



Local Planning Policy 4.4 : Urban Water Management

Appendix 2

City Water Management Strategy: Volume 2

Water Sensitive Urban Design, Engineering Toolbox

June 2010





1. Introduction

In order to meet design criteria of reductions in TP, TN, TSS and gross pollutants as compared to developments in which water treatment is not undertaken, it is necessary to utilise a treatment train of water sensitive urban design best management practices.

This approach reduces risks of flooding to housing and infrastructure whilst maximising the potential for stormwater to be treated as a resource.

The hierarchy of water sensitive urban design principles is as follows:

1. Implement controls at or near the source to prevent pollutants entering the system and/or treat stormwater,
2. Install in-transit measures to treat stormwater and mitigate pollutants that have entered the conveyance system,
3. Implement end-of-pipe controls to treat stormwater, addressing any remaining pollutants prior to discharging to receiving environments.

Structural and non-structural strategies must be used in combination to achieve the required stormwater treatment outcomes.

The engineering design drawings (Figures 2453-1-0 to 2453-7-0) presented in this report show a range of possible structural best management practices that may be used in combination with others (including non-structural strategies) to form a treatment train.

The following flow diagram presents options for a treatment train of water sensitive urban design best management practices in increasing scale from residential and commercial lot to the whole development area.

Lot scale:

- On site soakage devices.
- Water-wise and Nutrient-wise landscaping,
- Maximise permeable surfaces,
- Porous pavements (Figure 2453-2-0)
- Amended topsoils,
- Landscaped infiltration structures (Figure 2453-5-0 to 2453-7-0)
- Hydrocarbon management and sediment traps, and
- Rainwater tanks for harvesting, detention and re-use.



BE A LEADER IN URBAN STORMWATER MANAGEMENT
Provide attractive and livable communities, reduce construction costs and maximise returns

- Maximise local infiltration**
Recharge local bores and reduce water quality and flooding problems:
 - Use vegetated swales
 - Use sited or perforated pipes and minimise use of piped drainage systems
 - Create vegetated buffer and filter strips
- Prevent runoff**
Slow the migration of rainwater from the catchment by retaining rainfall within property boundaries:
 - Use permeable surfaces
 - Use non hatched roads and carparks
 - Plant trees with large canopies over sealed surfaces such as roads and carparks
- Make use of seasonal wetlands**
Avoid summer algal blooms and ridge problems and maintain nature's water balance:
 - Retain seasonal wetlands and vegetation
 - No direct drainage to a wetland or its buffer
- Make the most of nature's drainage**
Cost effective, safe and attractive alternative to pipes & drains:
 - Retain natural channels and incorporate into Public Open Space and Multiple Use Corridors
 - Retain and restore riparian vegetation to improve water quality through infiltration
 - Create riffles and pools to improve water quality and provide refuge for local flora and fauna
- Convert drains into natural streams**
Benefit from natural storage of flood water and lower flow velocities:
 - Create streams with channel size suitable for maximum annual rainfall events
 - Accommodate large and infrequent storm events within the stream's floodplain



Estate scale:

- Waterwise landscaping and use of smart irrigation systems in public open space, retaining and restoring existing natural bushland wherever possible
- Retention/detention (including water quality treatment) areas integrated within POS, in accordance with the objectives and requirements of Elements 4 (Public Parkland) and 5 (Urban Water Management) of Liveable Neighbourhoods Edition 4 (2009) (Figure 2453-1-0),
- Retain existing waterways and aim to restore a pre-development ecology and channel morphology in new and existing waterways
- Stormwater storage and reuse schemes, and
- Non-structural BMPs such as interpretive signage, garden education programs, publishing a WSUD web-page for the estate, and inviting residents to engage with existing community catchment groups.

Street scale:

- Landscaped infiltration structures and raingardens (Figure 2453-5-0 to Figure 2453-7-0),
- Sediment traps,
- Porous pavements (Figure 2453-2-0), and
- Conveyance bioretention systems or swales (Figure 2453-3-0 and 2453-4-0)



