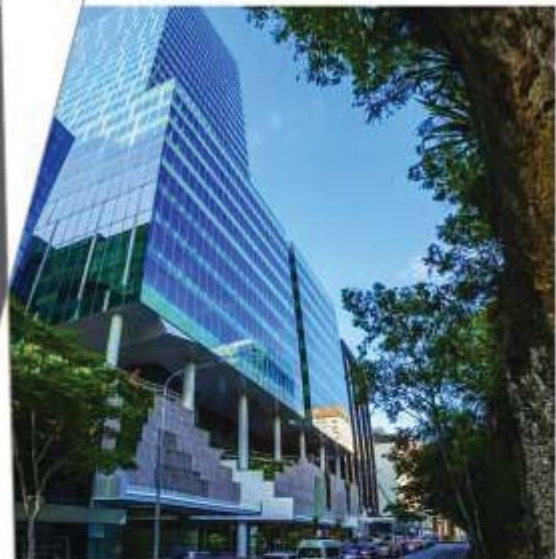


Stormwater Management Plan

Dalton Drive, Maroochydore - Stage 1
Amendment

V171462



Prepared for

Maroochydore Spotlight Property 2 Pty Ltd
C/O Blueprint Group Australia Pty Ltd

30 August 2018

**PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL**

Approval no: DEV2018/960

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1 Introduction

Cardno has been engaged by Maroochydore Spotlight Property 2 Pty Ltd C/O Blueprint Group Australia Pty Ltd to prepare a Stormwater Management Plan to support the Material Change of Use (MCU) development application for Stage 1 of Lot 1 on SP202103. For Stage 1 it is proposed to develop part of this site for large format retail development including a Spotlight and other showroom tenancies along with associated parking.

The development application is being made to Economic Development Queensland (EDQ), rather than the Sunshine Coast Council, given the site is located within the Maroochydore City Centre (MCC) Priority Development Area (PDA). Therefore, assessment of the development is undertaken in accordance with the Development Scheme, and not the Planning Scheme (other than where the development scheme is called up by the Planning Scheme).

The development site is zoned Principal Centre (CBD).

2 Site Description

The site has an area of 4.35 ha, of which approximately 2.25 ha of the southern portion will be developed as part of the Stage 1 development. The subject site is bounded by Dalton Drive to the west and south, residential townhouses to the south-east and the MCC PDA site (currently being developed by SunCentral Maroochydore Pty Ltd) to the north and north-east. The subject site is part of the Cornmeal Creek catchment.

The site is currently grassed and with relatively flat terrain. The Stage 1 development area generally slopes in a south-easterly direction towards Dalton Drive. The surface level of the Stage 1 development area ranges from approximately 3.0 mAHD to 4.0 mAHD. Figure 2.1 below shows the locality plan of the subject site with existing site drainage shown in Figure 2.2.



Figure 2-1 Site Location



Figure 2-2 Existing Site Drainage (SCC MyMaps)

3 Proposed Development

3.1 Summary

The proposed development plan is provided in Appendix A. Stage 1 of the development consists of large format retail with associated car parking. During Stage 1 of the development, vacant lots on the northern boundaries will be retained. An access road to the south, connecting to Dalton Drive, will be provided during Stage 1. This access road will require filling over the existing stormwater connection, which has an invert level of 1.65 mAHD. Therefore a new connection point for the neighbouring lots may be required, to ensure that this area can continue to freely drain. The roof area from the proposed building and the carpark area will be drained towards the south, replicating the existing catchment area draining towards this location.

The northern carpark area will have syphonic drainage directed towards the east and west, discharging into a proposed 525 mm RCP with an invert level of around 1.8 mAHD for the eastern catchments. This 525 mm RCP then connects into a 600 mm RCP, heading south before discharging into the existing council drainage located near the south-east corner of the property at Dalton Drive. The western carpark area will drain to the existing council drainage located to the south west on Dalton Drive. The basement carpark will have gravity drainage into a pump pit located near the north-east corner of the basement carpark. This pump station will then discharge into the proposed 525 mm RCP. The main building envelope will be split with 50% draining via a syphonic system to the 600 mm RCP located on the eastern boundary and 50% draining via a syphonic system to the council drainage system located to the south west on Dalton Drive.

This drainage plan was based on preliminary drainage plans and road grading prepared for the future development of the MCC site. The proposed drainage layout can be seen in Appendix B. The developed case catchment plan has replicated the existing flow patterns on site as much as practicable.

3.2 Lawful Points of Discharge

The lawful point of discharge for flows directed towards the south is the existing headwall, located within the south-east corner of the site and the inlet located on the south west corner. Both of these locations connect to Council drainage in Dalton Drive.

