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**U.S. EPA Water Technology Innovation
Cluster Leaders Meeting**
*National Perspective on Developing a Testing and
Evaluation Program for New Stormwater Technologies*

*March 25, 2014
Cincinnati, OH*



Kurt Marx

Assistant Director – Clean Water Innovation

University of Washington Tacoma – Center for Urban Waters

Washington State's stormwater treatment certification program

Technology Assessment Protocol - Ecology

TAP E

Emerging Stormwater Treatment Technologies (BMPs)



What are drivers for your program?

Phase I Municipal Stormwater Permit

*(4 counties, 2 cities, 2
ports)*

Western WA Phase II Municipal Stormwater Permit

(~80 cities, ~ 5 counties)

Stormwater Management Manual for Western Washington *August 2012 (Publication 12-10-030)*

Includes design criteria and performance goals for stormwater treatment facilities (BMPs) for development and re-development, but does not provide these criteria for emerging (“new”) treatment technologies.

TAPE Technology Assessment Protocol - Ecology

Ecology’s evaluation and approval process for emerging stormwater treatment technologies.



What need does the program fill?

- **Department of Ecology wants and needs new stormwater treatment technologies to meet permit requirements and to protect and improve water quality**
- **Stormwater Management Manual for Western Washington** (*August 2012, Publication 12-10-030*)
 - >>> manual updated every approx. five (5) years
- **Approval by the TAPE program allows proven treatment systems to be utilized before manual is updated. Also, manual no longer lists specific proprietary products.**
- **Provides vetted, consistent, third-party performance data to users.**



History of the TAPE program

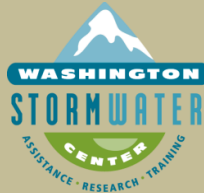
1999 – American Public Works Association, Washington Chapter, Surface Water Managers Committee

2002 – Program adopted by Ecology. First guidance manual.

2004 & 2008 – Revisions to the guidance document/process

May 2008 – TAPE program closed due to budget and staffing constraints

January 2011 – TAPE re-opens; revised guidance document





Business Resource Program

Educational workshops, videos, webinars, publications

Stormwater management tools

One-on-one assistance

TAPE - Emerging Technologies

Technology Assessment Protocol – Ecology (TAPE)

Information dissemination (technical briefs)

Functionally Equivalent BMP evaluations

Municipal Resource Program

Educational workshops, videos, webinars, publications

Stormwater management tools

Information Clearinghouse

Low Impact Development (LID) Program

LID research development

Educational workshops, videos, webinars, publications

Development of new tools and methods

Briefly describe the program model and the scope of coverage of testing or labeling results use?

- Applies to WA state only
- Development and redevelopment requirements to treat stormwater
 - Doesn't include retrofits
 - Doesn't include industrial stormwater permit (numerical effluent benchmarks)

Certification levels

PULD – Up to five (5) installations in WA State; all five must be monitored

CULD – Up to ten (10) installations in WA State; at least one must be monitored

GULD – Unlimited installations in WA State

(following requirements in the Use Level Designation)



TAPE evaluates and certifies stormwater treatment technologies for....

Sediment

(total suspended solids)



Metals

(dissolved copper & zinc)