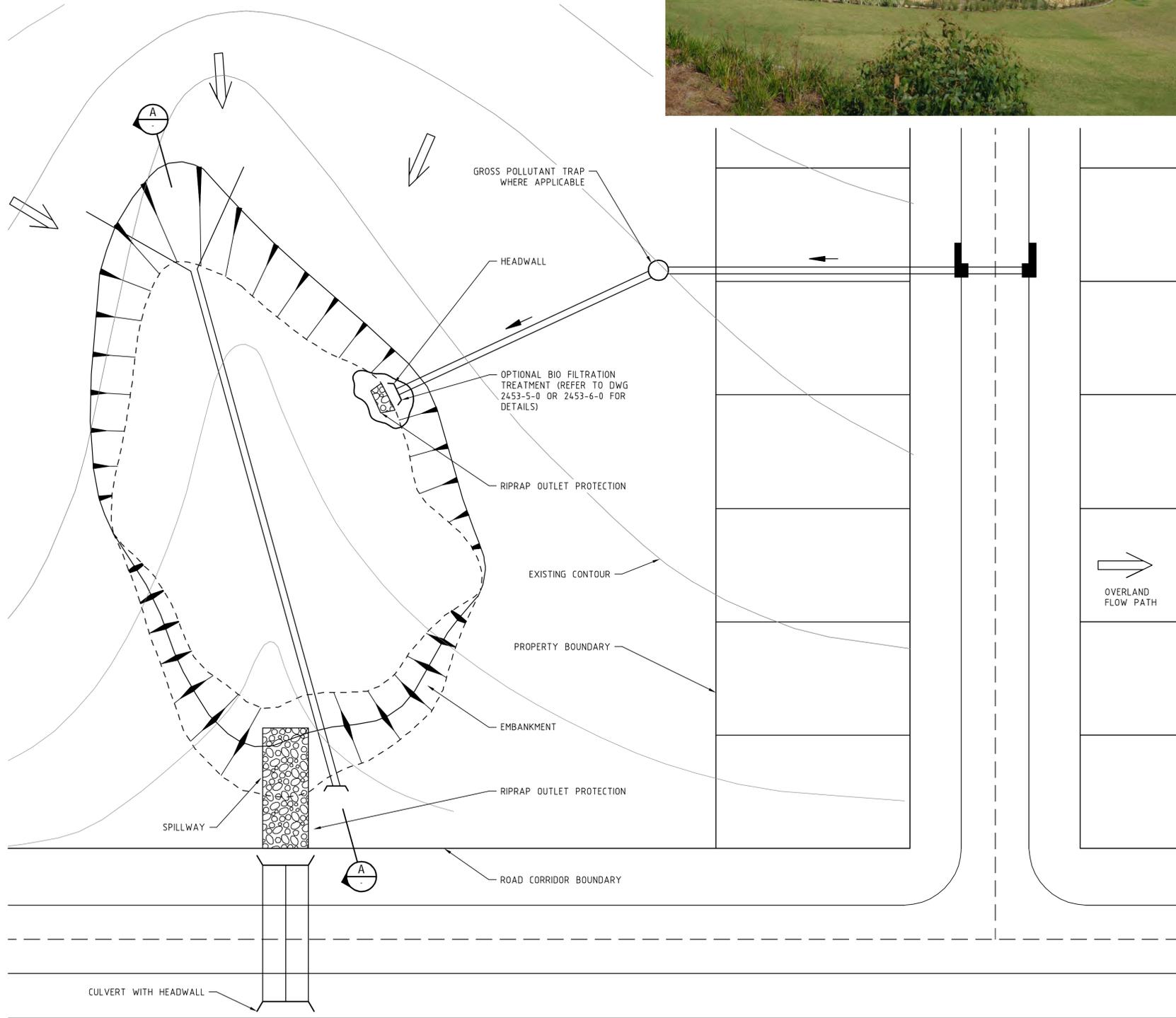
Area scale:

- Non-structural BMPs such as public education campaigns, support of local community catchment groups, installation of interpretive signage and webpages, and the adoption of appropriate planning principles including local laws for On-site Detention and Retention.

