STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Ocean Protect Pty Ltd**
Applicant Address	60 Lyn Parade, Prestons, NSW 2170
Website	www.oceanprotect.com.au
Contact Email	michaelw@oceanprotect.com.au

Verified Technology

Product Title	**Filterra**
SQIDEP Pathway	**Body of Evidence Pathway**
Reviewed Documents	The following documents form the basis of this independent evaluation: • Dalrymple B, Wicks M. (August 2024). *Detailed performance report for SQIDEP review – Filterra biofiltration*. Prepared on behalf of Ocean Protect. • Supporting information for the Filterra biofiltration technology monitoring at the study site at Western Sydney, including plan and section drawings, site photos, sample receipt notifications, chain of custody documentation, certificate of analyses, individual storm reports, and monitoring equipment calibration and maintenance logs. • Statutory declarations from Ocean Protect personnel. • Ocean Protect (2019). *Filterra® Operations & Maintenance Manual*. • Ocean Protect (2020). *Filterra® Technical Design Guide*. • Anderson A, Smolek A (2015). Filterra® Bioretention System Water Quality and Hydrologic Field-Scale Performance Evaluation. Prepared for Contech Engineering Solutions. • Pattle Delamore Partners Ltd, (2023), Letter re *Coatesville Filterra Infiltration Trial*, prepared for Stormwater360. • Smolek A P, Anderson A R, Hunt W F (2018). Hydrologic and Water-Quality Evaluation of a Rapid-Flow Biofiltration Device. Journal of Environmental Engineering 144(2), February 2018.

Technology Information

<table>
<tr><td>Applicant's Verified Performance Claims</td><td>The verified performance claim is shown below in Table 1. It is based on the Efficiency Ratio included in the DPR.

Table 1 – Verified Performance Claim
<table><tr><th>Pollutant</th><th>Verified Performance Claim (% reduction)</th></tr><tr><td>TSS</td><td>90</td></tr><tr><td>TP</td><td>85</td></tr><tr><td>TN</td><td>47</td></tr><tr><td>Gross Pollutant</td><td>100</td></tr></table>
The verified method for modelling Filterra in MUSIC is described in section "Verified method to model in MUSIC".</td></tr>
<tr><td>Test Stormwater Runoff</td><td>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 (e.g. urban roads, residential, industrial, commercial).</td></tr>
<tr><td>Test Catchment</td><td>University car park</td></tr>
</table>

Maintenance Performed during monitoring	• The system was maintained approximately every twelve (12) months. • Specific maintenance activities that have been undertaken are: inspection of Filterra® biofiltration system and surrounding area; temporary removal of tree grate to access filter media surface; removal of debris, litter and mulch; mulch replacement; and plant health evaluation and pruning, as necessary.

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Verified method to model in MUSIC

Modelling a Filterra in MUSIC is as follows:

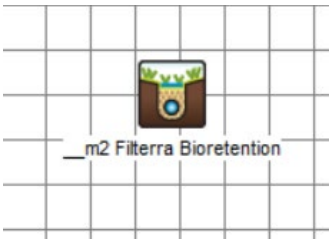

Table 2 – Recommended values for MUSIC Bioretention node for Filterra modelling

Parameter	Recommended value	Comments
Inlet properties		
Low-flow bypass (m^3/s)	User defined	
High-flow bypass (m^3/s)	User defined	
Storage properties		
Extended detention depth (m)	≤ 0.3	150mm is a typical value, equal to the depth of air space above the mulch layer. The mulch layer is 75mm thick and shall not be included within the EDD calculation.
Surface area	User defined	
Filter and media properties		
Filter area (m^2)	User defined and to be at least 0.3% of the catchment area.	
Unlined filter media perimeter (m)	User defined	
Saturated hydraulic conductivity (mm/hour)	3550	
Filter depth (m)	0.53	
Total Nitrogen (TN) content (mg/kg)	1000	
Orthophosphate content	40	
Infiltration properties		
Exfiltration rate (mm/hr)	User defined	
Lining properties		
Is the base lined ?	User defined	
Vegetation properties		
Plant selection	User defined	'Vegetated with nutrient effective plants' recommended for optimal performance.
Outlet properties		
Overflow weir width (m)	User defined	
Underdrain present	Yes	
Submerged zone with carbon present	No	
Depth (of submerged zone)	-	

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 design of the device being consistent with the Manufacturer's guidelines and this verification certificate. • Regular inspection and maintenance should be performed in accordance with Ocean Protect's Operation and Maintenance Manuals. Results are reliant on the maintenance of the device being consistent with the Manufacturer's guidelines. • If the filter media used within Filterra is altered, then this verification becomes invalid.

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Independent Reviewers

Evaluator Signature	
Mark Liebman Director, Principal Engineer Sustainability Workshop	
Ricky Kwan Technical Director AECOM	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	24 October 2024
Acceptance by Stormwater Australia Board of Directors	24 October 2024
Verification Issued	24 October 2024
Stormwater Australia Verification Certificate Number Reference	SA-2024/13-VC

Verified under SQIDEP Version 1.3

Body of Evidence Pathway