Proprietary SCMs
Design, Design Review, & Operation
Design & Design Review
**Background**

- Proprietary SCMs can be used standalone (not recommended), or as a part of treatment train.
- Most proprietary SCMs are underground systems.
- Each system requires unique design & design review activities.
- Local governments may prohibit proprietary SCMs or impose additional requirements.
- Unmaintained or untracked SCMs can result in remobilization of pollutants.
Pollutant Removal

- Sedimentation
- Filtration
- Hydrodynamic Separation
- Gravitational Separation
- Screening
- Straining
Site Selection

- Depth to Groundwater
- Proximity to Public Spaces
- Gravity Discharge
- Access
- Traffic Loading
- Potential Flooding
Design Procedure

1. Surface SCM Design
   • Use WQCV design standards (capture and slow release)
     *Not recognized by MHFD*
   • Consider pretreatment
   • Provide additional chamber for pumping (if needed)
   • Provide view ports for all inaccessible areas
   • Overflow diversion
   • Maintenance access
2. Proprietary SCM Design
   • Accomplish Pollutant Removal Standard
   • Remove TSS to ≤ 30 mg/L
   • Ensure appropriate data is available to support proper pollutant removal
Pollutant Removal Standard Checklist

• For site identify:
  • WQ flow rate (usually 2-yr storm)
  • Land use type and corresponding TSS concentration of runoff

• For practice identify:
  • Effluent concentration or pollutant removal
  • The corresponding influent concentrations that achieved the effluent concentration or pollutant removal
  • Design flow rate that accomplished the effluent concentration or pollutant removal
Pollutant Removal Standard Checklist

• If effluent concentration is available:
  • Verify that site TSS concentration is LESS than or equal to the study influent TSS concentration
  • Verify particulate distribution of study that was removed (i.e. make sure it was not only sand that was removed by device)
  • Verify site flow is LESS than or equal to the WQ design flow of practice for study
  • If the above conditions are met and the reported effluent concentration of the study was less than 30 mg/L then the practice should work for the site.
Pollutant Removal Standard Checklist

• If pollutant reduction percentage is available:
  • Verify that site TSS concentration is equivalent to the study influent TSS concentration
  • Verify particulate distribution of study that was removed (i.e. make sure it was not only sand that was removed by device)
  • Verify site flow is LESS than or equal to the WQ design flow of practice for study
  • Apply the reduction percent to the site runoff TSS and see if the resulting TSS concentration is less than 30 mg/L then the practice should work for the site.

    • \( TSS_{out} = (1 - \%_{Reduction}) \times TSS_{Site Runoff} \)
Pollutant Removal Data Collection

- Data collection should meet the following requirements:
  - Testing must consist of field data (not laboratory data)
  - Climate similar to the Colorado Front Range is preferable
  - Collect and analyze according to Urban SCM Performance Monitoring Guidance (Geosyntec and WWE, 2009)
  - Quality Assurance/Quality Control (QA/QC)
Sources for Performance Data

1. New Jersey Corporation for Advanced Technology Technology Verification Program (NJCAT)
3. International BMP Database
4. University of Massachusetts Amherst Stormwater Technologies Clearinghouse
Sources for Performance Data

5. Wisconsin Department of Commerce & Wisconsin Department of Natural Resources (2007). Method for Predicting the Efficiency of Proprietary

6. U.S. Environmental Protection Agency Environmental Technology Verification (ETV)

7. Other data sources may also be acceptable
**Tree Filters**

**Bioretention**
Plant/Soil/Microbe Complex
Removes Pollutants, TSS, Phosphorus, Nitrogen, Bacteria, Heavy Metals, Hydrocarbons, etc.

