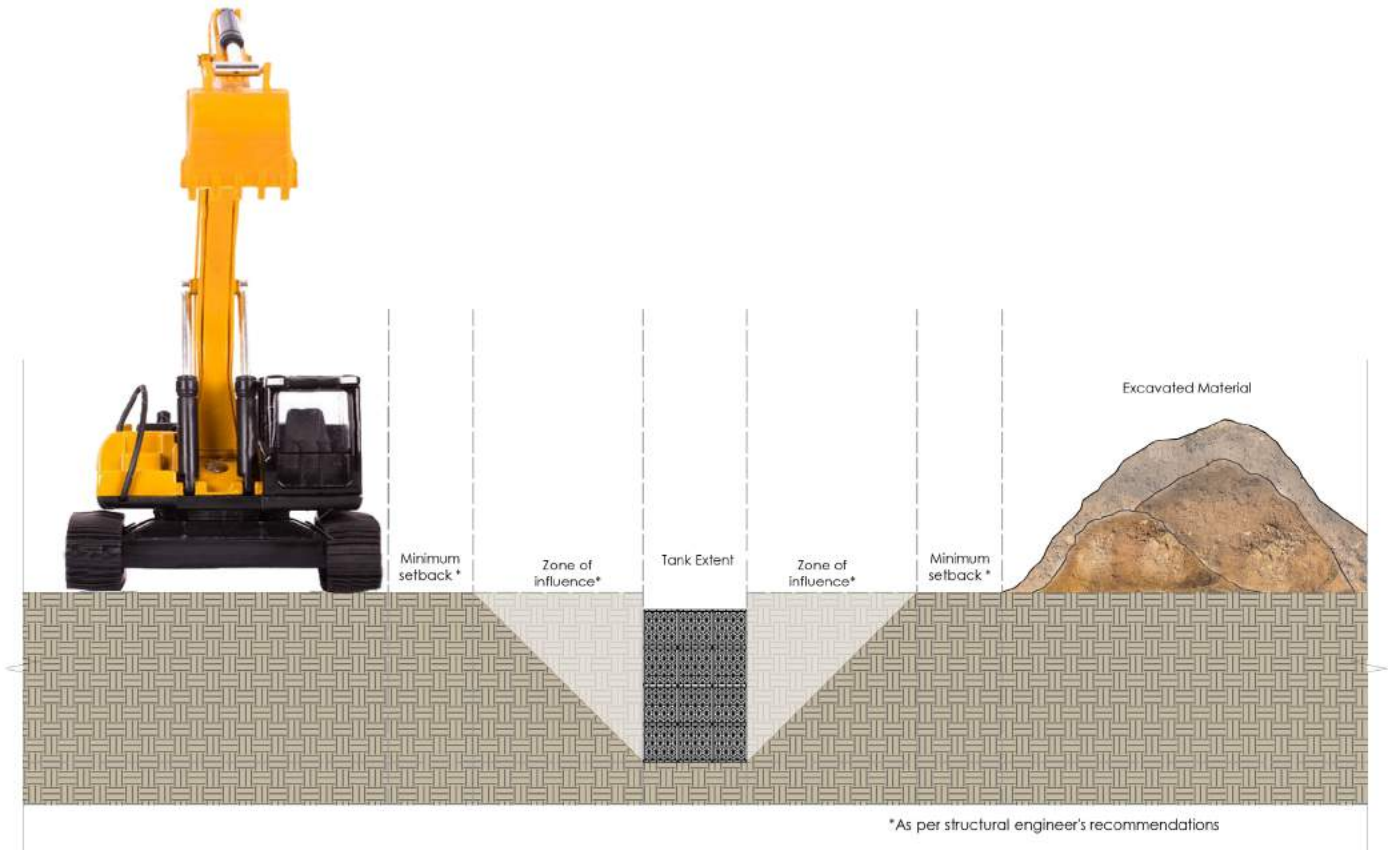
Soil Type	Typical Hydrailic Conductivity (cm/s)	Typical Hydraulic Conductivity (mm/hr) (inches/hr)	Modification Factor (U)	Minimum setback distances from structures and boundaries (m) (ft)
Sand	5.00E- 03	180 (7.08”)	0.5	1.0 (3.28 ft.)
Sand Clay	1.00E-03 - 5.00E-03	36 - 180 (1.42 - 7.08”)	1.0	2.0 (6.56 ft.)
Weathered of Fractured Rock	1.00E-04 - 1.00E-03	3.6 - 36 (.14 - 1.42”)	-	2.0 (6.56 ft.)
Medium Clay	1.00E-04 - 1.00E-03	3.6 - 36 (.14 - 1.42”)	2.0	4.0 (13.12 ft.)
Heavy Clay	1.00E-06 - 1.00E-04	0.036 - 3.6 (0.0014 - 0.14”)	2.0	5.0 (16.40 ft.)

b) For Construction equipment and machinery.

The structural engineer is to determine the zone of influence and the safe distance of heavy machinery and plants from the excavation. In some cases a ground support system may be required and designed by the structural engineer.

All construction traffic, excavated material, plants and heavy equipment are to be clear of the limits of excavation determined by the zone of influence until the project is completed and approved by engineer or project manager in charge.





2. THE CONSTRUCTION OF THE ATLANTIS SYSTEM

Review Atlantis installation procedures thoroughly, if in doubt contact Atlantis Technical support team at technical@atlantiscorp.com.au or call Atlantis on +61 2 9417 8344 on Australian Eastern Standard time between 8:30am and 5 pm Monday to Friday.
Visit the website https://www.timeanddate.com/worldclock/australia/sydney for current time difference from your location.

Carefully plan and coordinate the installation of the Atlantis system with other work on the project such as grading, excavation works, utilities installation, construction of access roads, site compaction and erosion management. The following documents shall be submitted to the builders on site: Geotechnical testing report and all relevant design information (elevation plans, site photos, hydrological/hydraulic studies etc.)

I. THE CONSTRUCTION OF THE ATLANTIS SYSTEM

Installation must be performed only by skilled and competent contractors with satisfactory record of performance and quality on underground installations. Multiple contractors may need to be employed for the overall job.

Contractors must adhere to the Atlantis installation guidelines and engineering specifications. If the plans or drawings conflict with our installation guide, please notify our technical department.

II. CONSTRUCTION & SITE TRAFFIC

Keep all construction traffic away from the limits of excavation determined by the zone of influence calculations until the project is completed and final surface materials are in place as approved by engineer or project manager in charge. Also mechanical plant and storage of materials (including excavated material) or any other heavy loads should not be located in the ‘zone of influence’ of an excavation.

III. EXCAVATION

In any excavation project, intelligent planning is mandatory. All excavations should take into account adjacent structures and how the excavation can affect existing footings, pipelines and services already buried underneath the ground. Before engaging in excavation the following must be looked at:

- Refer to a site-specific latest survey and ensure the survey includes an area beyond the site of interest and into properties directly adjacent in all sides of the excavation. This will give the location of all existing buried structures, footings, pipes & underground tanks etc.

- Contact **DBYD** (Dial Before You Dig) before excavation. For non-Australian locations contact any service that provides locations and types of all services and utilities beneath the ground.

- For geotechnical complexities such as slope stability (working excavations on slopes), material instability and groundwater pressures and how these may exacerbate the effect of the excavation on surrounding structures, a geotechnical engineer must be contacted prior to excavation. If it is found the excavation for the tanks will effect the stability of surrounding structures the excavation MUST NOT BE STARTED.

- Any ground support system must be designed by a competent person i.e. geotechnical engineer or structural engineer.