Phosphorus

Oil

W

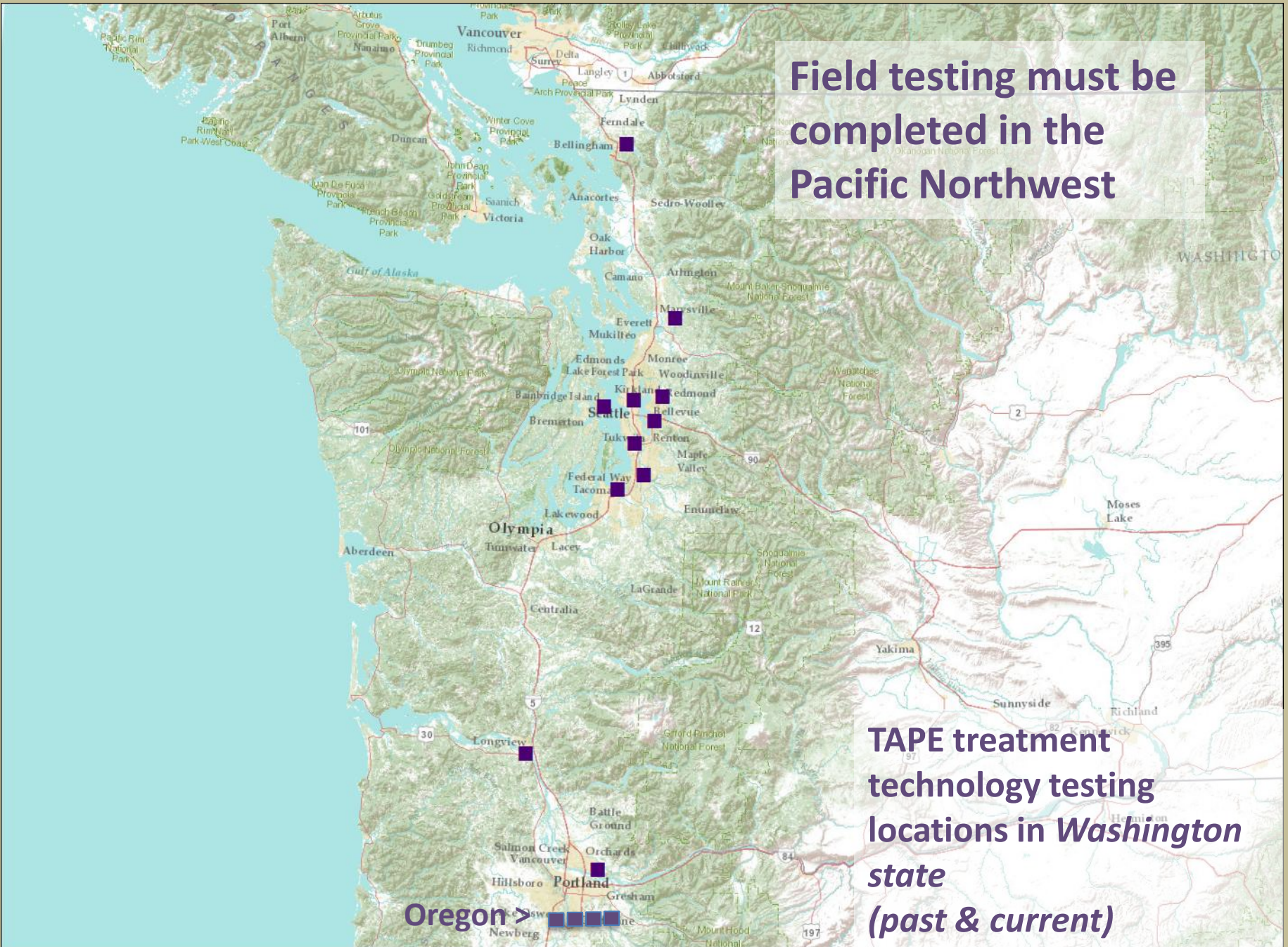
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