Route 7 Corridor Improvements Project
Reston Avenue to Jarrett Valley Drive

Stormwater Management Strategy
June 16, 2016
The proposed project will add additional impervious area increasing runoff
- Widening from 4 lanes to 6 lanes
- 10’ shared use path on both sides

We are obligated by law to control (detain) and treat stormwater runoff from roads after a rain

Detention of runoff is needed to reduce:
- Flood damage
- Erosion of natural streams
- Pollution of natural water ways

New regulations that took affect in July, 2014 make it more difficult to design facilities to treat such stormwater, especially in a constrained urban road corridor
Regulatory Requirements

• Detention of the stormwater runoff is made up of two parts:
  • Water Quality
  • Water Quantity

  ▪ Water Quality is the reduction of pollutants from runoff
    ▪ Phosphorus is the key pollutant runoff from pavement

  ▪ Water Quantity is the reduction of the volume and speed of water to minimize flood damage and erosion of natural stream channels

  ▪ An Outfall is a defined channel where stormwater runoff leaves the VDOT Right-of-Way. An outfall can naturally occurring based on low points in topography or from an existing storm drain system

  ▪ 1% Rule: Water Quantity requirements can be waived if the drainage area being treated for an outfall is less than 1% of the overall watershed
A pound of phosphorus is generated from an acre of right of way that has 65% impervious (paved) cover (application of Simple Method per VDOT SWM Regulations)
Stormwater Management Approach

- Constrained space along corridor
- 13 outfall locations on the project
- Locate stormwater detention facilities in places that minimizes impacts to wetlands, streams, and trees
- Utilize the “1% Rule” where possible to eliminate the need for detention ponds
- Maximize purchase of “nutrient credit” by law in lieu of building ponds for water quality (max of 25% of water quality treatment requirements can be purchased from Nutrient Credit Bank for a project this size)
Stormwater Management Project Requirements

Part II of the VSMP Regulations (9VAC25-870-40 et. seq.) provides technical criteria to address stream channel erosion, flooding and water quality.

Part IIB (9VAC25-870-62 et. seq.) contains the “new” technical criteria that include the Runoff Reduction methodology (for determining compliance with water quality requirements) and the Energy Balance Equation (for determining compliance with stream channel flooding and erosion requirements). Part IIB technical criteria are applicable to non-grandfathered projects (see Section 19.1 of this IIM for additional information on grandfathered projects).

Required to treat 71.29 lbs of Phosphorus for project
- Up to 25% can be purchased as nutrient credits = 17.82 lbs
- 53.73 lbs to be treated with BMP’s
Bio-swales

Applicable to small drainage areas, un-concentrated sheet flow
Dry Swale

Suited for small drainage areas, 5 acres or less; difficult to use on urban projects
Underground Detention

Suited for large drainage areas of 10 acres or greater; can treat concentrated flow from storm sewer
Wet Pond

Suited for large drainage areas of 10 acres or greater; can handle concentrated flow from storm sewer
## Project Specific Outfalls/Ponds

<table>
<thead>
<tr>
<th>Outfall/Pond</th>
<th>DA* (ac)</th>
<th>Property Type</th>
<th>Bioretention</th>
<th>Dry Swale</th>
<th>Wet Swale</th>
<th>Constructed Wetland</th>
<th>Wet Pond</th>
<th>Dry Pond</th>
<th>Extended Detention (ED)</th>
<th>Proprietary BMPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.2</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs; DA &lt; 10 acres</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8.8</td>
<td>Fairfax Co. Park</td>
<td></td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>20.8</td>
<td>Private Property</td>
<td></td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3B</td>
<td>8.8</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs; DA &lt; 10 acres</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>12.3</td>
<td>Private Property</td>
<td>N/A: Drainage Area is &gt; 5 acres</td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs</td>
<td>✓</td>
<td></td>
<td></td>
<td>15% phosphorus removal efficiency; increased facility footprint</td>
</tr>
<tr>
<td>8</td>
<td>24.0</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td>Increased construction costs; long-term maintenance needs</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>11.4</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>6.3</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>12.6</td>
<td>Private HOA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>4.7</td>
<td>Private Property</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Increased construction costs; long-term maintenance needs; DA &lt; 10 acres</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>8.1</td>
<td>Private Church</td>
<td>N/A (see above)</td>
<td>N/A (see above)</td>
<td>N/A (see above)</td>
<td>Increased construction costs; long-term maintenance needs</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Drainage Area

