

Independent verification scheme for stormwater treatment devices

Road map discussion paper – draft for consultation



Document name	Date of issue	Revision no:	Prepared by	Approved by:
Road map discussion paper	21/03/13	1	louri Vaisman	Peter Morison
Road map discussion paper	19/04/13	2	louri Vaisman	Peter Morison
Road map discussion paper	22/04/13	3	louri Vaisman	Peter Morison
Road map discussion paper - draft for consultation	24/05/13	4	louri Vaisman	Justin Lewis
Road map discussion paper - draft for consultation	03/07/13	5	louri Vaisman	Justin Lewis

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Introduction

Over the past 20 years, there has been an increasing focus in Australia and overseas on the need to manage urban stormwater quality in addition to its traditional quantity context (Engineers Australia 2006). In response to these needs, - a number of proprietary and not proprietary treatment devices have been developed by the market and their numbers are constantly evolving.

The advent of these treatment devices poses a need for a consistent and verifiable performance database to inform the fair and technically robust assessment and selection processes for treatment of stormwater. As the stormwater treatment devices' market expands - the lack of published data on their performance becomes more apparent (Victorian Stormwater Committee 1999), while detailed field monitoring is also very scarce (Wong et al. 2000).

At present, there are no standard methods or guidelines for the testing, validation and performance assessment of stormwater treatment devices in Australia, while several different guidelines and protocols for stormwater treatment devices currently exist overseas (e.g. United States, New Zealand) both for laboratory and field testing. In a review study on the performance of stormwater treatment devices in the United States, the authors concluded that due to the inconsistency of study

methods, lack of associated design information and reporting protocols, comparison of different systems is very difficult or impossible (Strecker et al. 2001). These studies often utilize different methods for data collection, analysis and reporting, resulting in significant differences in the range of treatment efficiency for similar devices. Thus it is difficult to apply the limited information to develop protocols for performance assessment.

The combination of a large number of devices, a lack of reporting protocols and standard methods and only a small number of detailed monitoring studies has resulted in a large uncertainty in stormwater treatment devices selection. Local government, which is largely responsible for the implementation and management of stormwater infrastructure in Australia, is dependent on in-house expertise and manufacturer's advice in selecting appropriate stormwater treatment strategies.

Given the current limited state of knowledge and increasing use of stormwater as a resource, interest in the adequate management and treatment of stormwater will continue to grow.

Independent discussions with local government, water authorities and stormwater industry professionals in Australia revealed interest in the documentation and development of guidelines and frameworks to assist in the system design, product selection and evaluation to ensure adequate stormwater treatment and management.

Melbourne Water Corporation in recognition of this industry need engaged [iouriv Water Solutions Pty Ltd](#) to prepare a road map paper on the development of an independent verification scheme for stormwater treatment devices, with the project commencing in November 2012. This report presents the findings and conclusions from this study.

Project aim and objectives

The overall aim of this project is to establish the regulatory and administrative framework, product testing and validation protocols and performance database for the storm water treatment devices to enable the better utilization and broader uptake of Integrated Water Cycle Management (IWCM).

The resultant document has the potential to be included as an appendice to the new revision of the *Urban stormwater best practice environmental management guidelines* (BPEMG)¹, adding consolidated knowledge from across Australia and overseas to the practical implementation of projects related to stormwater treatment.

This project will also greatly assist in the adoption and utilization of IWCM approach in Victorian towns and cities via the:

- Increased certainty in the performance of stormwater treatment devices and resultant water quality delivered
- Consistent and structured approach to the selection of stormwater treatment devices with the direct benefit to the proponents (e.g. councils/developers), designers, asset owners and other stakeholders of a stormwater projects
- Sharing the legacy of knowledge in stormwater treatment with the industry
- Increased customers' confidence in stormwater treatment devices they are procuring, and
- Improved accuracy in estimating the life cycle costs of stormwater treatment

