Stormwater Australia

Bryan Ward

Executive Officer

Via email: executive@storwmater.com.au

19 March 2025

AWC Reference: 241901_Up-Flo Filter

Dear Bryan

RE: Hydro International Up-Flo Filter SQIDEP Review

Australian Wetlands Consulting (AWC) and Dr Ricky Kwan (AECOM) were commissioned to audit the performance monitoring of the Hydro International Up-Flo Filter system. This review presents a novel hybrid approach, combining elements of Stormwater Australia's *Stormwater Quality Treatment Devices Evaluation Protocol (SQIDEP) – Field Monitoring pathway" (Stormwater Australia, Version 1.3, December 2014)*, carried out at Bells Creek, Caloundra, QLD, with the recent *SQIDEP Hybrid Lab Testing Pathway (Stormwater Australia, Version 3.4, August 2024)*

Hydro International/Covey supplied the following materials relating to the performance monitoring:

- Detailed performance report for SQIDEP review – Field Monitoring Pathway Up-Flo Filter – Phase 1 (*Covey Associates,* November 2022)
- Detailed performance report for SQIDEP review – Field Monitoring Pathway Up-Flo Filter – Phase 2 (*Covey Associates,* June 2023)
- Detailed performance report for SQIDEP review – Hybrid Lab Testing Pathway Up-Flo Filter – Phase 3 (*Covey Associates,* September 2024)
- Evaluation of Treatment Performance of Hydro International Up-Flo Filter (HIUFF) (*Covey Associates*, November 2024)
- Technical Note – Responses to Stormwater Australia Evaluator Queries Regarding Hydro UFF SQIDEP Report (*Terry Lucke, Covey Associates*, 11 December 2024)

The following key information needs to be highlighted with regards to any Treatment Claims that can be made for the HIUFF system evaluated under the SQIDEP framework:

- A treatable flow rate of 9.6 litres/ second (1.6 litres/second for each filter module)
- Pollutant concentration reduction claims that can be made as a result of the field trials are shown in Table 1
- Generic MUSIC node used would need to be updated as noted in the last Item of Table 2

Table 1: Summary of pollution reduction of Hydro International Up-Flo Filter obtained via the Hybrid Lat Testing Approach

Analyte	Efficiency Ratio (%)
TSS	94.4
TP	60.1
TN**	47

*** Hydro International made an original claim of 52% for TN. However, as the organic nitrogen concentrations used in the lab testing exceeded the lab target value, it has been agreed that a reduction to 47% would be appropriate.*

Conclusion

AWC can confirm the HIUFF achieved compliance within the outlined hybrid approach.

We believe the HIUFF achieved compliance within the outlined hybrid approach and the performance observed in Caloundra is transferrable to other locations since the key variables are treatable flow rate, appropriate media and catchment characteristics.

We hope this summary is clear but please contact either of us with any questions.

Yours sincerely,

Damian McCann
Director AWC

Technical Director
AECOM

Table 2: Assessment of the Hydro International Up-Flo Filter system performance monitoring undertaken at Bells Creek, Caloundra against SQIDEP (v3.4) Hybrid Lab Pathway requirements (the respective page number where the requirement is discussed in SQIDEP v1.3 is shown for ease of reference).