All activities of earthworks must be documented, namely:

1. Investigation and Planning: Includes surveys that determine existing services, footings, trees etc. Discussions with neighbouring sites regarding easements and the construction itself. Works-as-Expected survey.

2. Design and Specification: Engineering plans & documentation, Geotechnical investigation reports

3. Construction: Includes DBYD, meeting of relevant parties documentation.

3. MISCELLANEOUS

I. HYDROPHILIC GEOTEXTILE

For all applications, the geotextile should be HYDROPHILIC. The molecular properties of Hydrophilic geotextiles attract and absorb water. Geotextiles that are HYDROPHOBIC repel water due to the molecular structure and are not encouraged for use with Atlantis products. Having a geotextile that is hydrophobic will cause problems with flow, especially if the product is used in channelling large quantities of water.

A simple test to determine whether the geotextile is Hydrophilic is to use a square piece of geotextile 150mm (6”) in size. Take the geotextile sample and place it over a drinking cup. Use tape to secure it around the cup to form a spanned surface. Then place a few drops of water onto the surface. If the geotextile immediately attracts the water and allows the water to drain through it is Hydrophilic. If the water sits on top of the geotextile and forms droplets it is Hydrophobic. Hydrophobic geotextiles may require a head of pressure to perform however they are NOT suitable for use with Atlantis products.

For specification the designer/specifier can simply call up as “Geotextile as per Atlantis recommendations”.

II. POST CONSTRUCTION SIGNAGE

Where there is high risk of failure, damage to tanks or to other existing structures ensure there is permanent signage stating the location, extent and maximum load allowed above the tanks.

III. INFLOW WATER QUALITY

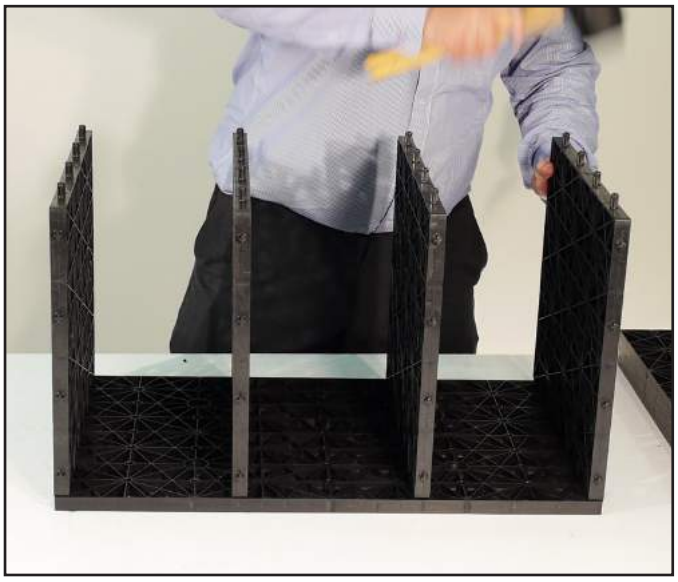
All water entering the system must be filtered, free of gross pollutants, silts, grit, sediments, oils and chemicals that can cause deterioration of the system, as the following chemicals: Benzene and derivatives, Acenaphthene Benzo-perylene, Carbon, Tetrachloride, Heptane, Kerosene Mineral Oil (White), Nitric Acid, Sulphuric Acid and Toluene chemicals are not recommended for polypropylene.

The design engineer is responsible for determining the nature of pollutants in the inflow water; they are then to devise the appropriate filtration device. Contact Atlantis Technical department to help choose the best filtration devices and techniques for the particular job.

Contact Atlantis for the maintenance schedule for our products.

Flo-Tank® Module Assembly Guide

Atlantis Flo-Tank® modules are shipped as flat pack components that need to be assembled into modules on site.



Module Assembly Time

The time required to build a 4 plate configuration Flo-Tank® modules are as follows:

Mini	=	1 minutes
Single	=	1 minutes
Double	=	2 minutes
Triple	=	4 minutes
Quad	=	6 minutes
Penta	=	7 minutes

NOTE: Completed tank modules should be staged as close to the installation area as possible, in order to avoid excessive handling.

Flo-Tank® Strength Configurations

Atlantis tank modules can be configured to suit your project design life requirements.

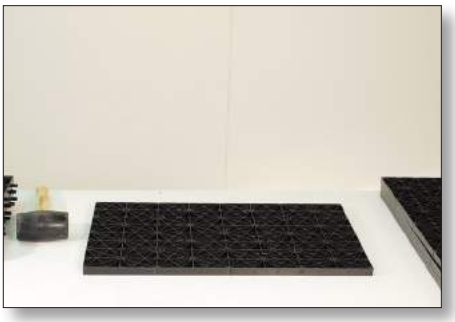
4 PLATE CONFIGURATION

5 PLATE CONFIGURATION

7 PLATE CONFIGURATION

9 PLATE CONFIGURATION

Flo-Tank® 4 plate module assembly.



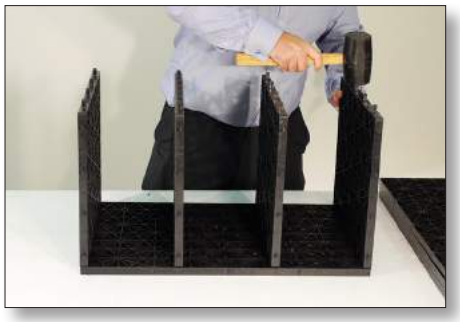
Place large plate onto work bench.

Align small plate pins with the holes on the large plate.

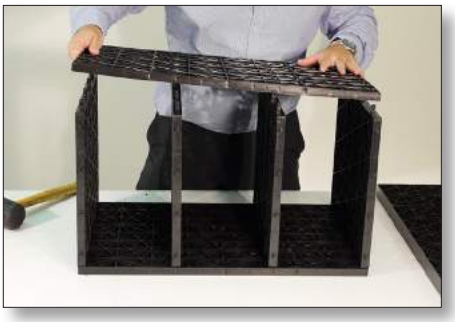
Insert small plate into large plate.

Position the 2nd small plate and insert into the large plate.

Repeat the insertion process for the small plates.

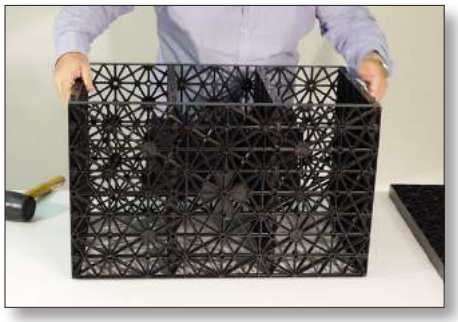


Firmly insert the small plates into the large plates.



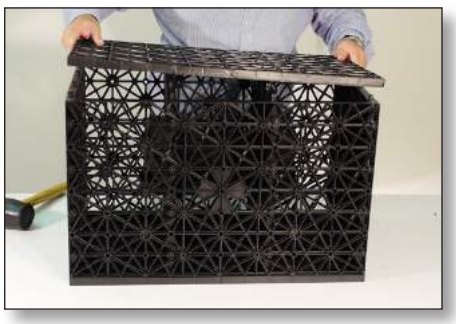
Align the pins on the small plate with the top large plate and insert into place.

Use a rubber mallet to hammer the pins to ensure a tight fit.



Flip the Flo-Tank® module onto its side.

Place the large plate on top of the semi assembled module and fit into place. Use a rubber mallet to securely fit the pins into place.