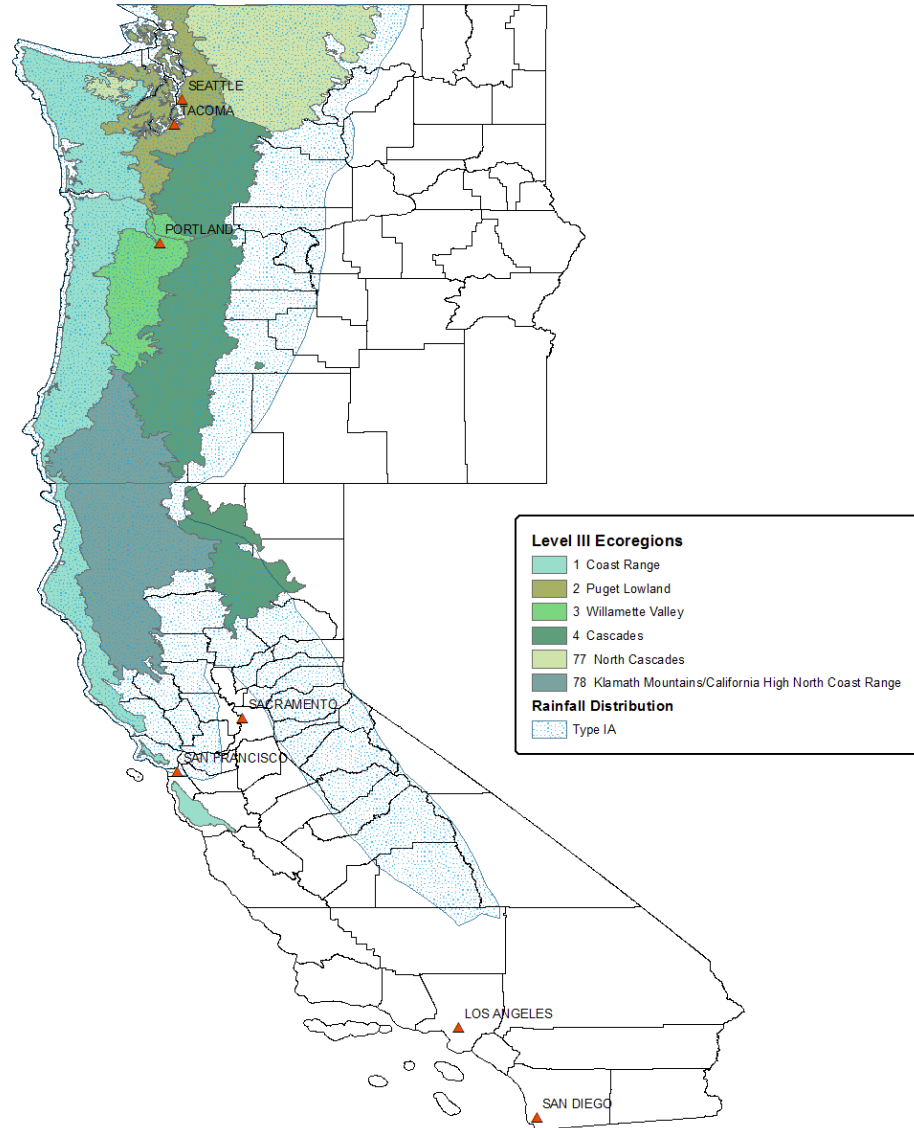
Field testing must be completed in the Pacific Northwest