SQIDEP Requirement	AWC comments	Compliance
SQIDEP – Hybrid Lab Testing Protocol Requirements		
Section 2: SQIDEP Hybrid Pathway – General Requirements		
Synthetic Stormwater – Develop a synthetic stormwater that meets specified requirements, as outlined in Table 1 of the Hybrid lab testing protocol	Nutrient speciation was not provided in the initial documentation. However, this was subsequently provided in a Technical Note dated 11 December 2024. The nutrient concentrations generally satisfy the targets set in the Hybrid Lab Testing protocol, except for organic nitrogen. This was because the liquid fertiliser used, Charlie Carp, had a relatively high organic nitrogen component, resulting in an OrgN concentration of about 2 mg/L compared to a lab target of 0.5 mg/L. In view of this oversight it was agreed that the treatment efficiency ratio reported for total nitrogen would be reduced by 10% for the purposes of this review until such time that additional data satisfying Table 1 of the lab target is available.	Y
Include a minimum number of test runs	A minimum of 2 test runs were implemented for tests at 33%, 66% and 100% MDTF, but not for the overflow conditions required for GP analysis, as indicated on Table 1 of the Phase 3 report. This approach is recommended in Table 2 of the SQIDEP Hybrid Lab Testing Pathway, and is therefore deemed acceptable.	Y
NATA accredited analytical methods – water quality, hydraulic testing and other analyses are undertaken in laboratories with NATA accreditation for each analytical method used.	Water quality and sediment testing was conducted by ALS, which holds NATA accreditation for all of the specified analyses, though this is not specified in the Phase 3 document.	Y
Field testing – to be undertaken as per SQIDEP: Field Evaluation Monitoring (v 1.3) (Stormwater Australia 2018), with the exception of the number of events. Given that you will have already undertaken extensive Lab testing using this protocol, the hybrid method will only require eight (8) events to be tested in the field.	Field testing was undertaken as per the SQIDEP: Field Evaluation Monitoring Protocol (v 1.3). Field testing was derived from 20 qualifying storms, which exceed the 8 qualifying storm threshold considerably.	Y
Data analysis – data is to be analysed as per SQIDEP: Field Evaluation Monitoring (v 1.3) (Stormwater Australia 2018), with the exception of gross pollutants	Data was analysed as per SQIDEP Field Evaluation Monitoring Protocol (v 1.3).	Y
Mass Balance – undertake a mass balance for total suspended solids (TSS) over the full suite of experiments.	A mass balance approach was applied across TSS, and within pooled size classes of TSS over the full suite of experiments, as outlined in Table 6 of the Phase 2 document	Y
Hybrid Reporting – Prepare a combined report of the field assessment and experiments undertaken to detail the	A hybrid detailed performance report addressing the combined field and lab approach has been provided	Y

performance of the device and submit for Evaluation		
Section 3: Specific Requirements		
Section 3.1: Independence Requirements		
Claimants may be able to contribute to the Lab section of the QAPP, but it must be signed off and published by the testing organisation.	To our knowledge, claimants did not contribute to the Lab section of the QAPP.	Y
Claimants may observe but must not participate in the testing.	To our knowledge, claimants did not participate in testing, instead engaging Covey Associates as an independent testing organisation.	Y
Claimants must not handle/collect samples.	To our knowledge, claimants did not handle/collect samples, instead engaging Covey Associates as an independent testing organisation.	Y
Claimants must not transport samples to the NATA testing laboratory.	To our knowledge, claimants did not transport samples to the NATA accredited testing facility.	Y
Claimants must not be the sole recipient of the water quality data reports from the NATA labs.	To our knowledge, claimants were not the sole recipient of the water quality data reports from the NATA accredited testing facility.	Y
The testing organisation must prepare and publish the final report.	Covey Associates, the independent testing organisation, prepared and published the final report.	Y
The final report must be presented in full, unredacted, in context.	The final report has been presented in full, in context, and without redactions.	Y
The testing organisation shall provide a Statutory Declaration that the testing process has been performed independently without duress from the claimant.	The testing organisation has not provided said Statutory Declaration – this has now been provided.	Y
Section 3.2: Data Quality Objectives		
Data collected must, at a minimum, include duplicate experiments at flow rates of 33%, 66% and 100% of the design flow rate	Data collected in the hybrid lab trials included duplicate experiments at 33%, 66% and 100% of the design flow rate, as outlined in Table 4 of the Phase 3 report.	Y
Where duplicated experiments do not demonstrate a reasonably consistent performance (e.g. the individual experimental results are not within experimental uncertainty), the reasons for the inconsistency are to be identified.	Duplicated experiments demonstrated reasonably consistent performance throughout the hybrid lab trials, as indicated in Table 7 of the Phase 3 report.	Y
The absolute numbers and percentage of gross pollutants that are released from the device under 100% flow and maximum design bypass flow conditions must be included.	The outlet screen was removed during testing. It is accepted that GPs are unlikely to pass through if the screen is fitted. However, how the trapped gross pollutants may impact on the flow behaviour and treatment of other stormwater pollutants is not clear. It is recommended that either one of the following 2 options be adopted in relation to GPs: 1) Specify that the Hydro UFF device would be used in conjunction with an upstream gross pollutant trap, basket, or similar, or 2) Do not make a claim for gross pollutants.	

