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Comprehensive Wastewater Master Planning – A Sustainable Approach for Future Growth

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AUSTIN, TX
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ACKNOWLEDGEMENTS

- Christine Polo, Katherine Weidner, **Susan Auten**, John Brinkley – Black & Veatch
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BLACK & VEATCH





Boomtown

1 of 10 Best Cities For Startups You'll Want to Be Based In

Hubstaff, August 2017

#4 in the Best Cities for Jobs in the U.S.

Glassdoor, September 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

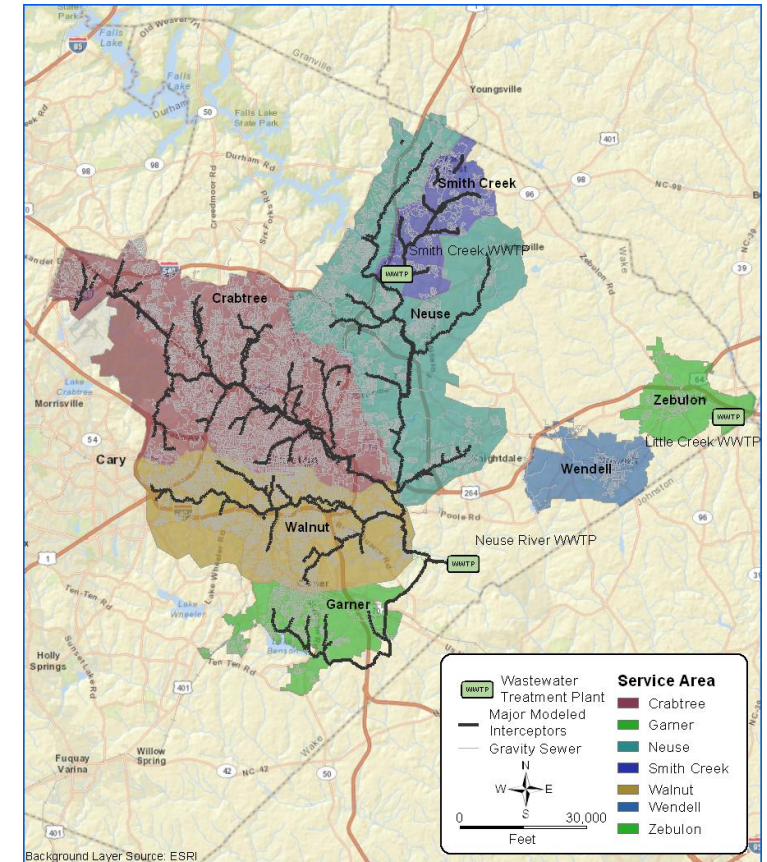
Among Top 10 Boomtowns of 2016

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).

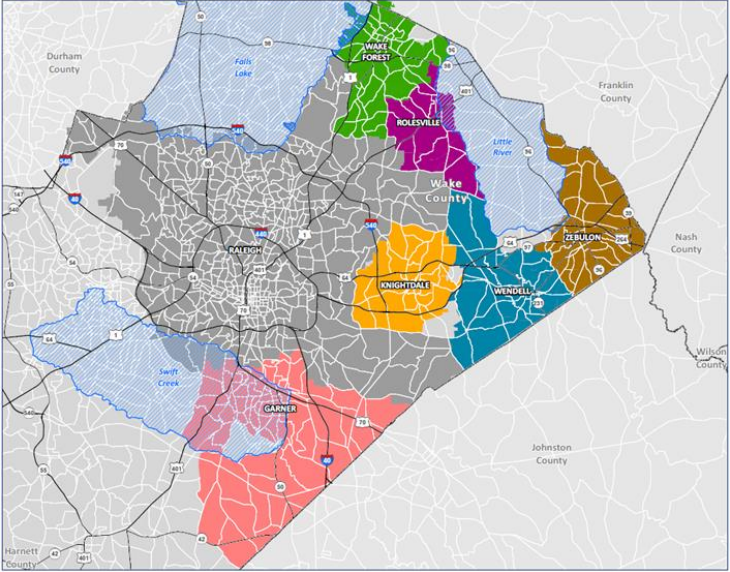


Mission: To provide safe, sustainable water services for our customers while protecting public health and contributing to the economic, environmental and social vitality of our communities.



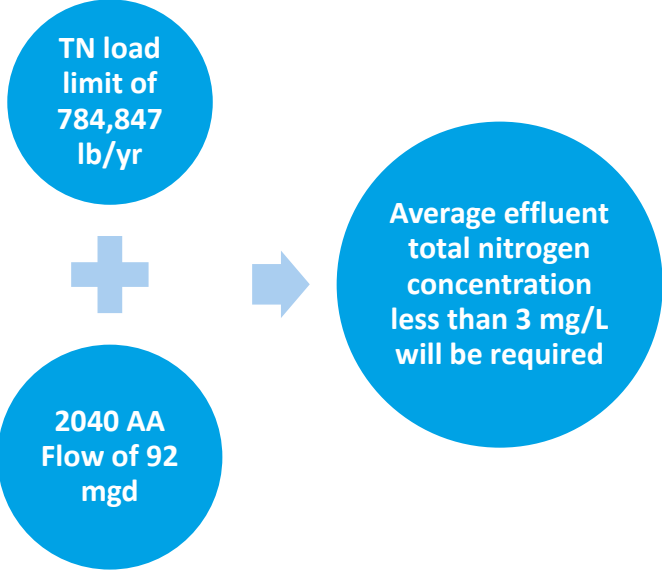
Key Planning Drivers

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.

Sustainability

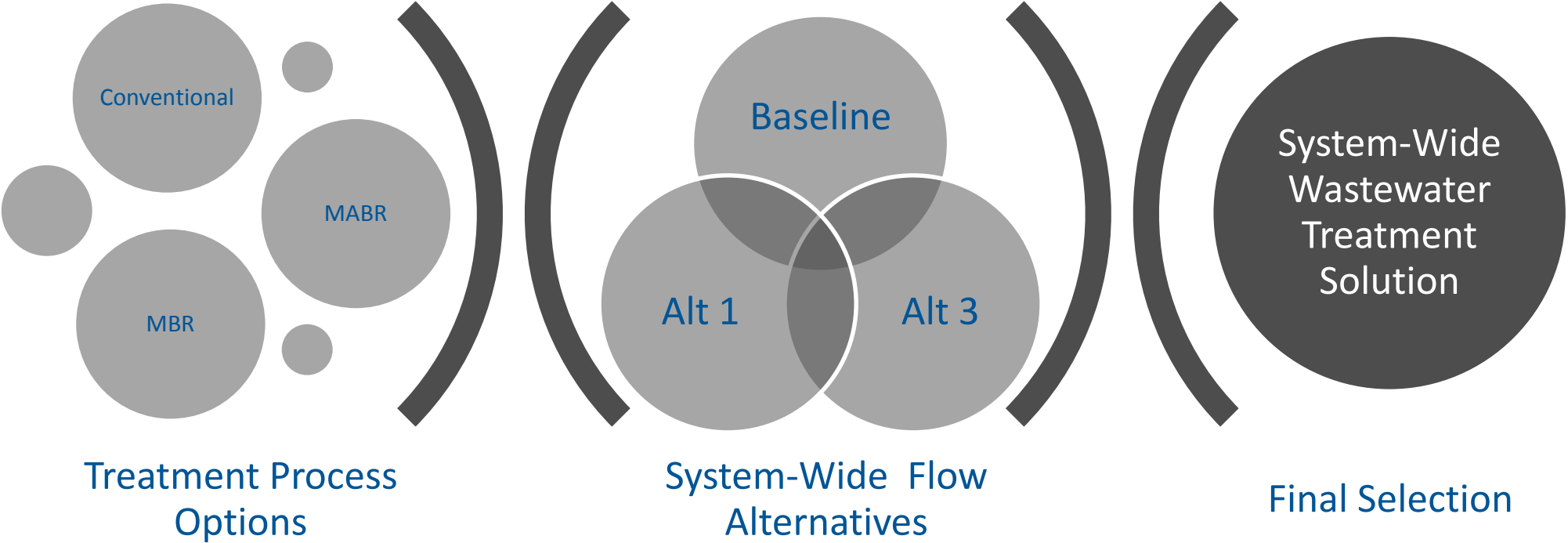


CORPUD has a long term vision to be a leader in the use of wastewater as a beneficial resource.

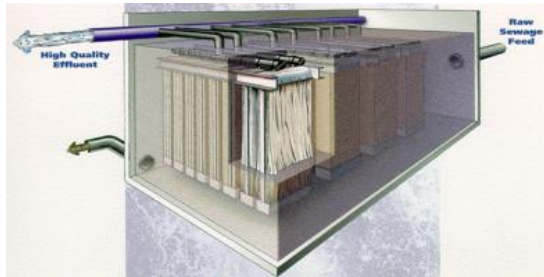
Drivers will shape the landscape of future wastewater treatment in CORPUD service area.



