



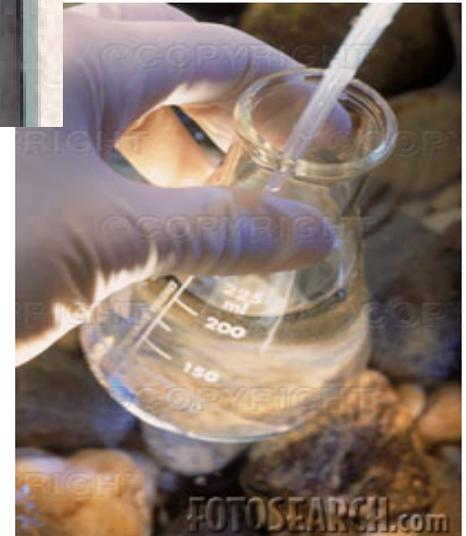
# **City-Wide Reclaimed Water Master Plan**

**City of Raleigh Public Utilities Department**

**March 20, 2007**

# What is Reuse Water?

- Highly Treated Wastewater.
- Non-potable uses such as Irrigation, Cooling towers, Industrial Process, Cleaning, Construction, Toilet Flushing
- Closely Monitored and Regulated

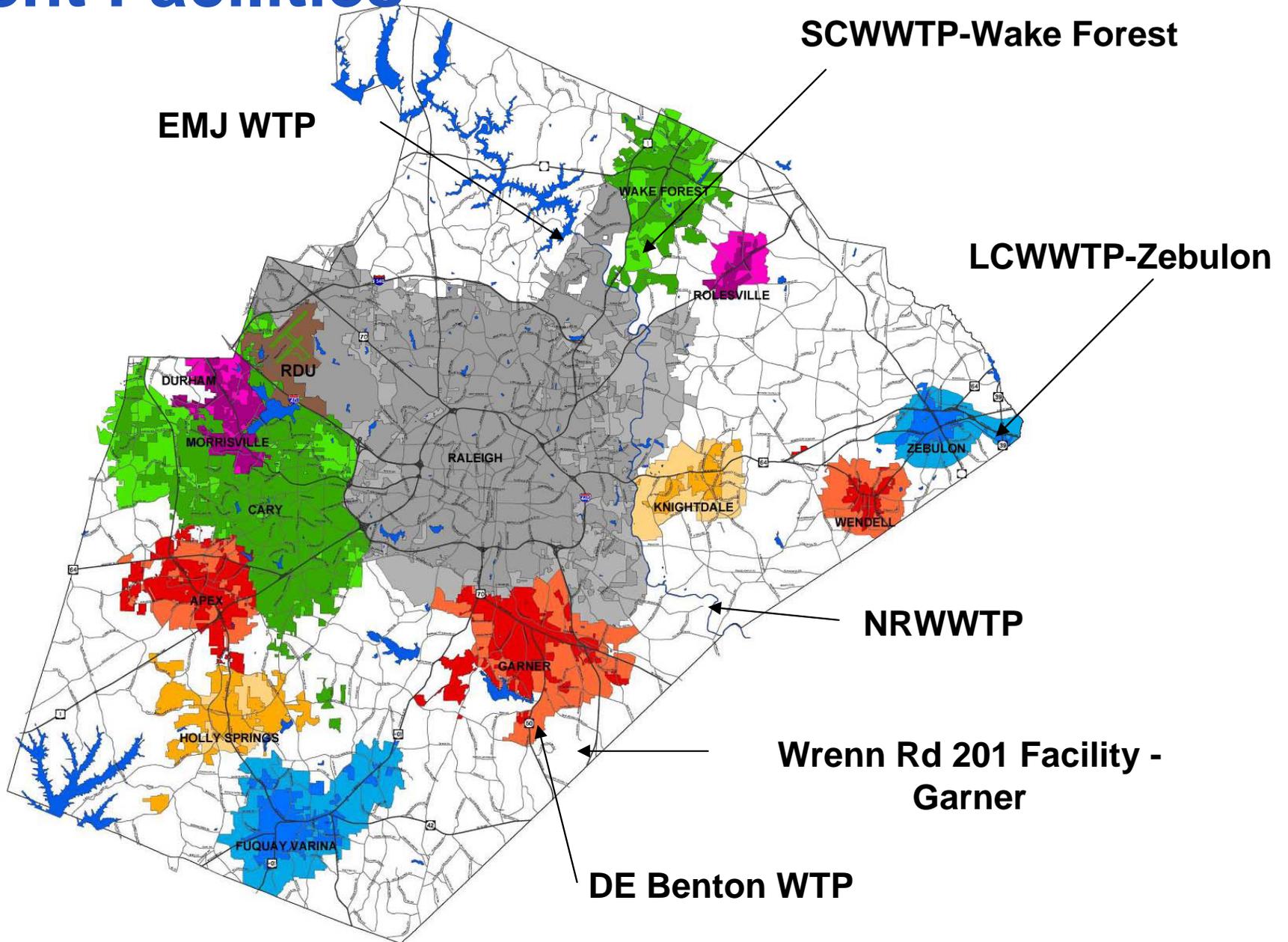


# Why Use Reuse Water?

- Many uses of Non-Potable Water in Raleigh Service Area.
- Seasonal droughts limit water resources.
- Reduced nitrogen in discharge streams.
- Reduced peak consumption associated with irrigation.
- Established as a Goal of the Raleigh Comprehensive Plan



