OceanSave

Technical Design Guide

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Introduction

The OceanSave is a vortex type engineered stormwater management device designed to remove litter, gross pollutants, sediment and associated pollutants from stormwater runoff. It removes all particles 5 mm and greater from stormwater flows, including neutrally buoyant material. It also removes some suspended solids and free-floating oil and grease via the internal baffle.

The internal treatment components are made of marine grade aluminium and a specially manufactured perforated 316 stainless screen with an integrated stiffening cage to provide longevity under the toughest conditions. These components are housed in a round, concrete manhole. Due to its lightweight, compact design OceanSave is well suited for tight sites and can be used as a standalone treatment system or as a pre-treatment device in conjunction with other stormwater tertiary treatment technologies.

Operation Overview

OceanSave employs a unique screen design that maximizes hydraulic capacity and pollutant removal whilst simultaneously cleaning the screen surface. During operation, a tangential inlet causes stormwater to swirl in the circular treatment chamber. Buoyant materials migrate to the centre of the treatment chamber and rise above the screen while non-floating pollutants are trapped in the storage sump below.

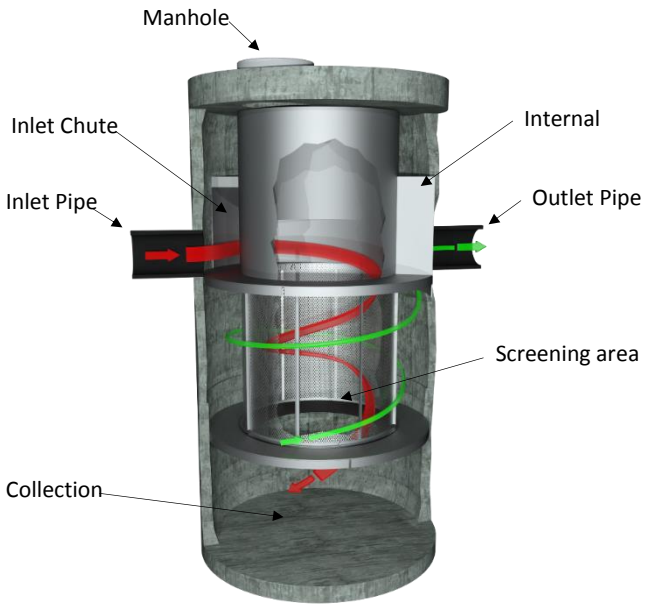

Figure 1: OceanSave components and flow path

During a storm, pipe flow enters the inlet structure where it is directed tangentially to the circular screen. The system builds driving head and forces water down into the screening area. This creates a vortex action with high tangential velocities across the face of the screen relative to the normal velocities through the screen. This indirect screening feature simultaneously cleans the screen surface whilst removing debris from stormwater. Floatable material is captured in the screening zone. There is also a baffle wall outside the screening zone that allows for the storage of hydrocarbons. Sediment and settable material fall into the sump below the screening area with treated stormwater exiting through the screen to the outlet pipe.

At higher flow rates, a portion of the runoff spills over the weirs located on either side of the inlet structure without affecting the treatable flow rate of the OceanSave. At the end of the storm water drains down to the pipe inverts further promoting the settling of fine suspended debris into the storage sump.

Features & Benefits

Each OceanSave system consists of the following features;

- Inlet chamber featuring separation cylinder, inlet flume and bypass weirs
- Treatment chamber featuring stainless screen and baffle wall
- Storage sump

The design of the inlet chamber allows one or more inlet pipes to enter at any location around an 180^0 arc. The outlet orientation can varied to suit your particular site conditions – hence acting as a junction pit.

Figure 2. OceanSave Screen

Due to the inlet chamber design, the vortex rotational flow is always initiated regardless of inlet pipe orientation.

The treatment chamber features a specially manufactured expanded metal 316 stainless screen with an integrated stiffening cage for longevity. Due to the treatment chamber configuration, the system can easily be inspected for any fine silt build up behind the screen and can easily be removed via a suction hose without dismantling any internal components.

The benefits of the OceanSave GPT are;

- Compact manhole design typically utilising a maximum of 3 pre-cast concrete pieces
- Single orientation each model size – no need for offsetting the inlet pipe from the trunk line
- On-line or offline units available for each model
- Minimal on-site assembly of internal components

Pre-cast Manhole OCEANSAVE is pre-configured (pipe size, location, unit height etc) prior to arrival upon site for ease of installation. These systems have a maximum of three pre-cast concrete pieces with minimal internal fit-out required on-site at time of installation. The internal fit-out on-site simply requires affixing the integrated screen cage to the inlet chamber and sump.

Configurations

The standard configuration for the OceanSave is a Pre-cast Manhole. This accommodates a wide variety of sizes and is suited to most applications. Where the site pipe flow is larger than what the inline OceanSave manholes can accommodate, diversion chambers can be utilised to convey these larger flows. A wide range of precast and custom designed diversion structures can be used.

The offline range is denoted with -D (e.g. OceanSave OS-11612-D) indicating an offline diversion box is required. See figures below for further detail.

