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Technical Support Sheet
Operation & Maintenance Manual

Downstream Defender® Select

SW30O&M
Version: 1.0
September 2023

The new generation in stormwater treatment

Designed to meet most stormwater regulations, the Hynds Downstream Defender® is a hydrodynamic vortex separator.

Pollutants are directed towards the sump of the chamber while oils and floatables collect in-between the inlet and outlet chute.

Available in a range of sizes, it can function as either pre-treatment or as a stand-alone device, providing engineers and contractors with a flexible, cost-effective stormwater management option.

Benefits of Downstream Defender® Technology

- Removes sediment, floatables, oil and grease
- No pollutant washouts
- Small footprint
- No loss of treatment capacity between clean-outs
- Low headloss

Capabilities

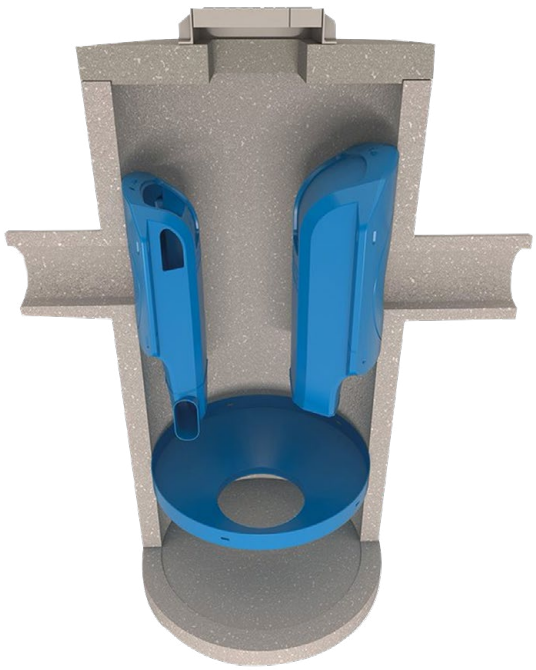
- Removes up to 80% Total Suspended Solids (TSS)
- No re-entrainment of previously captured pollutants
- Easy to install
- Low maintenance

Applications

- New developments and retrofits
- Utility yards
- Streets and roads
- Parking lots
- Pre-treatment for filters, infiltration, and storage
- Industrial and commercial facilities
- Wetland protection
- Pre-treatment to Low Impact Development practices

Operation

The Downstream Defender® operates on simple fluid hydraulics. It is self-activating, has no moving parts, no external power requirement and is manufactured from durable non-corrosive components. No manual procedures are required to operate the unit and maintenance is limited to monitoring accumulations of stored pollutants and periodic clean-outs. The Downstream Defender® has been designed to allow for easy and safe access for inspection/monitoring and clean out procedures. Entry into the unit or removal of the internal components is not necessary for maintenance, thus safety concerns related to confined-space entry are avoided.



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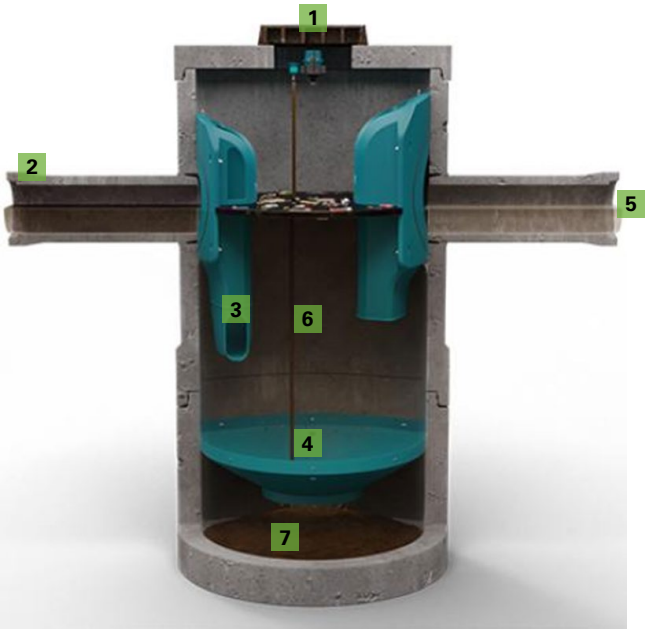