The drainage network was established when the site was zoned by Maroochy Shire Council as Mixed Housing, which had an assumed fraction impervious of 0.60. Therefore the development, which will have an increased fraction impervious, will need to provide for detention on site so that the existing capacity of the downstream stormwater network is not exceeded. Detailed detention sizing and analysis of the proposed stormwater network will be required during Operational Works. The proposed drainage plan has considered the future service and level requirements of the neighbouring sites.

4 Required Minimum Floor Levels

The site will be affected by local and regional flood levels, which will need to be considered when defining the minimum floor and surface levels for the development.

The regional 1% Annual Exceedance Probability (AEP) peak flood level (at 2100) in the future neighbouring lake is proposed to be 3.23 mAHD. Appropriate freeboard above this regional flood level is required. Based on minimum freeboard requirements of 400 mm within the PDA, a minimum floor level of 3.63 mAHD would be required. Carpark levels should also be set a maximum of 250 mm below this 1% AEP regional flood level, i.e. a minimum surface level of 2.98 mAHD. However basement carparks can be constructed below the specified levels provided that suitably waterproofed perimeter walls, air vents, and entry/exit ramps at the carpark entrance are at least 500 mm above the 1% AEP flood levels for all flooding sources. This will need to be confirmed during detailed design.

The local flood levels will determine the required minimum floor levels for this site, as the floor levels should be set 300 mm above the local 1% AEP flood level. Based on preliminary grading of the site, as shown in Appendix C, a minimum floor level of around 4.2 mAHD would be required. This will be required to be confirmed during detailed design.

5 Stormwater Quality Objectives

5.1 Operational Phase

The stormwater quality design objectives applicable to the site, as outlined in Table B of the Department of Infrastructure, Local Government and Planning (DILGP) *State Planning Policy (SPP)* (July 2017) are:

- > Total Suspended Solids (TSS) – 80% removal of mean annual load from unmitigated development.
- > Total Phosphorous (TP) – 60% removal of mean annual load from unmitigated development.
- > Total Nitrogen (TN) – 45% removal of mean annual load from unmitigated development.
- > Gross Pollutants >5mm – 90% removal of mean annual load from unmitigated development.

5.2 Construction Stage

The construction phase stormwater quality design objectives applicable to the site are outlined in Table A of the DILGP *State Planning Policy* (July 2017).

The release limits for stormwater captured in a sediment basin are not to exceed the following limits:

- > Total Suspended Solids (TSS): 50 mg/L
- > pH: 6.5 – 8.0

Appropriate erosion and sediment control measures will be required to be designed, constructed and operated in accordance with the SPP 2017 guidelines.

6 Proposed Stormwater Quality Treatment

6.1 Summary

The proposed stormwater quality treatment for the site consists of:

- > A bio-retention garden planted with trees on the eastern boundary (B1);
- > A bio-retention garden planted with trees on the south west boundary (B2);
- > 80kL rainwater tank used for toilet flushing and irrigation; and,
- > Stormwater360 Enviropod litter baskets on all field and kerb inlets.

The stormwater treatment required for the northern carpark area is proposed to be provided by Enviropod's and bio-retention basins located on the south east and south west corners of the Lot. Treated stormwater will then discharge into the proposed 525 mm RCP on the east and existing council drainage on the west.

Approximately 50% of the main roof area on the southern section will drain to the western bio-retention system which will then discharge into council drainage on Dalton Drive. The other 50% will drain to a 80kL rainwater tank, assumed to be used for toilet flushing and irrigation. If the tank is full it will overflow into the eastern bio basin.

The eastern basin will be approximately 4 metres wide by 13 metres long. The filter width will be 4 metres wide with 1 in 1 batters. The filter depth will be 0.8 metres to allow for tree planting. The extended detention depth will be 200 mm. The western basin will be approximately 7 metres wide by 10 metres long. The filter width will be 7 metres wide with 1 in 3 batters. The filter depth will be 0.8 metres to allow for tree planting. The extended detention depth will be 200 mm. The ultimate arrangement will be determined during detailed design.

6.2 Future Development Stages

During future development, the vacant area to the north of Stage 1 will be developed. This will be required to provide its own treatment and detention of runoff before discharging to any proposed stormwater network.

6.3 MUSIC Model

A MUSIC model was set up to determine the efficiency of the proposed treatment train for all stages of the development. The MUSIC model was set up using Version 6.2. The model used 6 minute timestep rainfall from Nambour, from 1989 to 1998. The MUSIC source nodes were based on the values for urban developments, as outlined in the MUSIC Modelling Guidelines – Version 1.0 2010 (Water by Design, 2010). The adopted source nodes are summarised in Table 6-1 and 6-2.