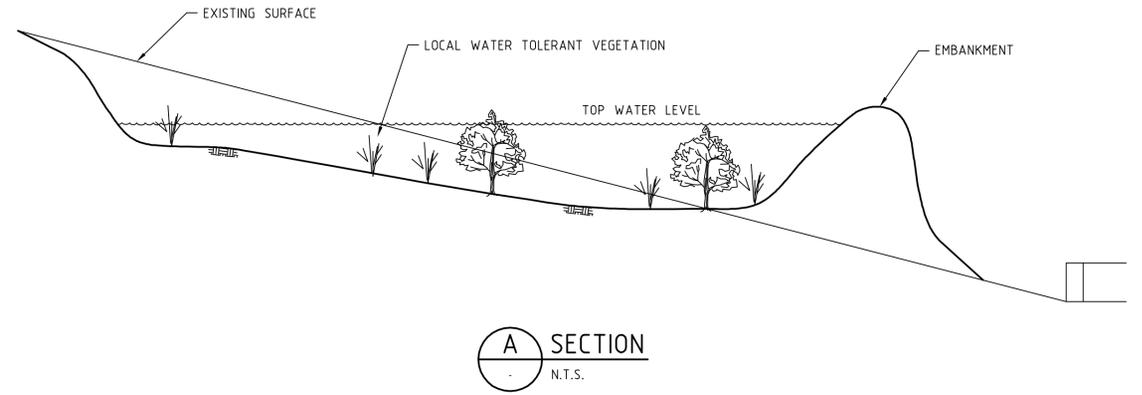




PHOTO OF TYPICAL INFILTRATION BASIN



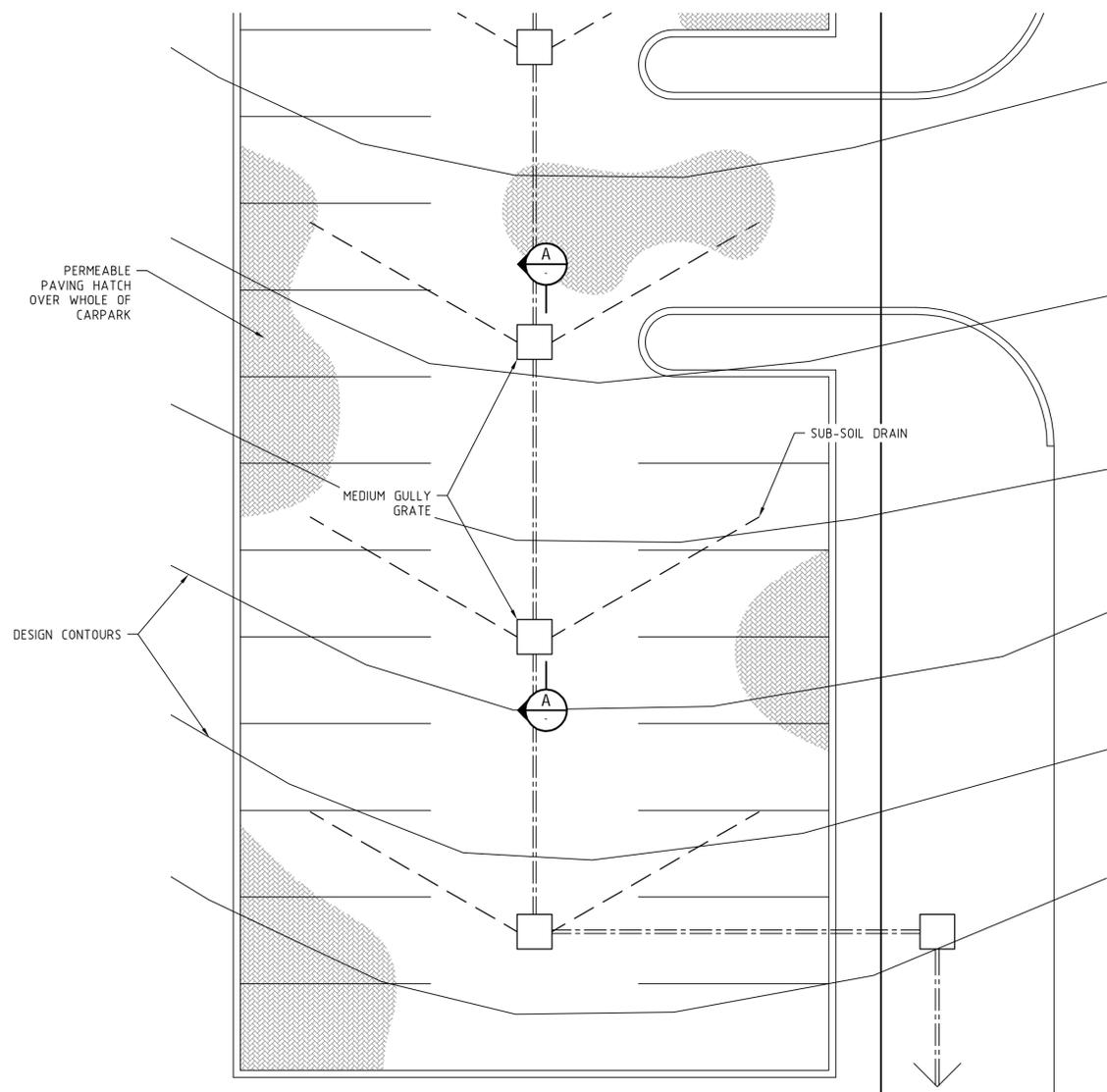
TYPICAL OFFLINE INFILTRATION BASIN
N.T.S.



- NOTES:
1. GROUNDWATER \geq 300MM FROM AAMGL
 2. EMPTYING TIME < 4 DAYS
 3. SIDE SLOPES SHOULD GENERALLY BE NO STEEPER THAN 1:6

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CITY WATER MANAGEMENT STRATEGY	
FIGURE 1	
TYPICAL OFFLINE INFILTRATION BASIN	
CITY OF WANNEROO	
DRAINAGE PLAN	
DRAWING No.	SHEET REVISION
2453 - 1 - 0	A1

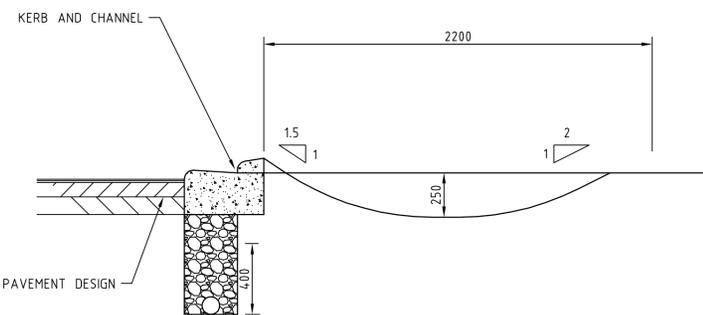
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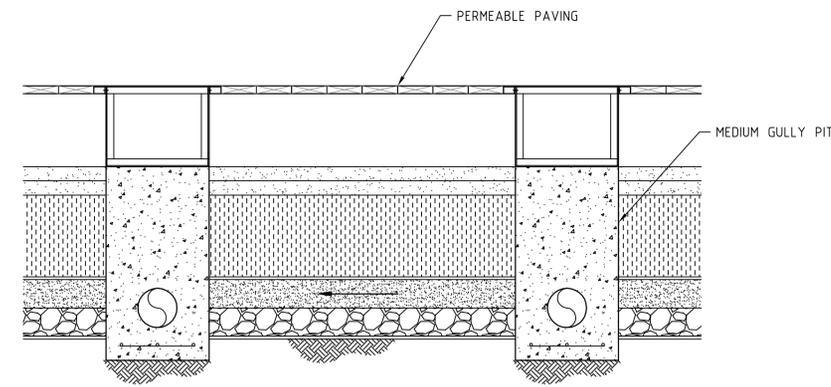
PLAN
SCALE 1:200



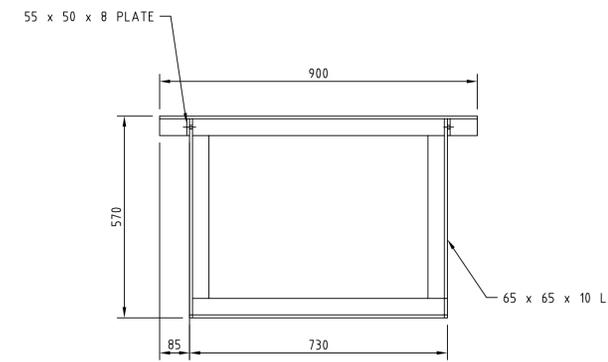
PHOTOS OF TYPICAL PERMEABLE PAVING



TYPICAL BOUNDARY SWALE
N.T.S.



A SECTION
N.T.S.



GRATE FRAME
N.T.S.

