SECTION 4

WATER SENSITIVE URBAN DESIGN

CASEY STANDARD WATER SENSITIVE URBAN DESIGN DRAWINGS REQUIREMENTS

CLAUSE 56 OF THE PLANNING SCHEME REQUIRES THAT ALL NEW DEVELOPMENTS COMPLY WITH BEST PRACTICE STORMWATER QUALITY OBJECTIVES AS STATED IN THE URBAN STORMWATER BEST PRACTICE ENVIRONMENTAL GUIDELINES (1999). THIS DRAWING SET HAS BEEN PREPARED TO AID CONSULTANTS AND DEVELOPERS IN REGARD TO MEETING THIS REQUIREMENT.

THE DRAWINGS CONTAINED IN THIS SET ARE NOT EXHAUSTIVE. CHANGES AND ADDITIONS CAN BE MADE TO SUIT DIFFERENT SITE REQUIREMENTS AND PROJECTS PROVIDED COUNCIL AGREES TO THESE CHANGES. THE AIM OF THE DRAWING SET IS TO CREATE SUCCESSFUL, LOW MAINTENANCE WSUD PROJECTS WHICH WILL BE SELF SUSTAINING WELL INTO THE FUTURE AND WHICH WILL SUPPLEMENT THE LOCAL LANDSCAPE AND ECOLOGY OF URBAN ENVIRONMENTS.

DESIGN

1. AS INDICATED ON THE STANDARD DRAWINGS DIMENSIONS OF SWALES AND ROAD RESERVE WIDTHS ARE MINIMUM ONLY. THE DESIGNER IS RESPONSIBLE FOR SIZING THE SWALES TO CATER FOR THE 5 YEAR ARI FLOW AND UNDERGROUND PIPE SYSTEM FOR BOTH WATER QUALITY TREATMENT. THE TOTAL ROAD RESERVE MUST BE DESIGNED TO HANDLE A 100 YEAR EVENT.

2. THE DESIGNER IS DIRECTED TO USE THE MELBOURNE WATER CORPORATION W.S.U.D. ENGINEERING PROCEDURES (STORMWATER) MANUAL TO ADEQUATELY SIZE SWALES, BIORETENTION AND NODAL SYSTEMS. DRAINAGE SYSTEM TO CATER FOR RUNOFF FLOWS FROM AUSTRALIAN RAINFALL AND RUNOFF

3. SWALES CANNOT BE USED IN DRAINAGE EASEMENTS WITHIN LOTS UNDER ANY CIRCUMSTANCES.

4. SOIL TESTS TO OCCUR PRIOR TO THE DESIGN OF W.S.U.D ELEMENTS. W.S.U.D ELEMENTS MAY NOT BE USED UNDER ANY CIRCUMSTANCES IN AREAS WITH CLAY SUBSURFACES.

4. THE DESIGNER MUST MAKE PROVISION FOR THE FLUSHING OUT AND/OR RODDING OF THE BIORETENTION SYSTEMS PERFORATED PIPES.

5. EARTHWORKS CONSTRUCTION TOLERANCES SHALL BE +/- 10-20 mm.

6. IF LOT DENSITIES ARE SUCH THAT LOT FRONTAGES ARE LESS THAN 14 - 15m STREETSCAPE SYSTEMS ARE CONSIDERED INAPPROPRIATE AND THE DESIGNER IS DIRECTED TO PROVIDE A NODAL END OF LINE TREATMENT.

7. ALL CULVERT CROSSING AND INLETS TO THE PIPE SYSTEM DOWN STREAM OF BIORETENTION SWALES ARE TO BE SET 100mm ABOVE THE INVERT OF THAT SWALE TO FACILITATE PONDING.

8. THE IMPERVIOUS MEMBRANE SURROUNDING THE LOWER SECTION OF THE BIORETENTION TRENCH IS NOT REQUIRED IF THE TRENCH IS GREATER THAN 2.40m OFFSET FROM THE BACK OF KERB AND THE SURROUNDING GROUND IS NON DISPERSIVE.

9. EVEN THOUGH VELOCITIES WITHIN THE SWALE SYSTEM SHOULD BE MINIMAL, TO ACHIEVE SUITABLE WATER QUALITY TREATMENT, THE DESIGNER SHOULD CONSIDER ROCK BEACHING EROSION PROTECTION AROUND INLET AND OUTLET STRUCTURES.

10. EROSION PROTECTION IS TO BE PROVIDED ON BOTH SIDES OF, SWALES IMMEDIATELY AFTER TOP SOILING, IN THE FORM OF A 1.0m WIDE STRIP OF INSTANT TURF. REFER DETAIL PROVIDED.