The catchment was broken down into the different source types. The properties of each sub-catchment are summarised in Table 6-3. The MUSIC model layout is shown in Figure 6-1

Table 6-1 Rainfall Runoff Parameters

Parameter	Commercial Source Node
Rainfall threshold (mm)	1
Soil storage capacity (mm)	18
Initial storage (% capacity)	10
Field capacity (mm)	80
Infiltration capacity coefficient a	243
Infiltration capacity exponent b	0.6
Initial depth (mm)	50
Daily recharge rate (%)	0
Daily baseflow rate (%)	31
Daily deep seepage rate (%)	0

Table 6-2 Pollutant Export Parameters

Parameter	Surface Type	TSS Log ¹⁰ Values		TP Log ¹⁰ Values		TN Log ¹⁰ Values	
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
Commercial							
Baseflow	Roof	N/A	N/A	N/A	N/A	N/A	N/A
	Roads	0.78	0.39	-0.60	0.50	0.32	0.30
	Ground	0.78	0.39	-0.60	0.50	0.32	0.30
Stormflow	Roof	1.30	0.38	-0.89	0.34	0.37	0.34
	Roads	2.43	0.38	-0.30	0.34	0.37	0.34
	Ground	2.16	0.38	-0.39	0.34	0.37	0.34

Table 6-3 Catchment Areas and Proposed Stormwater Treatment

Catchment	Area (ha)	% Impervious	MUSIC Node	Proposed Treatment
A1	0.10	30	Commercial Landscaping	EnvPod, Bio retention
A2	0.09	90	Commercial Road	EnvPod, Bio retention
A3	0.09	90	Commercial Road	EnvPod, Bio retention
A4	0.09	90	Commercial Road	EnvPod, Bio retention
A5	0.14	90	Commercial Road	EnvPod, Bio retention
A6	0.13	90	Commercial Road	EnvPod, Bio retention
A7	0.14	90	Commercial Road	EnvPod, Bio retention
A8	0.13	90	Commercial Road	EnvPod, Bio retention
A9	0.07	90	Commercial Road	EnvPod, Bio retention
B1	0.04	6	Garden	Bio retention
B2	0.36	90	Commercial Road	EnvPod, Bio retention
B3	0.07	90	Commercial Road	EnvPod, Bio retention
B4	0.12	30	Commercial Landscaping	EnvPod, Bio retention
B5	0.62	100	Commercial Roof	50% Rainwater tank 50% Bio retention
B6	0.04	6	Garden	Bio retention

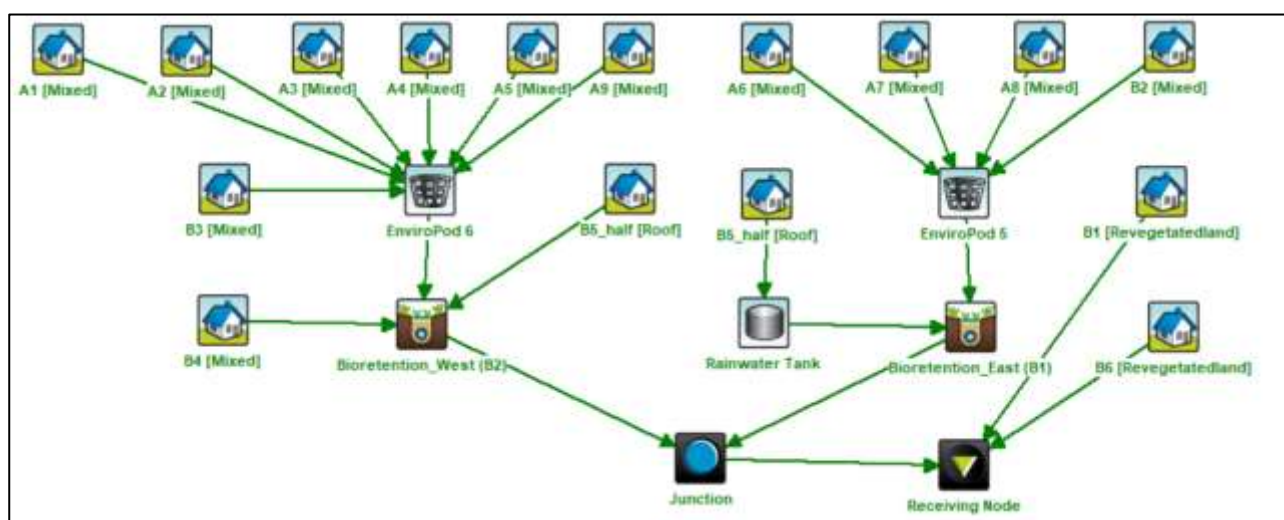


Figure 6-1 MUSIC Model Layout

The MUSIC catchments are shown in Figure 6-2.