FIG. 1 Components of the Downstream Defender

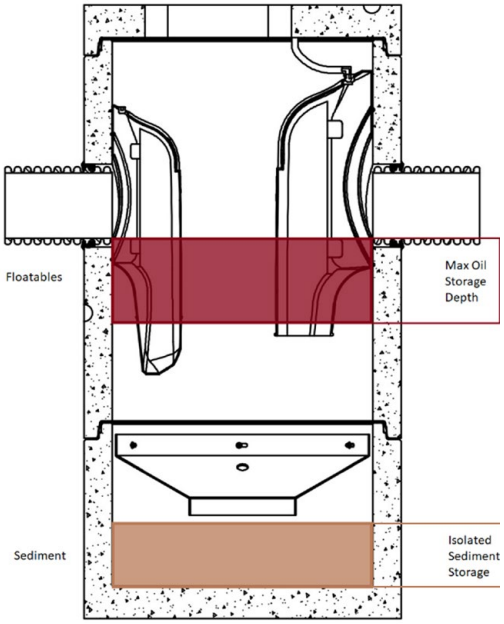

FIG. 2 Pollutant Storage of the Downstream Defender

Downstream Defender® Components

1. Central Access Port *(all models)*
2. Inlet Pipe
3. Inlet Chute
4. Sediment retention-skirt
5. Outlet Pipe
6. Floatables Storage Zone
7. Isolated Sediment Storage Zone

Pollutant Capture and Retention

The internal components of the Downstream Defender® have been designed to protect the oil/floatables and sediment storage volumes so that separator performance is not reduced as pollutants accumulate between clean-outs (Fig.2).

The Downstream Defender® vessel remains wet between storm events. Oil and floatables are stored on the water between the chutes and separate from the sediment storage volume in the sump of the unit, providing the option for separate oil disposal and accessories such as adsorbent pads.

Since the sediment storage volumes are isolated from the active separation region, the potential for re-suspension and washout of stored pollutants between clean-outs is minimized.

Wet Sump

The sump of the Downstream Defender® retains a standing water level between storm events, preventing the stored sediment from solidifying in the base of the unit.

The clean-out procedure becomes more difficult and labour intensive if the system allows fine sediment to dry-out and consolidate.

Blockage Protection

The Downstream Defender® has large clear openings and no internal restrictions or weirs, minimizing the risk of blockage and hydraulic losses.

Maintenance

Overview

The Downstream Defender® protects the environment by removing a wide range of pollutants from stormwater runoff. Periodic removal of these captured pollutants is essential to the continuous, long-term functioning of the Downstream Defender®. The Downstream Defender® will capture and retain sediment and oil until the sediment and oil storage volumes are full. When sediment and oil storage capacities are reached, the Downstream Defender® will no longer be able to store removed sediment and oil.

The Downstream Defender® allows for easy and safe inspection, monitoring and clean-out procedures. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Access openings are in the top of the manhole.

Maintenance events may include Inspection, Oil & Floatables Removal, and Sediment Removal.

Maintenance events do not require entry into the Downstream Defender®, nor do they require the internal components of the Downstream Defender® to be removed.

A vacuum truck is required if the maintenance event is to include oil removal and/or sediment removal.

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Determining Your Maintenance Schedule

The frequency of cleanout is determined in the field after installation. During the first year of operation, the unit should be inspected regularly to determine the rate of sediment and floatables accumulation. This information can be recorded in the maintenance log to establish a routine maintenance schedule.

Routine Maintenance Procedure

Inspection

Inspection is a simple process that does not involve entry into the Downstream Defender®. Maintenance crews should be familiar with the Downstream Defender® and its components prior to inspection.

Recommended Equipment

- Safety Equipment and Personal Protective Equipment (traffic cones, work cones, etc.)
- Manhole lifter to remove cast iron cover
- Pole with skimmer or net
- Trash bag for removed floatables
- Downstream Defender® Maintenance Log

Inspection Procedures

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender® as stipulated by local ordinances.
2. Remove the manhole cover to the manhole
3. Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. (Refer to fig 3 & 4)
4. Without entering the chamber, use the pole with the skimmer net to remove floatables and loose debris from the outer annulus of the chamber.
5. On the Maintenance Log provided by Hynds, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.
6. Securely replace the grate or lid.
7. Take down safety equipment.
8. Notify Hynds Environmental to discuss any irregularities noted during inspection.

FIG. 3 View over center shaft into floatable and sediment storage

FIG. 4 View of floatables and oil collection zone

Floatables and Sump Cleanout

Floatables cleanout is typically done in conjunction with sediment removal. A commercially or municipally owned sump-vac is used to remove captured sediment and floatables. Floatables and loose debris can also be netted with a skimmer and pole. The access port located at the top of the manhole provides unobstructed access for a vacuum hose and skimmer pole to be lowered to the base of the sump.