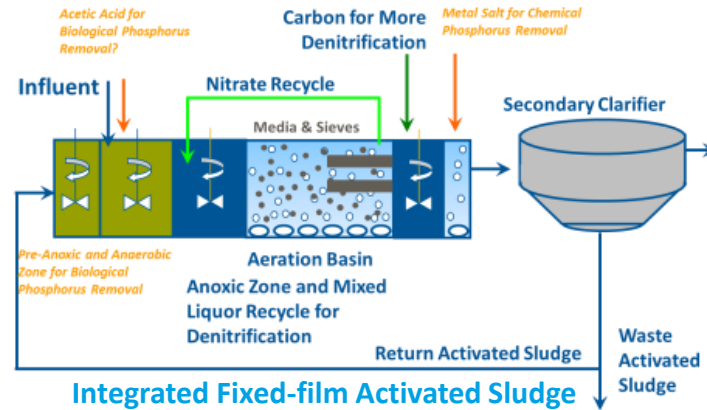
Methodology: Determination of System-Wide Treatment Solution



Treatment Process Options: Conventional or Innovative Treatment?



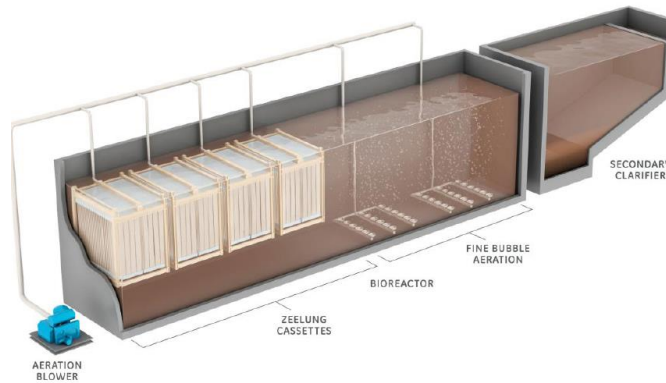
Membrane Bioreactor



Integrated Fixed-film Activated Sludge



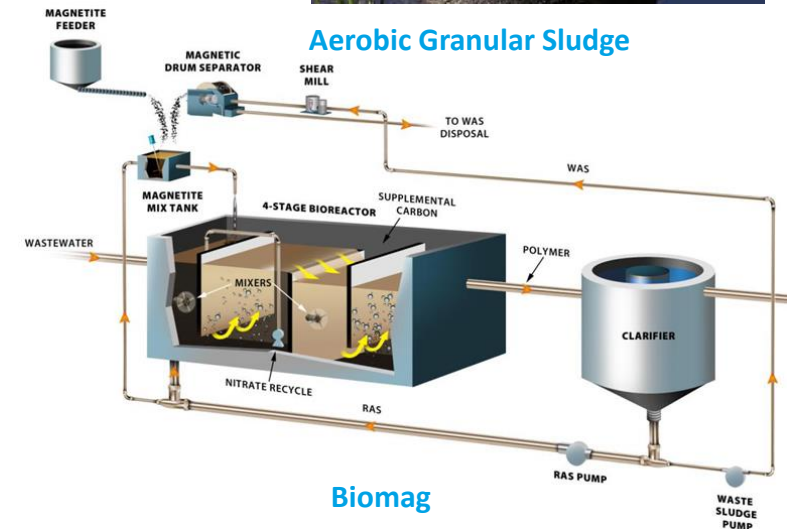
Aerobic Granular Sludge



Membrane Biofilm Reactor



Mainstream Deammonification



Biomag

Key criteria in screening process options was ability to achieve low total nitrogen concentrations in plant effluent and potential for water reuse.

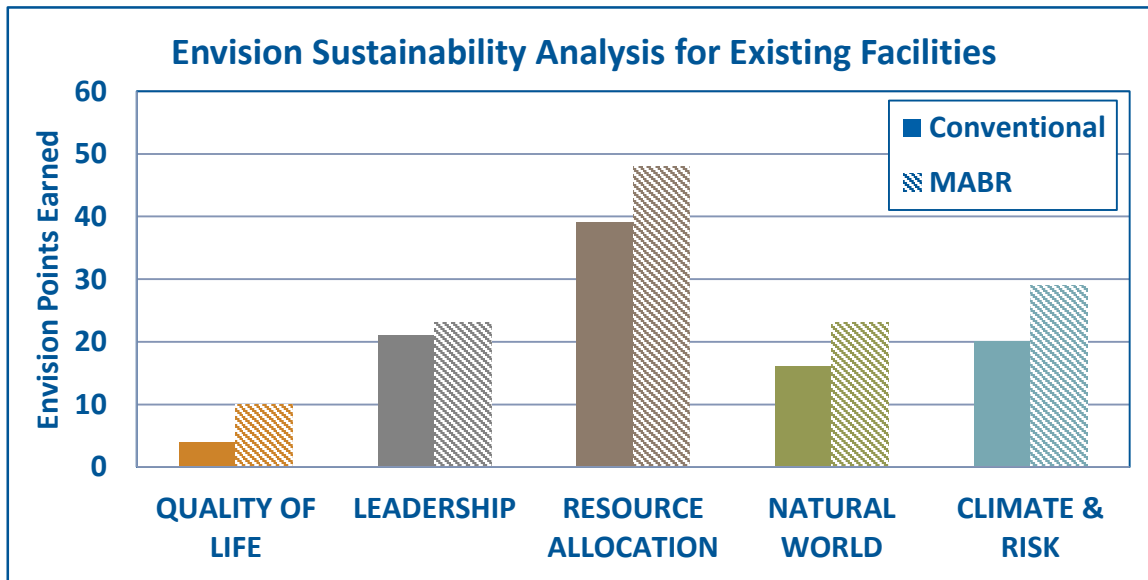


Treatment Process Options: Conventional or Innovative Treatment?

• Existing Wastewater Treatment Plants

- 5-Stage Biological Nutrient Removal (BNR)

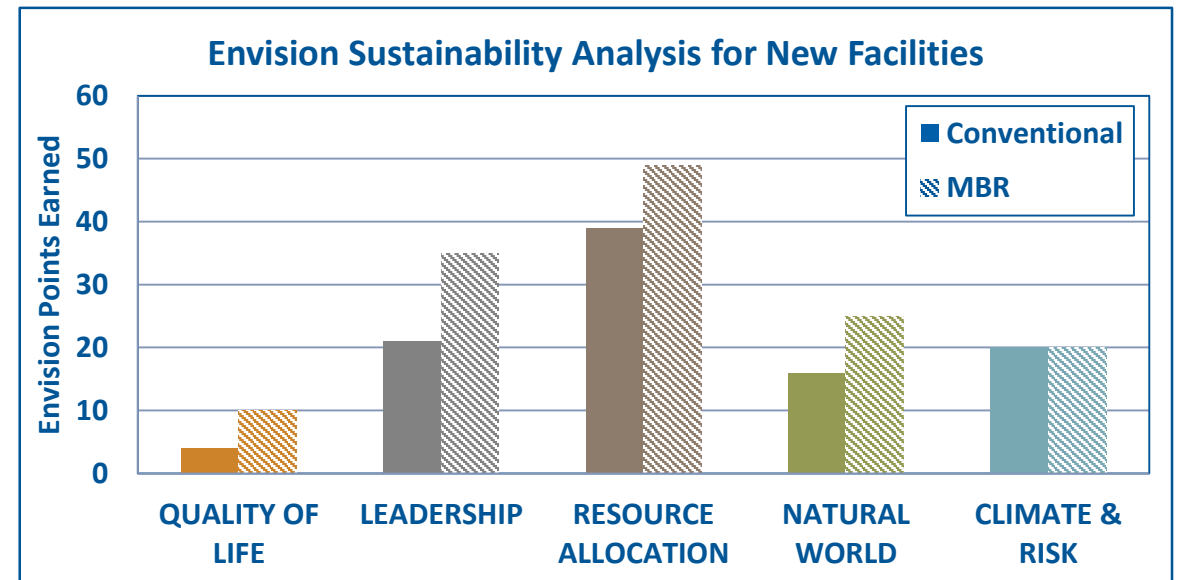
- Membrane Aerated Biofilm Reactor (MABR)



