Water Infrastructure – Utility Mapping and Asset Management Planning
Five County LRCOG Region:
Bladen, Hoke, Richmond, Robeson, and Scotland.

Plus: Sampson and Columbus

Where We Work

Municipalities and counties where we have worked are highlighted in blue.
# County Demographics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladen</td>
<td>35,190</td>
<td>34,657</td>
<td>-2%</td>
<td>25.8%</td>
<td>$30,164</td>
<td>40</td>
</tr>
<tr>
<td>Hoke</td>
<td>46,952</td>
<td>56,111</td>
<td>20%</td>
<td>22.9%</td>
<td>$45,489</td>
<td>120</td>
</tr>
<tr>
<td>Richmond</td>
<td>46,639</td>
<td>45,733</td>
<td>-2%</td>
<td>25.9%</td>
<td>$32,389</td>
<td>98</td>
</tr>
<tr>
<td>Robeson</td>
<td>134,168</td>
<td>134,760</td>
<td>0%</td>
<td>31.7%</td>
<td>$29,806</td>
<td>141</td>
</tr>
<tr>
<td>Scotland</td>
<td>36,157</td>
<td>35,576</td>
<td>-2%</td>
<td>32.3%</td>
<td>$29,592</td>
<td>113</td>
</tr>
<tr>
<td>Sampson</td>
<td>63,431</td>
<td>64,050</td>
<td>1%</td>
<td>22.8%</td>
<td>$36,496</td>
<td>67</td>
</tr>
<tr>
<td>Columbus</td>
<td>58,098</td>
<td>56,953</td>
<td>-2%</td>
<td>25.0%</td>
<td>$35,761</td>
<td>62</td>
</tr>
<tr>
<td>North Carolina</td>
<td>9,535,691</td>
<td>9,943,564</td>
<td>4%</td>
<td>17.5%</td>
<td>$46,334</td>
<td>196</td>
</tr>
</tbody>
</table>

### Population

- **North Carolina**: 420,635 in 2010 to 427,840 in 2014

US Census Bureau, ACS 2014
What We Do – Our Recent Efforts

- Asset Management Planning
- Utility Mapping
What is Asset Management Planning?

A process that helps ensure:

1. **Know your system assets**
2. **Get the most production from them**
3. **Have the financial capacity to replace and repair them when needed.**
Asset Management Planning

Know your system assets

- INVENTORY
- CONDITION ASSESSMENT
- RISK OF FAILURE ASSESSMENT

PRIORITIZATION OF ASSETS
Asset Management Planning

Get the most value from them and be ready to repair or replace when needed.

PREVENTIVE MAINTENANCE

BY ___________ DATE ___________
NEXT CHECK DATE _____________
Create a Better System through Asset Management

Run to Failure and
Unintended Failure
- Inadequate budget
- Lack of will
- Lack of maintenance

Preventative Maintenance And
Know when to quit (Replacement)
- Adequate budget
- Strategic investments
- Knowing and acting on the age, condition, or impacts to the overall system of asset failure.
Be Very Aware This Exists...

Tree Roots!

Hard water build up due to calcium & magnesium.
Emergency Night Repair
LRCOG Asset Management Program

- **Purpose**: to provide local governments with useful information upon which to base rehab and replacement decisions.

- Utilize EPA’s CUPSS software for inventory purposes.

- Develop the client reports by adding other useful data - rates and rate structures, task manager for maintenance, etc.

Now used by staff day-to-day and by elected officials in decisions on rates and investments.
CUPSS Asset and Task Entry Screen

The Asset Inventory List
Typical Water System - Asset Age and Value

- Original investment in water system (some lines and old Well #1) WPA era.
- Major reinvestment including more distribution lines and the wells in 1960s.
- Most recent investment: New Well #4 drilled in 2012.
- Water Treatment Plant installed in 1980s.
Typical Sewer System - Asset Age and Value

Current system comes online in 1940s. Most clay lines date to this period.

Line extensions.

Treatment Plant modified in 1968-69.