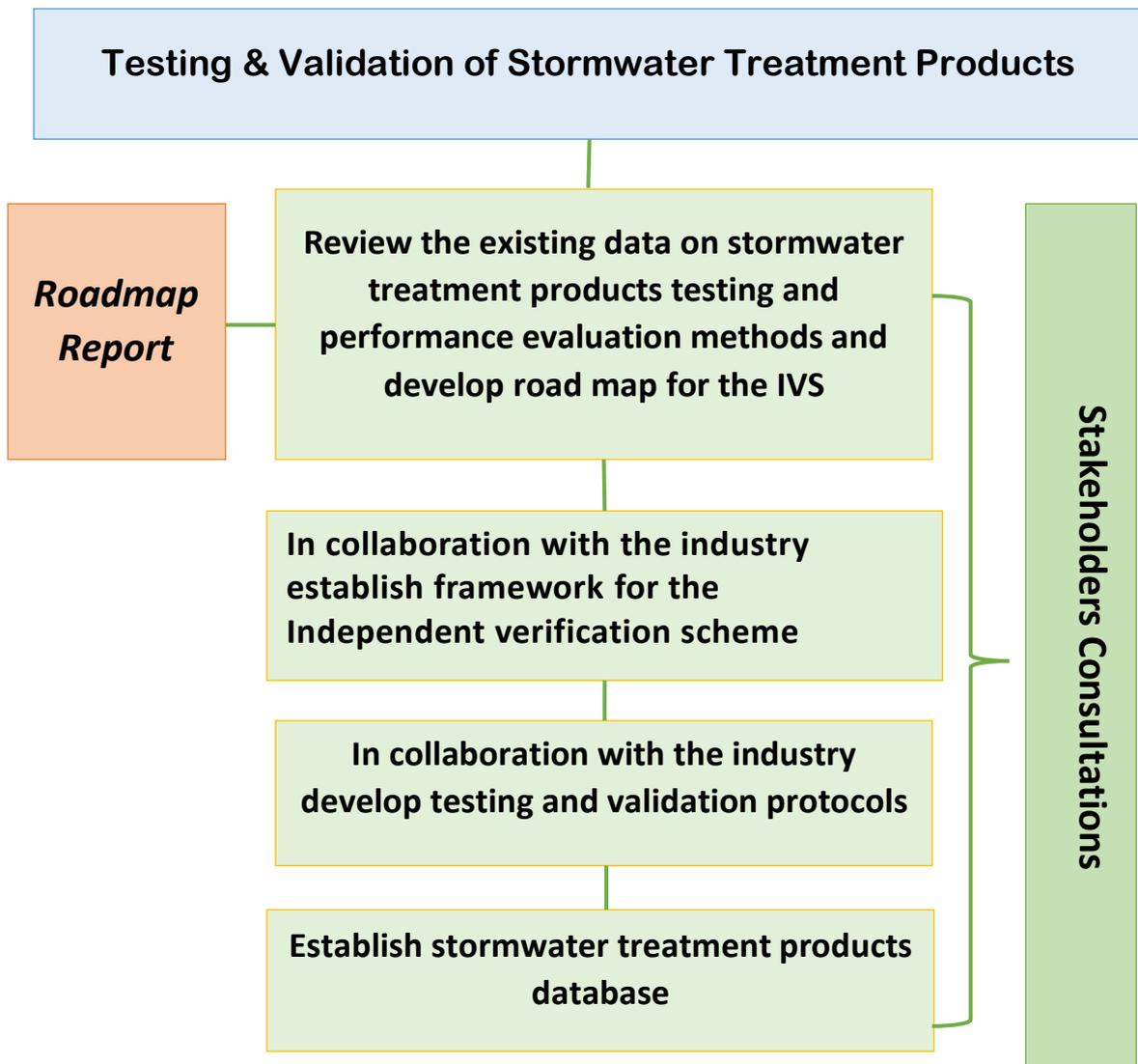
The Independent Verification Scheme (IVS) project is a joint initiative of Melbourne Water and Institute of Public Works Engineering (IPWEA) with active participation and support from Environment Protection Authority Victoria (EPA Vic), Victorian Department of Health (DOH VIC), Victorian Civil Contractors Federation, Stormwater Victoria, Commonwealth Scientific and Industrial Research Organization (CSIRO), Monash University and other stakeholders.

The delivery of this complex and multifaceted project is planned in three stages (refer picture 1), where:

- Stage 1 of this project (currently in progress) will deliver a road map discussion paper for the development of an independent verification scheme for stormwater treatment devices in Victoria.
- The subsequent stages of the project will involve comprehensive industry consultation on the proposed approach and formation of the delivery strategy (stage 2), and
- Establishment of the administrative framework and protocols for testing and validation of stormwater treatment devices in VIC and the stormwater treatment products database (stage 3).

This report presents findings and conclusions from stage 1 of the project. The road map presented in this report has been developed in consultation with the project stakeholders via a number of stakeholder's workshops, consultations and discussions.

¹ <http://www.publish.csiro.au/issue/3822.htm>



Picture 1 Project concept

Background studies for the development of a model for the Independent Verification Scheme (IVS)

At present, there are no standard methods or guidelines for the testing, validation and performance assessment of stormwater treatment devices in Australia, while several different guidelines and protocols for stormwater treatment devices currently exist overseas (e.g. in United States and New Zealand) both for laboratory and field testing.

Review of the existing guidelines has been conducted at stage 1 of the project and a brief summary of the key findings is presented below²:

NZ Auckland Council Proprietary Devices Evaluation Protocol (PDEP)

[\(\[http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDoQFjAB&url=http%3A%2F%2Fwww.aucklandcouncil.govt.nz%2FEN%2Fplanspoliciesprojects%2Freports%2Ftechnicalpublications%2FDocuments%2Fgd2012003pdepforstormwaterqualitytreatmentdevicesquickref.pdf&ei=b4NKUZa1N_GZiAeP6IHABq&usq=AFQjCNHGM5Q_knPZJWcEiLRYa7mG6itkeq&sig2=Yu7JbKxuRDLGNUMK7SYm5q&bvm=bv.44158598,d.aGc&cad=rja\]\(http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDoQFjAB&url=http%3A%2F%2Fwww.aucklandcouncil.govt.nz%2FEN%2Fplanspoliciesprojects%2Freports%2Ftechnicalpublications%2FDocuments%2Fgd2012003pdepforstormwaterqualitytreatmentdevicesquickref.pdf&ei=b4NKUZa1N_GZiAeP6IHABq&usq=AFQjCNHGM5Q_knPZJWcEiLRYa7mG6itkeq&sig2=Yu7JbKxuRDLGNUMK7SYm5q&bvm=bv.44158598,d.aGc&cad=rja\)\)](http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0CDoQFjAB&url=http%3A%2F%2Fwww.aucklandcouncil.govt.nz%2FEN%2Fplanspoliciesprojects%2Freports%2Ftechnicalpublications%2FDocuments%2Fgd2012003pdepforstormwaterqualitytreatmentdevicesquickref.pdf&ei=b4NKUZa1N_GZiAeP6IHABq&usq=AFQjCNHGM5Q_knPZJWcEiLRYa7mG6itkeq&sig2=Yu7JbKxuRDLGNUMK7SYm5q&bvm=bv.44158598,d.aGc&cad=rja)

- provides guidance to evaluate permanent proprietary stormwater quality management devices
- the PDEP does not address stormwater quantity and gross pollutant traps
- certifies the performance of a proprietary device against a Performance Claim made by the vendor
- two different evaluation routes, namely the Body of Evidence (BoE) route and the Local Pilot Trial (LPT) route
- evidence from laboratory scale models is not accepted for BoE
- when the performance of a device is evaluated against its Performance Claim, performance certification is granted or denied. If granted, the device will be certified to perform as evaluated for five (5) years, after which a renewal will be required for continued use within the region, and
- the scheme does not include a database of the treatment devices and their performance

