ORGANIZATION AND STAFFING ASSESSMENT

City of Burlington, Water Resources Department
Technical Memorandum
Final Version – April 1, 2019
Executive Summary

The City of Burlington, Department of Public Works – Water Resources Division engaged Raftelis to perform an organizational review and staffing assessment (Assessment) to assess the effectiveness of the overall organizational structure of Water Resources and its ability to support the program and project management necessary for strong regulatory compliance, stewardship of natural resources, and proper investment in infrastructure. The Assessment focused on identifying performance and resource gaps, inclusive of staffing, as compared with industry best appropriate practices. Periodic objective assessments of different aspects of a utility are critical, as they ensure that the utility is meeting its mission in an effective and efficient manner, and that the utility can deliver sustainable levels of service in the face of evolving internal and external challenges. Such assessments are even more critical when an organization has identified latent challenges, such as those uncovered in late 2017 in its meter-to-cash-billing cycle, while it works to maintain forward momentum on challenges that face most Water Resources utilities: reinvestment in aging infrastructure, an aging workforce, rate affordability, and meeting new regulatory obligations (e.g. Lake Champlain TMDL). Ultimately, the goal of the Assessment is to present recommendations that provide an opportunity to improve the performance of work processes, reduce long-term costs, and help to ensure a high-functioning organization capable of responding quickly and efficiently to current and future challenges.

The Assessment presents organizational structure and staffing recommendations that will support Water Resources as it prepares to focus on revenue assurance improvements, implement $30 million in Wastewater and Stormwater capital projects from a recent bond referendum, continue reinvestment in its aging drinking water infrastructure and develop new water quality programs to enhance protection of the City’s water.

Organization

Water Resources is a division of the City of Burlington, Department of Public Works (DPW). Water Resources consists of six sectors of operation: Water Distribution and Meters, Wastewater Treatment, Water Treatment, Engineering, Stormwater, and Customer Service/Billing. Each group reports to the DPW Assistant Director for Water Resources. There are 43 full time equivalent (FTE) positions in Water Resources, including one vacancy. These full-time positions do not include the part-time, temporary position in the Customer Service/Billing group or the three temporary positions in the Water Distribution group. Water Resources typically employs 1-3 interns for tasks within various groups, including wastewater, stormwater, and engineering. There is a modest amount of labor sharing between Water Resources and the DPW Streets Division, which provides some maintenance and construction services for the stormwater and wastewater systems.

Although Water Resources effectively executes its mission on a day-to-day basis, the Assessment Team noted several performance gaps, which will be exacerbated as the utility’s capital and compliance programs grow over the next few years. These gaps include:

- **A lack of programmatic Preventative Maintenance (PM)** – The Water Distribution group spends a good deal of time during the contraction season engaged in pipe relining and replacement projects; working closely with contractors. While using the Water Distribution crews to support capital projects, such as water main re-lining and replacement, has reduced capital costs, it is occurring at the expense of routine PM activities, such as meter testing, hydrant inspection and repair, valve exercising, uni-directional flushing, etc.

- **A lack of resources for water quality program development and execution** – Water Resources does not have fully developed, implemented, and enforced cross-connection (backflow) prevention and industrial pretreatment programs, which are required for regulatory compliance. Lack of an industrial pretreatment program and consistently higher strength wastewater than the plants were designed to handle likely contributed to the June 2 release of partially disinfected
wastewater into Lake Champlain. While Water Resources has a strong regulatory review process for construction and post-construction stormwater management, compliance inspections are largely ad hoc, which may make it more challenging for the City to leverage these best management practices for regulatory credits under the Lake Champlain TMDL. Additionally, the City does not have a Fats, Rags, Oils, and Grease (FROG) program, which, if implemented, could help to improve collection system capacity.

> **Insufficient support for revenue assurance/billing, customer service, and outreach functions** – The Customer Service/Billing group has myriad responsibilities and a relatively small staff in comparison. While some of the functions are partially shared with other departments in the City, the group’s workload has increased over the last several years because of additional attention on metering and financial planning/management, and due to the growing complexity of communicating with the public about the Water Resources activities and programs. The workload will likely continue to increase due to the growth in capital projects and new programs.

> **Insufficient meter staffing resources and inefficiencies related to meter field services being in a separate work group than billing work group** – There are insufficient resources to address the significant backlog of meters that are overdue for testing and/or replacement and to maintain appropriate levels of testing and replacement. Leaving meters in place past their useful life can mean a loss in revenue, since meters lose accuracy and under-register over time. This lack of staffing also impacts the cross-connection control (backflow) program, which is essential to protecting water quality. Additionally, the meter technicians and customer service/billing staff currently report through different parts of the organization, which has led to a lack of alignment of operational priorities, inefficient and error prone data handoffs, and some lapses that have impacted customers. Recently identified legacy issues related to meter and billing configuration also indicate likely benefits from these groups working in a more formalized team dynamic.