LANDSCAPING NOTES:

1, LANDSCAPE DESIGNERS ARE DIRECTED TO USE THE RECOMMENDED PLANT LIST PROVIDED IN THE MELBOURNE WATER CORPORATION WSUD ENGINEERING PROCEDURES : STORMWATER MANUAL.

2. COUNCILS LANDSCAPE SECTION MUST APPROVE THE PLANT SPECIES PRIOR TO CONSTRUCTION..

3. TREE ROOT BARRIERS ARE TO BE PROVIDED WHERE TREES ARE IN THE VICINTIY OF BIORETENTION TRENCHES. "TREEMAX TYPE 1400" OR EQUIVALENT IS TO BE USED.

4. WHERE PLANTED SWALES OR BIORETENTION SWALES ARE ADJACENT TO EXOTIC FLORA, HARD WOOD EDGING SHALL BE SUPPLIED TO DELINEATE A MAINTENANCE EDGE.

5. VEGETATED BIORETENTION SWALES ARE TO BE TOPSOILED TO A MINIMUM DEPTH OF 200mm.

CITY OF CASEY

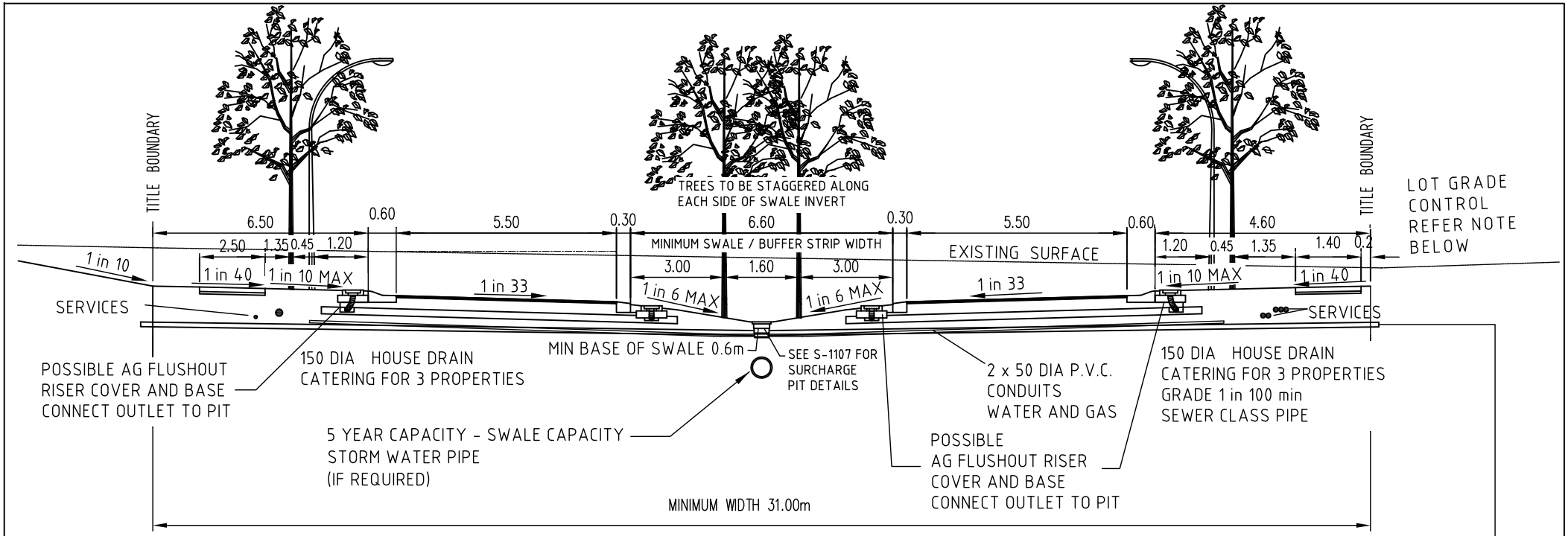
WATER SENSITIVE URBAN DESIGN
NOTES AND CONSTRUCTION REQUIREMENTS

AMENDMENTS:

MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

S-1101



NOTES

1. KERB AND CHANNEL TO BE OUTFALL TRAY AS PER VICROADS SM3 AND MEDIAN KERB TO BE SEMI MOUNTABLE KERB AND CHANNEL(VICROADS SM1)
2. REFER TO CODE OF PRACTICE FOR COORDINATION OF STREET WORKS, VICTORIA FOR SERVICE LOCATION.
3. W.S.U.D ELEMENTS DESIGNED AS PER REQUIREMENTS OF CASEY STD S-1100 AND MELBOURNE WATER CORPORATION WSUD ENGINEERNG PROCEDURES "STORMWATER MANUAL"
4. REFER TO CASEY STD S-1106 FOR FILTER MATERIAL SPECIFICATIONS
5. REFER TO CASEY STD S-1107 FOR SURCHARGE PIT DETAIL
6. GUARD RAIL TO BE PROVIDED AS PER VIC ROAD CLEAR ZONE REQUIREMENTS

DIRECT STORM WATER FROM LOW SIDE ONLY WHEN EXISTING SURFACE FALLS AWAY AT 1 in 150 OR LESS AND FOOTPATH MATCHES EXISTING SURFACE ON THIS SIDE. OTHERWISE DIRECT STORM WATER TO CONVENTIONAL DRAINAGE AT REAR.

CITY OF CASEY

MEDIAN SWALE AT GRADE

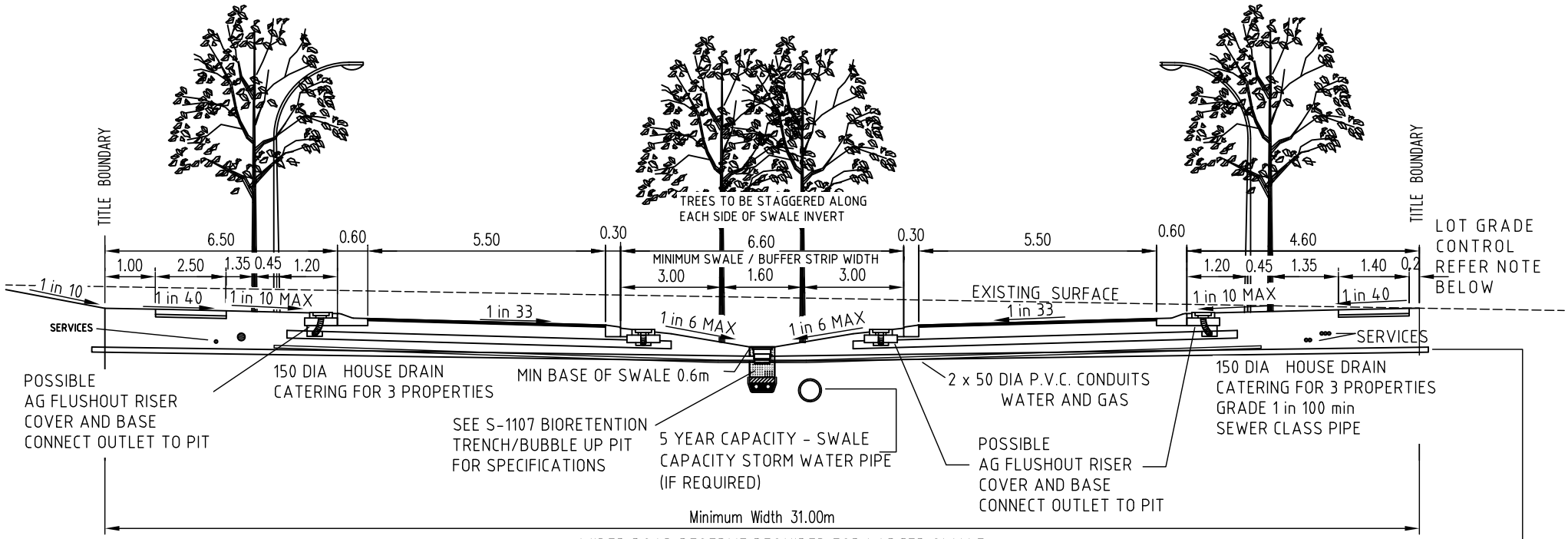
COLLECTOR ROADS (31.00m ROAD RESERVE)

AMENDMENTS:

MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

S-1102



NOTES

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3. W.S.U.D ELEMENTS DESIGNED AS PER REQUIREMENTS OF CASEY STD S-1101 AND MELBOURNE WATER CORPORATION WSUD ENGINEERNG PROCEDURE "STORMWATER MANUAL"
4. REFER TO CASEY STD S-1106 FOR FILTER MATERIAL SPECIFICATIONS
5. REFER TO CASEY STD S-1107 FOR BIORETENTION TRENCH DETAIL
6. GUARDRAIL TO BE PROVIDED AS PER VIC ROADS CLEAR ZONE REQUIREMENTS

DIRECT STORM WATER FROM LOW SIDE ONLY WHEN EXISTING SURFACE FALLS AWAY AT 1 in 150 OR LESS AND FOOTPATH MATCHES EXISTING SURFACE ON THIS SIDE. OTHERWISE DIRECT STORM WATER TO CONVENTIONAL DRAINAGE AT REAR.