# Current Facilities



# Raleigh Reuse Master Plan Components

- Demand projections
- Hydraulic modeling
- Implementation
  - i. Cost
  - ii. Rate Structure
  - iii. Design Standards
  - iv. Ordinance
  - v. Permitting
- Public Education



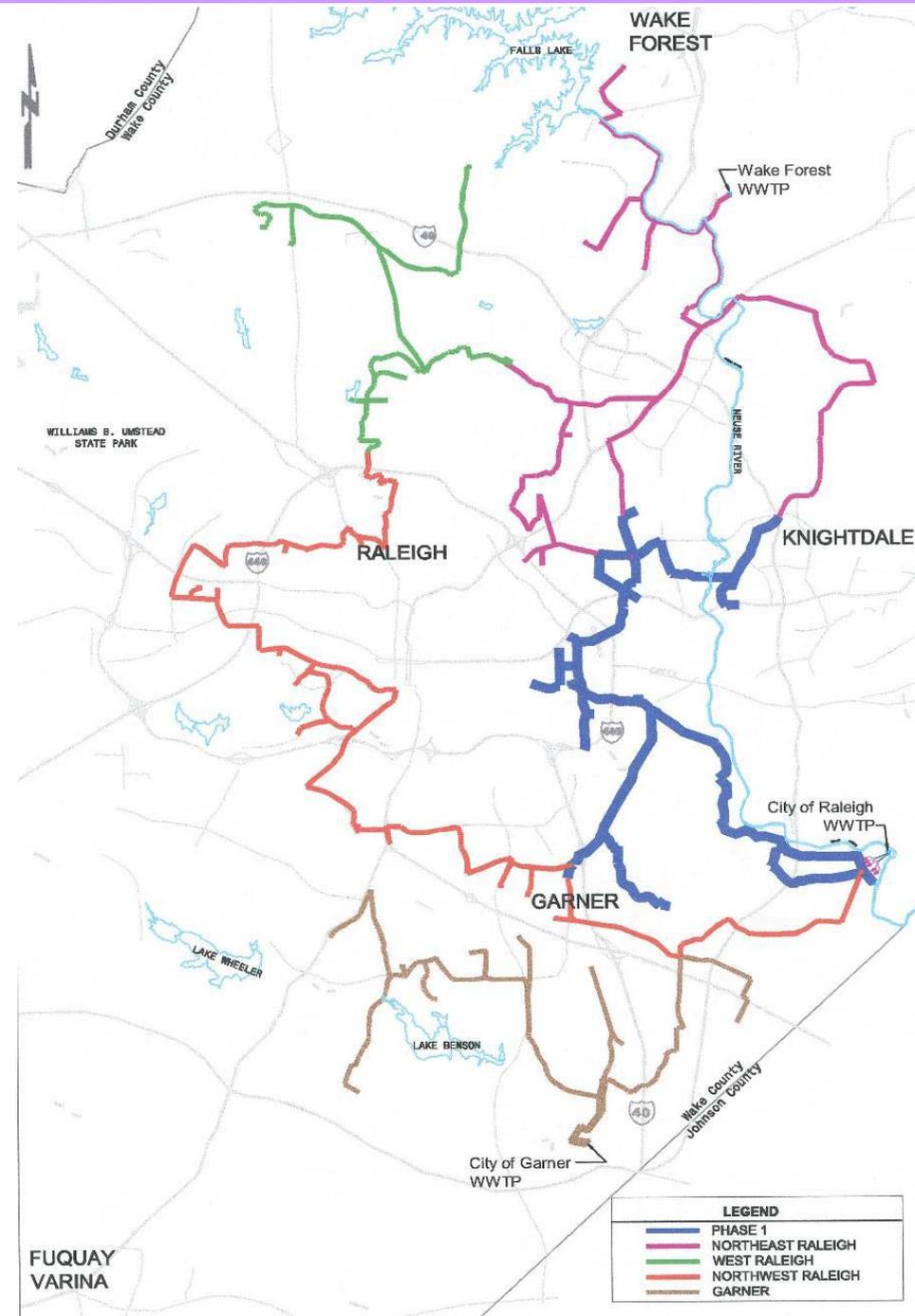
*City Of Raleigh*  
*North Carolina*

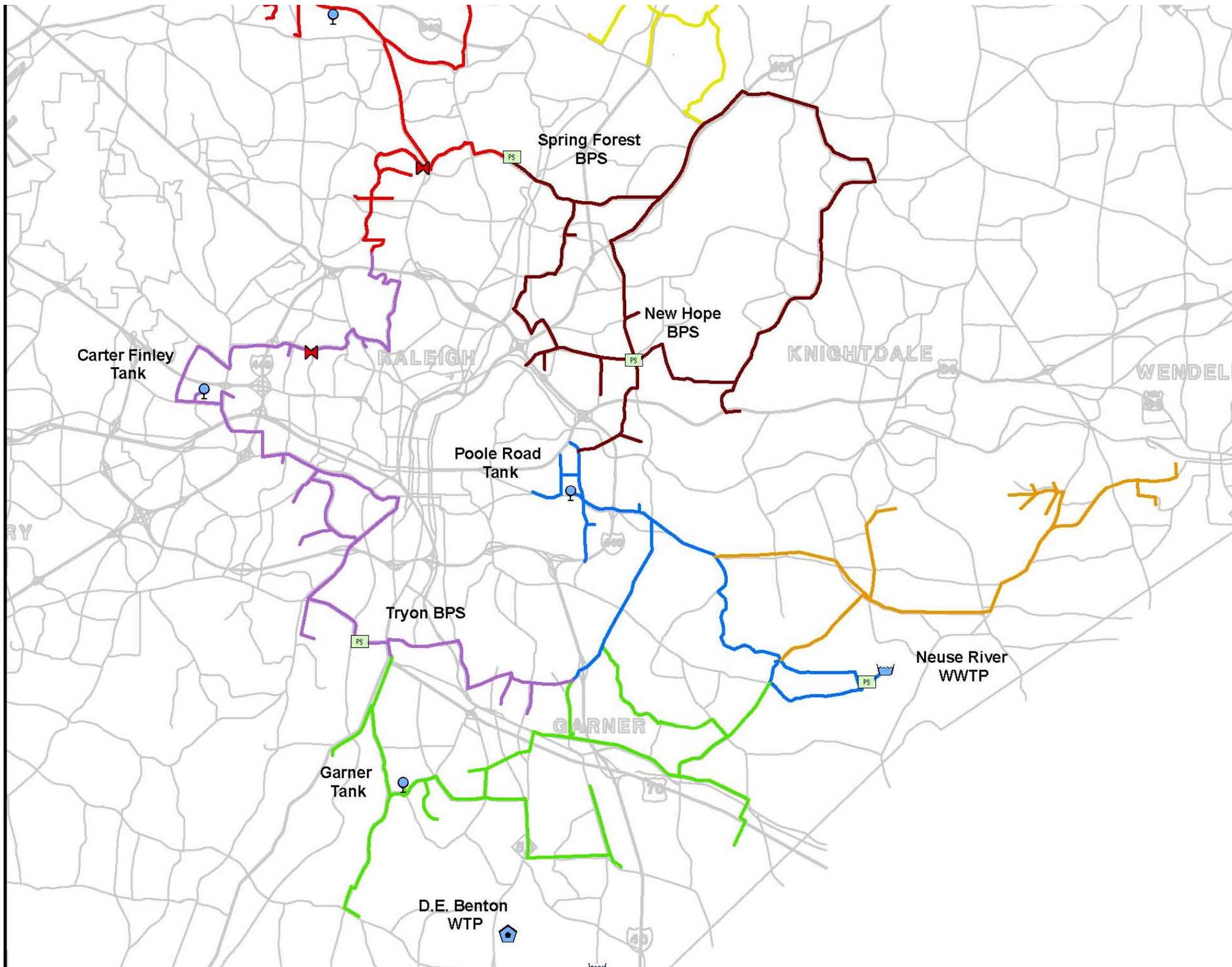
# Identified Potential Users and Demand

<b>User Categories</b>	<b>Number of Identified Users</b>	<b>Average Day Flow (gal)</b>	<b>Maximum Day Flow (gal)</b>	<b>Maximum Hour Flow (gal)</b>
<b>Golf Course</b>	24	1,227,400	3,769,600	11,143,200
<b>Commercial</b>	23	283,000	849,000	2,834,000
<b>Industry</b>	33	383,000	579,500	1,397,150
<b>Institution</b>	37	397,750	1,069,821	2,804,816
<b>Recreational</b>	45	247,173	1,246,019	3,019,730
<b>School</b>	40	107,800	810,600	2,298,500
<b>Residential</b>	14	1,030,000	1,280,000	3,400,000
<b>Nursery</b>	17	184,000	368,000	1,364,000
<b>TOTAL</b>	233	3,860,634	9,972,540	28,261,397

# Facility Recommendations

- Reuse Water Sources
  - EMJWTP, SCWWTP, LCWWTP, DEBWTP and NRWTP.
- Storage Facilities
  - 3 elevated storage tanks (2 mg)
- Pumping Facilities
  - 2 ground storage/pumping stations
  - 3 inline booster stations
- Distribution System
  - 145 miles of pipe (4"-24")
- System Constructed in 7 phases