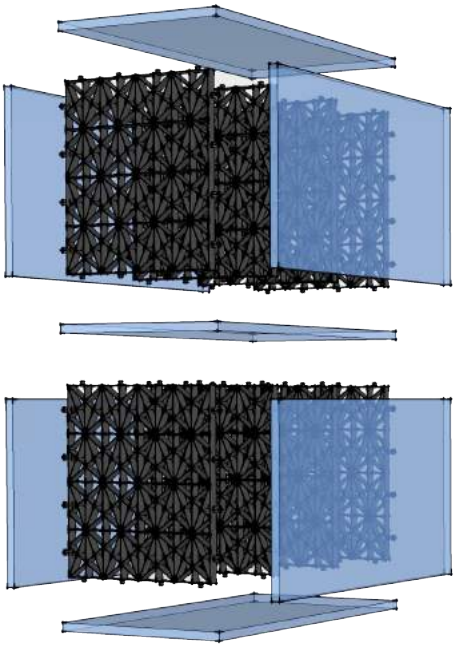


Flip the module over again and repeat the last step.

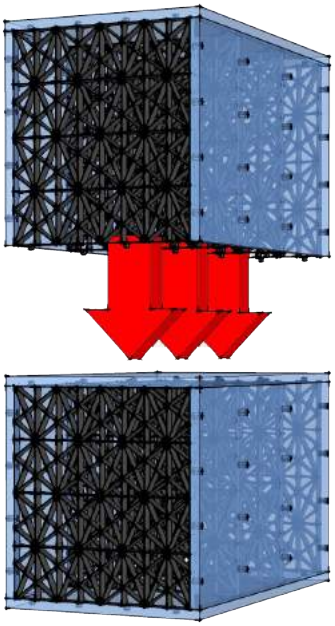
Completed Flo-Tank® module.

Flo-Tank® Double, Triple, Quad and Penta Assembly Guide.

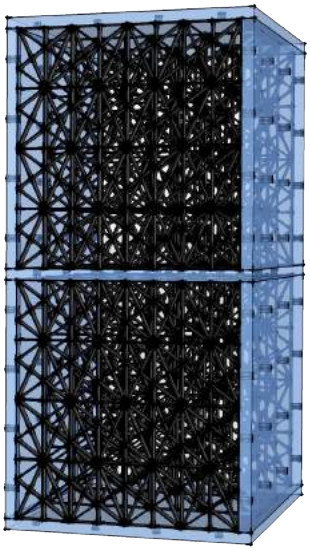
The Atlantis Flo-Tank® modules can be configured into taller modules by simply attaching an additional module on top of a single module. Tall Flo-Tank® modules use a common plate in between. The additional modules must be constructed without a bottom plate. The exposed pins are used to clip into the single module.



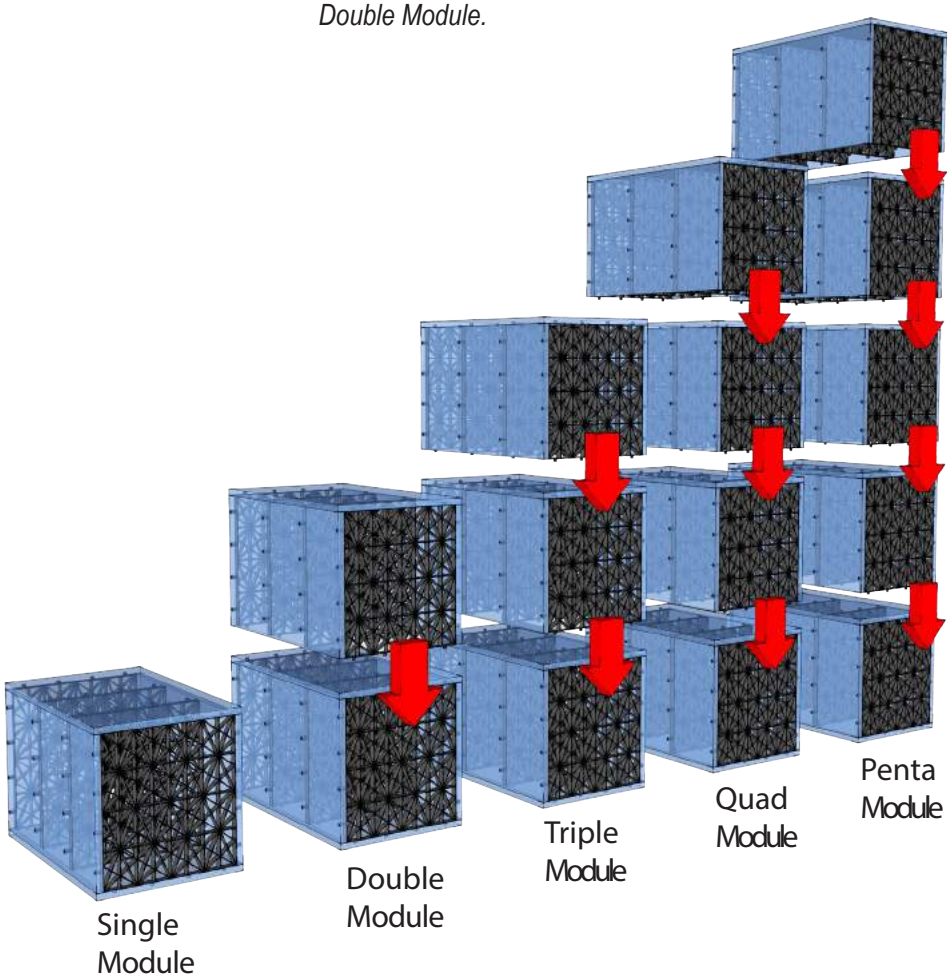
Exploded view of the Flo-Tank® Double Module.



Attaching the additional module to the Single Module to create a Double Module.



Completed Flo-Tank® Double Module.



STEP 1 - Excavate

Note: Please ensure a temporary perimeter fence is erected before excavation.

Prepare excavation as per geo technical engineer's specifications and/or as shown on engineering drawings.

Examine prepared excavation and conditions for level smoothness and compaction. Correct unsatisfactory conditions before commencement of base preparation layer.

NOTE:
Excavation size should be: tank size + minimum top, side and base backfill

STEP 1 - Excavate.

Check for the presence of soft or muddy soils. Insure the presence of a high ground water table is at least 1m (3ft) feet below the bottom of the Atlantis Tank structure at all times.

The excavation must be level before the base fill can be applied.

NOTE: Ground foundations with a clay profile are considered non-standard conditions. The design must be approved by a geotechnical engineer.

STEP 2: Prepare Base

Base Layer Installation

Apply a level base of 100mm - 200mm (4" - 8") of smooth clean washed river sand, free from lumps and debris or any other sharp materials and compact to 95% modified proctor density. Structural fill material, (sand and gravel) may be used to amend the structural capacity of the base layer.

The foundation should achieve a CBR of 3-5% and be checked by the authorised engineer.

STEP 2 - Prepare Base.

Backfill Materials

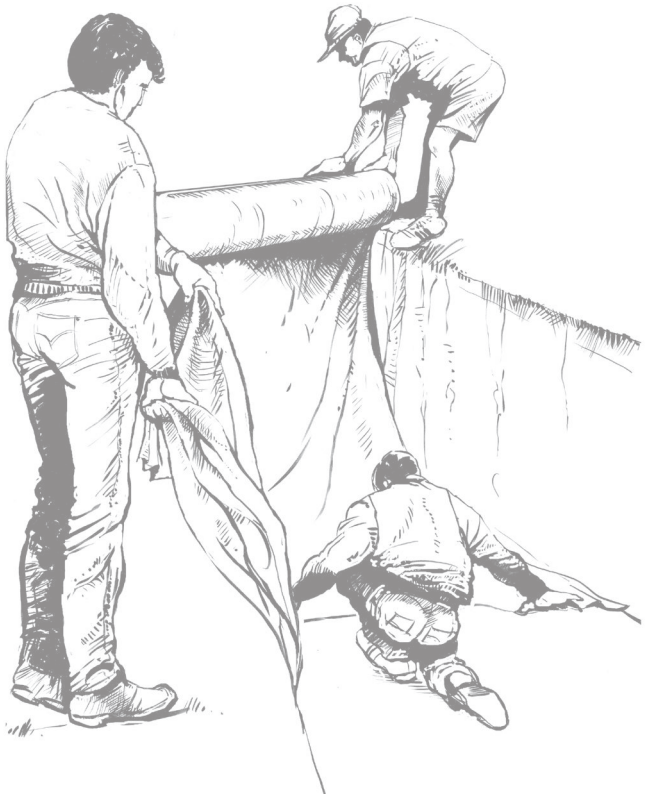
Either washed river sand or gravel of 19mm (3/4") in size is acceptable for base materials. Technical specifications are available upon request.