Figure 6-2 MUSIC Model Catchments

The removal efficiencies for the proprietary treatment devices were provided by the manufacturer. Details of the Stormwater360 Enviropods are provided in Appendix D.

The details of the bio-retention gardens are provided in Table 6-4 and 6-5.

Table 6-4 East Bio-retention basin MUSIC Details

Parameter	Bio-retention Gardens
Extended Detention Depth (m)	0.2
Saturated Hydraulic Conductivity (mm/hr)	200
Filter Depth (m)	0.8
Filter Area (m ²)	50
TN Content of Filter Media (mg/kg)	500
Orthophosphate Content of Filter Media (mg/kg)	20

Table 6-5 West Bio-retention basin MUSIC Details

Parameter	Bio-retention Gardens
Extended Detention Depth (m)	0.2
Saturated Hydraulic Conductivity (mm/hr)	200
Filter Depth (m)	0.8
Filter Area (m ²)	70
TN Content of Filter Media (mg/kg)	500
Orthophosphate Content of Filter Media (mg/kg)	20

An 80kL tank was assumed to be used for toilet flushing and irrigation. The irrigation rate was assumed to be 730 mm/year, which totalled 1600 kL/year of irrigation. The number of toilets was not known, and so toilet flushing was excluded from the analysis. The rainwater tank will be required to be topped up from mains water supply. Half of the available roof area was assumed to be drained towards the tank. The proposed tank will provide 74% of the non-potable water demand.

6.4 MUSIC Model Results

The results of MUSIC are provided in Table 6-5. As demonstrated by this table the water quality objectives have been satisfied for all pollutants.

Table 6-6 MUSIC Model Results

Parameter	Mean Annual Load (kg/yr)		% Removal
	Sources	Residual	
Flow (ML/yr)	28.1	26.5	5.6
TSS	8040	789	90.2
TP	15.5	4.69	67.6
TN	88.3	48.2	45.4
GP	624	2.1	99.7

7 Maintenance

Maintenance of the stormwater quality devices is to be carried out by body corporate. The maintenance requirements of the proprietary products are to be carried out in accordance with manufacturer's guidelines. Maintenance of the bio-retention gardens should be carried out in accordance with Water by Design (2012) *Maintaining Vegetated Stormwater Assets (Version 1)* guidelines.

8 Conclusion

The proposed development of Stage 1 of Lot 1 on SP202103 has been shown through MUSIC modelling to satisfy the proposed stormwater quality requirements. The proposed stormwater treatment includes:

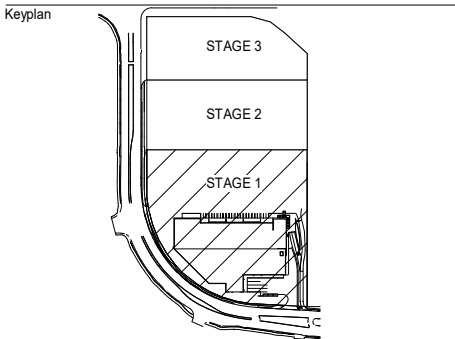
- > Bio-retention gardens planted with trees at two locations on the southern boundary;
- > 80kL rainwater tank used for toilet flushing and irrigation; and
- > Stormwater360 Enviropod litter baskets on all field and kerb inlets.

Further detailed modelling of the stormwater detention requirements will be necessary during the Operational Works stage.

APPENDIX

A

DEVELOPMENT PLAN



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Project
MAROOCHYDORE
STAGE ONE
53-91 Dalton Drive, Maroochydore

Project Number
717006

Status
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Date Plotted
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Date Issued

