Potable Water System
Master Plan Update

Katie Gilmore
Water Division Manager, Utilities Department
November 19, 2019
Action Requested

▪ Approval of Resolution R-19-150: Adoption of the 2019 Potable Water System Master Plan

▪ Manatee County Code of Ordinances Sec 2-31-5(e)(1):
  System master plans. The county shall adopt and maintain, by resolution of the board, master plans for the construction and build-out of the potable water treatment plant, potable water distribution system, the wastewater treatment plants, the wastewater collection systems and the reclaimed water distribution system. The master plans shall be updated on a regular basis.
Background

- Most recent potable water distribution system master plan was completed by the Public Works Department in 2012 and adopted by the board in September 2013.

- In 2017, the Utilities Department retained Carollo Engineers, their Engineer of Record, to update the current potable water hydraulic model and update the potable water system master plan.
Potable Water System

- Water Treatment Plant
  - 84 MGD maximum treatment capacity from two sources – surface water (54 MGD) and ground water (30 MGD)
- Water Pumping Stations
  - Four high service pump stations located at WTP
  - Six booster pump stations throughout the distribution system
- Water Storage Facilities
  - Six elevated storage tanks (5.5 MG)
  - Seven ground storage tanks (26.5 MG)
- Water Mains
  - 2,022 miles of potable water mains (10/01/2019)
Potable Water System Master Plan

Key Components

- Hydraulic model update and calibration
- Hydraulic analysis of current and future model scenarios
- WTP Capacity and Storage Analysis
- Potable Water Pipeline Replacement Assessment
- Capital Improvement Plan Recommendations
Model Scenarios

- Applied calibrated model to perform hydraulic analysis under four scenarios:
  - Existing (2018)
  - 2025
  - 2035
  - Build-Out

- Existing: Verify that the existing infrastructure satisfies the performance criteria and identify necessary corrective actions.

- Future: Assess the performance of the existing distribution system under increased demands to determine necessary improvements to be programmed into the Capital Improvements Plan (CIP).
## Potable Water Demand Projections for Model Scenarios

<table>
<thead>
<tr>
<th>Year</th>
<th>Functional Population</th>
<th>Total Average Daily Demand (mgd)&lt;sup&gt;(2)&lt;/sup&gt;</th>
<th>Max Month Demand (mgd)</th>
<th>Max Day Demand (mgd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>302,603</td>
<td>39.36</td>
<td>43.09</td>
<td>49.14</td>
</tr>
<tr>
<td>2025</td>
<td>333,047</td>
<td>44.12</td>
<td>52.94</td>
<td>59.56</td>
</tr>
<tr>
<td>2035</td>
<td>394,506</td>
<td>51.34</td>
<td>61.61</td>
<td>69.31</td>
</tr>
<tr>
<td>Build-Out</td>
<td>745,990</td>
<td>78.33</td>
<td>94.00</td>
<td>105.75</td>
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</tbody>
</table>

Notes:
(1) Data for year 2018 is actual (population and demand)
(2) The total average daily demand shown in Table 2.4 is calculated using the functional population and 105 gpcd LOS, plus addition of the wholesale customers for years 2025 and 2035. No wholesale customers are included for Build-Out.

mgd = million gallons per day
Hydraulic Performance Criteria

- **Pressure**
  - Maximum Day Demand: Pressures must be > 50 psi
  - Maximum Day Demand plus Fire Flow: A minimum of 20 psi

- **Velocity**
  - < 8 fps under peak hour demand conditions
  - < 10 fps under maximum day demand conditions plus fire flow

- **Headloss Gradient**
  - Based on pipeline diameter and demand condition
  - Example: < 3.5 feet per 1,000 ft for pipe ≥ 36” under maximum day demand condition

- **Fire Flow**
  - Per Manatee County Comp Plan
  - 1000-3000 gpm
Hydraulic Analysis Summary: Pressure, Velocity, Headloss

- Under maximum day conditions for all scenarios:
  - No velocities over 6 fps
  - No head losses over recommended performance criteria

- Pressures < 40 psi only occurred in two nodes in 2018 and build-out scenarios
Hydraulic Analysis Summary: Fire Flow and Water Age