CITY OF CASEY

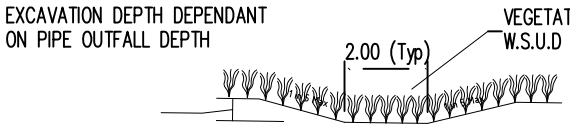
MEDIAN BIORETENTION SWALE
COLLECTOR ROADS (31.00m ROAD RESERVE)

AMENDMENTS:

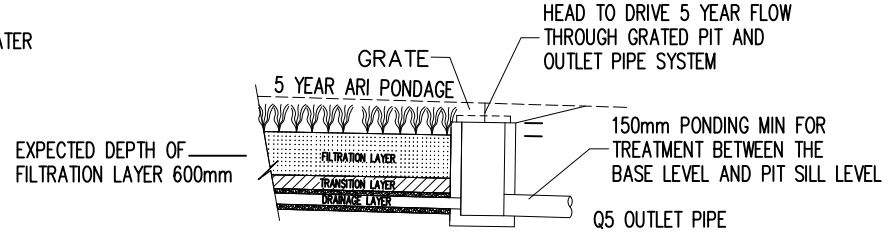
MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

S-1103



SECTION B – B
GRASSED SWALE



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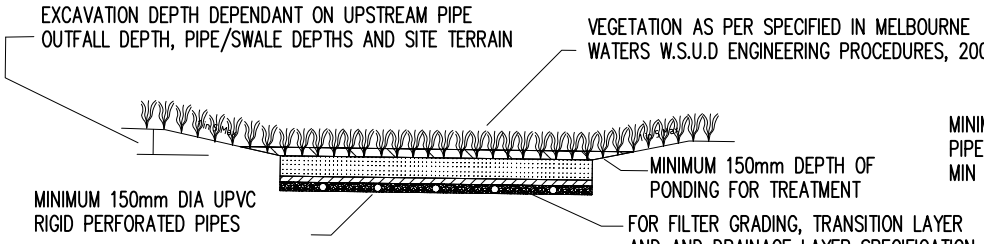
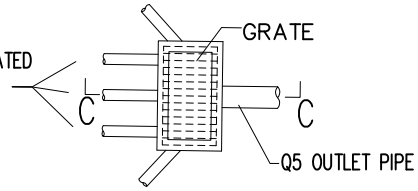
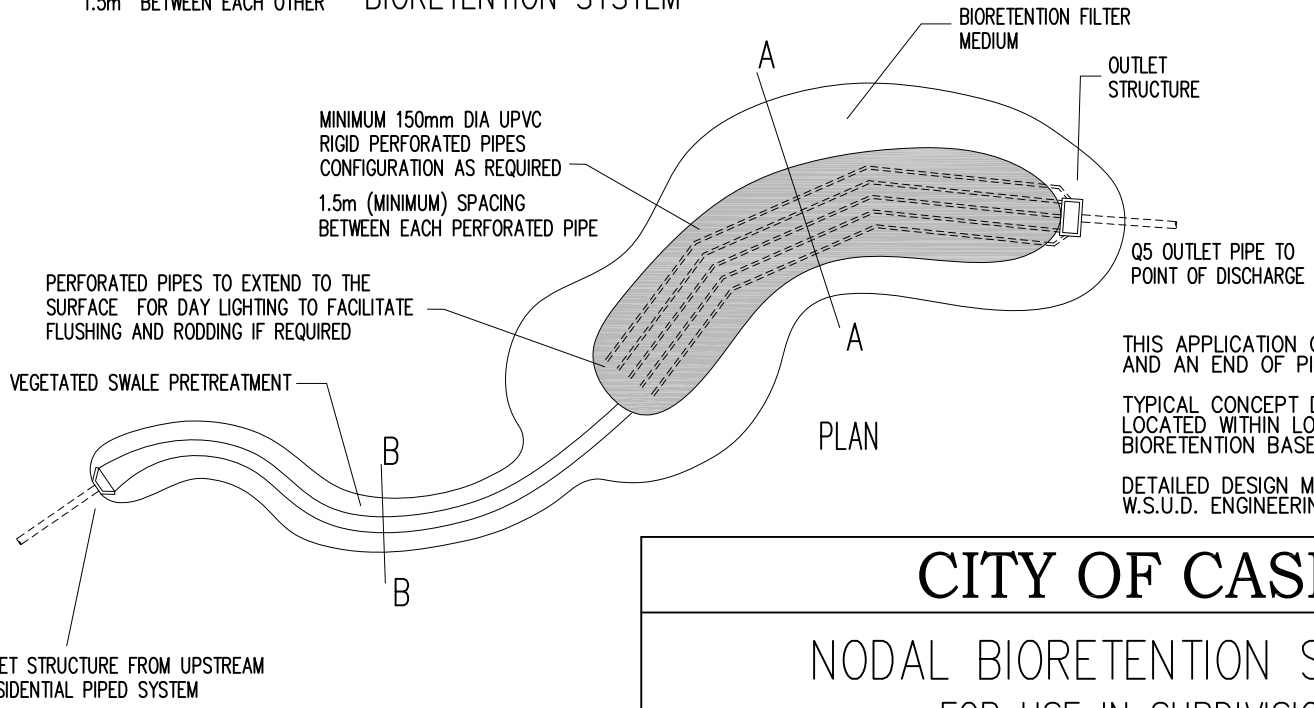


