

24 November 2020

RE: PROPRIETARY SQID REVIEW CHECKLIST

Thank you for registering for the webinar *Development assessment for stormwater quality management – tips, tricks & tribulations*, hosted by Ocean Protect on 11 November 2020. The webinar is now publicly available via YouTube¹. The presentation slides used in the webinar are also provided with this correspondence.

As promised, this document provides a ‘checklist’ for reviewing the performance claims of (and associated MUSIC modelling for) proprietary stormwater quality improvement devices (SQIDs). This checklist has been provided to assist personnel from local government (and other regulatory authorities) responsible for the assessment of stormwater quality-related aspects of new development applications – and stormwater professionals involved in the preparation and submission of stormwater quality management plans for development applications.

Two checklists are provided in Tables 1 and 2:

- Table 1 provides a checklist for reviewers (e.g. development assessment personnel for local government) responsible for assessing the performance claims of any proprietary SQID
- Table 2 provides a checklist that we recommend be completed by suitably qualified person(s) on behalf of the SQID proprietor and subsequently provided (with no distribution restrictions) to reviewers (e.g. development assessment personnel for local government) responsible for assessing the performance claims of any proprietary SQID.

These checklists have been developed based on our personal and Ocean Protect’s 20+ years’ experience in proprietary SQIDs, and the following documents:

- E2DesignLab (2015). *Development Application Requirements and Performance Protocol for Proprietary Devices on the Gold Coast*. Prepared for the City of Gold Coast, 2015, Originally Prepared by DesignFlow. Peer Reviewed and Amended by E2DesignLab.
- eWater (2014). *MUSIC by eWater User Manual*.
- Stormwater Australia (2018). *Stormwater Quality Improvement Device Evaluation Protocol*. Version 1.3, December 2018.

¹ Webinar – *Development assessment for stormwater quality management – tips, tricks & tribulations*, presented by Brad Dalrymple & Michael Wicks, Ocean Protect, 19 August 2020, <https://youtu.be/sF5C2GvXjb4>

- Stormwater NSW, *Stormwater NSW comments and advice on SQIDEP* (sent to Stormwater Australia, 14 August 2019), <https://stormwaternew.asn.au/wp-content/uploads/2019/09/Stormwater-NSW-Comments-and-Advice-on-SQIDEP.pdf>
- Stormwater Queensland, Stormwater Queensland submission on the Stormwater Quality Improvement Evaluation Protocol (sent to Stormwater Australia, 12 March 2020), <http://stormwaterqueensland.asn.au/wp-content/uploads/2020/03/SQ-SQIDEP-Submission-Final.pdf>
- Stormwater Queensland (2019), *MUSIC Modelling Guideline (v3) (November 2018)*, Stormwater Queensland Submission (sent to Water by Design 28 March 2019), <http://stormwaterqueensland.asn.au/wp-content/uploads/2019/04/SQ-MUSIC-Guidelines-Submission-March-2019-Ver1.1.pdf>
- Water By Design (2018). *MUSIC Modelling Guidelines*. Consultation Draft, November 2018. Healthy Land and Water.
- Wicks M, 2020. *How SQID proprietors will exaggerate stormwater treatment performance claims via SQIDEP* <https://oceanprotect.com.au/wp-content/uploads/2020/09/SQIDEP-webinar-explanatory-note.pdf> 18 September 2020.

We acknowledge that we have a conflict of interest in authoring this document – noting that Ocean Protect develop, manufacture, install and manage proprietary SQIDs.

Please contact us if you have any questions or would like to discuss anything further.

Yours faithfully,



Michael Wicks
Technical Director



Brad Dalrymple
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Attached: Presentation slides from *Development assessment for stormwater quality management – tips, tricks & tribulations*, presented by Brad Dalrymple & Michael Wicks, Ocean Protect, 11 November 2020.

