Outline

- History & Objectives
- Integrated Approach
  - Stakeholder participation
  - Incorporating technical information
  - Decision support
- Implementation
- Summary
Project History

- City of Franklin, TN is a fast growing community
  - Water and wastewater capacity challenges
  - The Harpeth is a small river with non-point source inputs upstream
- Environmental Factors
  - Effluent dominated stream
  - Nutrient limited (TMDL for DO)

Project Objectives

- Develop a 30-year Integrated Water Resources Plan with the City, focusing on stakeholder-derived objectives as the central measure of success.
- The IWRP must be:
  - Comprehensive
  - Implementable
  - Fundable
  - Broadly acceptable
    - Citizens
    - City administration and staff
    - Regulatory community
    - Advocacy groups
Integrated Planning Approach

- Stakeholder participation to develop plan objectives and performance measures
- Collaborative development of plan alternatives
  - Stakeholders
  - Technical resources
- Integrated modeling/analyses
- Progressively screen alternatives
- Select preferred alternative
- Finalize implementation plan

System Modeling for Integrated Water Resources Planning

Integrated Planning Approach
Stakeholder Participation - Stakeholder Advisory Group

System Modeling for Integrated Water Resources Planning
Integrated Planning Approach
Stakeholder Participation – Steering Committee and BOMA

• Steering Committee
  – City of Franklin Mayor (retired physician; participates in international public health development)
  – Director of Capital Improvements Projects
  – City Administrator
  – Director of Water and Wastewater Management
  – Director of Engineering
  – Vanderbilt University, Assistant Chair of Civil and Environmental Engineering (water resources engineer and citizen of Franklin)

Objectives
Defines the major goals of the IWRP, in broad and understandable terms

Performance Measures
Specific metrics that indicate whether or not objectives are being achieved

Options
Individual projects to be assembled into comprehensive alternatives

Alternatives
Packages of individual projects that are designed to meet objectives
Integrated Planning Approach
Stakeholder Participation – IWRP Performance Measures

<table>
<thead>
<tr>
<th>Objective</th>
<th>Weight</th>
<th>Example Performance Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>31.1%</td>
<td>% of time demands are met</td>
</tr>
<tr>
<td>Efficiency</td>
<td>15.5%</td>
<td>Volume of wastewater effluent reused</td>
</tr>
<tr>
<td>Water quality &amp; ecology</td>
<td>13.5%</td>
<td>Nutrient load to river</td>
</tr>
<tr>
<td>Reasonable cost</td>
<td>13.2%</td>
<td>Life-cycle cost of projects &amp; policies</td>
</tr>
<tr>
<td>Safety &amp; security</td>
<td>8.3%</td>
<td>Vulnerability score for facilities</td>
</tr>
<tr>
<td>Regional acceptance</td>
<td>5.7%</td>
<td>Extent of regional focus</td>
</tr>
<tr>
<td>Biosolids handling</td>
<td>4.7%</td>
<td>Tons of biosolids handled sustainably</td>
</tr>
<tr>
<td>River access and aesthetics</td>
<td>4.7%</td>
<td>% of Harpeth River flow that is effluent</td>
</tr>
<tr>
<td>Carbon footprint</td>
<td>4.5%</td>
<td>Average energy requirements</td>
</tr>
</tbody>
</table>

System Modeling for Integrated Water Resources Planning

Integrated Planning Approach
Stakeholder Participation – IWRP Options

- WTP
- Distribution System
- WWTP
- Collection System
- Reclaimed Water
- Stormwater
- Conservation
- Ecological Restoration
- Biosolids

**WASTEWATER OPTIONS**

<table>
<thead>
<tr>
<th>WWTP</th>
<th>Collection System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade and rerate existing WWTP</td>
<td>System Management Practices</td>
</tr>
<tr>
<td>Construct new WWTP at Goose Creek in southern service area</td>
<td>Address Inflow/Infiltration in collection system</td>
</tr>
<tr>
<td>Collect and treat wastewater from adjacent communities or other small systems (e.g., Lynwood, Cartwright Creek)</td>
<td>• Pump Stations: Condition/Criticality assessment program in conjunction with collection system model to prioritize PS projects</td>
</tr>
<tr>
<td>• Collection Mains: Formalize existing program for development review, inspections, troubleshooting, line repairs and replacements (CTV, etc.)</td>
<td></td>
</tr>
</tbody>
</table>
## Integrated Planning Approach

