Hastings Secondary College PCYC/ B and L

Construction Soil and Water Management Sub Plan

669-AWE-CSWSP-001

Date:	02/10/2024
Author:	Craig McIlveen
Revision:	B
Status:	For Construction

Prepared By:

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Revision Register:

Project No.	669
Project Name	Hastings PCYC / Hastings Secondary College
Client	NSW Department of Education, PCYC, Hastings Secondary College
Client Project Manager	RPS
Project Location	16 Owen Street, Port Macquarie, NSW, 2444
Planning Instrument	
AWE Project Manager	Craig McIlveen
Phone No.	0403 611 161
Scope of Works	Construction of a new Multi- sport centre conceived in three parts. Courts, a circulation spine and supporting facilities. Works include external site improvements and on-grade car parking.
Timing of the Works	November 2022- January 2024 PCYC September 2024 – March 2025 Building B and L
Authorised By:	Craig McIlveen – AWE Project Manger

REV	DATE	STATUS	AUTHOR	APPROVED BY	COMMENTS
A	13/12/2022	For Approval	Craig McIlveen		
B	02/10/2024	For Construction	Craig McIlveen		Appendix D -Building B and L added
	Date	Status			
	Date	Status			
	Date	Status			
	Date	Status			

This document has been prepared in collaboration with MPC Consulting Engineers for PCYC scope.

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Contents

1. INTRODUCTION

AW Edwards are required to provide a Construction Soil and Water Management Report for the construction of the proposed Hastings PCYC and buildings B and L in response to condition B18 provided in Figure 1.0. MPC Consulting Engineers have been commissioned by AW Edwards to provide technical civil advice on the project and within this document.

The site is located at 16 Owen Street Port Macquarie, which is part of the Port Macquarie-Hastings Council Local Government Authority. The site has an approximate overall crossfall of a 1.5m over 100m falling from the South East to the North West. The proposed development is detailed on the architectural drawings by SHAC Architects. Refer to the site plan in Appendix A. The project involves construction of new PCYC building.

The following engineering works includes:

- Earthworks for the site compound and temporary sediment basin to be used during the construction of the works.
- Earthworks for building platforms for the New PCYC, associated pathways and drainage channels.
- Maintaining the natural gradient of the site and overland flow path through the development site.
- New stormwater drainage and water quality measures for the new works to comply with the design requirements contained in Council's stormwater drainage guidelines and requirements.

This report provides a summary of the measures incorporated into the design and to be adopted during the construction works to manage stormwater, flood flows and water quality on the site both during construction and throughout the life of the PCYC for small and large sized rainfall events including the 1 in 1-year ARI, 1 in 5-year ARI rainfall events.

Building B and L scope id limited to internal refurbishment. Recommendations have been proposed around protection of stormwater in the vicinity of the works.

Figure 1.0. SSD Conditions-year ARI

B18. The Applicant must prepare a Construction Soil and Water Management Sub-Plan (CSWMSP) and the plan must address, but not be limited to the following:

(a) be prepared by a suitably qualified expert, in consultation with Council;

(b) measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site;

(c) describe all erosion and sediment controls to be implemented during construction, including as a minimum, measures in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book';

(d) provide a plan of how all construction works will be managed in wet-weather events (i.e. storage of equipment, stabilisation of the site);

(e) detail all off-site flows from the site; and

(f) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including, but not limited to 1 in 5-year ARI.

2. CONSTRUCTION SOIL AND WATER MANAGEMENT

2.1 EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION WORKS

The construction phase approach adopted for this site will incorporate the principles recommended by the Soils and Construction 4th Edition – Vol.1 (the "Blue Book") published by Landcom, 2004, namely:

- Plan for erosion and sediment control concurrently with engineering design and in advance of earthworks proper assessment of site constraints and integration of the various needs.
- Minimise the area of soil exposure.
- Conserve the topsoil where possible.
- Control water flow from the top of the development area, through the works and out the bottom of the site, forexample,
  - ➢ divert clean runoff above denuded areas,
  - ➢ minimise slope gradient and length,

- keep runoff at non-erodible velocities,
- trap soil and water pollutants.

- Rehabilitate disturbed lands quickly.

A design of erosion and sediment controls for the overall site development is documented on engineering plans 669-CV-DRG-0010[C] and 669-CV-DRG-0011[C]. Controls will be provided onsite prior to and during all earthworks in accordance with EPA Site Work Practices. Features of the construction phase erosion and sediment controls to be adopted for this site include:

- Prevention of sediment and polluted runoff water from entering the existing adjacent council stormwater system - this procedure involves the provision of silt fences, catch drains and sediment traps.
- Controlling potential soil erosion - grassing and stabilising embankments and drainage outlets where required.
- Stabilised stockpile areas to prevent wind and water erosion.
- Scour protection at discharge locations.
- Stabilised site access - providing a firm base for vehicle entry/exit and preventing the main access from becoming a sediment source.

Prior to any earthworks commencing on site, soil and water management control measures will need to be put in place. These measures for a 1 in 5 ARI include:

- Installation of geo-textile filter fabric to the perimeter of the work site area, where required;
- The use of sediment diverting methods to minimise sediment in Council's / RMS' stormwater drainage system using sandbags around kerb inlet pits and geo-textile filter fabric around drop inlet pits;
- The provision of a rock-lined sediment basin towards the Northern end of the works area for which stormwater runoff shall be channelled and treated during construction;
- The provisions of a stabilised site access to service vehicles exiting the site during the construction stage.

Refer to drawings 669-CV-DRG-0010[C] and 669-CV-DRG-0011[C] contained in Appendix A for further details.

AW Edwards will be responsible to attain all necessary licences, permits or approvals prior to the commencement of the works.

AW Edwards will be responsible for the implementation and maintenance of the Erosion and Sediment Control measure used during construction of the works.

2.2 SOIL AND WATER MANAGEMENT DURING WET WEATHER WORKS

The following soil and water management measures are to be incorporated into the construction works during wet weather construction works:

- All plant and equipment are to be relocated away from edges of batters and edges of excavations.
- Construct temporary earth V-drains to direct surface water away from top of batters, edges of excavations batters and temporary shoring
- Inspect all batters and temporary shoring and undertake remedial works as required.
- Inspect all erosion and sediment control measures and repair, as necessary.

- Ensure all vehicle access tracks are in good condition. Undertake repairs and top with gravel/ballast as required.

2.3 MAINTENANCE

The following inspection frequency and corrective action, to be undertaken by AW Edwards, for the soil and water management measures during the construction works and during periods of wet weather is recommended to ensure that the system remains functional for the various ARI storm events that have been considered:

Table 1.0 – Construction Soil and Water Quality Maintenance Schedule

Construction Soil and Water Quality Maintenance Schedule			
Maintenance Action	Maintenance Requirements	Frequency	Responsibility
Sediment Fences			
Sediment build-up	Remove any excessive silt/sediment/debris build-up	Weekly or after significant rainfall event	AW Edwards
Damage	Repair and/or replace damaged fences	Weekly or after significant rainfall event	AW Edwards
Mesh and Gravel Inlet Filters			
Sediment build-up	Remove any excessive silt/sediment/debris build-up. Ensure filters are positioned around pit inlets	Weekly or after significant rainfall event	AW Edwards
Geotextile and Straw Bale Filters			
Sediment build-up	Remove any excessive silt/sediment/debris build-up. Ensure filters are positioned around pit inlets	Weekly or after significant rainfall event	AW Edwards
Stabilised Site Entry and Roadways			
Sediment build- up/Debris/Mud	Clean site entry grate and remove all debris build-up. Replace water in tyre wash bay. Clean and sweep roads.	Daily and after rainfall events	AW Edwards
Sediment Pond			
Sediment Build-up	Remove any excessive silt/sediment/debris build-up. Ensure filters are positioned around pit inlets	Every 2 months	AW Edwards
Flocculation and Water Testing	Ensure water in sediment pond is flocculated and water quality tested prior to discharging from site	After and during rainfall events	AW Edwards
General			
Spills	All spills are to be cleaned up immediately	After spills	AW Edwards
Mud or Sediment	All cumulated sediment/mud built-up is to be removed on a regular basis.	Daily	AW Edwards
Mud/sediment tracked onto public roadways	Any mud or sediment which is tracked onto public roadways is to be removed immediately	Always	AW Edwards
Erosion and Sediment Control Measures	Inspect and maintain all erosion and sediment control measures to ensure that they are maintained and in good-working condition	Daily and with 24 hrs of expected rain and within 18 hours of a rainfall event	AW Edwards

3. STORMWATER MANAGEMENT

3.1 PORT MACQUARIE-HASTINGS COUNCIL DEVELOPMENT PLANS

The stormwater drainage for the proposed development has been designed to comply with the following Port Macquarie-Hastings (PMH) Council's Development Plans, Australian Standards and Guidelines:

- Port Macquarie-Hastings Council Development Design Specification D5 "Stormwater Drainage Design" and D7 "Stormwater Management".
- AUS-SPEC Design Specifications
- Australian Rainfall and Runoff.
- Australian Standard AS3500.3 – 2018 Stormwater Drainage.

3.2 STORMWATER DRAINAGE (SWD) SYSTEM

The SWD system has been design in accordance with the above requirements and is detailed on the Stormwater Management Report by MPC (220391-CV-RPT-3100[D)] included in Appendix B. The essential requirements addressed in the stormwater design are as follows:

- Ensure that the rainwater runoff from the developed site for all design storms up to a 1% AEP storm event is limited to its pre-developed green field conditions and safely conveyed through the drainage network in accordance with the DCP and AS/NZS3500.3-2021.
- Ensure that overland flow in an event of a choked or blocked piped system does not adversely impact buildings located on the site and does not cause a nuisance to the neighbouring properties.
- Provide allowances for rainwater reuse where appropriate.
- Ensure stormwater from the developed site is passed through appropriate Water Quality treatment systems and meets the water quality targets specified by the Port Macquarie Hastings Council Development Control Plan.

The stormwater drainage system has been analysed using the "DRAINS" and "MUSIC" software to assess the performance of the site stormwater system and water quality.

The in-ground pits and pipes system for the proposed development has been designed for 20 ARI (5% AEP) minor storm events, and the overall stormwater system will be able to convey stormwater safely for 100 ARI (1% AEP) major storm events. Controlled stormwater discharge is then connected to the existing Port Macquarie Hastings Council stormwater network.

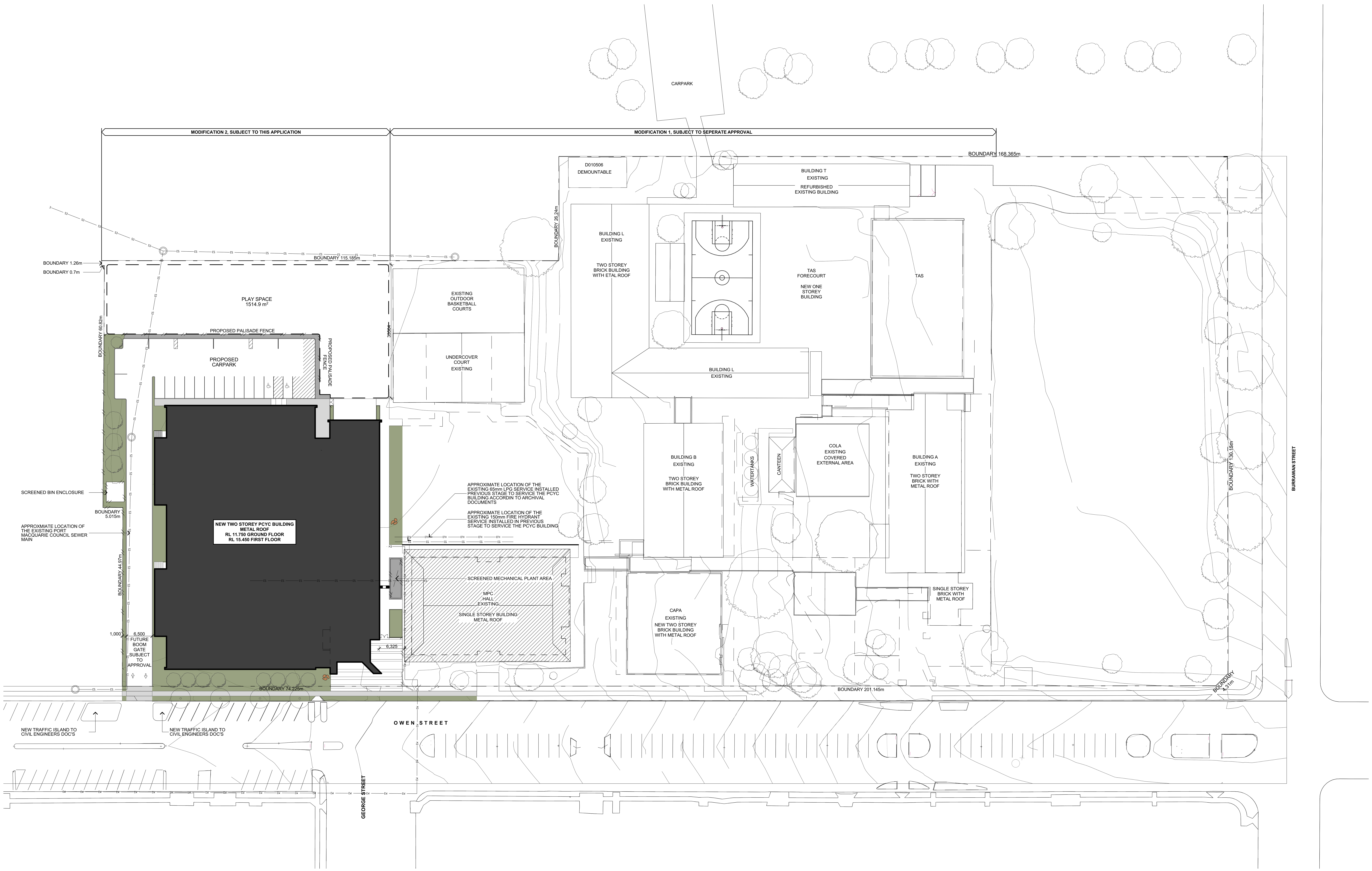
The proposed Stormwater Management Plan is documented in detail within the Stormwater Management Report provided (220391-CV-RPT-3100[D]) in Appendix B. The principal stormwater management components and their functions are listed below.

- Stormwater runoff from paved areas, car park and vehicle access driveway will be collected in grated inlet pits and directed to the in-ground piped network into the underground detention tank. Stormwater collection pits will be fitted with Ecosol litter basket 200 containing reactive filter media (RFM) pillows (Proprietary drop-in filtration system) as part of the overall water quality management system.
- Approximately 60% of the rainwaterrunoff from new roof areas will be directed to an underground rainwater reuse tank fitted with a first-flush device. Reuse water will be available for use in toilets and some garden irrigation. Overflow from the rainwater harvesting tank will be connected to the detention tank.
- Sub-soil drainage lines will be installed throughout the site, for example, behind kerbs, along driveway edges, and within landscaped areas. The subsoil drainage lines will be connected to the stormwater management system.
- Surface levels of grated inlet pits in pavement areas have generally been specified providing sufficient freeboard to adjacent habitable finished floor levels. Furthermore, overland flow paths have been designed to convey the stormwater in the event of a blocked system or a major storm, ensuring surface flows do not travel through buildings.

- The post-developed site will be provided with an underground stormwater treatment solution (Humeceptor – a hydrodynamic and gravitational separation system) at the downstream end. The proposed system will satisfy the stormwater quantity and quality criteria in conjunction with the underground rainwater harvesting tank and a first flush device, underground detention tank, and stormwater collection pits fitted with Ecosol litter baskets with reactive filter media (RFM) Pillows.

4. APPENDICES

APPENDIX A – SITE PLAN



MODIFICATION 2, SUBJECT TO THIS APPLICATION
MODIFICATION 1, SUBJECT TO SEPERATE APPROVAL
CARPARK
BOUNDARY 168.365m
D010506
DEMOUNTABLE
BUILDING T
EXISTING
REFURBISHED
EXISTING BUILDING
BOUNDARY 26.24m
BUILDING L
EXISTING
TWO STOREY
BRICK BUILDING
WITH ETAL ROOF
TAS
FORECOURT
NEW ONE
STOREY
BUILDING
TAS
BOUNDARY 1.26m
BOUNDARY 0.7m
BOUNDARY 115.185m
PLAY SPACE
1514.9 m²
EXISTING
OUTDOOR
BASKETBALL
COURTS
BOUNDARY 60.82m
PROPOSED PALISADE FENCE
PROPOSED PALISADE FENCE
PROPOSED
CARPARK
UNDERCOVER
COURT
EXISTING
BUILDING L
EXISTING
BUILDING B
EXISTING
TWO STOREY
BRICK BUILDING
WITH METAL ROOF
WATERTANKS
CANTEEN
COLA
EXISTING
COVERED
EXTERNAL AREA
BUILDING A
EXISTING
TWO STOREY
BRICK WITH
METAL ROOF
BOUNDARY 130.15m
BURRAWAN STREET
SCREENED BIN ENCLOSURE
BOUNDARY
5.015m
APPROXIMATE LOCATION OF
THE EXISTING PORT
MACQUARIE COUNCIL SEWER
MAIN
NEW TWO STOREY PCYC BUILDING
METAL ROOF
RL 11.750 GROUND FLOOR
RL 15.450 FIRST FLOOR
APPROXIMATE LOCATION OF THE
EXISTING 65mm LPG SERVICE INSTALLED
PREVIOUS STAGE TO SERVICE THE PCYC
BUILDING ACCORDIN TO ARCHIVAL
DOCUMENTS
APPROXIMATE LOCATION OF THE
EXISTING 150mm FIRE HYDRANT
SERVICE INSTALLED IN PREVIOUS
STAGE TO SERVICE THE PCYC BUILDING
BOUNDARY 44.97m
SCREENED MECHANICAL PLANT AREA
MPC
HALL
EXISTING
SINGLE STOREY BUILDING
METAL ROOF
SINGLE STOREY
BRICK WITH
METAL ROOF
CAPA
EXISTING
NEW TWO STOREY
BRICK BUILDING
WITH METAL ROOF
1,000
6,500
FUTURE
BOOM
GATE
SUBJECT
TO
APPROVAL
6,325
BOUNDARY 74.225m
BOUNDARY 201.145m
BOUNDARY 4.31m
OWEN STREET
NEW TRAFFIC ISLAND TO
CIVIL ENGINEERS DOC'S
NEW TRAFFIC ISLAND TO
CIVIL ENGINEERS DOC'S
GEORGE STREET

CONSULTANTS

BCA CONSULTANT Metro Building Consultancy T 4927 5566	**LANDSCAPE ARCHITECT** Terras Landscape Architects T 4929 4926	**MECHANICAL ENGINEER** Edwards & Vickerman Consulting Engineers T 4929 2461	**HYDRAULIC ENGINEER** McCallum PFCA T 4946 2633	**ELECTRICAL ENGINEER** Electrical Projects Australia T 4967 5999	**STRUCTURAL ENGINEER** MPC Consulting Engineers T 4927 5566	**SCHOOL INFRASTRUCTURE** School Infrastructure NSW	**BUILDING CONTRACTOR** AW EDWARDS T 9958 1474

AMENDMENTS

No	Drn	Chk	Date	Comment
A			08.11.22	60% Submission
B		CV	17.11.22	Consultant Coordination
C		CV	06.12.22	90% Submission

NOTES

1. Dimensions are in millimetres unless otherwise shown.
2. Work to given dimensions. Do not scale from drawing
3. Check all dimensions on site prior to construction and fabrication.
4. Bring any discrepancies to the attention of the proprietor & architect.

CLIENT NAME
SCHOOL INFRASTRUCTURE NSW

SCALE
0m 2 4 6 8 10 1:200 @A1

PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC
HASTINGS SECONDARY COLLEGE

DRAWN | APPROVED: CV

STATUS
NOT FOR CONSTRUCTION

DRAWING TITLE
Proposed Site Plan

PROJ. NO.	DRAWING NO.	REV.
4662	AR.DRG.1101	C

SHAC

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E info@shac.com.au
224 Maitland Road
Islington NSW 2296
Australia
Nominated Architect
Justin Hamilton (6160)
ABN 32 131 584 846

APPENDIX B – SEDIMENT CONTROL PLANS

SEDIMENTATION AND EROSION CONTROL PLAN

SCALE 1 : 200

SEDIMENTATION AND EROSION CONTROL NOTES

1. SELECTIVE CLEARING OF VEGETATION TO BE RESTRICTED TO NOMINATED AREAS WITH CLEARED VEGETATION WIND ROWED ON THE CONTOUR.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSTALLED PRIOR TO SITE DISTURBANCE.
3. TOPSOIL FROM ALL AREAS THAT WILL BE DISTURBED TO BE STRIPPED AND STOCKPILED AT THE NOMINATED SITE.
4. NO MORE THAN 150m OF TRENCH TO BE OPEN AT ANY ONE TIME.
5. CUT AND FILL BATTER GRADIENTS OF 1:2 (MAXIMUM).
6. A STRIP OF TURF 450mm WIDE IS TO BE PLACED IMMEDIATELY BEHIND THE KERB ON ALL NEW ROAD TO ACT AS A FILTER TRAP. REFER TO DETAIL SD6-13.
7. ALL SEDIMENT CONTROL STRUCTURES TO BE INSPECTED BY SITE SUPERVISOR AFTER EACH RAINFALL EVENT FOR STRUCTURAL DAMAGE AND ALL TRAPPED SEDIMENT TO BE REMOVED TO A NOMINATED STOCKPILE SITE.
8. THE PROJECT MANAGER TO INFORM ALL CONTRACTORS AND SUB-CONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN.
9. NO DISTURBED AREA IS TO REMAIN DENUDED LONGER THAN 14 DAYS.
10. ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAY'S OPERATION.
11. THE CONTRACTOR MUST ENSURE THE SUITABILITY AND INTEGRITY OF ALL WORKS AT THE END OF EACH DAY'S WORK.
12. ORANGE BARRIER TAPE TO BE AFFIXED TO TOP OF SEDIMENT CONTROL BARRIER TO IDENTIFY WORK AREA.
13. ALL SEDIMENTATION & EROSION CONTROL MEASURES ARE TO STRICTLY COMPLY WITH THE GUIDELINES DETAILED IN THE DEPARTMENT OF HOUSING PUBLICATION, "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION", 4TH EDITION.
14. WATER TRUCKS TO BE USED AS REQUIRED TO PREVENT WIND EROSION.
15. SUBGRADE MATERIAL TO BE CONSTRUCTED IMMEDIATELY FOLLOWING FILL.

SEDIMENT BASIN DESIGN DATA

DESIGN DATA	BASIN 01
TOTAL CATCHMENT AREA (ha)	0.648
DISTURBED CATCHMENT AREA (ha)	0.648
SOIL TEXTURE GROUP	D
DESIGN RAINFALL DEPTH (days)	2
DESIGN RAINFALL DEPTH (percentile)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	18
RAINFALL INTENSITY: 2 year, 6 hour storm	13.6
RAINFALL EROSIVITY (R-FACTOR)	4030
VOLUMETRIC RUNOFF COEFFICIENT	0.39

SEDIMENT BASIN VOLUMES

	BASIN 01
SETTLING ZONE VOLUME (m^3)	46
STORAGE ZONE VOLUME (m^3)	23
TOTAL STORAGE VOLUME (m^3)	69

NOTE
- REFER TO DETAIL SD6-4 FOR TYPICAL DETAILS OF SEDIMENT BASIN AND SPILLWAY
- BASIN TO BE DISCHARGED TO EXISTING STORMWATER PITS. BASIN CAPACITY TO BE RESTORED WITHIN 2 DAYS OF A RAIN EVENT.
- PRIOR TO DISCHARGING THE BASIN, THE WATER QUALITY MUST BE:
  - pH:6.5-8.5
  - TSS: <50mg/L
  - OIL AND GREASE: NONE VISIBLE

LEGEND

- DENOTES TEMPORARY WATERWAY CROSSING, REFER TO DETAIL SD5-1
- DENOTES SEDIMENT POND, REFER TO DETAIL SD6-4
- DENOTES EARTH BANK (LOW FLOW), REFER TO DETAIL SD5-5
- DENOTES GEOTEXTILE INLET FILTER, REFER TO DETAIL SD6-12
- DENOTES ENERGY DISSIPATER, REFER TO DETAIL SD5-8
- DENOTES STABILISED SITE ACCESS, REFER TO DETAIL SD6-14
- DENOTES SEDIMENT POND, REFER TO DETAIL SD6-4

DISTURBED CATCHMENT AREA
6,482 SQM

EXISTING 750Ø PIPE IL 7.780
EXISTING PIT SL 9.70, IL 7.780
EXISTING 750Ø
EXISTING PIT SL 9.62, IL 7.904
CREST OF SPILLWAY RL 10.02
TOP OF BASIN NOT LESS THAN RL 10.512
EXISTING SEWER SL 10.39, IL 8.64 T.B.C ENSURE EXISTING SEWER MANHOLE AND SURROUNDS ARE FULLY SEALED IN SEDIMENT BASIN DEPTH
EXISTING PIT SL 9.82, IL 8.012
DENOTES OUTLINE OF PROPOSED CARPARK AND DRIVEWAY
DENOTES OUTLINE OF PROPOSED DEVELOPMENT
OUTLINE OF DISTURBED CATCHMENT AREA
DENOTES EARLY WORKS SEDIMENTATION FENCE FOR STORMWATER DIVERSION PIPE INSTALLATION
DENOTES LOW FLOW EARTH BANK
DENOTES OUTLINE OF PROPOSED DEVELOPMENT
"PORT CITY BOWLING CLUB" LOT 1 DP 1141185
EXISTING EASEMENT
COVERED BASKETBALL COURT
COURT 11.75
BUILDING S SINGLE STOREY TIMBER
FLOOR 15.30
GAZEBO
STAIRS
MPC HALL SINGLE STOREY BRICK BUILDING METAL ROOF
FLOOR 11.97
RAMP
RAMP
CONCRIB RETAINING WALL
PATH
GAS
SIP
SMH
HYD
LP
TELSTRA
boundary
KERB & GUTTER
OWEN STREET

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SCHOOL INFRASTRUCTURE
School Infrastructure NSW

BUILDING CONTRACTOR
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AMENDMENTS

ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22
B	90% SUBMISSION	6.12.22
C	FOR SECTION 68	7.12.22

ISSUE	REASON FOR ISSUE	DATE

DO NOT SCALE DRAWING

CLIENT NAME
SCHOOL INFRASTRUCTURE NSW

SCALE
1 : 200 @A1

PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC
HASTINGS SECONDARY COLLEGE

DRAWN R.G. | APPROVED R.B./D.P.

STATUS
NOT FOR CONSTRUCTION

DRAWING TITLE
SEDIMENTATION AND EROSION CONTROL PLAN

PROJ. NO. 669 | DRAWING NO. CV-DRG 0010 | REV. C

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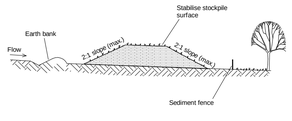
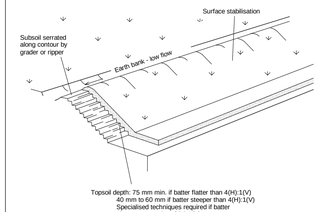
MPC Project Number: 220319



Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

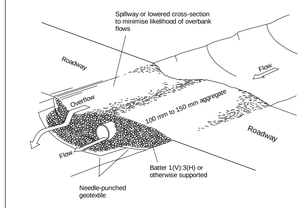
STOCKPILES SD 4-1



Construction Notes

1. Scarify the ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and to provide a good bond between the respread material and subsoil.
2. Add soil ameliorants as required by the ESCP or SWMP.
3. Rip to a depth of 300 mm if compacted layers occur.
4. Where possible, replace topsoil to a depth of 40 to 60 mm on lands where the slope exceeds 4(H):1(V) and to at least 75 mm on lower gradients.

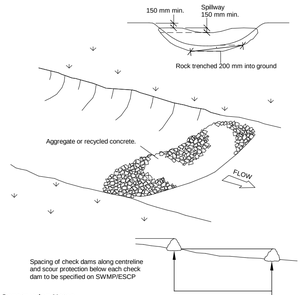
REPLACING TOPSOIL SD 4-2



Construction Notes

1. Prohibit all traffic until the access way is constructed.
2. Strip any topsoil and place a needle-punched textile over the base of the crossing.
3. Place clean, rigid, non polluting aggregate or gravel in the 100 mm to 150 mm size class over the fabric to a minimum depth of 200 mm.
4. Provide a 3-metre wide carriageway with sufficient length of culvert pipe to allow less than a 3(H): 1 (V) slope on side batters.
5. Install a lower section to act as an emergency spillway in greater than design storm events.
6. Ensure that culvert outlets extend beyond the toe of fill embankments.

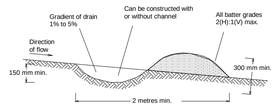
TEMPORARY WATERWAY CROSSING SD 5-1



Construction Notes

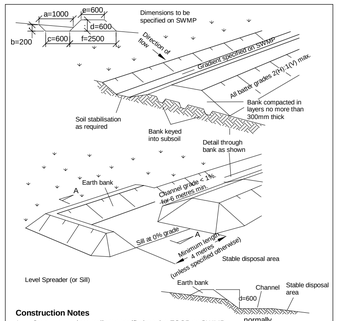
1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM SD 5-4



NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

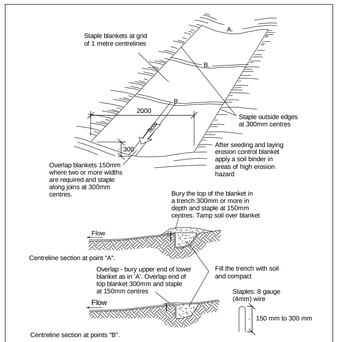
EARTH BANK (LOW FLOW) SD 5-5



Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, between 1 and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

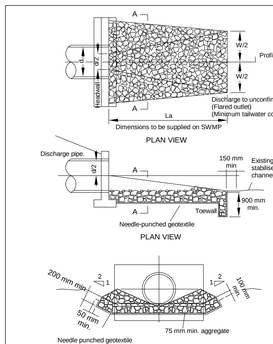
EARTH BANK (HIGH FLOWS) SD 5-6



Construction Notes

1. Remove any rocks, clods, sticks or grass from the surface before laying matting.
2. Ensure that topsoil is at least 75 mm deep.
3. Complete fertilising and seeding before laying the matting.
4. Ensure fabric will be continuously in contact with the soil by grading the surface carefully first.
5. Lay the fabric in "shingle-fashion", with the end of each upstream roll overlapping those downstream. Ensure each roll is anchored properly at its upslope end.
6. Ensure that the full width of flow in the channel is covered by the matting up to the design storm event, usually in the 10-year ARI time of concentration storm event.
7. Divert water from the structure until vegetation is stabilised properly.

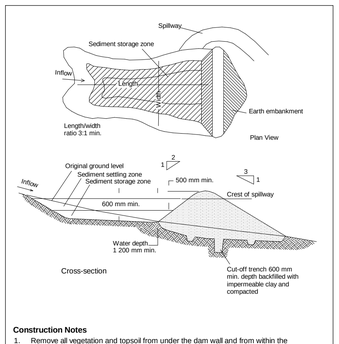
RECP : CONCENTRATED FLOW SD 5-7



Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

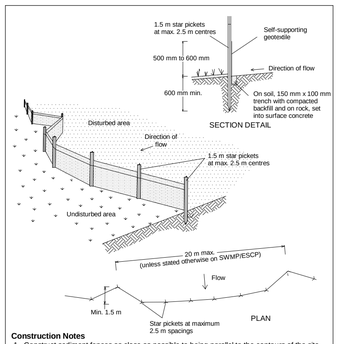
ENERGY DISSIPATER SD 5-8



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

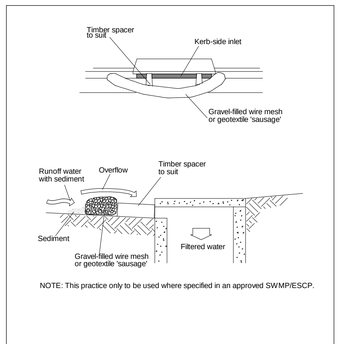
EARTH BASIN - WET (APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY) SD 6-4



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE SD 6-8

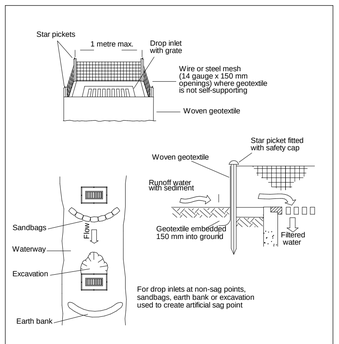


NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

1. Install filters to kerb inlets only at sag points.
2. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit and fill it with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening leaving at least a 100-mm space between it and the kerb inlet. Maintain the opening with spacer blocks.
5. Form a seal with the kerb to prevent sediment bypassing the filter.
6. Sandbags filled with gravel can substitute for the mesh or geotextile providing they are placed so that they firmly abut each other and sediment-laden waters cannot pass between.

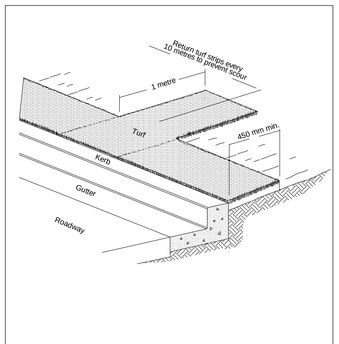
MESH AND GRAVEL INLET FILTER SD 6-11



Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

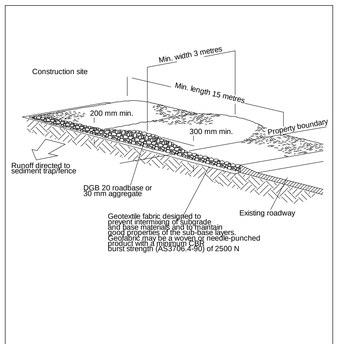
GEOTEXTILE INLET FILTER SD 6-12



Construction Notes

1. Install a 450 mm minimum wide roll of turf on the footpath next to the kerb and at the same level as the top of the kerb.
2. Lay 1.4 metre long turf strips normal to the kerb every 10 metres.
3. Rehabilitate disturbed soil behind the turf strip following the ESCP/SWMP.

KERBSIDE TURF STRIP SD 6-13

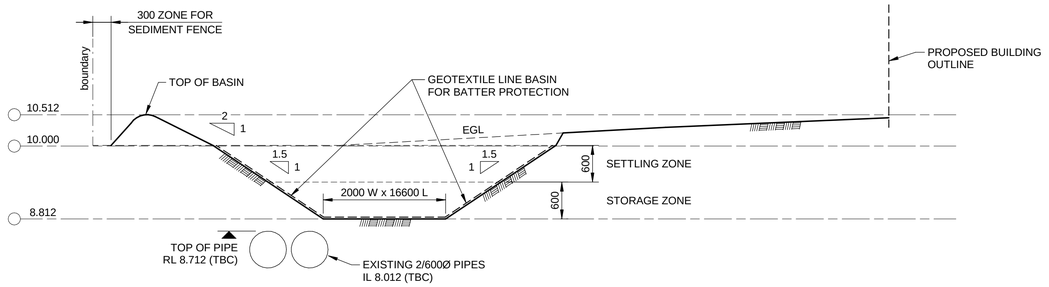


Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200 mm thick pad over the geotextile using road base or 30 mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS SD 6-14

SEDIMENTATION AND EROSION CONTROL DETAILS



SECTION 1
N.T.S 0010

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AMENDMENTS

ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22
B	90% SUBMISSION	6.12.22
C	FOR SECTION 68	7.12.22

ISSUE	REASON FOR ISSUE	DATE

NOTES

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DO NOT SCALE DRAWING

CLIENT NAME

SCHOOL INFRASTRUCTURE NSW

SCALE

As indicated @A1

PROJECT NAME AND ADDRESS

PORT MACQUARIE-HASTINGS PCYC HASTINGS SECONDARY COLLEGE

DRAWN **R.G.** APPROVED **R.B./D.P.**

STATUS

NOT FOR CONSTRUCTION

DRAWING TITLE

SEDIMENTATION AND EROSION CONTROL DETAILS

PROJ. NO. **669** DRAWING NO. **CV-DRG 0011** REV. **C**

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APPENDIX C – STORMWATER MANAGEMENT REPORT

APPENDIX C – STORMWATER MANAGEMENT REPORT

Stormwater Management Report

Hastings Secondary College – PCYC Multi-Sports Centre
Port Macquarie Campus
16 Owen Street, Port Macquarie NSW 2444
S4.55(2) #2 Modification
Ref: 220391-CV-RPT-3100[D]

for

AW Edwards Pty Ltd

the maths in the middle

MPC Ref: 220391 [3]
19 December 2022

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mpc consulting engineers civil+structural

Contents

Appendices

1. Introduction

1.1 Basis of Report

This report has been prepared by MPC Consulting Engineers ('MPC') evaluating the stormwater management requirements for the proposed modifications to the approved stamped plans for the development application, SSD-11920082 at 16 Owen Street, Port Macquarie NSW 2444 (Lot 111, DP 1270315). MPC's intention has been to maintain the approved design methodology previously proposed by Northrop (Ref: SY202097-01-CR02). Therefore, the current stormwater design by MPC adopts a similar approach to the management of stormwater but catering for the changes to the Site Plan.

This report is to be read in conjunction with the developed DRAINS and MUSIC models for clarity.