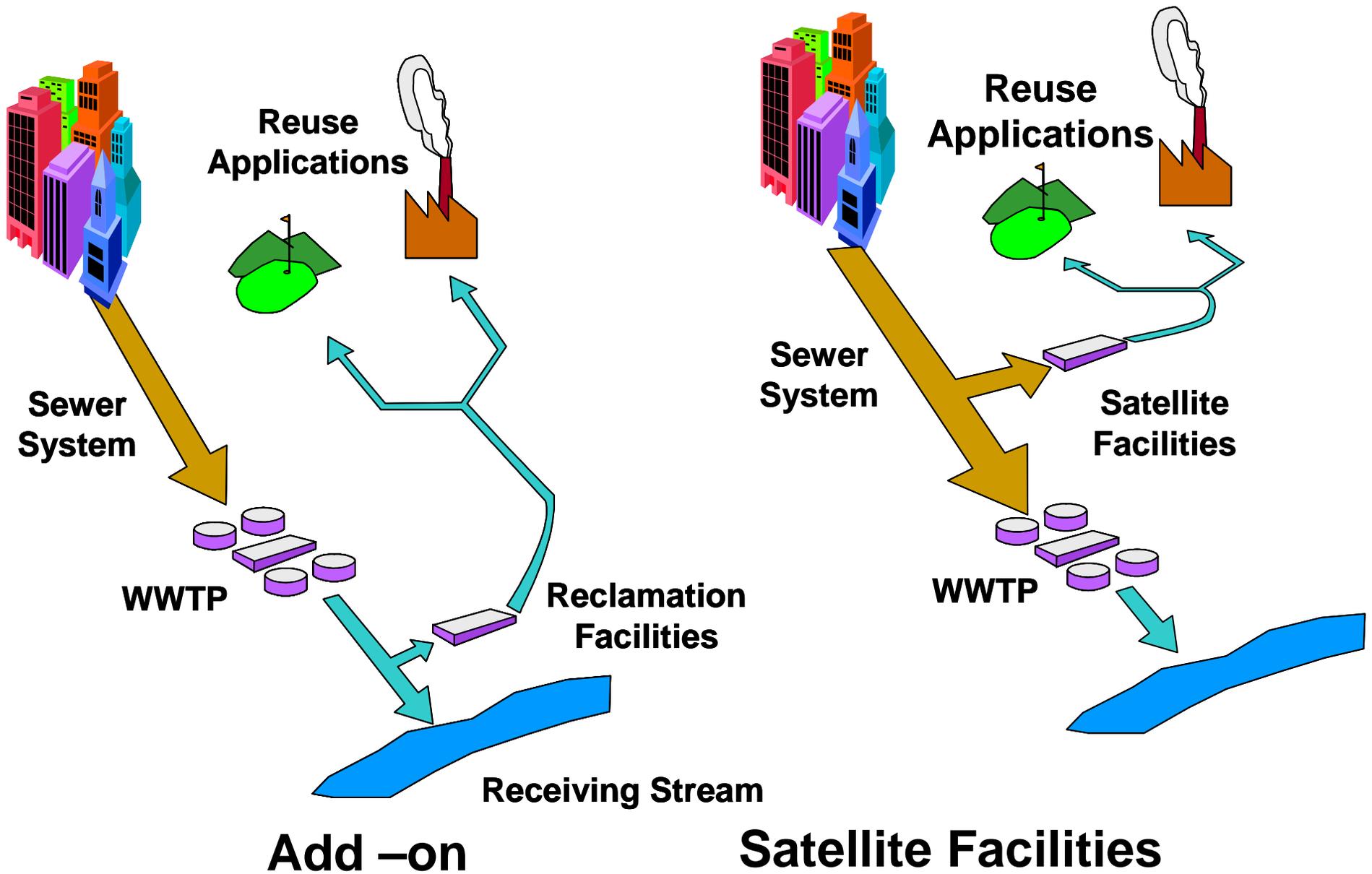


# Reuse Probable Cost

Phase	Facilities	Probable Cost (\$)	Deferred Potable Water Treatment Costs (\$)*
<b>Southeast Raleigh</b>	Transmission mains, elevated storage tank	8,200,000	3,044,000
<b>Wake Forest</b>	Transmission mains, reuse pump station	8,100,000	2,367,000
<b>East Wake</b>	Transmission mains	4,900,000	930,000
<b>Northeast Raleigh</b>	Transmission mains	19,700,000	4,686,000
<b>Garner</b>	Transmission mains	16,500,000	2,280,000
<b>West Raleigh</b>	Transmission mains, elevated storage tank, booster pump station	18,200,000	2,679,000
<b>Northwest Raleigh</b>	Transmission mains, elevated storage tank, booster pump station	10,500,000	2,578,000
<b>TOTAL</b>		<b>86,100,000</b>	<b>18,564,000</b>