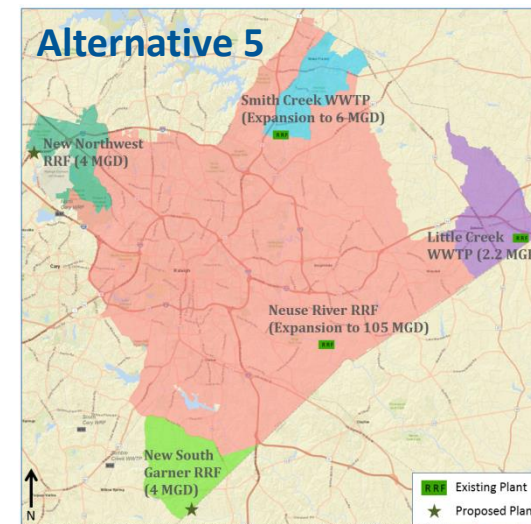
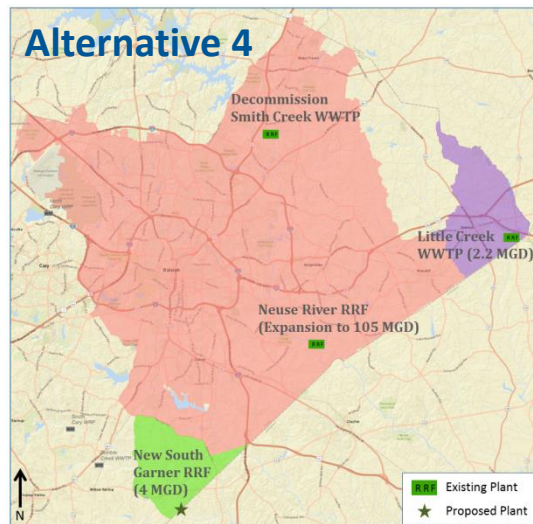
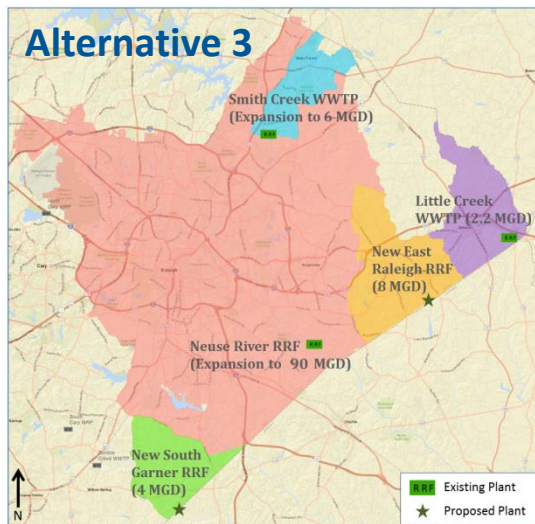
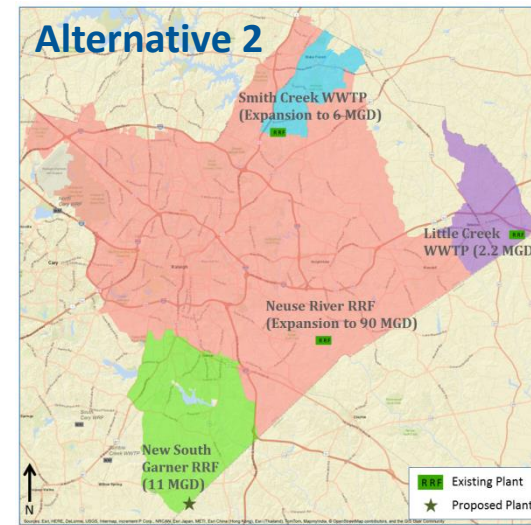
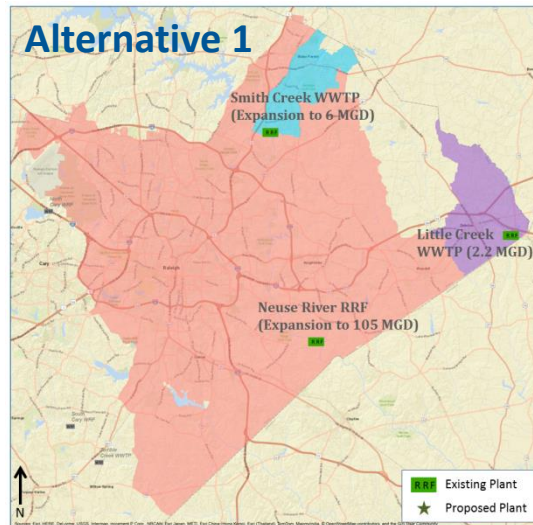
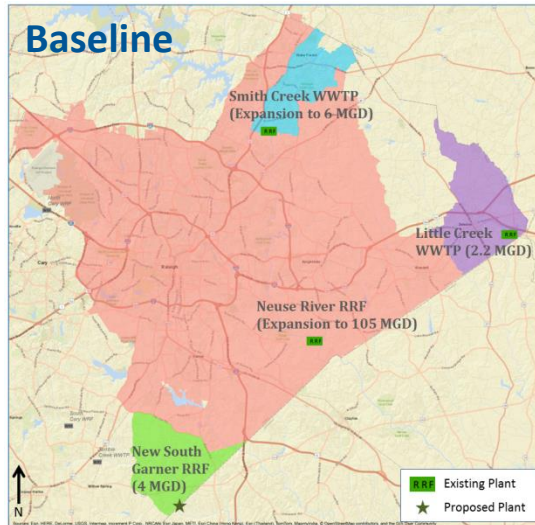
• New Resource Recovery Facilities

- 5-Stage Biological Nutrient Removal (BNR)

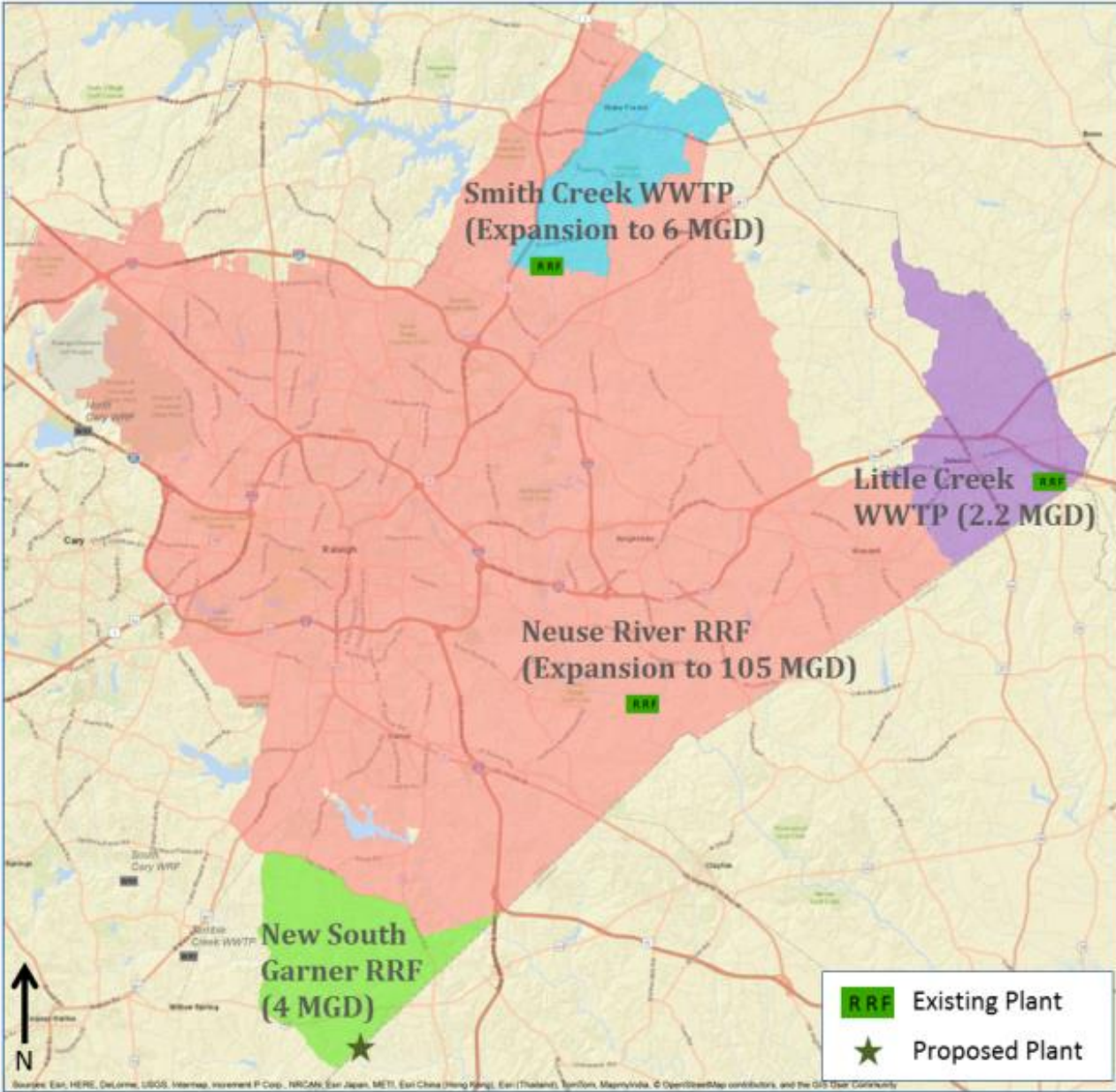
- Membrane Bioreactor (MBR)



