Solids Master Plan – Review of Desired Outcomes

- Replacement of aging infrastructure
- Make better use of valuable resources
- Project phasing to maintain reasonable utility rates
### Solids Master Plan – Timeline Review

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate Needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Phase I)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short term improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Phase II)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term improvements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Phase III)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Solids Master Plan – Project Milestones

- **Fall 2015**
  - Prioritize needs
  - Narrow down choices

- **Condition Assessment**
  - Winter 2016
  - Look at immediate needs

- **Set and Rank Criteria**

- **Spring 2016**

- **Develop Alternatives**

- **Final Report**
  - Fall 2016-Winter 2017

- Ongoing outreach to stakeholders
- Ongoing peer review
Today’s Meeting Agenda

• WPCP Capacity and Solids Loading
• Plan to Address Immediate Needs
• Regulatory Review of Biosolids
• Communication Update
• Discussion
• Paired Comparison Analysis - Exercise
Running 12 month WPCP Flows

Running 12 month Precipitation
(AVG = about 39.0)

Running Average
Annual Flow

WPCP Flow (MGD)

Date
Jan-90 Jan-95 Jan-00 Jan-05 Jan-10 Jan-15

Plant Capacity--History
Plant Capacity

- Based on Water Master Plan and Council of Governments population projections
- Includes usage change in Crystal City, reasonable rate of Inflow and Infiltration
- Should have adequate capacity beyond 2040
- Master Plans are done every 10-20 years—will target 2030 for the next one

<table>
<thead>
<tr>
<th>Year</th>
<th>Sanitary Flow Increase From 2010 (mgd)</th>
<th>Average Annual Plant Flow (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>0</td>
<td>26.0 (actual)</td>
</tr>
<tr>
<td>2015</td>
<td>2.09</td>
<td>28.1</td>
</tr>
<tr>
<td>2020</td>
<td>3.82</td>
<td>29.8</td>
</tr>
<tr>
<td>2025</td>
<td>4.97</td>
<td>30.9</td>
</tr>
<tr>
<td>2030</td>
<td>5.79</td>
<td>31.8</td>
</tr>
<tr>
<td>2035</td>
<td>6.37</td>
<td>32.3</td>
</tr>
<tr>
<td>2040</td>
<td>6.72</td>
<td>32.7</td>
</tr>
</tbody>
</table>
Plant Capacity

Wastewater Flow Projections

- Recorded Plant Flow
- Projected Flow

Year

Influent (mgd)


0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0
Solids Side Loading

- Solids side loading projections based on concentration of pollutants in influent
- Design of new solids processes will be based on current concentrations and projected flows
- Mass balance being performed on alternative technologies
  - (Mass balance: loadings into a process must equal loadings out)

\[ \text{lbs} = X \quad \text{lbs} = Y \quad \text{lbs} = X - Y \]
Solids Side Loading

- Influent loadings of readily biodegradable carbon (BOD) and suspended solids are used as basis for sizing
- Generally using max month value for design

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Annual Average Flow (mgd)</th>
<th>Influent BOD (lb/day)</th>
<th>Influent TSS (lb/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual Average</td>
<td>Maximum Month</td>
<td>Annual Average</td>
</tr>
<tr>
<td>2015</td>
<td>28.1</td>
<td>78,300</td>
<td>111,700</td>
</tr>
<tr>
<td>2020</td>
<td>29.8</td>
<td>83,000</td>
<td>118,400</td>
</tr>
<tr>
<td>2040</td>
<td>32.7</td>
<td>91,100</td>
<td>130,000</td>
</tr>
<tr>
<td>Design Capacity</td>
<td>40</td>
<td>111,400</td>
<td>159,000</td>
</tr>
</tbody>
</table>
Plan to Address Immediate Needs

Five *Immediate Needs* projects identified:

- Gravity Thickeners
- Bar Screens
- Primary Scum Collection
- Motor Control Center in Preliminary Treatment Building
- Scum Concentrator

Equipment is old and condition is fair to poor; failure could have consequences beyond the process itself
Plan to Address Immediate Needs

- Condition assessment; alternatives analysis complete
- Draft business cases have been developed
- Conceptual design is next step
- Design engineer procurement has not yet started
Biosolids Regulations

  - Pollutants
  - Pathogens
  - Nutrients
- VA Biosolids Use Regulations
  - VA Dept of Health -1993
  - VA Dept of Environmental Quality (DEQ) -2008
- Local Governments
  - Ordinances
Types of Biosolids