SECTION A – A
BIORETENTION SYSTEM



PLAN
OUTLET STRUCTURE



PLAN

NODAL BIORETENTION SYSTEM BASE AREA SHAPE AND STORAGE AREA SHAPE VARY DEPENDING ON SITE CONSTRAINTS, APPLICATION AND LANDSCAPE CONSIDERATIONS. THE BASE AREA MUST BE SIZED TO MEET CLAUSE 56 REQUIREMENTS IN REGARD TO STORMWATER POLLUTANT TREATMENT. PERFORMANCE CAN INCLUDE THE PERFORMANCE OF THE UPSTREAM SWALE SYSTEM IN A TREATMENT TRAIN SENSE.

THIS APPLICATION CAN BE USED WHEN STREETSCAPE APPLICATIONS ARE NOT FEASABLE AND AN END OF PIPE TREATMENT FACILITY IS REQUIRED.

TYPICAL CONCEPT DESIGN "END OF LINE" NODAL BIORETENTION SYSTEMS. TYPICALLY LOCATED WITHIN LOCAL PARKS. SYSTEM SIZE IN W.S.U.D. TREATMENT TABLE REFERS TO BIORETENTION BASE AREA.

DETAILED DESIGN MUST BE CONSISTENT WITH REQUIREMENTS OF MELBOURNE WATER'S W.S.U.D. ENGINEERING PROCEDURES, 2005.

CITY OF CASEY

NODAL BIORETENTION SYSTEMS
FOR USE IN SUBDIVISIONS

AMENDMENTS:

MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

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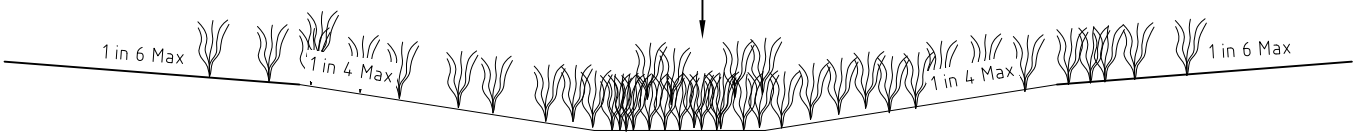
S-1104

EXAMPLE OF A TYPICAL APPLICATION

VEGETATION AS SPECIFIED IN THE MELBOURNE WATER W.S.U.D MANUAL FOR "BOULEVARD MEDIAN SWALE OR BIORETENTION SYSTEM"

DENSE PLANTING OF SEDGES AND RUSHES IS REQUIRED. (4 – 6 PLANTS PER SQ.M.) ROCK WORK ONLY REQUIRED IN LOCALISED AREAS FOR LANDSCAPE TREATMENT (AS REQUIRED BY THE LANDSCAPE ARHITECT) OR AT INLET LOCATIONS (PIPE INLETS, BUBBLE UP PIT LOCATIONS, ETC) FOR EROSION PROTECTION. ROCK SPALLS WHEN USED TO BE NO LESS THAN 50mm IN DIA.



BASE WIDTH OF SWALE SHOULD BE 2m (TYP) OR AS REQUIRED TO CONTAIN THE 5 YEAR ARI EVENT (MANNINGS N =0.3 FOR TOTALLY VEGETATED SYSTEM).