Section 3.3: Organisational Roles and Responsibilities		
Organisational roles and responsibilities are clearly identified.	The roles and responsibilities of the various parties involved in demonstrated the performance of the device are clearly identified. • Hydro International is the claimant, as identified on the cover page of the Phase 3 report. • Covey Associates is the independent testing and reporting organisation as identified on the cover page of the Phase 3 report. • ALS is the NATA accredited analytical laboratory, as identified on pg 5 of the Phase 3 Report.	Y
Section 3.4: Description of the laboratory testing rig		
Sufficient Detail - the testing rig shall be described and videos/photographs supplied, sufficient to satisfy an Evaluator that this pathway has been complied with.	The testing rig has been described and illustrated in sufficient detail across the 3 documents to satisfy that the approach is valid and reasonable. Descriptions and photographs to this effect are provided in Section 2-Phase 1 report, Section 2, Phase 2 report, and sections 2 & 3, Phase 3 report.	Y
Full Scale - Devices are to be tested in full scale (unless a family of devices is being tested).	The device was not tested in full scale, as the HIUFF device used in Hybrid Lab Testing had 6 of 12 filter modules engaged consistent with the revised hydraulic loading rate. As a family of devices this criteria is satisfied.	Y
Section 3.5: Composition and testing of the synthetic stormwater		
TSS concentration of 100 ± 50 mg/L	Field testing data was used for TSS evaluation and not lab data.	Y
Particle size distribution not greater than the medium grading specification in Table 3.1 in Lawrence and Breen (1998).	Particle size distributions are provided in Table 6 of the Phase 2 document, and are consistent with grain sizes at or below the medium grading specification	Y
Particle specific gravity similar to Table B.2 in Lawrence and Breen (1998).	Field testing data was used for evaluation, so compliance lab specifications was not required.	Y
TN concentration of 1.8+/- 0.6 mg/L as N.	Inlet TN concentrations were in agreeable alignment with those specified in the SQIDEP Hybrid Lab Testing document	Y
TP concentration of 0.35 +/- 0.12 mg/L as P	Inlet TP concentrations were in agreeable alignment with those specified in the SQIDEP Hybrid Lab Testing document	Y
The inclusion of nutrient species envisages a future where regulations will be based on more environmentally relevant parameters, such as the nutrient species, rather than only on TN and TP. Therefore, the pathway requires organic, inorganic and particulate forms of nitrogen as sub-components of TN. It is expected that the removal efficiency of TN and TP will be significantly influenced by the speciation of the nutrients. The Laboratory Testing pathway therefore requires that the speciation of TN and TP is	This is addressed in the first item of this Table under "Synthetic Stormwater".	Y

measured and the removal (or otherwise) of the components is reported.		
The water source used for the Laboratory Testing pathway should be consistent throughout the experiments and is to be described.	Source water used for the laboratory testing was described on page 3 of the Phase 3 document as 'incoming mains water', which Table 1 indicates was tested to evaluate background concentrations and consistency	Y
The total volume of water passed through the SQID across all experiments and the means of measuring is to be reported.	The total water volume is provided in Table 1 of the Phase 3 document. The means of measuring flows is described as an ABB FEV-WRS-150 electromagnetic flow meter in section 2.2 of the Phase 1 document	Y
The TSS mass balance is to be determined and reported. This can be done by reporting the total mass of suspended solids that have been dosed into the SQID and measuring the mass of solids captured in the device across all experiments, or by an alternative method. The assessment of the mass balance is also to include calculations of the mass not captured in the device based on effluent flow rates and measured effluent TSS concentrations to demonstrate the veracity of the mass balance calculation. The claimant will be required to provide a detailed explanation where the weighed masses and calculated masses differ by more than 20%.	Field testing data was used for this evaluation and so a TSS mass balance is not required.	Y
Section 3.6: Flow Control and Monitoring		
Flow rates should target a range of flows including at least 33%, 66% and 100% of the design treatment flow rate for the device.	HIUFF Device was tested under the Hybrid Lab Testing protocol at 33%, 66% and 100% of the design treatment flow rate for TSS,TN and TN, as well as at the maximum design bypass flowrate of 180% for gross pollutant trials. This amounted to 3.2 L/s, 6.6 L/sec, 9.6 L/sec and 17.5 L/sec at 33%, 66%, 100% and 180% respectively. This information is outlined in Table 1 of the Phase 3 report.	Y
Section 3.7: Sampling equipment		
The sampling equipment is to be accurately described. For example, the make and model of an autosampler including the sampling flow rates, location of sampling tubing within the flow and any cross comparison with grab samples should be reported. If grab samples are used, a description of how and where a sample is collected is required,	The make and model of the sampling equipment was provided in Phase 2 – Section 2.2. • Campbell Scientific CR850-Series data logger was used to control and monitor the sampling equipment • The autosampler was a Global Water WS755 • The pluviometer was described as a tipping bucket rain gauge, though the make and model was not provided • The flow monitoring device was an ABB FEV-WRS-150 electromagnetic flow meter	Y
Section 3.8: Sampling methodology		