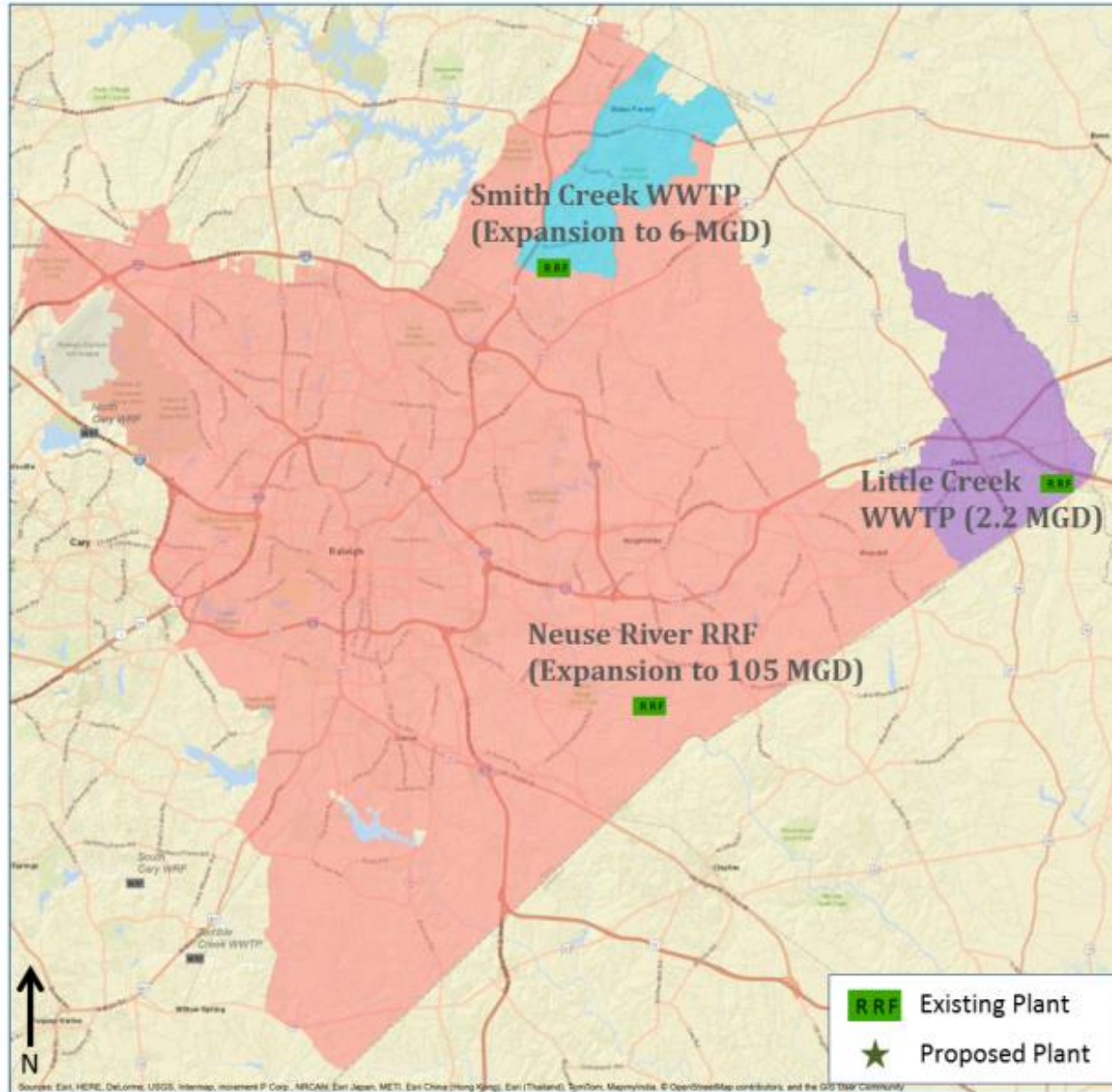
System-Wide Flow Alternatives: Expand Existing or Build New?