TAPE treatment technology testing locations in *Washington state* (past & current)

Oregon >



Pacific Northwest Region



Jacob Moore, Center for Urban Waters

Regarding testing programs, what would be your recommended role(s) for water cluster or water innovation initiative leaders focused on helping early-stage companies bring their innovative water technologies to the marketplace?

1. Help finding a testing site (partnerships)
2. Help minimize cost (staffing, construction, lab, etc)
3. Reciprocity: different testing programs in various states, cities, counties, etc.

One of the biggest challenges for technology companies is to find a testing/installation location

- Willing site owner (public or private)
- Location physically capable of being monitored (e.g., not affected by tidal backwater; has to be safe)
- Pollutant loading: sufficient concentrations to show removal (i.e., not too clean)
- Collaborations
 - *local and state permitting authorities*
 - *vendors*
 - *developers, site owners*
 - *engineers, scientists, consultants*
 - *analytical laboratories*



Distribution of State/Regional Stormwater Testing/Evaluation Programs

- - Active Programs
- - Part of TRRP
- - Recognition of TRRP
- - Under Development

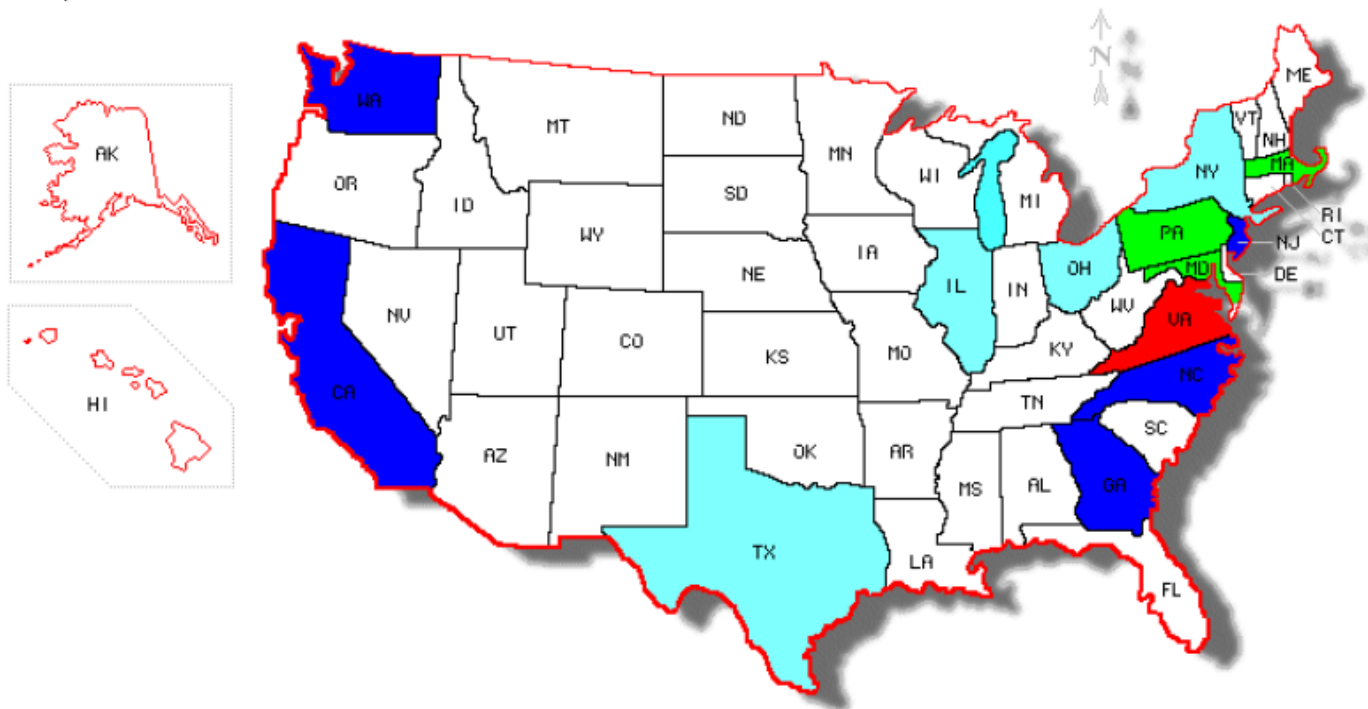


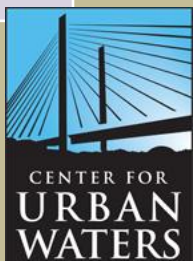
Figure 1 - Distribution of state and regional stormwater testing/evaluation programs in the U.S.

Investigation into the Feasibility of a National Testing and Evaluation Program for Stormwater Products and Practices. Water Environment Federation. February 6, 2014. STEPP Workgroup – Steering Committee.

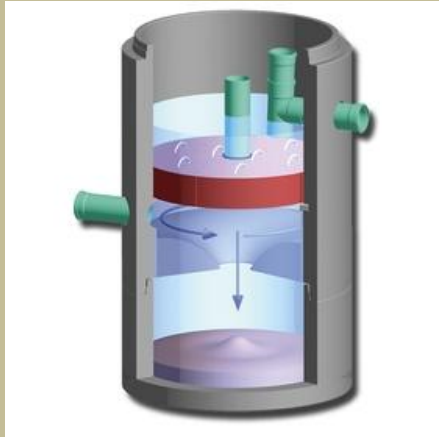
Current status of TAPE program

| Number | Description of item and status |
|--------|---|
| 3 | Technologies fully approved since TAPE re-opened in January 2011 |
| 13 | Total number of technologies approved under TAPE program* |
| 15 | Technologies currently active in stages of the TAPE program <ul style="list-style-type: none">• Initial application• QAPPs being developed (& site identification)• QAPPs being reviewed• Monitoring underway• Final technical reports being reviewed |