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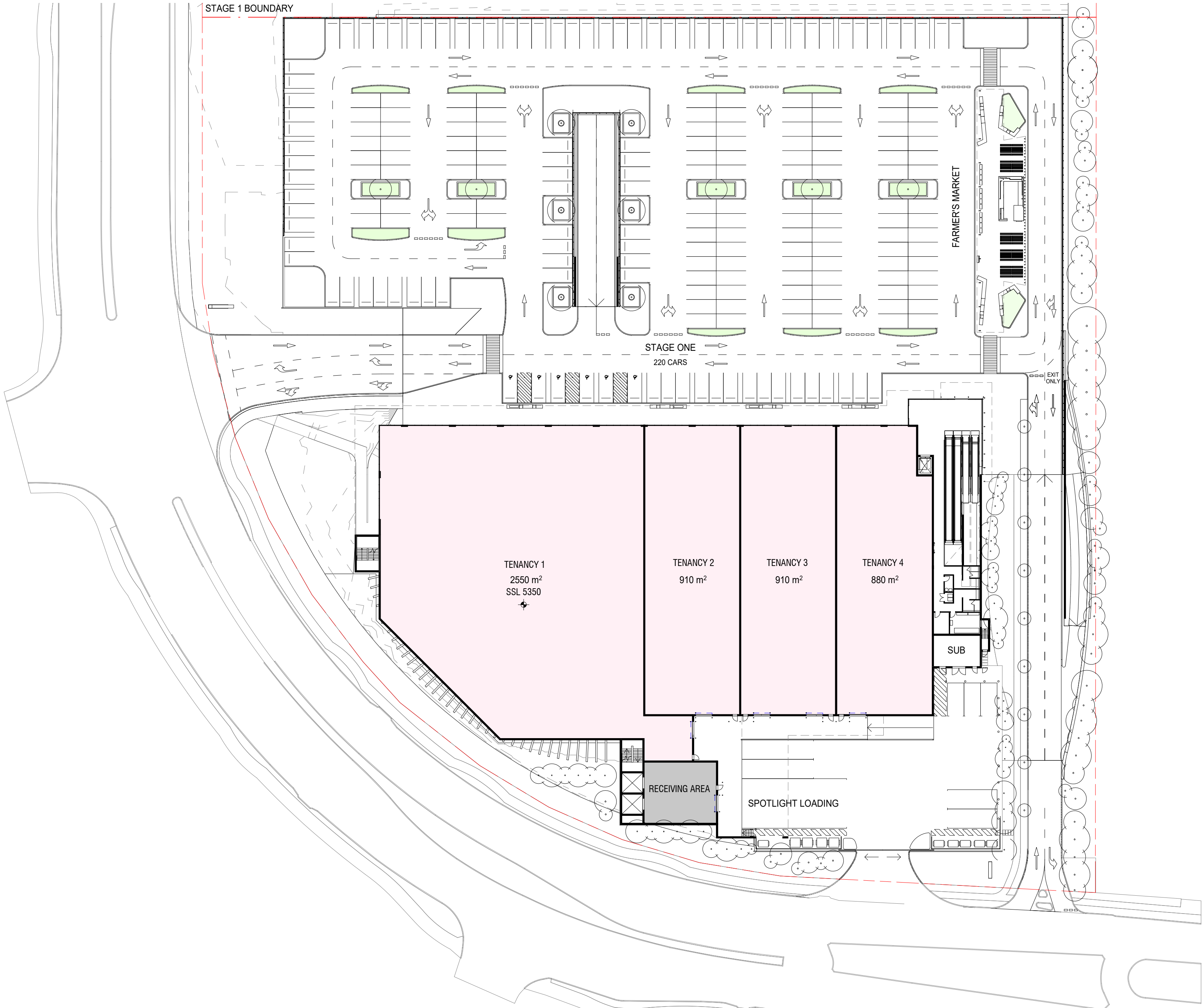
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FLOOR PLAN
DECK

Drawing Number
A-DA-0101

Revision
E

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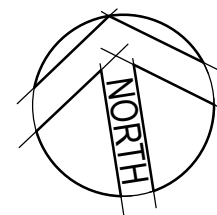


APPENDIX

B

DRAINAGE PLAN

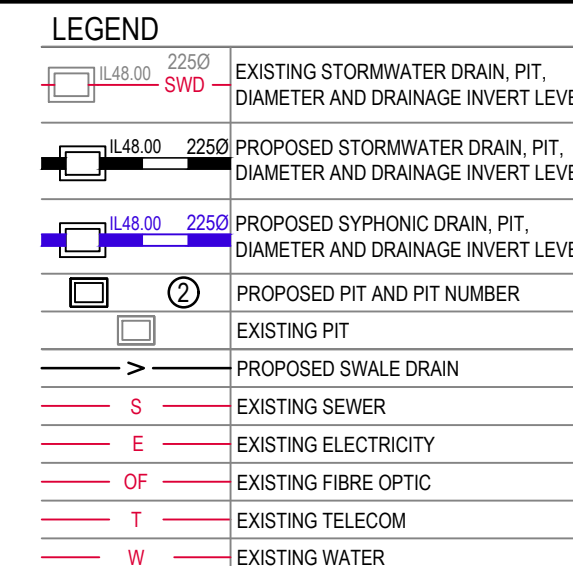
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CONTRACTOR TO VERIFY EXISTING SERVICES
CONNECTION LEVELS PRIOR TO CONSTRUCTION
ANY DISCREPANCIES MUST BE IMMEDIATELY
IDENTIFIED AND THE SUPERINTENDENT NOTIFIED
PRIOR TO CONSTRUCTION COMMENCING.