STEP 3: Place geotextile to wrap tank

Ensure the geotextile is hydrophilic. Refer to the geotextile guide lines for more information. Lay the geotextile into the excavation. Use sandbags or heavy objects to temporarily secure the geotextile at the top of the excavation to prevent the fabric from falling into the excavation.

Step 3 - Lay geotextile.

Over lap the edges by a minimum of 300mm (12”). Ensure 300mm of geotextile is available on the ends to wrap over the tank system.



RAINWATER & O.S.D TANKS ONLY

STEP 3 B: Laying the impermeable plastic liner along the base and up the sides.

Lay impermeable liner into the excavation and spread out evenly. Ensure the Impermeable liner is centred into position and that the minimum allowable overlap of 1m (3ft.) is available on all edges of the tank system to fold over the top of the tank system.

Take care not to tear or puncture the liner. Overlapping edges and joins should be welded by an experienced polyplastic welder. Tank configurations should have as few welded joins as possible.

STEP 3 C: Laying protective layer of geotextile

Lay geotextile fabric into the excavation as a protective layer between the impermeable liner and the Atlantis Flo-Tank® modules. Secure overlapping edges with duct tape.

STEP 4: Install Tank Modules

The boundaries of the tank is best carried out by surveyors to ensure a straight installation. The corner of the tank selected to begin the tank construction is located in the area where critical pipe connections need to be made.

Using the string lines as a guide, place the Flo-Tank® modules into the corner of the excavation following the string lines as a guide.

Continue the process of placing the Flo-Tank® modules in a sequential manner until all the modules are placed. Minor gaps (< 5mm - 1/4") between adjacent units or variations in height (< 5mm - 1/4") are acceptable.

STEP 5: Install Maintenance Ports

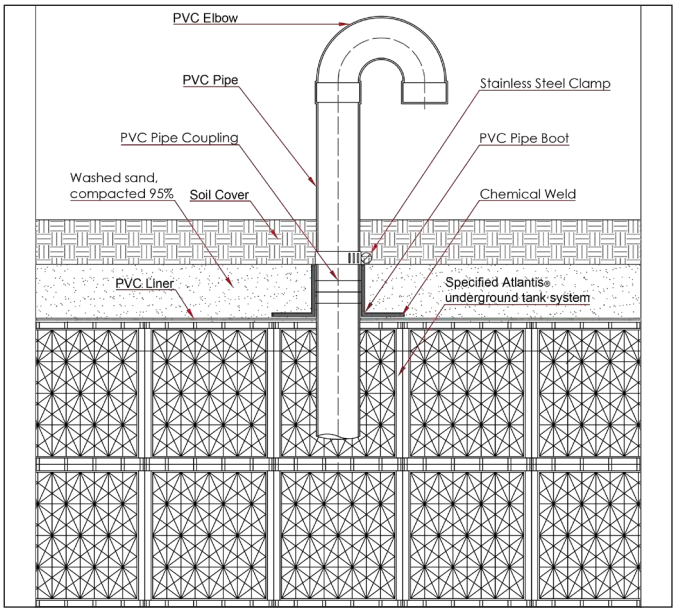
INSPECTION • MAINTENANCE • VENTILATION

Typically made from PVC pipe, these provide vertical access into the system. They should be long enough to sit on the bottom of the Flo-Tank® module, rising to the finished surface where they are capped.

For an effective and on-going underground water system a good maintenance design plan is needed.

Atlantis recommends two tools, which can help achieve a good long-term maintenance system. Ventilation ports & maintenance/inspection ports.

1. Ventilation pipes prevent vacuum formation when large quantities of water are withdrawn from the tanks. 2 x ventilation pipes can be installed in opposite sections of the tank. They should be placed in all underground tanks, whether for infiltration, detention or retention. The vent is drilled into the tanks in between the vertical plates using a reciprocating saw to cut the hole. See the section below.



The vent pipe is to be installed 1 metre from the inlet and the other on the opposite end of the tank, either near the outlet or overflow pipe.

The pipe must be 150mm diameter. It must be possible to remove the PVC elbow and use that as the maintenance access for vacuum trucks. An alternative vent pipe is a 4"-6" (100mm-150mm) diameter pipe capped with a PVC tank breather vent cap and/or slotted cover.

NOTE: When a vent is installed an overflow pipe must be used otherwise water will start escaping from the vent.

2. Maintenance ports are used as access openings for flushing the system and for inspection. Vacuum trucks can flush the system from sediment build up. These are highly recommended for large and small tank systems.

Figure 1 shows the maintenance port coming out from the Flo-Tank.

Figure 2 shows the 2D section with the pipe and concrete collar.

For large tank systems over 10,000L, it is recommended to use multiple maintenance ports: one for every 25,000L of volume. Each maintenance port will be drilled into the tanks from above and through each tank and terminate at the bottom plate of the bottom-most tank.