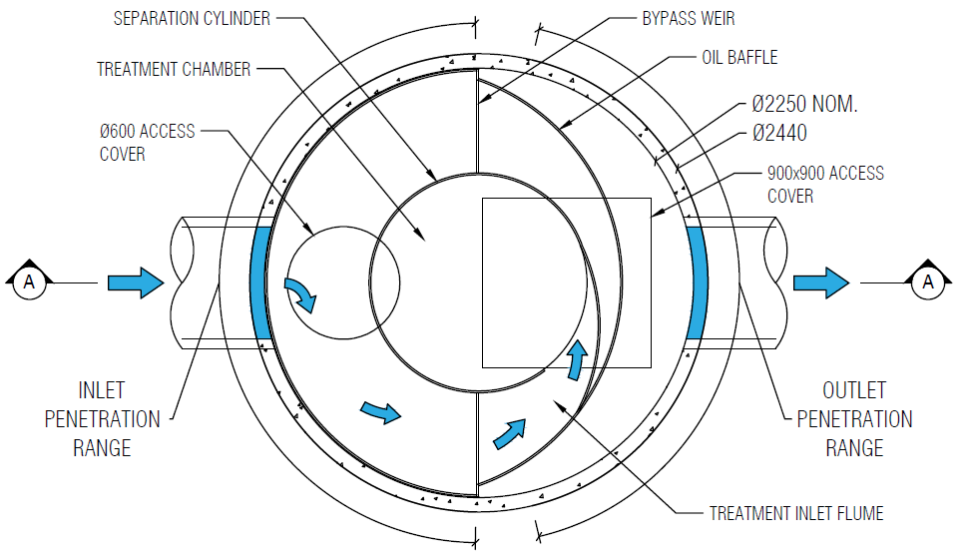

Figure 1. OceanSave Manhole (OS-1112)

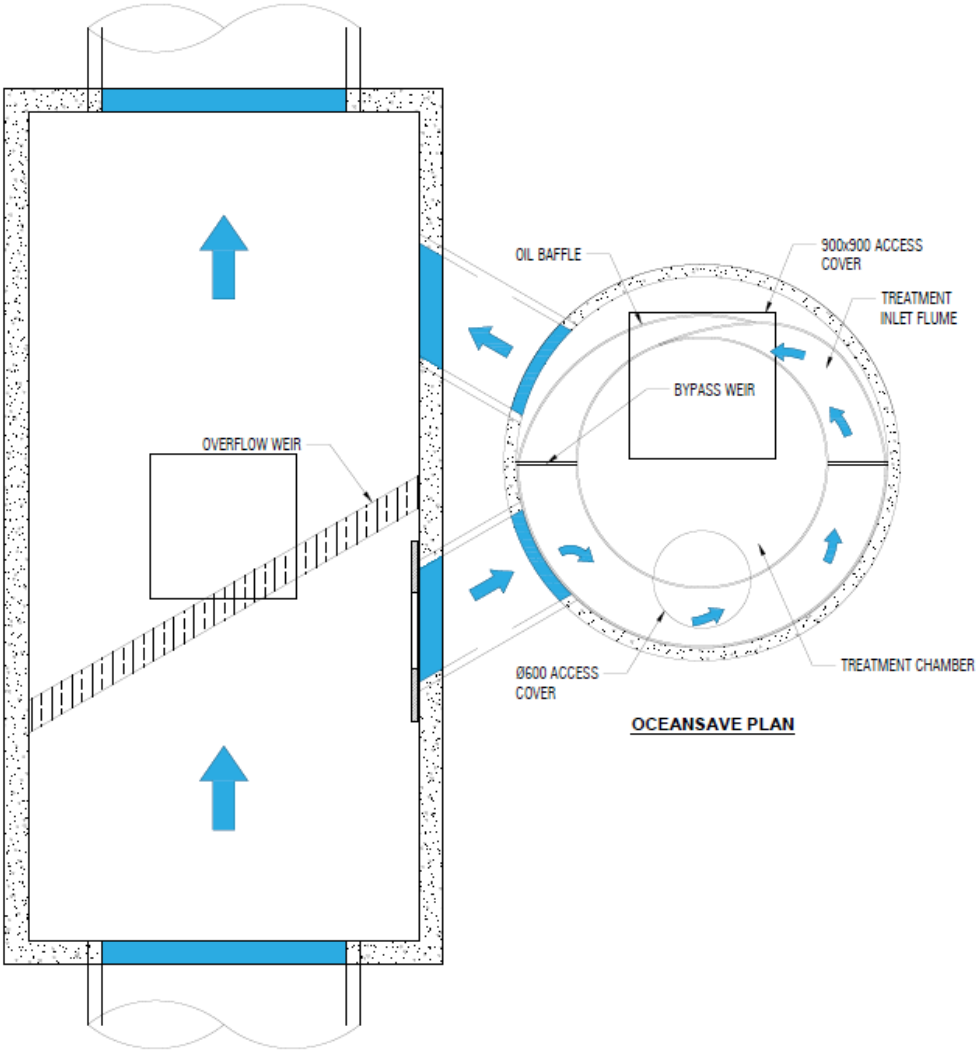

Figure 2. OceanSave-D Offline (typical)