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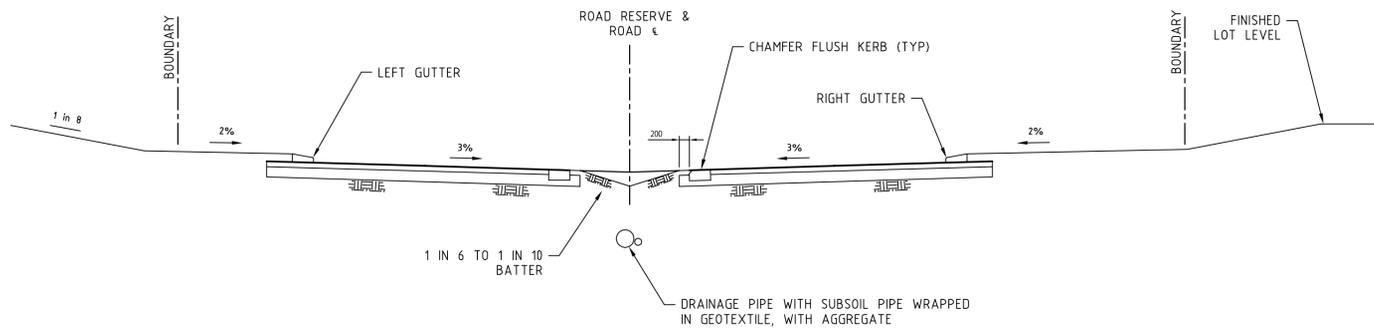
CITY WATER MANAGEMENT STRATEGY
FIGURE 2
TYPICAL CARPARK TREATMENT
CITY OF WANNEROO

DRAINAGE PLAN

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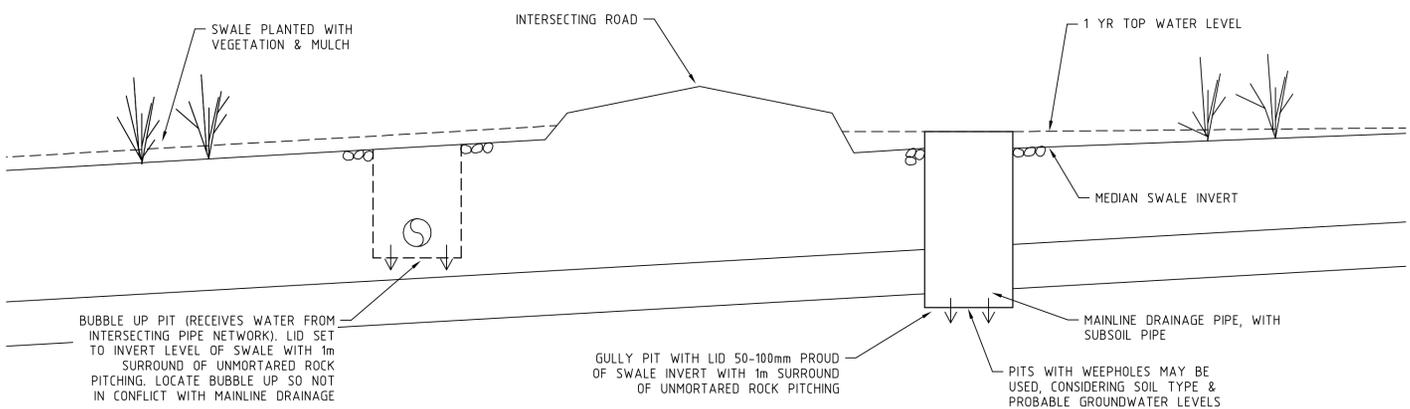