FIGURE 1

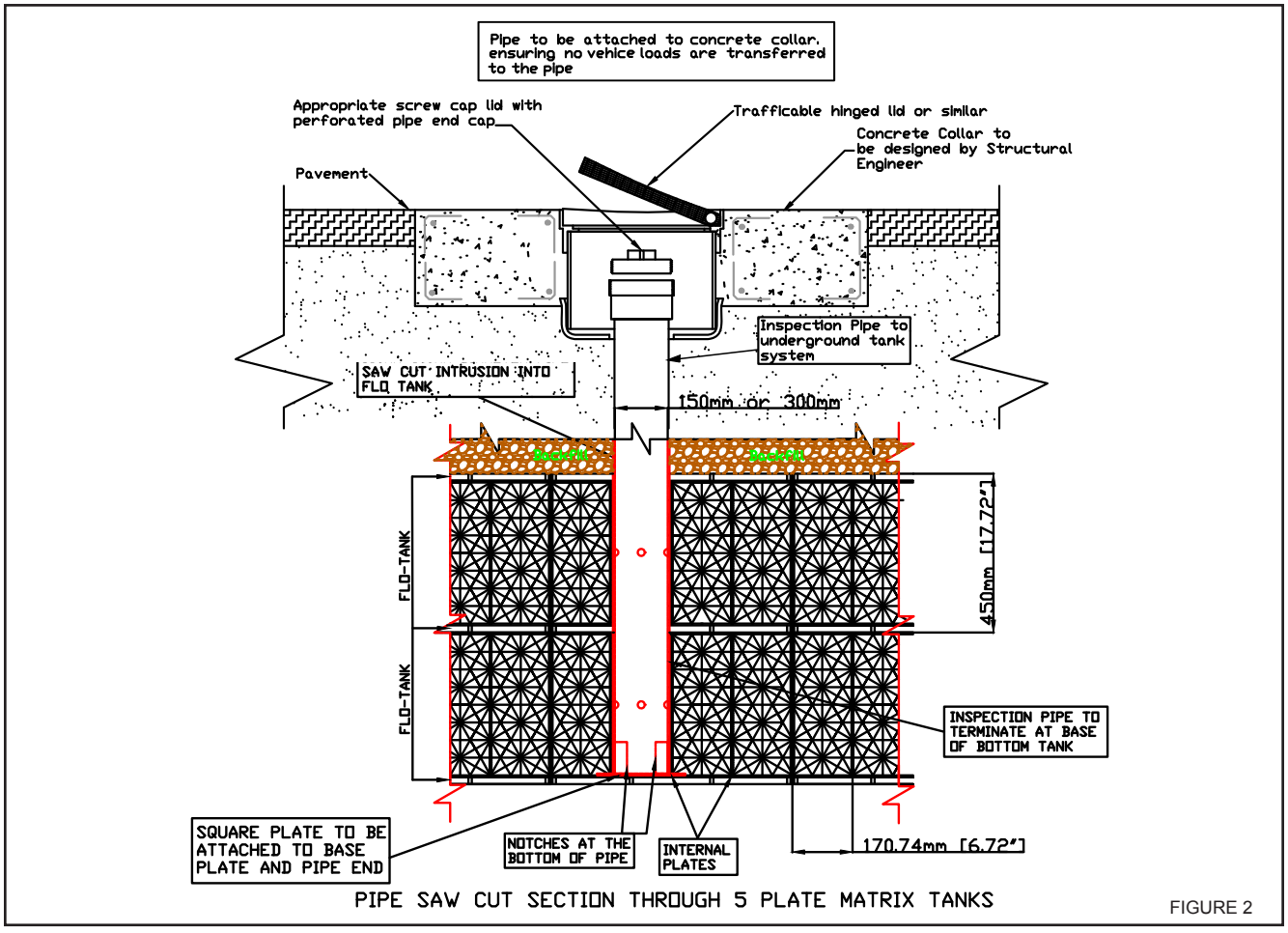


FIGURE 2

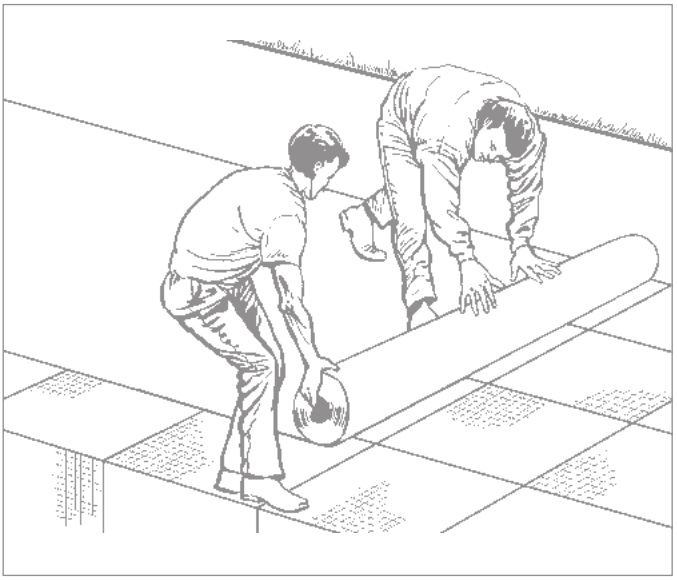
NOTE: After the installation, ensure the pipes are capped to prevent debris from entering the system.

STEP 6 A: Wrap Tank in Geotextile

Wrap Geotextile placed in Step 3, over the Flo-Tank® modules.

Seal all the seams and joins of the geotextile using duct tape. There should be a minimum of 300mm (12”) overlap at the joins and seams.

Sealing the system insures that backfill materials are kept out of the system.



Put utility tape on all corners of the tank to determine sub-surface location in the future.

RAINWATER & O.S.D TANKS ONLY

STEP 6 B: Seal System with Liner

Position and fold the Impermeable Liner over the constructed tank system and completely seal the system with quality hot welded overlaps.

Wrap tank modules in hydrophilic geotextile.

Position and fold the impermeable liner over the tank construction, overlapping the edges by 1m (3 ft.) and completely seal the system.

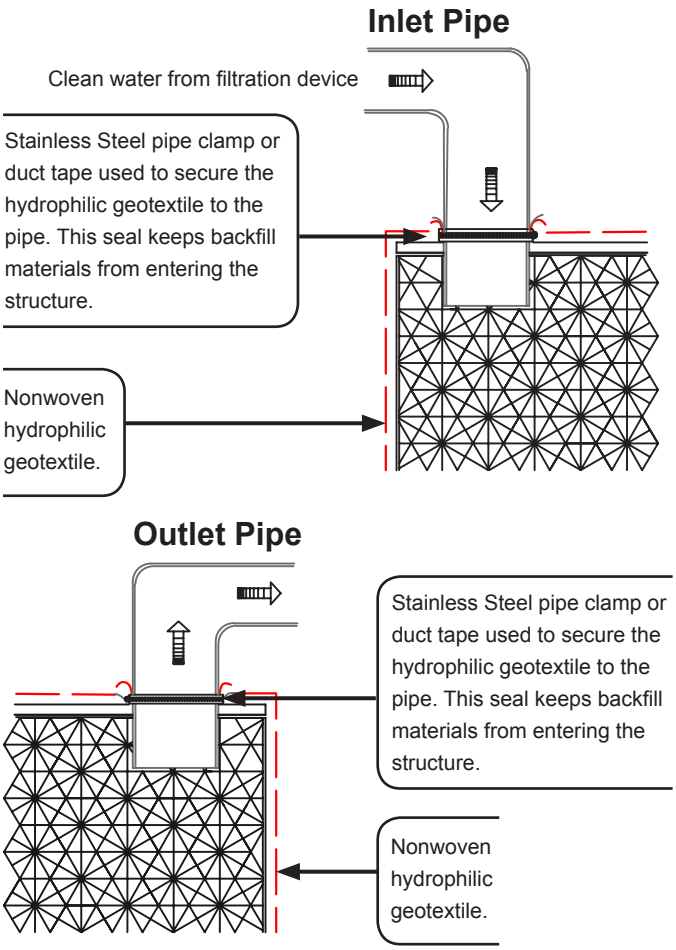
STEP 6 C: Installation of Pipe Boot

Install pipe boot to liner according to the detailed instructions found on **page 22** of this manual.

STEP 7 A: Connect Inlet / Outlet Pipes

IMPORTANT: All water entering the Atlantis system must be filtered by an approved filtration device. Raw stormwater containing gross pollutants and heavy sediments must be kept out of the Atlantis system.

Typical Pipe Inlet Outlet Connection



Pipe connections can be made anywhere on the top of the Flo-Tank® modules.
Wherever a pipe must pass through the geotextile, cut an “X” in the geotextile, pull the four flaps back over the pipe. Use duct tape to seal around the pipe, then attach stainless steel clamp to securely fasten the connection.

Inlet and outlet pipes should not be greater than 225mm (9”) in diameter.

Pipes can also be installed using a pipe boot and securing it to the membrane. (See pages 22-23)

Note: Flo-Tank® tank systems should not be activated or brought on-line until construction is completed and the site is stabilized. This will prevent construction debris and heavy sediments from contaminating the system.

Step 1 - Cut an X shape into the geotextile. Ensure the cut is slightly smaller than the pipe for a tight fit.

Step 2 - Lift the cut flaps of the geotextile.

Step 3 - Use a hole saw attachment on a power drill to cut the opening on the tank module.

Step 4 - Position the pipe into the opening.

Step 5 - Slide the pipe through the hole and into the final position.

Step 6 - Use duct tape to secure the geotextile then place stainless steel clamp to secure the connection.