USA - state based

Technology Assessment Protocol – Ecology (TAPE) the State of Washington

[\(<https://fortress.wa.gov/ecy/publications/summarypages/1110010.html>\)](https://fortress.wa.gov/ecy/publications/summarypages/1110010.html)

- part of the Washington State Department of Ecology water quality program

² Only a brief summary of key findings is presented in this report. For more detailed discussion on the various approaches to testing and validation of stormwater treatment devices please refer to “Literature Review on Performance Testing Approaches for Gross Pollutant Traps” Luis Neumann and Ashok Sharma, CSIRO 2010

- established the Technology Assessment Protocol for short detention, flow-based BMPs (may not be suitable for all stormwater treatment devices)
- the TAPE program provides a peer-reviewed regulatory certification process for emerging stormwater treatment technologies
- partnership between the Washington State Department of Ecology (Administrator) and Washington Stormwater Centre established Board of External Reviewers (Technical panel)
- based on existing/submitted data the Administrator evaluates the technology and assigns the use level designations; the use level designations determine how many installations may occur in Washington and what the monitoring requirements are for obtaining additional data on treatment performance
- 3-levels of certification
 - pilot use level designation when there are sufficient laboratory data available to indicate a treatment technology may meet the performance goals for TAPE
 - conditional use level designation when there are both laboratory and field data available for a treatment technology that would indicate an even greater likelihood of meeting these performance goals
 - general use level designation when there is sufficient field data to support the performance claims
- on line register

Table 1. TAPE use level designations

Use Level Designation	Minimum Data Required for Certification ^a	Time Limit (months) ^b	Maximum Number of Installations in Washington State	Field Testing Required Under Designation
Pilot (PULD)	Laboratory	30	5 ^c	A minimum of one site indicative of or located in the Pacific Northwest; <i>all</i> sites installed in Washington state must be monitored ^d
Conditional (CULD)	Field data required; laboratory data may supplement	30	10 ^c	A minimum of one site indicative of or located in the Pacific Northwest
General (GULD)	Field data required; laboratory data may supplement	Unlimited	Unlimited ^e	None

Table 1 TAPE use level designations

source: <https://fortress.wa.gov/ecy/publications/summarypages/1110010.html>

USA – multi-state collaboration

Technology Acceptance Reciprocity Partnership (TARP) **(<http://www.mass.gov/dep/water/laws/swprotoc.pdf>)**

- a process started by six states in the US (California, Illinois, Massachusetts, New Jersey, New York, and Pennsylvania)
- this agreement does not supersede individual state requirements; the final certification and use vary in different states
- inclusive of both structural and non-structural best management practices
- links to the International Stormwater BMP database <http://www.bmpdatabase.org/>
- prequalification- technology is environmentally beneficial, commercially available, field-tested, and the product has been quality controlled
- technologies are evaluated for contaminant removal efficiency based on proponents performance claims
- is typically based on field testing
- administered by individual states

USA National

Environmental Technology Verification (ETV) (<http://www.epa.gov/etv/>)

- managed by US EPA’s Office of Research and Development
- ETV focuses on various environmental sectors – not just stormwater
- stormwater treatment technologies fall under Wet Weather Flow Technologies Pilot of the US EPA ETV program
- verification of a technology under the ETV program does not constitute “certification” or “approval” by NSF or EPA
- this protocol applies to pre-engineered, commercially-available, proprietary technologies that are used to treat stormwater runoff
- this protocol will objectively measure the performance of a stormwater treatment technology in relation to the performance claims made by the manufacturer
- Is typically based on field testing
- verification report and statement are posted on EPA Website

- the USEPA National Risk Management Research Laboratory provides administrative, technical, and quality assurance guidance and oversight on all WWF Pilot activities
- NSF and EPA issues a Verification Statement intended to provide verified vendors a tool by which to promote the strengths and benefits of their product

Australia

The NatVal: The Map to an Accepted Workable National Validation Framework for Water Recycling Schemes (<http://www.australianwaterrecycling.com.au/coe/category-1/roadmap-for-a-national-validation-framework>)

- aim - development of a national validation framework for water recycling schemes in Australia, consistent with the 2006 Australian Guidelines for Water Recycling (AGWR)
- mainly applicable to wastewater /sewage/grey water treatment however some stormwater technologies (e.g. bio filtrations, treatment wetlands) have been considered
- stage 1 – Road map report is now completed
- stage 1 report outlines the Validation Framework that has been developed after significant consultation, including identifying the next steps required for implementation
- stage 2 is pending subject to funding

Literature Review on Performance Testing Approaches for Gross Pollutant Traps 2010

- the Stormwater Industry Association (SIA) has commissioned CSIRO to prepare a literature review to summarise the existing knowledge on gross pollutant traps in terms of testing and performance
- final report was submitted to SIA in 2010 and published on the SIA website <http://www.stormwater.asn.au/index.php/projects-a-advocacy/75-literature-review-on-performance-testing-approaches-of-gross-pollutant-traps> in 2012
- as part of the literature review, a consultation was undertaken with specialist cleaning contractors and local councils (GPT users) to assess their perceptions on the performance of these systems
- CSIRO has contacted several Australian manufacturers to provide information on their testing procedures. The purpose of the consultation was to determine if there was a series of procedures that were common and could be adopted to form the basis for an Australian testing protocol
- recommendations on the issues that should be considered in developing testing protocols

Other initiatives

Water Efficiency Labelling and Standards (WELS) <http://www.waterrating.gov.au/about-wels>

WELS is Australia's water efficiency labelling scheme that requires certain products to be registered and labelled with their water efficiency in accordance with the standard set under the national Water Efficiency Labelling and Standards Act 2005. The WELS Regulator is established under the *Water Efficiency Labelling and Standards Act 2005* (the WELS Act) and is the First Assistant Secretary of the Environment Quality Division in the Department of Sustainability, Water, Population and Communities. The WELS Regulator is responsible for monitoring and enforcing the WELS Scheme and is committed to ensuring the integrity and credibility of the WELS Scheme. The WELS team is located within the Environment Quality Division of the department.