\*Note: Costs do not include deferred potable water distribution improvements

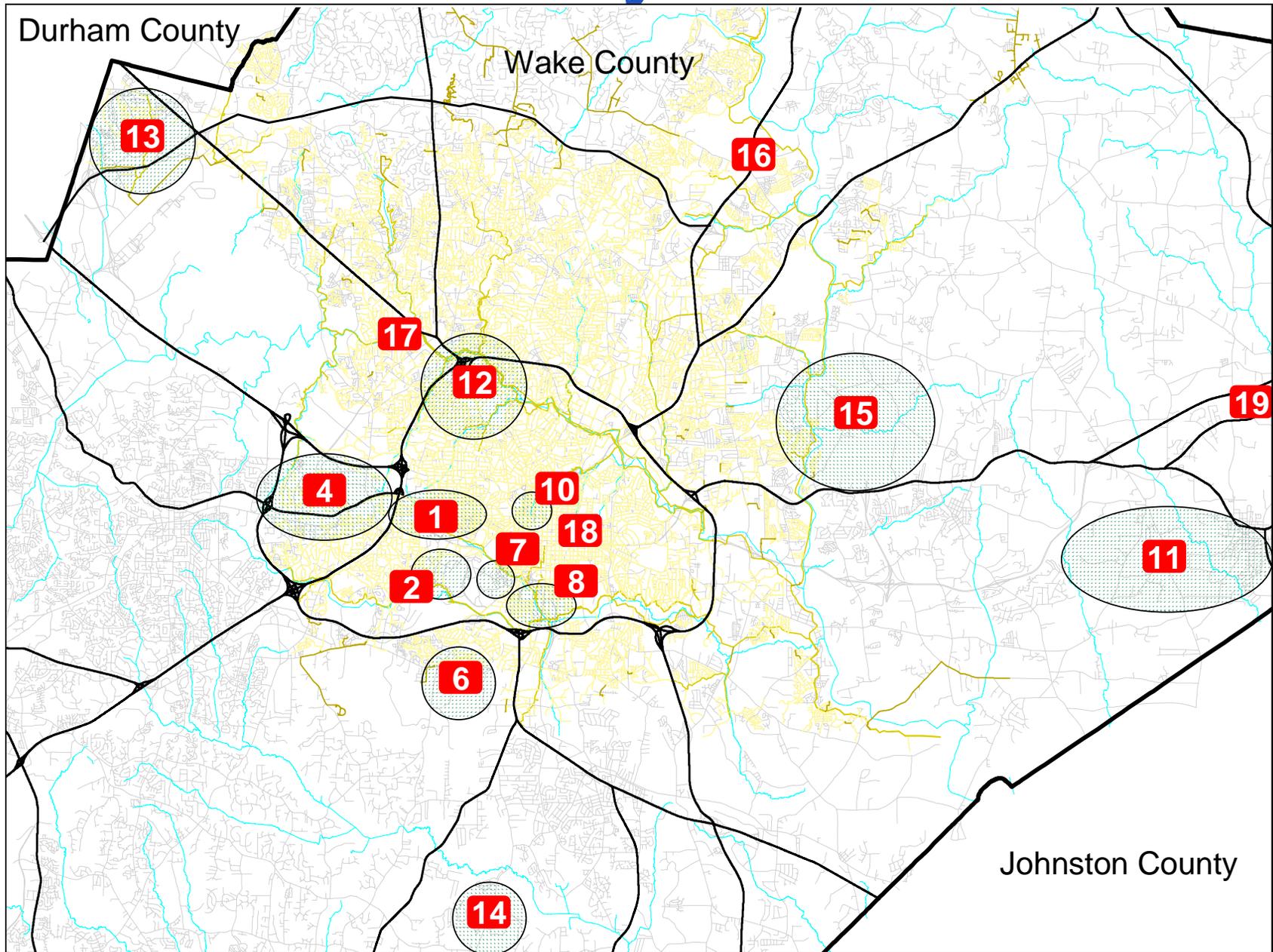
# Distribution versus Satellite Reuse Facilities



# Alternative Satellite Systems Evaluated

1. NCSU Main Campus
2. NCSU Centennial Campus
3. NCSU Main and Centennial Campus
4. Stadium Area
5. West Raleigh
6. Tyron Road Area
7. Dorothea Dix
8. Downtown South
9. Downtown South and Dorothea Dix
10. Downtown North
11. Town of Wendell
12. Northwest Raleigh
13. Brier Creek Planned Urban Development
14. Eagle Ridge Golf Course
15. East Raleigh
16. Mallinckrodt
17. Crabtree High-Rise
18. Downtown High-Rise
19. GlaxoSmithKline

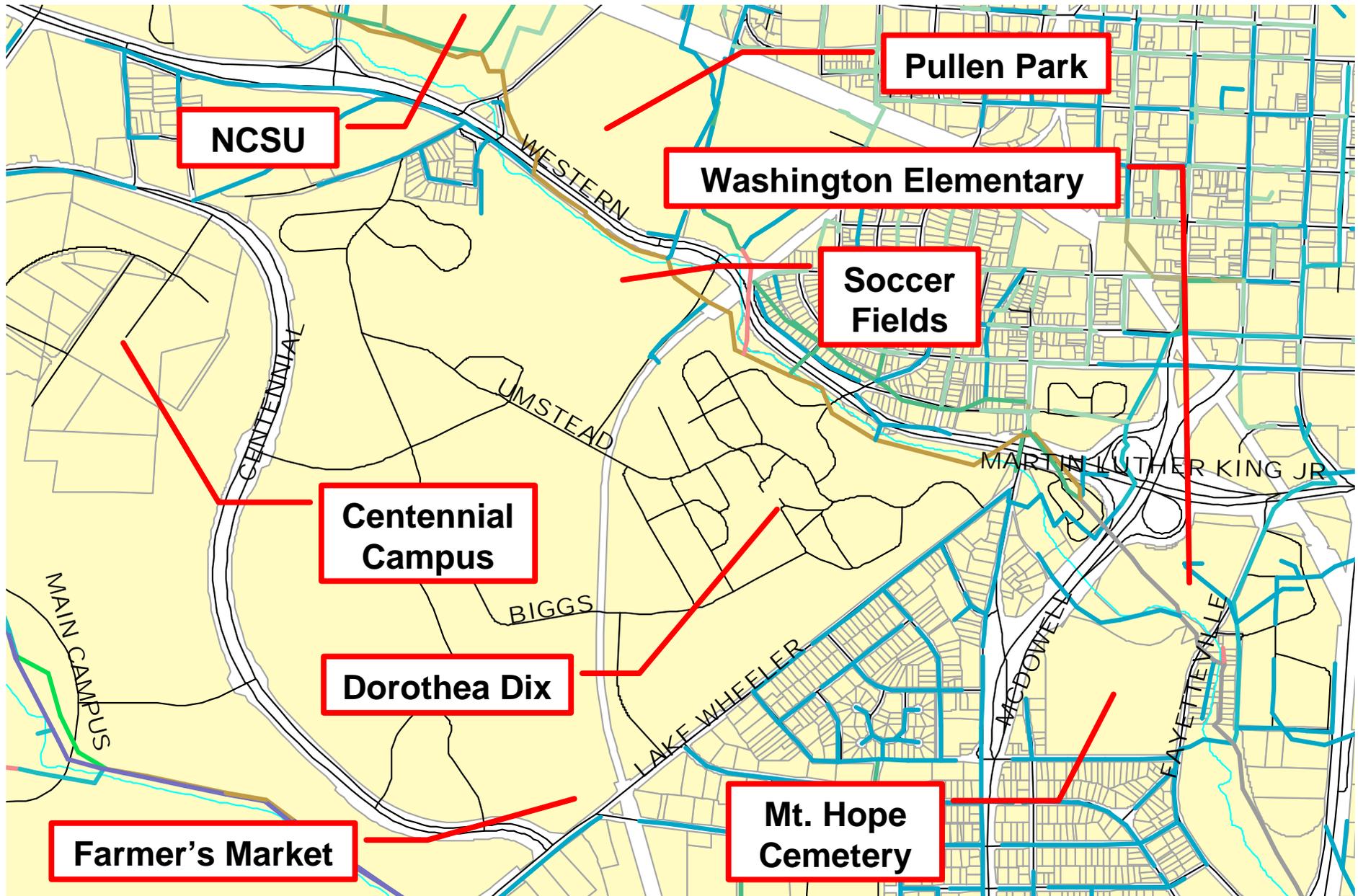
# Alternative Satellite Systems Evaluated