STEP 8: Backfill Sides

Side backfill can range in width from 200mm (10”) to 500mm (20”) for standard applications. If you have a minimal footprint and have to limit your side fill please contact our technical department for directions.

For installations into reactive soils or clay a minimum of 500mm (20”) side backfill is required.

Step 8 - Backfill Sides

Side backfill must consist of clean washed river sand, free from lumps and debris or any other sharp materials. Backfill materials containing clay should NEVER be used.

Compact side fill in 150mm (6”) lifts and compact to 95% proctor density. Each compacted lift must be constructed on all sides of the tank structure before the next lift can be constructed. Use a powered mechanical compactor to compact the lifts. Vibration from compactor will help eliminate minor gaps between Flo-Tank® modules.

When using a mechanical compactor cover the side of the tank system with a sheet of plywood to protect the fabric and tank modules from damage. Move the plywood sheet as the compactor moves.

STEP 9: Backfill Top

When the side backfill reaches the top of the tank structure the backfill process can commence. When placing backfill materials be careful to avoid damage or displacement of the tanks and geotextile fabric. Excavator equipment shall remain clear of the excavation. Material shall not be dropped vertically on the tank from a distance greater than one-foot.

Backfill around the sides of the tank system first, compacting material to 95% proctor density with a vibratory plate compactor, in 150mm (6”) lifts. Keep the compactor clear of the tank structure, geotextile and liners.

Step 9 - Backfill Top

Exercise care when placing the first 150mm (6”) lift on Matrix® Tank. Spread material using a lightweight powered mechanical compactor or roller*. The next 150mm (6”) lift may be placed using lightweight equipment with tracks. Place at least 500mm (20”) of material and blade down to 300mm (12”), where required, then compact to 95%.

* For large scale projects, spread the backfill material with a low ground pressure skid steer loader (i.e. Posi Track)

MINIMUM BACKFILL UNDER CONCRETE SLAB for lightweight traffic load: A minimum of 100mm of top backfill can be applied when specified under a 150mm reinforced concrete slab. Seek approval from a structural engineer.

MAXIMUM BACKFILL: This depends on the type of Atlantis system used. Typically for a 9 plate Atlantis Flo Tank the maximum backfill is 4.0m, but there are other factors involved such as magnitude and type of load, type of backfill and its density etc. Please contact our technical department to take a look into your specific site requirements.

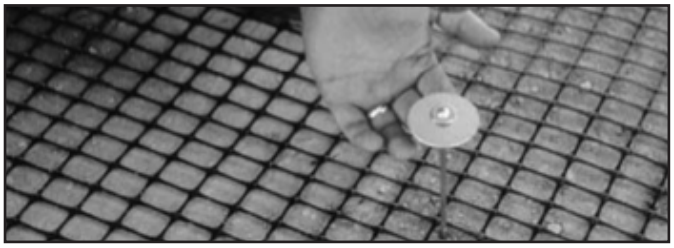
STEP 10: Place Geogrid (optional)

Geogrid is required for load-bearing applications such as systems placed below parking lots.

Geogrid should be BX-1200 or equal and should extend 1m (3ft.) beyond the excavation footprint.

STEP 10 - Install BX-1200 geogrid.

Overlap all edges by 500mm (20”) or as recommended by manufacturer or engineer. Continue backfilling to recommended levels in 150-300mm (6”-12”) lifts with compaction to 95%.



STEP 11 - Site Final Cleaning

Perform final cleaning of work and remove all excess material, debris and equipment. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

STEP 12 - Surface Materials

Place surfacing materials such as ground covers, shrubs or paving materials over the structure with care to avoid displacement of cover fill and damage to surrounding areas.

STEP 13 - Erect Perimeter Fencing

Following completion of the work, mark the perimeter of the system footprint and place temporary fencing to restrict heavy traffic or impact above the system until construction of the site is complete.

STEP 14 - Permanent Perimeter

When necessary install permanent signs that display warnings of maximum loads allowable over the tank installation.

Permanent bollards (traffic post) can also be installed to prevent any traffic from entering the tank location.

STEP 15 - System Commissioning / Bringing the System Online

Direct all site stormwater runoff away from the installation area during construction. The installation area shall not receive any run off. To maintain the area provide temporary erosion control devices and landscaping that minimizes the entry of silts and clay into the infiltration installation area.

For Rainwater Harvesting & O.S.D Detention Tanks ONLY

Step 7 B: Installation of Pipe Boot to Liner

Liner Preparation
When installing pipe boots it is important that the liner is flat against the modules without creases or wrinkles and the surface is clean and dry. The liner should now be secured against the crates in its final location.

Determine Position of Pipe and Cut Out Hole In Liner
With the pipe in place, carefully cut the liner around the pipe and remove the section of liner.

Prepare Final Position of Pipe
Slide the pipe boot over the pipe, then position pipe at its final location and fix into place with compacted backfill. It is important that the pipe does not move after the pipe boot is bonded to the liner as this movement may break the seal or damage the pipe boot causing failure.

Mark Flange Position
Slide the flange of the pipe boot against the liner, then mark the liner around the flange with a felt tip marker.

Primer Application
Slide the pipe boot back along the pipe out of the way. Then, with the application pad supplied, apply a good thick bead of primer 100mm (4”) wide around the inside of the line. Overlap the line by about 10mm (0.4”) Even out the primer with the pad as much as possible so there is a uniform thickness. Allow the primer to flash off till touch dry. This should be less than 10 minutes depending on the ambient temperature.

Position Flange
When the primer is touch dry slide the pipe boot back into place lining up the edge with the primer. Carefully remove the backing paper from one edge of the flange then push the flange against the primer making sure that there are no wrinkles in the liner or flange.

Install Flange
Tightly rub the back of the flange making sure that all of the flange is bonded to the liner. It may be a good idea to install a thin sheet of plywood or similar substance between the crates and the liner to give a firm backing. Repeat this process for the other 3 sides of the pipe boot flange always making sure that there are no wrinkles or folds in the liner or pipe boot flange. Give the flange a good firm rub making sure that there are no bubbles in the bond and that the flange is firmly bonded to the liner. Remove the plywood.

Apply Sealant to Flange
With the tube of sealant supplied, apply a bead of sealant around the outside of the flange about 15mm (0.6”) wide.

Sealing the Pipe Boot to the Pipe
Put a bead of sealant between the pipe boot and the pipe then apply a stainless steel pipe band around the pipe boot and pipe.

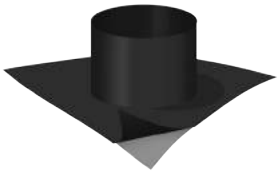
Wrap Protective Layer of Duct Tape Around Pipe Clamp
To protect the pipe boot from the sharp edges of the pipe clamp it is a good idea to run a couple of layers of duct tape around the pipe boot prior to installing the pipe clamp.

Self Adhesive Pipe Boot Instructions page

Materials needed

White marker

Box cutter



Self adhesive pipe liner booth

Sealant

Metal hose clamps

1. Clean the area where the boot is to be installed

2. Trace the edge of the boot onto the tank liner

3. Cut the opening for the pipe

4. Prepare the area of the boot flange with a polypropylene glue

5. The area is ready when the surface is dry to the touch

6. Peel the back corner of the flange to expose the sticky side

7. Mount the boot liner starting from the corner.

8. Insert the pipe and push all the way against the tank

9. Apply the sealant between the liner and the PVC pipe.

10. Move the clamp over and around the boot and tighten

DESIGN CHECKLIST

The following checklist is strictly for the use of a certified engineer who has been given the authority to design for the project in which the tanks will be used.