Online

OceanSave	Diameter (ID)	Typical depth below invert	Maximum Flow	Recommended single pipe size *	Water quality flow rate	Sump storage capacity	Oil storage capacity
	m	m	L/s	mm dia	L/s	m^3	L
OS-0606	1.2	1.3	228	375/450	28	0.8	150
OS-0809	1.5	1.6	368	450/525	68	0.8	250
OS-1112	2.25	2.0	765	600/750	155	2.5	600
OS-1612	2.25	2.8	890	600/750	250	4.4	650
OS-1618	3.25	3.4	1200	750/900	350	11.9	2000
OS-2318	3.25	3.4	1580	750/900	580	11.9	2000
OS-2324	3.25	4.0	1680	900/1050	870	9.5	2000

* The pipe size can be physically larger than the recommended pipe size if required.

Offline

OceanSave	Footprint	Typical depth below invert	Maximum Flow	Recommended single pipe size **	Water quality flow rate	Sump storage capacity	Oil storage capacity
	m	m	L/s	mm dia	L/s	m^3	L
OS-0606-D	1.37	1.3	1048	525	28	0.8	150
OS-0809-D	3.3 x 1.7	1.6	1338	750	68	0.8	250
OS-1112-D	5.2 x 4.3	2.0	2355	900	155	2.5	600
OS-1612-D	5.2 x 4.3	2.8	3800	1200	250	4.4	650
OS-1618-D	5.2 x 4.3	3.4	3800	1200	350	4.4	650
OS-2318-D	6.1 x 4.3	3.4	3800	1200	580	11.9	2000
OS-2324-D	6.1 x 4.3	4.0	3800	1200	870	9.5	2000
TWIN - OS-2324-D	9.2 x 3.6	4.0	4600	1200	1680	19.0	4000

** The recommended pipe size is maximum pipe for the precast diversion box
Custom diversion structures can be used for larger pipe sizes

Table 1. OceanSave Models

Performance & Select Approvals

Field testing both locally in Australia and overseas has been undertaken for indirect screening devices like the OceanSave. Further research is being undertaken in Australia. The design and performance certification statement is available upon request from Ocean Protect.

The OceanSave style of gross pollutant traps has been accepted by some of the most stringent stormwater quality regulators in North America and Australia.

Please contact your Ocean Protect representative to obtain the OceanSave approval status in your area.

Maintenance

Every manufactured treatment device will eventually need routine maintenance. The question is how often and how much it will cost. Proper evaluation of long-term maintenance costs should be a consideration when selecting a manufactured treatment device.

OceanSave systems provides unobstructed access to stored pollutants, making it easy to maintain. Maintenance is a simple process using a vacuum truck, with no requirement to enter the unit. Fine silt build behind the screens of these devices can occur periodically. The OceanSave has been configured in such a way to allow removal of this debris without dismantling the screen or internal components.

Maintenance support – Ocean Protect provides flexible program options and contract terms. A detailed maintenance guide as well as Mass Load calculation spreadsheet is available upon request.

Design Basics

The OceanSave style of gross pollutant traps has been successfully installed in a variety of applications to meet regulatory requirements set by authorities and has been available in Australia for almost 20 years.

The design requirements of any OceanSave are detailed in 3 typical steps. These are;

1. Hydraulic Design & Configuration
2. Water Quality Design
3. Mass Load Design

Hydraulic Design & Configuration

All OceanSave GPTs must be designed to ensure that the hydraulic requirements of the system are met without adversely impacting the upstream hydraulics and eliminate any likelihood of localised flooding. Table 1 details the hydraulic loss for model at the maximum flow rate. The designer must ensure the corresponding head loss can be catered for the proposed development site.

For an OceanSave system the inlet and outlet pipes are located at the same invert level at the top of the inlet chamber deck.

Water Quality Design

Ocean Protect recommends and uses the widely endorsed Model for Urban Stormwater Improvement Conceptualisation (MUSIC), which makes it easy for correctly sizing an appropriate OceanSave system for your site.

A complimentary design service which includes MUSIC modelling is provided by the Ocean Protect qualified engineering team. Simply email your project details to design@oceanprotect.com.au or alternatively you can always call one of our engineers for a discussion or to arrange a meeting in your office.

The team will provide you with a cost-effective design containing the quantity and type of components required to meet your water quality objectives together with budget estimates, product drawings and the MUSIC (*.sqz) file.

Conversely, you can download the MUSIC treatment nodes for the Ocean Protect products from our website (www.oceanprotect.com.au).

When designing your own OceanSave GPT for water quality purposes in MUSIC a single Generic Treatment Node is required.

All details such as drawings, specifications and maintenance manuals can also be downloaded for integration into your project's documentation and the Ocean Protect friendly engineering team is always available to review your model or to provide additional assistance and guidance in how the OceanSave system should be configured for your site.

Mass Load Design

A typical solids and gross pollutant annual load can be obtained by completing a Water Quality Design undertaken most often in MUSIC. The selection of an appropriate OceanSave model should be undertaken such that the sump capacity falls within the maintenance frequency of 4 to 12 months.