Table 1 Proprietary SQID checklist for reviewers

Aspect	Criteria	Compliance		Comments
		Yes	No	
Information from SQID proprietor	Checklist given in Table 2 must be completed by suitably qualified person(s) on behalf of SQID proprietor and provided to Council, along with all associated information referred to in checklist (with no distribution restrictions).			
MUSIC treatment node(s) for proprietary SQID(s)				
Pollution removal	Modelled SQID pollution removal does not exceed values approved by Council.			
High flow bypass	The high flow bypass value for any approved treatment node is equal to the design treatment flow rate (TFR) approved by Council.			
Modelling of detention/sedimentation nodes representing the storage area/ volume where filtration devices are to be installed	When using MUSIC to model proprietary filter type products which incorporate the use of an area/ volume where filtration devices are to be installed, a detention or sediment basin node is to be used. However, the 'k' values associated with this system must have no additional treatment (i.e. k value set to 1 or zero). Selection of parameter values (default or otherwise) should not be used to claim additional stormwater treatment when none materially exists.			
Gross pollutant trap storage	Calculations must be provided demonstrating that GPT storage volumes are large enough to store collected sediments and gross pollutants given maintenance schedule approved by Council.			

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Table 2 Checklist to be completed by suitably qualified person(s) on behalf of SQID proprietor and provided to reviewers (with no distribution restrictions)

Aspect	Criteria	Compliance		Comments
		Yes	No	
Claimed performance	<p>Claimed stormwater treatment performance of SQID must be described, including:</p> <ul style="list-style-type: none"> • Reduction of pollution concentrations • Reduction of flow (if any) • Design treatment flow rate (TFR) • Recommended maintenance frequency (and associated activities) <p><i>Note:</i> The TFR is defined the defined as the maximum flow rate that can pass through the SQID without excess clogging that achieves the claimed pollutant removal rate and maximum inflow drainage area claimed by the SQID manufacturer. To ensure the validity of the flow rate, additional (laboratory) tests may be required that show the changes in head loss that correspond to the changes in treatable flow rate.</p> <p>Should sampling of flow rates through a device have not occurred within the context of field testing, it would be impossible to determine the treatable flow rate and validity of water quality data.</p>			
Reporting	<p>Reporting of performance must be provided and must include:</p> <ul style="list-style-type: none"> • SQID sizing methodology and description, including any non-validated or non-referenced assumptions • Map showing location of SQID, rainfall gauge, and catchment extent • Catchment characteristics (area, approximate grade, landuse type), with photographs • Roles and responsibilities of all parties involved • Sampling and analytical methodologies • Discussion of all/any maintenance activities performed on the treatment measure including, nature, interval, modifications, repairs, replacements, observations • Data (for all qualifying events) • Discussion of any factors affecting the performance, including scaling effects and particle size distribution of both the influent and effluent. Other factors shall be included if deemed appropriate • Performance metrics (see below) • Conflicts of interest for all individuals involved in sampling, analyses and reporting. 			

Aspect	Criteria	Compliance		Comments
		Yes	No	
Supporting information	Data provided for all qualifying events, including: <ul style="list-style-type: none"> Storm sequence logs Individual storm reports Chain of custody documentation Laboratory reports of water sample analyses 			
Data quality	Performance data must be for a minimum of fifteen (15) qualifying events			
	Performance data must be for a minimum of seven (7) qualifying events from a single location – all of which must be sequential OR Where a single site is used, a minimum of 10 qualifying events must be sequential <i>Note:</i> Any events within a sequence where failure of equipment or meeting of event criteria has occurred, can be excluded from the sequence.			
Site details	Site must be representative of the installation and land use appropriate to the device and intended market segments. The test site land use must be detailed and described according to land use category.			
Rainfall measurement	Rainfall must be measured by a rain gauge (pluviometer) that is capable of sampling at intervals of 5 minutes or less, and in increments no greater than 0.25mm.			
	The rain gauge must be installed and maintained according to manufacturer's instructions, and as a minimum be checked, cleared of debris regularly and calibrated at least two times during the testing period (if a non-recording gauge is used this can be emptied and 'reset' to achieve this).			
Hydrographs	Hydrographs must be provided of all qualifying events demonstrating the programme has representatively captured the event			
	At least four (4) peak inflows from the sampled events should exceed 75% of the design treatment flow rate (TFR) of the device, and one (1) of those events at or greater than its design TFR.			
Dissolved nitrogen	The average dissolved fraction for nitrogen in the source stormwater must be above 40%. Individual events can be as low as 20% dissolved nitrogen provided the overall dataset (excluding outliers) has a mean dissolved nitrogen above 40%. Where the analysis of dissolved nitrogen has not occurred with datasets that are more than 2 years old, alternative speciation can be used to illustrate the suitability of the data. In these cases, the minimum fraction of total of NO _x and NH ₃ must be greater than 25%			