Atlantis system specified:

☐ Infiltration

☐ Harvesting (Reuse).
Impermeable liner required

☐ On Site Detention (OSD)
Impermeable liner required

		YES	NO
1.	**Have Project Drawings and a Geo-technical Report been provided?** **If NO:** *Please contact an engineering consulting firm to obtain a geotechnical report and relevant project sections, and then continue completing the rest of the form.*	☐	☐
2.	**Have expected loads been incorporated into the design?** Vertical Dead Load: _____ kPa / _____ psi Vertical Live Load: _____ kPa / _____ psi Vertical Combination / Uniformly distributed loads (UDL): _____ kPa / _____ psi Lateral Load: _____ kPa / _____ psi Uplift Load: _____ kPa / _____ psi Diagonal Load: _____ kN / _____ lb **According to AS4678, AS1170.1. AS 2566.1, AS 5100, AUSTROADS, BS EN 1997-1:2004 and CIRIA C680*	☐	☐
3.	**Have the following requirements been considered?** Top Cover/backfill: _____ m / _____ (ft) Setback / Adjacent structure at: _____ m / _____ (ft) **Please review minimum top cover according to AS2566.1 and AS3500 and minimum setback according to Engineers Australia (2003-2006) in Atlantis technical specification*	☐	☐
4.	**Is there presence of high water table?** **If YES:** *please specify distance from level* _____ m / _____ (ft)	☐	☐
5.	**Are there any nearby hills or steep slopes?** **If YES:** *How far from the tank perimeter?* _____ m / _____ (ft) *What is the slope gradient?* _____ **Please note that the coefficient of earth pressure may be greater in presence of nearby hills. Atlantis does not recommend tank installations near hills or steep slopes.*	☐	☐
6.	**Main soil type present on the site, identified in geotechnical report?** **Soil type:** ☐ Coarse sand ☐ Sandy loam ☐ Sandy clay ☐ Clay ☐ Other: _____	☐	☐
6.1	**Is there presence of soft soils (such as clay) and/or the tank will be used as a foundation system?** **If YES:** *Please check settlements and bearing capacity of soils.*	☐	☐
7.	**Design Life of the project:** ☐ 20 years ☐ 30 years ☐ Other: _____		
7.1	**Has a creep reduction factor been taken into account for compressive strength capacity?** ** According to AS4678*	☐	☐
7.2	**Is the tank height greater than 1.6m (5.3 ft)? and/or** **Is the tank located at depth greater than 4m (13.1 ft)?** **If YES to either:** *Creep reduction factor should be taken into account for lateral strength capacity according to CIRIAC680.*	☐	☐

		YES	NO
8.	**Pre-treatment/filtration system:** ☐ Atlantis Large / Small Filter ☐ Gross Pollutant Trap (GPT) ☐ Biofiltration ☐ Other: _____ **If NO:** *The end-user is responsible for the performance of the tanks if there is not a pre-filtration system installed/specified.* **Note**: *Sediments, debris and contaminants must be kept out of the system.*	☐	☐
9.	**Backfill material specified?** ☐ Coarse washed river sand (less than 5% fines passing 75 micron sieve) ☐ Aggregate of angular material (up to 19mm - 3/4") ☐ Other: _____ *(Material graded to AS 1141)* **If NO:** *Please seek approval from a geotechnical/structural engineer as to what backfill should be used.*	☐	☐
10.	**Has an internal plate configuration been specified?** **If YES:** *Please select from the following:* ☐ 4 Plates ☐ 5 Plates ☐ 7 Plates ☐ 9 Plates ☐ Titan Tank	☐	☐
	10.1 **Is the strength capacity of the tank greater than the loads applied on it?**	☐	☐
11.	**Project was consulted upon and approved by qualified engineers**	☐	☐

Company: _____ Date: _____

Designer: _____ Signature: _____

Note: Atlantis products are manufactured by independent factories from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.

INSTALLATION CHECKLIST

Atlantis system specified:

☐ Infiltration

☐ Harvesting (Reuse)
- ***Impermeable liner required***
- ***Always include section 4***

☐ On Site Detention (OSD)
- ***Impermeable liner required***
- ***Always include section 4***

	YES	NO
Does the P.O./ Batch Number match the designed load specified by the authorized engineer?	☐	☐

1. EXCAVATION

Note: *Please ensure a temporary perimeter fence is erected before excavation.*		YES	NO
a.	**Is the base compacted and leveled?** **If NO:** *Correct unsatisfactory conditions before commencement of base preparation layer.*	☐	☐
d.	**Are contaminated/acid soils and/or filling present? Is the site a landfill?** **If YES:** *Design must be approved by an authorised qualified engineer*	☐	☐
c.	**Are clay/soft/muddy soils and/or high water table present?** **If YES:** *Design must be approved by an authorised structural engineer*	☐	☐

2. GROUND FOUNDATION - BASE PREPARATION

		YES	NO
a.	**Does the foundation of the excavation have a minimum CBR of 3-5% in accordance with AS 1289.6.1.1?** **If NO:** *Design must be approved by an authorised structural engineer*	☐	☐
b.	**Is the base layer minimum meeting authorised engineer's depth requirements?**	☐	☐
c.	**Is the base well compacted according to AS 1289.5 and the site graded?**	☐	☐

3. GEOTEXTILE USE

		YES	NO
a.	**Is your geotextile hydrophilic?** **If NO:** *Ensure the geotextile is hydrophilic*	☐	☐
b.	**Is there enough overlap available to fold over the top of the tank?** **If NO:** *Ensure an overlap by a minimum of 300mm (12")*	☐	☐

4. OSD & REUSE INSTALLATION

		YES	NO
a.	**Is there enough overlap for the impermeable liner?** **If NO:** *Ensure overlap is available to fold over the top of the tank. Minimum overlap of 1m (3 ft.)*	☐	☐
b.	**Is there a geotextile layer to protect the liner?** **If NO:** *Ensure a geotextile/sand protection layer* **Note:** *Please consider the use of an extra strip of geotextile on the corners to protect the liner.*	☐	☐

5. INSTALLING ATLANTIS MODULES

		YES	NO
a.	**Are string lines around the boundaries to ensure straight lines** **If NO:** *Ensure the tanks are aligned according to original design* **Note:** *Best practices recommend that boundaries of the tank should be carried out by surveyors to ensure a straight installation.*	☐	☐
b.	**Are the modules stacked firmly against each other?** **If NO:** *Gaps should not be greater than 5mm (1/4").*	☐	☐

INSTALLATION CHECKLIST (Continued)

6. INSTALLING MAINTENANCE PORTS

		YES	NO
a.	**Inspection/Vent/Flushing Ports** **If NO:** *Atlantis tanks must be vented to prevent vacuum effect and may require specific maintenance according to the authorised engineer*	☐	☐

7. BACKFILLS

		YES	NO
a.	**Backfill material: Either Coarse washed sand with less than 5% fines passing 75micron sieve or Aggregate of angular material up to 19mm (3/4") or Other granular material graded to AS 1141?** **If NO:** *Any other backfill material must be approved by the authorised engineer* **Note:** *Backfill materials containing clay should never be used*	☐	☐
b.	**Backfill sides between 200-500mm (7.87" - 19.68")?** **If YES:** *Compact according to AS 1289.5* **If NO:** *Design must be approved by a structural engineer.* **Note:** *When backfilling and compacting, make sure that you do not pinch the liner or rub the compactor against the liner. Protect it with a plywood sheet 20mm (0.8") thick*	☐	☐
c.	**Is the top backfill meeting Australian Standards (or local standards) minimum cover requirements and not exceeding 4000mm (13.12ft)?** **If YES:** *Compact according to AS 1289.5* **If NO:** *Structural engineers' approval needed.* **Note:** *Ensure an equally distributed load light vehicle (i.e. Posi Track) is used to spread and level top backfill*	☐	☐
d.	**Placing and handling the backfill material: Is the backfill material placed alongside the excavation line around the tank?**	☐	☐

