Sediment Management in Urban Creeks

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Otak Team

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Perkins Geosciences – Geomorphic Evaluation
Gary Minton, RPA Inc. – Pond Circulation Study
HWA GeoSciences – Geotechnical Engineering
Thornton Creek Watershed

- 7,400-acre watershed
- 1940s – begin urbanization
- 1960s – complete build-out
- No detention originally built
- Urban flooding problems
Meadowbrook Pond

- 2.7-acre facility
- Flood Reduction
- Sediment Removal
- 60-inch Sewer

Thornton Creek – Flow Rates

<table>
<thead>
<tr>
<th>RI</th>
<th>Upstream Flow</th>
<th>Bypass</th>
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</thead>
<tbody>
<tr>
<td>Base</td>
<td>15 cfs</td>
<td>0 cfs</td>
</tr>
<tr>
<td>2-yr</td>
<td>327 cfs</td>
<td>286 cfs</td>
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<tr>
<td>100-yr</td>
<td>924 cfs</td>
<td>406 cfs</td>
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<tr>
<td>Period</td>
<td>Pond Dredged</td>
<td>Forebay Dredged</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>1960-1980s</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>1,800</td>
</tr>
<tr>
<td>2001</td>
<td>7,281</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>1,200</td>
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**Breakdown of Dredging Costs**

- Haul/Dispose: 36%
- Dredging: 29%
- Flow Bypass: 15%
- Fish Removal: 7%
- Planning/Permits: 13%

*Average Cost = $165/CY*
• Worker Safety
• Access

• Hauling
• Disposal of Hazardous Waste
Sediment Management Plan

Explore different dredging strategies:
- increase operational flexibility
- reduce operating costs
- provide environmental benefits

In-line Sediment Basin
HEC-6T Model Inputs

Hydrology

Sediment

Geometry

HEC-6T

Hydrology
Sediment Loading in Thornton Creek

Predicted vs. Observed Dredging Volumes
Grain Size by Flow Rate

Predicted vs. Observed Grain Size
HEC-6T Modeling

Dredging Frequency

Basin Configuration

Dredging Method

HEC-6T Simulations

1. Existing Channel and Dredging
2. New Pond Upstream – Dredge 1x/Year
3. New Pond Upstream – Dredge 3x/Year
4. New Pond Upstream – Dredge 1x/3-Years
### Predicted Dredging Volumes

<table>
<thead>
<tr>
<th>Dredge Volume (CY/Year)</th>
<th>Existing</th>
<th>New Basin 1x/Yr</th>
<th>New Basin 3x/Yr</th>
<th>New Basin 1x/3-Yr</th>
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### HEC-6T Output

- Sediment delivery
- Dredge volume
- Grain size distribution
- Changes in channel geometry - erosion and deposition
- Changes in water surface profiles
Conclusions

- HEC-6T design process models complex problems
- Assess alternative strategies
- Develop Sediment Management Plan
- Evaluate upstream and downstream impacts