PHOTO EXAMPLE



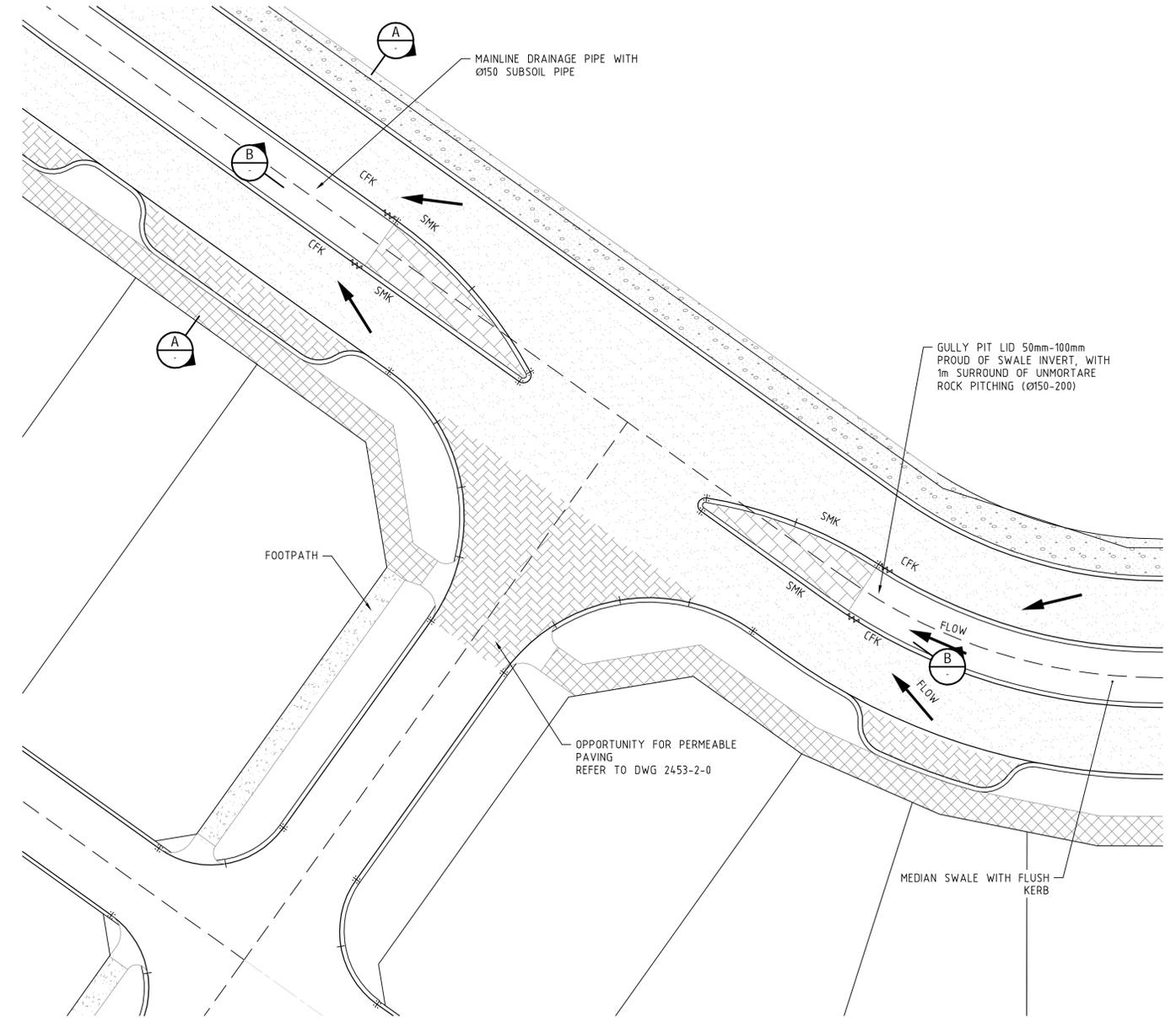
TYPICAL VEGETATED MEDIAN SWALE ROAD CROSS SECTION

A SECTION
N.T.S.



TYPICAL LONG SECTION OF VEGETATED MEDIAN SWALE AND ROAD INTERSECTION

B SECTION
N.T.S.



PLAN - TYPICAL MEDIAN SWALE
SCALE 1:200

LEGEND

- SMK SEMI MOUNTABLE KERB
- MK MOUNTABLE KERB
- FK FLUSH KERB
- CFK CHAMFER FLUSH KERB
- KERB TRANSITION

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CITY WATER MANAGEMENT STRATEGY