APPENDIX

C

PRELIMINARY GRADING

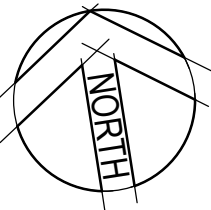
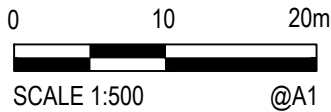
LEGEND

	PSM	PERMANENT SURVEY MARK
	TBM	TEMPORARY BENCH MARK
	DTR	BOREHOLE LOCATION
	BH	DEPTH TO REFUSAL AND DEPTH TO TERMINATION
	57.0	PROPOSED FINISHED SURFACE CONTOUR
	57.0	EXISTING SURFACE CONTOUR
		FALL OF ALLOTMENT
	x ES48.00	EXISTING SURFACE LEVEL
	x FS48.00	FINISHED SURFACE LEVEL
	x BL48.00	BULK EARTHWORK LEVEL
	x FL48.00	FINISHED FLOOR LEVEL
		PROPOSED BATTER
		EXISTING FEATURES TO BE REMOVED
		SEDIMENTATION FENCE
	48.00 2250	EXISTING STORMWATER DRAIN, PIT, DIAMETER AND DRAINAGE INVERT LEVEL
	48.00 2250	PROPOSED STORMWATER DRAIN, PIT, DIAMETER AND DRAINAGE INVERT LEVEL
		PROPOSED PIT AND PIT NUMBER
		EXISTING PIT
	FIO	PROPOSED AGRICULTURAL DRAIN WITH FLUSH OUT RISER
	AG	PROPOSED SWALE DRAIN
		PROPOSED SWALE DRAIN
	S	EXISTING SEWER
	E	EXISTING ELECTRICITY
	OF	EXISTING FIBRE OPTIC
	T	EXISTING TELECOM
	W	EXISTING WATER

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POTENTIAL BIO BASIN LOCATIONS

POTENTIAL BIO BASIN LOCATION



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BLUEPRINT AUSTRALIA			
PROPOSED LEVELS PLAN			
GROUND FLOOR			
SHEET 2 OF 2			
Date	29.08.2018	Scale	1:500
Size	A1		
Drawing Number	V171462-CI-SK004	Revision	5

APPENDIX

D

ENVIROPOD INFORMATION

EnviroPod[®]

Technical Design Manual



Stormwater360
AUSTRALIA

Contents

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1.1 Design and Operation

The EnviroPod® is a proven catchpit insert designed to be easily retrofitted into new and existing stormwater catchpits, requiring no construction or land take. It removes a significant portion of sediment, trash, debris and other pollutants from water entering the stormwater system, and can be installed in either curb inlet, standard pre-cast catchpits or manhole catchpits. Using low-cost passive screening and optional oil-adsorbent media, the EnviroPod® can be customised to meet site-specific requirements with interchangeable polyester mesh screens ranging from 100 to 1600 micron pore size. 200 micron filter mesh screening bags are supplied as standard (unless specified otherwise). This filter mesh has a moderate/high removal rate and a moderate maintenance requirement.

The EnviroPod is also effective as a pretreatment device for use in a treatment train with hydrodynamic separators, filtration, ponds, swales and wetlands. In many cases, it's often the most practical solution for retrofits.

Independently trialled and tested by city councils throughout Australia and New Zealand and with installation of over 7,000 units including North America, the EnviroPod® Filter is the premiere pit insert.

Design and Operation

The EnviroPod® consists of a screening bag supported by a filterbox and structural cage. Modular plastic deflector panels attach to the filterbox and guide the flow of water to the screening bag. The screening bag captures pollutants and allows the water to pass through to the outlet pipe. Optional absorbent material inside the screening bag captures oil and grease. Openings in the filterbox allow water to bypass the screening bag during high flow conditions to prevent surface flooding.

Configurations

The EnviroPod® is designed to simply insert into the gully pit below the grate and is mounted on aluminum rails anchored to the (gully) pit walls. The one configuration fits sump type grates, road gullies, kerb entry units etc. Plastic deflector panels seal against the pit walls and direct flow into the filterbox and through the mesh screens. There are mainly two standard sizes to fit most pre-cast (FRC & plastic included) regular and curb entry gullypits with varying plan dimensions between 500 x 500 up to 900 x 900. Custom designs are able to be fabricated for non-standard pits.

Maintenance

Maintenance of the EnviroPod is easy and straight forward. Simply lift the screening bag from the frame and dump out the captured pollutants. Alternatively, the bag can be vacuumed for even faster maintenance. If necessary, replace the oil absorbent media bags.