1.2 Preamble

The proposed development is for constructing a new Multi-Sports Centre and includes the following items: (Proposed and previously approved Site Plans are attached in **Appendix A** and **Appendix I,** respectively.)

- New Sports Building and associated facilities,
- New carpark and driveway area,
- New stormwater conveying system with onsite stormwater detention,
- New onsite stormwater water quality treatment system.

MPC addressed the following issues in devising this Stormwater Management Plan.

- Stormwater Management for the Proposed Development (Conveyance and Detention),
- Water Quality requirements (Treatment),
- Sediment and Erosion Control.

The stormwater and environmental management philosophy is discussed in Section 3. The Stormwater Management Plan is discussed in Section 4, and Water Quality requirements are discussed in Section 5. Section 6 of this report discusses the construction phase sediment and erosion controls. The design methodology for diverting the existing stormwater pipe is discussed in Section 7.

In preparing this Stormwater Management report, a review has been undertaken with the Port Macquarie Hastings Council Development Control Plan (DCP), AUS-SPEC design specifications and Development Consent Conditions (Ref; SSD 11920082).

Based on our review of the Development Consent Conditions, DCP, AUS-SPEC design specifications and supplemental information on the Port Macquarie Hastings Council website, we understand the following;

- Onsite stormwater detention will be required to limit the stormwater discharge from the site for all storm events up to and including 1% AEP event.
- Pollution control and stormwater treatment measures will be required for the site.

2. Site and Catchment Details

2.1 The Existing Catchment

A survey plan by YSCO Geomatics Land Resource Consultants has been provided to MPC and is included in **Appendix B** of this report. The proposed development will occupy an area of approximately 5985 m^2 within the existing sports field area of Hastings Secondary College-Port Macquarie Campus. An aerial view of the existing site is shown in Figure 1.

Figure 1: Existing Hastings Secondary College – Port Macquarie Campus Site

The current land usage of the proposed development is shown in Table 1 below.

Table 1: Current Land Usage of the Proposed Development

Land Usage	Area
Sports Field	5985 m^2 (0% impervious)

2.2 The Proposed Development

Architectural site plan by SHAC Architects has been provided to MPC, which is included in **Appendix A** of this report. Figure 2 shows the site catchment boundary for the proposed development (shown hatched).

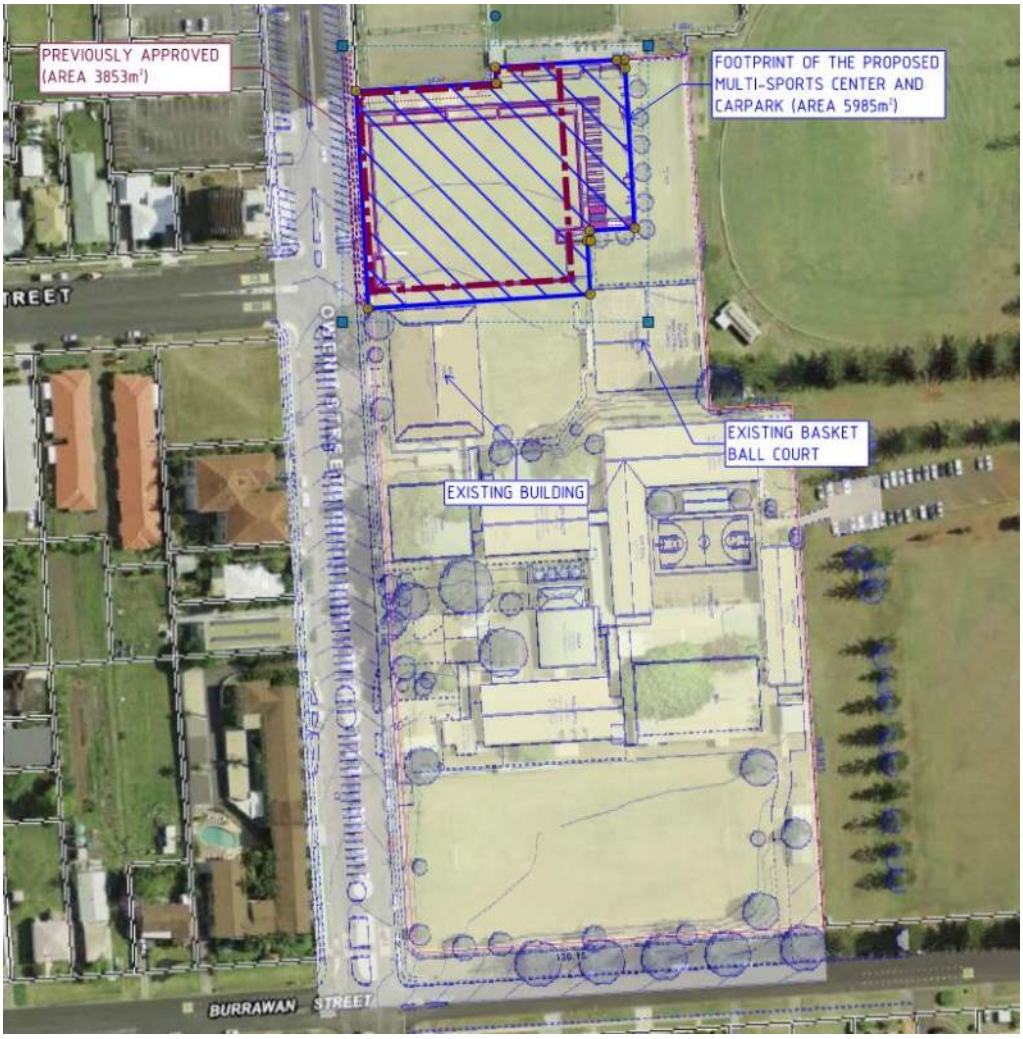


Figure 2: Post-Developed Site

The developed site will comprise an area of 5985 m^2 (approximately). This developed catchment will mainly consist of a roof area, driveway, and car parking area. Post-developed site's stormwater analysis is carried out based on the land usage summarised in Table 2 below.

Table 2: Post-Developed Site – Land Usage

Land Usage	Area
New Roof Area	3630 m^2 (100% impervious)
New Driveway/Car Park, Paved and Landscaped Area	2355 m^2 (75% impervious)
Total Area	5985 m^2 (90% impervious)

3. Stormwater and Environmental Management Philosophy

In preparing this Stormwater Management Plan, we have reviewed the Port Macquarie Hastings Council Development Control Plan (DCP), and AUS-SPEC design specifications incorporating Water Sensitive Urban Design measures relevant to Port Macquarie coastal catchments. The essential requirements to be addressed in the stormwater design are as follows:

- Ensure that the rainwater runoff from the developed site for all design storms up to a 1% AEP storm event is limited to its pre-developed green field conditions and safely conveyed through the drainage network in accordance with the DCP and AS/NZS 3500.3-2021.
- Ensure that overland flow in an event of a choked or blocked piped system does not adversely impact buildings located on the site and does not cause a nuisance to the neighbouring properties.
- Provide allowances for rainwater reuse where appropriate.
- Ensure stormwater from the developed site is passed through appropriate Water Quality treatment systems and meets the water quality targets specified by the Port Macquarie Hastings Council Development Control Plan.
- Institute appropriate erosion protection and soil stabilisation measures associated with the proposed site work. Such measures are to be designed in accordance with the requirements of the Managing Urban Stormwater: Soils and Construction 4th Edition – Vol.1 (the "Blue Book") published by Landcom, 2004.

4. Proposed Stormwater Management Plan

4.1 Stormwater Management Facilities

The proposed Stormwater Management Plan is shown in **Appendix C**. In addition, the principal stormwater management components and their functions are listed below.

- Stormwater runoff from paved areas, car park and vehicle access driveway will be collected in grated inlet pits and directed to the in-ground piped network into the underground detention tank. Stormwater collection pits will be fitted with Ecosol litter basket 200 containing reactive filter media (RFM) pillows (Proprietary drop-in filtration system) as part of the overall water quality management system.
- Approximately 60% of the rainwater runoff from new roof areas will be directed to an underground rainwater reuse tank fitted with a first-flush device. Reuse water will be available for use in toilets and some garden irrigation. Overflow from the rainwater harvesting tank will be connected to the detention tank.
- Sub-soil drainage lines will be installed throughout the site, for example, behind kerbs, along driveway edges, and within landscaped areas. The subsoil drainage lines will be connected to the stormwater management system.
- Surface levels of grated inlet pits in pavement areas have generally been specified providing sufficient freeboard to adjacent habitable finished floor levels. Furthermore, overland flow paths have been designed to convey the stormwater in the event of a blocked system or a major storm, ensuring surface flows do not travel through buildings.
- The post-developed site will be provided with an underground stormwater treatment solution (Humeceptor – a hydrodynamic and gravitational separation system) at the downstream end. The proposed system will satisfy the stormwater quantity and quality criteria in conjunction with the underground rainwater harvesting tank and a first flush device, underground detention tank, and stormwater collection pits fitted with Ecosol litter baskets containing reactive filter media (RFM) Pillows.

Stormwater quality requirements have been addressed in Section 5 of this report.

4.2 Design Storm Events

The in-ground pits and pipes system for the proposed development will be designed for 5% AEP minor storm events, and the overall stormwater system will be able to convey stormwater safely for 1% AEP Major events.

4.3 Stormwater Modelling and Analysis Procedure

Pre-developed and post-developed conditions are modelled using the DRAINS software package according to ARR 2019 procedures.

4.3.1 ILSAX Hydrological Model

Input properties for the adopted hydrological model are shown in Figure 3.

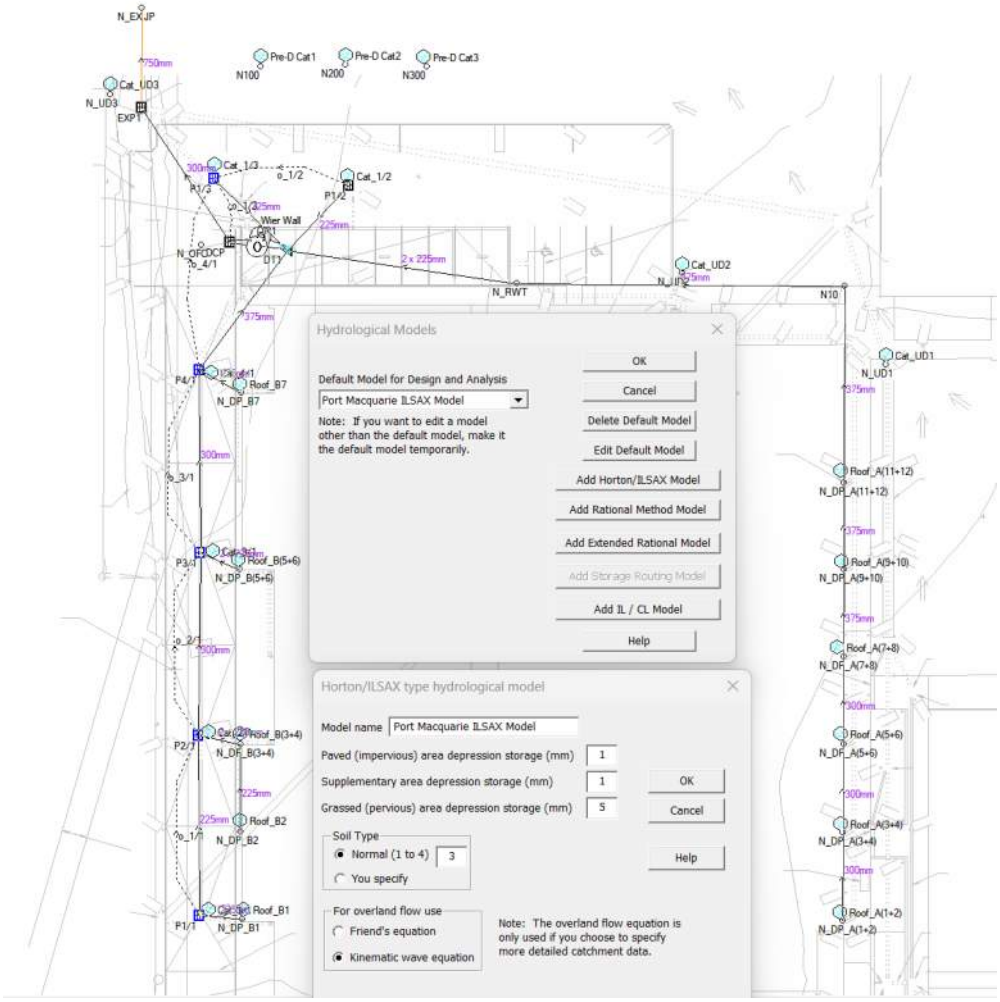


Figure 3: DRAINS – ILSAX Model

4.4 Pre-Developed Site

Pre-developed site is modelled in DRAINS software. Pre-developed flows are assessed based on the greenfield site conditions. The time of concentration for each storm event is calculated inside the DRAINS program using the kinematic wave equation based on the catchment properties shown in Table 3 below.

Table 3: Pre-Developed Site Catchment Properties

Catchment ID	Area	Length	Average Slope	Retardance coefficient n*
Pre-D Cat 1	1950 m^2	70 m	1.5%	0.1
Pre-D Cat 2	3193 m^2	70 m	1.5%	0.1
Pre-D Cat 3	842 m^2	54 m	2.5	0.1
Total	5985 m^2			

Pre-development site catchments are shown in Figure 4.

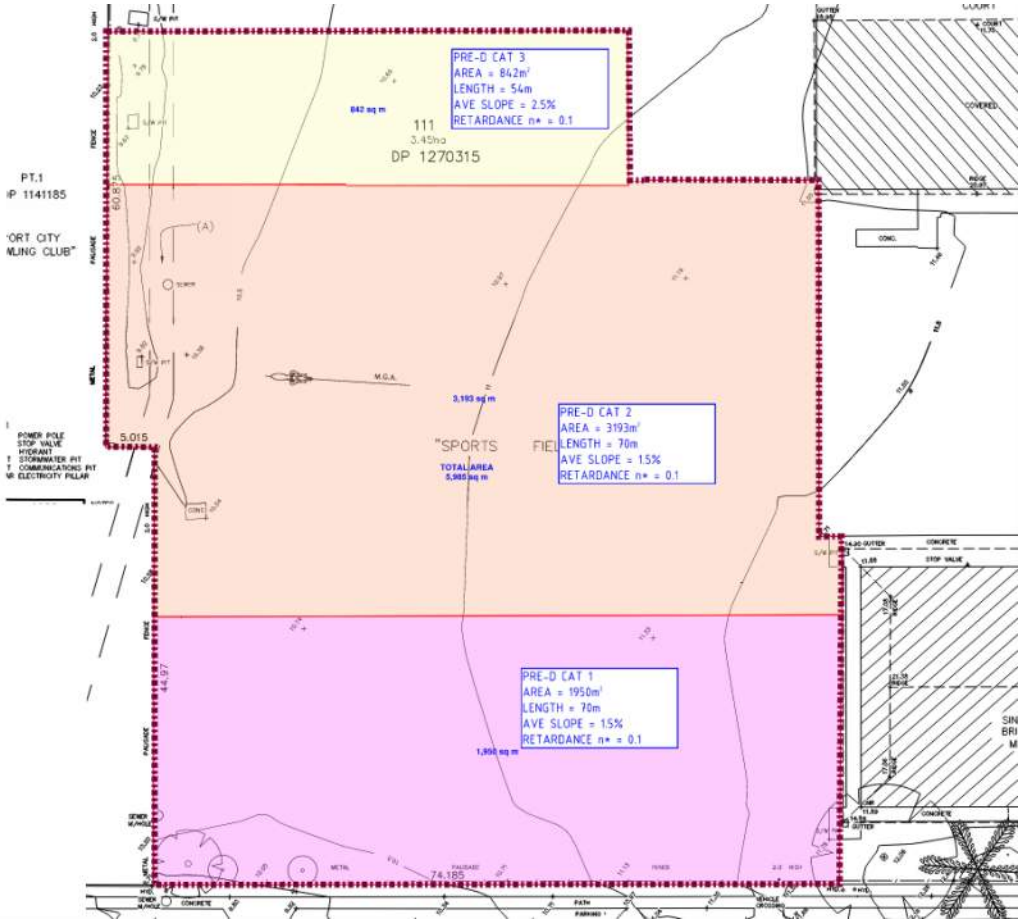


Figure 4: Pre-developed Site Catchments

4.5 Post-Developed Site

The post-developed site is modelled in DRAINS software, and the post-developed catchment allocation plan is shown in Figure 5. Developed sub-catchments are modelled with a time of concentration of 5 min.

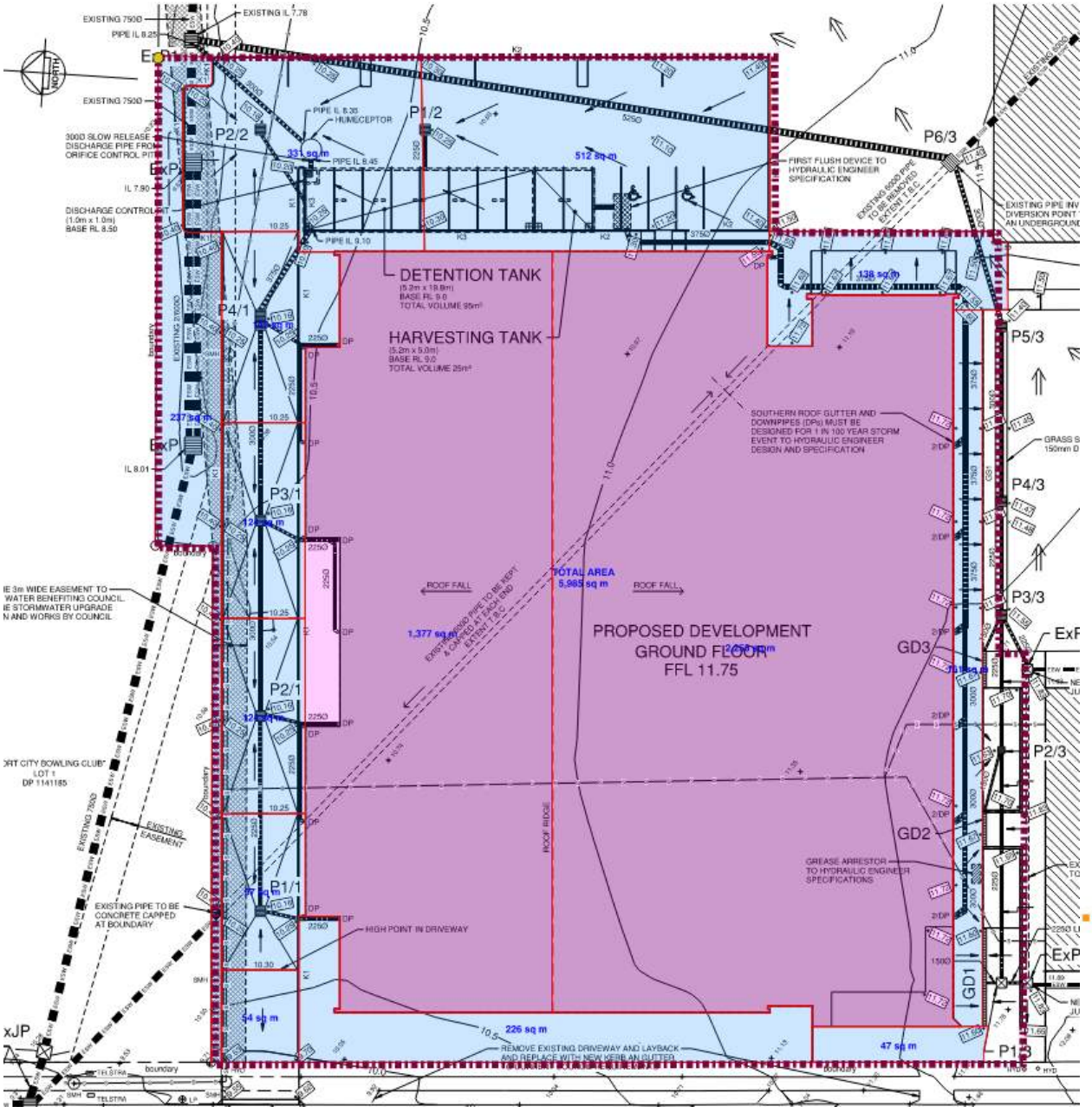


Figure 5: Post-developed Site Catchments

Post-developed flows were assessed based on the sub-catchment characteristics shown in Table 4 below.

Table 4: Post-Developed Site Catchment Properties

Sub Catchment Type	Area (m^2)	Percentage Impervious	Impervious Area (m^2)	Remarks
Roof area	3630	100%	3630	60% of the roof area will be directed to rainwater harvesting tank and then overflows into the underground detention tank
Detained driveway/paved area	1332	100%	1332	Collected in stormwater pits and then connected into the underground detention tank
Undetained area	1023	43%	440	Collected in stormwater pits and then connected into the existing stormwater drainage system
Total catchment	5985	90%	5402	

4.6 Site Flows and Detention Volume Requirements

4.6.1 Pre-developed Site Flows

Calculated total pre-developed flows are shown in Table 5.

Table 5: Total Pre-Developed Flows from Site

Storm Event	Total Pre-developed flow (l/s)
20% AEP	135
10% AEP	183
5% AEP	225
2% AEP	286
1% AEP	346

4.4.2 Post-developed Site Flows and Detention Volume Requirements

Controlled discharge from the underground detention tank will be released into the existing council pit located near the site's north-east corner. Calculated post-developed site flows and detention volume requirements are summarised in Table 6.

Table 6: Post-Developed Flows and Detention Volume Requirement

Storm Event AEP	Uncontrolled Flow (l/s) (No OSD)	Controlled Flow (l/s) (With OSD)	Storage Requirement (m^3)	Maximum Water RL
20%	239	132 < 135	55	9.49
10%	294	153 < 183	71	9.65
5%	338	179 < 225	91	9.84
2%	398	280 < 286	99	10.14
1%	476	294 < 346	100	10.20

Therefore, an underground detention tank will be constructed within the developed site to contain the stormwater in the below-ground tank for up to 1% AEP storm events. The plan location and the detention tank details are shown in MPC stormwater management drawings (see **Appendix C**).

5. Stormwater Quality Requirements

Water quality treatment measures are determined based on the developed MUSIC model. The Climate data file (MUSIC.mlb) obtained from the Port Macquarie Hastings Council website was used to analyse and design the stormwater treatment system.

5.1 Proposed Stormwater Treatment Measures

The proposed water quality treatment train is shown in Figure 6 and includes the following:

- Rainwater harvesting tank to store rainwater for reuse purposes. roof rainwater will be directed through a first flush device before being stored in the rainwater water tank. Overflow pipe from the rainwater harvesting tank will be directed to the underground detention tank.
- Stormwater pits installed with Ecosol Litter Baskets fitted with RFM pillows collecting stormwater from developed paved areas. Outlet pipes from stormwater pits will be connected to the detention tank through an underground pipe network.
- Proprietary stormwater treatment device (Humeceptor STC3). Outlet pipe from the underground detention tank will be connected to Humeceptor before discharging into the existing drainage pit.

The developed MUSIC model treatment train and estimated mean annual pollutant loads are shown in Figure 6.

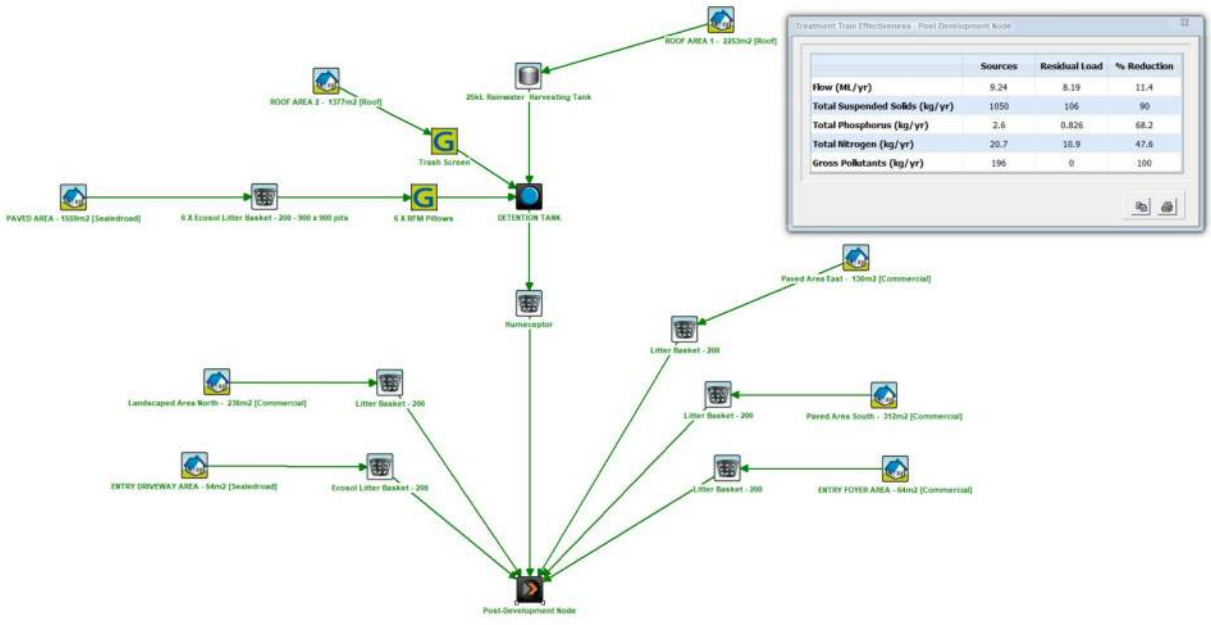


Figure 6: MUSIC Model Treatment Train

The stormwater treatment devices have been specified on the plans, which collectively achieve the stormwater treatment targets listed in AUSPEC-D07 (stormwater), Table D7.7. A summary of the MUSIC modelling results is shown in Table 7.

Table 7: MUSIC Model Result Summary

Pollutant Type	Target Efficiency (As per DCP requirements)	Achieved Efficiency	Target Achieved (Y/N)
Total Suspended Solids (TSS)	80%	90%	Y
Total Phosphorus (TP)	45%	68.2%	Y
Total Nitrogen (TN)	45%	47.6%	Y
Gross Pollutants (GP)	100%	100%	Y

5.2 Maintenance of Stormwater Management Facilities

Maintenance of stormwater pits, pipes and paved flow paths will be minimal as they are generally self-cleansing and hence only involve occasional cleaning. However, regular inspections should be carried out to ensure satisfactory performance of the drainage and water quality treatment system. Proprietary filtration systems (Ecosol Litter baskets + RFM pillows) and GPT (Humeceptor) will be accessible for regular cleaning and maintenance. Generally, maintenance should occur on a 3-month basis/after a major storm event. Proposed proprietary systems are to be maintained as per the manufacturer's recommendations.

6. Construction Phase Erosion and Sediment Controls

The construction phase approach adopted for this site will incorporate the principles recommended by the Soils and Construction 4th Edition – Vol.1 (the "Blue Book") published by Landcom, 2004, namely:

- Plan for erosion and sediment control concurrently with engineering design and in advance of earthworks proper assessment of site constraints and integration of the various needs.
- Minimise the area of soil exposure.
- Conserve the topsoil where possible.
- Control water flow from the top of the development area, through the works and out the bottom of the site, for example,
    - divert clean runoff above denuded areas,
    - minimise slope gradient and length,
    - keep runoff at non-erodible velocities,
    - trap soil and water pollutants.
- Rehabilitate disturbed lands quickly.

A design of erosion and sediment controls for the overall site development is shown in **Appendix D**. Controls need to be provided onsite prior to and during all earthworks in accordance with EPA Site Work Practices. Features of the construction phase erosion and sediment controls adopted for this site include:

- Prevention of sediment and polluted runoff water from entering the existing adjacent council stormwater system - this procedure involves the provision of silt fences, catch drains and sediment traps.
- Controlling potential soil erosion - grassing and stabilising embankments and drainage outlets where required.
- Stabilised stockpile areas to prevent wind and water erosion.
- Scour protection at discharge locations.
- Stabilised site access - providing a firm base for vehicle entry/exit and preventing the main access from becoming a sediment source.

7. Existing Stormwater Pipe Diversion

The proposed PCYC development is located over an existing stormwater pipe which connects into the existing council stormwater drainage network. The existing pits and pipe configuration near the proposed development are shown in Figure 7, which has been obtained from the Port Macquarie Hastings Council's underground services online maps.

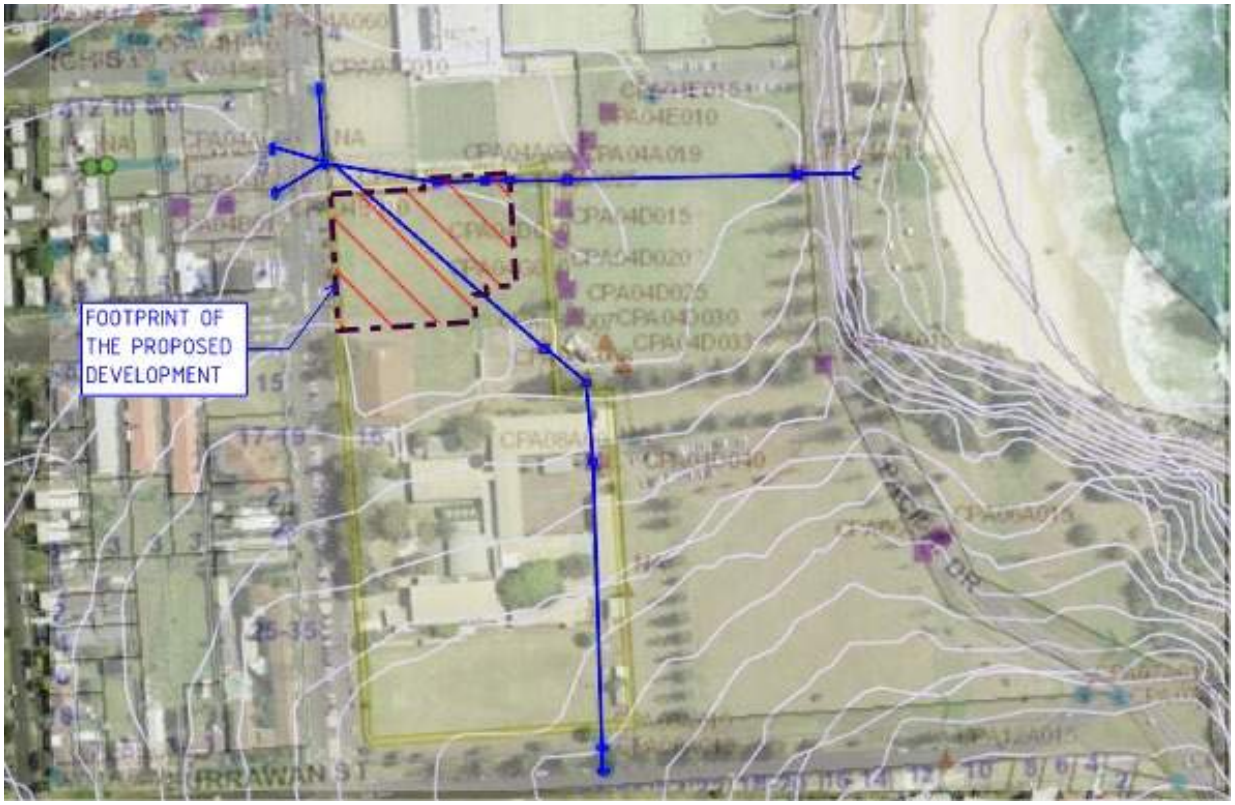


Figure 7: Existing Stormwater Drainage Network near the Proposed Development

The previous report by Northrop (Ref: SY202097-01-CR02) states that the council prefer diverting the existing stormwater pipe around the PCYC building and connect into the council's drainage system located along the northern boundary of the site. An extract from the previously approved concept stormwater design by Northrop is shown below in Figure 8.

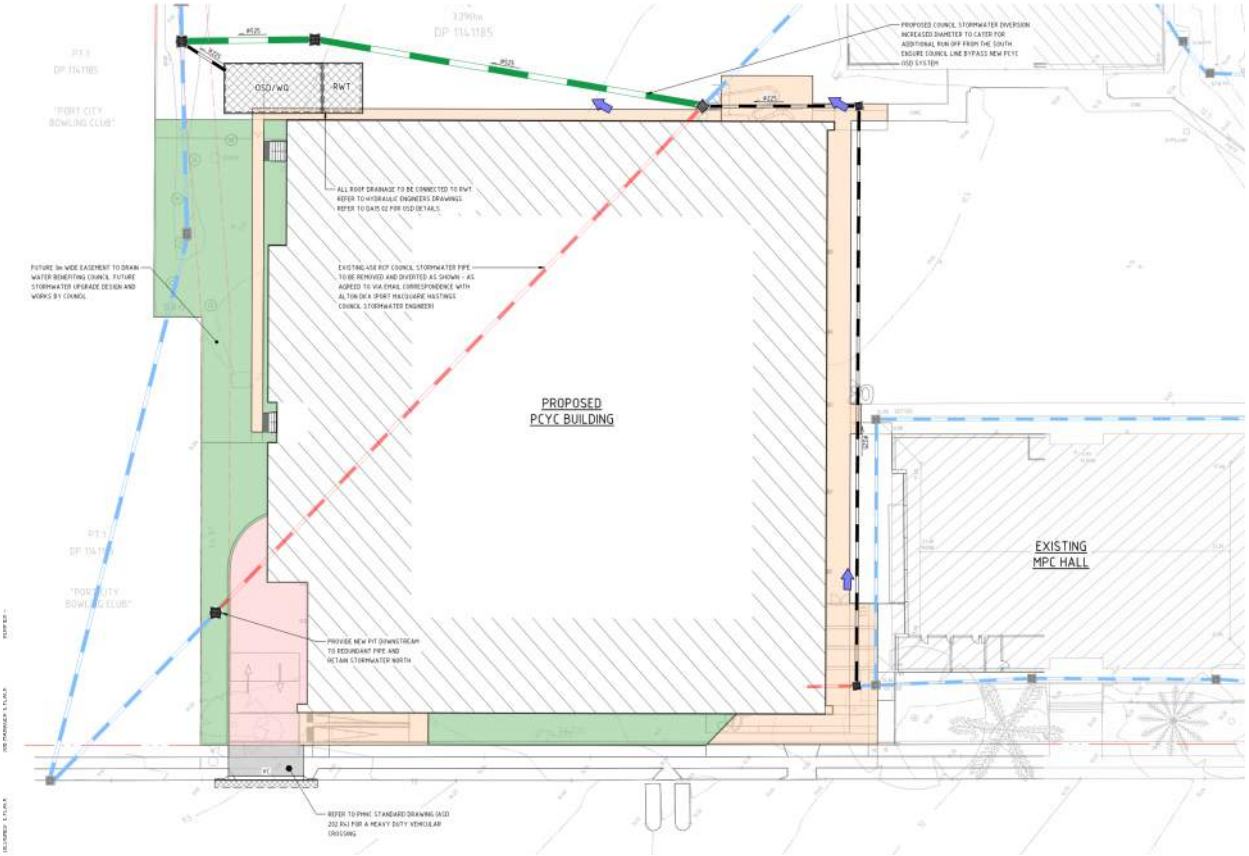


Figure 8: Stormwater Pipe Diversion – Previously SSD-Approved Design
(Extract from Northrop Report - Ref: SY202097-01-CR02)

MPC's design intent is to maintain the approved design methodology previously proposed by Northrop. Therefore, the current design by MPC adopts a similar approach by redirecting the existing stormwater pipe along the east side of the site and then connecting it to the existing council stormwater pit located at the north-east corner of the site, as shown in Figure 9.