FIGURE 3
TYPICAL VEGETATED SWALE TREATMENT
CITY OF WANNEROO

DRAINAGE PLAN
SHEET 1 OF 2 - MEDIAN

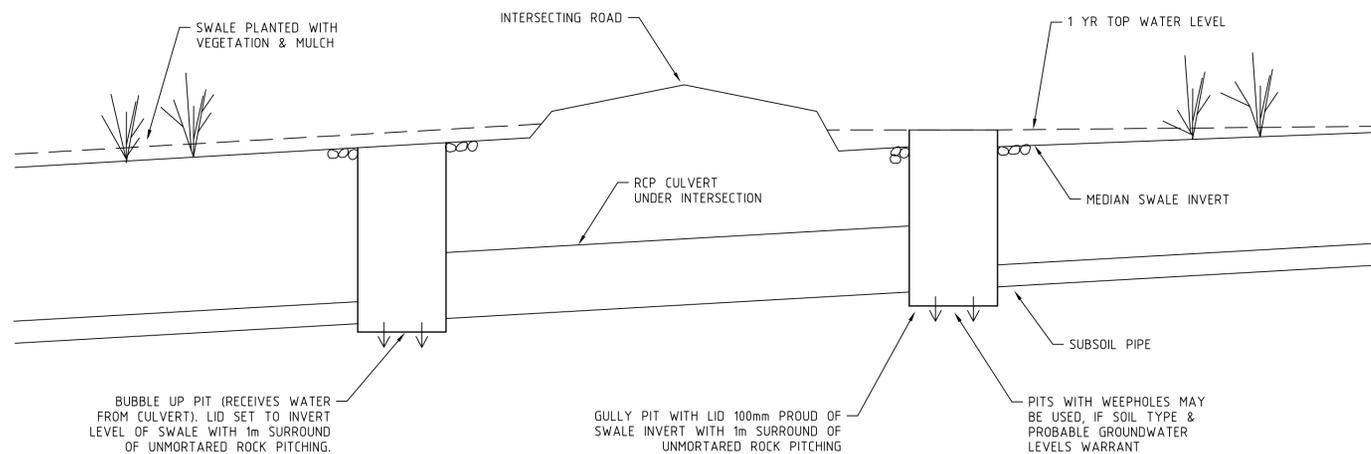
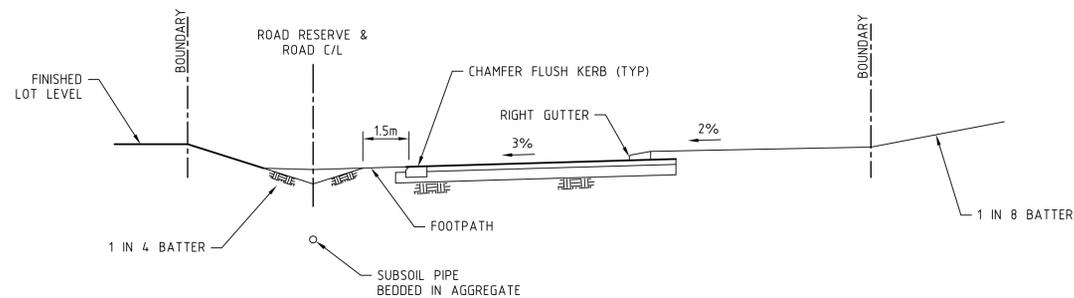
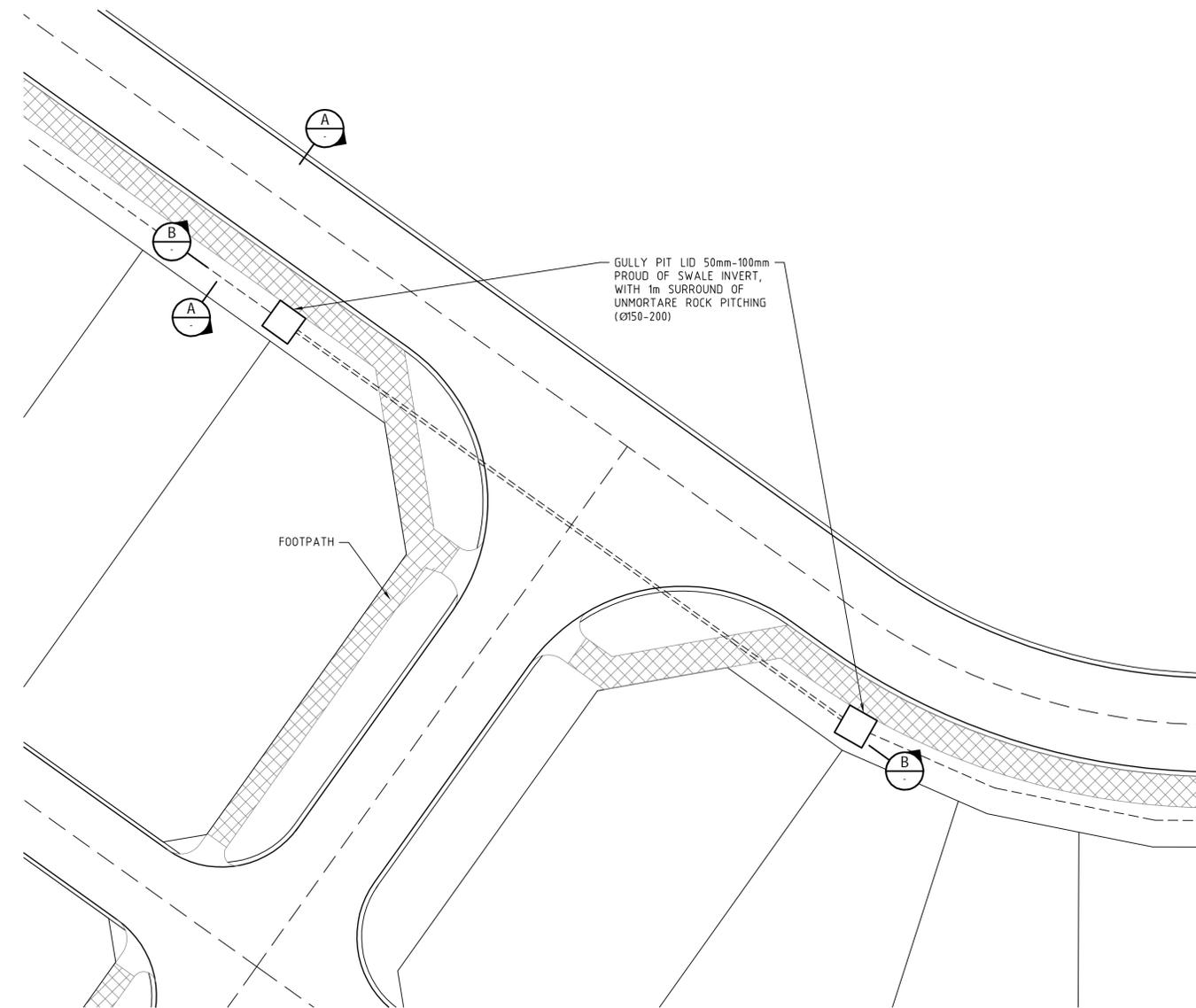
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PHOTO OF - TYPICAL VERGE SWALE



PHOTO OF - TYPICAL VERGE SWALE



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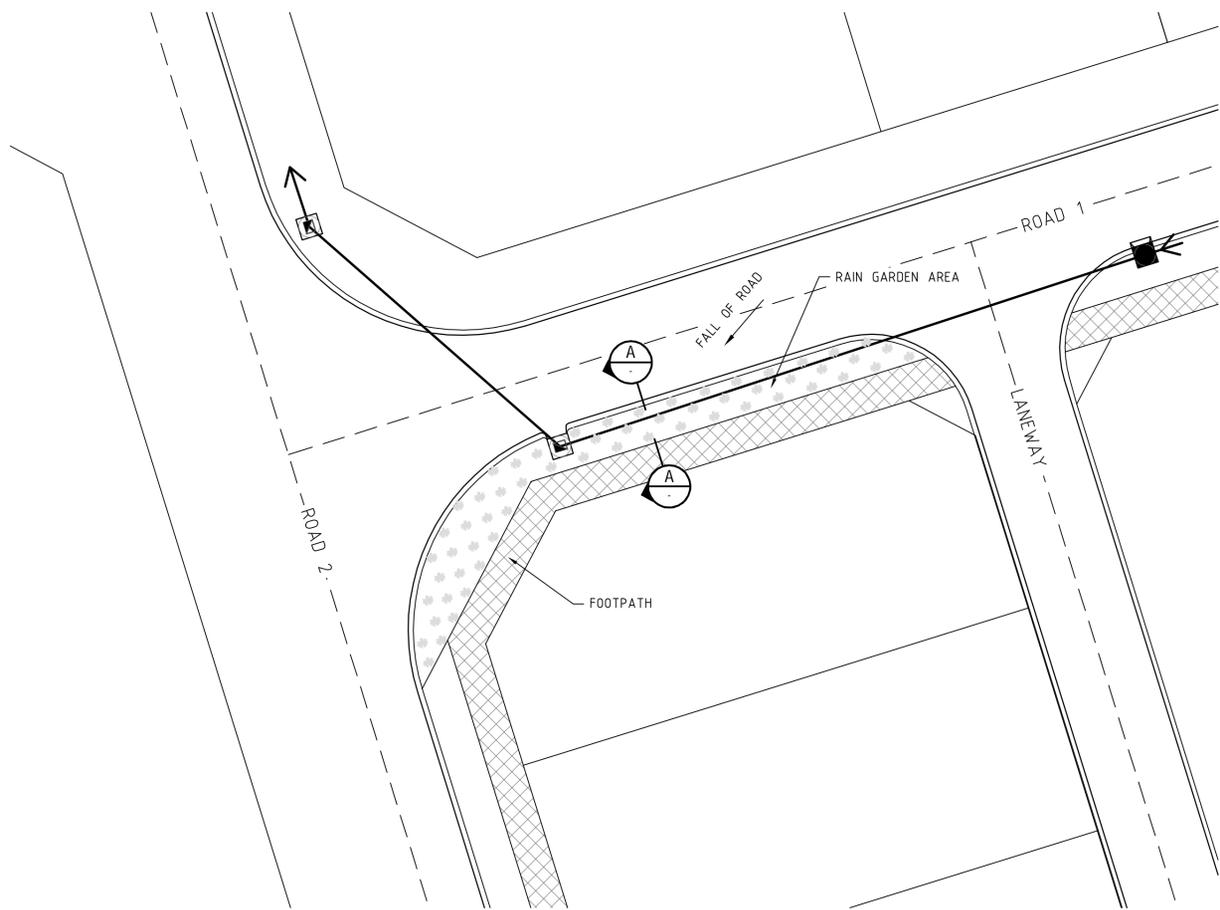
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CITY WATER MANAGEMENT STRATEGY
FIGURE 4
TYPICAL VEGETATED SWALE TREATMENT
CITY OF WANNEROO