The chosen sampling methodology is to be described accurately and is to include a detailed description of how the methodology attempts to ensure that the samples are representative and how the "paired" inlet and outlet samples are comparable. This includes detailing the relative timing of aliquots between inlet and outlet compared to the hydraulic retention time within the device.	The sampling methodology is clearly laid out in Section 3 of the Phase 1 document, and Section 3 of the Phase 2 document, where inlet and outlet samples were demonstrated to be comparable	Y
Section 3.9: 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 are to be provided	Chain of custody documents were not initially provided. However. These have since been provided.	Y
Sample blanks are to be sent with each analytical batch.	Sample blanks were not taken and tested initially. However, these have since been tested and provided.	Y
At least one spiked TSS sample, with an additional 50 mg/L is to be sent with every second analytical batch	Only field testing TSS results were used for evaluation. This clause does not apply.	Y
Duplicate samples are to be collected for at least one matched pair of samples for each analytical batch.	Table 7 in combined report shows duplicates and consistency of results.	Y
Section 3.10: Laboratory analysis		
NATA accredited laboratories and methods used	The laboratory used (ALS) and methods used have achieved NATA accreditation	Y
Section 3.11: Laboratory Quality Assurance and Quality Control		
Analyses should be in accordance with National or International standards (e.g. APHA (2017)). If there is no NATA accreditation available for that method, the laboratory method is to be fully described.	All listed analytical laboratory methods were in line with APHA standards	Y
Section 3.12: Data Management		
All documentation and data is to be recorded and retained for five years	To our knowledge, all documentation recorded has been retained at time of writing.	Y
Section 3.13: Reporting		
Reporting is undertaken by an external independent party to the claimant, per SQIDEP: Field Monitoring (Stormwater Australia 2018).	To our knowledge, all reporting of the field and hybrid lab testing was undertaken by Covey Associates, an external independent party to the claimant, Hydro International	Y
The relevant elements of Section 5.2 of SQIDEP: Field Monitoring (Stormwater Australia 2018) are to be reported against. Items b and c will only need to be addressed for the Field component of testing, and item g for the lab pathway should be read in reference to the different flow tests rather than storm events	The relevant elements of Section 5.2 of SQIDEP: Field Monitoring (Stormwater Australia 2018), and the HIUFF compliance with these elements are evaluated below in Table 2.	Y

The performance metrics recommended in SQIDEP: Field Monitoring (Stormwater Australia 2018) should be reported where each laboratory test run is considered as a "qualifying event". For the lab pathway, there is no requirement to show a flow-based variability curve if testing is only undertaken at the 33%, 66% and 100% flow rates.	Performance metrics for hybrid lab testing data were reported as though each laboratory run is a qualifying event, as outlined in Table 7.	Y
The statistical significance testing of the difference between inflow and outflow EMCs and Mass Loads is required, as per SQIDEP: Field Monitoring (Stormwater Australia 2018).	Statistical significance testing was undertaken using the Shapiro-Wilk Normality and Mann-Whitney U test for inflow and outflow EMCs and mass loads for TN, TP and TSS.	Y