Last significant modification was addition of a sewer lift station and extension of sewer to the industrial park.
## Sewer Rate Adjustment Scenarios

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Customers(Accounts)</td>
<td>1100</td>
<td>1111</td>
<td></td>
<td></td>
<td>1% Growth</td>
<td></td>
<td>1122</td>
<td>1133</td>
</tr>
<tr>
<td>RATES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/1/2012</td>
<td>7/1/2013</td>
<td>7/1/2014</td>
<td></td>
<td></td>
<td>7/1/2015</td>
<td></td>
<td>7/1/2016</td>
<td>7/1/2017</td>
</tr>
<tr>
<td>Base Rate (2000 gallons)</td>
<td>$19.00</td>
<td>$19.00</td>
<td>$19.00</td>
<td>$19.00</td>
<td>$20.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base Rate Zero Gallons</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$20.00</td>
<td>$21.00</td>
<td></td>
</tr>
<tr>
<td>First Block price per 1000 gallons(2001-5000 gallons)</td>
<td>$1.95</td>
<td>$1.95</td>
<td>$1.95</td>
<td>$1.95</td>
<td>$1.95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Block price per 1000 gallons(Zero -2001 gallons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$2.95</td>
<td>$2.95</td>
</tr>
<tr>
<td>Second Block price per 1000 gallons(all over 5001 gallons)</td>
<td>$2.20</td>
<td>$2.20</td>
<td>$2.20</td>
<td>$2.20</td>
<td>$2.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sewer Administrative Charge</td>
<td>$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>$3.50</td>
<td>$4.50</td>
</tr>
<tr>
<td>Charge for 4,000 gallons per month</td>
<td>$22.90</td>
<td>$22.90</td>
<td>$22.90</td>
<td>$22.90</td>
<td>$23.90</td>
<td></td>
<td>$29.40</td>
<td>$31.40</td>
</tr>
<tr>
<td>Percentage Rate Increase Per Year</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td></td>
<td></td>
<td></td>
<td>23%</td>
<td>7%</td>
</tr>
<tr>
<td>Median Household Income</td>
<td>$26,681</td>
<td>$31,028</td>
<td>$32,330</td>
<td></td>
<td>$28,173</td>
<td>1% Growth</td>
<td>$28,455</td>
<td>$28,739</td>
</tr>
<tr>
<td>Charge for 4000 gallons as percent of Median Household Income</td>
<td>1.0%</td>
<td>0.9%</td>
<td>0.8%</td>
<td></td>
<td>1.0%</td>
<td></td>
<td>1.2%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Urgency</td>
<td>Service</td>
<td>Issue</td>
<td>Corrective Action Plan</td>
<td>Target Date for Completion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>W</td>
<td>Due to their age, condition, and strategic value to the Town's drinking water system, Wells #2 and #3 should be assessed for any further rehab or replacement needs. <strong>Video camera inspection</strong> will likely give the best results. This is necessary so that safe water may continue to be delivered and emergency repairs avoided.</td>
<td>The pump, piping, motors controls, electrical service and yard piping should be assessed for major rehabilitation need or replacement. Video camera inspection is recommended. Develop a strategy for cycling between wells so that the strain on any one can be reduced. The Town’s recent investment in SCADA should be helpful in this management.</td>
<td>6/30/2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>W</td>
<td>The main electrical panel at the water filter plant is aged well beyond its useful life and requires significant rehab to the point of replacement.</td>
<td>Contract with an electrician to review the potential costs. Plan for upgrade or replacement.</td>
<td>6/30/2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>W</td>
<td>A portion of the town's water distribution system lines are made of cement asbestos and galvanized and iron materials. Many of these lines are undersized and are difficult to repair. The useful life of these lines has long expired and maintenance needs are growing.</td>
<td>Conduct a review of the town's water lines and develop a plan for rehabilitation or replacement of these lines.</td>
<td>6/30/2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>W</td>
<td>Revenues from rates are not yet sufficient to cover the costs of operating the system and assisting with the cost of making needed capital improvements.</td>
<td>Consideration should be given to increasing water rates so that a planned investment strategy can be developed for the water assets. The recent emergency expenses incurred by the Town for the water system in the last year substantiate the need for a planned strategy. Set goal to operate at ratio of at least 1.0.</td>
<td>6/30/2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Sewer System Action Plan