Scheduling

- Floatables and sump cleanout are typically conduced once a year
- If sediment depths are greater than 75% of maximum cleanout depths stated in table 1, sediment removal is required.
- Floatables and sump cleanout should occur as possible following a spill in the contributing drainage area

Recommended Equipment

- Safety Equipment (traffic cones, etc.)
- Manhole lifter or crow bar to remove grate or lid
- Pole with skimmer or net
- Vacuum Truck (150mm diameter flexible hose recommended)
- Downstream Defender® Maintenance Log

Floatables and Sediment Clean Out Procedures

1. Set up any necessary safety equipment around the access port or grate of the Downstream Defender® as stipulated by local ordinances. Safety equipment should notify passing pedestrian and road traffic that work is being done.

2. Remove the manhole cover to the manhole (Fig. 4). NOTE: The 1.2m Downstream Defender® will only have one manhole cover.

3.Without entering the vessel, look down into the chamber to inspect the inside. Make note of any irregularities. (Refer to fig 3 & 4)

4. Using the Floatables Port for access, remove oil and floatables stored on the surface of the water with the vacuum hose or the skimmer net.

5. Once all floatables have been removed, drop the vacuum hose to the base of the sump via the Central Access Port. Vacuum out the sediment and gross debris off the sump floor.

6. Retract the vacuum hose from the chamber.

7. On the Maintenance Log provided by Hynds, record the date, unit location, estimated volume of floatables and gross debris removed, and the depth of sediment measured. Also note any apparent irregularities such as damaged components or blockages.

8. Securely replace the grate or lid

NB: In areas of high ground water tables this unit should be refilled with clean water to counter buoyancy

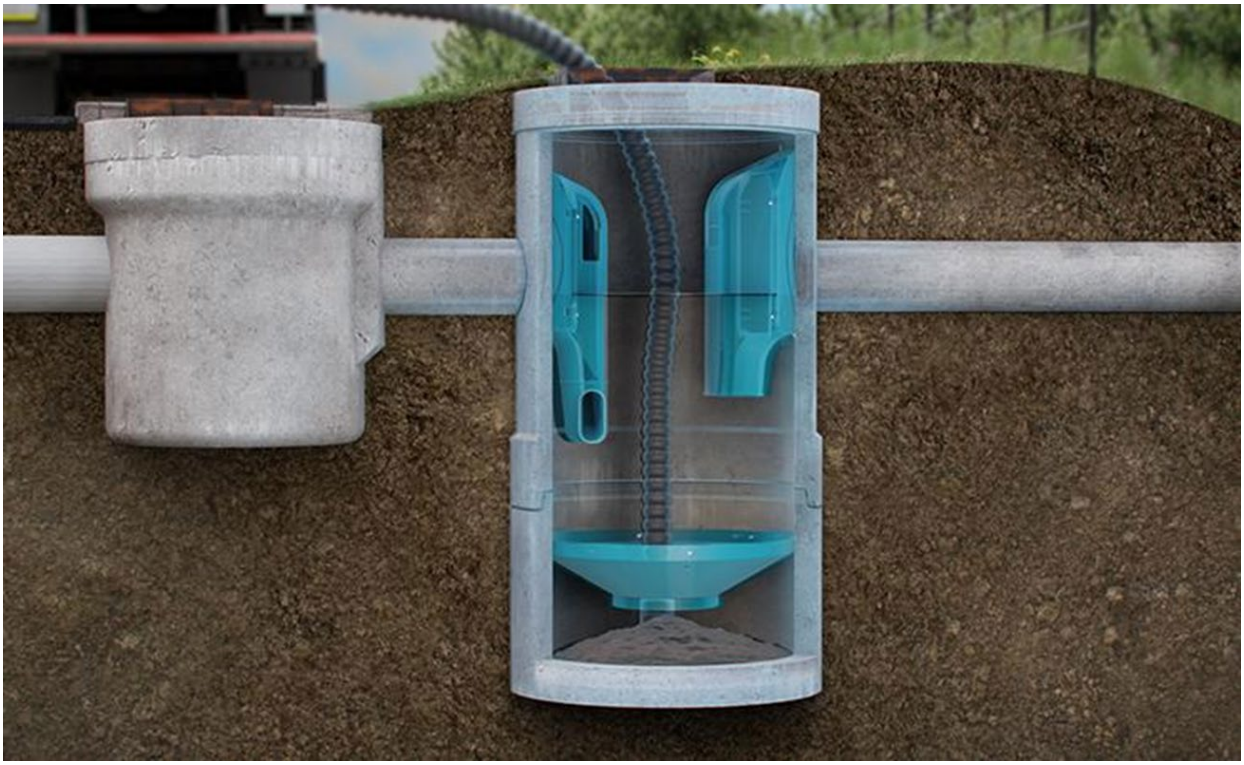

FIG. 5 Cut away of installed Downstream Defender

TABLE 1 Downstream Defender® Pollutant Storage Capacities

Model Diameter (m)	**Liquid hydrocarbon (oil) storage capacity (L)**	**Minimum sediment storage capacity** (m3)
1.2	442	0.45
1.8	1458	1.02
2.55	3586	1.81
3	6811	2.83