The Regulator has a wide range of powers and resources to make WELS work, including:

- tasking inspectors to monitor compliance and/or investigate alleged breaches of the WELS act
- imposing significant fines and penalties for breaches of the WELS Act
- compelling the withdrawal of a product from the market
- deregistering a product
- advertising convictions

The Regulator has the option to use administrative actions and education, as an alternative to legal action, to help manufacturers, importers and retailers to meet their legal obligations under the WELS Act. Where a cooperative solution is not possible, the Regulator can act to impose penalties and enforcement provisions outlined in Part 7 of the WELS Act.

The water-using WELS products include:

<u>Plumbing products</u>
• showers
• tap equipment
• flow controllers (optional)
<u>Sanitary ware</u>
• toilet (lavatory) equipment
• urinal equipment
<u>White goods</u>
• clothes washing machines
• dishwashers

It is voluntary to label flow controllers, and a minimum water efficiency standard also applies to toilets and washing machines. This means you cannot supply toilets that have a higher flow rate than 5.5 litres per average flush volume, and washing machines that are less than 3 stars for a machine 5kg or more capacity, or less than 2.5 stars for a machine less than 5kg capacity. Waterless urinals are not currently included under WELS.

The WELS scheme excludes second-hand products and products imported into Australia for personal use.

Smart Approved Watermark <http://www.smartwatermark.info/home/default.asp>

Smart Approved Watermark is Australia's water saving labelling program for products and services that are helping to reduce outdoor water use. It is a not-for-profit scheme run by the Australian Water Association in conjunction with Irrigation Australia, the Nursery and Garden Industry Australia and the Water Services Association of Australia with funding from the Australian Government's Water Smart Australia program through the Department of the Environment, Water, Heritage and the Arts.

All applications to the scheme are assessed by an independent technical expert panel – only those that can verify their water-saving claims are able to use the Smart Approved WaterMark label. The range of products and services approved by the scheme include

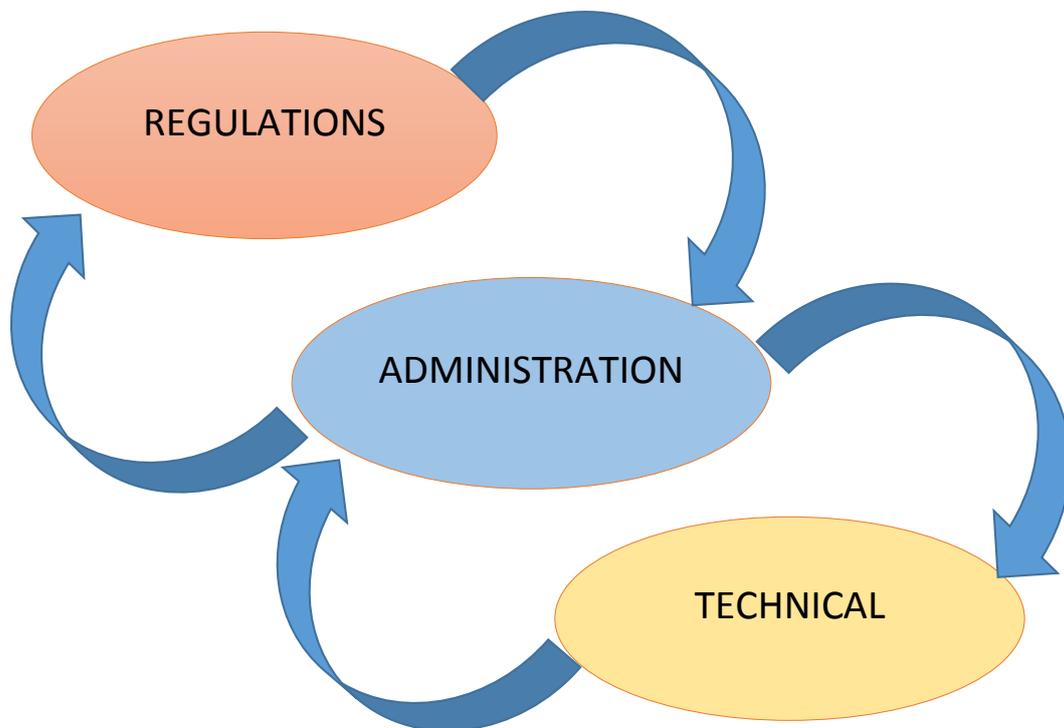
- greywater treatment and irrigation systems
- downpipe diverters
- rainwater tank controllers
- rain and soil moisture sensors
- efficient irrigation systems and consultation services
- garden mulches
- soil wetting agents
- plant selection and gardening advice services
- pool covers and filters
- waterless car cleaning products and services
- low flow, high pressure cleaners

To encourage people to save water around their homes the scheme has developed three online water-saving calculators as part of their 'Every Bucket Counts' campaign. The calculators show how much water each of us could save around our homes by choosing a waterless car wash product, installing a rainwater tank or by using a pool cover.

Key considerations and input for model development

Structure and major components

Based on the review of industry best practice and consultations with project stakeholders it was established that the Independent Verification Scheme (IVS) is likely to include three major components as part of its structure and these are presented in picture 2 below.