---

**Route 7 Corridor Improvements**
## Stormwater Management Requirements

<table>
<thead>
<tr>
<th>Pond #</th>
<th>IMP DA (acres)</th>
<th>BMP Type</th>
<th>Treating Water Quality</th>
<th>Treating Water Quantity</th>
<th>Phos. Load Redux (lb/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.60</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>3.47</td>
</tr>
<tr>
<td>2</td>
<td>3.05</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>4.02</td>
</tr>
<tr>
<td>3A</td>
<td>6.52</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>8.64</td>
</tr>
<tr>
<td>3B</td>
<td>6.06</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>6.95</td>
</tr>
<tr>
<td>4</td>
<td>N/A</td>
<td>Dry Pond</td>
<td>No</td>
<td>Yes</td>
<td>0.00</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
<td>N/A</td>
<td>Nutrient Credits</td>
<td>1% rule</td>
<td>0.00</td>
</tr>
<tr>
<td>6</td>
<td>N/A</td>
<td>N/A</td>
<td>Nutrient Credits</td>
<td>1% rule</td>
<td>0.00</td>
</tr>
<tr>
<td>7</td>
<td>N/A</td>
<td>N/A</td>
<td>Nutrient Credits</td>
<td>1% rule</td>
<td>0.00</td>
</tr>
<tr>
<td>8</td>
<td>6.41</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>8.40</td>
</tr>
<tr>
<td>9</td>
<td>3.76</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>4.69</td>
</tr>
<tr>
<td>10</td>
<td>3.31</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>4.03</td>
</tr>
<tr>
<td>11</td>
<td>5.67</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>6.95</td>
</tr>
<tr>
<td>12</td>
<td>1.90</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>2.62</td>
</tr>
<tr>
<td>13</td>
<td>2.96</td>
<td>Wet Pond</td>
<td>Yes</td>
<td>Yes</td>
<td>3.96</td>
</tr>
</tbody>
</table>

| Total  | 53.73          |          |                        |                        |                         |
Outfall # 1: Dog Run

Total Drainage Area: 8.2 acres
Required pond volume:
- 630 CY (quality)
- 1932 CY (quantity)
SWM Pond #1 Detail
Pond Volume Comparison

Required Pond Volume: 21 Dumpsters (Quality)
65 Dumpsters (Quantity)
## Wet Pond vs. Underground Storage

<table>
<thead>
<tr>
<th>Cost Comparison</th>
<th>Wet Pond</th>
<th>Underground Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>$300,000</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>Maintenance (50 Years)</td>
<td>$150,000</td>
<td>$500,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$450,000</strong></td>
<td><strong>$1,500,000</strong></td>
</tr>
</tbody>
</table>
Outfall # 2: Nike Park
East of Utterback Store Rd

Total Drainage Area 8.8 acres
Required pond volume 500 CY (quality) 1990 CY (quantity)
SWM Pond #2 Detail
Outfall # 3A: Piney Run
West of Baron Cameron Intersection

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Drainage Area</td>
<td>20.8 acres</td>
</tr>
<tr>
<td>Required pond volume</td>
<td></td>
</tr>
<tr>
<td>(quality)</td>
<td>1240 CY</td>
</tr>
<tr>
<td>(quantity)</td>
<td>4440 CY</td>
</tr>
</tbody>
</table>
SWM Pond #3A Detail
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Drainage Area</td>
<td>8.8 acres</td>
</tr>
<tr>
<td>Required pond volume</td>
<td>900 CY (quality)</td>
</tr>
<tr>
<td></td>
<td>2520 CY (quantity)</td>
</tr>
</tbody>
</table>

Outfall # 3B: Piney Run
West of Baron Cameron Intersection
SWM Pond #3B Detail
Outfall # 4
Near Mills Nursery

Total Drainage Area 12.3 acres
Required pond volume 0 CY (quality)* 3100 CY (quantity)

*Quantity only due to site constraints
SWM Pond #4 Detail
**Outfall # 5, 6 & 7**

Colvin Run & Difficult Run Stream Area

Colvin Run Total Drainage Area: 3,891 Acres
Difficult Run Total Drainage Area: 28,416 Acres

- Outfall 5 – 18.62 ac
- Outfall 6 – 12.77 ac
- Outfall 7 – 12.85 ac
Outfall # 8
Near Middleton Ridge

Total Drainage Area: 24.0 acres
Required pond volume:
1320 CY (quality)
5230 CY (quantity)
SWM Pond #8 Detail
Outfall # 9
Across from Wolftrap Nursery

Total Drainage Area
14.4 acres

Required pond volume
790 CY (quality) 2350 CY (quantity)
Outfall # 10
Along Towlston Road

Total Drainage Area  6.3 acres
Required pond volume  630 CY (quality)  2060 CY (quantity)
SWM Pond #10 Detail
**Outfall # 11**
Along Wolftrap Run Rd

- **Total Drainage Area**: 12.6 acres
- **Required pond volume**: 946 CY (quality) 3650 CY (quantity)
SWM Pond #11 Detail
Outfall # 12
Relocated Lewinsville Rd Intersection

Total Drainage Area | 4.7 acres
Required pond volume | 530 CY (quality) 1000 CY (quantity)
SWM Pond #12 Detail
Outfall # 13
East of McLean Bible Church

Total Drainage Area
8.1 acres

Required pond volume
762 CY (quality) 2565 CY (quantity)
SWM Pond #13 Detail
Community Concerns

- Mosquitos
- Flooding
- Landscaping
- Fencing

SWM Pond from Adjacent Route 7 Project