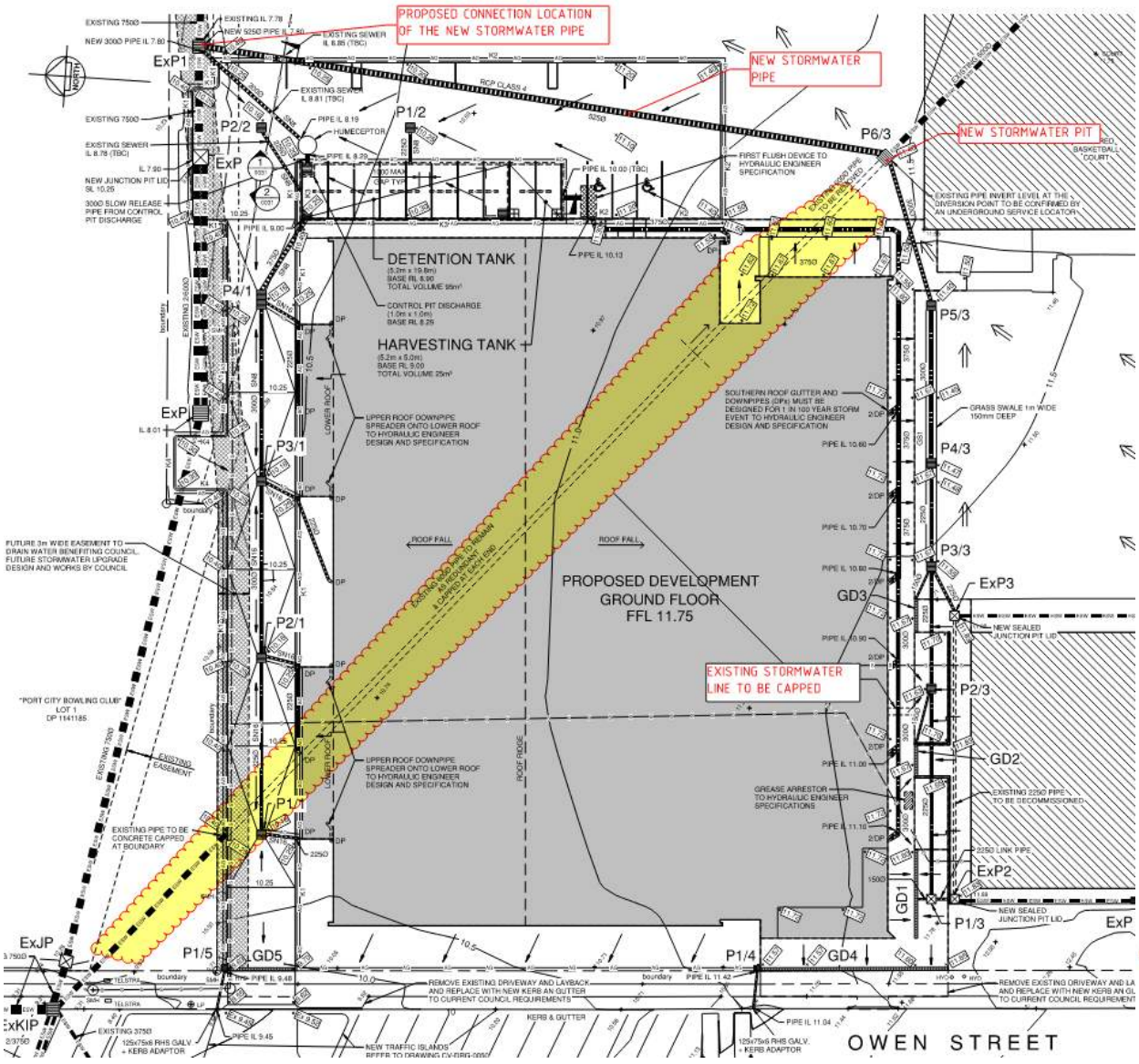


Figure 9: Stormwater Pipe Diversion – Current Design by MPC

8. Summary

MPC Consulting Engineers have prepared this stormwater management report for AW Edwards Pty Ltd for the proposed development at 16 Owen Street, Port Macquarie NSW 2444 (Lot 111, DP 1270315). This report evaluated the impacts of the proposed development works based on the stormwater quantity and quality as per the Port Macquarie Hastings Council Development Control Plan (DCP) and AUS-SPEC design specifications.

For further information about this stormwater management report, please contact the undersigned.

Signed:

Prepared by

……..

Rajeev Batuwitage
Civil/Structural Engineer
B.Sc Eng (Hons), MPhil, PhD, AFHEA, MIE(Aust)
Date: 19/12/2022

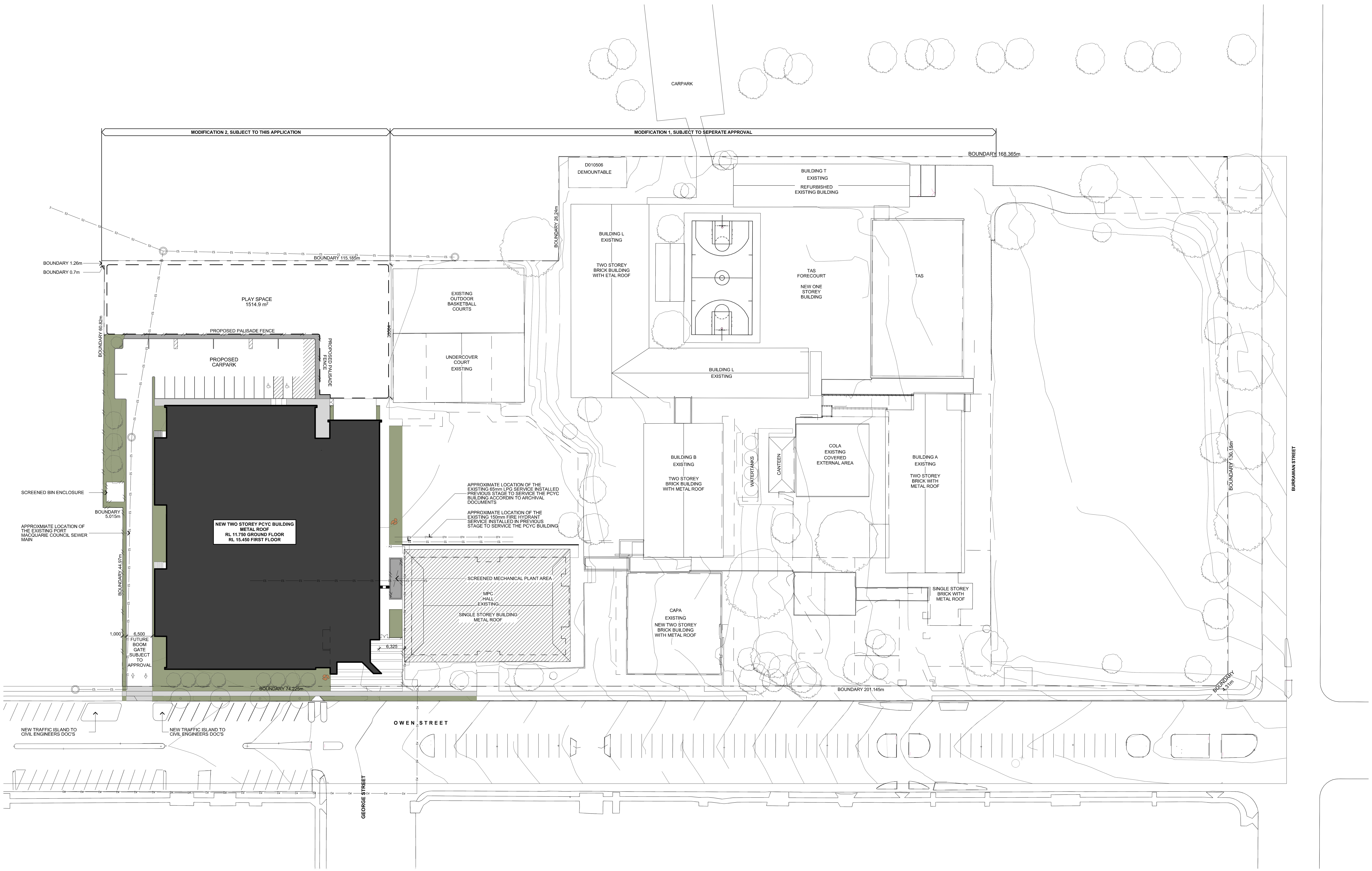
Reviewed by

……

Derek Prentice
Director, Senior Structural/Civil Engineer
B.E (Civil)(Hons) MIEAust CPEng NER RPEQ
APEC Engineer IntPE(Aust)
Date: 19/12/2022

Appendix A

Architectural Site Plan



CONSULTANTS

BCA CONSULTANT	LANDSCAPE ARCHITECT	MECHANICAL ENGINEER	HYDRAULIC ENGINEER	ELECTRICAL ENGINEER	STRUCTURAL ENGINEER	SCHOOL INFRASTRUCTURE	BUILDING CONTRACTOR
Metro Building Consultancy	Terras Landscape Architects	Edwards & Vickerman Consulting Engineers	McCallum PFCA	Electrical Projects Australia	MPC Consulting Engineers	School Infrastructure NSW	AW EDWARDS
T 4927 5566	T 4929 4926	T 4929 2461	T 4946 2633	T 4967 5999	T 4927 5566		T 9958 1474

AMENDMENTS

No	Drn	Chk	Date	Comment
A			08.11.22	60% Submission
B		CV	17.11.22	Consultant Coordination
C		CV	06.12.22	90% Submission

NOTES
1. Dimensions are in millimetres unless otherwise shown.
2. Work to given dimensions. Do not scale from drawing
3. Check all dimensions on site prior to construction and fabrication.
4. Bring any discrepancies to the attention of the proprietor & architect.

CLIENT NAME
SCHOOL INFRASTRUCTURE NSW

SCALE
1:200 @A1
0m 2 4 6 8 10

PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC
HASTINGS SECONDARY COLLEGE

DRAWN

APPROVED
CV

STATUS
NOT FOR CONSTRUCTION

DRAWING TITLE
Proposed Site Plan

PROJ. NO. **4662** | DRAWING NO. **AR.DRG.1101** | REV. **C**

SHAC

T +61 2 4961 5888
E info@shac.com.au
224 Maitland Road
Islington NSW 2296
Australia
Nominated Architect
Justin Hamilton (6160)
ABN 32 131 584 846

Appendix B

Survey Plan

M.G.A.

PACIFIC DRIVE

SHEET 8

SHEET 4

SHEET 2

"OXLEY OVAL"

STREET

WILLIAM STREET

MARITIME LANE

7054
DP 107417

168.365

BUILDING "T"

26.24

115.12

1.26

0.7

PT.1
DP 1141185

"PORT CITY
BOWLING CLUB"

BUILDING "L"

BUILDING "C"

BUILDING "TAS"

BASKETBALL COURT

60.875

130.15

SP72688

SHEET 3

1A
DP1141186

111
3.45ha
DP 1270315

5.015

BUILDING "S"

BUILDING "B"

BUILDING "A"

SHEET 6

1–2
SEC 65
DP758852

MPC HALL

44.97

74.185

201.225

OWEN

STREET

BURRAWAN

SHEET 5

SP73027

SP72527

C

1–2
DP154449

SP48564

2
DP335940

3
DP335940

SP56950

SHEET 7

CHURCH STREET

GORDON STREET

2
DP500017

1
DP500362

SP33611

2
DP500362

2
DP500018

SP11695

1
DP783729

SP19788

SP1156674

17
DP19867

15
DP19867

OVERALL

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DATE	REVISIONS	BY
02/03/21	ADDITIONAL DETAIL ADDED	P.Y.
21/10/20	EASEMENT FOR DRAINAGE ADDED	P.Y.

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HASTINGS SECONDARY COLLEGE, PORT MACQUARIE
CAMPUS. CORNER OF OWEN & BURRAWAN STREETS
IN THE PORT MACQUARIE–HASTINGS LGA

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M.G.A.

7054
DP 107417

115.12

1.26

0.7

METAL 10.31 PALISADE FENCE 2.0 HIGH 10.61

METAL 11.18 PALISADE

11.85

E/PILLAR E/PILLAR 18.34 14.69 15.49

13.34

DEMOUNTABLE

LAWN

SEWER I/O

E/PILLAR

2.0 HIGH 13.83 15.91

RAMP

14.33

22.27 GUTTER GUTTER 22.31

26.24

SEWER

15.90

FENCE 14.29 PATH

22.27 RIDGE

15.85

SEWER

COVERED AREA

S/W PIT

S/W PIT

BUILDING "L"

TWO STOREY BRICK METAL ROOF

14.25

15.85

22.32

BASKETBALL COURT

GUTTER 18.98

COURT 11.75

GUTTER 19.01

13.5

13.67

14

12

CONC.

22.27

FIRST FLOOR 19.25

15.89

RIDGE 22.77

COVERED

14.30

GUTTER 22.26

GUTTER 22.27

RIDGE 20.97

11.75

GUTTER 19.01

S/W PIT

13.48

SEWER

22.29 GUTTER

LANDING

CONC.

11.55

11.58

12.12

CONC.

12.34

S/W PIT

15.89

14.99

GARDEN

GARDEN

SEWER

SEWER

22.27

11.46

12.5

12.43

E/PILLAR

PATH

14.42

PATH

14.99

GAS

15.98 GROUND FLOOR

23.23

RIDGE

19.19 FIRST FLOOR

14.71

12.65

STAIRS

14.53

RIDGE 20.48

14.83

FLOOR 15.30

12.19

GARDEN

18.71

12.84

PATH

18.58

13

BUILDING "S" SINGLE STOREY TIMBER

14.85 S/W PIT

S/W PIT

BUILDING "B"

GUTTER

11.93

RIDGE 20.42

CONCRETE

2.61

PT.1
DP 1141185

"PORT CITY BOWLING CLUB"

2.0 HIGH 10 9.70 9.78 S/W PIT

10.23

FENCE

S/W PIT 9.62

60.875

PALISADE

(A)

9.92

SEWER

10.5

METAL

9.82 S/W PIT 10.38

5.015

5.4 36.15

10.69

111
3.45ha
DP 1270315

10.97

11.19

11

11.5

11.50

11.70

"SPORTS FIELD"

LEGEND

P/P	POWER POLE
SV	STOP VALVE
HYD.	HYDRANT
S/W PIT	STORMWATER PIT
COM PIT	COMMUNICATIONS PIT
E/PILLAR	ELECTRICITY PILLAR

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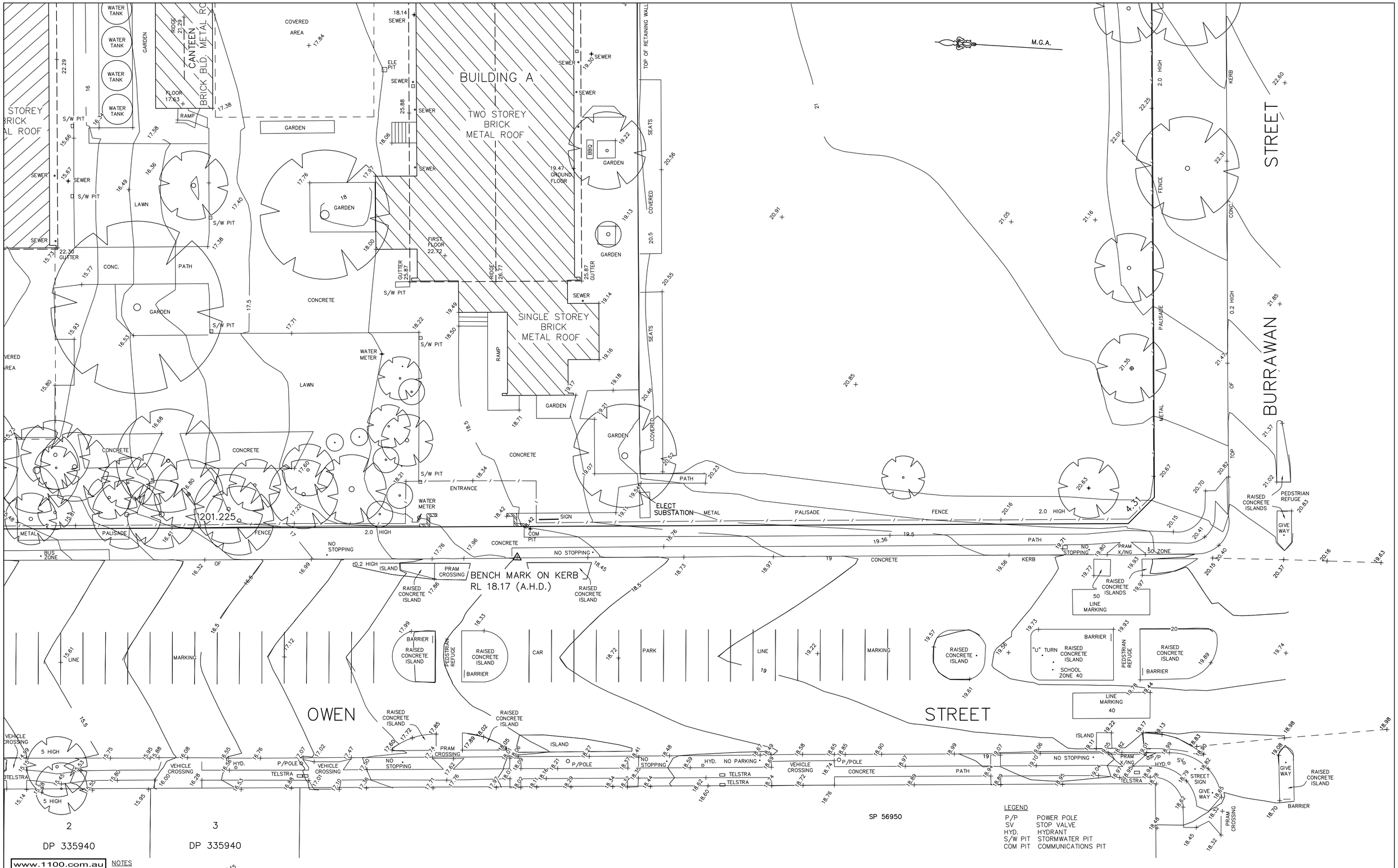

LEGEND

P/P	POWER POLE
SV	STOP VALVE
HYD.	HYDRANT
S/W PIT	STORMWATER PIT
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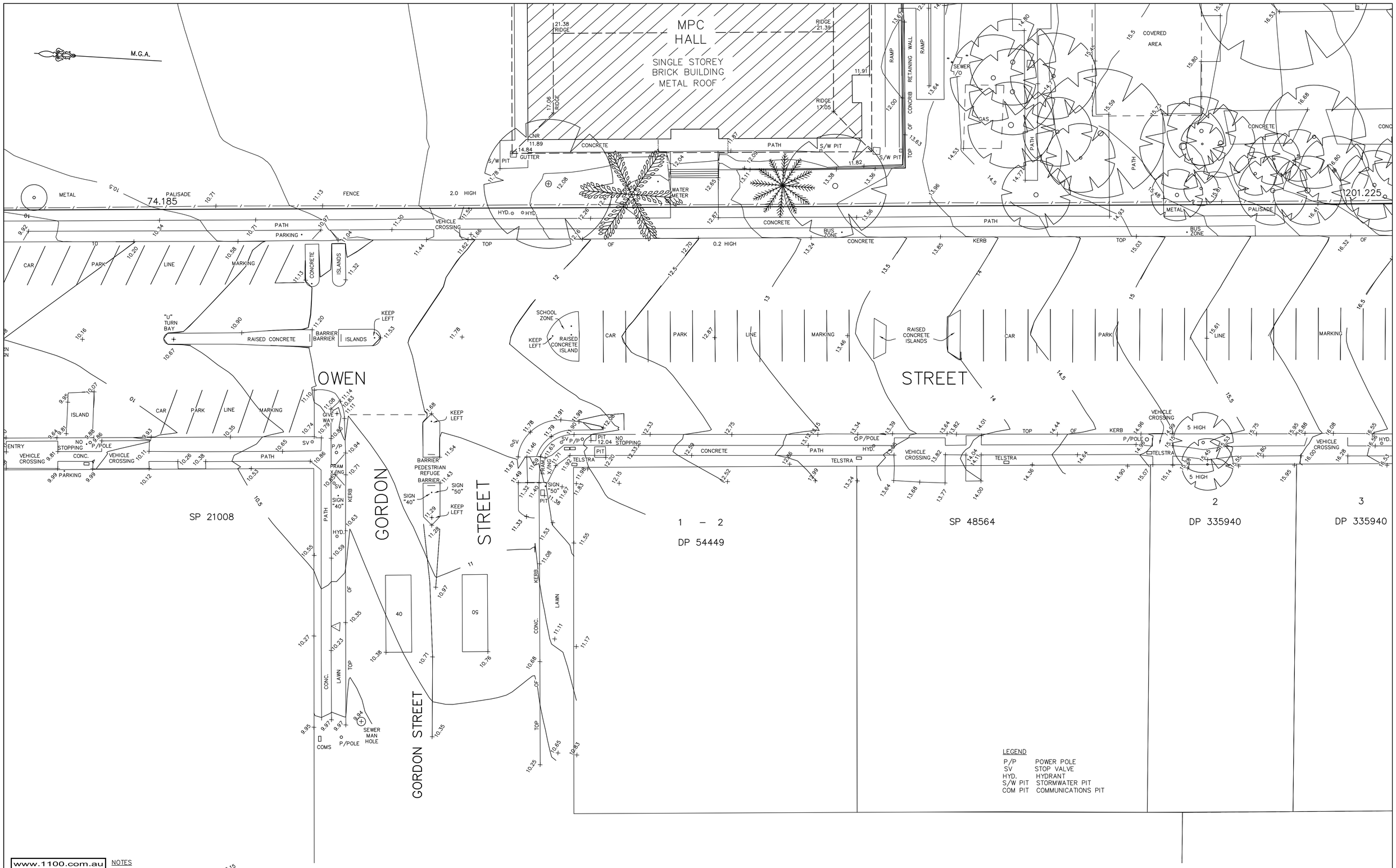

LEGEND

P/P	POWER POLE
SV	STOP VALVE
HYD.	HYDRANT
S/W PIT	STORMWATER PIT
COM PIT	COMMUNICATIONS PIT

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DATE	REVISIONS	BY
02/03/21	ADDITIONAL DETAIL ADDED	P.Y.
21/10/20	EASEMENT FOR DRAINAGE ADDED	P.Y.

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GEOMATIC ENGINEERING
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PROJECT MANAGEMENT
SOIL AND WATER MANAGEMENT
ENVIRONMENTAL PLANNING & DESIGN

PLAN SHOWING DETAIL & LEVELS AT HASTINGS SECONDARY COLLEGE, PORT MACQUARIE CAMPUS. CORNER OF OWEN & BURRAWAN STREETS IN THE PORT MACQUARIE–HASTINGS LGA

DRAWN:	CHECKED:	SCALE:	DATUM:	REFERENCE:
9TH DECEMBER 2019	M.B.	1:200 @ A1	A.H.D.	5819/2B SHT 7 OF 8

LEGEND
P/P POWER POLE
SV STOP VALVE
HYD. HYDRANT
S/W PIT STORMWATER PIT
COM PIT COMMUNICATIONS PIT
E/PILLAR ELECTRICITY PILLAR

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NOTES
1. SPOT LEVELS SHOWN THUS: +
2. CONTOURS SHOWN THUS: 36.5
3. CONTOUR INTERVAL 0.5 METRE
4. SIGNIFICANT TREES SHOWN THUS:

THE SPREAD OF EACH TREE IS INDICATIVE ONLY AND CANNOT BE SHOWN ACCURATELY WITHOUT VERY DETAILED FURTHER SURVEY. THE SHAPE AND SIZE OF SPREAD OF THE TREE MAY VARY DUE TO LACK OF UNIFORMITY OF THE BRANCHES, TRUNK AND OTHER REASONS.

5. BOUNDARY INFORMATION HAS BEEN COMPILED FROM INFORMATION SHOWN ON PLANS ON PUBLIC RECORD AT THE N.S.W. LAND REGISTRY SERVICES.
6. BOUNDARIES PLOTTED ARE ACCURATE FOR D.A. PURPOSES. BOUNDARIES SHOULD BE MARKED ON THE GROUND PRIOR TO ANY FURTHER DEVELOPMENT OF THE LAND.
7. (A) APPROXIMATE LOCATION OF EASEMENT FOR DRAINAGE 2.44 WIDE (M8557-666)

DATE	REVISIONS	BY
02/03/21	ADDITIONAL DETAIL ADDED	P.Y.
21/10/20	EASEMENT FOR DRAINAGE ADDED	P.Y.

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ENVIRONMENTAL PLANNING & DESIGN

PROFESSIONAL STANDARDS SCHEME
Liability limited by a scheme approved under Professional Standards Legislation

PLAN SHOWING DETAIL & LEVELS AT HASTINGS SECONDARY COLLEGE, PORT MACQUARIE CAMPUS. CORNER OF OWEN & BURRAWAN STREETS IN THE PORT MACQUARIE-HASTINGS LGA

DRAWN:	CHECKED:	SCALE:	DATUM:	REFERENCE:
9TH DECEMBER 2019	M.B.	1: 200 @ A1	A.H.D.	5819/2B SHT 8 OF 8

Appendix C

Stormwater Drawings

STORMWATER PLAN

SCALE 1 : 200

STORMWATER NOTES

1. REFER TO DRAWING CV-DRG-0031 FOR NOTES, LEGEND AND PIT SCHEDULE.

NOTE
SETOUT AND ALIGNMENT OF WALLS TO BOUNDARY TO ARCHITECTS DETAILS TYPICAL

NOTE
BUILDER TO PROVIDE ADEQUATE SHORING IN ORDER TO MAINTAIN STABILITY OF EXISTING NEIGHBOURING STRUCTURES AND FENCES DURING EXCAVATION WORKS TYPICAL

NOTE
ALL AG LINES BEHIND KERBS (K1) TO CONNECT TO STORMWATER SYSTEM TYPICAL

NOTE
ALL STORMWATER PITS TO HAVE ECOSOL LITTER BASKET200 + REACTIVE FILTER MEDIA (RFM) PILLOWS INSTALLED AS PER THE MANUFACTURER SPECIFICATION

NOTE
ALL SETOUT, DIMENSIONS AND RL's TO ARCHITECTS SPECIFICATION & DETAILS

NORTH
EXISTING 750Ø
NEW 300Ø PIPE IL 7.80
EXISTING IL 7.78
NEW 525Ø PIPE IL 7.80
EXISTING SEWER IL 8.85 (TBC)
EXISTING SEWER IL 8.81 (TBC)
EXISTING SEWER IL 8.78 (TBC)
IL 7.90
NEW JUNCTION PIT LID SL 10.25
300Ø SLOW RELEASE PIPE FROM CONTROL PIT DISCHARGE
PIPE IL 8.19
HUMECEPTOR
PIPE IL 8.29
PIPE IL 9.00
PIPE IL 10.00 (TBC)
PIPE IL 10.13
1000 MAX GAP TYP
RCP CLASS 4
525Ø
FIRST FLUSH DEVICE TO HYDRAULIC ENGINEER SPECIFICATION
EXISTING 600Ø PIPE TO BE REMOVED
EXISTING PIPE INVERT LEVEL AT THE DIVERSION POINT TO BE CONFIRMED BY AN UNDERGROUND SERVICE LOCATOR
COVERED BASKETBALL COURT
COURT 11.75
DETENTION TANK
(5.2m x 19.8m)
BASE RL 8.90
TOTAL VOLUME 95m³
CONTROL PIT DISCHARGE
(1.0m x 1.0m)
BASE RL 8.29
HARVESTING TANK
(5.2m x 5.0m)
BASE RL 9.00
TOTAL VOLUME 25m³
UPPER ROOF DOWNPIPE SPREADER ONTO LOWER ROOF TO HYDRAULIC ENGINEER DESIGN AND SPECIFICATION
SOUTHERN ROOF GUTTER AND DOWNPIPES (DPs) MUST BE DESIGNED FOR 1 IN 100 YEAR STORM EVENT TO HYDRAULIC ENGINEER DESIGN AND SPECIFICATION
GRASS SWALE 1m WIDE 150mm DEEP
EXISTING 600Ø PIPE TO REMAIN AS REDUNDANT & CAPPED AT EACH END
ROOF FALL
PROPOSED DEVELOPMENT
GROUND FLOOR
FFL 11.75
ROOF RIDGE
LOWER ROOF
SERVICES TRENCH UNDER
GREASE ARRESTOR TO HYDRAULIC ENGINEER SPECIFICATIONS
NEW SEALED JUNCTION PIT LID
EXISTING 225Ø PIPE TO BE DECOMMISSIONED
225Ø LINK PIPE
MPC HALL
SINGLE STOREY BRICK BUILDING METAL ROOF
BUILDING S
SINGLE STOREY TIMBER
FLOOR 15.30
GAZEBO
STAIRS
RAMP
CONCRIB RETAINING WALL
GAS
PATH
FUTURE 3m WIDE EASEMENT TO DRAIN WATER BENEFITING COUNCIL. FUTURE STORMWATER UPGRADE DESIGN AND WORKS BY COUNCIL
"PORT CITY BOWLING CLUB"
LOT 1
DP 1141185
EXISTING EASEMENT
EXISTING PIPE TO BE CONCRETE CAPPED AT BOUNDARY
EXISTING 750Ø
EXISTING 2/600Ø
EXISTING 375Ø
EXISTING 2/375Ø
125x75x6 RHS GALV. + KERB ADAPTOR
PIPE IL 9.45
PIPE IL 9.48
PIPE IL 11.42
PIPE IL 11.04
NEW TRAFFIC ISLANDS REFER TO DRAWING CV-DRG-0050
REMOVE EXISTING DRIVEWAY AND LAYBACK AND REPLACE WITH NEW KERB AN GUTTER TO CURRENT COUNCIL REQUIREMENTS
KERB & GUTTER
OWEN STREET
boundary
TELSTRA
ExP1
P2/2
P1/2
P6/3
P4/1
P3/1
P2/1
P1/1
P1/5
GD5
P1/4
GD4
GD1
P1/3
ExP2
GD2
P2/3
GD3
ExP3
P3/3
P4/3
P5/3
ExJP
ExKIP
ExP

CONSULTANTS							
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AMENDMENTS

ISSUE	REASON FOR ISSUE	DATE	ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22			
B	90% SUBMISSION	6.12.22			

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CLIENT NAME: SCHOOL INFRASTRUCTURE NSW

SCALE: 1 : 200 @A1

STATUS: NOT FOR CONSTRUCTION

PROJECT NAME AND ADDRESS: PORT MACQUARIE-HASTINGS PCYC HASTINGS SECONDARY COLLEGE

DRAWING TITLE: STORMWATER PLAN

DRAWN	APPROVED	PROJ. NO.	DRAWING NO.	REV.
R.G.	R.B./D.P.	669	CV-DRG 0030	B

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MPC Project Number: 220319

STORMWATER NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH AS/NZS3500.3.
2. ALL PIPES TO HAVE A 1% MINIMUM FALL U.N.O.
3. ALL DOWNPIPES (DP) TO BE SPECIFIED BY ARCHITECT. FOR EXACT LOCATION OF DOWNPIPES, REFER TO ARCHITECTURAL DRAWINGS.
4. ALL PIPES TO BE UPVC U.N.O.
5. ALL UPVC PIPES TO BE SEWER GRADE AND TO AS/NZS1260 WITH THE FOLLOWING PIPE CLASSES U.N.O.:
   100Ø OR LESS TO BE CLASS 'SN10', 150Ø AND ABOVE TO BE CLASS 'SN8'
6. ALL REINFORCED CONCRETE PIPES (RCP) TO BE SPIGOT AND SOCKET TYPE WITH RUBBER RINGS TO AS4058,
   CLASS 3 BENEATH TRAFFICABLE PAVEMENTS U.N.O., CLASS 4 UNDER HEAVY VEHICLE PAVEMENTS, CLASS 2 OTHERWISE.
7. PITS TO BE CI&D REINFORCED PRE-CAST CONCRETE PITS OR EQUIVALENT PROPRIETARY PITS.
8. ALL LIDS AND GRATES TO BE PROPRIETARY HOT DIPPED GALVANISED U.N.O. LOCKABLE HEAVY DUTY CLASS 'D' IN AREAS OF VEHICULAR TRAFFIC AND CLASS 'B' ELSEWHERE, COMPLYING WITH RELEVANT COUNCIL AND AUSTRALIAN STANDARDS SPECIFICALLY AS3996.
   ALL GRATED TRENCH DRAINS AND GRATED PITS TO BE CLASS 'B' HEEL SAFE WITHIN PEDESTRIAN PAVEMENTS
9. MINIMUM COVER TO STORMWATER PIPES TO BE AS FOLLOW U.N.O.:
   LANDSCAPED AREAS - 300mm, SEALED ROADS/TRAFFICABLE AREAS - 600mm, UN-SEALED ROADS - 750mm.
   PIPES TO BE CONCRETE ENCASED IF MINIMUM COVERS CANNOT BE OBTAINED,
   REFER TO MPC CONSULTING ENGINEERS FOR FURTHER ADVICE.
10. PROVIDE 100Ø AG DRAINS IN FILTER SOCKS TO ALL LANDSCAPED AREAS, PLANTER BEDS AND STORMWATER PIPE TRENCHES.
    ALL AG DRAINS TO BE BEDDED IN COARSE AGGREGATE AND TO BE CONNECTED TO STORMWATER SYSTEM U.N.O. (3m MIN AG LENGTH AT ALL PIT LOCATIONS TBC ON SITE)
11. ALL PITS, DETENTION TANKS AND PROPRIETARY POLLUTION CONTROL DEVICES TO BE CLEANED OF SEDIMENT AT 3 MONTH MAXIMUM INTERVALS.
12. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF WORK.
13. ANY FOOTPATHS, KERB AND GUTTER OR ROADWAY DISTURBED BY WORKS TO BE REINSTATED TO CURRENT COUNCIL REQUIREMENTS.
14. PROVIDE ACCESS LADDER TO TANK AS REQUIRED, REFER TO AS1657.