Table 2: Assessment of the Hydro International Up-Flo Filter system performance monitoring undertaken at Bells Creek, Caloundra against SQIDEP (v1.3) Field Monitoring Pathway requirements that are not included in SQIDEP (v3.4)

SQIDEP – Field Monitoring Protocol Requirements (not specified in Hybrid Lab Testing Protocol)		
Section 4: Quality Assurance Project Plan		
Section 4.1: Data Quality		
The events sampled must also represent rainfall, and thus runoff, patterns for the catchment across an extended period of time typically (> 12 months) and be subject to the qualifying number of characteristic storms being achieved. Representativeness shall be assessed and reported.	The qualifying storms were evaluated over an almost contiguous period, where Phase 1 sampling was conducted between May and October 2022, while Phase 2 sampling was conducted between November 2022 and April 2023. Sampled storm events were variable is size and occurred throughout this time period, indicated representativeness was achieved. Information pertaining to the sampled storm events is provided in Phase 1 -Table 2, Phase 2 -Table 2, and via attached hydrograph data, Phase 2 -Appendix A	Y
At a minimum 15 qualifying storm events must be sampled to ensure accurate evaluation	20 qualifying storm events were sampled, as outlined in the Phase 1 and Phase 2 reports. While the flow and pollutant characteristics within these storms were adequate to address TSS removal efficiency, TP and TN was at or below irreducible concentration values. TP and TN pollutant removal characteristics were therefore determined via the hybrid lab testing protocol, and not from qualifying storms.	Y
Section 4.3: Description of Test Site		
Catchment area described	Catchment area is described on pg 2 of the Phase 1 Field monitoring document as a parking area in a commercial business precinct (Civilmart) in Bells Creek, Caloundra. The catchment area is described as being 1200 m2, which is presumed to exhibit 100% surface imperviousness.	Y
Site shall be representative of the installation and land use appropriate to the device and intended market segments.	The chosen site is reflective of the targets market as as majority of applications for device will be for areas with impervious surfaces.	Y

Aerial photos provided	Aerial site photos are provided on pg 2 of the Phase 1 Field monitoring document.	Y
Site Photos	Site photos are provided in: • Phase 1 document – pg 3, 4 • Phase 2 document – pg 2,3,4 • Phase 3 document – pg 3,5,8	Y
Site map showing: • Catchment area • Drainage system layout • Treatment device Sampling points	A site map illustrating catchment area and treatment device location is provided on pg 2 of the Phase 1 document. While drainage system layout and sampling points are not indicated, detail pertaining to this is provided within site photos.	Y
Treatable flow rate (TFR)	The treatable flow rate is described as 1.6L/sec for each filter modules. The HIUFF device used at Bells Creek had a capacity of up to 12 modules, but was used in varying arrangements across respective field monitoring and hybrid lab testing trials.	Y
Expected catchment flows	Not initially provided but have since been provided. DRAINS modelling was undertaken to estimate catchment flows.	Y
Section 4.4 Measuring Rainfall		
Rainfall ≤ 5 min time interval	Rainfall and flow measurements we recorded in 10 second intervals, pg 5 Phase 1 document	Y
Rainfall ≤ 0.25mm increments	Rainfall is measured in <0.2 mm increments (Phase 1 document – pg 6)	Y
Rainfall - Location shown on site map	The rain gauge is directly adjacent to the HIUFF device, as indicated in Figure2.2 of Phase 2 document -	Y
Rainfall shall 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.	A tipping bucket pluviometer was used, with rain increments of <20mm. The temporal resolution the pluviometer is described as having 10 second intervals.	Y
Rainfall - Checked, cleared of debris and calibrated at least two times during the testing period	Cleaning and testing of the sampling equipment, including the pluviometer, was conducted at quarterly intervals (Phase 2 document – pg 3)	Y
Rainfall - Protected from excessive wind velocities	The rain gauge used in the study had a weather protection shield. However, water sampling was based on flowrate in inlet pipe, not rainfall, so this was not affected by wind.	Y
4.5 Qualifying Storm Events		
Each monitoring program will need to identify the period delineating the end of one event and beginning of the next – typically 24hrs or the time taken to reset monitoring equipment	This is covered in pages 5 and 6 of Final Evaluation (combined) report. Trigger start when >=2mm rainfall and >= 250L recorded within 30mins. Until < 0.2mm and < 20L in 12 hours period. Or when after 50samples are collected.	Y
Hydrographs for each event to demonstrate the program has representatively captured the event	Hydrographs have been provided for Events 2 & 8 (Figure 3.1 and Figure 3.2) in the Phase 1 document, and in the appendices of the Phase 2 documents. Hydrographs for events 1, 3-7, 9 & 10 were not initially provided but have now been provided in Appendix A.	Y
Min 2 peak inflows from the sampled events should exceed 75% of the design TFR of the device + 1 ≥ than its design TFR	The inlet pipe into the UFF was designed as an orifice arrangement with a maximum inflow rate approximately equal to the TFR. It was	Y