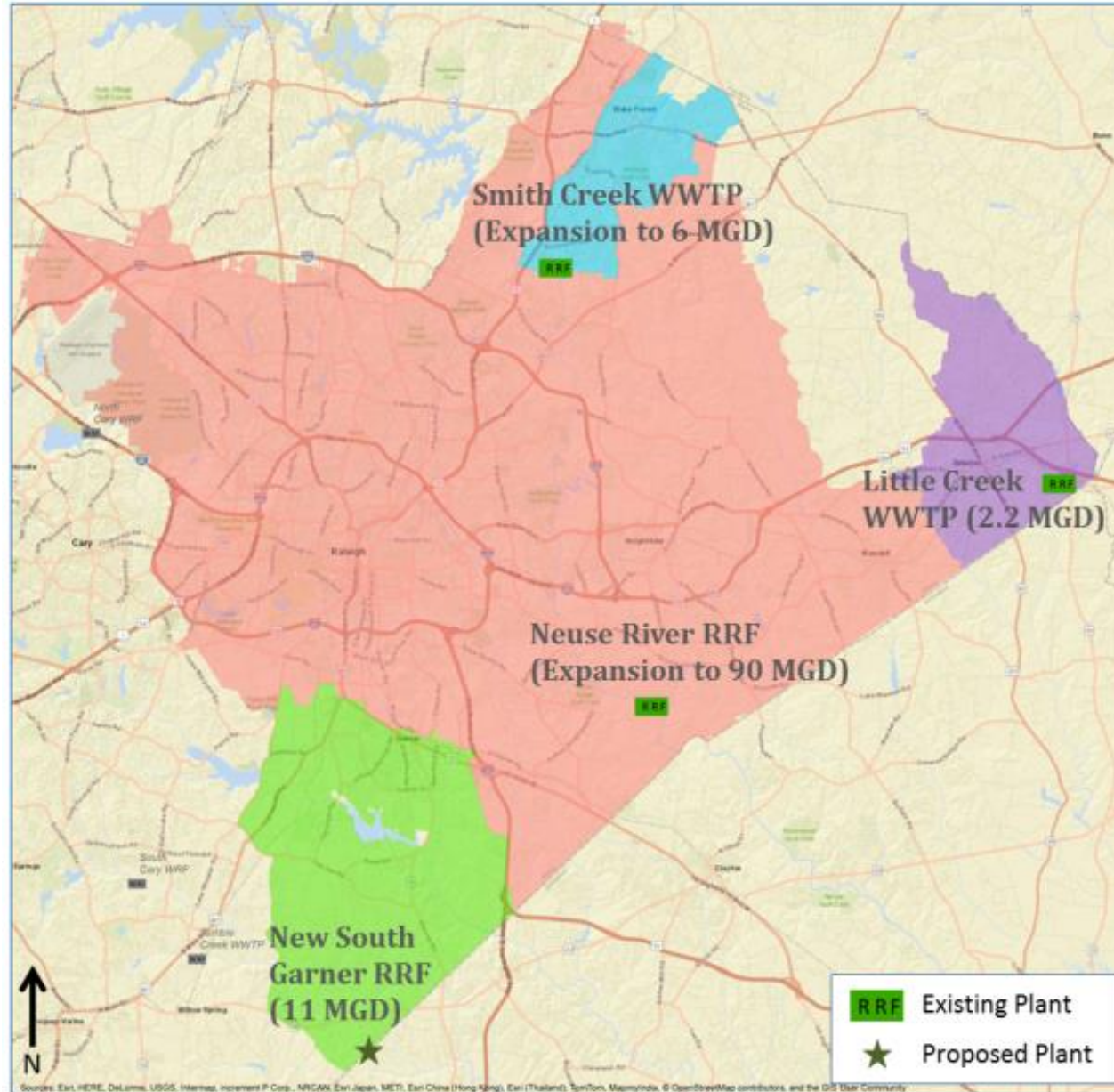
Baseline



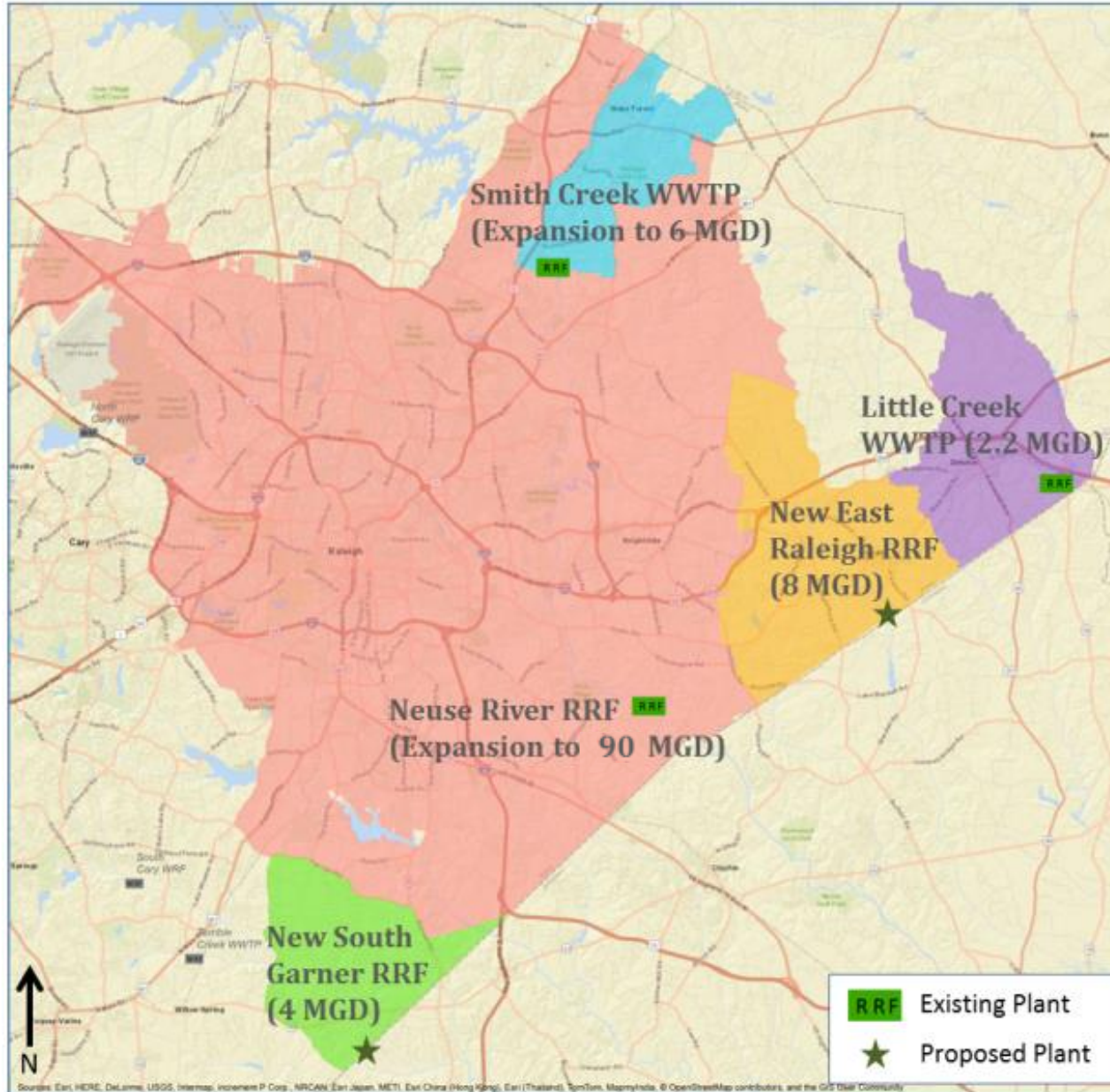
Alternative 1



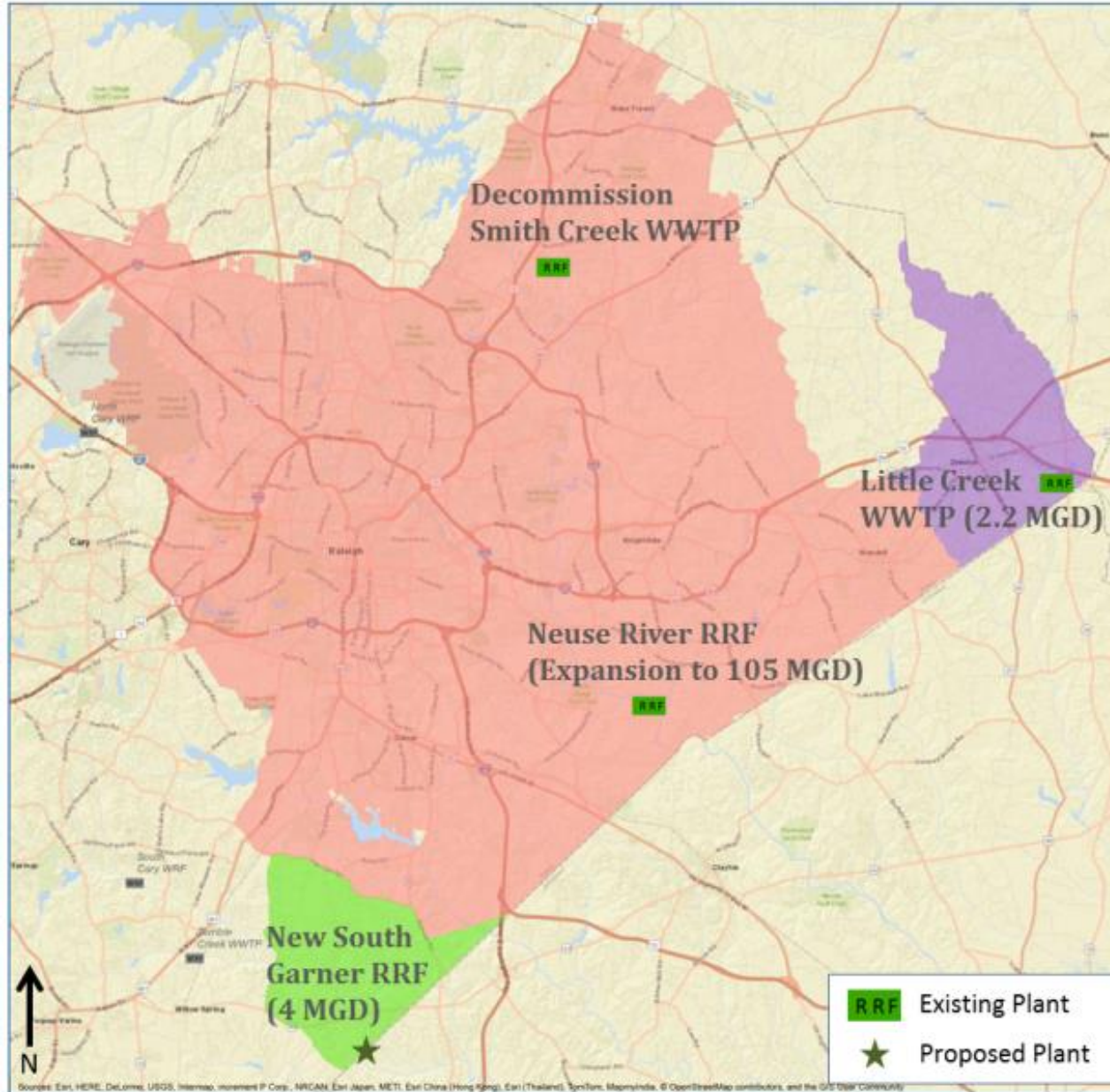
Alternative 2



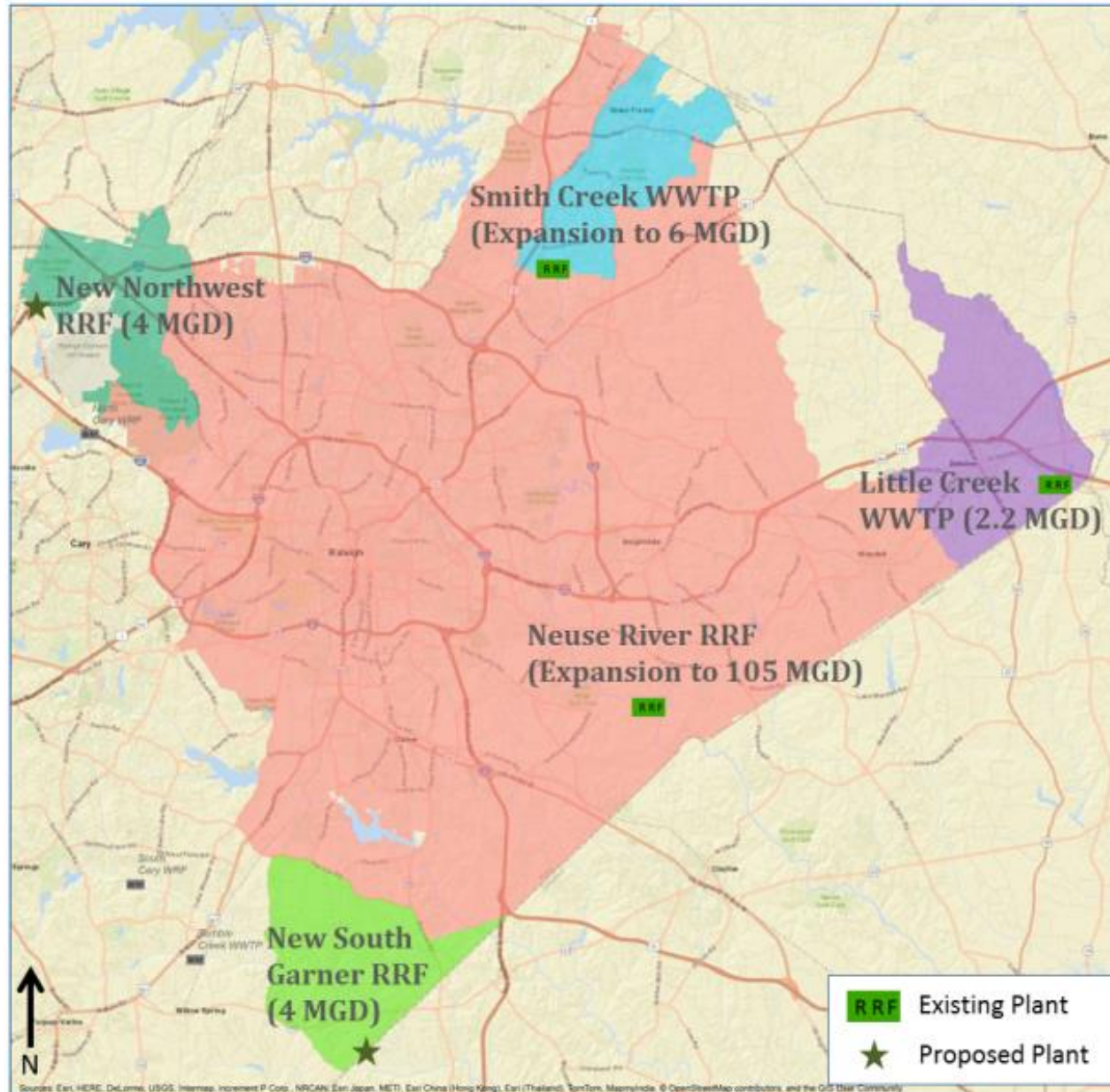
Alternative 3



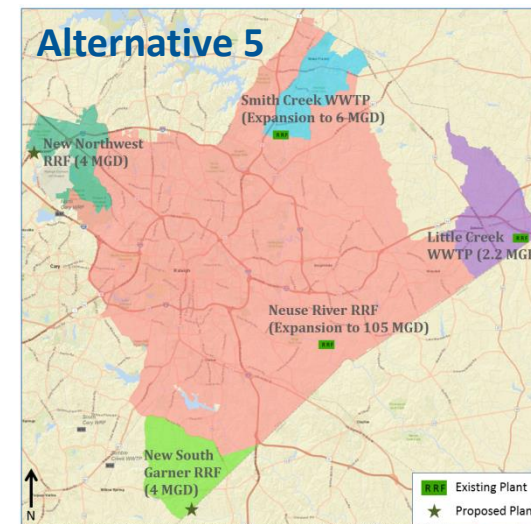
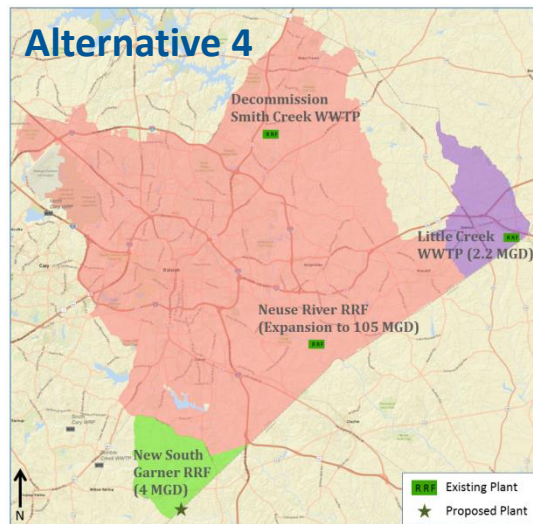
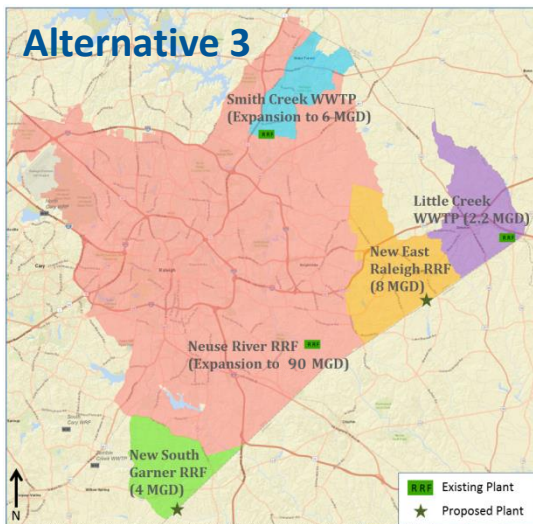
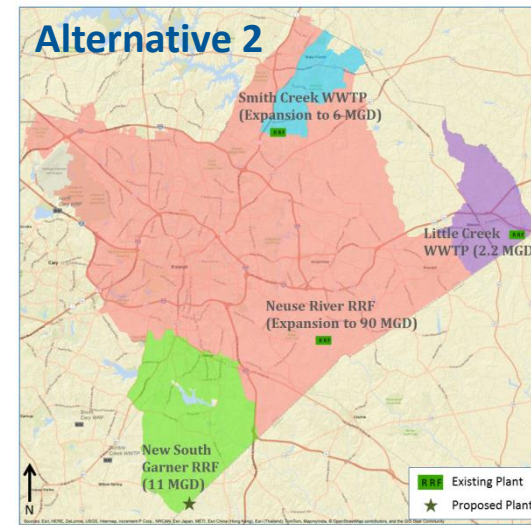
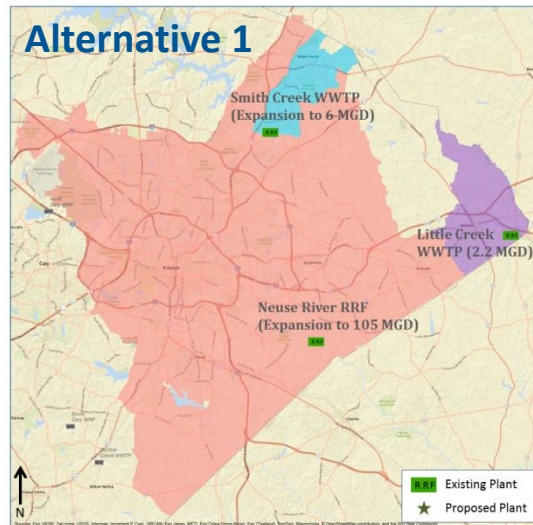
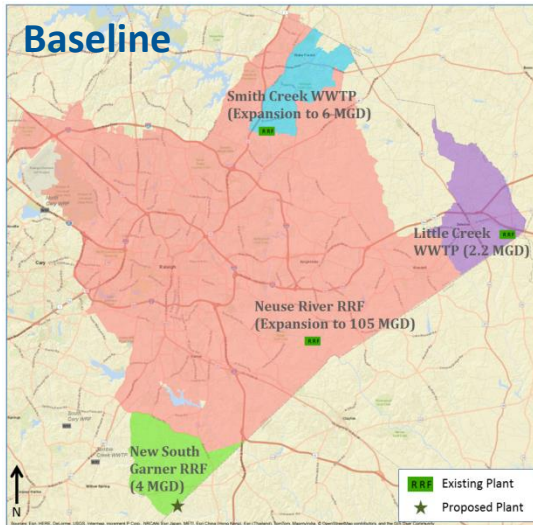