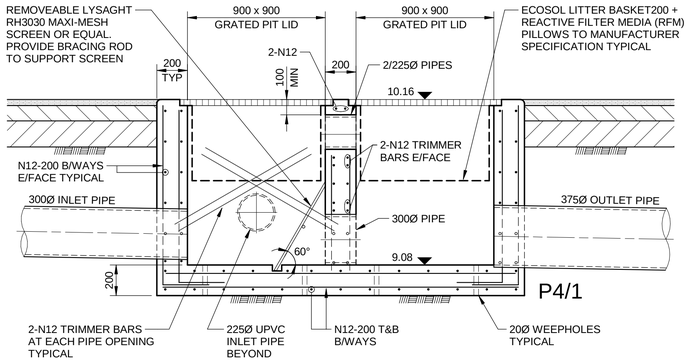
LEGEND

ESW	DENOTES EXISTING STORMWATER PIPE	GS1	DENOTES 1000 WIDE x 150 MIN DEEP GRASS LINED SWALE, 1% MIN FALL, U.N.O
	DENOTES STORMWATER PIPE		DENOTES DIRECTION OF SURFACE FLOWS
10.0	DENOTES EXISTING CONTOUR	AG	DENOTES 100Ø AG DRAIN IN FILTER SOCK PROVIDE ADDITIONAL AG PIPES IN STORMWATER PIPE TRENCHES AS SPECIFIED (NOT SHOWN ON PLAN)
10.25	DENOTES DESIGN CONTOUR		DENOTES 900x900 SEALED LOCKABLE MANHOLE PIT LID
11.70	DENOTES EXISTING LEVEL		DENOTES OVERLAND FLOW DIRECTION IN MAJOR STORM EVENT
10.20	DENOTES DESIGN SPOT LEVEL	ExP	DENOTES EXISTING GRATED PIT SURFACE AND INVERT LEVEL T.B.C
K1/K4	DENOTES 150 HIGH KERB U.N.O.	ExKIP	DENOTES EXISTING KERB INLET PIT SURFACE AND INVERT LEVEL T.B.C
K2	DENOTES 100 HIGH KERB U.N.O.	ExJP	DENOTES EXISTING JUNCTION PIT SURFACE AND INVERT LEVEL T.B.C

PIT SCHEDULE

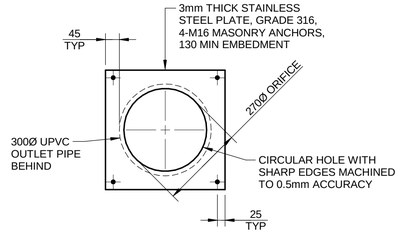
LINE	PIT No.	SIZE	TYPE	SURFACE LEVEL S.L.	INVERT LEVEL I.L.
LINE 1	P1/1	900x900	GRATED PIT	10.16	9.51
	P2/1	900x900	GRATED PIT	10.16	9.34
	P3/1	900x900	GRATED PIT	10.16	9.17
	P4/1	CUSTOM DOUBLE 900x900	GRATED PIT	10.16	9.08
LINE 2	P1/2	900x900	GRATED PIT	10.25	9.40
	P2/2	900x900	GRATED PIT	10.16	9.31
LINE 3	P1/3	900x900	JUNCTION PIT	11.60	10.30
	P2/3	900x900	GRATED PIT	11.63	10.10
	P3/3	900x900	GRATED PIT	11.55	9.98
	P4/3	900x900	GRATED PIT	11.47	9.88
	P5/3	900x900	GRATED PIT	11.40	9.72
	P6/3	900x900	GRATED PIT	11.40	IL 9.57
	ExP1	T.B.C	JUNCTION PIT	9.70	7.78
	ExP2	T.B.C	JUNCTION PIT	11.83	10.35
	ExP3	T.B.C	JUNCTION PIT	11.83	10.91
	GD1	150 WIDE	GRATED DRAIN	11.60	150 MIN DEPTH
	GD2	150 WIDE	GRATED DRAIN	11.67	150 MIN DEPTH
	GD3	150 WIDE	GRATED DRAIN	11.67	150 MIN DEPTH
LINE 4	P1/4 ✳	600x600	GRATED PIT	11.57	10.97
	GD4	150 WIDE	GRATED DRAIN	11.57	150 MIN DEPTH
LINE 5	P1/5 ✳	600x600	GRATED PIT	9.63	9.03
	GD5	200 WIDE	GRATED DRAIN	11.67	150 MIN DEPTH

✳ DENOTES GRATED PIT TO HAVE 20Ø WEEPHOLES



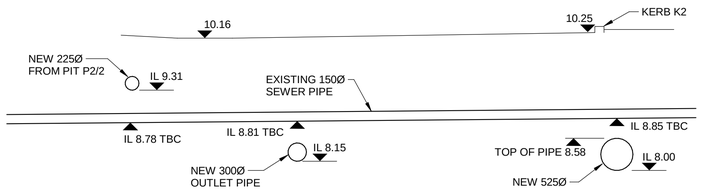
POLLUTION CONTROL PIT - P4/1

SCALE 1 : 20



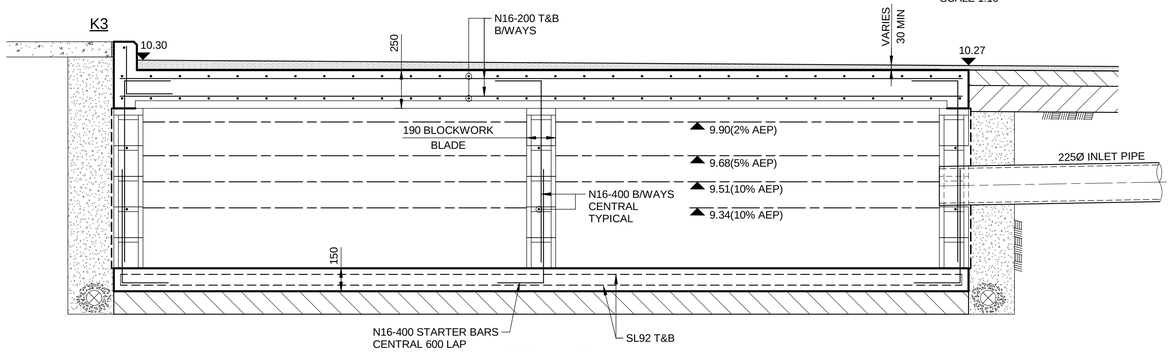
ORIFICE PLATE ELEVATION

SCALE 1:10



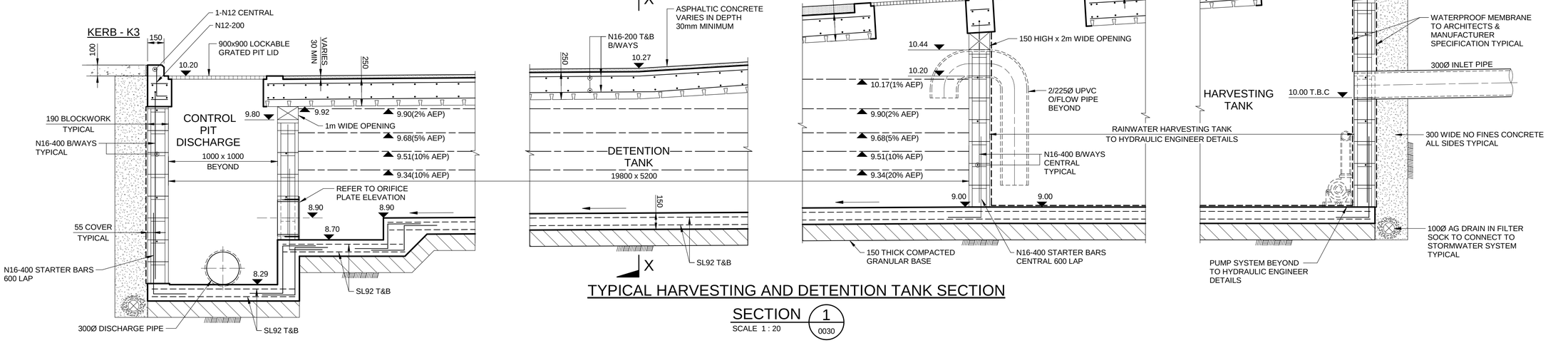
SECTION 2

N.T.S 0030



VIEW X-X

SCALE 1 : 20



TYPICAL HARVESTING AND DETENTION TANK SECTION

SECTION 1

SCALE 1 : 20 0030

CONSULTANTS

METROBC	terras landscape architects	EVC Edwards & Vickerman Consulting Engineers Pty Ltd	PFCA	ELECTRICAL PROJECTS AUSTRALIA Pty Limited	SHAC	NSW	AW EDWARDS
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AMENDMENTS

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CLIENT NAME

SCHOOL INFRASTRUCTURE NSW

SCALE

As indicated @A1

PROJECT NAME AND ADDRESS

PORT MACQUARIE-HASTINGS PCYC HASTINGS SECONDARY COLLEGE

DRAWN	APPROVED
R.G.	**R.B./D.P.**

STATUS

NOT FOR CONSTRUCTION

DRAWING TITLE

STORMWATER DETAILS

PROJ. NO.	DRAWING NO.	REV.
669	**CV-DRG 0031**	**B**

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MPC Project Number: 220319

Appendix D

Sediment and Erosion Control Plans

SEDIMENTATION AND EROSION CONTROL PLAN

SCALE 1 : 200

SEDIMENTATION AND EROSION CONTROL NOTES

1. SELECTIVE CLEARING OF VEGETATION TO BE RESTRICTED TO NOMINATED AREAS WITH CLEARED VEGETATION WIND ROWED ON THE CONTOUR.
2. ALL EROSION AND SEDIMENT CONTROL MEASURES TO BE INSTALLED PRIOR TO SITE DISTURBANCE.
3. TOPSOIL FROM ALL AREAS THAT WILL BE DISTURBED TO BE STRIPPED AND STOCKPILED AT THE NOMINATED SITE.
4. NO MORE THAN 150m OF TRENCH TO BE OPEN AT ANY ONE TIME.
5. CUT AND FILL BATTER GRADIENTS OF 1:2 (MAXIMUM).
6. A STRIP OF TURF 450mm WIDE IS TO BE PLACED IMMEDIATELY BEHIND THE KERB ON ALL NEW ROAD TO ACT AS A FILTER TRAP. REFER TO DETAIL SD6-13.
7. ALL SEDIMENT CONTROL STRUCTURES TO BE INSPECTED BY SITE SUPERVISOR AFTER EACH RAINFALL EVENT FOR STRUCTURAL DAMAGE AND ALL TRAPPED SEDIMENT TO BE REMOVED TO A NOMINATED STOCKPILE SITE.
8. THE PROJECT MANAGER TO INFORM ALL CONTRACTORS AND SUB-CONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN.
9. NO DISTURBED AREA IS TO REMAIN DENUDED LONGER THAN 14 DAYS.
10. ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAY'S OPERATION.
11. THE CONTRACTOR MUST ENSURE THE SUITABILITY AND INTEGRITY OF ALL WORKS AT THE END OF EACH DAY'S WORK.
12. ORANGE BARRIER TAPE TO BE AFFIXED TO TOP OF SEDIMENT CONTROL BARRIER TO IDENTIFY WORK AREA.
13. ALL SEDIMENTATION & EROSION CONTROL MEASURES ARE TO STRICTLY COMPLY WITH THE GUIDELINES DETAILED IN THE DEPARTMENT OF HOUSING PUBLICATION, "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION", 4TH EDITION.
14. WATER TRUCKS TO BE USED AS REQUIRED TO PREVENT WIND EROSION.
15. SUBGRADE MATERIAL TO BE CONSTRUCTED IMMEDIATELY FOLLOWING FILL.

SEDIMENT BASIN DESIGN DATA

DESIGN DATA	BASIN 01
TOTAL CATCHMENT AREA (ha)	0.648
DISTURBED CATCHMENT AREA (ha)	0.648
SOIL TEXTURE GROUP	D
DESIGN RAINFALL DEPTH (days)	2
DESIGN RAINFALL DEPTH (percentile)	75
X-DAY, Y-PERCENTILE RAINFALL EVENT	18
RAINFALL INTENSITY: 2 year, 6 hour storm	13.6
RAINFALL EROSIVITY (R-FACTOR)	4030
VOLUMETRIC RUNOFF COEFFICIENT	0.39

SEDIMENT BASIN VOLUMES

	BASIN 01
SETTLING ZONE VOLUME (m^3)	46
STORAGE ZONE VOLUME (m^3)	23
TOTAL STORAGE VOLUME (m^3)	69

NOTE
- REFER TO DETAIL SD6-4 FOR TYPICAL DETAILS OF SEDIMENT BASIN AND SPILLWAY
- BASIN TO BE DISCHARGED TO EXISTING STORMWATER PITS. BASIN CAPACITY TO BE RESTORED WITHIN 2 DAYS OF A RAIN EVENT.
- PRIOR TO DISCHARGING THE BASIN, THE WATER QUALITY MUST BE:
  - pH:6.5-8.5
  - TSS: <50mg/L
  - OIL AND GREASE: NONE VISIBLE

LEGEND

- DENOTES TEMPORARY WATERWAY CROSSING, REFER TO DETAIL SD5-1
- DENOTES SEDIMENT POND, REFER TO DETAIL SD6-4
- DENOTES EARTH BANK (LOW FLOW), REFER TO DETAIL SD5-5
- DENOTES GEOTEXTILE INLET FILTER, REFER TO DETAIL SD6-12
- DENOTES ENERGY DISSIPATER, REFER TO DETAIL SD5-8
- DENOTES STABILISED SITE ACCESS, REFER TO DETAIL SD6-14
- DENOTES SEDIMENT POND, REFER TO DETAIL SD6-4

DISTURBED CATCHMENT AREA
6,482 SQM

EXISTING 750Ø PIPE IL 7.780
EXISTING PIT SL 9.70, IL 7.780
EXISTING 750Ø
EXISTING PIT SL 9.62, IL 7.904
CREST OF SPILLWAY RL 10.02
TOP OF BASIN NOT LESS THAN RL 10.512
EXISTING SEWER SL 10.39, IL 8.64 T.B.C ENSURE EXISTING SEWER MANHOLE AND SURROUNDS ARE FULLY SEALED IN SEDIMENT BASIN DEPTH
EXISTING PIT SL 9.82, IL 8.012
DENOTES OUTLINE OF PROPOSED CARPARK AND DRIVEWAY
DENOTES OUTLINE OF PROPOSED DEVELOPMENT
OUTLINE OF DISTURBED CATCHMENT AREA
DENOTES EARLY WORKS SEDIMENTATION FENCE FOR STORMWATER DIVERSION PIPE INSTALLATION
DENOTES LOW FLOW EARTH BANK
DENOTES OUTLINE OF PROPOSED DEVELOPMENT
"PORT CITY BOWLING CLUB" LOT 1 DP 1141185
EXISTING EASEMENT
COVERED BASKETBALL COURT
COURT 11.75
BUILDING S SINGLE STOREY TIMBER
FLOOR 15.30
GAZEBO
STAIRS
MPC HALL SINGLE STOREY BRICK BUILDING METAL ROOF
FLOOR 11.97
RAMP
RAMP
CONCRIB RETAINING WALL
GAS
PATH
KERB & GUTTER
KERB & GUTTER
OWEN STREET
boundary
SMH
HYD
TELSTRA
LP
ESW
SIP

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SCHOOL INFRASTRUCTURE
School Infrastructure NSW

BUILDING CONTRACTOR
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CLIENT NAME
SCHOOL INFRASTRUCTURE NSW

SCALE
1 : 200 @A1

STATUS
NOT FOR CONSTRUCTION

PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC
HASTINGS SECONDARY COLLEGE

DRAWING TITLE
SEDIMENTATION AND EROSION CONTROL PLAN

DRAWN	APPROVED
R.G.	R.B./D.P.

PROJ. NO.	DRAWING NO.	REV.
669	CV-DRG 0010	B

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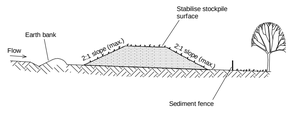
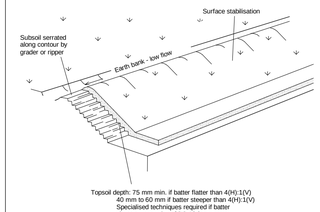
MPC Project Number: 220319



Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

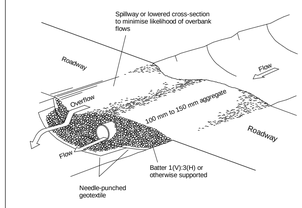
STOCKPILES SD 4-1



Construction Notes

1. Scarify the ground surface along the line of the contour to a depth of 50 mm to 100 mm to break up any hardsetting surfaces and to provide a good bond between the respread material and subsoil.
2. Add soil ameliorants as required by the ESCP or SWMP.
3. Rip to a depth of 300 mm if compacted layers occur.
4. Where possible, replace topsoil to a depth of 40 to 60 mm on lands where the slope exceeds 4(H):1(V) and to at least 75 mm on lower gradients.

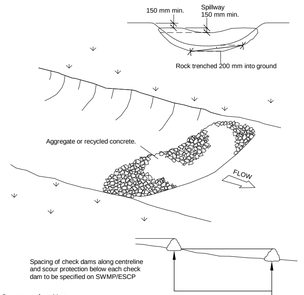
REPLACING TOPSOIL SD 4-2



Construction Notes

1. Prohibit all traffic until the access way is constructed.
2. Strip any topsoil and place a needle-punched textile over the base of the crossing.
3. Place clean, rigid, non polluting aggregate or gravel in the 100 mm to 150 mm size class over the fabric to a minimum depth of 200 mm.
4. Provide a 3-metre wide carriageway with sufficient length of culvert pipe to allow less than a 3(H): 1 (V) slope on side batters.
5. Install a lower section to act as an emergency spillway in greater than design storm events.
6. Ensure that culvert outlets extend beyond the toe of fill embankments.

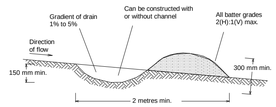
TEMPORARY WATERWAY CROSSING SD 5-1



Construction Notes

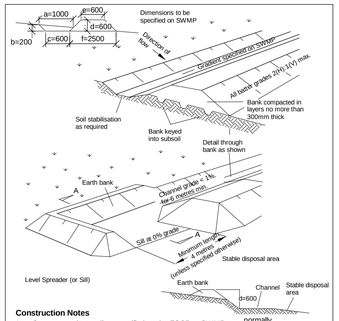
1. Check dams can be built with various materials, including rocks, logs, sandbags and straw bales. The maintenance program should ensure their integrity is retained, especially where constructed with straw bales. In the case of bales, this might require their replacement each two to four months.
2. Trench the check dam 200 mm into the ground across its whole width. Where rock is used, fill the trenches to at least 100 mm above the ground surface to reduce the risk of undercutting.
3. Normally, their maximum height should not exceed 600 mm above the gully floor. The centre should act as a spillway, being at least 150 mm lower than the outer edges.
4. Space the dams so the toe of the upstream dam is level with the spillway of the next downstream dam.

ROCK CHECK DAM SD 5-4



NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

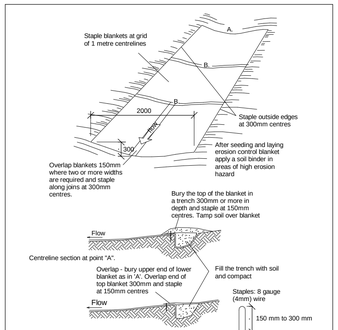
EARTH BANK (LOW FLOW) SD 5-5



Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, between 1 and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

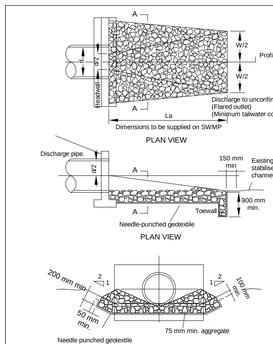
EARTH BANK (HIGH FLOWS) SD 5-6



Construction Notes

1. Remove any rocks, clods, sticks or grass from the surface before laying matting.
2. Ensure that topsoil is at least 75 mm deep.
3. Complete fertilising and seeding before laying the matting.
4. Ensure fabric will be continuously in contact with the soil by grading the surface carefully first.
5. Lay the fabric in "shingle-fashion", with the end of each upstream roll overlapping those downstream. Ensure each roll is anchored properly at its upslope end.
6. Ensure that the full width of flow in the channel is covered by the matting up to the design storm event, usually in the 10-year ARI time of concentration storm event.
7. Divert water from the structure until vegetation is stabilised properly.

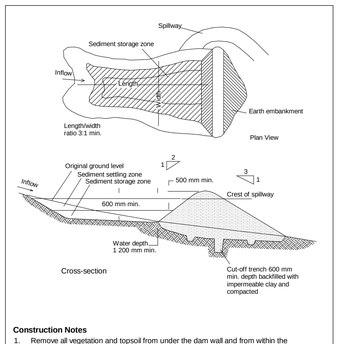
RECP : CONCENTRATED FLOW SD 5-7



Construction Notes

1. Compact the subgrade fill to the density of the surrounding undisturbed material.
2. Prepare a smooth, even foundation for the structure that will ensure that the needle-punched geotextile does not sustain serious damage when covered with rock.
3. Should any minor damage to the geotextile occur, repair it before spreading any aggregate. For repairs, patch one piece of fabric over the damage, making sure that all joints and patches overlap more than 300 mm.
4. Lay rock following the drawing, according to Table 5.2 of Landcom (2004) and with a minimum diameter of 75 mm.
5. Ensure that any concrete or riprap used for the energy dissipater or the outlet protection conforms to the grading limits specified on the SWMP.

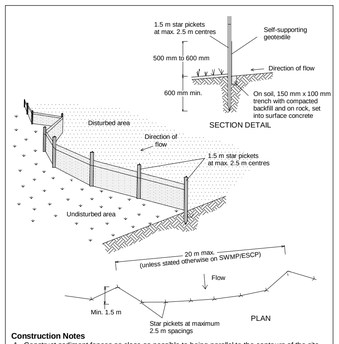
ENERGY DISSIPATER SD 5-8



Construction Notes

1. Remove all vegetation and topsoil from under the dam wall and from within the storage area.
2. Construct a cut-off trench 500 mm deep and 1,200 mm wide along the centreline of the embankment extending to a point on the gully wall level with the riser crest.
3. Maintain the trench free of water and recompact the materials with equipment as specified in the SWMP to 95 per cent Standard Proctor Density.
4. Select fill following the SWMP that is free of roots, wood, rock, large stone or foreign material.
5. Prepare the site under the embankment by ripping to at least 100 mm to help bond compacted fill to the existing substrate.
6. Spread the fill in 100 mm to 150 mm layers and compact it at optimum moisture content following the SWMP.
7. Construct the emergency spillway.
8. Rehabilitate the structure following the SWMP.

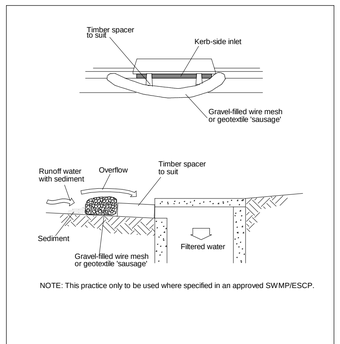
EARTH BASIN - WET (APPLIES TO 'TYPE D' AND 'TYPE F' SOILS ONLY) SD 6-4



Construction Notes

1. Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns as shown in the drawing to limit the catchment area of any one section. The catchment area should be small enough to limit water flow if concentrated at one point to 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre intervals (max) at the downslope edge of the trench. Ensure any star pickets are fitted with safety caps.
4. Fix self-supporting geotextile to the upslope side of the posts ensuring it goes to the base of the trench. Fix the geotextile with wire ties or as recommended by the manufacturer. Only use geotextile specifically produced for sediment fencing. The use of shade cloth for this purpose is not satisfactory.
5. Join sections of fabric at a support post with a 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE SD 6-8

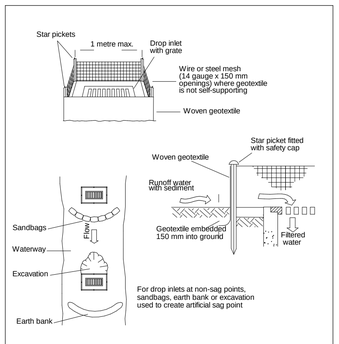


NOTE: This practice only to be used where specified in an approved SWMP/ESCP.

Construction Notes

1. Install filters to kerb inlets only at sag points.
2. Fabricate a sleeve made from geotextile or wire mesh longer than the length of the inlet pit and fill it with 25 mm to 50 mm gravel.
3. Form an elliptical cross-section about 150 mm high x 400 mm wide.
4. Place the filter at the opening leaving at least a 100-mm space between it and the kerb inlet. Maintain the opening with spacer blocks.
5. Form a seal with the kerb to prevent sediment bypassing the filter.
6. Sandbags filled with gravel can substitute for the mesh or geotextile provding they are placed so that they firmly abut each other and sediment-laden waters cannot pass between.

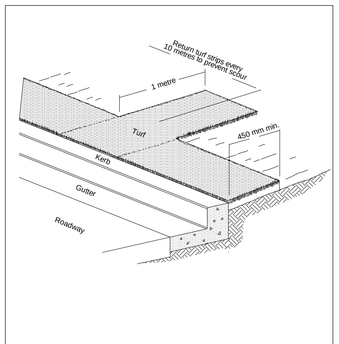
MESH AND GRAVEL INLET FILTER SD 6-11



Construction Notes

1. Fabricate a sediment barrier made from geotextile or straw bales.
2. Follow Standard Drawing 6-8 for installation procedures for the straw bales or geofabric. Reduce the picket spacing to 1 metre centres.
3. In waterways, artificial sag points can be created with sandbags or earth banks as shown in the drawing.
4. Do not cover the inlet with geotextile unless the design is adequate to allow for all waters to bypass it.

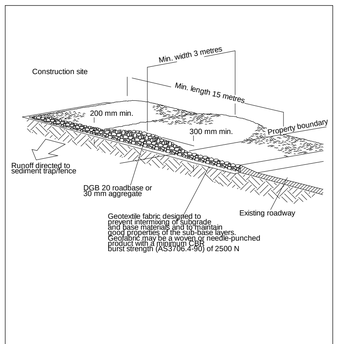
GEOTEXTILE INLET FILTER SD 6-12



Construction Notes

1. Install a 450 mm minimum wide roll of turf on the footpath next to the kerb and at the same level as the top of the kerb.
2. Lay 1.4 metre long turf strips normal to the kerb every 10 metres.
3. Rehabilitate disturbed soil behind the turf strip following the ESCP/SWMP.

KERBSIDE TURF STRIP SD 6-13

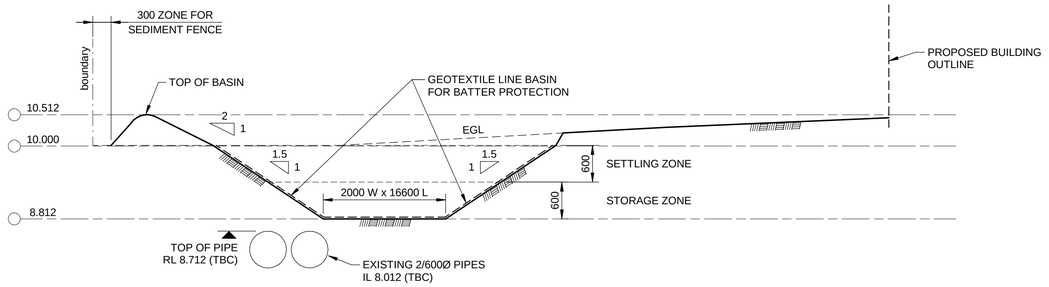


Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200 mm thick pad over the geotextile using road base or 30 mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS SD 6-14

SEDIMENTATION AND EROSION CONTROL DETAILS



SECTION 1
N.T.S 0010

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ARCHITECT Schreiber Hamilton Architecture T 4961 5888

SCHOOL INFRASTRUCTURE School Infrastructure NSW

BUILDING CONTRACTOR AW EDWARDS T 9958 1474

AMENDMENTS

ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22
B	90% SUBMISSION	6.12.22

ISSUE	REASON FOR ISSUE	DATE

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SCALE

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PROJECT NAME AND ADDRESS

PORT MACQUARIE-HASTINGS PCYC HASTINGS SECONDARY COLLEGE

DRAWN **R.G.** APPROVED **R.B./D.P.**

STATUS

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DRAWING TITLE

SEDIMENTATION AND EROSION CONTROL DETAILS

PROJ. NO. **669** DRAWING NO. **CV-DRG 0011** REV. **B**

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MPC Project Number: 220319

Appendix E

DRAINS Modelling Data

PRE-D CAT 3
AREA = 842m²
LENGTH = 54m
AVE SLOPE = 2.5%
RETARDANCE n* = 0.1

842 sq m

111
3.45ha
DP 1270315

PRE-D CAT 2
AREA = 3193m²
LENGTH = 70m
AVE SLOPE = 1.5%
RETARDANCE n* = 0.1

3,193 sq m

TOTAL AREA
5,985 sq m

PRE-D CAT 1
AREA = 1950m²
LENGTH = 70m
AVE SLOPE = 1.5%
RETARDANCE n* = 0.1

1,950 sq m

PRE-DEVELOPED CATCHMENT PLAN

220391
PCYC Port Macquarie
MPC SK-E1
MPC Consulting Engineers

STORMWATER PLAN

SCALE 1 : 200

STORMWATER NOTES

1. REFER TO DRAWING CV-DRG-0031 FOR NOTES, LEGEND AND PIT SCHEDULE.

NOTE
SETOUT AND ALIGNMENT OF WALLS TO BOUNDARY TO ARCHITECTS DETAILS TYPICAL

NOTE
ALL AG LINES BEHIND KERBS (K1) TO CONNECT TO STORMWATER SYSTEM TYPICAL

NOTE
ALL SETOUT, DIMENSIONS AND RL's TO ARCHITECTS SPECIFICATION & DETAILS

NOTE
BUILDER TO PROVIDE ADEQUATE SHORING IN ORDER TO MAINTAIN STABILITY OF EXISTING NEIGHBOURING STRUCTURES AND FENCES DURING EXCAVATION WORKS TYPICAL

NOTE
ALL STORMWATER PITS TO HAVE ECOSOL LITTER BASKET200 + REACTIVE FILTER MEDIA (RFM) PILLOWS INSTALLED AS PER THE MANUFACTURER SPECIFICATION

POST-DEVELOPED CATCHMENT PLAN

CONSULTANTS

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AMENDMENTS

ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22
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C	FOR SECTION 68	7.12.22

ISSUE	REASON FOR ISSUE	DATE

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SCALE
1 : 200 @A1

STATUS
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PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC
HASTINGS SECONDARY COLLEGE

DRAWING TITLE
STORMWATER PLAN

DRAWN	APPROVED	PROJ. NO.	DRAWING NO.	REV.
R.G.	R.B./D.P.	669	CV-DRG 0030	C

220391
PCYC Port Macquarie
MPC SK-E2
MPC Consulting Engineers

Appendix F

MUSIC Modelling Data

STORMWATER PLAN

SCALE 1 : 200

STORMWATER NOTES

1. REFER TO DRAWING CV-DRG-0031 FOR NOTES, LEGEND AND PIT SCHEDULE.

NOTE
SETOUT AND ALIGNMENT OF WALLS TO BOUNDARY TO ARCHITECTS DETAILS TYPICAL

NOTE
ALL AG LINES BEHIND KERBS (K1) TO CONNECT TO STORMWATER SYSTEM TYPICAL

NOTE
ALL SETOUT, DIMENSIONS AND RL's TO ARCHITECTS SPECIFICATION & DETAILS

NOTE
BUILDER TO PROVIDE ADEQUATE SHORING IN ORDER TO MAINTAIN STABILITY OF EXISTING NEIGHBOURING STRUCTURES AND FENCES DURING EXCAVATION WORKS TYPICAL

NOTE
ALL STORMWATER PITS TO HAVE ECOSOL LITTER BASKET200 + REACTIVE FILTER MEDIA (RFM) PILLOWS INSTALLED AS PER THE MANUFACTURER SPECIFICATION

POST-DEVELOPED CATCHMENT PLAN FOR MUSIC MODELLING

CONSULTANTS

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STATUS
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DRAWING TITLE
STORMWATER PLAN

PROJ. NO. 669 | DRAWING NO. CV-DRG 0030 | REV. C

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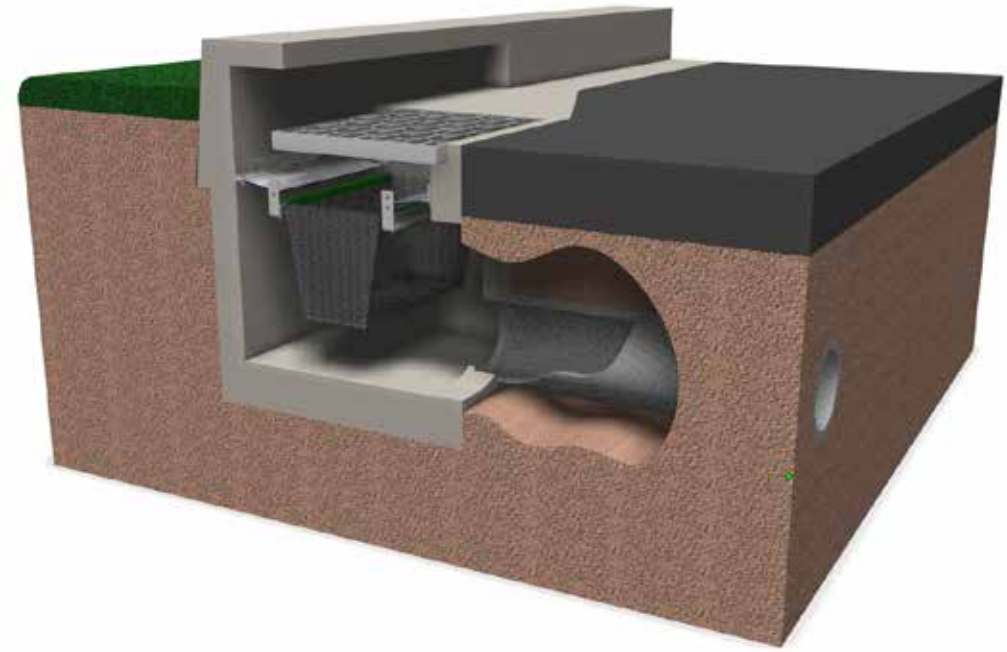
PCYC Port Macquarie
MPC SK-F1
MPC Consulting Engineers

Appendix G

Specifications

- Ecosol RFM Pillows
- Ecosol Litter Baskets
- Humeceptor

Ecosol™ Litter Basket
Technical Specification



environmentally engineered
for a better future

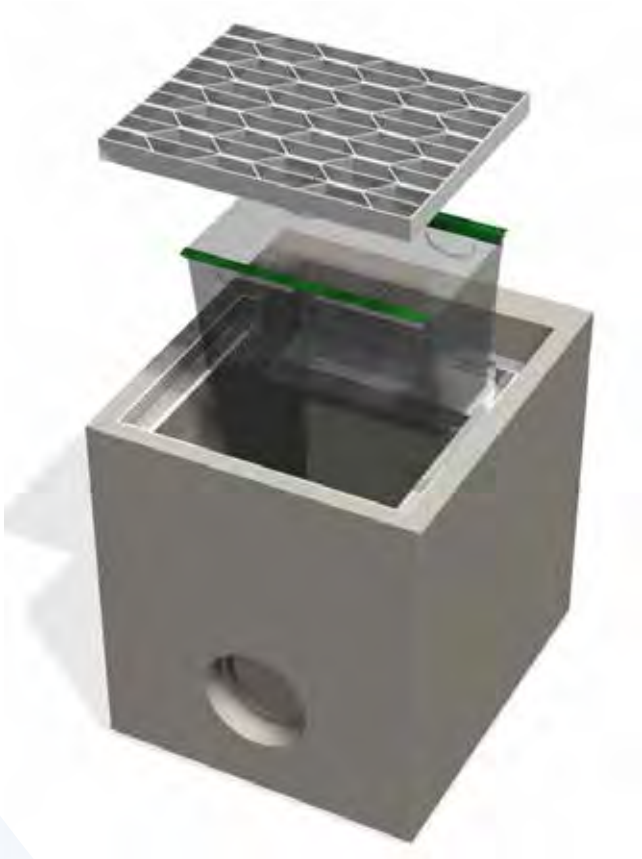
URBAN®
ASSET SOLUTIONS

CONTENTS

1.0 Introduction

Increasingly stringent environmental best management practice requires planners and developers to apply a fit-for-purpose treatment train approach to stormwater treatment to achieve today's water quality objectives (WQOs). An integral element to any good WSUD design is primary treatment or pre-screening of stormwater flows to remove coarse sediment and gross pollutants prior to downstream secondary or tertiary treatment systems such as bio retention filters or wetlands.

The Ecosol™ Litter Basket provides effective primary treatment of stormwater flows at point of source. For many years the Ecosol™ Litter Basket has been seen as the industry standard for at-source filtration with its effectiveness proven over time both in the field and under strict laboratory conditions.



The system has been designed to provided robust and durable cost effective at-source primary treatment system that captures and retains solid pollutants at drainage entry points.

In developing this innovative stormwater treatment system careful consideration has been given to durability, longevity, cost and maintainability. Key commercial technical features include:

- low visual impact and energy footprint;
- designed hydraulics with proven performance and longevity;
- scalable design; and
- cost effective maintenance regime.

This technical manual describes the operation and performance characteristics of the system.

URBAN® ASSET SOLUTIONS

1.1 How And Why The Ecosol™ Litter Basket Works

The Ecosol™ Litter Basket captures pollutants at drainage entry points and consists of a capture basket and an overflow by-pass flap(s). The basket is fitted below the invert of the gutter and inside the drainage inlet pit and importantly does not obstruct flow in the outlet pipe. Solid pollutants enter the Ecosol™ Litter Basket with the stormwater from roadside or other run-off areas, such as car parks. The incoming flow and the pollutants aquaplane across the flap(s) into the capture basket. The filtered stormwater then passes into the drainage network without any head/hydraulic loss through the unit.

As the basket approaches 90% full, the by-pass flap(s) begins to open in response to the incoming flow. Once the basket is 100% full the pressure of the incoming flow forces open the by-pass flap(s), allowing the excess flow, to enter the drainage system through the by-pass openings. This effectively eliminates the likelihood of flooding, a common fault with other at-source systems. Even when in by-pass, the captured pollutants are not remobilised and are retained in the capture basket.

2.0 Ecosol™ Litter Basket Credentials

Ecosol has commissioned a range of tests to confirm not only product performance but also to help with further research and development work. In 1996, the University of South Australia, a National Australian Testing Authority (NATA)-approved testing body, tested the Ecosol™ Litter Basket. Its full-size Roadway Surface Drainage Rig was used to carry out a series of tests in two stages on the Ecosol™ Litter Basket. These tests measured the capture performance of the unit in both on-grade and sag situations for a range of flows containing full-size, real-life solid pollutants. The testing confirmed the unit's ability to capture 97% of pollutants greater than the filtration mesh size.

The testing also focused on determining whether the unit had any hydraulic impact on the flows entering the pit. It found that the Ecosol™ Litter Basket did not reduce the pit's inlet capacity, a key benefit, especially as the unit is often installed in road side entry pits where any level of flooding would be unacceptable. The Ecosol™ Litter Basket also has a by-pass overflow that effectively eliminates the risk of flooding.

In 2012 Ecosol engaged the University of Adelaide (ENGTEST The school of civil, environmental and mining engineering) to undertake further independently laboratory hydraulic and capture efficiency testing on the improved Ecosol™ Litter Basket design. Additional they also undertook a comprehensive peer review of all prior and current Ecosol™ Litter Basket field and laboratory testing reports to comprehensively determine its performance specification. Reference – "Performance Review of the Ecosol™ Litter Basket at- source solid pollutant filter (report dated 9 May 2013).

THE UNIVERSITY of ADELAIDE

3.0 Warranty And Life Expectancy

The Ecosol™ Litter Basket has a one- year warranty covering all components and workmanship. Urban Asset Solutions Pty Ltd will rectify any defects that fall within the warranty period. The warranty does not cover damage caused by vandalism and may be invalidated by inappropriate cleaning procedures or where the unit is not cleaned within the recommended frequency. The Ecosol™ Litter Basket is designed to meet strict engineering guidelines and manufacturers guarantees and is one of the most durable at-source treatment systems available. The stainless steel components have a life expectancy of 15 years while the filtration bag has a life expectancy of 5 years providing appropriate maintenance practices are employed.

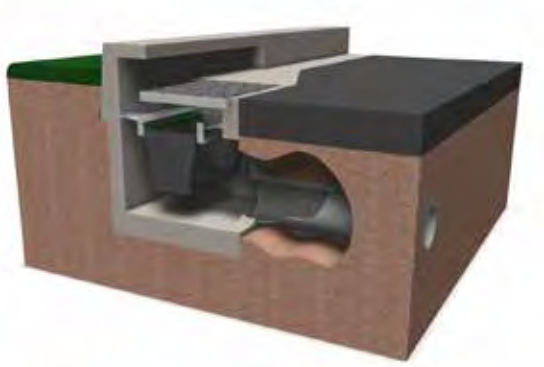
URBAN® ASSET SOLUTIONS

4.0 Key Features And Benefits

The Ecosol™ Litter Basket captures and retains a range of pollutants at entry points to the drainage network. Easily installed into most types of side entry pits, also known as gully pits or catch-pits, it retains more than 97% of pollutants greater than 600µm and in the field it has been found to collect much smaller particles, including fine sediments.

For many years the Ecosol™ Litter Basket has been seen as the industry standard for at-source filtration with its effectiveness proven over time both in the field and under strict laboratory conditions. Consisting of a capture basket, reusable liner, and overflow bypass flap(s) the Ecosol™ Litter Basket is fitted below the invert of the gutter inside the drainage pit and, importantly, does not obstruct flow into the outlet pipe. The liner is easily removed and emptied during maintenance and comes in a range of filtration fabric sizes from 100µm to 3000µm, depending on the site requirements.

Key Features	Benefits
Hydraulics	• Minimal head/hydraulic loss • Does not affect stormwater inlet capacity • Treats 100% of incoming flow
Pollutant Capture and Retention	• Unique by-pass overflow eliminates flooding risk • More than 97% of solid pollutants > 600µm • Significant amounts of sediment and more than 40% TSS • No remobilisation of captured pollutants
Design	• Different sizes of filter media available for targeted pollutant capture • Able to be retro-fitted into existing pits or supplied in its own pit • Easily installed
Cleaning and Maintenance	• Dry storage of pollution thereby reducing risk of toxic fermentation • Pollutants not handled during cleaning
Environmental Impact	• Re-usable filter liner is easily removed for manual cleaning • Reduces sedimentation build-up • Visually unobtrusive



5.0 Key Dimensions

The Ecosol™ Litter Basket can be fitted to new and existing side entry pits (whether single, double, or triple in size), including those with non-standard inlets, outlets, and junctions. The table below shows the approximate dimensions and holding capacities for the most typical Ecosol™ Litter Basket applications. Holding capacities, treatable flow rates and by-pass capacities vary dependent on the site-specifics.