DRAINAGE PLAN
SHEET 2 OF 2 - VERGE

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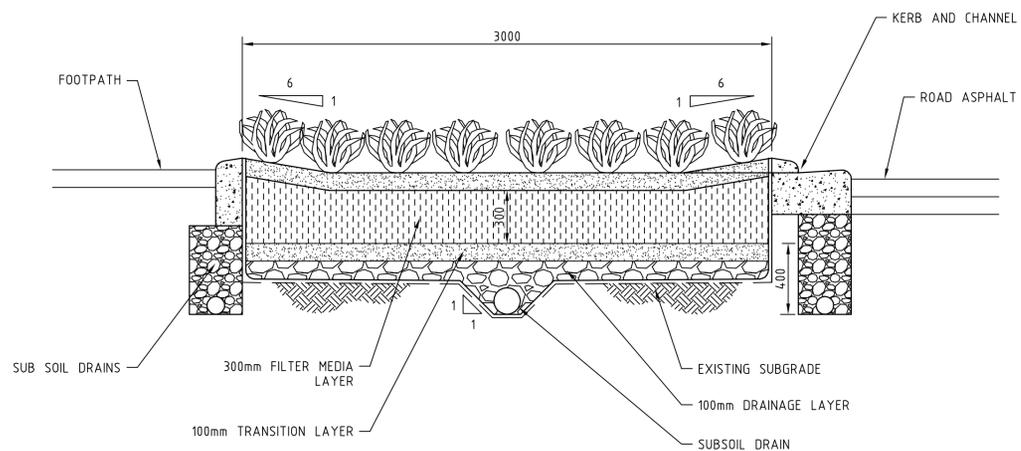
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PLAN
SCALE 1:200



PHOTO EXAMPLES

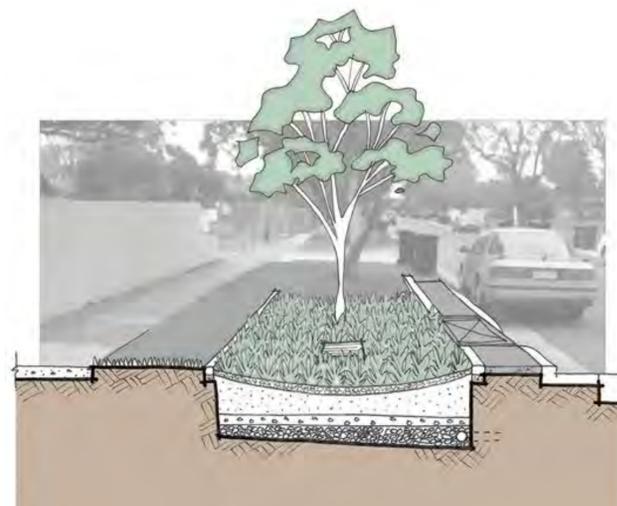


TYPICAL RAIN GARDEN

A SECTION
N.T.S.

NOTE:

CAN ALSO BE APPLIED IN TYPICAL OFFLINE INFILTRATION BASIN



SKETCHES

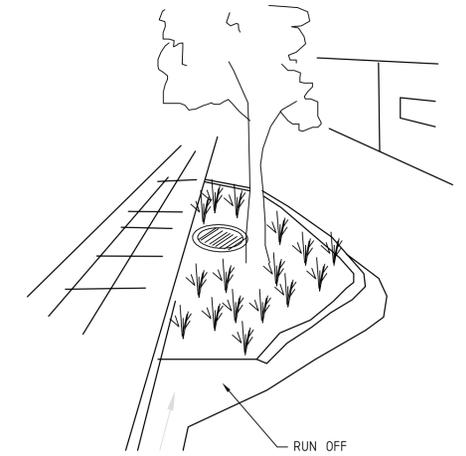
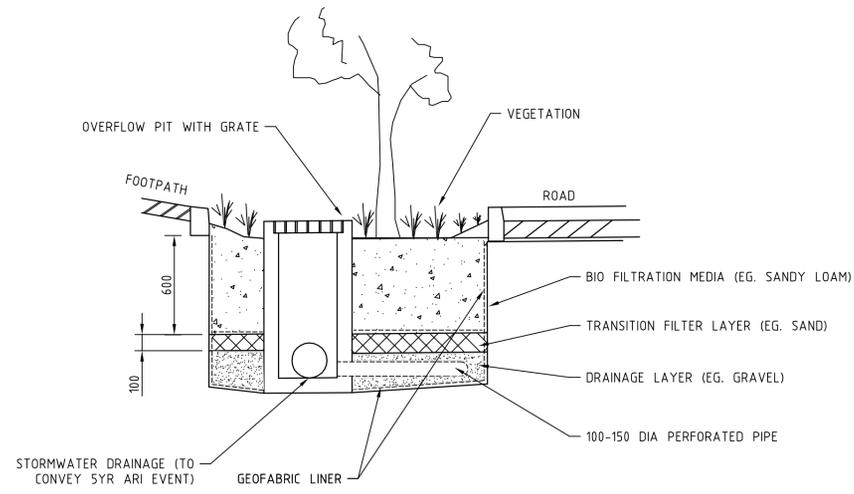
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CITY WATER MANAGEMENT STRATEGY	
FIGURE 5	
TYPICAL BIO FILTRATION TREATMENT	
CITY OF WANNEROO	
DRAINAGE PLAN	
SHEET 1 OF 3	
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PHOTO EXAMPLE OF BIO FILTRATION POCKET OR RAINGARDEN WITH SIDE ENTRY PIT

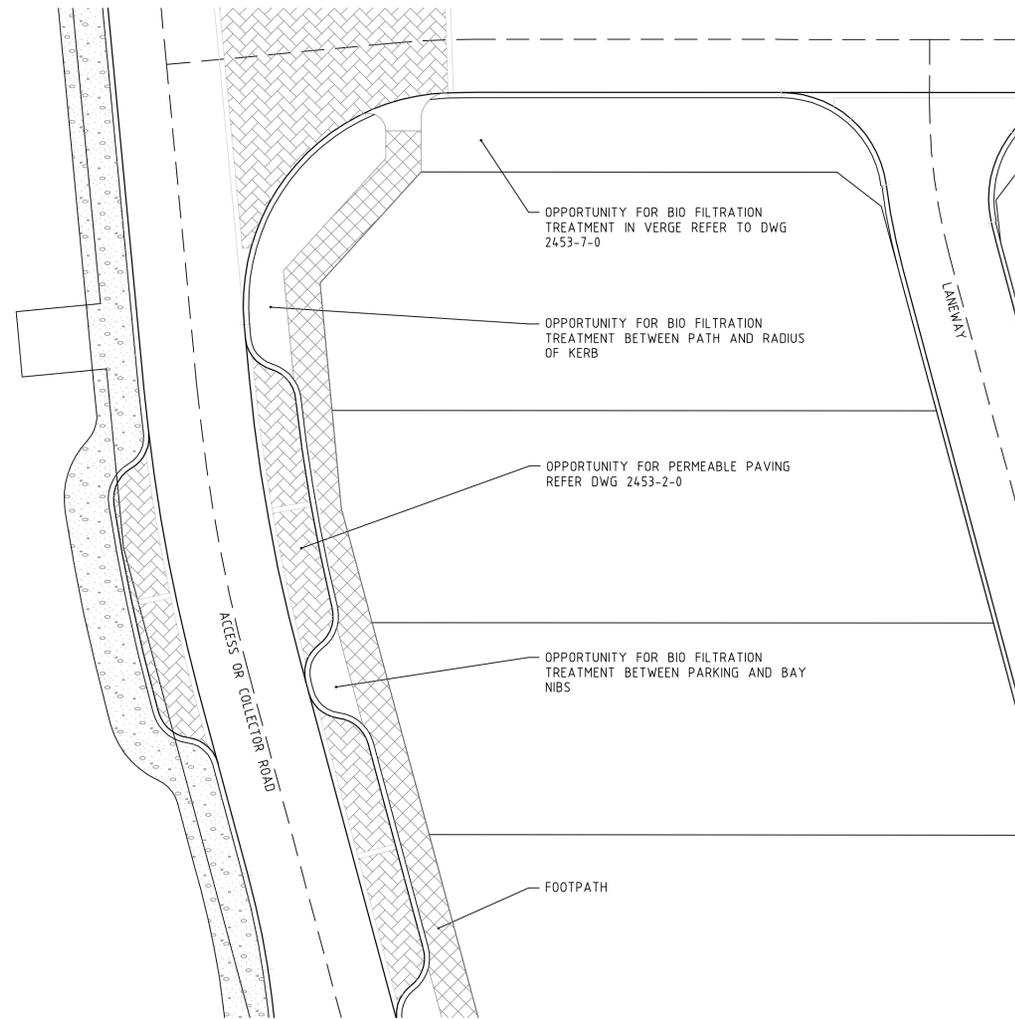


TYPICAL DETAIL OF BIO FILTRATION POCKET OR RAINGARDEN WITH BUBBLE-UP

N.T.S.



PHOTO EXAMPLE OF TYPICAL BRICK PAVING WITH BIO FILTRATION POCKETS OR RAINGARDEN



EXAMPLE OPPORTUNITIES FOR BIO FILTRATION POCKETS

SCALE 1:200

NOTE:

CAN ALSO BE APPLIED IN TYPICAL OFFLINE INFILTRATION BASIN

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CITY WATER MANAGEMENT STRATEGY

FIGURE 6

TYPICAL BIO FILTRATION TREATMENT

CITY OF WANNEROO

DRAINAGE PLAN

SHEET 2 OF 3

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