* Not including CTAPE technologies for construction runoff treatment



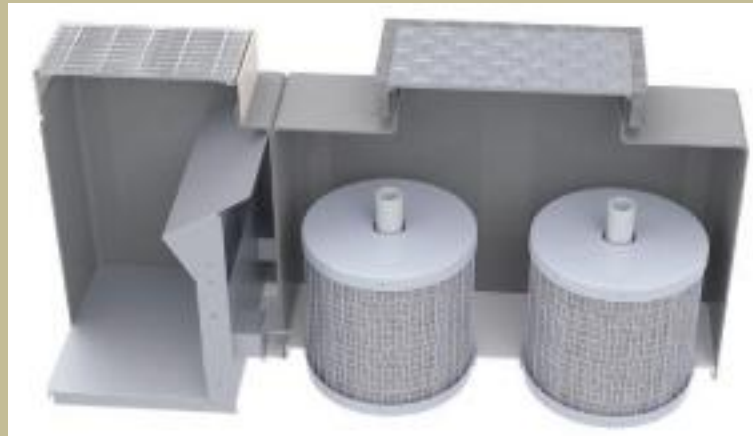
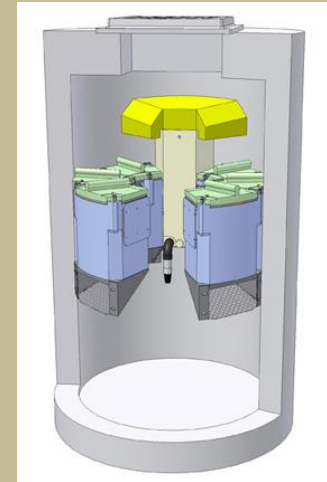
Royal Environmental Systems



BaySaver Technologies, Inc.



Hydro International



Kristar Enterprises



StormwaterRx®

Modular Wetlands™



MWS-LINEAR

Contech Engineered Solutions



Environment 21



CDS - Offline Unit - CA
Image 3 of 15

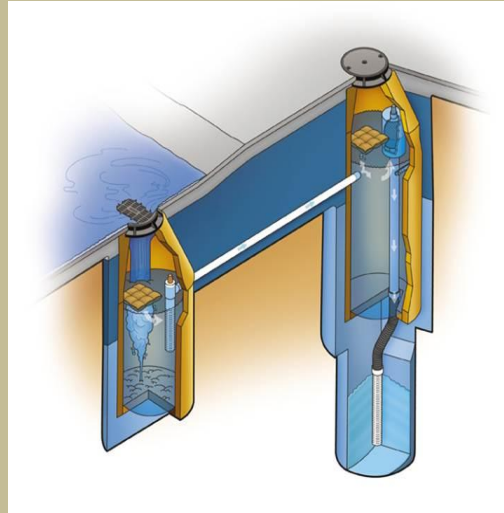


Imbrium Systems

Filterra Bioretention Systems



Torrent Resources



Lean Environment



AquaShield



WaterTectonics



How does the program benefit vendors who participate?

“My product has a GULD – so what?”

or...

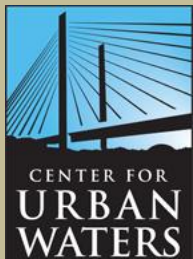
What does TAPE certification mean?

- The new technology has successfully met the TAPE performance goals, when properly installed, operated, and maintained.
- Meets design criteria and performance goals for new development and redevelopment.
- Does not require local jurisdictions to accept the product for use or allow use within their boundaries.
- Technologies with a GULD are listed on Ecology’s website = **unlimited use in Washington State**

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The Washington State Department Of Ecology Has Approved Filterra® For General Use Level Designation

Filterra receives TAPE/GULD approval for TSS, Oil and Grease and Enhanced Dissolved Metals

December, 2009 - The Washington State Department of Ecology (DOE) has now approved the Filterra® Bioretention System for General Use

Proven Performance

- Only proven filter on the market - Performance verified by the WA DOE and NJ DEP

Field Validated

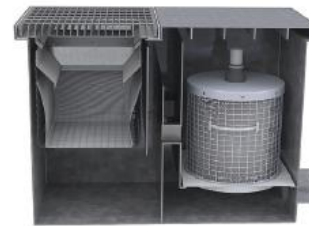
- High TSS removal
- Enhanced phosphorous removal rate
- In-line installation eliminates the need for separate junction structures