<table>
<thead>
<tr>
<th>Urgency</th>
<th>Service</th>
<th>Issue</th>
<th>Corrective Action Plan</th>
<th>Target Date for Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>WW</td>
<td>Due to its age, condition, and strategic value to the Town's future, the current wastewater treatment plant requires significant upgrades to the digester basin and equipment, clarifiers, oxidation ditch, bar screen and grit removal apparatus, chlorine contact chamber and equipment, electrical systems and the lab/office building.</td>
<td>Each of the wastewater treatment plant assets should be assessed for major rehabilitation need or replacement. A plan for upgrade or replacement should then be made.</td>
<td>6/30/2015</td>
</tr>
<tr>
<td>High</td>
<td>WW</td>
<td>The Town's collection system contains approximately 45% clay lines which are aged well beyond any useful life and represent a significant ongoing financial and environmental liability for the Town.</td>
<td>Further assess the need for replacement of all clay lines.</td>
<td>6/30/2015</td>
</tr>
<tr>
<td>High</td>
<td>WW</td>
<td>Several of the Town's lift station contain original equipment dating back to the 1960s and require upgrades.</td>
<td>Further assess the need for replacement of all outdated lift stations.</td>
<td>6/30/2015</td>
</tr>
<tr>
<td>High</td>
<td>WW</td>
<td>The Town operates without a mobile generator.</td>
<td>Plan for purchase of a mobile generator.</td>
<td>6/30/2015</td>
</tr>
<tr>
<td>High</td>
<td>WW</td>
<td>Sewer rates and fees are not sufficient to cover the true operating costs of the system; low interest loans and grants should be secured to help offset the cost of capital needs.</td>
<td>Consideration should be given to increasing sewer rates so that a planned investment strategy can be developed for the system assets. The recent emergency expenses incurred by the Town for the sewer system in the last year substantiate the need for a planned strategy.</td>
<td>6/30/2015</td>
</tr>
</tbody>
</table>
Utility Mapping
We have connected Utility Mapping to Asset Management Planning

- Each asset is assigned an ID number – all data tied to that number.
- Allows us to archive and display individual asset data.
- Allows to create system level, detailed maps.
- Maps renewed as the asset profile is updated.
Today ... Utility Mapping

- **Purpose**: to archive information and produce a useable system map showing the best available data.

  - Developed a GIS-based platform that allowed for the creation of a “published” map usable without the purchase of ESRI software.
  - Utilized EDA and Rural Center grants to help apply GIS mapping program to pilot towns.
  - Replicated this effort in three other COGs as part of a Rural Center grant.

Used by staff day-to-day and to show local officials the real size and complexity of their water and sewer utility systems, base data for planning, rate studies, customer base assessments, etc.
Where We Started.
Where We Are Now

- Line location
- Line material type
- Line diameter
- Lift Stations/Booster Pumps
- Wells/Water Storage
- Treatment
Our Findings and Conclusions

- Asset Mapping work is a logical extension of the LRCOG’s ongoing educational effort for water/wastewater utilities of our local governments – what our systems need right now.

- Through creative and strategic use of resources, we are able to perform this work cost-effectively for small systems.

- With modifications, the CUPSS Program offers an affordable tool that is easily understood, can be used by local officials and staff, and is replicable.
Findings and Conclusions

- Though the sample is small at present, indications are that things are worse than previously thought and under more threat of significant failure than sewer systems.
  - Groundwater systems: Aged Well Infrastructure

- These findings on small water systems should inform State policy.

- While not possible for some (question of cost effectiveness) we still maintain that regionalization of small water systems may help address the overarching problem of an inadequate customer base to generate needed revenue.