Picture 2 Key elements of the Independent Verification scheme

Element 1 Regulations

For the Independent Verification Scheme (IVS) to be successful – it needs to be aligned with the current regulatory framework pertaining to stormwater in the particular geographical area (e.g. in the state of Victoria, Australia).

These could include the following:

Environment Protection

- Legislation - *Environment Protection Act 1970* <http://www.epa.vic.gov.au/about-us/legislation/acts-administered-by-epa>

- Statutory Policy - *State environment protection policy (waters of Victoria)* <http://www.epa.vic.gov.au/~media/Publications/905.pdf>
- Guidance - *Urban Stormwater Best Practice Environmental Management Guidelines*) <http://www.epa.vic.gov.au/business-and-industry/guidelines/water-guidance/urban-stormwater-bpemg>

Planning and Development

- Legislation - *Planning and Environment Act 1989* <http://www.dpcd.vic.gov.au/planning/theplanningsystem/legislation-and-regulations/planning-acts/planning-and-environment-amendment-general-bill-2012>
- Statutory Policy - *Victoria Planning Provisions* (in particular Clause 56.07) <http://planningschemes.dpcd.vic.gov.au/aavpp/56.pdf>

Other guidance

- Australian Guidelines for Water Recycling: Stormwater Harvesting and Reuse <http://www.environment.gov.au/water/publications/quality/water-recycling-guidelines-stormwater-23.html>

Element 2 Administration

The scheme Administrator shall provide a central point of coordination and be ultimately responsible for implementing the Independent Verification Scheme (IVS).

The Administrator duties include:

- Overarching governance arrangements
- Establish and administer the Stormwater Treatment Devices database
- Set the requirements for claims evaluation and testing
- Develop and administer Independent Technical Experts panel
- Development of relevant guidelines and protocols
- Financial administration including fees, funding and grants
- Promotion, education and training on the IVS
- Reporting to the relevant regulatory bodies on the IVS

Element 3 Technical

To assist with the practical implementation of the IVS scheme, the Administrator shall form an Independent Evaluation panel comprised of industry, technical and regulatory specialists to assist with:

- Setting the definitions, categories and parameters for Stormwater treatment devices and its performance
- Based on best industry practice prepare testing procedures and protocols for verification of stormwater treatment devices performance as part of IVS
- Develop protocols and procedures for data evaluation and reporting
- Review vendors' applications and test plans and make recommendations

- Audit tests for compliance
- Review the Verification reports submitted by vendors and make recommendations

Other considerations

Development, establishment and operation of the Independent Verification Scheme (IVS) is a complex multifaceted process that will have an impact on a number of stakeholders groups such as:

- Product suppliers
- Product designers
- Local government engineering personnel
- Engineering consultants
- Civil contractors
- Research Institutions

Each of these stakeholders groups will have different interests and objectives in the Independent Verification scheme.

The framework for the IVS should be developed with a clear understanding of the objectives of each stakeholder group in the process with public benefit being the basis for reconciling any differences between the parties.

Given the relatively small size of the Australian marketplace, it is likely that many stormwater treatment technologies will be derived internationally. Consequently, the Verification Framework will need to have in-built flexibility to assess and where appropriate to adopt non-Australian derived validation data for specific technologies.

Effort should be made to minimize any additional significant expense on industry in adopting and complying with the IVS and encourage the entry of innovative stormwater treatment technologies into the Australian market.

Road map and proposed model

General

Definitions

Verification is an assessment of the overall performance of the treatment system and the ultimate quality of water being supplied (NRMCC et al. 2006).

Treatment device validation is the process of demonstrating that a treatment system can produce water of the required quality under a defined range of operating conditions (Draft guidelines for validating treatment processes for pathogen reduction, VIC DOH, 2011)

Jurisdiction and extent

The proposed IVS is developed and implemented in the state of Victoria, Australia serving as a pilot for the broader National scheme.

Regulatory status

Once developed, - the IVS becomes part of the revised *Urban stormwater best practice environmental management guidelines* (BPEMG). Local government applies the IVS as part of BPEMG via relevant regulations such as new Sustainable Neighbourhoods Clause 56 of the Victoria Planning Provisions.

Deliverables

Major deliverable of IVS is the establishment of Stormwater Treatment Devices performance database.

The purpose of this database is to provide a central location for the collection and access to the list of claims pertaining to particular stormwater treatment technologies that have been validated under the IVS program and management of this data. For project proponents, the stormwater treatment devices performance database will provide greater clarity for selection of pre-validated technologies to meet the stormwater quality objectives.

The overarching responsibility of maintaining a database function within the IVS resides with the Administrator.

Administration

EPA may appoint Melbourne Water or other suitable organization as the IVS scheme Administrator under the auspices of the *Environment Protection Act*. The Administrator then appoints a Stormwater treatment devices performance database manager and forms an Independent Evaluation and Experts panel to assist with the implementation of IVS.

Devices covered by the scheme

This Independent Verification scheme applies to pre-engineered, commercially-available technologies that are used to treat stormwater runoff from the catchment areas before it enters the receiving water.

Claims and Certification

Application

The manufacturers' that wish to have their devices included into the stormwater treatment devices performance database must fill and lodge the (on-line) application form including reference information provided in support of their claim(s).

