

Downstream Defender[®]

Advanced
Vortex Separator

Proven to be *more efficient* for removing pollutants and preventing washout

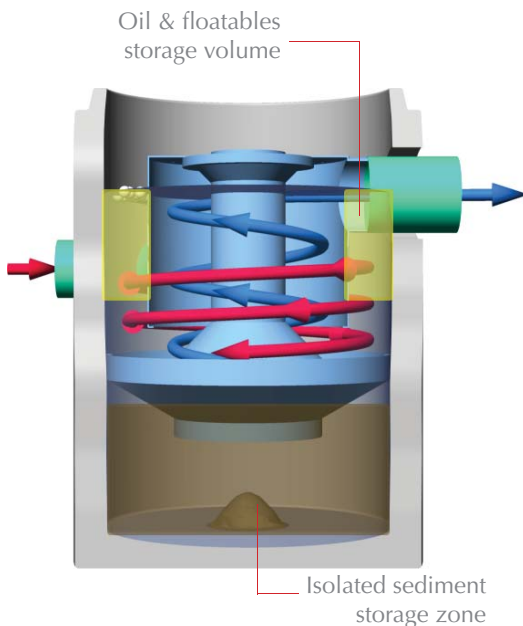
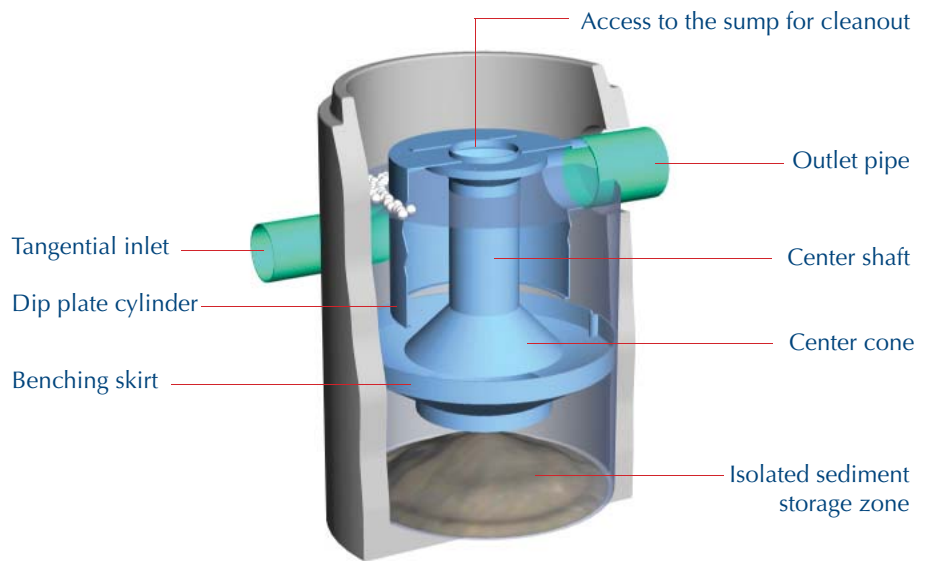
APPLICATIONS

- Control of sediment, floatable trash and petroleum products
- New developments
- Redevelopment projects
- Streets, roadways and parking lots
- Pretreatment for filters, infiltration or storage
- LEED[®] development projects

ADVANTAGES

- Most efficient separator available
- Smaller footprint
- Lower capital cost than other devices
- Proven to prevent washout
- Verified through nationally recognized programs
- Low system headloss

The **Downstream Defender** is the most advanced vortex separator available for the removal of sediment, oil and floatables from stormwater runoff. The **Downstream Defender** is proven to be more efficient than other structural treatment devices in as little as 1/2 the footprint and is the only separator with internal components proven to prevent pollutant washout.



HOW IT WORKS

The **Downstream Defender** has internal components designed to advance vortex separation by minimizing turbulence and headloss, increasing efficiency and preventing washout of stored pollutants.

Stormwater is introduced tangentially into the side of the vessel, generating a rotating flow that spirals around the outside of the dip plate (red arrow).

Oils, trash and floatable debris rise to the water surface and are trapped in the oil and floatables storage volume (yellow zone).