Washington State Department of Ecology

- GUID for basic and enhanced phosphorous treatment
- Allowed for in-line installation



VAULT STYLE CONFIGURATION



STEEL PERK FILTER



GET A QUOTE



Home > News Events > News Releases : May 22, 2006

BayFilter™ Receives GULD Approval from WA DOE

August 22, 2011

(Mount Airy, Maryland) August 22, 2011 – BaySaver Technologies Inc, a leading provider of stormwater treatment solutions, has announced that the Washington State Department of Ecology (DOE) has approved the BayFilter System with a General Use Level Designation (GULD) for Basic Level Treatment (TSS/SSC). This important approval recognizes BayFilter as a proven, cost-effective solution for the treatment of stormwater runoff.



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News & Events

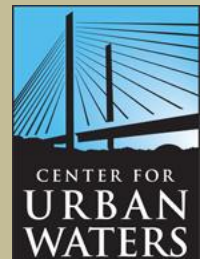
Washington State Department of Ecology Approves ecoStorm plus for Permanent Stormwater Treatment

[Click here to view Department of Ecology's Use Designation Document for Basic Treatment.](#)



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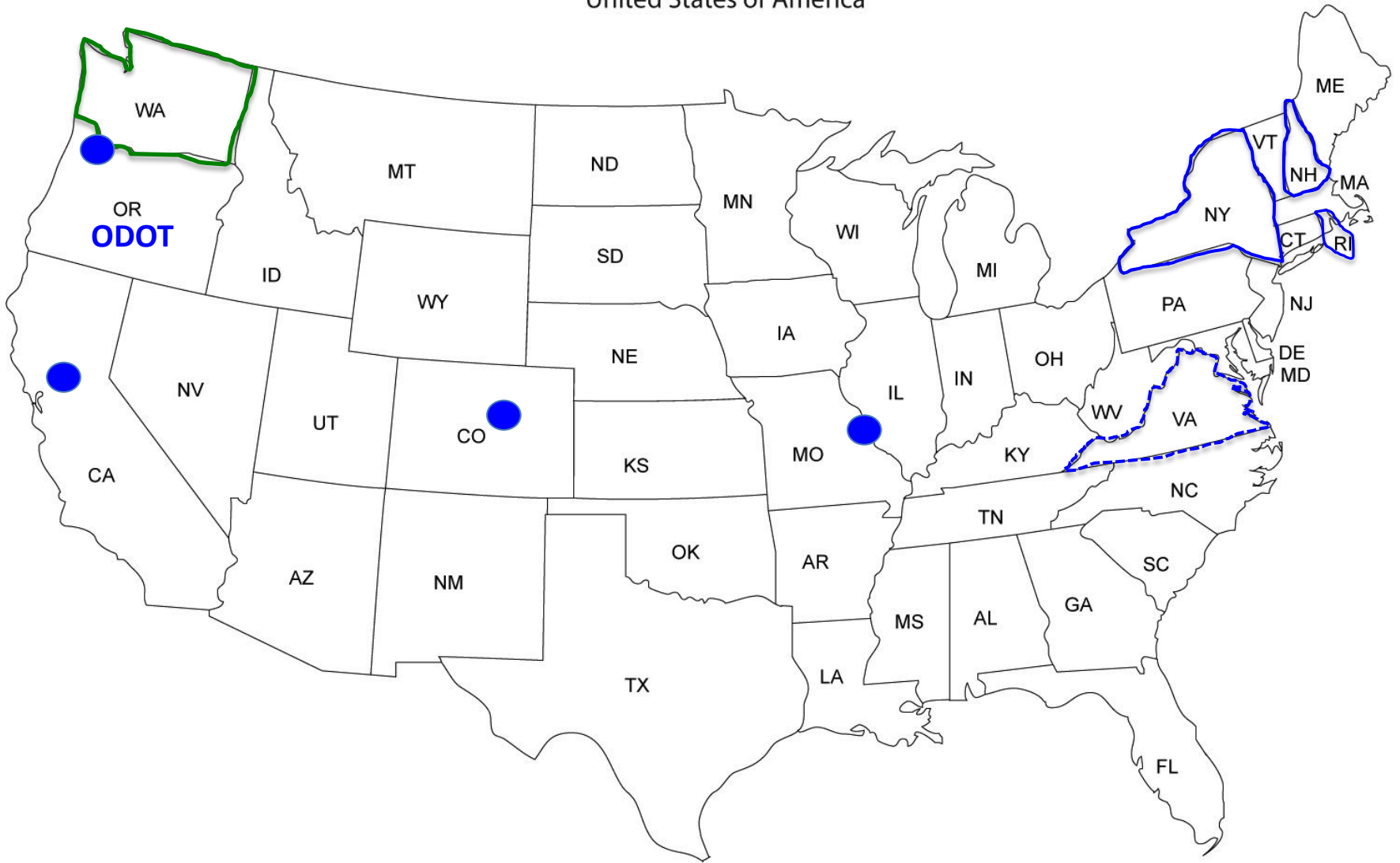