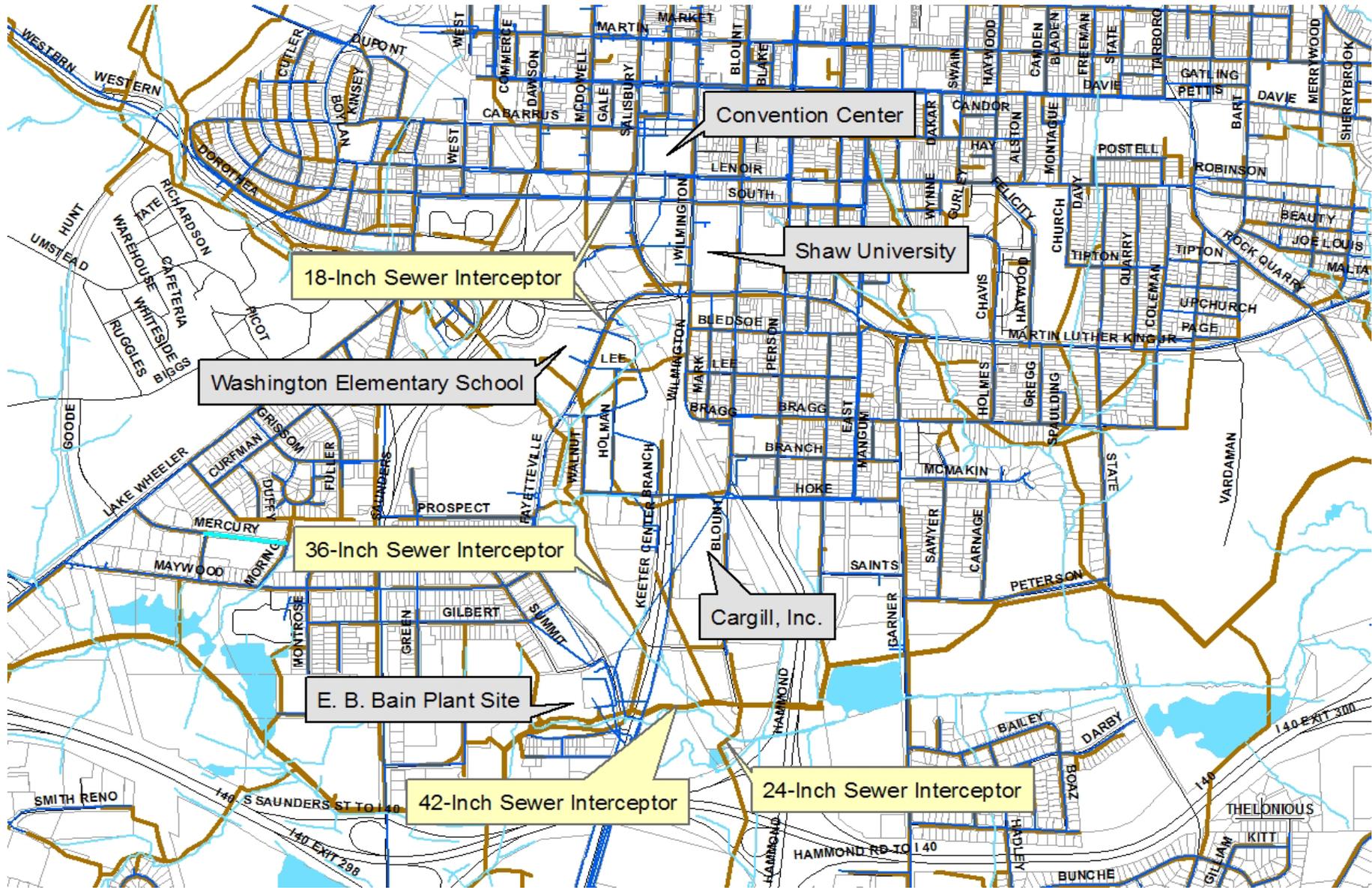
# Service Areas Identified in Screening Workshop

1. NCSU Centennial Campus
2. West Raleigh
3. Carolina Country Club
4. Brier Creek
5. Downtown South
6. Downtown North
7. High-Rise Commercial Building