The Application form and associated supporting data should describe as a minimum:

- a generic description of the technology with sufficient detail to allow the reader to fully understand how the technology works
- engineering and scientific principles upon which the technology is based including (but not limited to) biological, chemical, or physical treatment mechanisms and hydraulic performance
- design drawings and photographs
- description of the components of the equipment and how they function together as a system
- any necessary or recommended pre- and post-treatment processes and the necessary influent water quality characteristics
- the applications for which the product is suited, including, but not limited to the size and nature of the catchment that the unit is intended to treat
- the materials of construction, including structural and functional components
- how and where the equipment is typically installed
- construction requirements and limitations
- requirements for installation and operation of the device
- description of the sizing methodology recommended by the vendor for selecting or designing the technology for a site, including any limitations and deviations from sizing methods recommended
- unique or innovative features of the equipment;
- pollution storage capacity (if applicable)
- operation and maintenance requirements, including the anticipated frequency and duration of a typical maintenance cycle
- pollutant categories that the device is designed to treat
- pollutant category(ies) included under the claim lodged
- performance quantification under this claim (e.g. removal efficiency)
- the laboratory, field tests and pilot studies results in support of the claim(s)

Proponents may request that certain records or other information submitted in support of their application be considered confidential. Upon receipt of a written request from the Applicant such records or information will be made available only for the confidential use of IVS Administrator and Independent Technical Experts group for the sole purpose of claim(s) assessment and returned to the Applicant at the completion of the assessment period.

Evaluation of applications

On receipt of an application the Administrator commissions the Independent Evaluation and Experts panel to review the application and its supporting data and provide advice on:

- can the submitted data be accepted in full or in part in view of its compliance to the IVS protocols
- what are the additional tests required to validate the claim(s)

Based on the Panel assessment report, - the Administrator issue a Notice of Assessment to the applicant, addressing the following:

- summary of claim(s) assessment by the Independent Experts panel
- information that has been accepted in support of the claim(s)
- information that has not been accepted in support of the claim(s) and reasons for non-acceptance
- recommendations on additional information/testing required to validate the claim(s) (if necessary)

NOTE: The stormwater treatment devices performance database is grouped into two categories:

1. Common/General use devices
2. Conditional use devices

The Administrator can include the device/claim into the Conditional use category provided that:

- the supporting information have been accepted by the Experts panel as compliant, and
- the claimant agreed to conduct the additional tests recommended within the specified timeframe

Additional testing

If additional testing is recommended by the Independent Verification panel and accepted by the manufacturer/applicant the following ensues:

- timeframe for the testing is established
- applicant (or a third party/consultants engaged by the Applicant) prepares the product-specific Verification Test Plan (VTP) and a Quality Assurance Project Plan (QAPP)
- the VTP and QAPP are submitted to the Administrator for review
- independent Experts panel reviews the VTP and QAPP and provides comments to the Administrator
- the tests start following the endorsement of VTP and QAPP by the Administrator
- as part of QAPP – the audit(s) are conducted by the Independent Experts panel during the testing period
- on the completion of the tests the Applicant (or a third party/consultant engaged by the Applicant) prepares Validation report and submits it to the Administrator
- following the review and acceptance of Validation report by the Independent Verification panel, - Administrator advises the Applicant on the acceptance of its claim and inclusion of the validated claim(s) into the stormwater treatment devices performance database

The fully verified claims are included in the stormwater treatment devices performance database under the Common/General use devices category for a period of five (5) years.

Verification of a technology / claim under the IVS program does not constitute “certification” or “approval” by the Administrator, EPA or the Council. Rather it means that the technology has been evaluated for the claims made by the applicant in accordance with a recognized protocol and that the results are available on the stormwater treatment devices database.

Testing Protocols

These protocols are intended to characterize a technology’s effectiveness in removing specified pollutants from stormwater runoff under an intended application. Verification testing conducted in accordance with these protocols shall objectively measure the performance of a stormwater treatment technology in relation to the performance claims made by the manufacturer.

The objectives of the testing protocols are:

- describe the sampling and data collecting methods acceptable to IVS
- describe laboratory and analytical methods acceptable to IVS and appropriate for the contaminants that are monitored
- statistical analysis appropriate for reporting and analysing the data collected
- requirements for data assessment and reporting
- quality assurance system requirements

The testing protocols should be developed for the following groups of stormwater pollutants (those included as major quality indicators in BPEMG):

- Total Suspended Solids (TSS)³
- Nitrogen
- Phosphorus

Also, a protocol and methods for measuring and verifying the device’s design treatment flow rate and volume need to be developed.

These protocols should be developed at stage 3 of the project by the Independent Technical Panel based on the best international industry practice and its adaptation to Australian/Victorian conditions. Where applicable, - these protocols should be developed for both field and laboratory testing with clear statement of application where limitations and/or deviations exist.

With the progress of IVS, the demand for further categories of pollutants (e.g. heavy metals, oil and grease etc.) shall be determined based on applications, and the appropriate protocols developed as necessary.

Expert panel

Under the proposed arrangement, - the IVS Administrator forms the Independent Experts Technical Evaluation panel to assist with the following tasks:

³ The TSS should be distinguished from gross pollutants, with a separate protocol developed for the latter

- define the categories of devices, pollutants groups and parameters for testing
- conduct the research on existing methods and practices for testing and validation of stormwater treatment devices and develop testing protocols for IVS based on defined pollution groups and parameters
- develop protocols for data evaluation and reporting
- review and assess the supporting evidence for the applications submissions and prepare the assessment report
- review and assess the product-specific Verification Test Plan (VTP) and a Quality Assurance Project Plan (QAPP)
- conduct laboratory and field tests audits
- review and assess the product/test specific Validation reports and prepare an assessment report

The Independent Experts Technical Evaluation panel should represent the best industry practice in Victoria with the following issues critical to the selection of panel members:

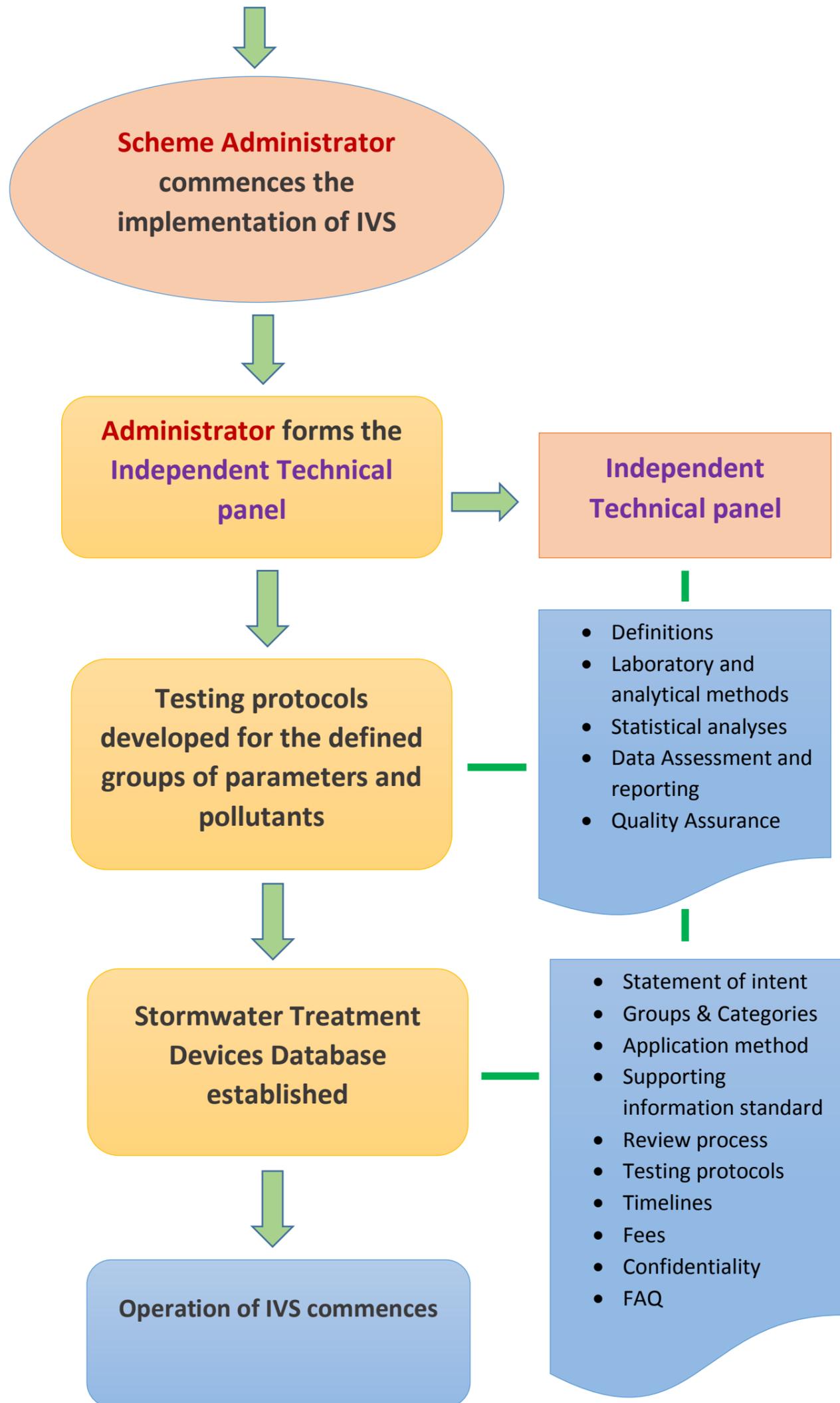
- demonstrable technical expertise
- no commercial affiliations with the product suppliers/manufacturers
- resources and capability to perform the specified tasks within the required timeframe
- signing the confidentiality agreement with the IVS Administrator on the use of the supplied data

Implementation

This report should be reviewed by project stakeholders and the final report “IVS Road map – Discussion paper for industry consultation” issued to the industry. The subsequent stages of the project involve comprehensive industry consultation on the proposed approach and formation of the delivery strategy (stage2), and establishment of the administrative framework, protocols for testing and validation of stormwater treatment devices and the stormwater treatment devices database (stage 3).

The flowchart presented in Picture 3 overleaf outlines major stages of proposed project implementation plan.

Industry Consultation and development of implementation framework for the Independent Verification Scheme (stage 2) concludes



Picture3 Flowchart – Implementation of Independent Verification scheme for stormwater treatment devices (stage 3 of the project)

Timelines

Following the finalization of the IVS road map discussion paper (stage 1), - the final document shall be uploaded on the EPA, IPWEA and Melbourne Water websites for extensive industry consultation and feedback.

The industry consultation process is envisaged to take approximately 6 months and will be delivered through active collaboration between the Project Steering Committee, Stormwater Industry Association, Clearwater, IPWEA and other stakeholders with the aid of seminars, workshops, tours, conferences, on line forums etc. At the end of this consultation process - the proposed approach will be revised in view of the industry comments (this could take 2 months). The total duration of stage 2 is expected to be 8 months.

Following the completion of industry consultation process, - the strategy and implementation plan for the IVS is prepared. The administration framework for the IVS is established at stage 3 along with the development of testing and validation protocols, the stormwater treatment devices database and other activities described herein.

Stage 3 of the project is expected to take approximately 12 months to completion.

Indicative costs

As part of this road map report the indicative budget costs for the IVS have been estimated including project implementation costs, on-going operational costs and claims based applicant's costs. These figures are budget estimates only and should be thoroughly reviewed and adjusted during the industry consultation stage of the IVS project.