- **Class A** - Exceptional Quality treated to levels that virtually eliminates disease-causing organisms/pathogens, low in heavy metals, and no distribution restrictions

- **Class B** - Less restrictive standards for content of metals and disease causing organisms and require more limitations/restrictions on use and distribution

- **Both Class A and Class B** - Protect human health and the environment
Biosolids Treatment

- Prevents Risk of Disease Infection

- Treatment includes high temp, pressure and pH to kill
  - Bacteria
  - Viruses
  - Parasites

- Processes include
  - Digestion
  - Lime Stabilization
  - Composting
  - Heat Treatment
Clean Water Act, Section 405 mandated risk-based limits for pollutants “which may adversely affect public health and the environment”

EPA Part 503 Regulations established Mean Trace Element Concentrations

Biosolids well below regulated Pollutant Concentration Limit
### Biosolids Metal Concentrations (ppm)

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>CEILING CONC LIMIT</th>
<th>POLLUTANT CONC LIMIT (Class A Limit)</th>
<th>ARLINGTON BIOSOLID CONC - ANNUAL AVE (2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>75</td>
<td>41</td>
<td>3</td>
</tr>
<tr>
<td>Cadmium</td>
<td>85</td>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>Copper</td>
<td>4300</td>
<td>1500</td>
<td>137</td>
</tr>
<tr>
<td>Lead</td>
<td>840</td>
<td>300</td>
<td>19</td>
</tr>
<tr>
<td>Mercury</td>
<td>57</td>
<td>17</td>
<td>0.5</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>75</td>
<td>--</td>
<td>16 (MAX)</td>
</tr>
<tr>
<td>Nickel</td>
<td>420</td>
<td>420</td>
<td>9</td>
</tr>
<tr>
<td>Selenium</td>
<td>100</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Zinc</td>
<td>7500</td>
<td>2800</td>
<td>363</td>
</tr>
</tbody>
</table>
Nutrient Management Plans

- Biosolids applied to land must also comply with all regulatory agronomic requirements such as Nutrient Management Plans (NMPs)

- NMPs regulated at State level - Virginia Department of Conservation and Recreation (DCR)

- Marketed Products/Brands require registration with Virginia Department of Agriculture and Consumer Services (VDACS)
Biosolids Regulations: What’s Changing?

- No Changes to Federal Regulations expected

- Changes to State Regulations with respect to nutrient management are already taking place

- It is likely that additional nutrient reduction strategies may be incorporated as promotion of complete restoration of the Chesapeake Bay by 2025 takes hold
Biosolids Regulations: What’s Changing?

- The seasonal window to land apply biosolids is shrinking

- On-site land application and management costs are on the rise

- Nutrient and energy recovery could help reduce quantities of solids applied to land and reduce nutrients of concern
Communications update


- Feedback: what’s working? What additional resources do we need?
Discussion
Evaluation Criteria: Exercise

Evaluation Criteria Goal
Ensures alternative selected best reflects Arlington County’s priorities

Paired Metric Comparison
Simple Decision Tool to define the relative importance of a number of different options
Evaluation Criteria: Exercise

Today’s Objectives:

- Perform Paired Metric Comparison for External Stakeholder Community

- Integrate Results to reflect Civic Associations and Commissions Input

- Incorporate Overall input into SMP and discuss any impacts that result
Evaluation Criteria - Grouping Reflects “Quadruple Bottom Line” Approach

- Capital Cost
- Annual O&M Cost
- Life Cycle Cost
- Financial Options/Risk
- End Use Control

- Flexibility
- Operability and Safety
- Constructability
- MOPO/Impacts on Plant
- Proven System/Technology
- Reliability

- Resource recovery potential
- Energy Intensity
- Carbon Footprint
- Regulatory Permits
- Gas and Product Quality

- Odor Generation Potential/Reduction
- Acceptability
- Hauling
### Paired Metric Comparison

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
<td>O</td>
<td>P</td>
<td>Q</td>
<td>R</td>
<td>S</td>
</tr>
</tbody>
</table>

#### Rating Scale:
1 - The listed objective is *slightly higher* in priority.
2 - The listed objective is *higher* in priority.
3 - The listed objective is *significantly higher* in priority.
Paired Metric Comparison Example

- Capital cost is slightly higher in priority than operating cost.
- Capital cost is significantly higher in priority than ease of operations and maintenance.
- Operating cost is higher in priority than ease of operations and maintenance.