**Stakeholder Participation – IWRP Alternatives**

<table>
<thead>
<tr>
<th></th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
<th>Non-Integrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Head Dam Removal</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Water Treatment Plant</td>
<td>4 mgd &amp; HVUD Purchase</td>
<td>Decommission WTP &amp; HVUD Purchase</td>
<td>2.1 mgd &amp; HVUD Purchase</td>
<td>Line to Cumberland &amp; 12.5 mgd WWTP</td>
<td>2.1 mgd &amp; HVUD Purchase</td>
</tr>
<tr>
<td>Water Distribution System</td>
<td>WQ/Quantity Improvements, advanced metering</td>
<td>WQ/Quantity Improvements, advanced metering</td>
<td>Advanced metering</td>
<td>WQ/Quantity Improvements</td>
<td>Model</td>
</tr>
<tr>
<td>Conservation</td>
<td>5% savings</td>
<td>2% savings</td>
<td>None</td>
<td>2% savings</td>
<td>None</td>
</tr>
<tr>
<td>Stormwater BMPs</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Ecological Restoration</td>
<td>Low Head Dam Removal &amp; Specific Restoration Projects</td>
<td>Low Head Dam Removal &amp; Watershed Projects</td>
<td>Low Head Dam Removal</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Existing WWTP</td>
<td>16 mgd</td>
<td>24 mgd</td>
<td>24 mgd</td>
<td>16 mgd</td>
<td>24 mgd</td>
</tr>
<tr>
<td>New Southern WWTP</td>
<td>8 mgd</td>
<td>None</td>
<td>None</td>
<td>8 mgd</td>
<td>None</td>
</tr>
<tr>
<td>Berry's Chapel/ Cartwright Flows</td>
<td>To be considered</td>
<td>To be considered</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Collection System</td>
<td>Septic Users, I/I Reduction</td>
<td>Septic Users, I/I Reduction, Pump to Existing WWTP</td>
<td>I/I Reduction, Pump to Existing WWTP</td>
<td>Septic Users</td>
<td>Pump to Existing WWTP</td>
</tr>
<tr>
<td>Reclaimed Water</td>
<td>Upgrade Pumping to 12 mgd &amp; add Probable Customers</td>
<td>Upgrade Pumping to 12 mgd &amp; add Probable Customers</td>
<td>None</td>
<td>Upgrade Pumping to 12 mgd &amp; add Probable Customers</td>
<td>None</td>
</tr>
</tbody>
</table>

## Incorporating Technical Information

**Systems Network Modeling**

![Systems Network Modeling Diagram](image-url)
Incorporating Technical Information
Systems Network Modeling - STELLA

STELLA is a graphical system simulation package that allows users to model physical flow systems with operational or planning level resolution.

Incorporating Technical Information
Detailed Water Quality Modeling

Calibrated Model
Incorporating Technical Information
Decision Support

Stakeholder Weights
- 9. Carbon Footprint
- 8. Improved Access & Aesthetics
- 7. Sustainable Biosolids Management
- 6. Regional Acceptance
- 5. Safety & Security
- 4. Service at Reasonable Cost
- 3. Water Quality & Ecological Health
- 2. Efficiency
- 1. Reliability

<table>
<thead>
<tr>
<th>Importance (Regulatory, Growth, Objectives)</th>
<th>15+ Years</th>
<th>5 – 15 Years</th>
<th>0 – 5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>[Alt 1]</td>
<td>[Alt 4]</td>
<td>[Alt 2]</td>
</tr>
<tr>
<td>Add Berry’s Chapel &amp; Cartwright Creek WWTPs</td>
<td>• Add Berry’s Chapel &amp; Cartwright Creek WWTPs</td>
<td>• Add other potential reclaimed customers</td>
<td>• SCADA System (Water/Wastewater)</td>
</tr>
<tr>
<td>Additional water conservation ordinances/programs</td>
<td>• Annual leak detection program</td>
<td>• Low head dam removal</td>
<td>• Low head dam removal</td>
</tr>
<tr>
<td>Medium</td>
<td>[Alt 2]</td>
<td>[Alt 4]</td>
<td>[Alt 3]</td>
</tr>
<tr>
<td>Add septic users within UGB</td>
<td>• Irrigation controls ordinance</td>
<td>• Stormwater BMPs</td>
<td>• Expand WTP to 4 mgd</td>
</tr>
<tr>
<td>Water distribution quantity/supply improvements</td>
<td>• Toilet/faucet replacement program</td>
<td>• Produce Class A Biosolids (solar dryer)</td>
<td>• Rehabilitation for I/I reduction/control</td>
</tr>
<tr>
<td>Irrigation controls ordinance</td>
<td>[Alt 3]</td>
<td>[Alt 4]</td>
<td>[Alt 1]</td>
</tr>
<tr>
<td>Toilet/faucet replacement program</td>
<td>• Streambank restoration projects</td>
<td>• Calibrated wastewater collection model</td>
<td>• Calibrated wastewater collection model</td>
</tr>
<tr>
<td>High</td>
<td>[Alt 4]</td>
<td>[Alt 2]</td>
<td>[Alt 1]</td>
</tr>
<tr>
<td>New WWTP to increase capacity ultimately to 24 mgd (2 phases)</td>
<td>• Upgrade reclaimed pump station to 12 mgd</td>
<td>• Water distribution quality improvement (Multiple) projects</td>
<td>• Phase 1 of Wastewater Treatment Plant capacity to 16 mgd</td>
</tr>
<tr>
<td></td>
<td>• Add potential City owned reclaimed customers</td>
<td>• WTP upgrades to meet LT2 regulations (UV addition)</td>
<td>• Produce Class B Biosolids (Thickening, Anaerobic Digestion, Dewatering)</td>
</tr>
<tr>
<td></td>
<td>• Calibrated water distribution model</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary

- Recommend Implementation of Alternative 1
  - Highest Ranked by: BOMA, Stakeholders & Steering Committees
  - All Sensitivity Analysis
- Cost and Financing of the Plan
  - City’s Approach to Being “Proactive Rather than Reactive”
  - Allows for Addressing of Continued Growth and Regulatory Compliance
- Permitting Process
  - Start Now & Stay Ahead of the Game
  - Water Quality and Effect on Harpeth River is Key to the Successful Implementation of this IWRP and its Projects

Acknowledgements

- City of Franklin
  - BOMA
  - Engineering and Utility Staff
- Dr. Eugene LeBoeuf, Vanderbilt University
- Stakeholders
- Dan Rodrigo, CDM Smith
- SSR