SECTION VIEW
NOT TO SCALE

CITY OF CASEY

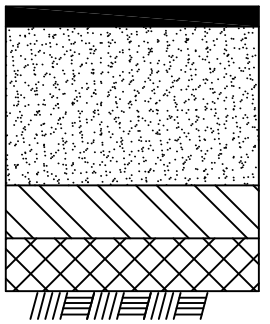
EPHEMERAL SWALE
FOR USE IN RESERVES

MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

S–1105

AMENDMENTS:



MULCH	50mm (TYP) STONE AGGREGATE 5–13mm NO FINES
FILTER	600mm (TYP) min WASHED SAND WITH AMELIORATION TO TOP 75mm HYDRAULIC CONDUCTIVITY 100 – 200mm/hr (TYP) SEE SAND SPECIFICATION BELOW
TRANSITION LAYER	100mm (TYP) SAND / COARSE SAND
DRAINAGE LAYER	100mm (TYP) COARSE SAND OR FINE GRAVEL 2mm – 7mm
EXISTING SUBGRADE	COMPACTED TO 95% (STD)

BIORETENTION FILTER LAYERS
MATERIAL
NOT TO SCALE

1. pH 6.0 – 7.0
2. SALT (ppm) < 500
3. PARTICLE SIZE (% RETAINED)

Fine Gravel (>2mm)	0
Very Coarse Sand (1mm)	< 10
Coarse Sand (0.5mm)	20–30
Medium Sand (0.25mm)	40–75
Fine Sand (0.106mm)	< 30
Very Fine Sand (0.053mm)	< 15
Silt & Clay (<0.053mm)	< 5

NOTE: Combined % RETAINED OF COURSE, MEDIUM AND FINE SAND SHALL EXCEED 75%

4. HYDRAULIC CONDUCTIVITY (mm/hr) 300 – 400

THE HYDRAULIC CONDUCTIVITY IS TO BE MEASURED USING A SATURATED HYDRAULIC CONDUCTIVITY TEST.
THE pH OF THE TURF SAND IS TO BE AMENDED PRIOR TO DELIVERY TO BE WITHIN THE RANGE OF pH 6.0 – 7.0
ALL MATERIALS ARE TO BE TESTED AND APPROVED BY AN APPROVED LABORATORY, PRIOR TO DELIVERY

FILTER SAND SPECIFICATION

1. SPECIFICATION SHOWN IS BASED ON RECOMMENDATIONS WITHIN "REVIEW OF STREETSCAPE WSUD IN MELBOURNE" BY Dr NICHOLAS SOMES AND MATTHEW POTTER, 2007" AND ARE SUBJECT TO CHANGE OVER TIME GIVEN FURTHER INVESTIGATION OF THESE SYSTEMS.

CITY OF CASEY

FILTER MATERIAL
WSUD STANDARD ELEMENT

AMENDMENTS:

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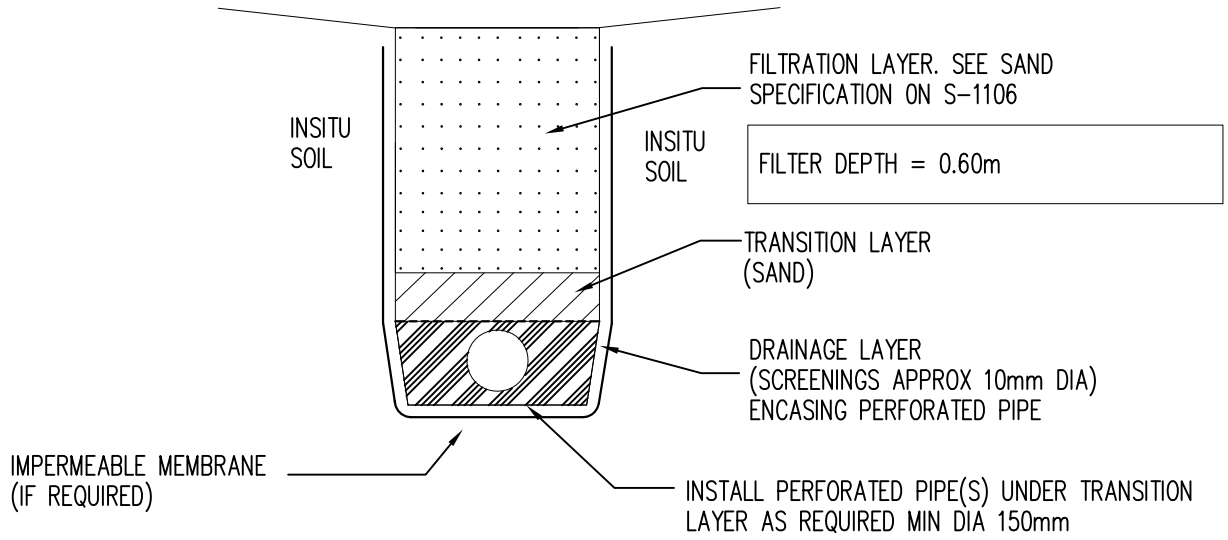
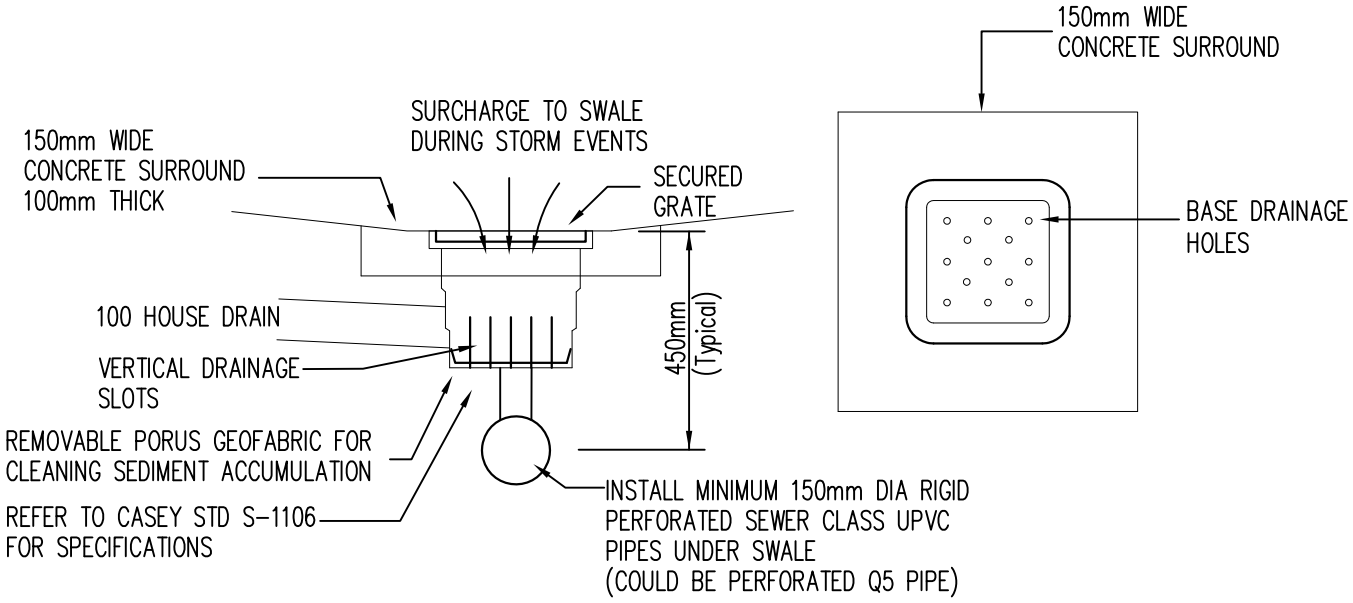
LAST UPDATE 09.11.2012

S–1106



BIORETENTION TRENCH

NOT TO SCALE



DETAILS OF SURCHAGE TO PIT TO SWALES AND BIORETENTION SYSTEMS

NOT TO SCALE

NOTE:
1. REFER TO CASEY STD S-1106 FOR FILTER MATERIAL SPECIFICATION

CITY OF CASEY

BIORETENTION TRENCH

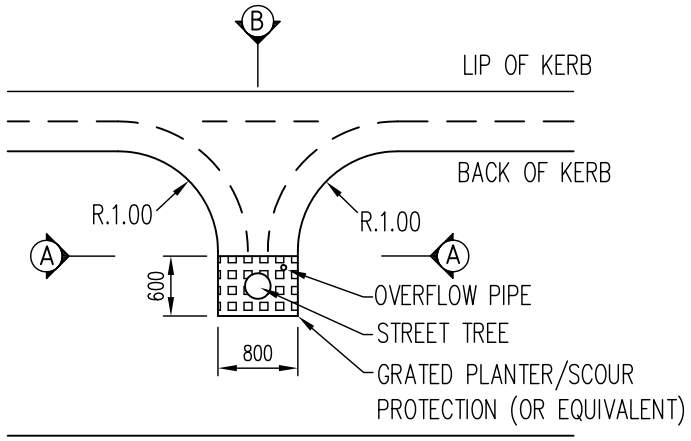
STANDARD ELEMENTS

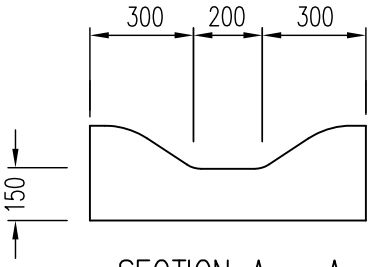
MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

