STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Ocean Protect Pty Ltd**
Applicant Address	PO Box 75 Casula Mall NSW 2170
Website	www.oceanprotect.com.au
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Verified Technology

Product Title	**StormFilter PSorb**
SQIDEP Pathway	**Body of Evidence Pathway**
Reviewed Documents	The following documents form the basis of this independent evaluation: ● Contech Construction Products Inc (2009), The Int'l Corporate Center Stormwater Treatment System Field Evaluation: The Stormwater Management StormFilter® (StormFilter) with PhosphoSorb and Sintered Perlite Media at specific flow rate of 0.67 gal/min/ft^2. ● Dalrymple B, Wicks M. (2021). A review of the application of StormFilter® in Australia. Prepared on behalf of Ocean Protect. ● Goonetilleke A (2011), Kuranda Stormwater Treatment System Field Evaluation. ● Laboratory reports for all monitoring events at site. ● Letter from John Pedrick, Contech Engineered Solutions, Stormwater Management StormFilter PhosphoSorb, 5/18/2015. ● Letter from Gretchen Tellessen, Contech Engineered Solitons, Review of catchment conditions at StormFilter monitoring site, Lolo Pass Road, Zig Zag, Oregon, 4/8/23. ● Ocean Protect (2019). StormFilter® Operations & Maintenance Manual. ● Ocean Protect (2020). StormFilter® Technical Design Guide. ● Peer review report by Damian McCann of StormFilter® (16 June 2021) ● Photos of StormFilter® Psorb technology installations. ● Plan and section drawings for the StormFilter PSorb technology monitoring installation at the study site. ● Rahman A (2020). Peer Review: StormFilter® as a stormwater improvement device under typical Australian conditions, Prepared for Ocean Protect, 2 March 2020. ● Renew Solutions (2021), StormFilter Flow Test. ● Urban Green (2015), The Stormwater Management StormFilter® PhosphoSorb® at a Specific Flow Rate of 1.67 gpm/ft^2. GULD Technical Evaluation Report for Basic & Phosphorus Treatment, Prepared for Contech Engineered Solutions. ● Statutory declarations from Ocean Protect personnel. ● Wicks M, Lenhart J, Pedrick J (2014). Solid and nutrient pollutant removal by an engineered stormwater filtration media – Field evaluation of a radial cartridge media filter, Published in Water Journal, September 2014. ● Wicks M, Vigar N, Hannah M (2011), Nutrients and solids removal by an engineered treatment train – Field evaluation of a gully pit insert and cartridge media filter.

	Published in Water Journal of the Australian Water Association, September 2011.

Technology Information

Applicant's Verified Performance Claims (ER)	**Total Suspended Solids (TSS) 88.6 %** **Total Phosphorus (TP) 77.1 %** **Total Nitrogen (TN) 61.9 %** **Gross Pollutants 100 %**
Test Stormwater Runoff	The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (Urban Roads, Residential, Industrial, Commercial).
Test Catchment	Residential

Maintenance Performed during monitoring	● During the performance monitoring period, maintenance of the system was performed three (3) times – on 27 March 2012, 28 March 2013, and 17 January 2014. Each of the maintenance events involved the removal of sediment within the system, removal of the used cartridge, and the installation of a new cartridge. ● The StormFilter system at the site has been maintained in accordance with typical/ standard maintenance procedures for these assets.

Verified method to model in MUSIC

Modelling a StormFilter PSorb technology in MUSIC is as follows:

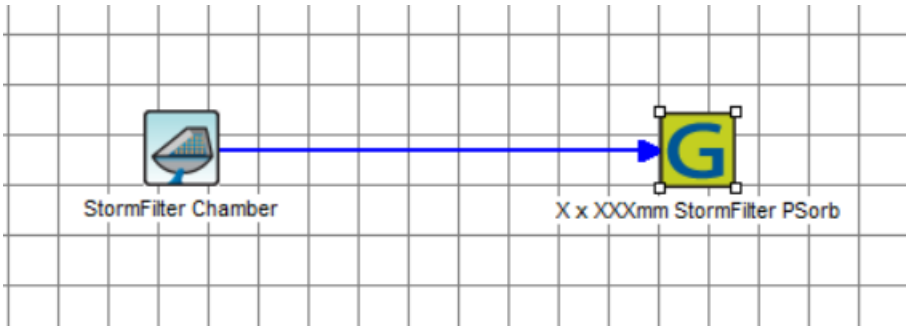

Table 1 – Summary of StormFilter® PSorb cartridge dimensions

Parameter	Cartridge name/ siphon height		
	690	460	310
Physical height (mm)	840	600	600
Typical weir height from outlet (mm)	920	690	540
Treatment flow rate (L/s)*	1.26	0.86	0.60

*: Treatment flow rate based on StormFilter® Psorb technology applied at study site.

Use the detention basin node to hydraulically represent the detention tank (or 'vault'/ storage) 'housing' the StormFilter® cartridge system(s), with the properties given in Table 2.

Table 2 – Recommended values for MUSIC Detention Node component for StormFilter® PSorb technology modelling

Parameter	Value for given cartridge name/ siphon height			
	690	460	310	Comments
Inlet properties				
Low flow by-pass (m^3/s)	0			No bypass of flows below treatment flow rate occurs.
High flow by-pass (m^3/s)	100			Default (very high value), noting bypass occurs in the Generic node and any overflow occurs via the overflow weir in the detention node.
Storage properties				
Surface area (m^2)	Varies. Adjust to be equal to value of surface area of chamber housing StormFilter® cartridges minus area of cartridges.			
Extended detention depth (m)	0.77	0.54	0.39	Standard 80mm head above top of cartridge media.
Permanent pool volume (m^3)	0			No permanent ponding of water occurs in appropriately functioning StormFilter® technologies.
Initial volume (m^3)	0			
Evaporative Loss as % of PET	0			StormFilter® cartridges are almost exclusively underground. Any evaporative loss is likely to be minimal.
Outlet properties				
Equivalent pipe diameter (mm)	Varies.			Depends on cartridge height, number, and chamber dimensions. Best to liaise with Ocean Protect.
Overflow weir width (m)	Varies. Adjust to be equal to width of weir structure within system.			
Notional detention time (hrs)	Varies.			
Advanced properties				
k (m/year)	Set to 1 or zero.			Ensures no additional treatment is modelled where none exists.

Use the generic node with the properties given below in Tables 3 and 4.

Table 3 – Recommended treatment flow rate & pollutant removal for StormFilter® PSorb technology

High flow bypass/ treatment flow rate (TFR)	Pollutant removal up to TFR
Treatment flow rate multiplied by number of cartridges*	88.6% for TSS 77.1% for TP 61.9% for TN 100% for gross pollutants

*: Treatment flow rates for available configurations given in Table 1.

Table 4 – Recommended generic node transfer function properties for StormFilter® PSorb technology

Pollutant	Influent	Effluent	Reduction
Total suspended solids (TSS)	1000	114	88.6%
Total Phosphorus (TP)	10	2.29	77.1%
Total Nitrogen	100	38.1	61.9%
Gross Pollutants	1000	0	100%

Conditions/Notes

The limitations of the acceptance of these claims include:

- The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water.
- Design and installation should be performed in accordance with the Manufacturer's guidelines. Results are reliant on the maintenance of the device being consistent with the manufacturer's guidelines.
- Regular inspection and maintenance should be performed in accordance with the Manufacturer's Operation and Maintenance Manuals.

STORMWATER AUSTRALIA

Independent Reviewers

Evaluator Signature	
Dr Baden Myers Director Baden Myer's Consulting	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	22 December 2023
Acceptance by Stormwater Australia Board of Directors	22 December 2023
Verification Issued	22 December 2023
Stormwater Australia Verification Certificate Number Reference	SA-2023/09-VC

Verified under SQIDEP Version

1.3 Body of Evidence Pathway