Alternative 4



Alternative 5



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

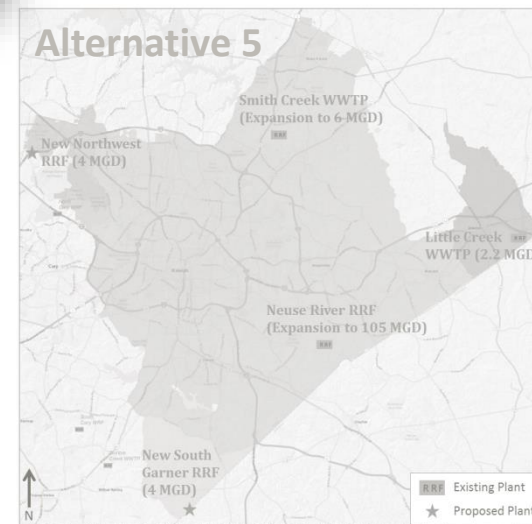
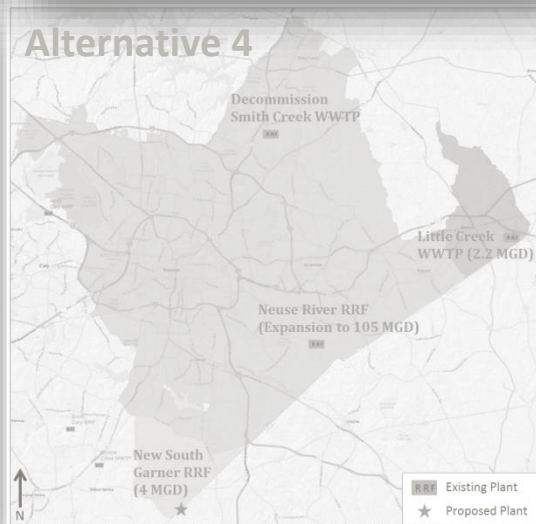
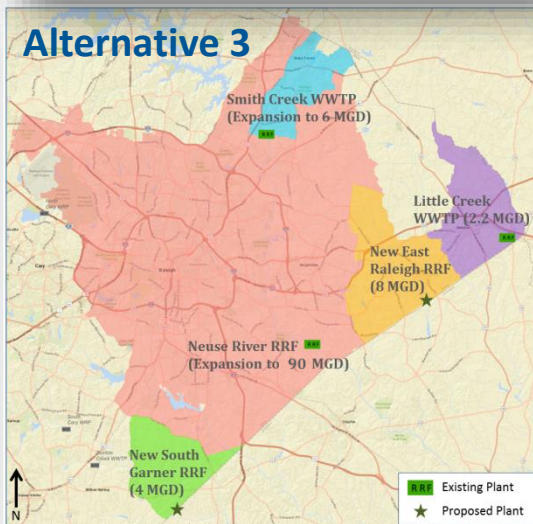
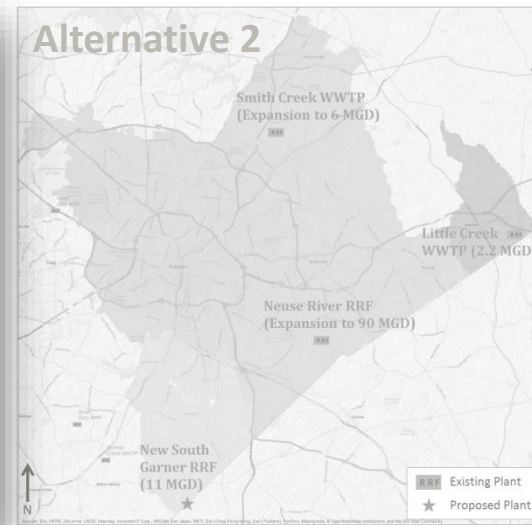
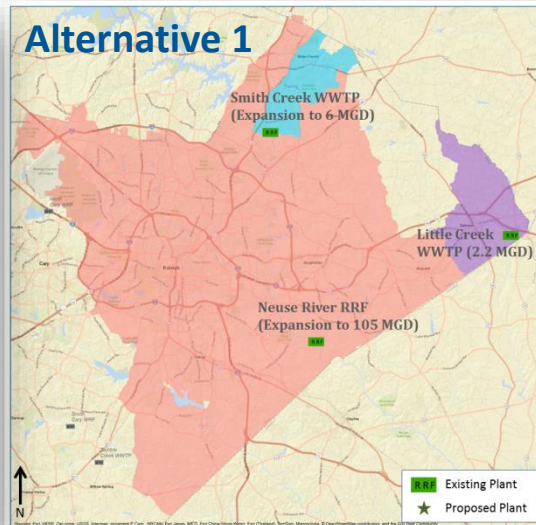
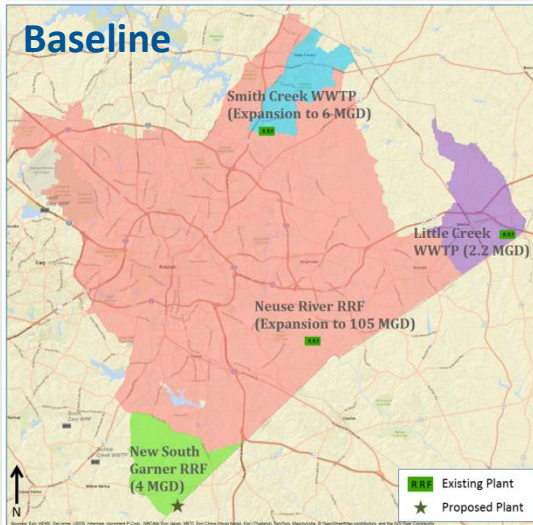
The ability to meet regulatory requirements and address potential hazards to public health and safety.