Aspect	Criteria	Compliance		Comments
		Yes	No	
Flow monitoring	Flow monitoring equipment must be able to continuously monitor flow at regular intervals to match rainfall information (5 minutes or less is recommended) throughout the duration of a storm event and over the expected range of flows.			
	Flow measurement at the inlet and outlet is required unless there is no attenuation of the flows and no bypass or overflows of treatable flow rate			
	Equipment must be installed and calibrated according to manufacturer's instructions and as described in the QAPP.			
Sampling location	For typical installations, gross pollutants (>1000 µm) should be excluded from any captured water samples, unless this is being claimed for the device.			
	If a claim is being made for performance including bypass, the contribution of bypass (if/when it occurs) shall be incorporated into the calculation of device efficiency (USEPA 2002) or design tools as appropriate			
	The performance claim must be made in relation to the device up to TFR, and no removal can be claimed for the bypass flows.			
Automated samplers	Automated samplers are to be used for all water sampling, except where grab samples are required (i.e. to ensure timely sample preparation, preservation or monitor unstable parameters).			
Sampling Quality Assurance and Quality Control	Chain of custody documents identifying sample, collection agency, collection time, preservation used, and laboratory receipt of sample and sample condition shall be provided.			
Laboratory analysis	All analysis must be undertaken at laboratory or analytical facilities with current NATA accreditation for requested analysis (including limit of reporting).			
Non-detects	Effluent sample results below the limit of detection (LOD) shall be set at 0.5 x LOD			
Performance metrics	The following methods are appropriate to present removal rates and efficiencies: <ul style="list-style-type: none"> • average and median concentration removal efficiency • summation of loads • efficiency ratio 			

Aspect	Criteria	Compliance		Comments
		Yes	No	
Maintenance	<p>Information related to the recommended maintenance procedures and associated frequencies must be derived from field monitoring and shall be provided.</p> <p>All filters generally fail from an accumulation of sediment and/or algal growth (being kept saturated with stormwater) within the media matrix. Should predictions be made from data obtained from testing low sediment generating sites, a cleaning frequency of 12 months should be adopted. For example, if a proprietor calls for a 4-year maintenance frequency for given filters, but the testing site generated sediment say on average 1/5th of the typical load (e.g. 30mg/L TSS concentration vs say 140mg/L for residential land), then the maintenance frequency of 4 years is inadequate and should be reduced to 12 months until sufficient evidence can be provided.</p>			
Approved performance	If available, existing approvals for other locations (in Australia and USA) must be provided, including approval body, approved performance and associated design TFR.			
Rationale for any non-compliances	Where any non-compliances to the aforementioned criteria exist, the rationale for these must be disclosed.			
Relevant experience of suitably qualified person(s) that completed this checklist	The relevant experience of the suitably qualified person(s) that has completed this checklist must be outlined.			
Conflicts of interest of suitably qualified person(s) that have completed this checklist	A signed document must be provided by the person(s) that has completed this checklist, outlining any perceived or actual conflicts of interest in relation to the SQID proprietor.			