Stormwater Inlet Pit Description	Dimensions (Length x Width)[3]		Holding Capacity (typical basket depth 450mm)[1]	Treatable Flow Rate (L/s)[2]		By- pass Capacity	Static Head in By-pass
	Pit	Litter Basket	(m^3)	200µm mesh	1.5mm mesh	L/s	mm
Drainway	600 x 595	600 x 445	0.120	53	106	110	150
Single Grated Kerb Inlet (with Lintel)	600 x 600	600 x 450	0.121	53	106	110	150
	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
Double Grated Kerb Inlet (with Lintel)	1200 x 600	2 x 600 x 450	0.243	103	212	220	150
	1200 x 900	2 x 600 x 600	0.324	103	212	430	150
	1800 x 600	2 x 900 x 450	0.364	106	220	230	150
	1800 x 900	2 x 900 x 600	0.496	106	220	440	150
Single Side Kerb Inlet (with Lintel - no grate)	600 x 660	600 x 450	0.121	53	106	110	150
	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
Double Side Kerb Inlet (with Lintel - no grate)	1200 x 600	2 x 600 x 450	0.243	103	212	220	150
	1200 x 900	2 x 600 x 600	0.324	106	220	430	150
	1800 x 600	2 x 900 x 450	0.364	106	220	230	150
	1800 x 900	2 x 900 x 600	0.486	106	220	440	150
Grated Field Inlet (no Kerb or Lintel)	600 x 600	600 x 450	0.121	53	106	110	150
	900 x 750	900 x 450	0.182	83	167	215	150
	900 x 900	900 x 600	0.243	83	167	215	150
Circular Inlet	600	437 x 437	0.085	54	108	120	150
	750	558 x 558	0.140	92	184	172	150
	900	680 x 680	0.208	103	212	225	150
	1050	801 x 801	0.228	103	212	225	150

[1]Holding capacities are largely determined by the existing inlet pit dimensions and the outlet pipe diameter but typically ranges from 120 - 364Kg at 100% full.

[2]The TFR varies dependent on the size of the Litter Basket , mesh appetures and percentage of fill for the individual baskets. For the purpose of providing indicative TFR's we have assumed a minimum 375mm diameter outlet and empty litter baskets.

[3]All Ecosol™ Litter Baskets installed in pits larger than 600mm in width are fitted with flow plates, removable capture baskets, optional hydrocarbon socks and include by-pass openings to cater for peak flow conditions.

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6.0 Collection And Removal Efficiencies

Stormwater treatment is best when distributed across the catchment treating stormwater pollutants as close as possible to their point of source. The Ecosol™ Litter Basket provides a cost effective and efficient solution at point of source and has the highest treatable flow rate of any comparable system. In order to determine a meaningful characterisation of the Ecosol™ Litter Basket collection efficiency, an extensive verification phase was undertaken by Avocet Consulting Pty Ltd, Ecosol and EngTest (The University of Adelaide). To best summarise the capture efficiency results of extensive product testing a regression of the data points using a sigmoidal regression curve was selected as it provided a conservative fit to the wide scatter of data collected. Refer to figures 1 & 2 for testing results. Table 1 summarises these results

6.1 Particle Size Distribution Collection Efficiency

Pollutant Capture Efficiency PSD		
Sieve Size (micron)	Capture Efficiency (200µm Filter Bag)	Capture Efficiency (1500µm Filter Bag)
2000 - 6000	97%	97%
600 - 2000	97%	77%
200 - 600	86%	37%
60 - 200	35%	8%
20 - 60	4%	1%

Table 1 – Ecosol™ Litter Basket typical particle size distribution results at designed Treatable Flow Rates.

6.2 Laboratory Testing Collection Efficiency Sigmoidal Regression Lines

In 1996, the University of South Australia tested the Ecosol™ Litter Basket. These tests measured the capture efficiencies of the unit in both on-grade and sag situations for a range of flows containing full-size, real-life solid pollutants. In 2012 the University of Adelaide (Engtest Civil, Environmental and Mining) completed further measurements of the products capture efficiency at varying flow rates and compiled comprehensive product performance report (Performance Review of the Ecosol™ Litter Basket) reviewing both past and present field and laboratory testing data. The below graphs summarise this data.

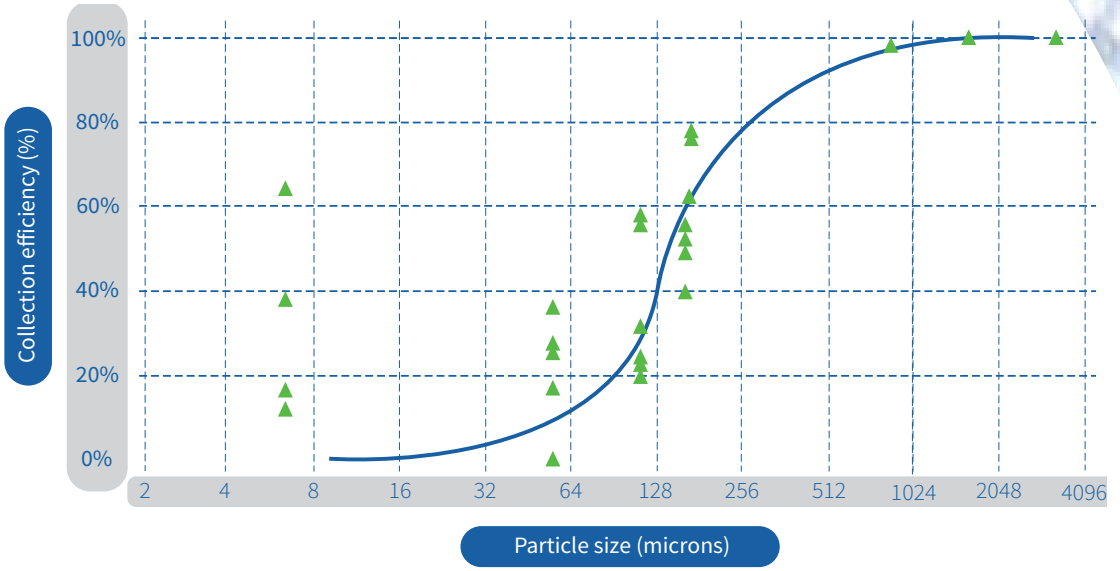


Figure 1 - Sigmoidal regression line for the Ecosol™ Litter Basket, with a 200 micron filtration bag indicating high capture efficiencies for a range of particle sizes.

6.2 Laboratory Testing Collection Efficiency Sigmoidal Regression Lines continued

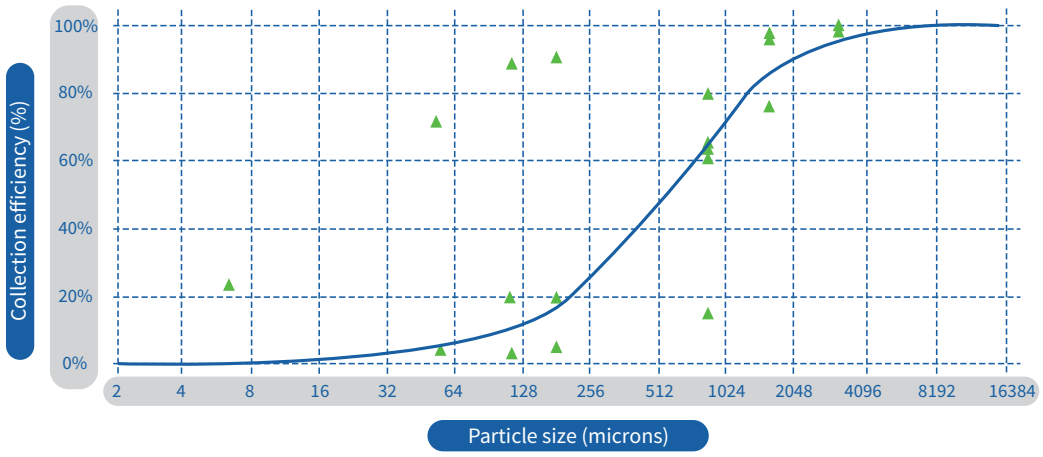


Figure 2 - Sigmoidal regression line for the Ecosol™ Litter Basket, with a 1500 micron filtration bag indicating high capture efficiencies for a range of particle sizes.

6.3 Field Testing Particle Size Distribution Data

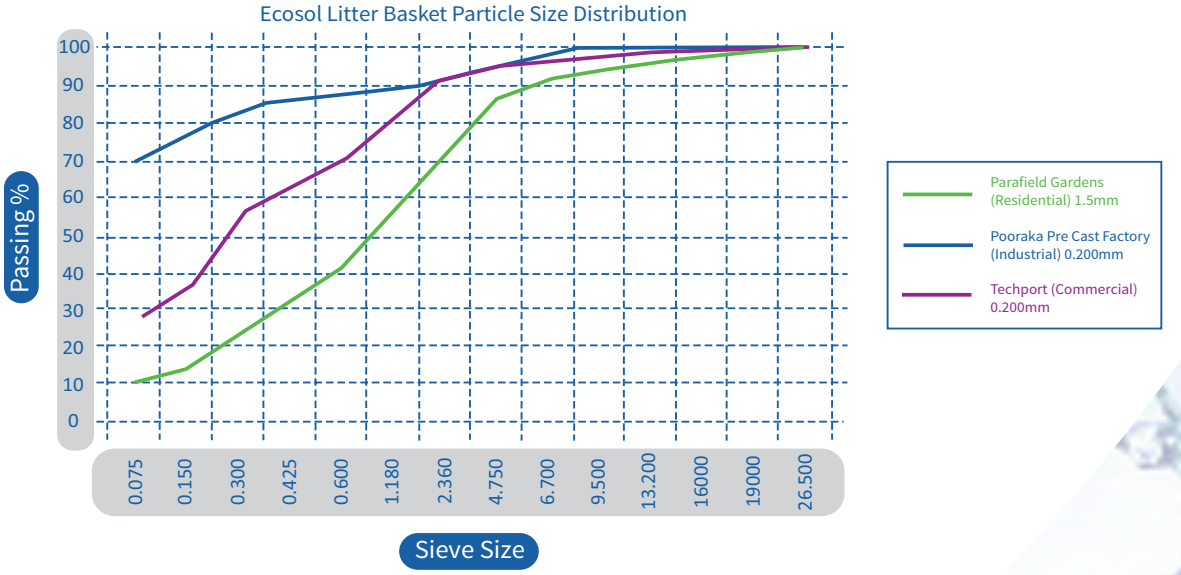


Figure 3 - Field testing Particle size distribution data for three separate product installations.

6.4 Summary Product Collection Efficiency Data

In recent years modern Water Sensitive Urban Design (WSUD) objectives and principles now applied to most urban development's require more onerous water quality objectives (WQOs) specifically targeting the removal of suspended solids, nitrogen, phosphorus and heavy metals. The Ecosol™ Litter Basket is an integral part of the treatment train providing essential pre-screening of stormwater flows, and when used in conjunction with other treatment measures such as swales or sand filters will achieve target water quality objectives.

Performance Criteria[1]	Capture Efficiency (Up to) (200µm Filter Bag)	Capture Efficiency (Up to) (1500µm Filter Bag)
Gross Pollutants (>600µm)	97%	77%
Total Suspended Solids (TSS) (20 - 600µm)	41%	15%
Total Phosphorous (TP)	39%	15%
Total Nitrogen (TN)	11%	4%
Heavy Metals	6%	2%
Total Petroleum/Hydrocarbon	20%	7%

[1] Figures quoted are mean collection efficiency statistics based on available product testing data. It is important to note that the water quality CE values are indicative of potential field CEs given that Ecosol™ Litter Basket provides physical screening and the removal of chemical constituents is therefore largely dependent on the chemical composition of the particles and the bonding of these chemical constituents to the surface of the particles.

6.5 Products Options

To enhance the product capture efficiencies other filter medias can be incorporated into the design.

Hydrocarbon booms installed within the Ecosol™ Litter Basket will provide additional protection against oil or fuel spills in wet conditions.

Reactive filtration media pillows installed at the base of the basket will provide improved capture efficiencies for heavy metals, total nitrogen, total phosphorous, turbidity and suspended solids.

7.0 MUSIC Modelling Guidelines

These guidelines provide instruction to the creation and application of a treatment node for the Ecosol™ Litter Basket for the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The Ecosol™ Litter Basket can be modelled in MUSIC using the Generic Treatment node to represent the results derived from independent laboratory testing and field testing by the University of South Australia and the University of Adelaide (ENGTEST The school of civil, environmental and mining engineering). The guidelines apply to the creation of the treatment node within MUSIC v6.0.4

Insert a GPT treatment node into your model by selecting “GPT” under the treatment nodes menu. When the node is created the node properties dialog is displayed. There are several changes that need to be made in this dialog.

- Adjust the text in the Location box to read "Ecosol™ Litter Basket" plus any other relevant information (200µm or 1500µm).
- Adjust the low flow bypass to refect any flow (m3/sec) diverted away from the unit before treatment (usually zero).
- Adjust the high flow bypass to reflect the treatable flow rate (TFR values are detailed in page 6) (L/Sec) any higher flows will bypass treatment

NOTES: Can be used to describe assumptions or location of reduction values for authority approvals

Adjust the transfer function for each pollutant selecting the pollutant and editing (right click on the function point)the input and output values on the graph below to reflect the capture efficiencies (ce) of the treatment device. Table 2 provides the input and output values for the Ecosol™ Litter Basket based on the use of a 200µm-filter liner. Table 6 provides the input and output values for the Ecosol™ Litter Basket based on the use of a standard 1500µm filter liner

Pollutant	Removal Rate (%)	Entered Input Value	Entered Output Value
Total Suspended Solids (20 - 600µm)	41	1000	590
Total Phosphorus	39	1000	610
Total Nitrogen	11	1000	890
Gross Pollutants (>600µm)	97	1000	30
Heavy Metals	6	n/a	n/a
Total Petroleum/Hydrocarbons	20	n/a	n/a

Table 2 - Ecosol™ Litter Basket - 200 µm Filter liner, input and output values.

7.0 MUSIC Modelling Guidelines Continued

Pollutant	Removal Rate (%)	Entered Input Value	Entered Output Value
Total Suspended Solids (20 - 600µm)	15	1000	850
Total Phosphorus	15	1000	850
Total Nitrogen	4	1000	960
Gross Pollutants (>600µm)	77	1000	230
Heavy Metals	2	n/a	n/a
Total Petroleum/Hydrocarbons	7	n/a	n/a

Table 3 - Ecosol™ Litter Basket -1500 µm Filter liner, input and output values.

Once the transfer functions have been defined for each of the pollutants the node has been fully defined. When completed the properties window can be closed by clicking the "Finish" button.

For further assistance in sizing or specifying a system for your next project please complete the form in Appendix 1 and forward to your local Urban Asset Solutions Pty Ltd representative

8.0 Monitoring

Under normal weather and operating condition your Ecosol™ Litter Baskets should be checked a minimum of every two - three months depending on the quality and quantity of the inflow to the unit and immediately following a major storm event. Initially, Urban Asset Solutions Pty Ltd recommends that monitoring is undertaken monthly. Once the unit has been in operation for an extended period of time (say, 24 months) then the monitoring schedule can be adjusted to reflect the actual operating conditions specific to the catchment.

9.0 Cleaning And Maintenance

During the first two years of operation it is important to regularly monitor and maintain each unit to better determine long-term maintenance regimes. All elements within the Ecosol™ Litter Basket have been designed for easy safe and cost efficient cleaning by either manual basket removal or vacuum method. Please refer to the product maintenance guide for full cleaning and maintenance procedures.

The figures in the table below give a broad guideline about the optimal catchment size,and the number of cleans required annually based on typical expected urban pollutant loads.

Optimal Catchment Size (Ha)	Recommended cleaning frequency based on optimal catchment sizes and typical pollutant loads (per annum)
	Typical Developed Urban Catchment
Up to 0.2	2
Up to 0.3	2-3
Up to 0.5	3-4

One of the key advantages of the Ecosol™ Litter Basket is that it can be cleaned by vacuum method using street sweeping vehicles. This is safe and cost efficient.

10.0 Applications And Configurations

The Ecosol™ Litter Basket is an at-source filtration system that is ideal for capturing solid pollutants in a variety of locations but is especially effective in built-up areas, so-called “hot spots” such as shopping precincts and restaurant strips.

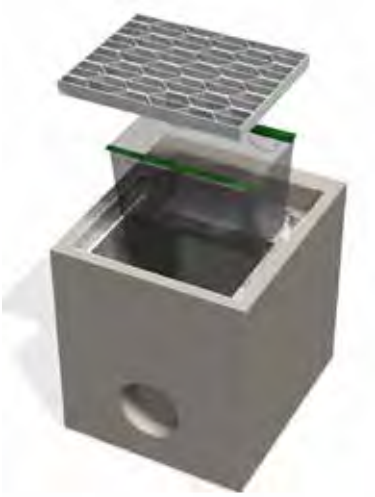
The ability to retro-fit the Ecosol™ Litter Basket into existing pits means that drainage lines serving pollutant-generating catchments, such as schools, shopping precincts, and central business districts, can be targeted for treatment cost efficiently.

Shopping Centre

Residential Development

Treatment-train Approach

As no one measure can treat all of the pollutants generated from a typical development a treatment-train approach to stormwater management is always preferable. This involves using a range of treatment measures, working together, to achieve improved water quality. The Ecosol™ Litter Basket operating as a pre-screening system in a treatment train provides essential primary treatment thereby enhancing the operating life of secondary and tertiary treatment systems.



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11.0 Turnkey Services

Urban Asset Solutions Pty Ltd design and estimating staff provide a dedicated management approach towards your project. In addition all staff are capable of liaising with the client, the consulting engineer, the contractor, and all other interested third parties to achieve a successful outcome.

Given the wide range of pit types, sizes, and configurations, Urban Asset Solutions Pty Ltd provide a complete turnkey service inclusive of site measure, manufacture and installation on-site to suit each individual stormwater inlet pit. This flexibility, when compared to other off-the-shelf, supply-only products, means the client can be assured of a unit that not only has proven performance but also one that is ideally suited to the particular needs of the site. The unit's unique design enables it to maximise holding capacities for the many different types of pits without impeding on the hydraulic design characteristics of the inlet pit.

Urban Asset Solutions Pty Ltd has a very competitive cleaning service. After each clean we provide a report detailing the volume and type of pollutants removed. We believe that it is in your best interests for Urban Asset Solutions Pty Ltd staff to clean and maintain the unit, not only because we are specialists, but also because proper monitoring and maintenance enhances the unit life significantly.

Should you use another company to clean the unit, or undertake this work yourself, we request that it be conducted according to Urban Asset Solutions Pty Ltd specifications. Otherwise, you may invalidate your warranty, as damage caused by inappropriate cleaning procedures is not covered. The advantages of using Urban Asset Solutions Pty Ltd to clean and maintain your unit are that you get:

- regular inspections of your unit;
- a comprehensive cleaning service with removal and disposal of all captured pollutants;
- a detailed report provided on completion of each clean;
- trained and experienced staff; and remedial work completed, if required.

12.0 Accreditation

Urban Asset Solutions Pty Ltd is accredited to AS/NZS ISO 1400 (Environment) and AS/NZS 9001 (Quality). Our commitment to continuously improving our products and services is demonstrated by our ongoing accreditation for Quality and Environmental Management. Urban Asset Solutions Pty Ltd is also committed to a safe environment for its employees. We are fully third-party accredited to AS/NZS 4801.

13.0 Suppiler And Technical Product Contact Details

For any maintenance or technical product enquiries please contact:
Urban Asset Solutions Pty Ltd
Tel: 1300 706 624
Fax: 1300 706 634
Email: info@urbanassetsolutions.com.au

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Appendix 1

Ecosol™ Litter Basket Essential Information Form

To ensure your system is appropriately designed for its intended application and meets local water quality objectives it is essential that the following minimum information is provided:

Customer Details

Asset Owner:

Asset ID:

Unit Location :

UAS Ref:

Date:

Time:

Product Code: Ecosol™ Litter Basket

Inspected By:

Project and Site Information

Project Name:

Project Address:

Type of Development/Catchment Type

Pollutant Removal Targets (%):
Site Water Quality Objectives (WQO's)

- Gross Pollutants (>2000µm)
- Total Suspended Solids (20 – 2000µm)
- Total Phosphorus
- Total Nitrogen
- Heavy Metals
- Total Petroleum/ Hydrocarbon
- Other

Local Authority:

Proposed Number of Ecosol™ Litter Baskets required:

Inlet pit type & typical dimensions
(e.g. Grated side entry pit 900 x 600mm)

Other essential design or site relevant information

Please forward the above information for your next project to your local Urban Asset Solutions Pty Ltd representative. On receipt Urban Asset Solutions Pty Ltd will model and design the most appropriately sized system to suit your application to assist you achieve the project Water Sensitive Urban design objectives.

Email: info@urbanassetsolutions.com.au
Fax: 1300 706 634

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Appendix 2

References

Dr. F.P Nejad, Dr.A. Zecchin, Dr.M Lambert (2013) - Performance Review of the Ecosol Litter Basket at-source solid pollutant filter - School of Civil Environmental and Mining Engineering. The University of Adelaide.

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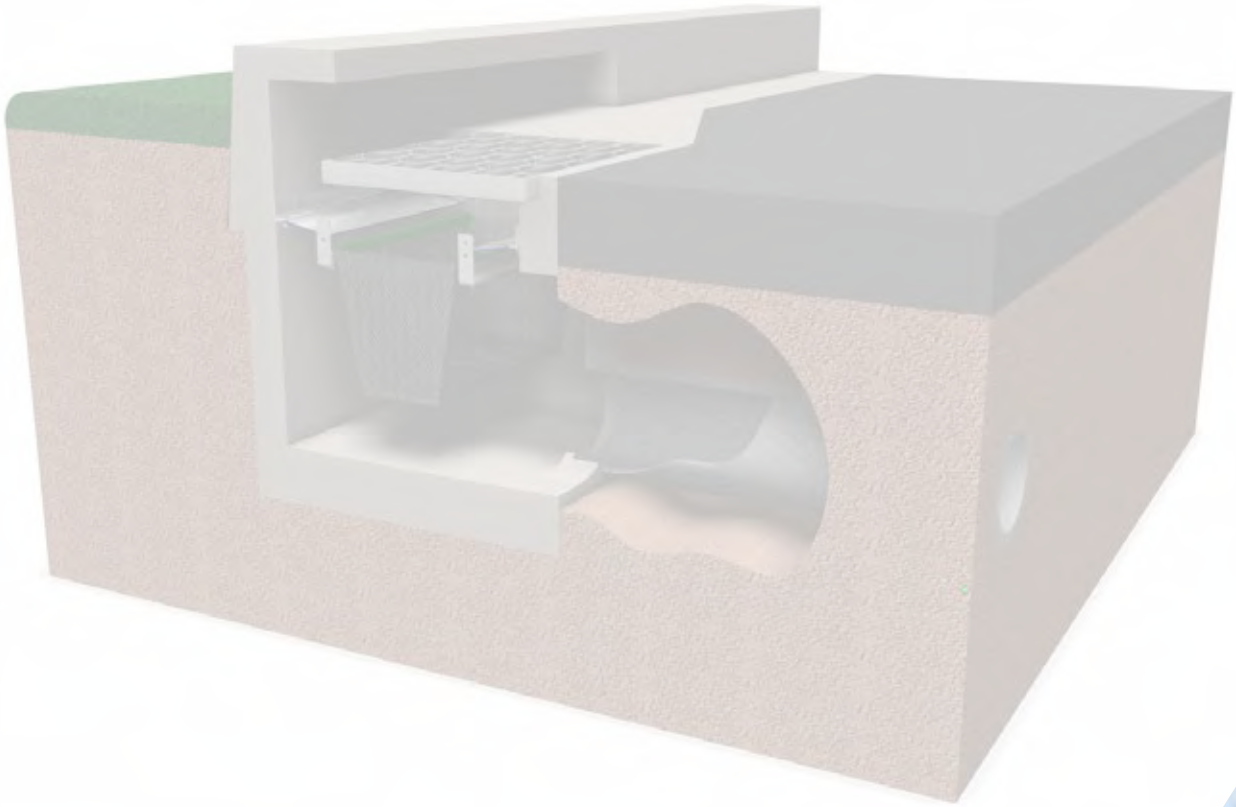

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STAR Water Solutions
Stormwater Treatment And Reuse

Water Treatment Using Reactive Filtration Media

With the imperative for Water Sensitive Urban Design, Low Impact Development and Total Water Cycle Management, there has been increasing interest in using filtration systems as a solution for the treatment and reuse of stormwater and low flow industrial waste water runoff. STAR Water Solutions has released a range of Reactive Filter Media that treat polluted stormwater and low flow industrial waste water.

Custom Designed

STAR Reactive Filter Media is custom designed for specific treatment applications using a blend of tailored components in defined proportions that are engineered for specific performance requirements such as contaminant removal, lifespan, hydraulic conductivity, compaction and plant growth. The STAR Reactive Filter Media product range includes Ecomedia ® and Infiltreat ®.

The Ecomedia ® range is custom designed to achieve performance requirements in vegetated applications such as:

- Wetlands
- Rain gardens
- Landscape gardens
- Sports fields, Golf courses
- Fill around permeable pipes
- Roof gardens, Planter boxes
- Swales
- Sand filters
- Leach drains
- Retaining walls
- Building site runoff
- Water harvesting/reuse

The Infiltreat ® range is custom designed to achieve performance requirements in non vegetated applications such as:

- Car park
- Retaining walls
- Building site runoff
- Water harvesting/reuse
- Sand filters
- Detention basins
- Fill around permeable pipes
- Kerb-gully by-pass system
- Sub-surface drainage systems
- Under permeable paving system
- Pavement sub base (structural grade)
- Pavement sub base (non structural grade)

Pollutant Removal Performance

Scientific studies have shown conclusively that STAR Reactive Filter Media can remove pollutants from water to enable harvesting and reuse or be safely discharged into waterways.

A distinctive strength of the media is its ability to remove dissolved contaminants such as nutrients (e.g. nitrogen, phosphorous) metals (e.g. copper, lead, zinc), bacteria (e.g. faecal coliforms) and hydrocarbons (e.g. petroleum) from stormwater. Particulates can be removed by STAR Reactive Filter Media through physical filtration. However, the lifespan of the media is far greater when particulates are removed through primary treatment.

Treatment of dissolved contaminants is achieved by chemical and biological processes created by the selected components in the filter media. These processes include:

- Sorption
- Ion exchange
- Microbial biodegradation
- Precipitation
- Volatilisation
- Phytoremediation

Conclusion

The results from the laboratory and field research indicate that an engineered reactive filtration media can successfully remove substantial quantities of contaminants from water, allowing potential harvesting and reuse.

Typical Treatment Results

Parameter	Inflow Mean value	Outflow Mean value	Percentage Removal
Total Zinc (µg/L)	276	6	97.8 %
Total Lead (µg/L)	133	1	99.2 %
Total Copper (µg/L)	75	5	93.3 %
Total Nitrogen (mg/L)	1.97	1.08	45.2 %
Total Phosphorous (mg/L)	0.264	0.057	78.4 %
PAH (ug/L)	3.7	0.6	83.8 %
Turbidity (ntu)	448	42	90.6 %
Suspended solids (mg/L)	291	50	82.8 %

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STAR Water Solutions
Stormwater Treatment And Reuse

Reactive Filter Media - Product Range

Product Code	Product Type	Description
RENS010	Pavement Infiltreat (non structural grade)	Specifically designed for swale type applications on roads, car parks and railways, Roadside Ecomedia provides a higher drainage performance standard required to treat high levels of first flush contaminated run-off. Treated water can then be either directed to on-site detention, ground water recharge or stored and re-used to irrigate landscaped areas.
RES011	Pavement Infiltreat (structural grade)	Specifically designed for structural applications such as car parks and kerb gully by passes on roadways, Roadside Ecomedia provides structural integrity combined with a high infiltration rate and drainage performance standard required to treat high levels of first flush contaminated run-off. Treated water can then be either directed to on-site detention, ground water recharge or stored and re-used to irrigate landscaped areas.
LGE012	Landscape Garden Ecomedia	Designed for a wide range of landscape applications, Landscape Garden Ecomedia allows for the efficient infiltration and treatment of contaminated water run-off from roads or other impermeable surfaces. The purified water can then be stored and re-used to irrigate landscaped areas. A wide range of plant species can be grown in Landscape Garden Ecomedia that can also take up stored water by natural capillary action.
RWE013	Retaining Wall Ecomedia	A free draining structured media with high hydraulic conductivity, Retaining Wall Ecomedia is engineered to be used in conjunction with Drainage Cell for all retaining wall applications. Contaminated water is purified through the media and directed away from retaining walls by the drainage cell and can be stored in drainage tanks for re-use or for recharging depleted ground water reserves.
RGES014	Roof Garden Ecomedia (Standard Weight)	Designed for use on concrete structures that can bare a standard weight soil, Roof Garden Ecomedia (Standard Weight) has a dry weight density of approximately 1,525 Kg's per cubic metre. It is a free draining mix in which a wide range of plant species can be grown and contaminated surface water run-off from impermeable paving or roofing can be bio-remediated. Contamination is eliminated in the process and water is safe for recycling.
RGEL014	Roof Garden Ecomedia (Light Weight)	Designed for use on structures that require a lightweight planting media, Roof Garden Ecomedia (lightweight) has a dry weight density of approximately 660 Kg's per cubic metre. It also has a free draining structure in which a wide range of plant species can be grown and contaminated surface run-off can be bio-remediated.
PBE015	Planter Box Ecomedia	Specifically designed for growing in confined spaces or in areas of high wind turbulence, Planter Box Ecomedia is suitable for either light weight or standard weight structures and has a dry weight density of approximately 660 Kgs per cubic metre. Holding good humidity levels, it has a free draining structure which bio-remediates contaminated surface run-off from impervious paving and is suitable for a wide range of both indoor and outdoor plants.
SFES016	Sports Field Ecomedia (Standard Formulation)	Specifically designed for a wide range of playing field applications, Sporting Field Ecomedia also provides superior drainage performance and maintenance characteristics. Allowing all weather usage, it ensures better nutrient management, which saves on fertiliser cost and protects surrounding environments from nutrient and pesticide run-off and leaching.
SFEH017	Sports Field Ecomedia (High Performance)	Designed for use on high traffic playing fields, Sporting Field Ecomedia (High Performance) also provides superior drainage performance, low compaction characteristics, effective hydraulic conductivity and bulk density and better maintenance characteristics. The high wearing characteristics provide cost saving benefits and minimise the risk of injuries.
GCE018	Golf Course Ecomedia	Specifically designed for golf course application this mix provides superior drainage performance, low compaction characteristics, good hydraulic conductivity, bulk density and improved Turf recovery. The mix also ensures better nutrient management, saving on fertiliser cost and protects surrounding environments from nutrient and pesticide run-off and leaching.
RTE019	Race Track Ecomedia	Designed for high impact performance and to treat accumulated toxins, Race Track Ecomedia is a free draining media which in conjunction with drainage cell systems provides a better water management solution than conventionally used systems. Nutrient run-off can also be effectively managed and retained water can be re-used for irrigation.
LDE020	Leach Drain Ecomedia	Designed as a free draining biochemical media to treat effluent and drain water, Leach Drain Ecomedia bio-remediates accumulated toxins contained in run-off. The water is can then be passed through drainage cell systems for re-use.

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Humes

Strength. Performance. Passion.

HumeCeptor® system Technical manual

Issue 5

Contents

enviro DEVELOPMENT™ PROFESSIONAL

HumeCeptor® system

The HumeCeptor® system is a patented hydrodynamic separator, specifically designed to remove hydrocarbons and suspended solids from stormwater runoff, preventing oil spills and minimising non-point source pollution entering downstream waterways.

The HumeCeptor® system is an underground, precast concrete stormwater treatment solution that utilises hydrodynamic and gravitational separation to efficiently remove Total Suspended Solids (TSS) and entrained hydrocarbons from runoff. First designed as an 'at source' solution for constrained, commercial and industrial sites it has been improved and expanded to service large catchments, mine and quarry sites, inundated drainage systems, and capture large volume emergency spill events. The system is ideal for hardstands/wash bays, car parks, shopping centres, industrial/commercial warehouses, petrol stations, airports, major road infrastructure applications, quarries, mine sites and production facilities.

Independently tested, and installed in over 30,000 projects worldwide, the HumeCeptor® system provides effective, and reliable secondary treatment of stormwater for constrained sites.

- **The system reliably removes a high level of TSS and hydrocarbons**
  The HumeCeptor® system was developed specifically to remove fine suspended solids and hydrocarbons from stormwater, and has been certified to achieve high pollutant removal efficiencies for TSS (>80%) and Total Nutrients (TN) (>30%) on an annual basis.
- **It captures and retains hydrocarbons and TSS down to 10 microns**
  Each system is specifically designed to maintain low treatment chamber velocities to capture and retain TSS down to 10 microns. It also removes up to 98% of free oils from stormwater.
- **Each device is sized to achieve the necessary Water Quality Objectives (WQO) on an annual basis**
  Utilising the latest build-up and wash-off algorithms, PCSWMM software for the HumeCeptor® system ensures that the device chosen achieves the desired WQO (e.g. 80% TSS removal) on an annual basis.
- **Its performance has been independently verified**
  The HumeCeptor® system's technology has been assessed by independent verification authorities including the New Jersey Department of Environmental Protection (NJDEP), The Washington Department of Environment (USA), and by the Canadian Environmental Technology Verification program (ETV).

Right:
The bypass chamber of a HumeCeptor® system

- **The system is proven**
  The HumeCeptor® system was one of the first stormwater treatment devices introduced to Australia, and now after 30,000 installations worldwide, its popularity is testament to its performance, quality and value for money.
- **High flows won't scour captured sediment**
  The unique design of HumeCeptor® units ensures that as flows increase and exceed the treatment flow, the velocity in the storage chamber decreases.
- **Nutrients are captured along with the sediment**
  The effective capture of TSS results in the capture of particulate nutrients shown to be >30% of TN and Total Phosphorous (TP).
- **Fully trafficable to suit land use up to class G**
  The HumeCeptor® system is a fully trafficable solution, it can be installed under pavements and hardstands to maximise above ground land use (loading up to class D as standard).
- **Custom designs allow for emergency oil spill storage, directional change, multiple pipes, tidal inundation and class G traffic loads**
  A range of HumeCeptor® systems are available, built specifically to manage emergency spills (50,000 L storage), change of pipe directions, the joining of multiple pipes, high tail water levels as a result of tides or downstream water bodies, and high levels of hydrocarbons with auxiliary storage tanks.
- **We are experienced in the provision of world class treatment solutions**
  Humes has a team of water specialists dedicated to the advancement of economical sustainable solutions, and the provision of expert advice and support.

System operation

The HumeCeptor® stormwater treatment system slows incoming stormwater to create a non-turbulent treatment environment, allowing free oils and debris to rise and sediment to settle. Each HumeCeptor® system maintains continuous positive treatment of TSS, regardless of flow rate, treating a wide range of particle sizes, as well as free oils, heavy metals and nutrients that attach to fine sediment.

The HumeCeptor® system's patented scour prevention technology ensures pollutants are captured and contained during all rainfall events.

Bypass chamber

1. Stormwater flows into the inlet (weir) area of the bypass chamber.
2. Design flows are diverted into the offline treatment chamber by a weir, orifice and drop pipe arrangement (refer to Figure 1).
3. The weir and orifice have been developed to create a vortex that sucks floating oils and sediment down into the treatment chamber.
4. During high flow conditions, stormwater in the bypass chamber overflows the weir and is conveyed to the stormwater outlet directly (refer to Figure 2).
5. Water which overflows the weir stabilises the head between the inlet drop pipe and outlet decant pipe ensuring that excessive flow is not forced into the treatment chamber, protecting against scour or re-suspension of settled material. The bypass is an integral part of the HumeCeptor® unit since other oil/grit separators have been found to scour during high flow conditions (Schueler and Shepp, 1993).

Figure 1 – HumeCeptor® system operation during design flow conditions

Figure 2 – HumeCeptor® system operation during high flow conditions

Treatment chamber

1. Once diverted into the treatment chamber through the weir and orifice, the drop pipe beneath the orifice is configured to discharge water tangentially around the treatment chamber wall.
2. Water flows through the treatment chamber to the decant pipe which is submerged similar to the drop pipe.
3. Hydrocarbons and other entrained substances with a specific gravity less than water will rise in the treatment chamber and become trapped beneath the fibreglass insert since the decant pipe is submerged.
4. Sediment will settle to the bottom of the chamber by gravity forces. The large volume of the treatment chamber assists in preventing high velocities and promoting settling.
5. Water flows up through the decant pipe based on the head differential at the inlet weir, and is discharged back into the bypass chamber downstream of the weir.