Indicative project implementation costs

<u>Stage 2</u>	
Overall project management, advise and consultation	\$25,000
Industry consultation	
Via websites incl. questionnaires, forums etc.	\$10,000
Individual meetings with industry experts	\$5,000
Targeted workshops incl. regional	\$15,000
Conferences and tours	\$5,000
Professional expert advice (e.g. Legal)	\$10,000
Finalization of selected option	\$15,000
Contingency	\$5,000
Total budget stage 2:	<u>\$90,000</u>
<u>Stage 3</u>	
IVS Administrator position (full time position)	\$125,000
Formation of the Independent Technical Experts	\$25,000

panel	
Define the categories of devices, pollutants and parameters for testing	\$45,000
Conduct research on existing methods and practices for testing and validation of stormwater treatment devices and develop testing protocols for IVS based on defined pollution groups and parameters	\$165,000 ⁴
Establish the stormwater treatment devices database	\$30,000
Project management assistance	\$20,000
Contingency	\$40,000
Total budget stage 3	<u>\$450,000</u>

Indicative on-going costs IVS (annual)

IVS Administrator position (full time position)	\$125,000
Maintenance of the stormwater treatment devices database	\$15,000
Retainer for the Independent Expert panel	\$50,000
Total estimated annual budget	<u>\$190,000</u>

Indicative estimate of claim based costs (paid by the Applicant)

Application fee (per claim)	\$15,000
Review of Verification Test Plan (VTP) and a Quality Assurance test Project Plan (QAPP) per claim	\$8,500
Laboratory and field tests audits, per audit	\$5,000
Review of the product/test specific Validation reports	\$15,000
Test laboratory (does not include the cost of the testing device model)	\$70,000
Test field 1 year (does not include the cost of the device and installation)	\$135,000

Table 2 *Indicative costs*

⁴ This figure excludes any in-kind contribution

Summary and Conclusions

- The overall aim of this project is to establish administrative framework, product testing and validation protocols and performance database for the storm water treatment devices to enable the better utilization and broader uptake of Integrated Water Cycle Management in Victoria
- The resultant IVS documentation shall be included as an appendice to the new revision of *Urban stormwater best practice environmental management guidelines* (BPEMG)⁵ as part of EPA VIC formal endorsement of the IVS
- The proposed Independent Verification Scheme (IVS) is developed and implemented in the state of Victoria, serving as a pilot for the broader National scheme.
- This Independent Verification scheme applies to pre-engineered, commercially-available technologies that are used to treat stormwater runoff from the catchment areas before it enters the receiving water
- The IVS will have a statutory base however participation in the scheme is voluntary
- EPA may appoint Melbourne Water, or other organization as the IVS scheme Administrator under the auspices of the *Environment Protection Act*. The Administrator forms an Independent Evaluation and Experts panel to assist with the implementation of IVS
- Major deliverable of IVS is the establishment of Stormwater Treatment Devices performance database. The purpose of this database is to provide a central location for the collection and access to the list of claims pertaining to particular stormwater treatment technologies that have been validated under the IVS program and management of this data.
- Testing protocols will be developed based on best international practice adopted to Australian conditions
- These protocols are intended to characterize a technology's effectiveness in removing specified pollutants from stormwater runoff under an intended application
- Verification testing conducted in accordance with these protocols shall objectively measure the performance of a stormwater treatment technology in relation to the performance claims made by the manufacturer
- The fully verified claims are included in the stormwater treatment devices performance database under the Common/General/In Use devices category for a period of five (5) years

⁵ <http://www.publish.csiro.au/issue/3822.htm>

Recommendations

- This report should be reviewed by project stakeholders and the final report “IVS Road map report - Discussion paper for industry consultation” issued to the industry
- The subsequent stages of the project involve comprehensive industry consultation on the proposed approach and formation of the delivery strategy (stage2), and establishment of the administrative framework, protocols for testing and validation of stormwater treatment devices and the stormwater treatment devices database (stage 3)
- Following the establishment and the successful operation of IVS for a period of 18 months it can be expanded to include other stormwater treatment devices (e.g. not pre-manufactured) adopting the same approach, protocols and methodology where feasible
- In order to encourage the entry of innovative stormwater treatment technologies into the Australian market funding options should be considered to assist the qualified applicants with the costs of complying with the requirements of the IVS
- The opportunities to share the results and experiences of the IVS with other AUS states and Internationally should be considered

Issues for further discussions

- Who should be appointed by EPA for the role of IVS Administrator
 - Melbourne Water
 - EPA itself
 - Industry Association (e.g. Stormwater VIC)
 - Local Government associations (e.g. IPWEA, MAV)
 - Research Institutions (e.g. CSIRO, CRC for WSC)
 - Other organizations
- Who shall sponsor IVS (financially) and underwrite the scheme
- Should the role of a Database manager be assumed by the IVS Administrator or delegated to an independent body
- Will voluntary status of IVS generate enough interest/participation from the industry
- Should scheme’s ongoing operational costs be:
 - fully funded by the stormwater devices application and assessment fees with no contribution from others including government
 - partially funded by other organisations and available VIC government grants
 - other sources of funding
- Should testing protocols be developed for:
 - Total Suspended Solids (TSS)
 - Nitrogen
 - Phosphorus
 - Gross pollutants
 - Other contaminants
- What could limit the uptake of the IVS by devices manufacturers/vendors:
 - Cost of conformance
 - Data confidentiality concerns

- Voluntary nature of IVS
 - Other reasons
- Should fully verified claim(s) be included in the stormwater treatment devices database for a period of:
 - 5 years
 - 10 years
 - indefinitely

Abbreviations

BPEMG	Urban stormwater best practice environmental management guidelines, VIC
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CRC for WSC	Cooperative Research Centre for Water Sensitive Cities
DOH	Department of Health
EOI	Expression of Interest
EPA	Environment Protection Authority
IPWEA	Institute of Public Works Engineering
IVS	Independent Verification Scheme
IWCM	Integrated Water Cycle Management
MAV	Municipal Association of Victoria
NRMMC	Natural Resource Management Ministerial Council
QAPP	Quality Assurance Project Plan
STD	Stormwater Treatment Device
TSS	Total Suspended Solids
VTP	Verification Test Plan

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