Trash Talk

Cleaning up the waters in Baltimore City and the Watershed 263 Trash Collection Program

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Trash…. It's a problem
What is being done?

- Clean Water Act 303d Listings
- EPA Database: Only four states currently acknowledge waterways impaired by trash
  - Alaska
  - Hawaii
  - California
  - Maryland
Enforcing Clean Water

- **Total Maximum Daily Loads**
  - A calculated loading of any given pollutant that if obtained will allow a water body to meet all applicable water quality standards

- **LA River Basin** (2001/2007)

- **Anacostia River** (2010)
Baltimore City

- Inner Harbor is 303d listed for trash impairment
- TMDL for trash has not been formally established, but is anticipated
- City has begun several programs to address trash prior to regulatory involvement
Baltimore City’s Efforts

- Street Sweeping
- City currently has deployed four in-line trash collection devices
  - Harris Creek
  - Braircliff
  - Alluvion Street
  - Gwynn’s Run
- Trash Skimmer
Bush Street Project Need

- Watershed 263 drains to Bush Street Outfall
  - Several other projects in watershed
- Drainage Area = 910 Ac
- Watershed drains a highly urbanized portion of Baltimore City to the Patapsco River and the Chesapeake Bay
- Receiving waters are 303d listed for various water quality impairments
Project Goals

- Meet anticipated future gross pollutant regulatory requirements
- Minimize visible presence of debris and debris collection device
- Minimize potential for vandalism or theft of debris collection device and components
- Select an easily accessible area for maintenance activities
- Select an area for construction activities that minimizes the impacts to traffic on busy arterials
Drainage Area

- Water Quality
  - Discharge = 595 cfs
  - 1-Yr = 1,220 cfs
  - 2-Yr = 1,560 cfs
  - 10-Yr = 2,740 cfs
  - 100-Yr = 5,610 cfs
Comparable Systems

- Wilmington Drain
  - L.A. DPW
    - 1-Year Storm = 1,100 cfs (Design Storm for Treatment)
    - 22 Net collection systems across a 110-foot wide open concrete channel
    - Largest netting based system constructed to date

- L.A. Freeway
  - CalTrans
    - Water Quality Discharge = 175 cfs
    - Largest CDS system constructed to date
    - Construction Cost ~$2 Million
Source Treatment

- Involves control devices that prevent trash from entering storm drain system
- Requires a comprehensive street sweeping program
- Requires regular maintenance clean-out of all catch basins
Small BMP Systems

- 8 Treatment Locations identified from preliminary screening
- Total DA Treated
  - 598.7 Acres
  - 66% of Total DA
- Treatment designed for the water quality storm
Smaller Systems

Advantages:
- Smaller flow rates for treatment
- Smaller cost per unit
- Lower trash loading per site / decreases maintenance cleanout needs
- Additional Water Quality Treatment Benefits (TSS and Metals)

Disadvantages:
- Lower percentage of watershed for treatment
- Disparate locations for maintenance cleanout
- Traffic disruptions during cleanout & construction
- Construction activities in residential neighborhoods
- Utilities will likely interfere with many of the system locations
Open Channel Systems

- Open Channel netting systems
- Floating system (Alluvion)
- Fixed mounted system (Gwynn’s Run)
- Removable netting capture/containment system
- Maintained by a truck mounted crane from street level
Open Channel System

Advantages:
- Treatment of a large percentage of the watershed
- Construction site located in single area with minimal disruptions to community
- Applicable to tidal areas

Disadvantages:
- System bypass potential significantly increased
- Overtopping flows & sunken trash
- Significant maintenance effort at clean-out
- Vandalism
- Low aesthetic value – highly visible presence of trash in the waterway
Waterwheel System

- Floating System
- Driven by water and solar power – powers a conveyor belt
- Self contained dumpster for collection
- Turbidity curtain system to feed trash to system
# Waterwheel System

## Advantages:
- Treatment of the entire watershed
- Single location for maintenance and cleanout activities
- Construction site located in single area with minimal disruptions to community
- Powered by renewable energy
- Aesthetic value – lowers trash visibility

## Disadvantages:
- Bypass potential similar to netting systems
- Complex system with several parts
- Mechanical System Maintenance
- The Unknown
Vault System

- In-line storm drain system
- Underground vault
- Removable netting capture/containment system
- Maintained by a truck mounted crane from street level
### Vault System

**Advantages:**
- Treatment of a large percentage of the watershed
- Single location for maintenance and cleanout activities
- Construction site located in single area with minimal disruptions to community
- Can have a very high capture rate

**Disadvantages:**
- High unit cost
- Capture efficiency decreases as flow rates increase
- Only applicable for upland treatment
Carroll Park Vault Site

- Current storm drain is a 17’ x 10’ elliptical masonry pipe
- Site has minimal underground utilities
  - Local electrical line for park lighting
- Site will likely have impacts to trees
  - Rec. and Parks owned property
    - 32” DBH Oak
    - 46” DBH Oak
    - Various small pine, maple, & oak (>12”
## Debris Collection Summary

<table>
<thead>
<tr>
<th>System</th>
<th>Catch Basin Retrofits</th>
<th>Small BMPs</th>
<th>Large Vault</th>
<th>Floating Net Collection</th>
<th>Trash Mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>900+ Sites</td>
<td>8 Sites</td>
<td>Carroll Park</td>
<td>Bush St. Outfall</td>
<td>Bush St Outfall</td>
</tr>
<tr>
<td>Drainage Area Treated (Acres)</td>
<td>910</td>
<td>598.7</td>
<td>786.8</td>
<td>910</td>
<td>910</td>
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<tr>
<td>Estimated Life Cycle</td>
<td>25</td>
<td>50</td>
<td>30</td>
<td>30</td>
<td>25</td>
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<tr>
<td>Total Construction Cost</td>
<td>$1,000,000</td>
<td>$ 1,900,000</td>
<td>$ 1,800,000</td>
<td>$ 700,000</td>
<td>$ 630,000</td>
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<tr>
<td>Estimated Annual Maintenance Cost</td>
<td>$ 250,000</td>
<td>$ 135,840</td>
<td>$ 205,080</td>
<td>$ 283,920</td>
<td>$ 101,840</td>
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<tr>
<td>Life Cycle Cost (2010 $ / yr)</td>
<td>$ 290,000</td>
<td>$ 173,840</td>
<td>$ 265,080</td>
<td>$ 307,253</td>
<td>$ 131,183</td>
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<tr>
<td>Cost/Benefit ($ / Acre / Year)</td>
<td>$ 318</td>
<td>$ 290</td>
<td>$ 337</td>
<td>$ 338</td>
<td>$ 144</td>
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<td>Goals Attained</td>
<td>2 of 5</td>
<td>2 of 5</td>
<td>4 of 5</td>
<td>2 1/2 of 5</td>
<td>4 1/2 of 5</td>
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<tr>
<td>Estimated Percent of Trash Captured from Watershed 263</td>
<td>86%</td>
<td>43%</td>
<td>65%</td>
<td>90%</td>
<td>95%</td>
</tr>
</tbody>
</table>
Funding Sources

- Maryland Port Authority
- Baltimore City DPW