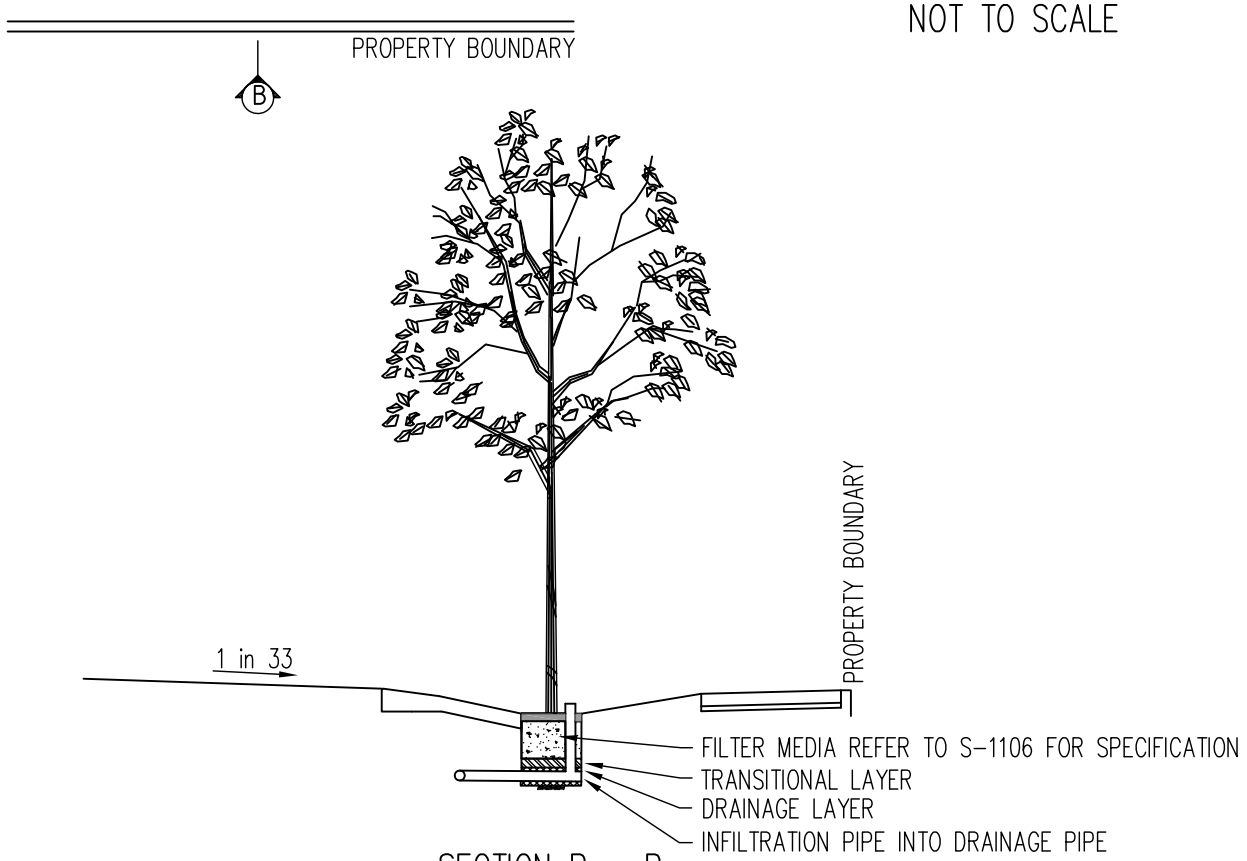
S-1107

AMENDMENTS:





SECTION A – A
NOT TO SCALE



SECTION B – B
NOT TO SCALE

NOTES:

1. MODIFIED KERB TO BE 150mm THICK CONCRETE F'C=25Mpa, SLUMP = 80mm MAX.
   ALL CONCRETE TO BE CONSTRUCTED ON 50mm COMPACTED DEPTH OF 20mm CLASS 3 FCR
2. REFER TO CODE OF PRACTICE FOR COORDINATION OF STREET WORKS, VICTORIA FOR SERVICE LOCATION.
3. REFER TO CASEY STANDARD DRAWING S–1106 FOR FILTER SPECIFICATION.

CITY OF CASEY

BIORETENTIONTION TREE PLANTER SYSTEM

FOR USE IN LOCAL STREETS

AMENDMENTS:

MANAGER OF ENGINEERING & ENVIRONMENTAL SERVICES

LAST UPDATE 09.11.2012

S–1108