Capabilities

- ✓ Captures sediment, trash, debris and other pollutants before they enter the storm drain system
- ✓ Fits curb inlet and flat-grate gully pits
- ✓ Easy access — maintenance-friendly design
- ✓ Fits a range of gully pit sizes — ideal for retrofits
- ✓ Adjustable panels allows fine-tuning during installation for a perfect fit

Configurations

Table 1.

	EnviroPod - A	EnviroPod - C
Gully Pit Width, Min – Max (mm)	500 - 900	500 - 900
Gully Pit Length, Min – Max (mm)	730 - 900	450 – 750
Mesh Size ¹ (µm)	200, 1600	200, 1600
Mesh Size ¹ (µm)	135	60
Mesh Size ¹ (µm)	10-100	10-100
Bypass Flow Rate ² (L/s)	200+	130+

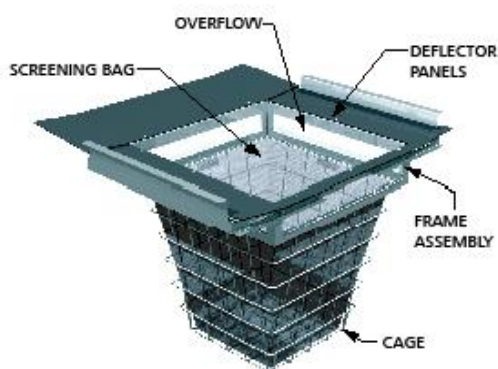


Figure 1. Standard EnviroPod Filter

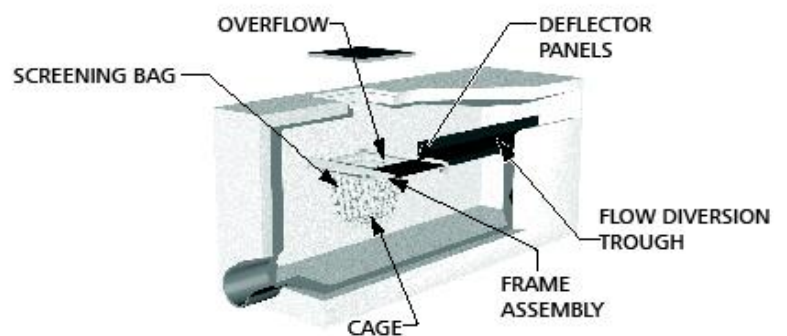


Figure 2. Gully Pit EnviroPod Filter configuration

1.2 Parameter Performance

1.2.1 Parameter Performance: Gross Pollutants and Coarse Sediment

Testing at the University of South Australia Urban Water Resources Centre found that the Enviropod unit retained all litter up to an approach flow of 100L/sec. On this basis and the design of the Enviropod Filter bag material which has a sieve aperture of 200 micron we can say with confidence that the Enviropod pre-treatment will retain 100% of Gross Pollutants and coarse sediment – defined by the Victoria Stormwater Committee as particles ranging from 500 to 5000 micron.

For full copies of the testing data please contact Stormwater360.

1.2.2 Parameter Performance: Gross Pollutants and Coarse Sediment

The Enviropod Filter is a gully pit insert designed to be easily retrofitted into new and existing stormwater gully pits, requiring no construction and no land take. Located at the source of stormwater contaminants the Enviropod Filter has interchangeable filters ranging from 100 micron to 4000 micron pore size. For Suspended Solids reduction application we recommend using a monofilament 200micron pore size filter bag (Enviropod 200).

The Enviropod filter relies on removing contaminants from stormwater by the mechanism of direct screening, guaranteeing debris and particles larger the pore size will be removed. Testing done in Auckland using an Enviropod 200micron filter shows a removal of up 97% Suspended Solids for particles 100 to 500micron in size (Butler, Ockleston, Foster, no date, pg 6).

