Agenda

• Background
• Methodology
• Treatment Process Options
• System-Wide Flow Alternatives
• Recommended Wastewater Treatment Solution
Why Raleigh?

1 of 10 Best Cities For Startups You’ll Want to Be Based In  
*Hubstaff, August 2017*

#6 Among 100 Most Adventurous Cities in America  
*Men's Health, June 2017*

#8 in Best Cities for Veteran Homebuyers to Live  
*Veterans United Network, March 2017*

#22 Among Most Caring Cities in America  
*WalletHub, January 2017*

#14 Fastest Growing Metro in U.S.  
*U.S. Census Bureau, March 2017*

Among Top 10 Boomtowns of 2016  
*SmartAsset, January 2017*
Existing Wastewater System

- CORPUD provides sanitary sewer service to 195,000 customers and a service population of 570,000 people.

- Wastewater collection system consists of 2,500 miles of pipeline and 114 pump stations.

- CORPUD owns and operates three WWTPs: Neuse River RRF (75 mgd), Smith Creek WWTP (3 mgd), and Little Creek WWTP (2.2 mgd).

Mission: To provide safe, sustainable water services for our customers while protecting public health and contributing to the economic, environmental and social vitality of our communities.
Key Planning Drivers

Capacity

AA flows are expected to double from 48 mgd in 2015 to more than 92 mgd by 2040 to meet the growing service area.

Regulatory

Existing nitrogen regulations will play a critical role in future wastewater treatment.

2040 AA Flow of 92 mgd

2040 AA Flow of 92 mgd

TN load limit of 784,847 lb/yr

Sustainability

CORPUD has a long term vision to be a leader in the use of wastewater as a beneficial resource.

Average effluent total nitrogen concentration less than 3 mg/L will be required

Drivers will shape the landscape of future wastewater treatment in CORPUD service area.
Methodology: Determination of System-Wide Treatment Solution
Key criteria in screening process options was ability to achieve low total nitrogen concentrations in plant effluent and potential for water reuse.
Treatment Process Options: Conventional or Innovative Treatment?

- **Existing Wastewater Treatment Plants**
  - 5-Stage Biological Nutrient Removal (BNR)
  - Membrane Aerated Biofilm Reactor (MABR)

- **New Resource Recovery Facilities**
  - 5-Stage Biological Nutrient Removal (BNR)
  - Membrane Bioreactor (MBR)

**Envision Points Earned**

<table>
<thead>
<tr>
<th>Category</th>
<th>Conventional</th>
<th>MABR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of Life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Allocation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural World</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate &amp; Risk</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NATURAL WORLD**

- **Envision Points Earned**
  - Conventional: 0
  - MABR: 50

**CLIMATE & RISK**

- **Envision Points Earned**
  - Conventional: 0
  - MABR: 50

**QUALITY OF LIFE**

- **Envision Points Earned**
  - Conventional: 0
  - MABR: 50

**LEADERSHIP**

- **Envision Points Earned**
  - Conventional: 0
  - MABR: 50
System-Wide Flow Alternatives: Expand Existing or Build New?

**Infrastructure Stability**
The ability to reduce the risk of a system failure.

**Infrastructure Adequacy**
The ability to allow for projected growth and capacity needs.

**Environmental Stewardship**
The ability to meet regulatory requirements and address potential hazards to public health and safety.

**Operational Optimization & Financial Viability**
The ability to enhance operational efficiencies and reduce maintenance costs.
System-Wide Flow Alternatives: Expand Existing or Build New?

**Infrastructure Stability**  
The ability to reduce the risk of a system failure.

**Infrastructure Adequacy**  
The ability to allow for projected growth and capacity needs.

**Environmental Stewardship**  
The ability to meet regulatory requirements and address potential hazards to public health and safety.

**Operational Optimization & Financial Viability**  
The ability to enhance operational efficiencies and reduce maintenance costs.
System-Wide Wastewater Treatment Solution: Present Worth Cost Analysis

- Alternative 1 only includes upgrades to the existing treatment plants.
- Baseline and Alternative 1 include an additional expansion at the Neuse River RRF.
- Alternative 3 includes the construction of two plants in addition to upgrades at the existing plants.
System-Wide Wastewater Treatment Solution: Envision Sustainability Analysis

**Quality of Life**
Fewer plants = reduced impacts to surrounding community.

**Leadership**
More plants = more opportunities for water reuse and collaboration with stakeholders.

**Resource Allocation**
Fewer plants = reduced materials. More plants = more opportunities for reuse.

**Natural World**
Fewer plants = reduced impacts on habitats, greenfields, etc.

**Climate & Risk**
More plants = more resiliency and opportunities for reuse. Fewer plants = longer force mains and potential for methane emissions.
System-Wide Wastewater Treatment Solution: Resiliency Analysis
Recommended Wastewater Treatment Solution: Alternative 3

- Consists of upgrades and expansions at the existing three WWTPs and new South Garner RRF and East Raleigh RRF.
- Recommended due to its high resiliency and Envision sustainability scores.
- Offers CORPUD the most flexibility for managing future flows.

Alternative 3 was the most environmentally sustainable long-term solution with the greatest resiliency and flexibility for managing future flows in a growing service area.
Comprehensive Wastewater Master Planning for the City of Raleigh – A Sustainable Approach for Future Growth

Eileen M. Navarrete, P.E., PMP
City Construction Projects Administrator, CORPUD
Eileen.Navarrete@raleighnc.gov

Susan D. Auten, P.E.
Civil Engineer, Black & Veatch
AutenS@bv.com

8 January 2018