8. GEOGRID (Optional)

	YES	NO
If YES: *Ensure a minimum Overlap of 1m (3ft)* **Note:** *Tensar BX 1200 or similar*	☐	☐

9.PIPING

	YES	NO
Are pipes no greater than 225mm (9")? Inlet: _____ mm / (_____ ") Outlet: _____ mm / (_____ ") Overflow: _____ mm / (_____ ") Other: _____ _____ mm / (_____ ") **If YES:** *Installed according to Atlantis installation guidelines* **If NO:** *Ensure pipes greater than 225mm (9") do not penetrate the Tank structure.* **Note:** *Overflow according to AS3500.1*	☐	☐

INSTALLATION CHECKLIST (Continued)

10. PROJECT DOCUMENTS	YES	NO
Maintenance manual provided to the end user?	☐	☐
Handover Document provided to the end user?	☐	☐

11. SITE FINAL CLEANING	YES	NO
Has cleaning been arranged?	☐	☐

12. PERMANENT PERIMETER		YES	NO
a.	**Did you install signage to prevent any traffic from entering the location?** **If NO:** *Ensure a signage is present*	☐	☐

COMMENTS *(For quality and training purposes)*	YES	NO
After the excavation: _____ *Size / cross section / design matches the site* *Other:* _____ _____ _____	☐	☐

Company: _____ Date: _____

Designer: _____ Signature: _____

Note: Atlantis products are manufactured by independent factories from high quality recycled materials, carefully selected and under strict quality control procedures. The strength could vary slightly due to raw material, country of manufacture, manufacturing process and external conditions.

END USER CHECKLIST

NOTE: The tank is solely used for its purpose to temporarily detain or permanently store potable or treated stormwater

MAINTENANCE GUIDANCE OF PRE-TREATMENT/FILTRATION SYSTEMS

1.	**Monthly/after significant storm events**	
	a. No clogging at inlet/outlet structures/trash racks	☐
	b. Clean when there is excessive sediment build up in the pre-treatment device	☐
	c. Inspect, lubricate and conduct routine test to check reliability of pump(s)	☐
	d. Check condition and conduct function test of all pump starters and their controls including level control systems	☐
	e. No obstruction of maintenance access/openings	☐
	f. Access into the tank system is secure (out of bounds to public and unauthorised personnel)	☐
2.	**Yearly as required**	
	g. De-silting of the tank has been carried out, trash screens have been cleaned	☐
	h. Inspect, service, replace, lubricate and test performance of pump(s)	☐
	i. Check condition and conduct function test of all pump starters and controls including level control systems.	☐
	j. Replace faulty and worn out parts if required.	☐

INSTALL PERMANENT SIGNAGE

Signage Should Read:
CAUTION:
UNDERGROUND STORMWATER TANK BELOW Underlining maximum vehicle loads

Flo-Tank®

MODULAR UNDERGROUND TANK SYSTEM

Atlantis Corporation International Pty Ltd

PHONE: + 612 9417 8344
FAX: + 612 9417 8311
EMAIL: info@atlantiscorp.com.au
WEB: www.atlantiscorpation.com.au

NOTE: Atlantis products are manufactured from carefully selected recycled materials that meet or exceed Atlantis material specifications and product performance requirements. The strength of the recycled plastic can vary due to raw material composition, manufacturing process and reactions to external conditions and adverse chemicals. The selected recycled materials are batch tested to ensure adherence to Atlantis material specification and product performance requirements. All trademarks and Patents are the property of Astral Property Pty Ltd.

MDE Manage Design Engineer

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(PO Box 44)
Lennox Head NSW 2478
www.mde.au

Appendix C – Stormwater Inspection & Maintenance Checklist

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(PO Box 44)
Lennox Head NSW 2478
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Inspection and Maintenance Checklist

INSPECTION DATE: BASIN / TANK / PIT NUMBER:

Defect	**Conditions When Maintenance Is Needed**	**Maintenance Needed? (Y/N)**	**Comments** (Describe maintenance completed and if any needed maintenance was not conducted, note when it will be done.)	**Results Expected When Maintenance Is Performed**
GENERAL				
Trash & Debris	• Trash and debris accumulated in basin or pit insert • Visual evidence of dumping			Trash and debris cleared from site and disposed of properly.
Undesirable Vegetation	Weeds, invasive vegetation and woody plants			Vegetation treated with herbicides or physically removed and disposed of properly.
Contaminants and Pollution	Any evidence of oil, fuels, contaminants or other pollutants.			No contaminants or pollutants present.
Animal Burrows	If facility acts as a dam or berm, any evidence of rodent holes, or any evidence of water piping through dam or berm via rodent holes.			The design specifications are not compromised by holes. Any rodent control activities are in accordance with applicable laws and do not affect any protected species.
Tree/Brush Growth and Hazard Trees	• Growth does not allow maintenance access or interferes with maintenance activity. • Dead, diseased, or dying trees.			• Trees do not hinder maintenance activities. • Remove hazard trees. (Use a certified Arborist to determine health of tree or removal requirements).

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Drainage time	Standing water remains in basin more than five days after a storm event.			Correct any circumstances that restrict the flow of water from the system. Restore drainage to design condition. If the problem cannot be corrected and problems with standing water recur, then mosquitoes should be controlled by a licensed pesticide applicator.
Outfall structure	Debris or silt build-up obstructs an outfall structure.			Remove debris and/or silt build-up and dispose of properly.
EMBANKMENTS				
Erosion	• Erosion where cause of damage is still present or there is potential for continued erosion • Any erosion on a compacted berm or embankment			Cause of erosion is managed appropriately. Side slopes or berm are restored to design specifications, as needed.
STORAGE AREA				
Sediment	Accumulated sediment affecting inflow or outflow of the facility			Sediment cleaned out to designed basin shape and depth; basin reseeded if necessary to control erosion. Sediment disposed of properly.
EMERGENCY OVERFLOW, SPILLWAY AND BERMS				
Settlement	Berm settlement lower than the design elevation.			Dike is built back to the design elevation.
Tree Growth	Tree growth on berms or emergency spillway.			• Trees should be removed. If root system is small the root system may be left in place. Otherwise the roots should be removed and the berm restored. • A licensed professional engineer should be consulted for proper berm/spillway restoration.
Emergency Overflow/ Spillway	Rock is missing and soil is exposed at top of spillway or outside slope.			Rocks and pad depth are restored to design standards.
DEBRIS BARRIERS (e.g., Trash Racks)				

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Trash and Debris	Trash or debris is plugging openings in the barrier.			Trash or debris is removed and disposed of properly.
Damaged/ Missing Bars	Bars are missing, loose, bent out of shape, or deteriorating due to excessive rust.			Bars are repaired or replaced to allow proper functioning of trash rack.
Inlet/Outlet Pipe	Debris barrier is missing or not attached to pipe.			Debris barrier is repaired or replaced to allow proper functioning of trash rack. There are to be no barriers present at pipe discharges.
FENCING AND GATES				
Missing or broken parts	Any defect in or damage to the fence or gate that permits easy entry to a facility.			Fencing and gate are restored to design specifications.
Deteriorating Paint or Protective Coating	Part or parts that have a rusting or scaling condition that has affected structural adequacy.			Paint or protective coating is sufficient to protect structural adequacy of fence or gate.
Miscellaneous				
Miscellaneous	Any condition not covered above that needs attention to restore extended detention basin to design conditions.			Meets the design specifications.