Who else benefits from TAPE?

- Department of Ecology – *“Ecology wants new technologies, but we want them to show us that they work and meet the performance standard set by the state; thus, the detailed review process.”*
- NPDES Permit holders (cities, counties, Ports) – more “tools in the tool box”. Design engineers.
- Manufacturing – concrete, plastic, stainless steel, etc.
- Construction – adding to expertise and nuances of installing these new devices (LID construction too)
- Engineering and scientific firms; analytical labs
- “The fishes” – e.g. one of the few, or only, states that certify BMPs for dissolved metals



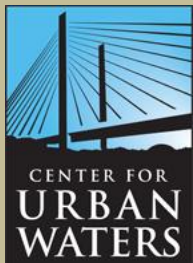
United States of America



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Jurisdictions outside of WA state -
use TAPE, reciprocity, or connection



What is the cost of going through the testing, labeling or approval process, etc.?

TAPE application fees

| | |
|----------------------|-----------------|
| Initial application | \$2,000 |
| QAPP review | \$4,000 |
| <u>Report review</u> | <u>\$6,000</u> |
| | \$12,000 |

Fees collected since program re-opened in January 2011
\$78,000

TAPE monitoring & testing

Site pre-monitoring
System installation
Development of QAPP
Flow and Water Quality Monitoring (> 1 year) – equipment & labor
Analytical Costs
Reporting

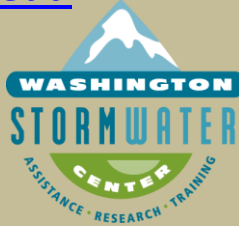
Approx. \$100,000 to \$500,000 (per site)



Kurt Marx

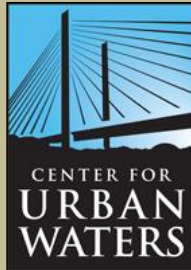
UW Tacoma at the Center for Urban Waters

marx@uw.edu



Washington Stormwater Center

www.washingtonstormwatercenter.org



Center for Urban Waters

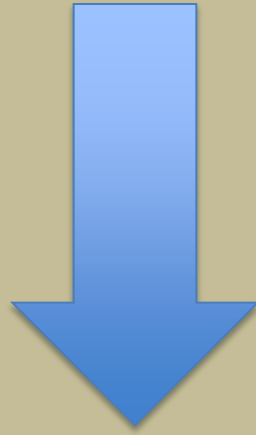
www.urbanwaters.org



Department of Ecology TAPE information

www.ecy.wa.gov/programs/wq/stormwater/newtech

EXTRA SLIDES



National perspective

Certification & testing

- U.S. EPA Environmental Technology Verification (ETV)
- Technology Acceptance Reciprocity Partnership (TARP)
- New Jersey and NJCAT (& NJDEP)
- American Society of Testing and Materials (ASTM)
- American Society of Civil Engineers (ASCE)
- SWEMA (hydrodynamic separators; filters)
- UNH – Stormwater Center
- Other states & cities:
 - Georgia – GTAP
 - Massachusetts – MASTEP
 - North Carolina
 - Portland, Oregon
 - Virginia – VTAP
 - Wisconsin
 - Washington – TAPE



Several states, municipalities, and organizations **outside of WA state** look to the TAPE certification.