	therefore not possible for treatment flows to be greater than the TFR. This approach was previously approved by SA for the QAPP. In addition, flows of 74% and 69% are close to the 75% requirement and demonstrate that the device operates well at higher flowrates. Flowrates greater than the TFR were achieved during the hybrid testing phase.	
Events to be sufficiently distributed throughout the monitoring period to capture seasonal influences on storm conditions & The independent evaluation panel must be satisfied that the qualifying storms includes a good range of storm event (longer and shorter duration) (p15-16).	The qualifying storms were evaluated over an almost contiguous period, where Phase 1 sampling was conducted between May and October 2022, while Phase 2 sampling was conducted between November 2022 and April 2023. Sampled storm events were variable is size and occurred throughout this time period, indicated representativeness was achieved. Information pertaining to the sampled storm events is provided in Phase 1 -Table 2, Phase 2 -Table 2, and via attached hydrograph data Phase 2 -Appendix A. AWC is satisfied that these events meet the qualifying storms criteria	Y
50% of qualifying storms should include the first 70% storm hydrograph coverage (p15-16).	Hydrographs for 8 of the qualifying storms have not been provided, however 10 of the 12 hydrographs for the remaining qualifying storms events had <70% coverage.	Y
The majority of qualifying events (80%) at least 8 aliquots are required if discreet aliquots are being collected.	All qualifying events collected >8 aliquots, as listed in Table 3 of the Phase 2 report	Y
4.6 Flow Monitoring		
Flow measurement at the inlet and outlet are recommended. Monitoring of bypass flows is optional, however, at a minimum the monitoring information should be sufficient to identify periods when device is operating in bypass (p17).	Flow monitoring undertaken at outlet only. Outflow monitoring included both treated and bypass flows. Monitoring at the inlet is only recommended not mandatory.	Y
4.7 Sample location		
The inlet sample shall be taken as close as possible to the device, at a minimum this should be at a point where total site runoff is sampled.	Figure 3.2 of the Phase 3 document illustrates the influent sampling location, which is directly downstream of the device of the inlet pipe.	Y
Outlet flow should be sampled either prior to or after mixing with bypass flow and Claims identify the inclusions/exclusion of bypass flows (p17).	Table 1 of the Phase 1 documents addresses outlet sampling location	Y
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 claims (given in Table 7 and Table 8 of the Phase 3 document) are for the device up to TFR.	Y
The performance claim must be made in relation to the device up to TFR, and no removal can be claimed for the bypass flows.	The performance claims (given in Table 7 and Table 8 of the Phase 3 document) are for the device up to TFR.	Y