# Dorothea Dix/NCSU Centennial Campus

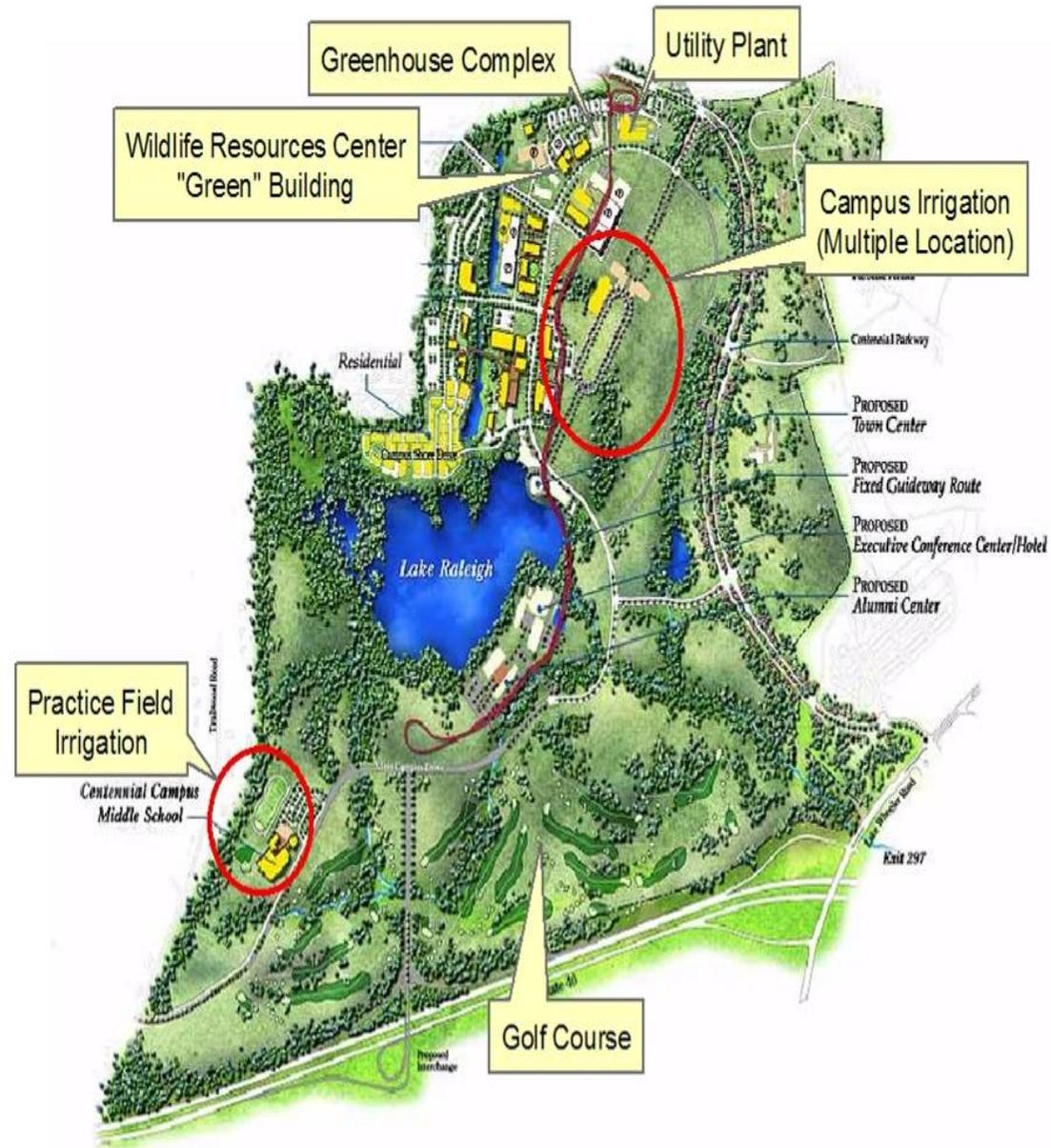


# Downtown South



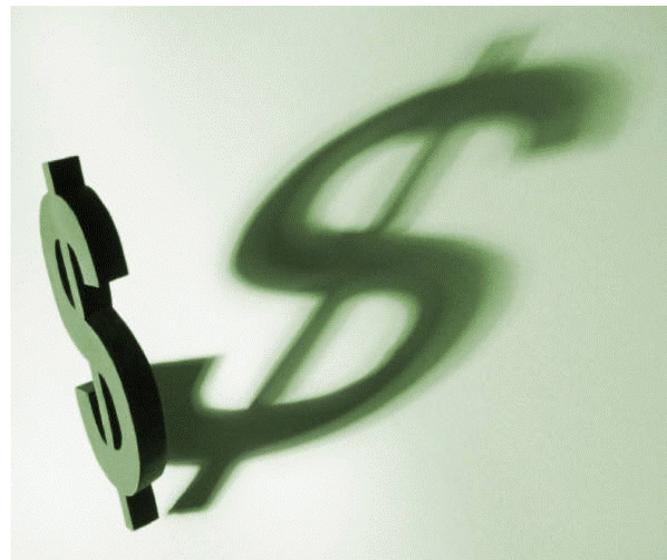
# NCSU Golf Course

- NCSU Centennial Campus very interested
- New Construction facilitates installation
- Drought-proof course