Some of the merits of a coordinated testing protocol mentioned during a recent open discussion:

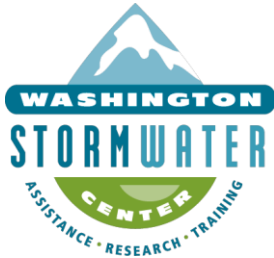
- Testing is happening, but products are not getting out into the market and we are letting the stormwater management community down (Dr. Roseen, UNH).
- Stormwater vendors want to be approved to sell their products.
- Approvals help to guide municipalities with their purchasing decisions.
- An opportunity for regulatory agencies to establish goals and criteria that are achievable.
- An opportunity to review and revise regulations and standards.
- A need to compare manufactured devices to traditional land-based BMPs.

A regional perspective

The necessary resources for developing emerging stormwater technologies can be, and are being, met in this region.

- Interested technology developers
- Local municipalities & industrial sites willing to host pilot testing
- Regulatory environment able to accommodate real-world testing
- Capacity to test and certify technologies
(Center for Urban Waters, WSU/LID, TAPE, WSDOT, Ports, environmental firms), etc.
- Light manufacturing & engineering capacity
- The Pacific Northwest is known for its rain...





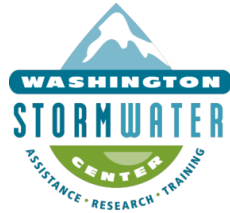
TAPE-certified GULD treatment technologies



| Treatment BMP | Company | Basic (TSS) | Phosphorus (TP) | Enhanced (diss. Cu & Zn) | Oil (TPH) |
|---|------------------------------|-------------|-----------------|--------------------------|-----------|
| BayFilter | BaySaver | ✓ | CULD | CULD | |
| Compost-amended bioswale | WSDOT | ✓ | | ✓ | CULD |
| ecoStorm/ecoStorm Plus | Royal Environmental Systems | ✓ | | | |
| Filterra | Filterra/Americast | ✓ | CULD | ✓ | ✓ |
| Perk Filter | Kristar | ✓ | ✓ | | |
| Media Filter Drain | WSDOT | ✓ | ✓ | ✓ | |
| Media Filtration System (MFS), perlite media, 1 gpm/ft ² | Contech Engineered Solutions | ? | ✓ | | |
| Storm Filter ZPG media, 1 gpm/ft ² | Contech Engineered Solutions | ? | ✓ | | |

✓ = General Use Level Designation (GULD) per TAPE Program

GULD status as of March 2013. Pre-treatment and C-TAPE technologies not shown.



Treatment technologies active in TAPE program



| Treatment BMP | Company | Basic (TSS) | Phosphorus (TP) | Enhanced (diss. Cu/Zn) | Oil (TPH) |
|---|------------------------|-------------|-----------------|------------------------|-----------|
| Aqua-Filter System | AquaShield | PULD | PULD | PULD | PULD |
| Aquip | StormwaterRx | CULD | CULD | CULD | |
| CDS System | Contech Eng. Solutions | (PT) | | | PULD |
| Enpurion Metals Treatment | LEAN Environment | * | | * | |
| JellyFish | Imbrium Systems | CULD | PULD | | PULD |
| Media Filtration System, perlite media, 2 gpm/ft ² | Contech Eng. Solutions | CULD | CULD | | |
| Modified Media Filter Drain | WSDOT | * | * | * | |
| MWS Linear | Modular Wetlands | CULD | | PULD | |
| Storm Filter Metal Rx media, 2 gpm/ft ² | Contech Eng. Solutions | CULD | | CULD | |
| Storm Filter Perlite media, 2 gpm/ft ² | Contech Eng. Solutions | CULD | PULD | | |
| Storm Filter Phospho Sorb media, 1.67 gpm/ft ² | Contech Eng. Solutions | CULD | CULD | | |
| StormPro | Environment 21 | * | | | |
| Up-Flo Filter | Hydro International | PULD | | | |
| UrbanGreen BioFilter | Contech Eng. Solutions | CULD | | PULD | PULD |

Status as of March 2013

(PT) = GULD for pre-treatment * = decision in process