As flow continues to spiral down around the dip plate cylinder, low energy vortex motion directs sediment inward along the benching skirt and into the protected sediment storage zone (brown zone).

The benching skirt and center cone redirect the rotating flow up and inward between the center shaft and dip plate cylinder away from the stored sediment. The outlet pipe discharges treated effluent from within the dip plate cylinder ensuring the longest possible residence time (blue arrow).

Advanced vortex separation is provided by extending and stabilizing the flow path while protecting trapped pollutants for a wide range of flow rates.

Maintenance

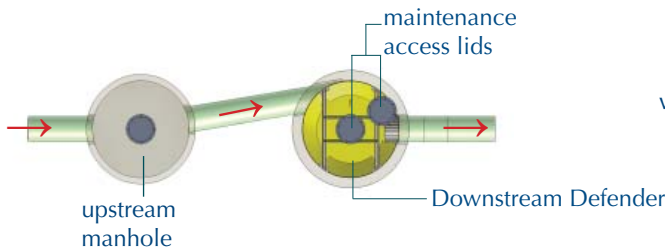


The **Downstream Defender** is easy to maintain using a sump-vac to remove captured sediment and floatables. Cleanout ports are located in the top of the manhole and provide access to pollutant storage areas. Maintenance is generally conducted every 12 to 18 months, although individual maintenance schedules are site specific. Hydro International works with owners and municipalities through networks of certified maintenance contractors to ensure proper maintenance practices.

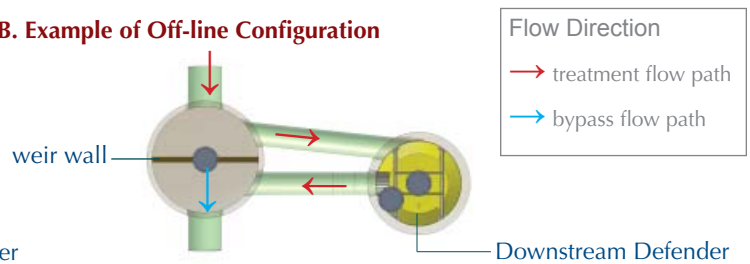
Sizing and Design

The **Downstream Defender** is sized and designed to accommodate site parameters. The device is commonly installed in an on-line configuration (figure A). In an off-line configuration an upstream diversion structure with an integral weir diverts treatment flows to the **Downstream Defender**. Excess storm flows spill over the weir directly to the outlet (figure B).

A. Example of On-line Configuration

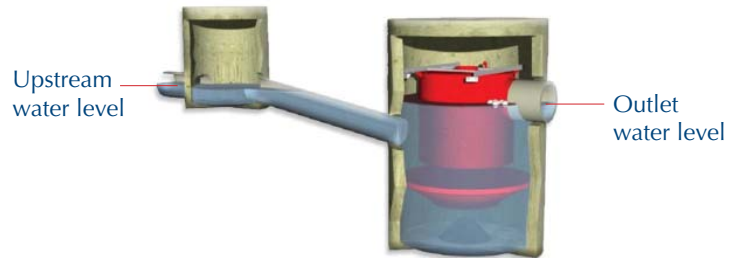


B. Example of Off-line Configuration



Low Headloss

The **Downstream Defender** has clear openings and no internal restrictions in order to minimize hydraulic losses, blockages and the risk of upstream flooding.



Downstream Defender Design Chart

Model Number and Diameter (ft)	Peak Treatment Flow (cfs)	Maximum Pipe Diameter (in)	Headloss at Peak Treatment Flow (in)	Oil Storage Capacity (gallons)	Sediment Storage Capacity (cubic yards)	Minimum Distance from Outlet Invert to Top of Rim (ft)	Standard Distance Outlet Invert to Sump Floor (ft)
4	3.0	12	6	70	0.70	3.2	4.0
6	8.0	18	8	230	2.10	3.6	5.9
8	15.0	24	9	525	4.65	4.1	7.7
10	25.0	30	10	1,050	8.70	4.9	9.4

For more information please call our office toll free at 800-848-2706 or inquire at www.hydro-international.biz.



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