Independent verification testing

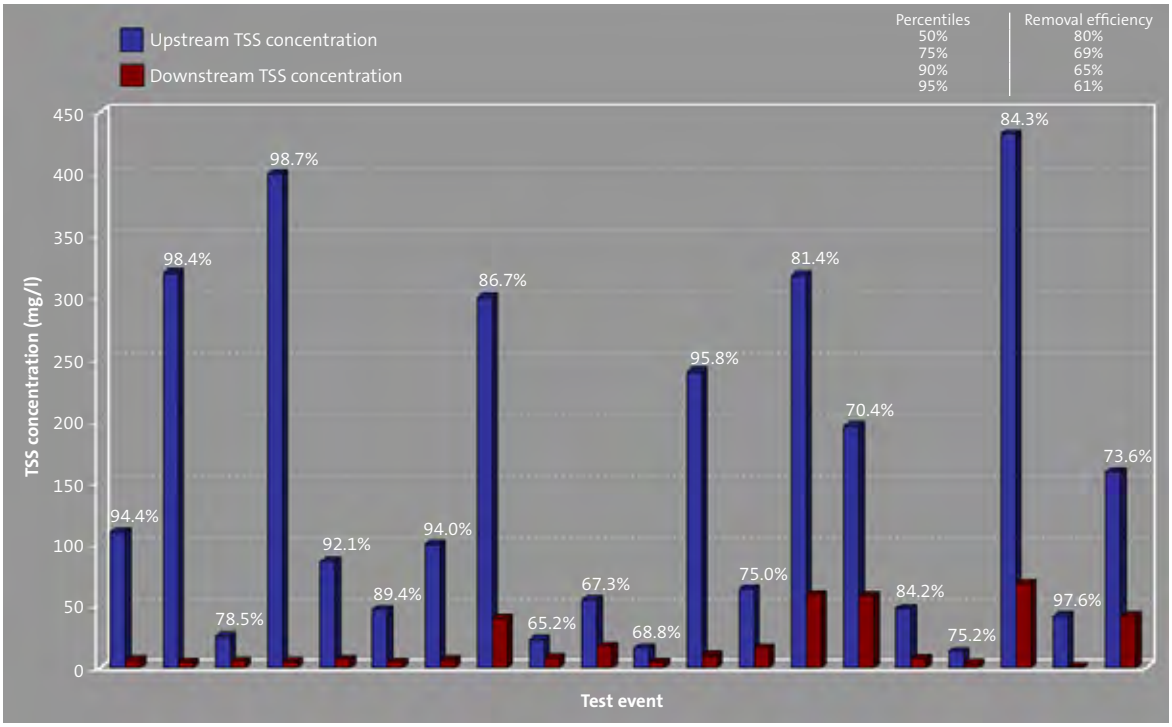
HumeCeptor® systems have been extensively researched by more than 15 independent authorities to validate its performance; it has now gained Environmental Technology Verification (ETV) certificates from ETV Canada, New Jersey Department of Environmental Protection (NJDEP) and Washington Department of Environment (WDOE).

A number of agencies have conducted independent studies; their results from these studies (over 100 test events) have been summarised in Table 1 below.

Table 1 – HumeCeptor® system performance summary

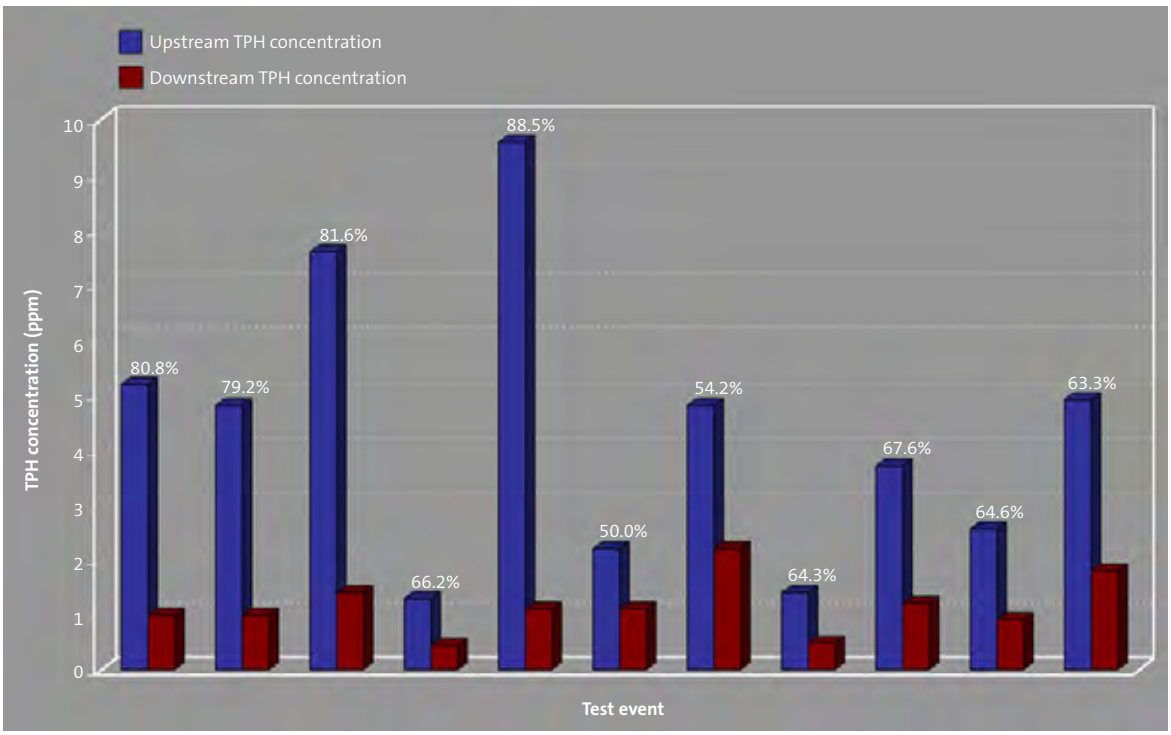
Pollutant	Average removal efficiency	Details
TSS	80%	Laboratory and field results, stable, hardstand, roads, commercial and industrial sites
TN	37%	Field results
TP	53%	Field results
Chromium	44%	Field results
Copper	29%	Field results
TPH	65%	<10 ppm inflow concentration
	95%	10 ppm - 50 ppm inflow concentration (typical stormwater)
	99%	>500 ppm inflow concentration (emergency spills)

Figure 3 – HumeCeptor® system field performance results for Total Suspended Solids (TSS) removal



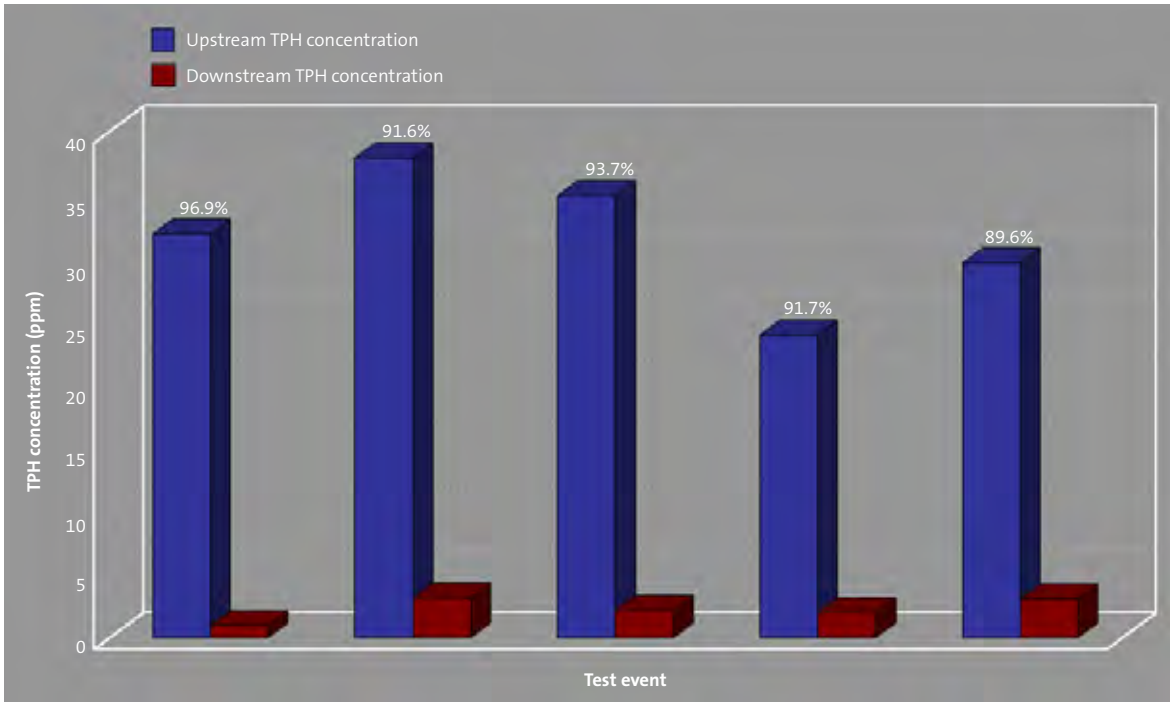
Note: Percentage values represent removal efficiencies

Figure 4 – HumeCeptor® system field performance for Total Petroleum Hydrocarbon (TPH) removal (influent concentration <10 ppm)



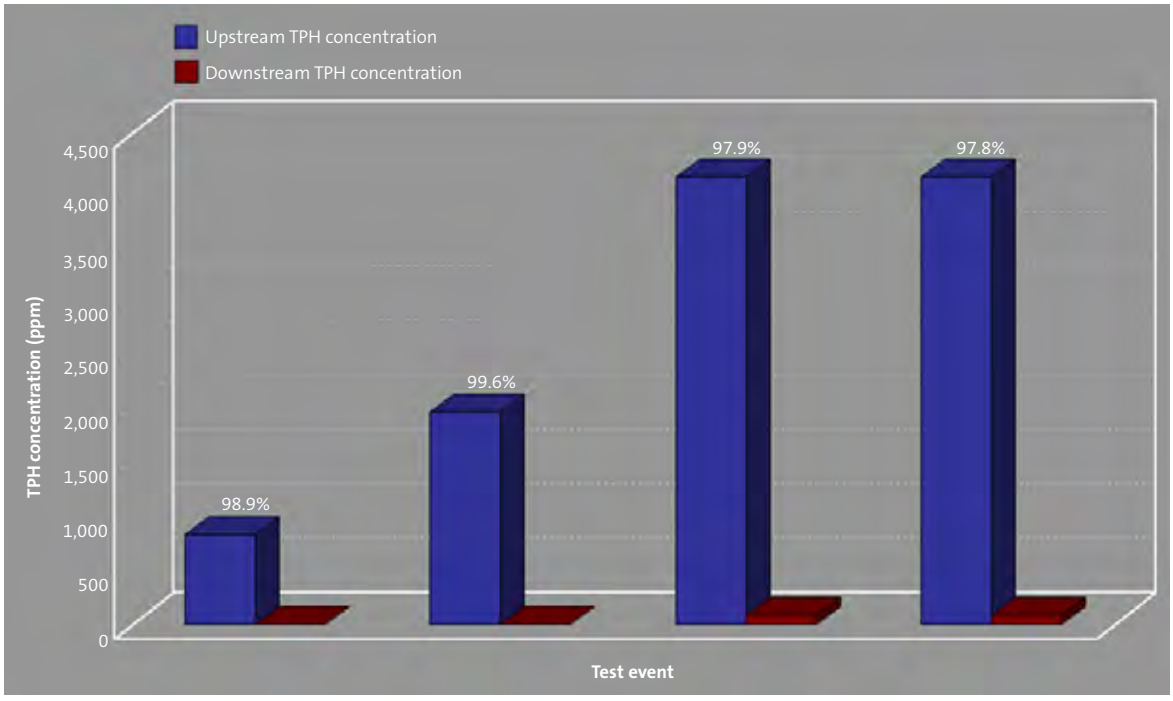
Note: Percentage values represent removal efficiencies

Figure 5 – HumeCeptor® system field performance for Total Petroleum Hydrocarbon (TPH) removal (influent concentration >10 ppm)



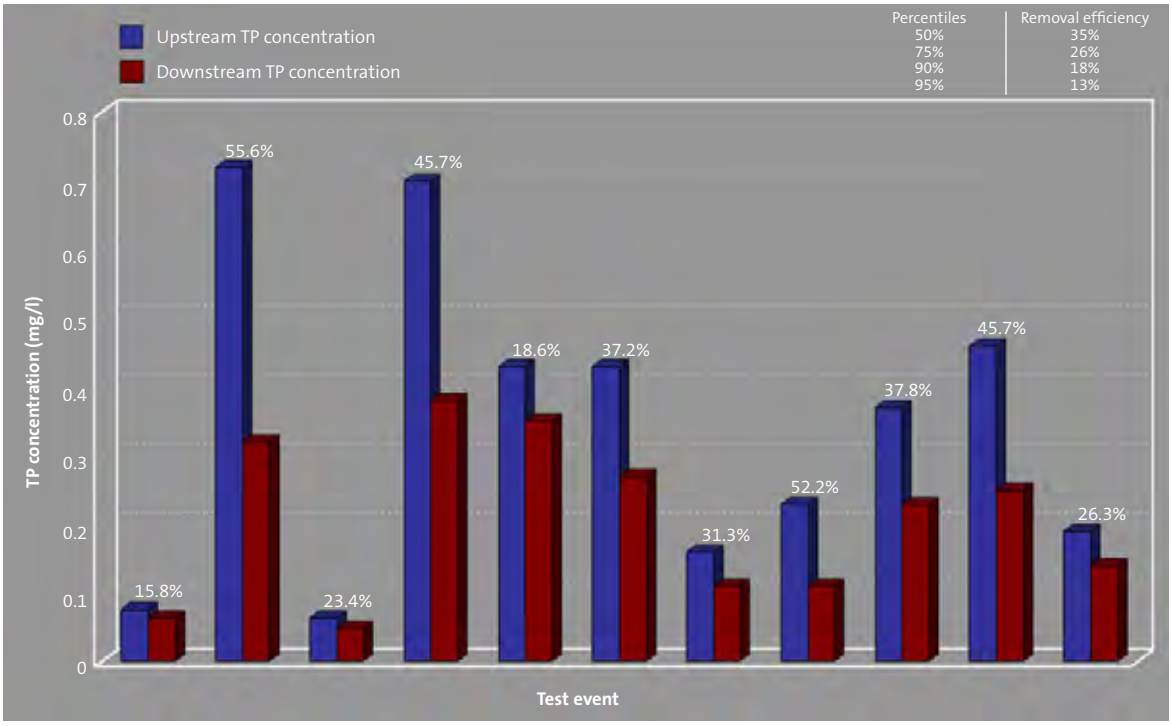
Note: Percentage values represent removal efficiencies

Figure 6 – HumeCeptor® system field performance for Total Petroleum Hydrocarbon (TPH) removal (influent concentration >1,000 ppm)



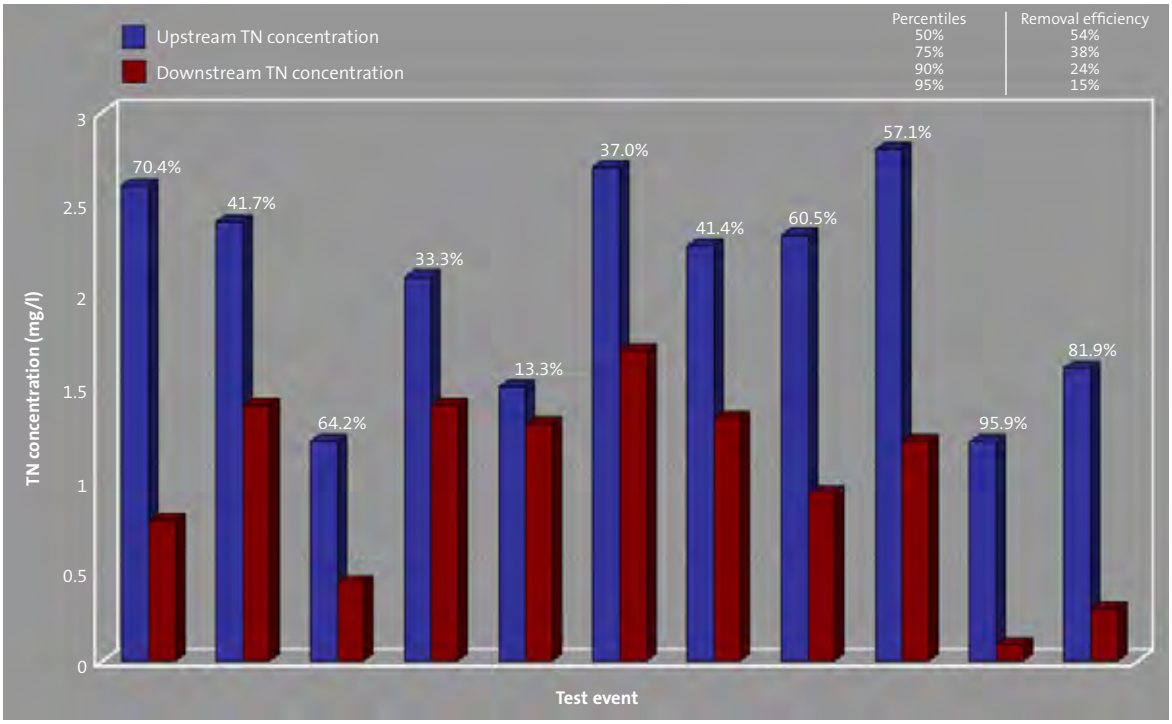
Note: Percentage values represent removal efficiencies

Figure 7 – HumeCeptor® system field performance for Total Phosphorous (TP) removal



Note: Percentage values represent removal efficiencies

Figure 8 – HumeCeptor® system field performance for Total Nitrogen (TN) removal



Note: Percentage values represent removal efficiencies

System options

There are a number of HumeCeptor® systems available to meet the requirements of various WQO for maintaining catchments and local hydrology. The standard range is detailed in Table 2 below.

Table 2 – HumeCeptor® model range and details

HumeCeptor® model	Pipe diameter (mm)	Device diameter (mm)	Depth from pipe invert* (m)	Sediment capacity (m^3)	Oil capacity (l)	Total storage capacity (l)
STC 2 (inlet)	100 - 600	1,200	1.7	1	350	1,740
STC 3	100 - 1,350	1,800	1.68	2	1,020	3,410
STC 5			2.13	3		4,550
STC 7			3.03	5		6,820
STC 9		2,440	2.69	6	1,900	9,090
STC 14			3.69	10	2,980	13,640
STC 18		3,060	3.44	14		18,180
STC 23			4.04	18		22,730
STC 27		3,600	3.84	20	4,290	27,270

Note:
*Depths are approximate.

Variants

Continual improvement over the last 14 years of HumeCeptor® system installations has provided a number of enhancements to address specific treatment and design requirements.

- **HumeCeptor® STC 2 (inlet) model**
  This model features a grated inlet to directly capture runoff from hardstand areas, replacing the need for a stormwater pit (refer to Figure 9).

Figure 9 – HumeCeptor® STC 2 (inlet) model

- **AquaCeptor™ model**

  This model has been designed with a weir extension to increase the level at which flows bypass the treatment chamber, and accommodate downstream tail water levels or periodic inundation (e.g. tidal situations). This weir extension is provided in standard heights of 100 mm intervals, up to a maximum of 500 mm.

  To maintain the hydrocarbon capture capabilities, an additional "high level" inlet pipe is also fitted. This facilitates the formation of the surface vortex from the bypass chamber into the treatment chamber and draws floating hydrocarbons into the unit.

  The selection of the appropriate weir extension height is undertaken in conjunction with the downstream engineering design and/or tidal range charts for the specific location. The AquaCeptor™ model is available in the same sizes as the standard HumeCeptor® units (refer Table 2 on the previous page).

Figure 10 – AquaCeptor™ model

- **MultiCeptor™ model**

  The MultiCeptor™ model (refer to Figure 11) was developed to facilitate the replacement of junction pits while still providing the treatment abilities of the original HumeCeptor® system and reducing time and costs during installation. These units reverse the weir structure to allow for:

  - change of pipe direction
  - multiple inlet pipes
  - differing invert levels of multiple inlet pipes
  - grated inlets.

  The MultiCeptor™ model is available in the same sizes as the standard HumeCeptor® units (refer to Table 3 below) and a 2,440 mm diameter MultiCeptor™ unit is also available to accommodate drainage pipes up to 1,800 mm diameter.

  The larger insert diameter allows for larger pipe connections that are more common where pipes are laid on very flat grades.

Figure 11 – MultiCeptor™ model

Table 3 – MultiCeptor™ model range and details

HumeCeptor® model	Pipe diameter (mm)	Device diameter (mm)	Depth from pipe invert (m)	Sediment capacity (m^3)	Oil capacity (l)	Total storage capacity (l)
MI3	100 - 1,350	1,800	1.68	2	1,020	3,410
MI5			2.13	3		4,550
MI7			3.03	5		6,820
MI9		2,440	2.69	6	1,900	9,090
MI14			3.69	10	2,980	13,640
MI18		3,060	3.44	14		18,180
MI23			4.04	18		22,730
MI27		3,600	3.84	20	4,290	27,270
MI9 - MI27 (2,440)	100 - 1,800	2,440 top up to 3,600 base	2.69 - 3.84	6 - 20	1,900 - 4,290	9,090 - 27,270

- **DuoCeptor™ model**

  The DuoCeptor™ model has been developed to treat larger catchments (2 Ha - 6 Ha) because some constrained developments can only accommodate a single, large device instead of several smaller devices.

  The unit operates by splitting the flow and treating half of the design flow through the first chamber. The untreated half of the design flow bypassed from the first chamber then passes through the split connection pipe into the second chamber for treatment. Treated flow from the first chamber exits and flows through the other side of the split connection pipe, and bypasses the second chamber to join the treated flow from the second chamber at the outlet of the DuoCeptor™ model.

  Figure 12 displays the DuoCeptor™ model and Table 4 details the range of capacities available.

Figure 12 – DuoCeptor™ model

Table 4 – DuoCeptor™ model range and details

DuoCeptor™ model	Pipe diameter (mm)	Device footprint (L x W)	Depth from pipe invert (m)	Sediment capacity (m^3)	Oil capacity (l)	Total storage capacity (l)
STC 40	600 - 1,500	7,750 x 3,500	3.41	27	10,585	42,370
STC 50			4.01	35	10,585	50,525
STC 60		9,150 x 4,200	3.89	42	11,560	60,255

- **HumeCeptor® MAX model**

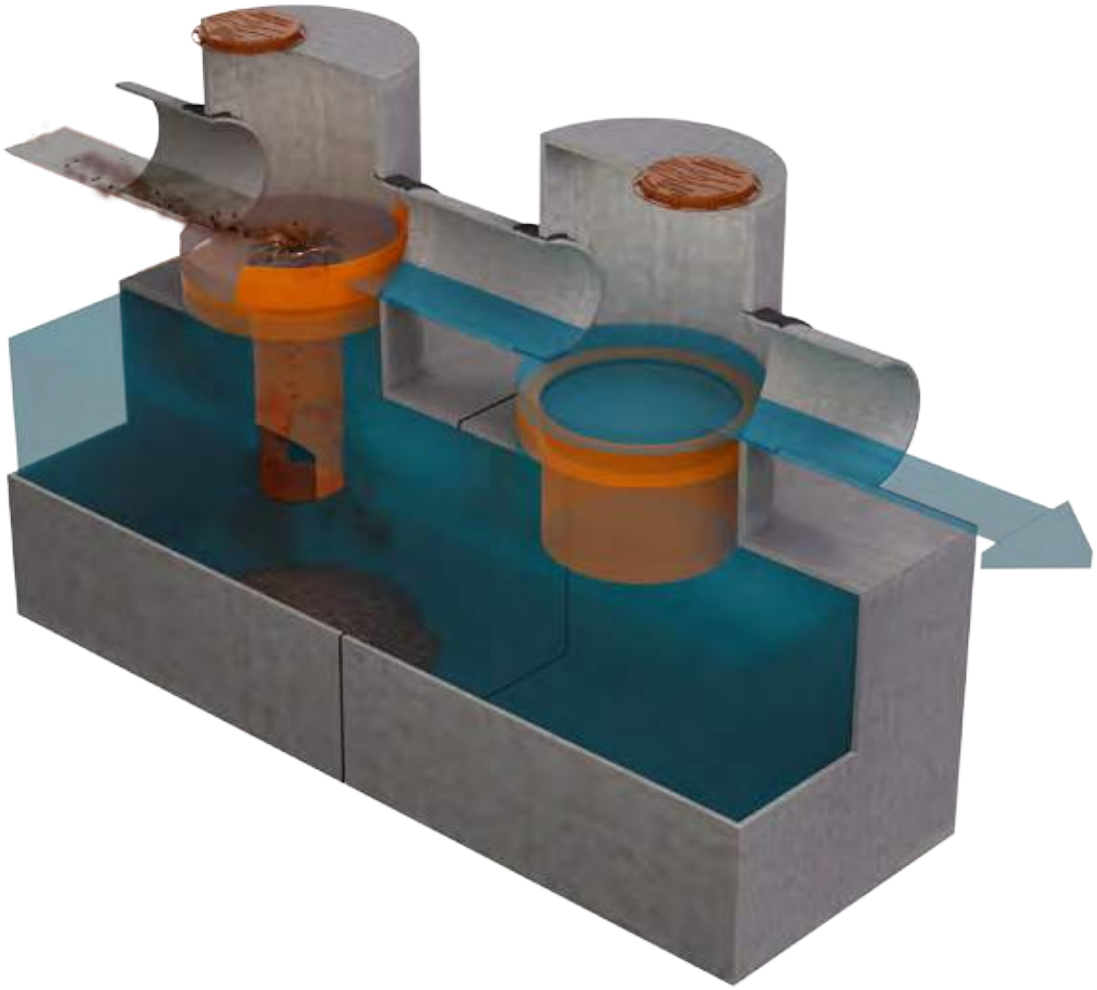
  The HumeCeptor® MAX model (refer to Figure 13) was developed to meet the market need for a single, large, end-of-pipe solution for TSS and hydrocarbon removal. Utilising the HumeCeptor® system's proven capture and scour prevention technology, it is ideal for very large commercial and industrial sites (>6 Ha) (eg. quarries, mine sites and stockpile areas) that need to achieve at least 50% TSS removal and hydrocarbon capture. The HumeCeptor® MAX model can be expanded to almost any capacity required.

  As the HumeCeptor® MAX model uses two 2,400 mm diameter inserts, sizing must be calculated separately from the PCSWMM software for the HumeCeptor® system. Contact Humes Water Solutions for assistance.

- **HumeCeptor® EOS model**

  The HumeCeptor® EOS (Emergency Oil Spill) system provides you with the maximum protection against hydrocarbon spills at petrol stations, highway interchanges and intersections. It combines the passive, always-operating functions of the HumeCeptor® system, with additional emergency storage to capture the volume of spill required by your road authority. Standard designs include 30,000 litres and 50,000 litres of total hydrocarbon storage but these can be modified to suit any specified volume.

Figure 13 – HumeCeptor® MAX model



Design information

To design a system suitable for your project it is necessary to review the configuration of the stormwater system, the location and purpose of other stormwater management (WSUD) controls, traffic loading, and the catchment area and hydrology.

Configuration of the stormwater system

As a cylindrical system, HumeCeptor® hydrodynamic separators are much more flexible for accommodating inlet and outlet pipes on angles than rectangular systems.

Location in the stormwater system

Specifically designed for capturing fine sediment and hydrocarbons, the HumeCeptor® system is best suited to "at source" applications. Therefore, it should be located immediately downstream of the catchment area to be treated, e.g. car parks, loading bays, refuelling stations, wash bays.

Catchment area

As a general rule, larger catchment areas require larger HumeCeptor® units. If the catchment area is unstable (e.g. exposed soil) or contributes unusually high pollutant loads (e.g. landscape supply yards), larger units are more appropriate. This can be modelled in PCSWMM software using the "Power Wash-off" or "Event Mean Concentration" TSS loading function.

Sizing HumeCeptor® systems

PCSWMM software for the HumeCeptor® system is the decision support tool used for identifying the appropriate model. A lite version of PCSWMM software is available to identify the HumeCeptor® system which best meets treatment criteria for conventional urban stormwater quality applications (commercial, industrial, residential etc).

Conventional sites typically have stable land cover, paved surfaces, or landscaped areas that do not easily erode during rainfall events. Please contact Humes for further assistance and modeling for unique or unconventional sites. Examples of unconventional sites are as follows:

1. Sites that exhibit unstable wash-off characteristics such as construction sites and sites with material storage. For example, council works depots, landscape supply yards, gravel surfaces etc.
2. Sites with specific suspended solids characteristics such as coal manufacturing facilities, cement manufacturers (sites with a particle size finer or coarser than what is identified in the program).
3. Sites with altered post-development annual hydrology. Alterations to the annual hydrology result from the implementation of stormwater detention upstream of the proposed HumeCeptor® system. Infiltration or detention of small storms (< 1 year) result in alterations to the annual hydrology. Sites with flood control (2 to 100 year detention facilities) will not significantly alter the annual hydrology since detention occurs infrequently. Upstream flood control facilities do not preclude the use of the software for water quality design.

The software calculates continuous runoff from rainfall and simulates sediment accumulation and sediment transport for the design area. Annual TSS removal rates are estimated from the particle size distribution with settling rates calculated using Stoke's Law, corrected for drag. Assumptions for slope, depression storage, evaporation rates, build-up and wash-off parameters as well as the particle size distribution and settling rates are given in the description of the model calculations.

Users of the software should become familiar with these calculations and parameter values to ensure that they understand the software application. For sites that differ from the assumptions made in the software, please contact your local Humes Water Solutions representative for assistance.

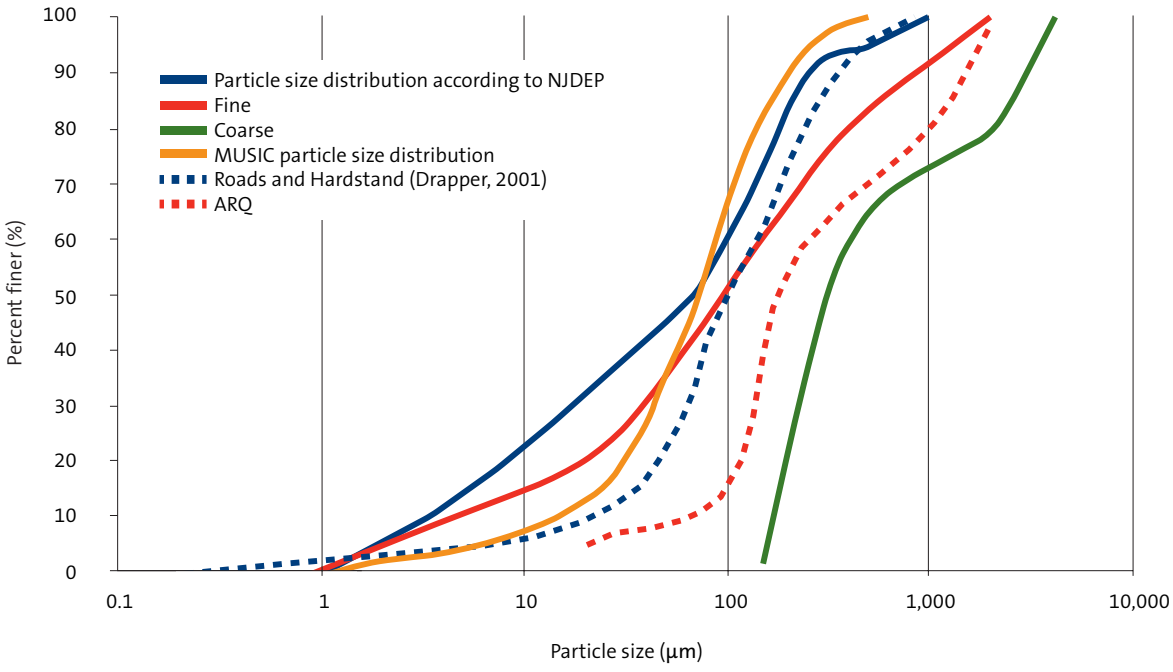
In order to size a unit using the lite version of PCSWMM software, the following six design steps should be followed.

- **Step 1 – Project details and WQOs**
  Enter the project details in the appropriate cells, clearly identifying the water quality objectives (WQO) for the development. It is recommended that a level of annual sediment (TSS) removal be identified and defined by a Particle Size Distribution (PSD). In most Australian situations, this WQO is for 80% TSS removal, but a PSD is not defined. This can be determined from relevant research data or from site monitoring.
- **Step 2 – Site details**
  Identify the site development by the drainage area and the level of imperviousness. It is recommended that imperviousness be calculated based on the actual area of paved surfaces, sidewalks and rooftops.
- **Step 3 – Upstream detention/retention**
  HumeCeptor® systems are designed as a water quality device and is sometimes used in conjunction with on site water quantity control such as ponds or underground detention systems. Where possible, it is more beneficial to install a HumeCeptor® unit upstream of a detention system, as the sediment load is reduced and the maintenance interval between cleaning is maximised.

  Where the HumeCeptor® system is installed downstream of a detention system it will alter the hydrology of the catchment and will influence the size of the unit selected by the software. For those projects, enter the footprint area and flow characteristics into the model.
- **Step 4 – Particle Size Distribution (PSD)**
  It is critical that the PSD is defined as part of the WQO. The design of the treatment system relies on a Stoke's Law settling (and floating) process, and selection of the target PSD influences the model outcomes.

  If the objective is for long term removal of 80% of TSS on a given site, the PSD should be representative of the expected sediment on the site. For example, a system designed to remove 80% of coarse particles (>150 microns) only provides relatively poor removal efficiency of finer particles (<75 microns) that may be naturally present in site runoff. PCSWMM software allows the user to enter their own PSD or select from a range of options in the program (refer to Figure 14 below).

Figure 14 – PCSWMM for HumeCeptor® system - PSD



- **Step 5 – Rainfall records**
  The rainfall data provided with PCSWMM software provides an accurate storm hydrology estimation by modelling actual historical storm events including duration, intensities and peaks. Local historical rainfall has been acquired from the Bureau of Meteorology. Select the nearest rainfall station from the list.
- **Step 6 – Summary**
  At this point, the software is able to predict the level of TSS removal from the site. Once the simulation has been completed, a table is generated identifying the TSS removal of each unit. Based on the WQO identified in Step 1, the recommended HumeCeptor® system unit will be highlighted.

MUSIC/pollutant export model inputs

Many local authorities utilise MUSIC or other pollutant export models to assist in stormwater treatment train selection, and recommend generic inputs for GPTs and hydrodynamic separators.

Considering these against the independent research results in Table 1 on page 4, and PCSWMM modelling used to size a HumeCeptor® unit, the conservative removal efficiencies in Table 5 below are recommended on an annual basis (i.e. no bypass). Humes Water Solutions can optimise the values to suit your specific site.

Table 5 – MUSIC inputs for HumeCeptor® system

Pollutant	Removal efficiency
TSS	80%
TN	30%
TP	30%

System installation

Top:
Installation of the base section (step 3)

Middle:
Installation of the bypass chamber (step 6)

Bottom:
System ready for connection of the inlet and outlet pipes (step 8)

The installation of HumeCeptor® units should conform in general to local authority's specifications for stormwater pit construction. Detailed installation instructions are dispatched with each unit.

The HumeCeptor® system is installed as follows:

1. Excavate and stabilise the site.
2. Prepare the geotextile and aggregate base.
3. Install the treatment chamber base section.
4. Install the treatment chamber section/s (if required).
5. Prepare the transition slab (if required).
6. Install the bypass chamber section.
7. Fit the inlet drop pipe and decant pipe (if required).
8. Connect inlet and outlet pipes as required.
9. Backfill to transition slab level.
10. Install the maintenance access chamber section (if required).
11. Install the frame and access cover/grate.
12. Backfill to finished surface/base course level and complete surface pavement.

System maintenance

The design of the HumeCeptor® system means that maintenance is conducted with a vacuum truck which avoids entry into the unit.

If the HumeCeptor® unit is sized using the PCSWMM guidelines, a maximum interval of annual maintenance is recommended.

A typical maintenance procedure includes:

1. Open the access cover.
2. Insert the vacuum hose into the top of the treatment chamber via the decant (outlet) pipe.
3. Remove the oily water until the level is just below the lower edge of the decant pipe.
4. Lower a sluice gate into the nearest upstream junction pit and decant the water from the treatment chamber into the upstream pit until the sediment layer is exposed.
5. Remove the sediment layer into the vacuum truck for disposal.
6. Raise the upstream sluice gate and allow water to return into the HumeCeptor® unit.
7. Replace the access cover.

FAQs

- **Will it capture litter?**
  The HumeCeptor® system is primarily designed for hydrocarbon and fine sediment removal, so if litter is expected from the catchment an upstream GPT is recommended. However, items such as cigarette butts, plastic bags and smaller gross pollutants will be captured by the system.
- **Do I need to model a bypass flow for the HumeCeptor® system in MUSIC?**
  No, PCSWMM software for the HumeCeptor® system analyses all flows from the catchment to determine 80% TSS removal on an annual basis. Therefore, the output efficiency of PCSWMM for the selected model can be incorporated into a MUSIC treatment node without a bypass flow.
- **How often do I need to undertake maintenance?**
  A maximum interval of 12 months is recommended, with 3 months ideal, however, these systems are designed with a factor of safety, so it will continue to retain sediment until it is completely full.
- **What if the PSD from my site is different to those in the software?**
  Humes Water Solutions has the ability to model a user-defined PSD in PCSWMM software for the HumeCeptor® system. If you have PSD results contact us for assistance.
- **Do I have to use the model that PCSWMM software highlights?**
  No, in most stormwater treatment trains, there are other measures upstream and/or downstream. Select the unit size that you need to achieve your desired removal efficiency in the context of your overall concept. Remember that selecting a model that removes less TSS will also remove less TN and TP.
- **Is it possible to change the hydrology model defaults in PCSWMM?**
  Yes, Humes Water Solutions has the ability to vary these inputs. Please contact us for further assistance.
- **Will the HumeCeptor® system's treatment chamber release nutrients?**
  Over time, captured organic material will break down and release nutrients in all treatment measures whether natural or manufactured. As part of a treatment train, downstream natural measures can remove the small portion of nutrients released during dry weather flows. A regular maintenance program will reduce the amount of break down occurring (Ball and Powell, 2006).