Operational Optimization & Financial Viability

The ability to enhance operational efficiencies and reduce maintenance costs.



System-Wide Flow Alternatives: Expand Existing or Build New?



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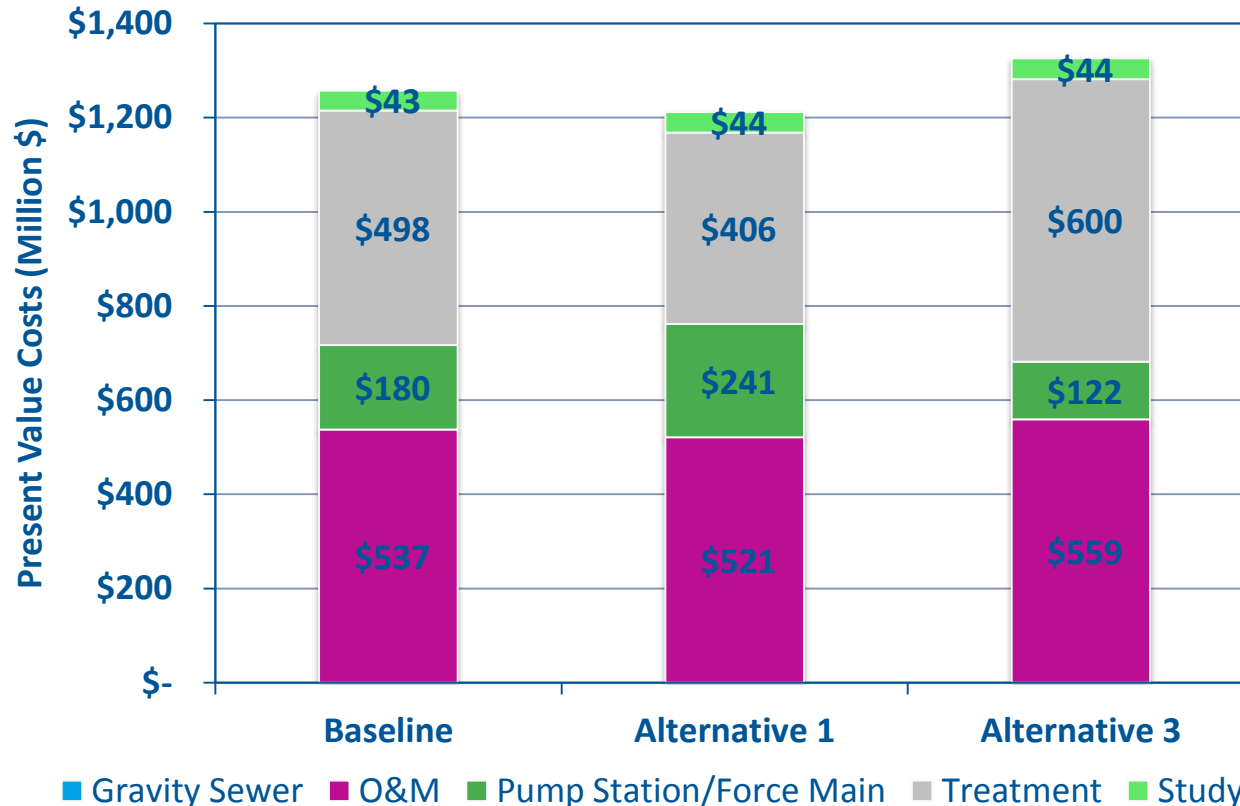
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System-Wide Wastewater Treatment Solution: Present Worth Cost Analysis

	BASELINE	ALTERNATIVE 1	ALTERNATIVE 3
Total	\$1,258 M	\$ 1,212 M	\$ 1,326 M



- Alternative 1 only includes upgrades to existing treatment facilities.
- Baseline and Alternative 1 include an additional expansion at the Neuse River RRF that is not required in Alternative 3 over planning horizon.
- Alternative 3 includes the construction of two plants and upgrades at the existing plants.

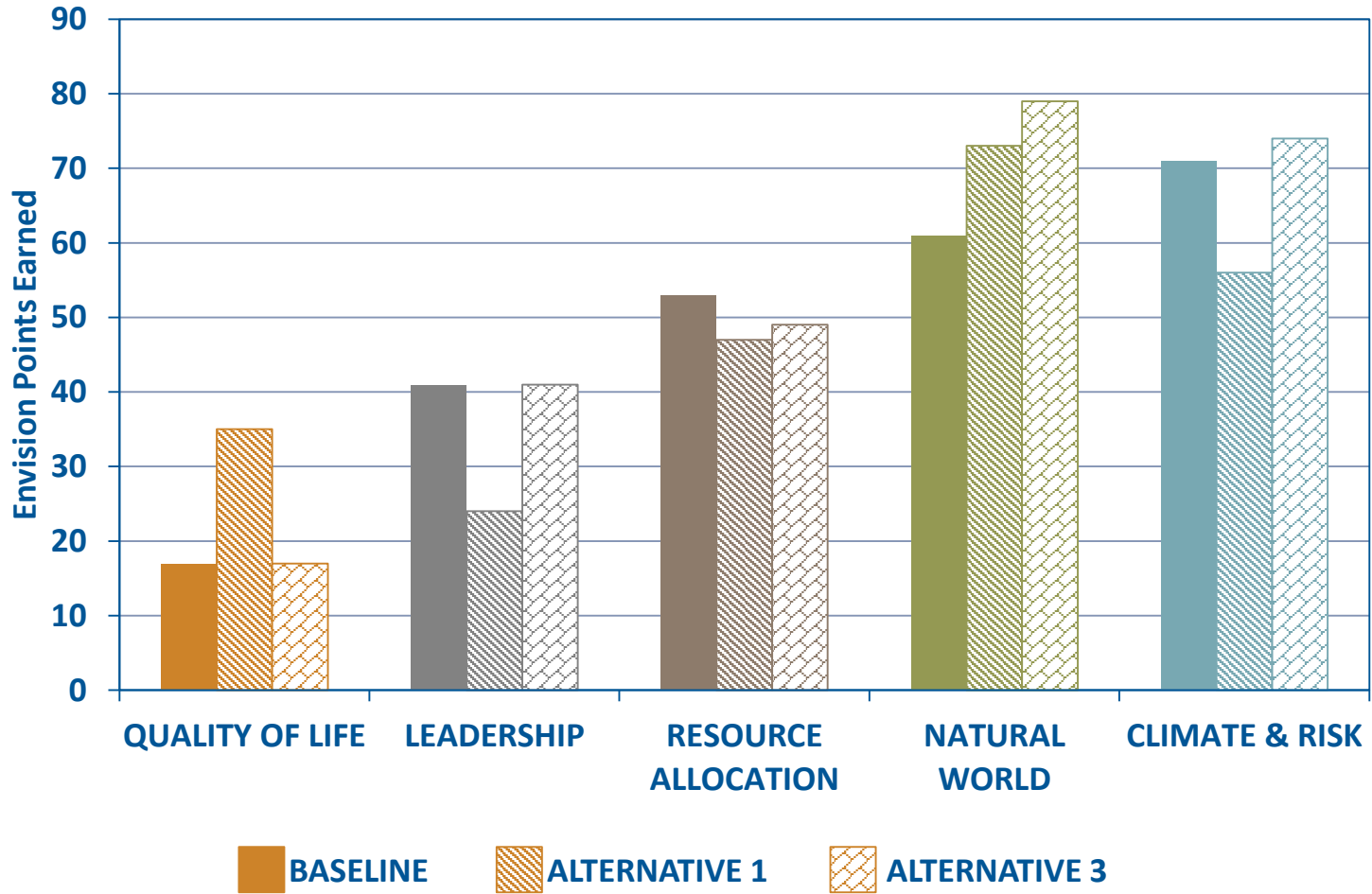


System-Wide Wastewater Treatment Solution: Envision Sustainability Analysis

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.

