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**P R O T E C T**

VortSentry HS

Operations & Maintenance Manual

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## Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The VortSentry HS system employs a helical flow pattern that enhances containment of pollutants and provides effective removal of sediment and floating contaminants from urban runoff. With the ability to accept a wide range of pipe sizes, the VortSentry HS can treat and convey flows from small to large sites. The design of the VortSentry HS minimises adverse velocities and turbulence in the treatment chamber. This helps to prevent washout of captured pollutants even during peak conditions.

### Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it works properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It's also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up).

## Health and Safety

Access to a VortSentry HS unit requires removing heavy access covers/grates, additionally it might become necessary to enter into a confined space. Pollutants collected by the VortSentry HS will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your VortSentry HS require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

### Personnel health and safety

Whilst performing maintenance on the VortSentry HS, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

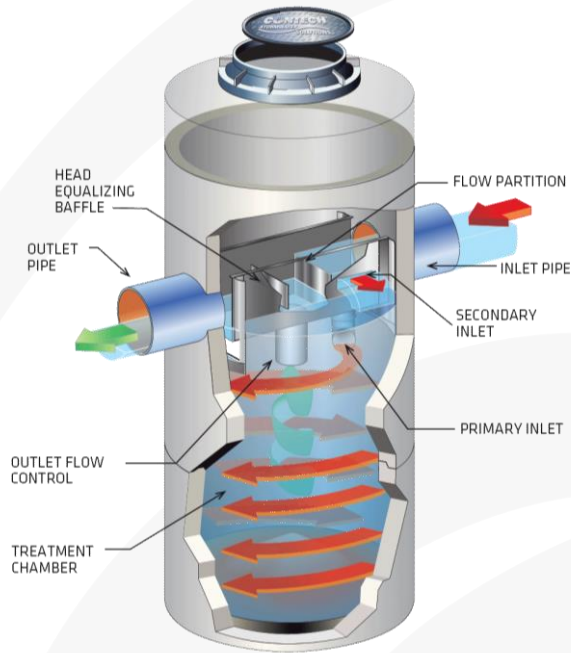
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst the minor maintenance for the VortSentry HS can be performed from surface level, there might be a need to enter the pit (confined space) during major services. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification in confined space entry requirements.

## How does it Work?

Stormwater enters into the treatment chamber through the inlet pipe. The tangentially oriented primary inlet induces a vortex motion in the treatment chamber that increases capture and containment abilities. Moderate storm flows are directed into the treatment chamber through the secondary inlet, which allows for the capture of floatables. The secondary inlet allows for treatment to occur at higher flows without significantly increasing the velocity or turbulence in the treatment chamber, reducing the possibility of resuspending pollutants which are captured in the treatment chamber.



Treated stormwater exits the treatment chamber through the outlet flow control which helps maintain the helical flow patterns developed within the treatment chamber. A flow partition allows for stormwater to bypass during high flow conditions and the head equalising baffle reduces the potential for re-suspension or washout of captured pollutants during higher flow conditions.

## Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically the VortSentry HS requires a minor service every 6 months and a major service every 12 months.

### Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the VortSentry HS.

	Description of Typical Activities	Frequency
<b>Minor Service</b>	Visual inspection of flow control trough Removal of larger pollutants in trough Measuring of sediment depth	At 6 Months
<b>Major Service</b>	Removal of accumulated sediment and gross pollutants	At 12 Months

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

### Minor Service

This service is designed to assess the condition of the device and record necessary information that will inform the activities to be undertaken during a major service.

1. Establish a safe working area around the access point
2. Remove access cover
3. Visually inspect the flow control trough
4. Remove larger pollutants in the flow control trough with a net
5. Measure and record sediment depth
6. Replace access cover

### Major Service

This service is designed to return the VortSentry HS device back to optimal operating performance.

1. Establish a safe working area around the access point
2. Remove access cover
3. Using a vacuum unit remove pollutants in the flow control trough
4. Remove accumulated pollutants with vacuum unit
5. Use high pressure water to remove grit in the flow control trough (if required)
6. Replace access cover

When determining the need to remove accumulated sediment from the VortSentry unit, the specific sediment storage capacity for the size of unit should be considered (see table below).

VortSentry HS Model	Unit Diameter (m)	Sediment Storage Capacity (m <sup>3</sup> )
HS09	0.9	0.4
HS12	1.2	0.7
HS15	1.5	1.1
HS18	1.8	1.6
HS21	2.1	2.1
HS24	2.4	2.8

## Additional Types of Maintenance

The standard maintenance approach is designed to work towards keeping the VortSentry HS system operational during normal conditions. From time to time, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

### Hazardous Material Spill

If there is a spill event on site, the VortSentry HS unit that potentially received flow should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event.

### Blockages

The VortSentry internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around or upstream of the device location the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the flow control trough, ensuring that it is free of debris and pollutants
2. Inspect both inlet and outlet pipes for obstructions, ensuring they are free of debris and pollutants

### Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the VortSentry HS after a major storm event. The focus is to inspect for higher than normal sediment accumulation that may result from localised erosion, where necessary accumulated pollutants should be removed and disposed.

### Disposal of Waste Materials

The accumulated pollutants found in the VortSentry HS must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the system has been exposed to any hazardous or unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

## Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our VortSentry HS system we offer long term pay-as-you-go contracts and pre-paid once off servicing.

For more information please visit [www.OceanProtect.com.au](http://www.OceanProtect.com.au)