- **Why is the HumeCeptor® system not sized on flow rate?**
  The HumeCeptor® system is sized using actual historical rainfall and an algorithm based on research (Novotny and Chesters 1981, Charbeneau and Barrett, 1988, Ball and Abustan 1995, Sartor and Boyd 1972) showing that pollutants build up and wash off a catchment which is influenced by time, Particle Size Distribution (PSD), rainfall volume and intensity. These form a pollutograph that the software uses to calculate the HumeCeptor® system performance for all flows in every event over the rainfall period. The software then recommends the model that will remove a user selected removal target (usually set to 80%) of TSS load from all of these events.
- **How is the HumeCeptor® system different to a GPT?**
  The HumeCeptor® system is specifically designed to target fine sediment and hydrocarbons. Therefore, it is designed to maintain velocities through the treatment chamber <0.02 m/s. A GPT is designed to capture gross pollutants (>1 mm). For a GPT to function in an equivalent way to a HumeCeptor® system, the treatment chamber velocity must be <0.02 m/s.
- **Why would I use a HumeCeptor® system upstream of a biofilter?**
  Using a HumeCeptor® system upstream of a biofilter acts as a non- scouring sediment forebay, containing sediment to a confined location for easy removal. This protects the biofilter and lengthens its lifespan.

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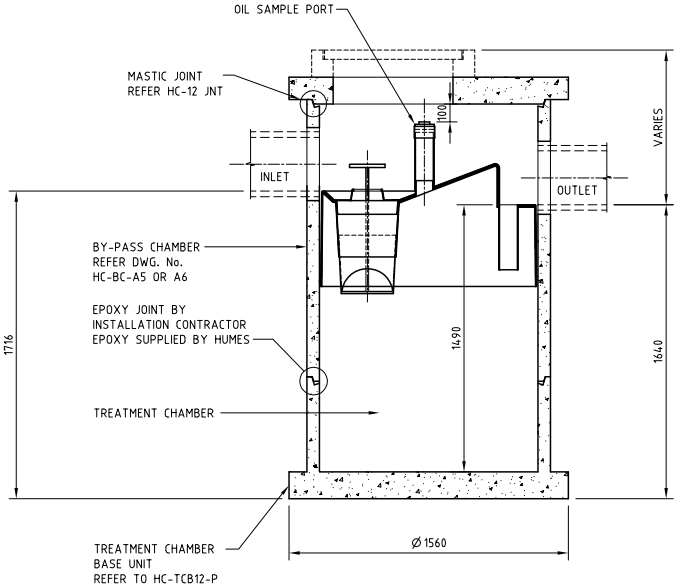
Appendix

HumeCeptor® system technical drawings



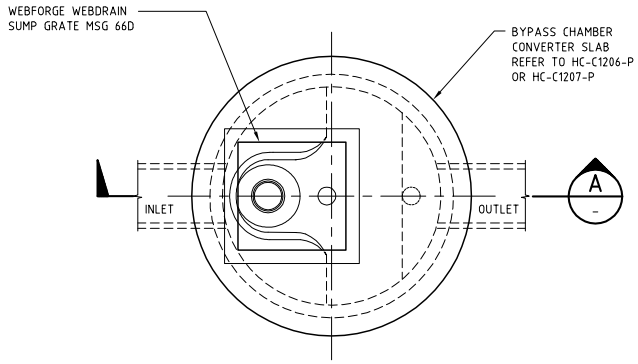
NOTE: STANDARD DROP INLET TO OUTLET IS 76mm

SECTION A – SCALE 1:20

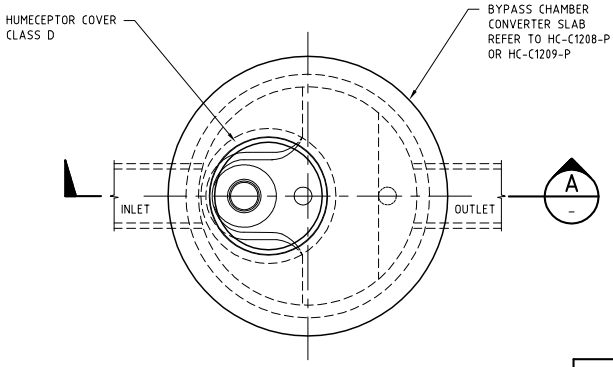
ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	ISSUED FOR MANUFACTURE	RGE	15.05.02	SO'C
1	UPDATED AND REISSUED FOR MANUFACTURE	M.Z.	23-01-03	DFW
2	GENERAL UPGRADE	RM	07-08-03	DFW

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 1740 LITRES
   OIL STORAGE VOLUME = 350 LITRES
   SEDIMENT STORAGE VOLUME = 1.34m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 1130 kg
   BYPASS CHAMBER = VARIES
   BYPASS CHAMBER CONVERTER SLAB = 575 kg
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. FOR OUTLET PIPE CONNECTION DETAILS
   REFER HC-BC-A5 OR A6 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
7. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWING)
8. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.



PLAN - SQUARE OPENING (PREFERRED) – SCALE 1:20



PLAN - CIRCULAR OPENING (ALTERNATIVE) – SCALE 1:20

Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	SO'C	23-04-02
DWN.	RGE	23-04-02
CKD.	SO'C	23-04-02
APP.	DFW	23-04-02

SUPERSEDES

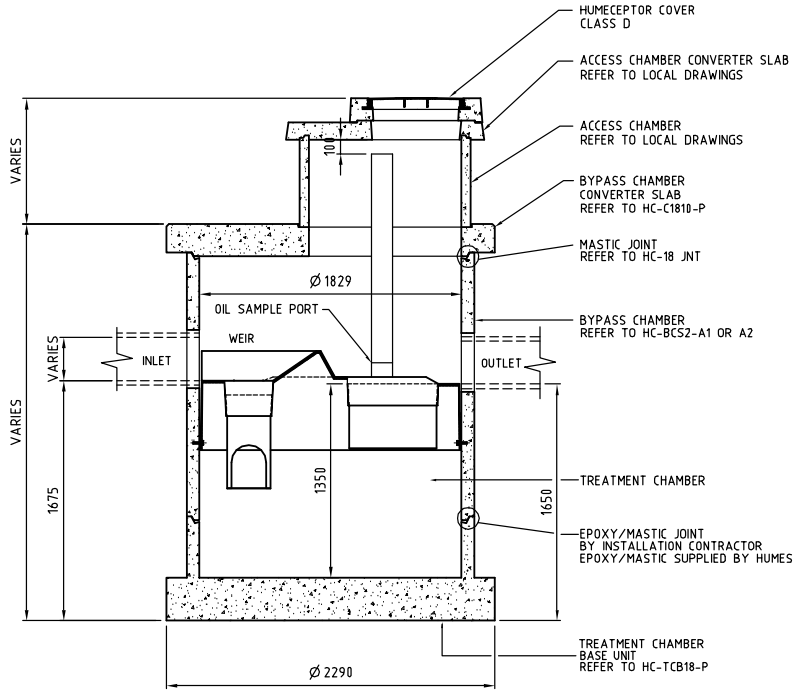
HUMECEPTOR™ STANDARD DRAWING

STC-2 HUMECEPTOR™ c/w INLET AND OUTLET PIPES

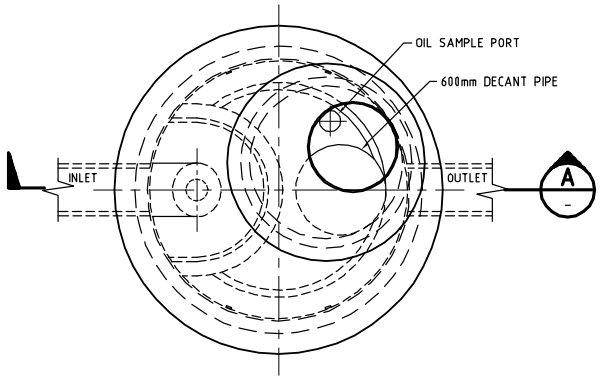
ASSEMBLY DRAWING

PLOT SCALE	SIZE	DRG. NO.	ISSUE
1:20	A2	HC-STC2-B	2

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	07-08-03	DFW
1	STORAGE VOLUMES REVISED	M.Z.	03-09-03	DFW



SECTION A
SCALE 1:25



PLAN
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 3540 LITRES (1)
   OIL STORAGE VOLUME = 1020 LITRES
   SEDIMENT STORAGE VOLUME = 2.20m3 (1)
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 3.9 TONNE
   BYPASS CHAMBER = VARIES
   BYPASS CHAMBER CONVERTER SLAB = 1.9 TONNE
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWING)
9. NOTE MARKINGS - INLET & OUTLET OVER EACH
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

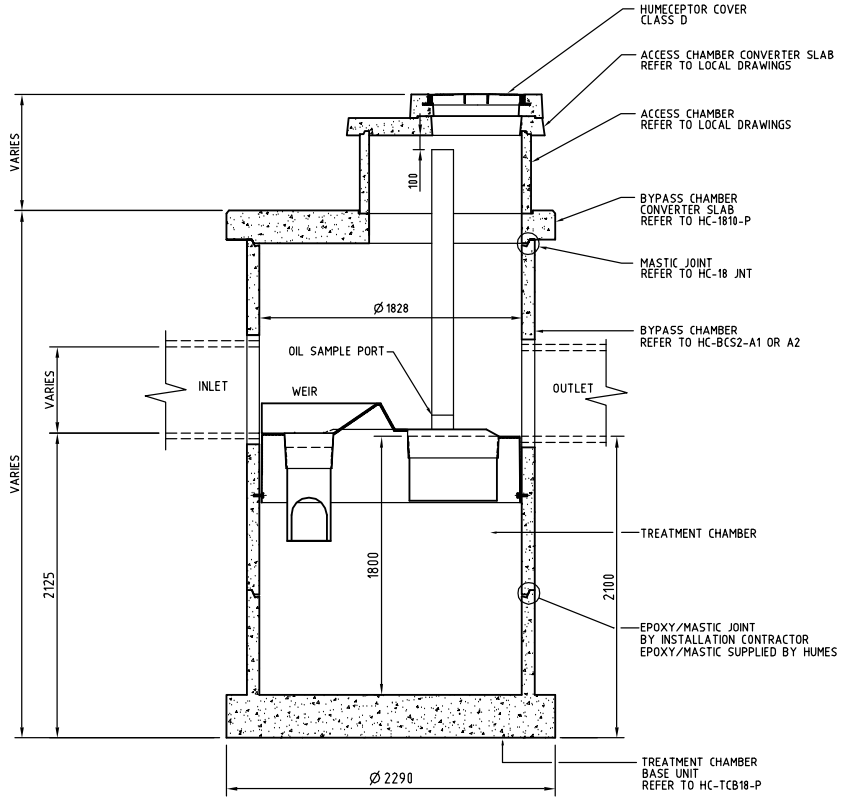
Humes
TECHNICAL (DESIGN) SERVICES
BRISBANE, QUEENSLAND

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	07-08-03
APP.	DFW	07-08-03

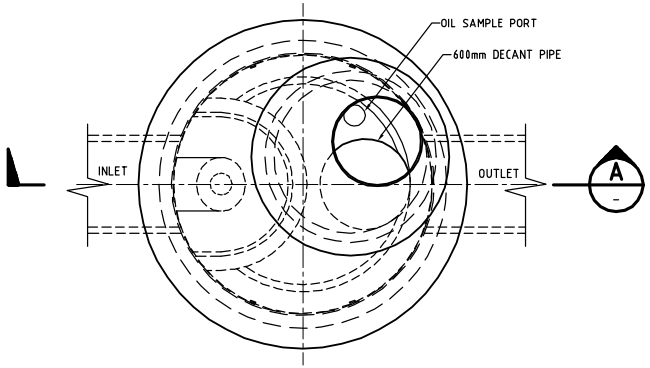
HUMECEPTOR™
STANDARD DRAWING
STC-3 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC3-A	1

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A – SCALE 1:25



PLAN SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 4720 LITRES
   OIL STORAGE VOLUME = 1020 LITRES
   SEDIMENT STORAGE VOLUME = 3.38m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 4.4 TONNE
   BYPASS CHAMBER = VARIES
   BYPASS CHAMBER CONVERTER SLAB = 1.9 TONNE
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWING)
9. NOTE MARKINGS - INLET & OUTLET OVER EACH
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

HUMECEPTOR™

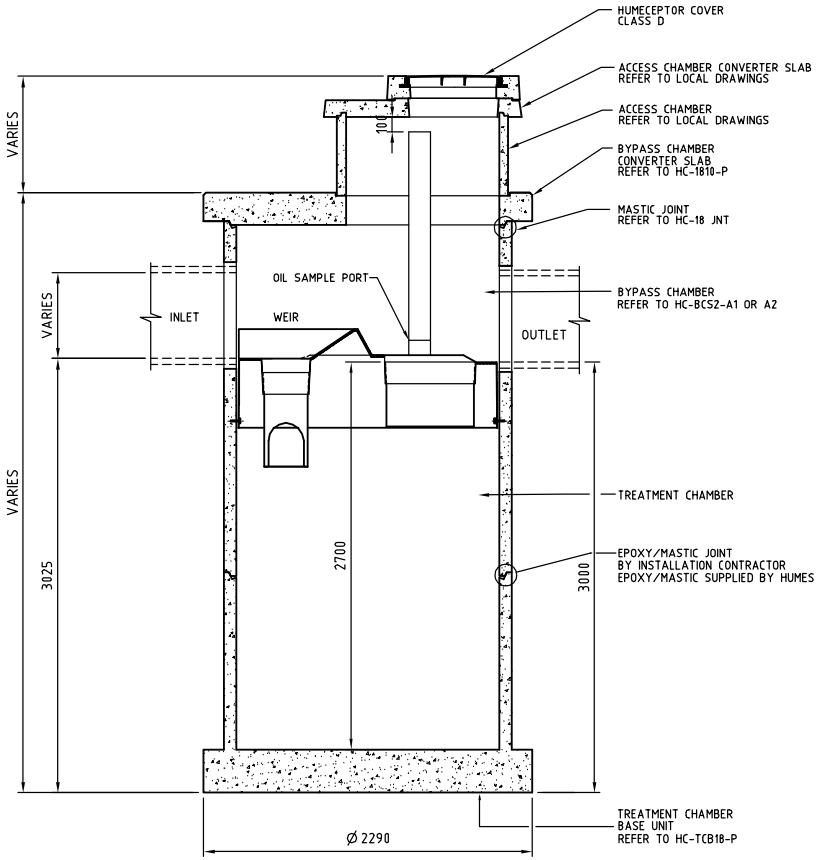
STANDARD DRAWING

STC-5 HUMECEPTOR

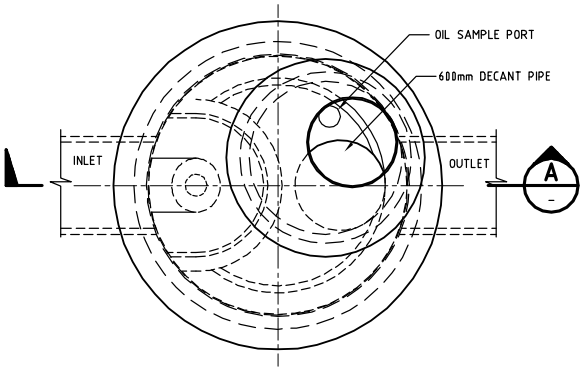
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC5-A	0

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A
SCALE 1:25



PLAN
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 7080 LITRES
   OIL STORAGE VOLUME = 1020 LITRES
   SEDIMENT STORAGE VOLUME = 5.74m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 5.1 TONNE
   BYPASS CHAMBER = VARIES
   BYPASS CHAMBER CONVERTER SLAB = 1.9 TONNE
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWING)
9. NOTE MARKINGS - INLET & OUTLET OVER EACH
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

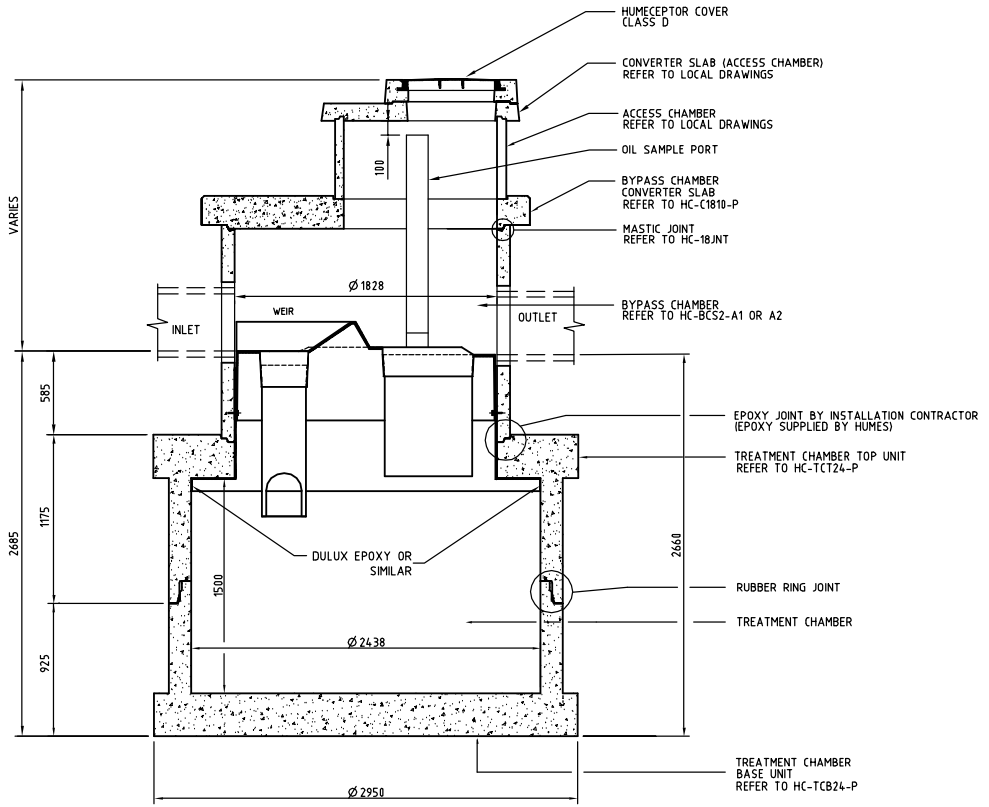
DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

SUPERSEDES

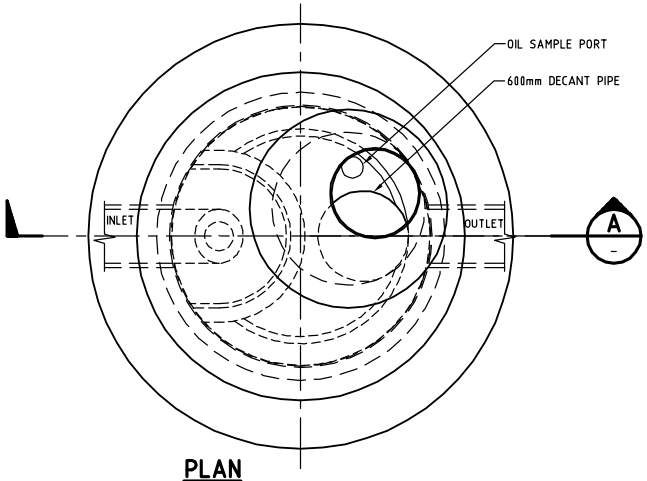
HUMECEPTOR™
STANDARD DRAWING
STC-7 HUMECEPTOR
ASSEMBLY DRAWING

PLOT SCALE	SIZE	DRG. NO.	ISSUE
1:25	A2	HC-STC7-A	0

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A – A
SCALE 1:25



PLAN
SCALE 1:10

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 9260 LITRES
   OIL STORAGE VOLUME = 1900 LITRES
   OIL SEDIMENT STORAGE VOLUME = 6.81 m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 7.7 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB + SHAFT) = 6.0 TONNE
   BYPASS CHAMBER = VARIES
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 or A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS.
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS. (REFER PRODUCT DRAWING)
9. NOTE MARKINGS - INLET AND OUTLET OVER EACH.
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

RUBBER RING JOINT SPECIFICATION

MATERIAL	: NITRILE
HARDNESS:	: 43 ± 3 IRHD (AS 1646)
PROFILE	: L25 (REFER Dwg. J1001-01)
ID	: 2225 ± 16mm

Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

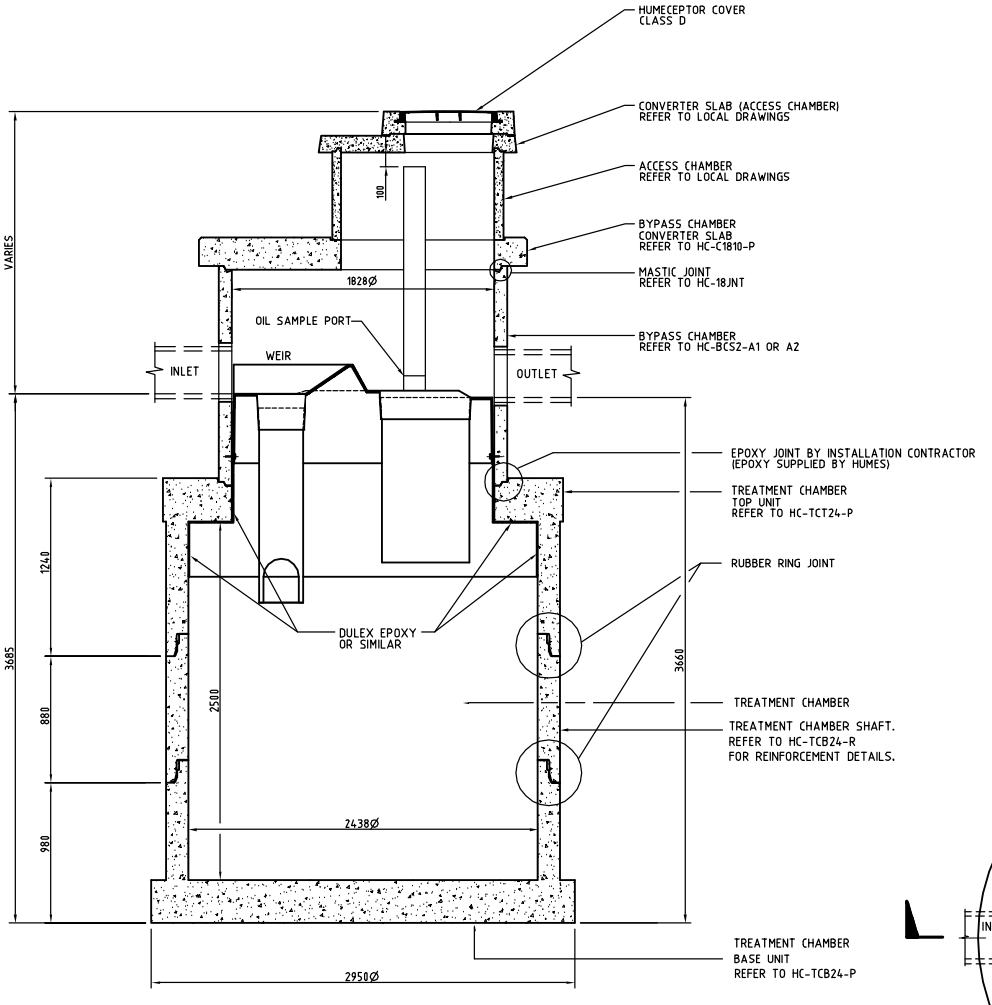
Readymix Holdings Pty Limited ABN 87 099 732 297

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

HUMECEPTOR™
STANDARD DRAWING
STC-9 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC-9-A	0

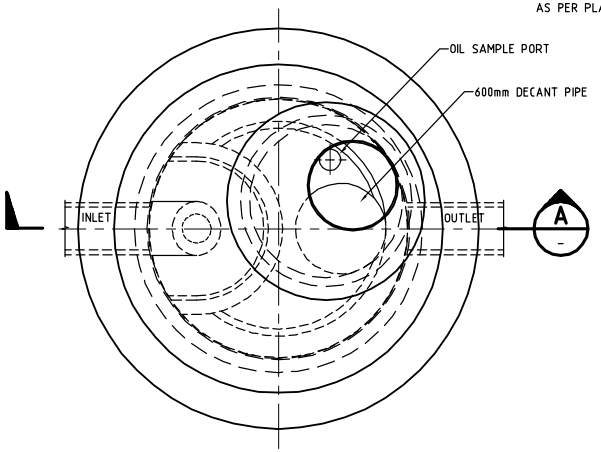
ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 13920 LITRES
   OIL STORAGE VOLUME = 2980 LITRES
   SEDIMENT STORAGE VOLUME = 10.27 m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 7.9 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB + SHAFT) = 6.1 TONNE
   BYPASS CHAMBER = VARIES
   TREATMENT CHAMBER SHAFT = 2.8 TONNE
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWINGS)
9. NOTE MARKINGS - INLET AND OUTLET OVER EACH.
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.



PLAN
SCALE 1:25

RUBBER RING JOINT SPECIFICATION	
MATERIAL	: NITRILE
HARDNESS	: 43 ± 3 IRHD (AS1646)
PROFILE	: L25 (REFER Dwg. J1001-01)
ID	: 2225 ± 16mm

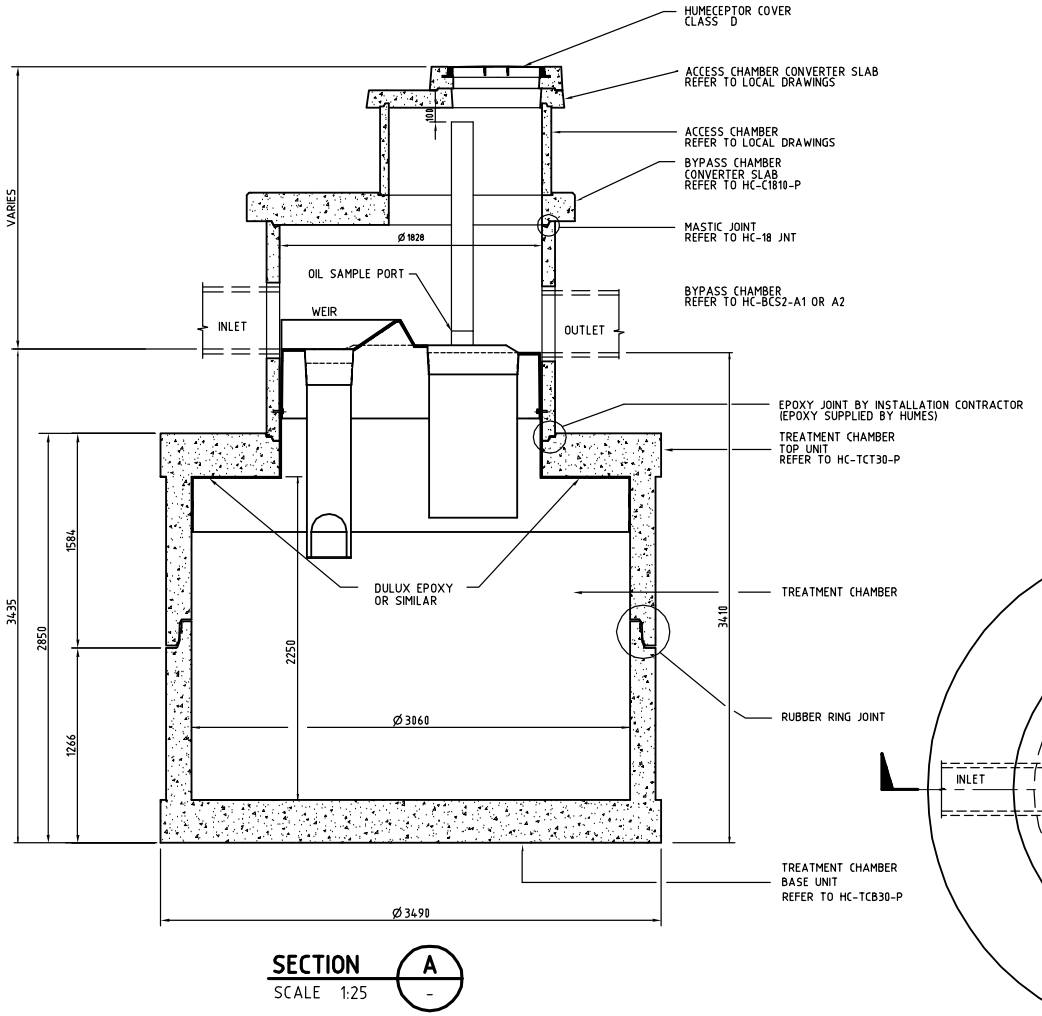
Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

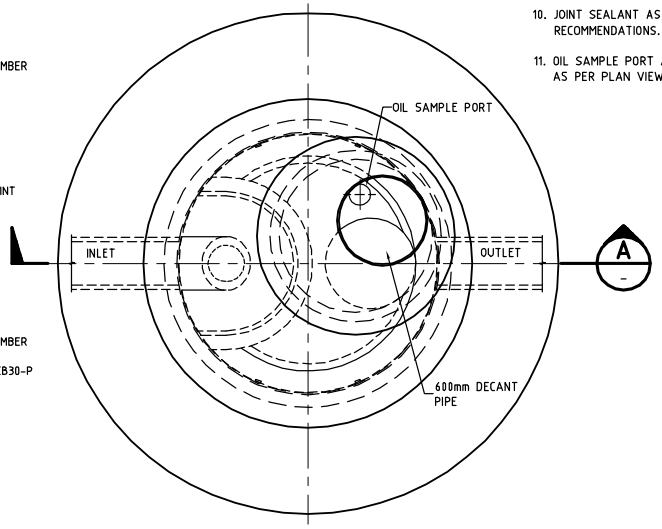
HUMECEPTOR™
STANDARD DRAWING
STC-14 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC14-A	0

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A
SCALE 1:25



PLAN
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 18790 LITRES
   OIL STORAGE VOLUME = 2980 LITRES
   SEDIMENT STORAGE VOLUME = 14.04 m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL.SHAFT) = 12.1 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB + SHAFT) = 11.2 TONNE
   BYPASS CHAMBER = VARIES
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWINGS)
9. NOTE MARKINGS - INLET AND OUTLET OVER EACH.
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

RUBBER RING SPECIFICATION

MATERIAL	:	NITRILE
HARDNESS	:	43 ± 3 IRHD (AS1646)
PROFILE	:	L25 (REFER Dwg. J1001-01)
ID	:	2775 ± 16mm

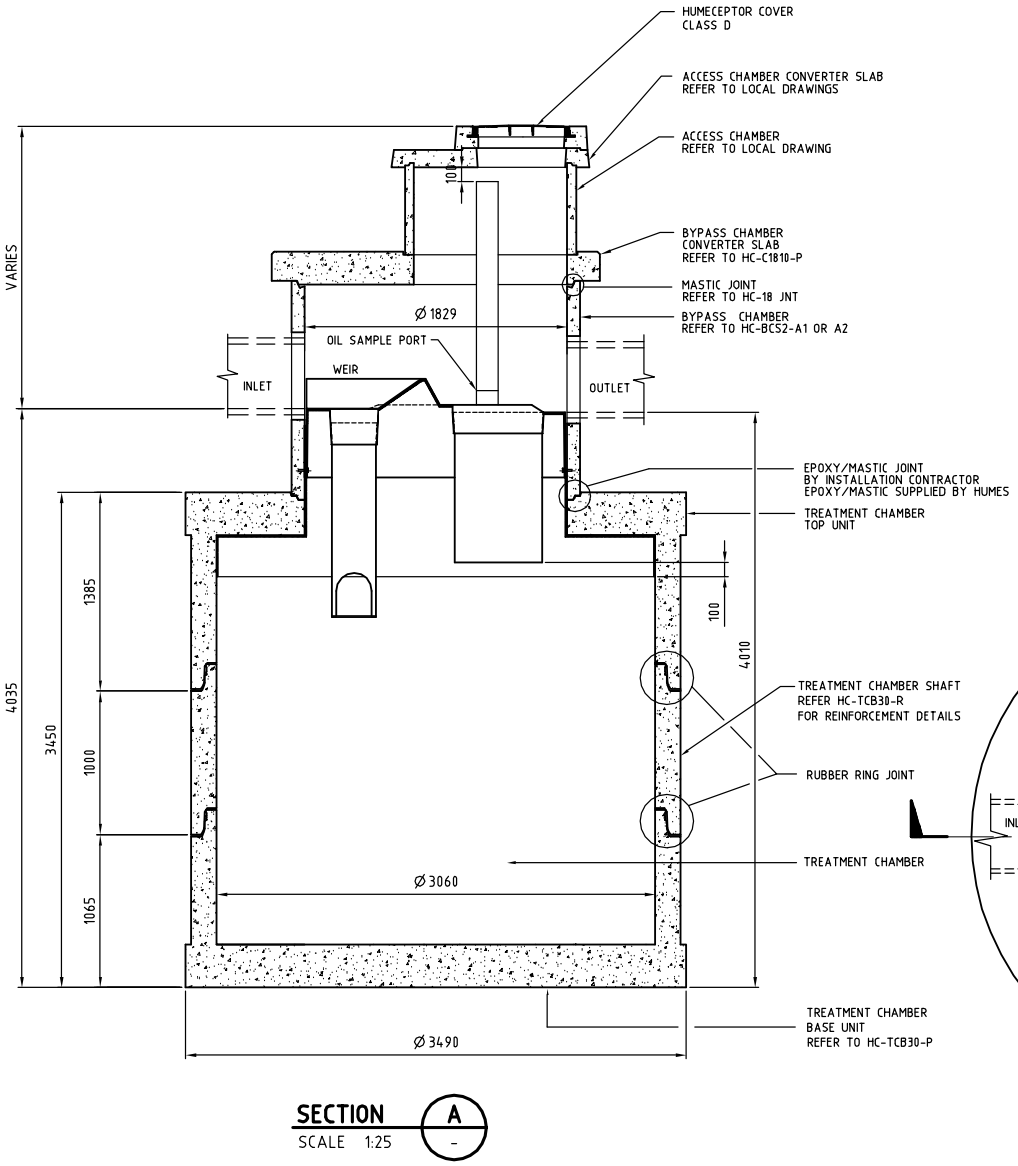
Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

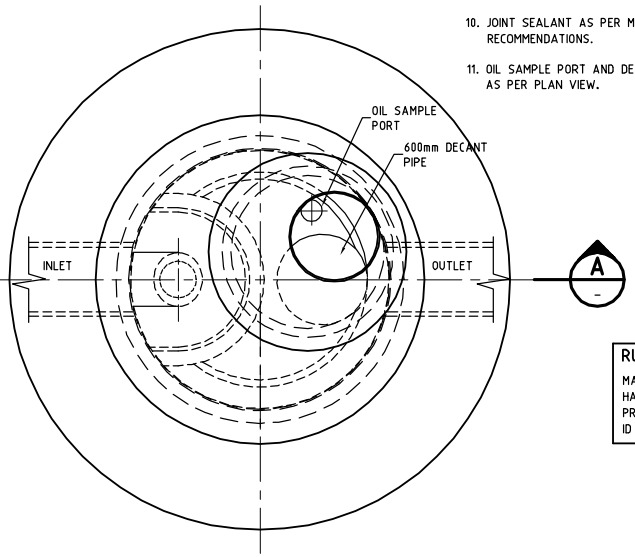
HUMECEPTOR™
STANDARD DRAWING
STC-18 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC18-A	0

ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND ISSUED FOR MANUFACTURE	M.Z.	03-09-03	DFW



SECTION A
SCALE 1:25



PLAN
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS
2. DIMENSIONS INCLUDED ARE STANDARD
3. STORAGE VOLUMES
   TOTAL = 23200 LITRES
   OIL STORAGE VOLUME = 2980 LITRES
   SEDIMENT STORAGE VOLUME = 18.45 m3
4. COMPONENT MASSES
   TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 11.2 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB + SHAFT) = 10.1 TONNE
   BYPASS CHAMBER = VARIES
   TREATMENT CHAMBER SHAFT = 4.6 TONNES
5. REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR-N-SEAL INSTALLATION INSTRUCTIONS.
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWINGS)
9. NOTE MARKINGS - INLET AND OUTLET OVER EACH.
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. OIL SAMPLE PORT AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