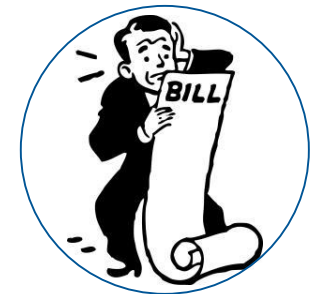
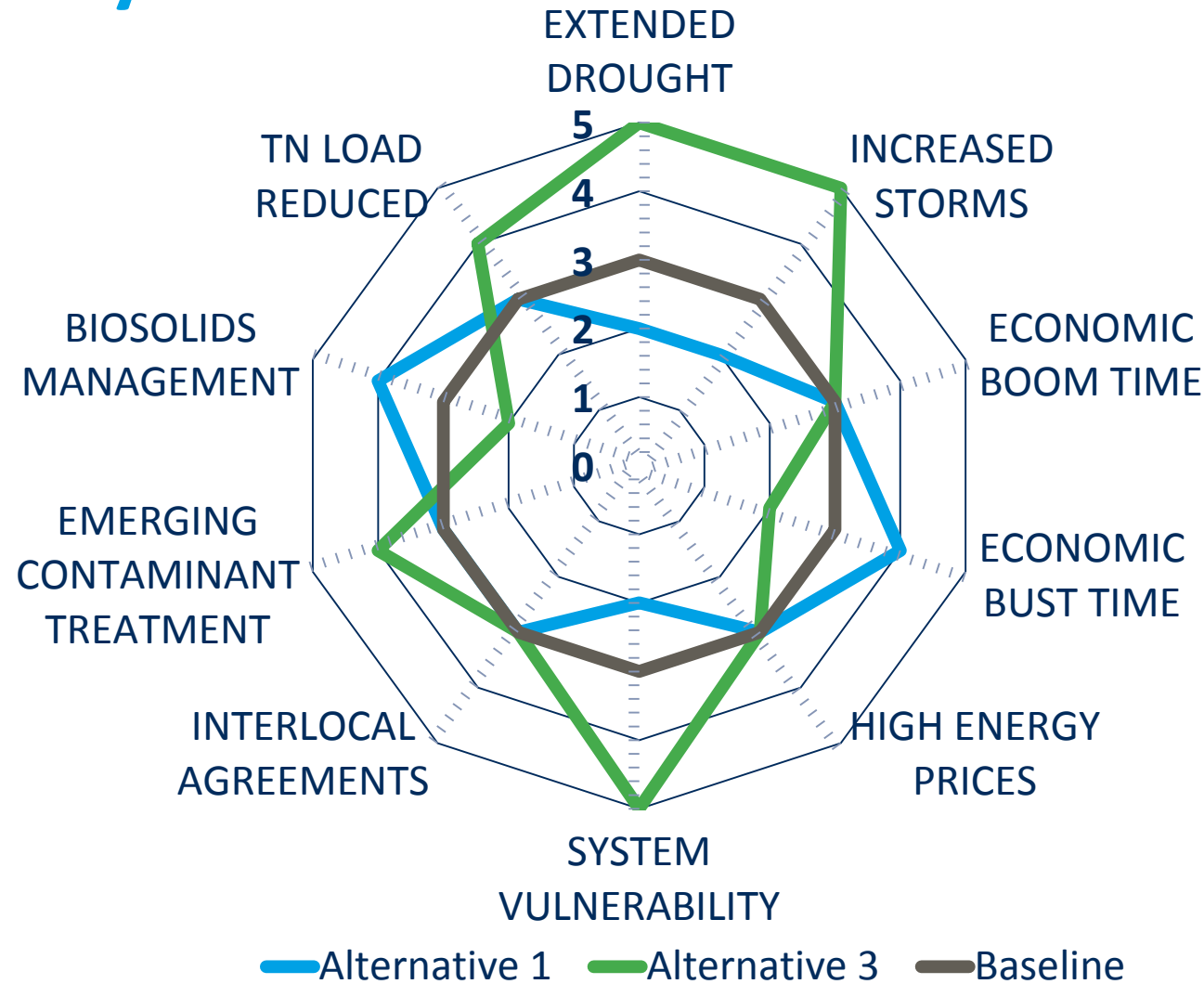
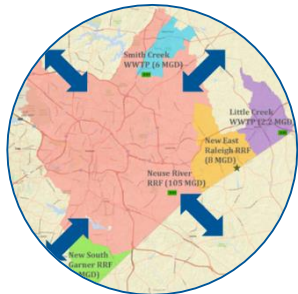


Natural World
Fewer plants = reduced impacts on habitats, greenfields, etc.

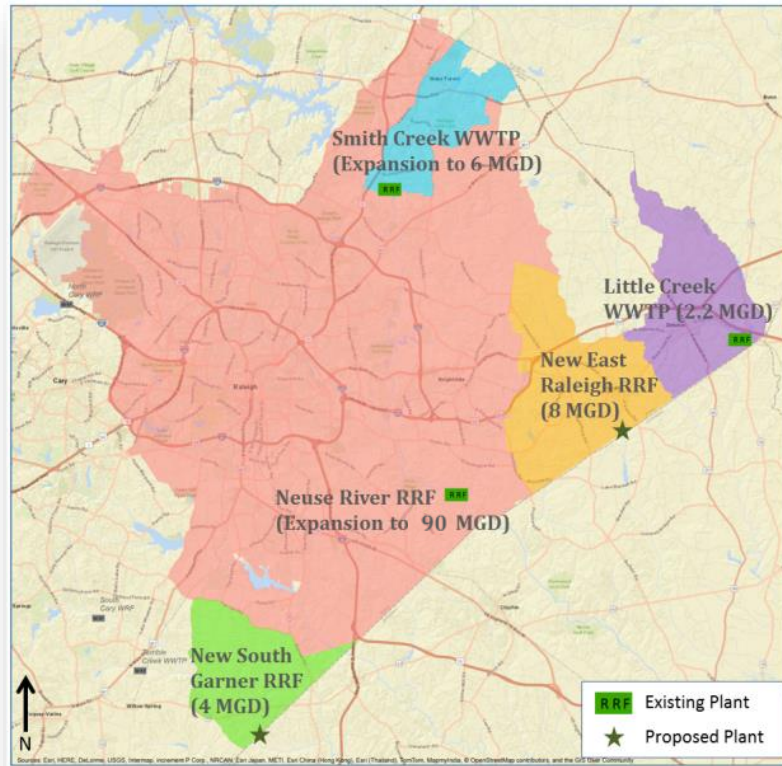
Climate & Risk
More plants = more resiliency and opportunities for reuse. Fewer plants = longer force mains and potential for methane emissions.



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 Masterplanning - Benefits

- **Something to aim for**
- **Holistic & more sustainable view**
- **Fewer surprises**
(or less shock when they do come!)

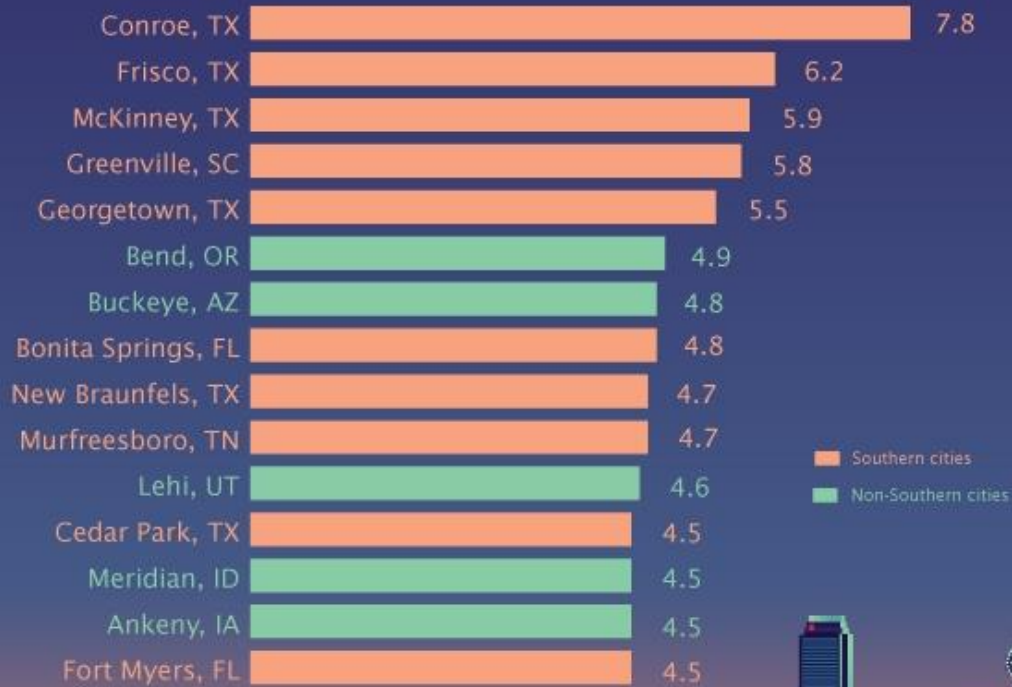


Texas Boomtown? – Boom-State!

<https://wallethub.com/edu/fastest-growing-cities/7010>

Southern Cities Growing Quickly

The 15 Fastest-Growing Large Cities by Percent Change
Between July 1, 2015, and July 1, 2016



Note: Graphic displays percent change for fastest-growing cities and towns with populations of 50,000 or more on July 1, 2015.

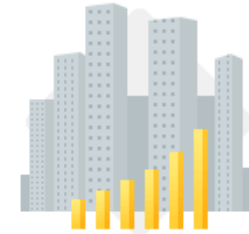
United States™
Census
Bureau

U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
census.gov

Source: Vintage 2016 Population Estimates
www.census.gov/programs-surveys/popest.html

Large Cities with the Highest Growth

1. Austin, TX
2. Charlotte, NC
3. Denver, CO
4. Seattle, WA
5. Nashville, TN



Midsize Cities with the Highest Growth

1. Frisco, TX
2. Kent, WA
3. Lehigh Acres, FL
4. Midland, TX
5. McKinney, TX



Highest Population Growth

1. Kent, WA
2. Frisco, TX
3. Lehigh, FL
4. McKinney, TX
5. Pearland, TX



BUILDING A WORLD OF DIFFERENCE

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