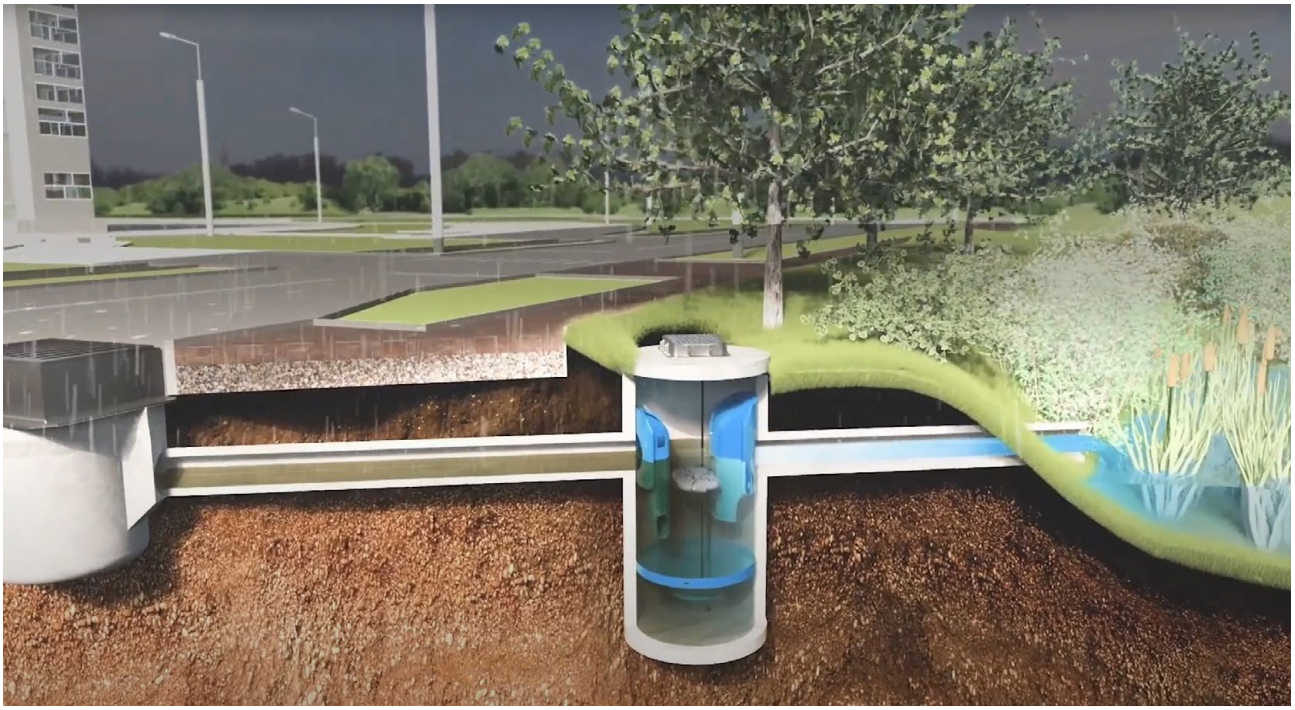

FIG. 6 Cut away of installed Downstream Defender

Maintenance at Glance

Inspection

- Regularly during the first year of installation
- Every 6 months after the first year of installation

Oil & Floatables Removal

- Once per year, with sediment removal
- Following a spill in the drainage area

Sediment removal

- Once per year or as needed
- Following a spill in the drainage area

Note: For most cleanouts it is not necessary to remove the entire volume of liquid in the chamber. Only removing the first few inches of oils/ floatables and the sediment storage volume is required.

Downstream Defender® Inspection and Maintenance Log

Site Name:

Site Location:

Date	Initials	Depth of Floatables and Oils	Sediment Depth Measured	Volume of Sediment removed	Site Activity and Comments

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Downstream Defender® Installation Log

Installation Date:

Site Name:

Site Location:

OWNER		**CONTRACTOR**	
Name:		**Name:**	
Company Name:		**Company Name:**	
Address:		**Address:**	
Telephone:		**Telephone:**	
Email:		**Email:**	

Commission Date:

Contractor:

Configuration *(circle one)*: Manhole Vault System

Total Number of Downstream Defender® units :

Call **0800 93 7473** to be directed to your local service provider.

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