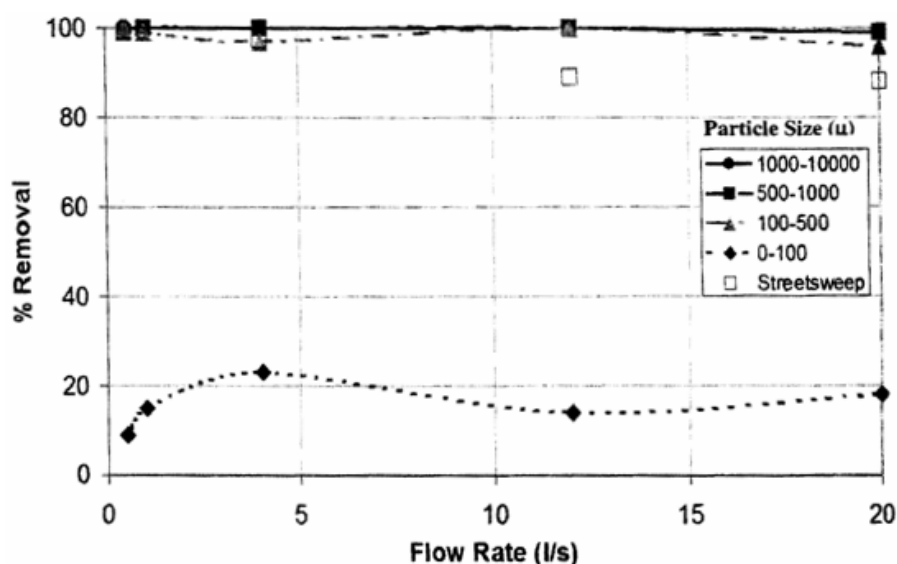


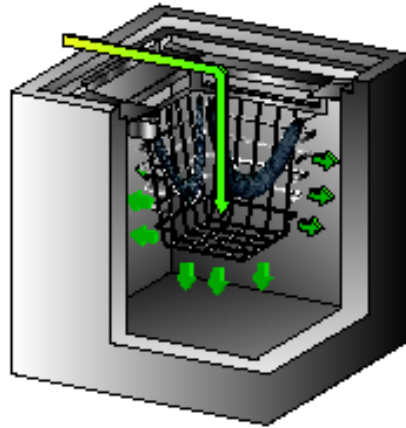
Figure 3. Percentage Removal for various particle sizes.

For full copies of the testing data please contact Stormwater360.

1.2.3 Parameter Performance: Oil and Grease

The EnviroPod uses a perlite based adsorbent material (optional) specially treated to enhance its natural ability to capture and retain oil and grease. The adsorbent material is contained in pouches that are designed to ensure maximum contact with stormwater as it enters the gully pit. Laboratory testing demonstrated that the oil adsorbent material can capture and retain three times its weight in oil.

Each EnviroPod is configured with oil adsorbent pouches around one side of the frame, at the top of the screening bag. During low flows, the water entering the catch basin contacts the oil adsorbent pouches before passing through the screening bag. During high flows, when the EnviroPod begins to bypass, the pouches skim floating oil and grease from the surface of the water retained in the screening bag.



The pouches are clipped to the screening bag for easy removal during maintenance. As the pouches capture oil, the adsorbent material darkens. When the pouches are nearly black they have almost reached their oil adsorbent capacity and should be replaced.

1.3 Inspection and Maintenance

EnviroPod installations vary due the vast number of gully pit configurations. These guidelines should apply to most cases as written. For the remaining cases, follow the general actions of these guidelines, varying them as necessary.

The maintenance crew is responsible for disposing of debris in accordance with all applicable regulations and is responsible for following all applicable regulations, including confined space entry requirements.

Contact the maintenance department at Stormwater360 for more information or to order EnviroPod bags and oil absorbent pouches.

Vacuum Truck Maintenance

1. Establish a safe working area per typical catch basin service activity.
2. Remove grate.
3. Vacuum accumulated debris from the upper portion of the catch basin.
4. Remove and inspect the oil absorbent pouches clipped to the inside of the EnviroPod bag. Replace with new pouches in step 8 if the pouches are dark with oil.
5. Vacuum contents from bag. Once most of the material is removed, remove the bag from the EnviroPod with two manhole cover hooks through the loops at the top of the bag.
6. Clean sediment and oils from sides of bag by shaking and/or brushing, taking care not to damage the bag.
7. Inspect the bag, replace if damaged.
8. Re-install oil absorbent pouches. Place bag in EnviroPod.
9. Replace grate.

Hand Maintenance

1. Establish a safe working area per typical catch basin service activity.
2. Remove manhole cover.
3. Remove any material that is in the trough through the curb inlet or manhole.
4. Remove the bag from the EnviroPod with two manhole cover hooks through the loops at the top of the bag. Excess debris should be scooped out first if the bag is near full.
5. Remove and inspect the oil absorbent pouches clipped to the inside of the bag. Replace with new pouches in step 9 if the pouches are dark with oil.
6. Pour contents of bag into disposal container.
7. Clean sediment and oils from sides of bag by shaking and/or brushing, taking care not to damage the bag.
8. Inspect bag, replace if damaged.
9. Re-install oil absorbent pouches in bag.
10. Place bag in EnviroPod. CRITICAL – There is a steel ring inside the bag. Make sure the loose ends are joined together in the connector tube.
11. Replace manhole cover.