# Rates Evaluated

- Uniform Rate- selected rate structure
- Calculated break-even rate
- Calculated rates with City subsidies
- CORPUD recommends a reuse water rate equal to  $\frac{1}{2}$  of potable water rates



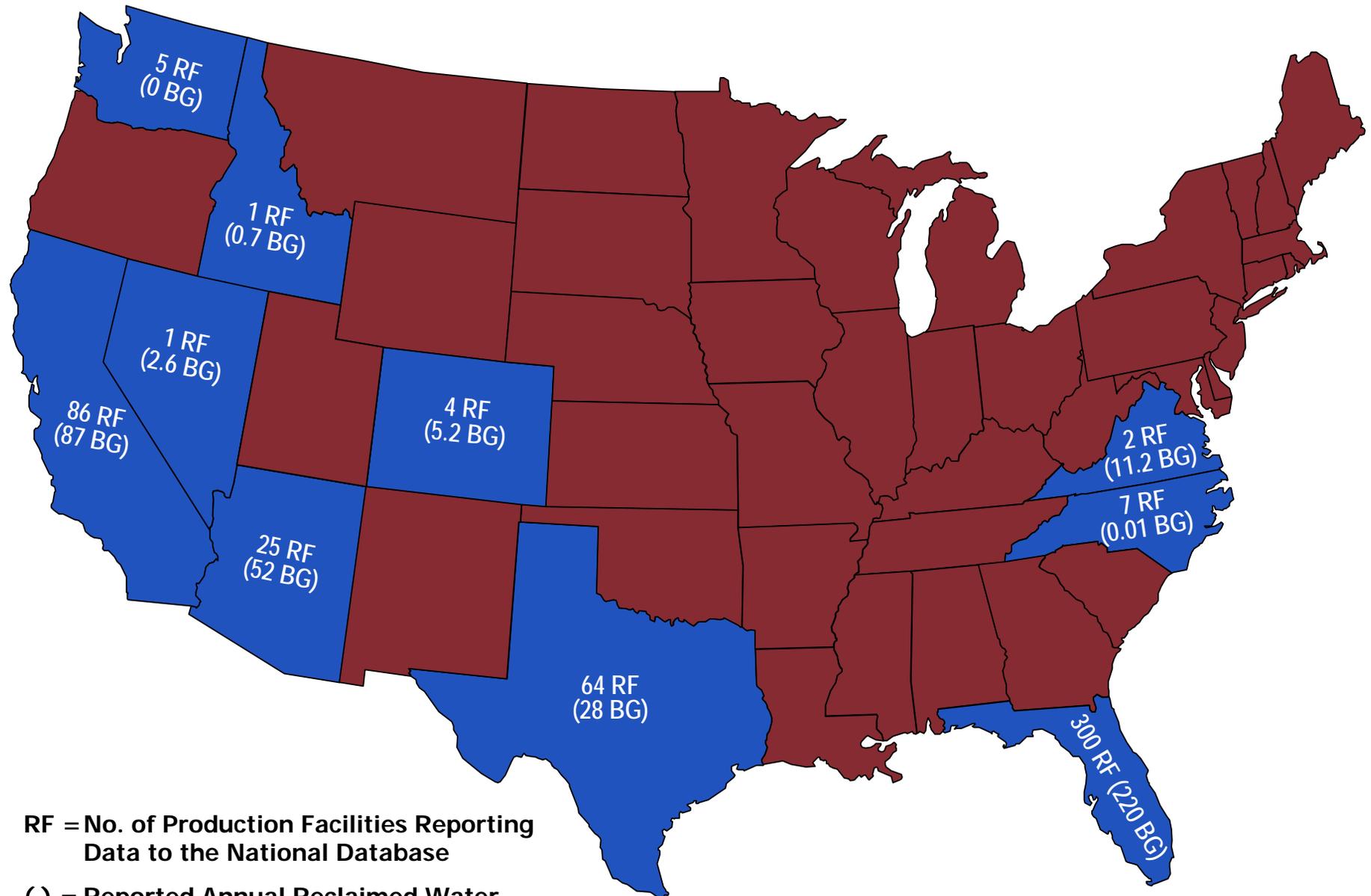
# Rate Analysis for 30-Year Build Out

Years	2006	2011	2016	2021	2026	2031	2036
Phase	SE Raleigh	Wake Forest	East Wake	NE Raleigh	Garner	West Raleigh	NW Raleigh
Rate per ccf	\$3.12	\$3.54	\$3.84	\$5.14	\$4.99	\$7.34	\$7.87
Est. Potable Water Rate per ccf	\$1.56	\$2.40	\$3.49	\$4.04	\$4.69	\$5.43	\$6.30

# Future of Reuse in Raleigh

- City-wide reuse system will be constructed in phases
  - Focus on areas closest to the existing plants
- Downtown South option will be evaluated for possible satellite reuse or an extension of the Southeast Raleigh distribution system currently under design. The final service option will:
  - be cost-effective in the long-term and;
  - allow for future expansion to Centennial Campus/Dorothea Dix Properties
- Downtown North is a promising, but challenging option.
  - Stream restoration is a novel application of reuse.
- NCDENR is currently reviewing regulations to encourage and provide flexibility in reuse in NC.

# National Database for Water Reuse Facilities



RF = No. of Production Facilities Reporting Data to the National Database

( ) = Reported Annual Reclaimed Water Production in Billion Gallons