If the outlet flow is sampled prior to mixing with bypass flow it should be noted when the bypass condition occurs (but it is not necessary to measure bypass flows).	Outlet flows are sampled after mixing with bypass flows	N/A
4.9 Monitoring Equipment		
The potential for power failure and subsequent loss of samples should also be considered	was supplied to all equipment from 12V batteries and charged through an on-site solar array, alleviating the potential impact of power outages on performance monitoring.	Y
4.9.1 Automatic Sampler		
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).	Section 2.2 of the Phase 1 document specifies that a Global Water WS755 automatic water sampler was installed to collect samples at the inlet and outlet of the Up-Flo® Filter to evaluate the treatment performance	Y
4.10 Sampling Methodology		
As a minimum, flow-weighted composite samples should be collected utilising an automated sampler, whenever possible.	Table 1 of the Phase 1 report specifies that 150ml aliquots were collected every 250L of flow, resulting in a flow weighted composite sample for each qualifying storm event.	Y
4.10.1 Automated Sampling		
Where the constituent being measured does not require grab sampling, automated sampling should be undertaken. Samples can be taken by automatic flow-weighted compositing, or discrete samples that can be composited later.	Section 2.2 of the Phase 1 document specifies that a Global Water WS755 automatic water sampler was installed to collect samples at the inlet and outlet of the Up-Flo® Filter to evaluate the treatment performance	Y
4.10.2 Grab Sampling		
Grab sampling is required for constituents that transform rapidly, require special preservation. adhere to bottles, or where compositing can mask the presence of some contaminants through dilution	As above	N/A
4.10.3 Flow- Proportional Sampling		
Flow proportional sampling requires at least 80% of the submitted events have at least 8 aliquots collected from both the rising and falling limbs of the hydrograph to form the composite sample	Reported analytes (refer Table 1, Phase 1 performance report) do not deteriorate readily and thus the addition of preservatives are not required and no grab samples were undertaken during monitoring	Y
Section 5: Performance Reporting		
5 1 Non-Detects		
Effluent sample results below the limit of detection (LOD) shall be set at 0.5 x LOD and must be accompanied by a sensitivity analysis showing impact on performance metrics of adopting both LOD and 0).	Section 5.3 and Table 4 of the Phase 2 report outline that effluent samples below LOD were set at 0.5 x LOD.	Y
5.2 Framework for Reporting		
A Detailed Performance report (DPR) is required after the local pilot trial (LPT) is completed.	AWC is satisfied that requirements of reporting have been addressed within the provided Detail performance report for SQUIDEP review-HIUFF 2024	Y
5.3 Data Quality		

Representativeness, completeness and applicability of rainfall/ runoff	Section 5,2 of the Phae 2 performance report document highlight how the monitoring program meet data quality requirements stated in SQUIDEP V1.3	Y
Values relative to the detection limits of the analytical methods applied	Values relative to the detection limits of the analytical methods applied are appropriately covered in Section 5.4 and Table 4 of the Phase 2 report.	Y
5.4.2 Performance metrics		
The pollutant removal capacity of a device needs to be consistent, and provided that suitable information is collected at the time of field trials, multiple metrics can be determined and should point to a consistent interpretation for the highest levels of confidence in evaluating results	This is discussed in section 4.4 of the Phase 3 document	Y
5.4.3 Average and Median Concentration Removal efficiency		
Pollutant Concentration Removal Efficiency (CRE) is computed to determine the reduction in pollutant concentration through a device.	Pollutant Concentration Removal Efficiency (CRE) values are provided in Table 7 of the Phase 3 report.	Y
5.4.7 Efficiency Ratio		
The efficiency ratio (ER) is defined in terms of the difference between the average Event Mean Concentration of influent and effluent pollutants calculated over all of the analysed events.	The results for the 16 events are provided within Table 7 of the Phase 3 performance report, which also outlines influent and effluent pollutant concentrations over all of the analysed events	Y
5.4.9 Event Mean Concentration		
Event Mean Concentration and Mass Discharge Variability (p30) The event mean concentration and Mass Discharge variability are required to verify the ability of the device to manage large variability in EMCs and mass discharges. Box and whisker plots should be prepared for influent and effluent EMCs as well as mass loads (where presented). The number of EMCs and mass loads contributing to each distribution should be clearly indicated.	Box and whisker plots for influent and effluent have been provided in Section 4.7 of the Phase 3 document. Additional EMC box plots showing all key data points are also presented in Figures 5 and 7 of the Technical Note dated 11 December 2024.	Y
Other		
MUSIC Node Application/ Modelling	A MUSIC model node has been developed and attached with the Technical Note dated 11 December 2024 and amended in March 2025. The MUSIC node provided is a Generic Node with TSS (95%), TN (52%) and TP (47%) claims. A 95% removal rate of Gross Pollutants was observed in the hybrid trial.	Y

	We note that the Hydro UFF report indicated that during testing, maintenance was undertaken at quarterly intervals (including annual maintenance). Removal rates above assume maintenance is consistence with maintenance in the trial and the manufacturers recommendations.	