- **Filtterra® Flow Line**
  at Higher Elevation than Bypass Flow Line
- **New or Existing Catch Basin**, Curb Cut or Other Means of Overflow Relief

**Clean-out**
- Curb and Gutter

**Storm Water Inflow**
("First Flush")
- Energy Dissipator Stones
- Treated Stormwater Underdrain System

3” Mulch
- Filtterra® Engineered Media
- Filtterra® Concrete Container

High Flow Bypass

[http://www.conteches.com/Products/Stormwater-Management/Biofiltration-Bioretention/Filtterra](http://www.conteches.com/Products/Stormwater-Management/Biofiltration-Bioretention/Filtterra)
Hydrodynamic Separation

**Stormceptor:**
http://www.stormceptor.com/

- Stormwater enters through an in-line or surface inlet
- Oil and sediment from design storm is removed and stored in sedimentation chamber
- Larger storms are able to bypass without causing damage
Stormceptor
Removes pollutants using upflow filtration and settling

Membrane filter cartridges capture very small particles

Jellyfish Filtration SCM
StormFilter SCM

Vortech SCM

http://www.conteches.com/Products/Stormwater-Management/Treatment/Vortechs.aspx
Questions?
Operations
• Most proprietary SCMs are underground systems
• Each system requires unique inspection and maintenance activities

• Objectives of this section:
  • Identify the most common systems
  • Describe how each system operates
  • Describe typical inspection and maintenance activities

• Our Disclaimer:
  • Inappropriate maintenance may void system warranty
  • ALWAYS refer to manufacturer’s inspection and maintenance manual
  • All information presented herein is based on manufacturer literature
Maintenance Considerations

• Sediment/pollutant loading varies considerably from site to site
• For first year after construction, visit site after large rainfall events (> 0.25 inches) and measure sediment/oil accumulation
  • Determine how often each facility needs to be inspected and maintained
  • Frequency range: every large storm event to annually
• OSHA confined space certification may be necessary
Maintenance Considerations

• Some vendors will provide first 1-2 years of maintenance...follow along to learn proper I&M

• Major maintenance should be scheduled during winter months (little/no rainfall)

• Keep track of location carefully
  • Underground SCMs tend to be forgotten!
Maintenance Measurement

- Use “Sludge Judge” to measure sediment accumulation
  
  http://www.coleparmer.com/Category/Sludge_Judge_Sludge_Samplers/47809

- Maintenance is required when 15% of capacity is filled with sediment or can be determined based on depths of sediment accumulation

- Maintenance performed with vac-truck

<table>
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<tr>
<th>OSR Models</th>
<th>Sediment Depth inches</th>
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<tr>
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<tr>
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<tr>
<td>Series OSR 1125</td>
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* based on 15% of the Stormceptor unit’s total storage
Bioretention
Plant/Soil/Microbe Complex
Removes Pollutants, TSS,
Phosphorus, Nitrogen, Bacteria,
Heavy Metals, Hydrocarbons, etc.

Tree Filters

http://www.contechs.com/Products/Stormwater
-Management/Biofiltration-Bioretention/Filterra
Tree Filters

• Routine Inspection/Maintenance
• Begin with 2 inspections annually
  • Spring
  • Fall
• After large events (>0.25”)
  • Ensure underdrain operates properly

• Routine Maintenance Summary
• Removal of tree grate and erosion control stones
• Removal of debris, trash and mulch
• Replace mulch
• Evaluate plant health (prune or replace as necessary)
• Replace erosion control stones and tree grate

O&M Manual:
Hydrodynamic Separation

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Stormceptor
Jellyfish Filtration SCM

Removes pollutants using upflow filtration and settling

Membrane filter cartridges capture very small particles

Jellyfish Filtration SCM
• Check sediment level using “Sludge Judge”
• Also check for oils/hazardous waste accumulation
• Sediment removal via vac-truck required when 12 inches of sediment has accumulated
• Filter cartridges must be backflushed manually when water remains standing on backwash pool
• Cartridge replacement will be necessary when manual backflushing is no longer beneficial (anticipated 2-5 years)
StormFilter SCM

Stormfilter SCM

StormFilter SCM

- Maintenance Frequency:
  - Maintenance intervals of 1-3 years
  - If > 4” of sediment has accumulated on structure floor
  - If > ¼” of sediment is on top of the cartridges
  - If > 4” of water remains 24 hours after event
  - After 3 years of no maintenance
StormFilter SCM

• Maintenance Activities:
  • Replace cartridge
  • Vacuum extraction of captured pollutants in the vault
Vortech SCM

http://www.conteches.com/Products/Stormwater-Management/Treatment/Vortechs.aspx
Remove floatables and sediment by hydrodynamic separation

Floatables and sediment accumulate in different storage chambers

http://www.conteches.com/Products/Stormwater-Management/Treatment/Vortechs.aspx
Accumulated floatables and sediment are removed via vac-truck.
Questions?