RUBBER RING SPECIFICATION

MATERIAL	:	NITRILE
HARDNESS	:	43 ± 3 IRHD (AS1646)
PROFILE	:	L25
ID	:	2775 ± 16mm

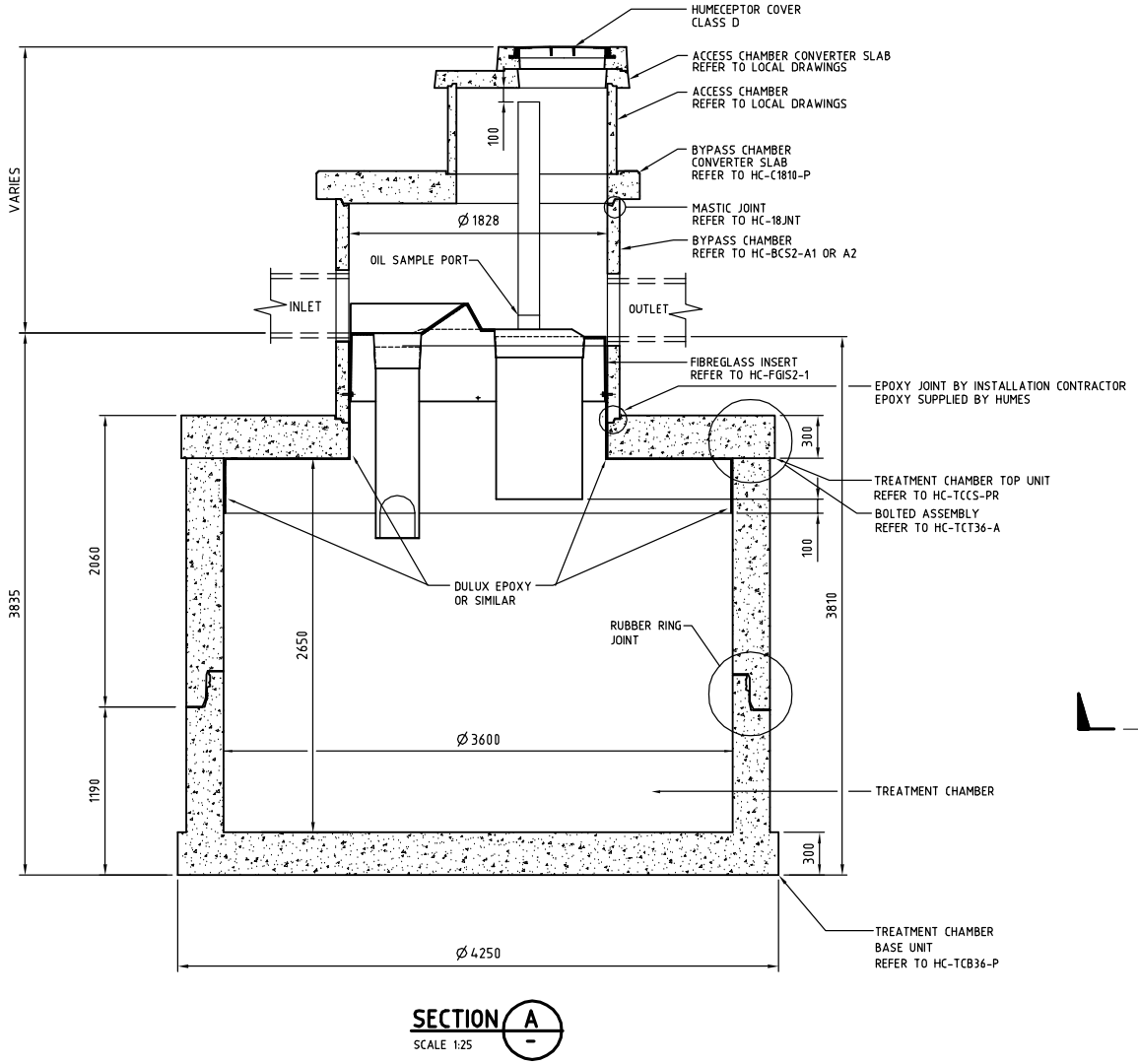
Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	DFW	28-01-03
DWN.	M.Z.	28-01-03
CKD.	DFW	03-09-03
APP.	DFW	03-09-03

HUMECEPTOR™
STANDARD DRAWINGS
STC-23 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC23-A	0

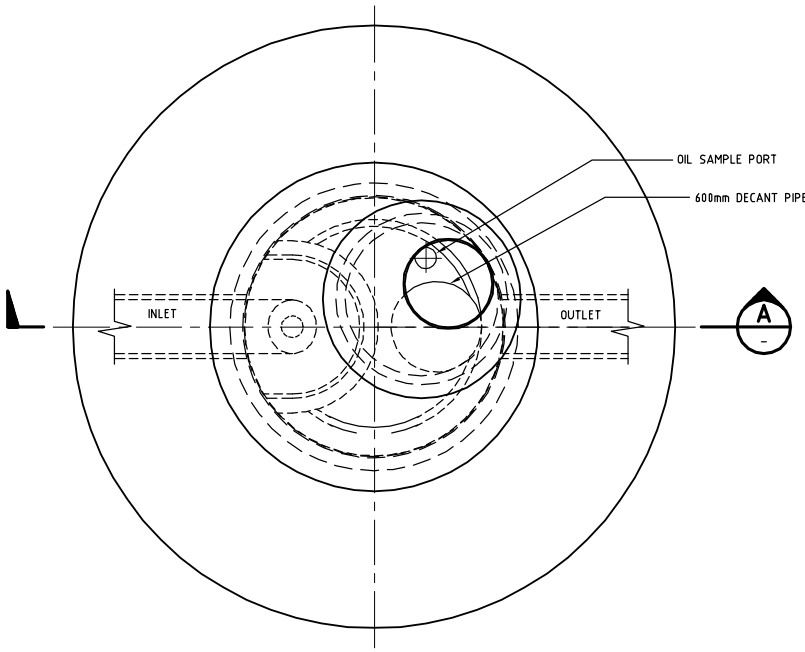
ISSUE	DETAILS OF ALTERATIONS	DWN	DATE	CKD
0	UPDATED AND REISSUED FOR MANUFACTURE	RM	22-04-04	DFW



SECTION A–A
SCALE 1:25

NOTES:

1. TYPICAL ASSEMBLY DETAIL ONLY - REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS.
2. DIMENSIONS INCLUDED ARE STANDARD.
3. STORAGE VOLUMES TOTAL = 29220 LITRES OIL
   STORAGE VOLUME = 4290 LITRES
   SEDIMENT STORAGE VOLUME = 23.50 m3
4. COMPONENT MASSES TREATMENT CHAMBER BASE UNIT (INCL. SHAFT) = 18.3 t
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB + SHAFT) = 23.2 t
5. BYPASS CHAMBER = VARIES REFER TO BYPASS CHAMBER ASSEMBLY DRAWING FOR FIXING DETAILS FOR FIBREGLASS INSERT.
6. BYPASS CHAMBER CONVERTER SLAB TO SUIT LOCAL ACCESS CHAMBER UNITS.
7. FOR INLET AND OUTLET PIPE CONNECTION DETAILS REFER HC-BCS2-A1 OR A2 AND KOR- N-SEAL INSTALLATION INSTRUCTIONS.
8. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS (REFER PRODUCT DRAWINGS)
9. NOTE MARKINGS - INLET AND OUTLET OVER EACH.
10. JOINT SEALANT AS PER MANUFACTURERS RECOMMENDATIONS.
11. VENT PIPE AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.



PLAN
SCALE 1:25

IMPORTANT INSTALLATION INFORMATION

1. FOUNDATION REQUIREMENTS - MIN. ALLOWABLE BEARING CAPACITY REQUIRED 200 kPa
2. UNIT TO BE PLACED ON 150mm THICK BED ZONE MATERIAL IN ACCORDANCE WITH AS3725 REQUIREMENTS
3. TREATMENT CHAMBER SHOULD BE FILLED WITH WATER TO 2/3 DEPTH IMMEDIATELY AFTER INSTALLATION (UNIT MAY FLOAT PRIOR TO BACKFILLING)

RUBBER RING JOINT SPECIFICATION

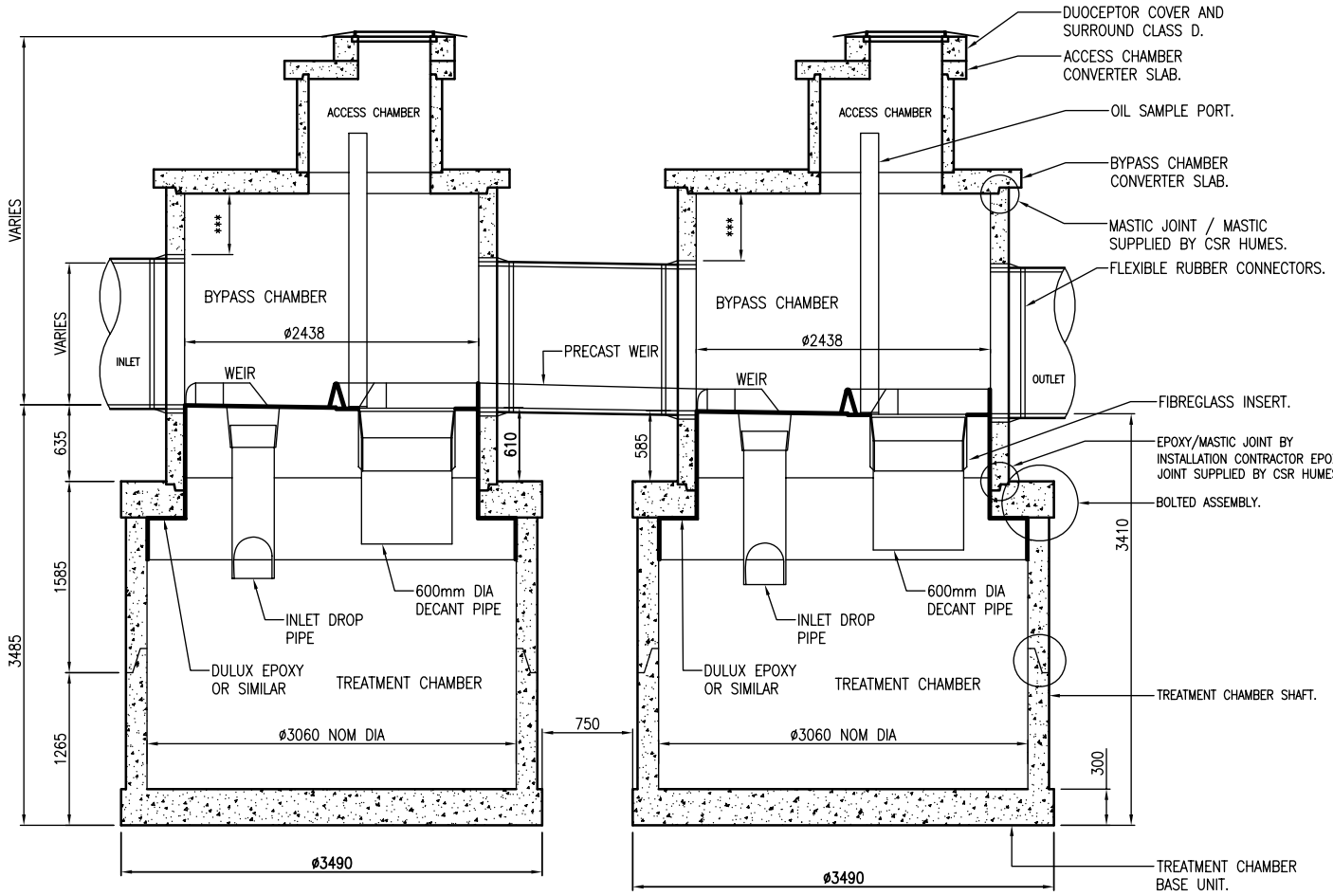
MATERIAL	: NITRILE
HARDNESS	: 43 (± 3) IRHD (AS1646)
PROFILE	: L 38 (REFER Dwg. J1002-01)
ID	: 3400 ± 16mm

Humes TECHNICAL (DESIGN) SERVICES BRISBANE, QUEENSLAND

DSN.	DFW	19-04-04
DWN.	RM	19-04-04
CKD.	DFW	19-04-04
APP.	DFW	19-04-04

HUMECEPTOR™
STANDARD DRAWING
STC-27 HUMECEPTOR
ASSEMBLY DRAWING

SUPERSEDES	PLOT SCALE	SIZE	DRG. NO.	ISSUE
	1:25	A2	HC-STC27-A	0



FOR INFORMATION

*150 MIN FOR INLET /OUTLET PIPE < 675 DIA
*300 MIN FOR INLET /OUTLET PIPE > 750 DIA

1. TYPICAL ASSEMBLY DETAIL ONLY – REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS.

2. DIMENSIONS INCLUDED ARE STANDARD.

3. STORAGE VOLUMES
   TOTAL = 42,370 LITRES
   OIL STORAGE VOLUME = 10,585 LITRES
   SEDIMENT STORAGE VOLUME = 27 m3

4. COMPONENT MASSES
   TREATMENT CHAMBER BASS UNIT (INC. SHAFT) = 11.92 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB AND SHAFT) = 8.95 TONNE
   BYPASS CHAMBER = 9.74 TONNE

5. REFER TO INSTALLATION GUIDE FOR RECOMMENDED INSTALLATION PROCEDURE.

6. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS THE FOLLOWING SWIFTLIFT KNUCKLES WILL BE REQUIRED:
   6 x 1.3 TONNES
   8 x 2.5 TONNES
   8 x 10.0 TONNES

7. OIL SAMPLE PORT, STEP IRONS AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

8. THE ABOVE WEIGHTS ARE ONLY APPROXIMATIONS OF THE ACTUAL FINAL WEIGHTS OF COMPONENTS AND ARE NOT TO BE USED.

NOT FOR CONSTRUCTION

Humes

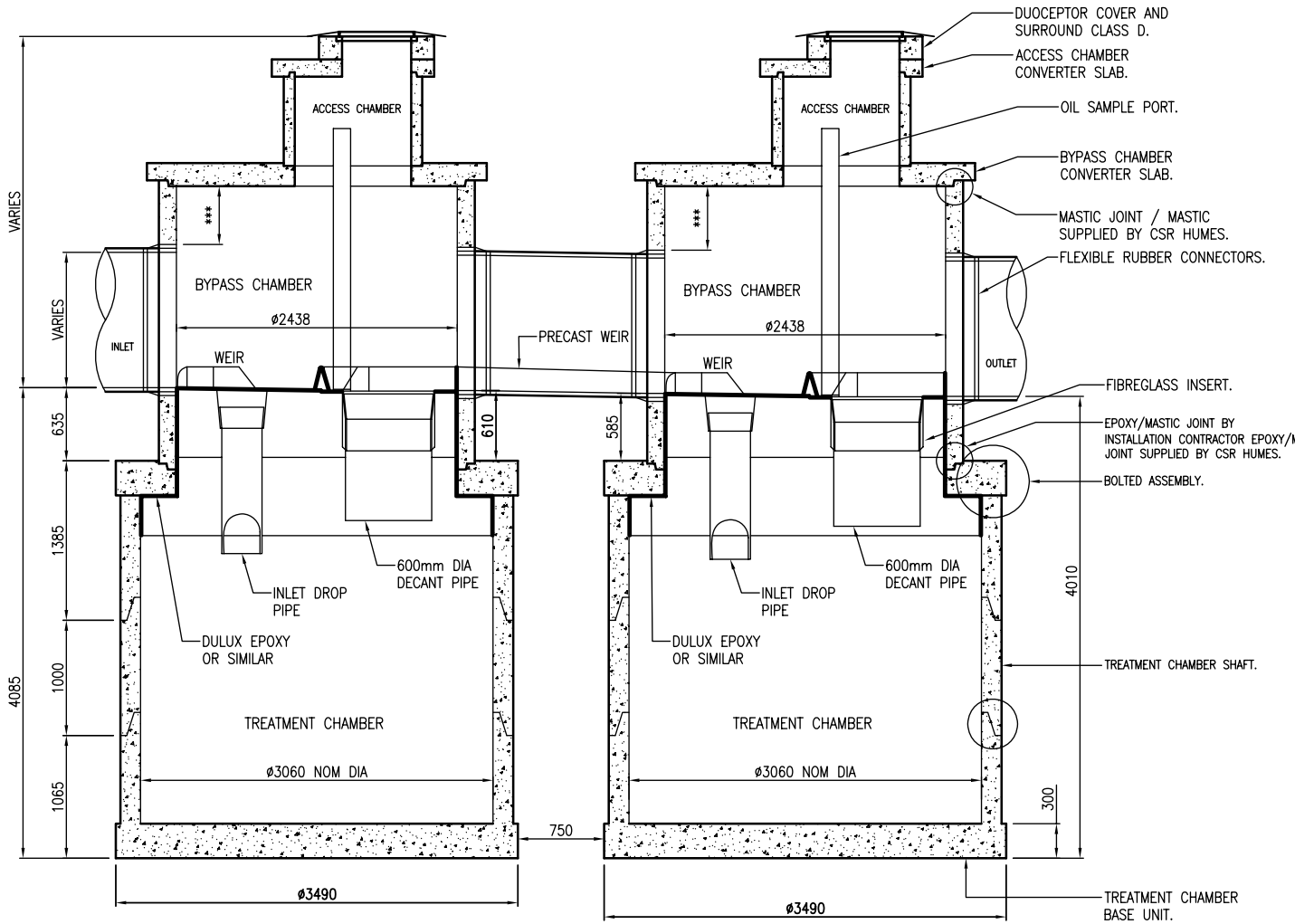
CLIENT: N/A
CLIENT NAME:

ISSUE	REVISION	INITIAL	DATE
A	ISSUE FOR CLIENT INFORMATION	JCM	25/10/07

JOB NAME: DUOCEPTOR STC40
JOB NO. N/A

DRAWING TITTLE:	GENERAL ARRANGEMENT			
DRAWING NO.	BIS-DUO-003			
DESIGNED BY:	–		MODEL:	STC60
DRAWN BY:	JCM	25/10/07	SCALE:	1:40
CHECKED BY:	CK	25/10/07	SIZE: A3	REV. A

FOR INFORMATION



*150 MIN FOR INLET /OUTLET PIPE < 675 DIA
*300 MIN FOR INLET /OUTLET PIPE > 750 DIA

1. TYPICAL ASSEMBLY DETAIL ONLY – REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS.

2. DIMENSIONS INCLUDED ARE STANDARD.

3. STORAGE VOLUMES
   TOTAL = 50,525 LITRES
   OIL STORAGE VOLUME = 10,585 LITRES
   SEDIMENT STORAGE VOLUME = 35 m3

4. COMPONENT MASSES
   TREATMENT CHAMBER BASS UNIT (INC. SHAFT) = 11.02 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB AND SHAFT) = 12.50 TONNE
   BYPASS CHAMBER = 9.74 TONNE

5. REFER TO INSTALLATION GUIDE FOR RECOMMENDED INSTALLATION PROCEDURE.

6. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS THE FOLLOWING SWIFTLIFT KNUCKLES WILL BE REQUIRED:
   6 x 1.3 TONNES
   8 x 2.5 TONNES
   8 x 10.0 TONNES

7. OIL SAMPLE PORT, STEP IRONS AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

8. THE ABOVE WEIGHTS ARE ONLY APPROXIMATIONS OF THE ACTUAL FINAL WEIGHTS OF COMPONENTS AND ARE NOT TO BE USED.

NOT FOR CONSTRUCTION

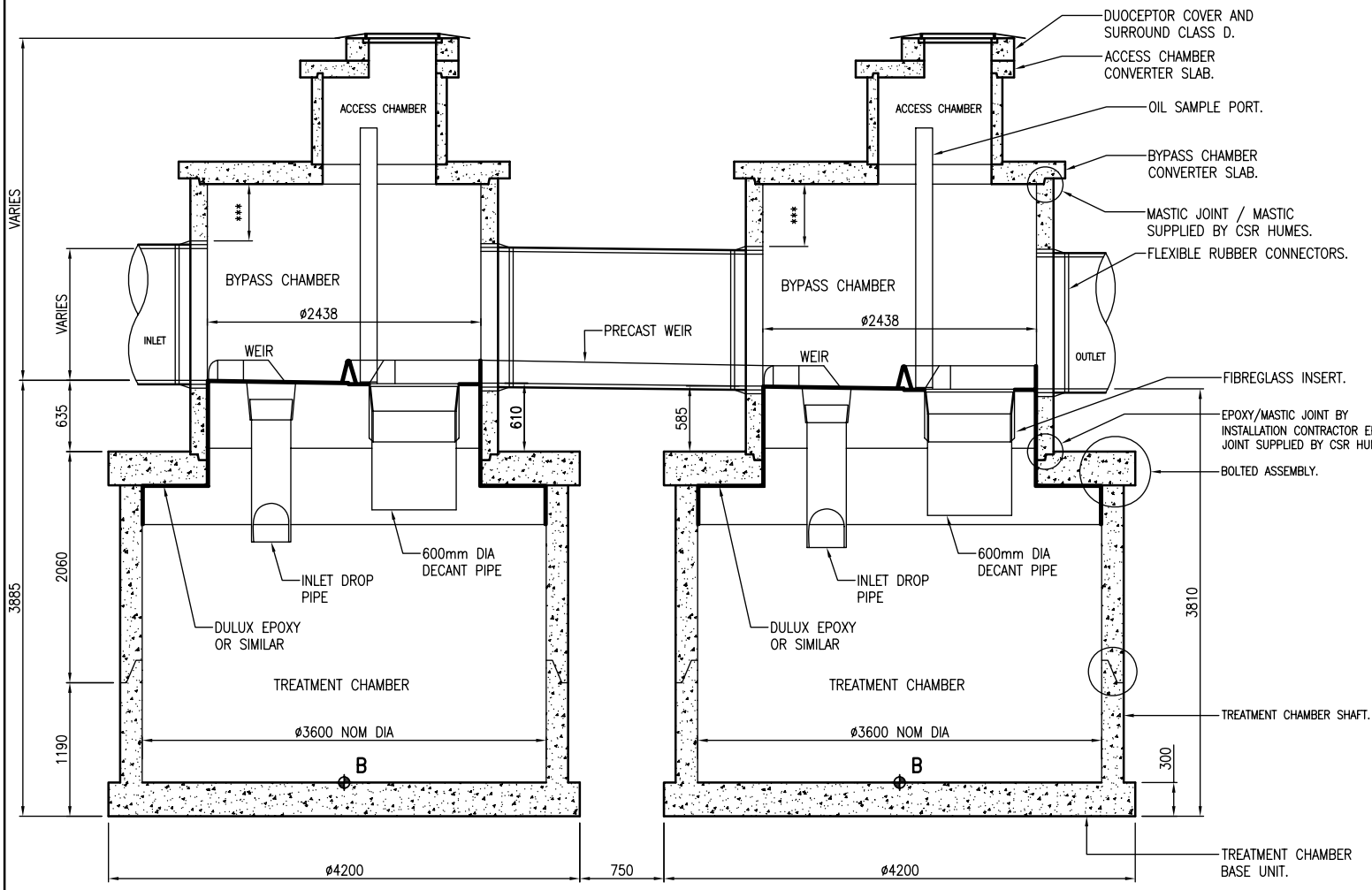
Humes

CLIENT: N/A
CLIENT NAME:

ISSUE	REVISION	INITIAL	DATE
A	ISSUE FOR CLIENT INFORMATION	JCM	25/10/07

JOB NAME: DUOCEPTOR STC50
JOB NO. N/A

DRAWING TITTLE:	GENERAL ARRANGEMENT		
DRAWING NO.	BIS-DUO-002		
DESIGNED BY:	–	MODEL:	STC60
DRAWN BY:	JCM 25/10/07	SCALE:	1:40
CHECKED BY:	CK 25/10/07	SIZE: A3	REV. A



FOR INFORMATION

*150 MIN FOR INLET /OUTLET PIPE < 675 DIA
*300 MIN FOR INLET /OUTLET PIPE > 750 DIA

1. TYPICAL ASSEMBLY DETAIL ONLY – REFER TO PROJECT DRAWING FOR ACTUAL REQUIREMENTS.

2. DIMENSIONS INCLUDED ARE STANDARD.

3. STORAGE VOLUMES
   TOTAL = 60,255 LITRES
   OIL STORAGE VOLUME = 11,560 LITRES
   SEDIMENT STORAGE VOLUME = 42 m3

4. COMPONENT MASSES
   TREATMENT CHAMBER BASS UNIT (INC. SHAFT) = 16.20 TONNE
   TREATMENT CHAMBER TOP UNIT (CONV. SLAB AND SHAFT) = 12.46 TONNE
   BYPASS CHAMBER = 9.74 TONNE

5. REFER TO INSTALLATION GUIDE FOR RECOMMENDED INSTALLATION PROCEDURE.

6. SWIFTLIFT LIFTING ANCHORS PROVIDED FOR LIFTING ALL COMPONENTS THE FOLLOWING SWIFTLIFT KNUCKLES WILL BE REQUIRED:
   6 x 1.3 TONNES
   8 x 2.5 TONNES
   8 x 10.0 TONNES

7. OIL SAMPLE PORT, STEP IRONS AND DECANT PIPE TO BE VISIBLE AS PER PLAN VIEW.

8. THE ABOVE WEIGHTS ARE ONLY APPROXIMATIONS OF THE ACTUAL FINAL WEIGHTS OF COMPONENTS AND ARE NOT TO BE USED.

NOT FOR CONSTRUCTION

Humes

CLIENT: N/A
CLIENT NAME:

ISSUE	REVISION	INITIAL	DATE
A	ISSUE FOR CLIENT INFORMATION	JCM	25/10/07

JOB NAME: DOUCEPTOR STC60
JOB NO. N/A

DRAWING TITTLE:	GENERAL ARRANGEMENT		
DRAWING NO.	BIS-DUO-001		
DESIGNED BY:	–		MODEL: STC60
DRAWN BY:	JCM	25/10/07	SCALE: 1:40
CHECKED BY:	CK	25/10/07	SIZE: A3 REV. A

Precast solutions

Top:
StormTrap® system

Middle:
RainVault® system

Bottom:
Segmental shaft

Stormwater

Stormwater treatment

Primary treatment

HumeGard® Gross Pollutant Trap

Secondary treatment

HumeCeptor® hydrodynamic separator

Detention and infiltration

StormTrap® system

Soakwells

Harvesting and reuse

RainVault® system

ReserVault® system

RainVault® Mini system

Precast concrete cubes

Segmental shafts

Stormwater drainage

Steel reinforced concrete pipes – trench

Steel reinforced concrete pipes – salt water cover

Steel reinforced concrete pipes – jacking

Box culverts

Uniculvert® modules

Headwalls

Stormwater pits

Access chambers/Manholes

Kerb inlet systems

Floodgates

Geosynthetics

Sewage transfer and storage

Bridge and platform

Tunnel and shaft

Walling

Potable water supply

Irrigation and rural

Traffic management

Cable and power management

Rail

Contact information

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info@humes.com.au

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Fax: (07) 3364 2963

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Townsville
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Fax: (07) 4758 6001

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Fax: (02) 6644 7313

Newcastle
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Melbourne
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Fax: (03) 9360 3887

South Australia

Adelaide
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Fax: (08) 8168 4549

Western Australia

Gnangara
Ph: (08) 9302 8000
Fax: (08) 9309 1625

Perth
Ph: (08) 9351 6999
Fax: (08) 9351 6977

Northern Territory

Darwin
Ph: (08) 8984 1600
Fax: (08) 8984 1614

Humes

National sales 1300 361 601
humes.com.au
info@humes.com.au

A Division of Holcim Australia

Appendix H

Information Related to the Existing Stormwater Pipe Diversion

EXISTING COUNCIL SORTMWATER DRAINAGE NETWORK NEAR THE PROPOSED SITE

(INFORMATION WAS OBTAINED FROM THE COUNCIL'S UNDERGROUND SERVICES ONLINE MAPS

STORMWATER PLAN

SCALE 1 : 200

STORMWATER NOTES

1. REFER TO DRAWING CV-DRG-0031 FOR NOTES, LEGEND AND PIT SCHEDULE.

NOTE
SETOUT AND ALIGNMENT OF WALLS TO BOUNDARY TO ARCHITECTS DETAILS TYPICAL

NOTE
ALL AG LINES BEHIND KERBS (K1) TO CONNECT TO STORMWATER SYSTEM TYPICAL

NOTE
ALL SETOUT, DIMENSIONS AND RL'S TO ARCHITECTS SPECIFICATION & DETAILS

NOTE
BUILDER TO PROVIDE ADEQUATE SHORING IN ORDER TO MAINTAIN STABILITY OF EXISTING NEIGHBOURING STRUCTURES AND FENCES DURING EXCAVATION WORKS TYPICAL

NOTE
ALL STORMWATER PITS TO HAVE ECOSOL LITTER BASKET200 + REACTIVE FILTER MEDIA (RFM) PILLOWS INSTALLED AS PER THE MANUFACTURER SPECIFICATION

PROPOSED CONNECTION LOCATION OF THE NEW STORMWATER PIPE

NEW STORMWATER PIPE

NEW STORMWATER PIT

DETENTION TANK
(5.2m x 19.8m)
BASE RL 8.90
TOTAL VOLUME 95m³

CONTROL PIT DISCHARGE
(1.0m x 1.0m)
BASE RL 8.29

HARVESTING TANK
(5.2m x 5.0m)
BASE RL 9.00
TOTAL VOLUME 25m³

PROPOSED DEVELOPMENT
GROUND FLOOR
FFL 11.75

EXISTING STORMWATER LINE TO BE CAPPED

EXISTING 600Ø PIPE TO BE REMOVED

EXISTING 600Ø PIPE TO REMAIN AS REDUNDANT & CAPPED AT EACH END

EXISTING PIPE INVERT LEVEL AT THE DIVERSION POINT TO BE CONFIRMED BY AN UNDERGROUND SERVICE LOCATOR

FIRST FLUSH DEVICE TO HYDRAULIC ENGINEER SPECIFICATION

SOUTHERN ROOF GUTTER AND DOWNPIPES (DPs) MUST BE DESIGNED FOR 1 IN 100 YEAR STORM EVENT TO HYDRAULIC ENGINEER DESIGN AND SPECIFICATION

UPPER ROOF DOWNPIPE SPREADER ONTO LOWER ROOF TO HYDRAULIC ENGINEER DESIGN AND SPECIFICATION

GREASE ARRESTOR TO HYDRAULIC ENGINEER SPECIFICATIONS

GRASS SWALE 1m WIDE 150mm DEEP

REMOVE EXISTING DRIVEWAY AND LAYBACK AND REPLACE WITH NEW KERB AN GUTTER TO CURRENT COUNCIL REQUIREMENTS

EXISTING 225Ø PIPE TO BE DECOMMISSIONED

225Ø LINK PIPE

NEW SEALED JUNCTION PIT LID

EXISTING PIPE TO BE CONCRETE CAPPED AT BOUNDARY

FUTURE 3m WIDE EASEMENT TO DRAIN WATER BENEFITING COUNCIL. FUTURE STORMWATER UPGRADE DESIGN AND WORKS BY COUNCIL

"PORT CITY BOWLING CLUB" LOT 1 DP 1141185

EXISTING EASEMENT

MPC HALL SINGLE STOREY BRICK BUILDING METAL ROOF

BUILDING S SINGLE STOREY TIMBER

GAZEBO

STAIRS

RAMP

CONCRIB RETAINING WALL

GAS

PROPOSED STORMWATER PIPE DIVERSION

OWEN STREET

CONSULTANTS							
BCA CONSULTANT Metro Building Consultancy T 4927 5566	LANDSCAPE ARCHITECT Terras Landscape Architects T 4929 4926	MECHANICAL ENGINEER Edwards & Vickerman Consulting Engineers T 4929 2461	HYDRAULIC ENGINEER McCallum PFCA T 4946 2633	ELECTRICAL ENGINEER Electrical Projects Australia T 4967 5999	ARCHITECT Schreiber Hamilton Architecture T 4961 5888	SCHOOL INFRASTRUCTURE School Infrastructure NSW	BUILDING CONTRACTOR AW EDWARDS T 9958 1474

AMENDMENTS		
ISSUE	REASON FOR ISSUE	DATE
A	60% SUBMISSION	9.11.22
B	90% SUBMISSION	6.12.22
C	FOR SECTION 68	7.12.22

ISSUE	REASON FOR ISSUE	DATE

NOTES

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DO NOT SCALE DRAWING

CLIENT NAME
SCHOOL INFRASTRUCTURE NSW

SCALE
1 : 200 @A1

STATUS
NOT FOR CONSTRUCTION

PROJECT NAME AND ADDRESS
PORT MACQUARIE-HASTINGS PCYC HASTINGS SECONDARY COLLEGE

DRAWING TITLE
STORMWATER PLAN

DRAWN	APPROVED
R.G.	R.B./D.P.

PROJ. NO.	DRAWING NO.	REV.
669	CV-DRG 0030	C

mpc consulting engineers civil+structural
Level 1,
16 Telford Street,
NEWCASTLE EAST, NSW 2300
PO BOX 553
THE JUNCTION, NSW 2291
Tel: (02) 4927 5566
Fax: (02) 4927 5577
Email: admin@mpceng.com.au
Web: www.mpceng.com.au
A.C.N. 098 542 575

MPC Project Number: 220313

Appendix I

Previously Approved Site Plan

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application: SSD-11920082 Signed: JC

Granted on: 1 December 2021 Sheet: 1 of 39

OXLEY OVAL
7054
DP 107417

OXLEY OVAL
SCHOOL SPORTS FIELD

CARPARK

DRIVEWAY

BOUNDARY 168.295

D010506
DEMOUNTABLE

D013043
DEMOUNTABLE

BUILDING T
EXISTING
REFURBISH EXISTING 1 STOREY BUILDING

BIN ENCLOSURE & MECH PLANT

BURRAWAN DRIVEWAY

VEHICLE ACCESS

ENTRY

AREA UNDER ALTERNATIVE PLANNING PATHWAY

BOUNDARY 115.185

BOUNDARY 60.82

EXISTING OUTDOOR BASKETBALL COURTS

PLAYING FIELD

BUILDING L
EXISTING
TWO STOREY
BRICK METAL ROOF
PROPOSED INTERNAL REFURBISHMENT

EXISTING SPORTS COURT

TAS FORECOURT
NEW LANDSCAPING

TAS
NEW 1 STOREY BUILDING

TAS REAR ACCESS LANE

PLAYING FIELD

UNDERCOVER COURT
EXISTING

BUILDING L
EXISTING
PROPOSED INTERNAL REFURBISHMENT

COVERED WALKWAY - NORTH SOUTH LINK
PROPOSED NEW BUILD

PROPOSED NEW LINK

BUILDING B
EXISTING
TWO STOREY BRICK METAL ROOF
PROPOSED PARTIAL INTERNAL REFURBISHMENT

WATER TANKS

CANTEEN

COLA
EXISTING
COVERED EXTERNAL AREA

BUILDING A
EXISTING
TWO STOREY BRICK WITH METAL ROOF

TEMPORARY DEMOUNTABLES TO BE REMOVED UNDER ALTERNATIVE PLANNING PATHWAY

PROPOSED BICYCLE PARKING
152 SPACES

5.015

PCYC
PROPOSED NEW BUILD
NEW 2 STOREY
BRICK BUILDING
WITH METAL ROOF

PORT CITY BOWLING CLUB

BOUNDARY 44.97

MPC HALL
EXISTING
SINGLE STOREY BRICK BUILDING
METAL ROOF

OUTDOOR TERACE

CAPA
PROPOSED NEW BUILD
NEW 2 STOREY
BRICK BUILDING
WITH METAL ROOF

COVERED ENTRY WALKWAY
PROPOSED NEW BUILD

ENTRANCE

SINGLE STOREY BRICK METAL ROOF

BOUNDARY 130.15

BOUNDARY 74.225

BOUNDARY 201.145

BURRAWAN STREET

BUS ZONE

OWEN STREET

OWEN STREET

ON-GRADE CARPARK

No. 1

GORDON STREET

No. 13-15

No. 17-19

No. 21

No. 23

No. 25-35
OXLEY COVE APARTMENTS

No. 37

No. 18-20

No. 22

No. 24

No. 26

No. 28

No. 32

No. 34

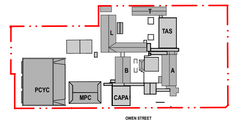
No. 36

0 5 10 20m

GENERAL NOTES

- ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY THE CONTRACTOR BEFORE PROCEEDING WITH THE WORK.
- ALL LEVELS RELATIVE TO 'AUSTRALIAN HEIGHT DATUM'.
- DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY.

keyplan



legend

- BOUNDARY LINE
- AREA UNDER ALTERNATIVE PLANNING PATHWAY
- PROPOSED REFURBISHMENT
- NEW CONSTRUCTION
- EXISTING TREES
- PROPOSED TREES

rev	date	name	by	chk
05	14/4/21	SSDA	MJ	
04	26/3/21	SSDA	KT	
03	19/3/21	SSDA - Consultant Background Issue	AD	
02	23/2/21	Draft SSDA 02	KT	
01	12/2/21	Draft SSDA	MJ	

fjmt studio architecture interiors landscape urban community
sydney melbourne uk
Level 5, 70 King Street t +61 2 9251 7077 w fjmtstudio.com

project
Hastings Schools Port Macquarie
Hastings Secondary College
Port Macquarie NSW 2444

title
Site
Site Plan - Proposed

scale	1:500 @ A1	first issued	12/2/21
project code		sheet no.	revision
HSPM		SSDA-120010	05

APPENDIX D – BUILDING B AND L

Building B and L

Hastings Secondary College Building B and L scope involves the refurbishment of classrooms on the first floor of building B and student amenities on the ground floor of building L. No alterations to stormwater occur and works are limited to the internal envelops of each building. Earthworks are limited to minor internal sanitary drainage for new amenities to the undercover area of Building L.

The small quantity of stockpile <7m3 of soil during these works need be managed in accordance with SD4.1 and appendix B of this document. Existing Stormwater pits located in the concrete quadrangle adjacent to the construction zone need sediment control installed in accordance with Appendix B and monitored during construction. Vigilance of existing stormwater during and after rain events need be taken by Site management.