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Hydrants Meeting Fire Flow Requirements</th>
<th>Water Age &gt; 5 days</th>
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<tbody>
<tr>
<td>2018</td>
<td>90.0%</td>
<td>0.39%</td>
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<tr>
<td>2025</td>
<td>92.8%</td>
<td>0.35%</td>
</tr>
<tr>
<td>2035</td>
<td>92.8%</td>
<td>0.36%</td>
</tr>
<tr>
<td>Build Out</td>
<td>93.6%</td>
<td>0.34%</td>
</tr>
</tbody>
</table>
2025 Max Day Demand Minimum Pressures
2025 Average Annual Demand Water Age
WTP Capacity and Storage Analysis

- Existing storage capacity of 32 MG is sufficient to meet fire reserve recommendations through 2035.
- Capacity of the WTP meets the average daily demand reserve emergency capacity requirements of the Water Supply Sub Element of Comprehensive Plan through 2035.
- Maximum day reserve capacity at the WTP projected to drop below the recommended 10% by 2034.
  - Additional 5 MGD required
  - Buffalo Creek RO facility to supply
Potable Water Pipeline Replacement Assessment

- Pipelines >4” assigned a risk value to prioritize replacement efforts.
- Risk = Vulnerability x Criticality
- **Vulnerability**: Likelihood of a failure, based on age and condition.
- **Criticality**: Consequence of a failure, based on location and impact to distribution.
  - Weighted score based on: financial impact (35%), impact on environment or regulatory compliance (15%), effect on service to customers (50%)
  - Scored as negligible (1), low (4), moderate (7), severe (10)
Potable Water Pipeline Replacement Assessment Risk Results

Water Main Risk Results by Percent Length

- Low (Risk<7) 32%
- Medium Low (7<Risk<12) 8%
- Medium (12<Risk<18) 4%
- Medium High (18<Risk<25) 5%
- High (Risk>25) 51%
Figure 7.7 Water Main Risk Results
Capital Improvement Plan (CIP) Recommendations

- **Pipeline Replacement Projects (2019-2029):**
  - Currently past remaining useful life: 0.45 mile galvanized steel, $340,000
  - By 2021: 1 mile cast iron, $1.72 M
  - No additional replacements necessary until after 2029
  - Does not include 80.5 miles of ‘unknown’ pipe material or pipeline replacement projects currently in 5-year CIP

- **CIP and Growth Related Projects:**
  - Population growth/new developments by 2025: 151.3 miles new mains, $178.1 M
  - Improvements at Cortez, Elwood, and Northwest Booster Pump Stations by 2025, $3.11 M
## CIP Project Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>FY 2018</th>
<th>FY 2019</th>
<th>FY 2020</th>
<th>FY 2021</th>
<th>FY 2022</th>
<th>FY 2023</th>
<th>FY 2024</th>
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<tbody>
<tr>
<td>Existing County CIP</td>
<td>$70,343</td>
<td>$10,269</td>
<td>$9,226</td>
<td>$9,737</td>
<td>$8,427</td>
<td>$15,532</td>
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<td>Additional Pipeline Replacement Projects (Due to Pipe Age)</td>
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<td></td>
<td></td>
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<td>$2,058</td>
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<td></td>
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<tr>
<td>Growth Related Projects</td>
<td></td>
<td></td>
<td></td>
<td>$40,600</td>
<td>$97,120</td>
<td>$43,493</td>
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<tr>
<td><strong>Total</strong></td>
<td>$70,343</td>
<td>$10,269</td>
<td>$9,226</td>
<td>$11,795</td>
<td>$49,027</td>
<td>$112,652</td>
<td>$252,682</td>
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</tbody>
</table>

(1) In $1,000s  
(2) Growth related projects will be paid for by growth/developers
Additional Recommendations

- Replacement and upsizing of small diameter mains that did not meet fire flow requirements
- Modifications to pump station configuration, operations, and upsizing/modify pumps at the stations.
Motion Requested

- Motion to Approve Resolution R-19-150: Adoption of the 2019 Potable Water System Master Plan