> **Insufficient engineering and project management resources** – There are insufficient engineering resources to support activities, such as managing existing capital projects, monitoring/compliance activities, reviewing private development plans and system connections, and responding to unplanned or emergency needs. Managing the proceeds of the recent $30 million bond referendum and providing technical support and resources to Operations and Process Control and for other Water Resources program development activities will be impossible under current staffing levels, even with the addition of 1.25 FTEs that were part of the bond package.

> **Backlog of water treatment plant projects due to water treatment plant scheduling challenges** – Scheduling limitations with water plant operators and operator/mechanics that were a result of a negotiated compromises between management and union representatives have led to the plant being inefficiently staffed, especially during night and weekend shifts. While the existing staff have accomplished several key projects and maintenance tasks in recent years, despite schedule constraints, overall the inefficient scheduling has contributed to a backlog of maintenance projects and higher-than-needed levels of overtime. In the long term, with more efficient scheduling of resources and possible technological adjustments, the number of FTEs assigned to the Water Plant could decrease and be shifted to other areas of the organization or eliminated (though attrition).

**Organizational Staffing and Structure Recommendations**

Based on the responsibilities, workloads, and the staffing comparisons presented throughout this memo, the Assessment Team believes that the total number of permanent FTEs in Water Resources should ultimately be approximately 45-47.5, compared with the current 43. This is the number of positions, based on current and expected demands, to meet current and desired service levels. However, the Assessment Team believes that the
current distribution of positions is somewhat inefficient, with too many resources allocated to activities such as after-hours water treatment plant operations and relining/construction and too few resources allocated to activities such as PM, engineering, and compliance programs. As such, staffing levels will likely need to increase more substantially in the short term, and then be reduced again through attrition over the long term. The table below highlights the current and proposed permanent FTE staffing levels for the six functional areas within Water Resources.

Table 1: Current and Proposed Staffing Levels

<table>
<thead>
<tr>
<th>Functional Area</th>
<th>Current Staffing Levels</th>
<th>Proposed Staffing Levels – Phase I</th>
<th>Proposed Staffing Levels – Phase II</th>
<th>Proposed Staffing Levels – Longer Term (FY21+)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Water Distribution and Meters</td>
<td>12</td>
<td>9†</td>
<td>9</td>
<td>9</td>
</tr>
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<td>13</td>
<td>13</td>
<td>14</td>
<td>14-15‡</td>
</tr>
<tr>
<td>Water Treatment</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>5³</td>
</tr>
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<td>4</td>
<td>5†</td>
<td>6İ</td>
<td>6-7İ</td>
</tr>
<tr>
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<td>1</td>
<td>2</td>
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<td>46</td>
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1 The proposed organizational structure shifts the meter-oriented positions in Water Distribution and Meters to Customer Service/Billing
2 One of the proposed positions could be a shared maintenance resource between the water and wastewater treatment groups
3 Any reduction in directly allocated resources is dependent on having fully addressed Water Plant maintenance backlog and feasibility of operating plant unattended.
4 Includes 1 to 1.25 FTEs funded by CWRP bond for next four years. Depending on needs, longer term could see addition of an Engineering Technician
5 In the shorter term, this total includes two potential “limited service” or “temporary” positions: a limited service position (Bond projects support) and a potentially “temporary” Wastewater Operator-in-Training (could be eliminated in the future pending other work groups and decreased level of retirement risk in work group). This total also includes a part-time customer care position if additional resources are required after evaluating Phase I Customer Service/Billing reorganization sufficiency. The long-term need for positions will need to be evaluated within a 3-year window.

Table 1 assumes that the recommendations discussed throughout this memo are executed, including:

> Shifting the field customer service/meter personnel from Water Distribution to Customer Service/Billing, to strengthen accountability for metered revenue and enhance customer service (Phase I)
> Adding one permanent engineer (Phase I), as well as an engineering/environmental technician (Phase III), which could be shared between the Water Quality group and the Engineering group (note that in addition to these positions, Water Resources has 1.25 FTEs authorized through the $30 million bond referendum, which will likely be limited service positions).
> Creating a Water Resources Policy and Programs Group, to include a Water Resources Policy and Programs Manager (Phase I), an Environmental Compliance Officer/Water Resources Technician (Phase II), and a reclassified Stormwater Program Coordinator (Phase I)
> Creating a customer service lead position to support water quality program administration (backflow, industrial pollution prevention, FROG), general education/outreach, capital project outreach and
other customer service activities as well as, most importantly, to allow the billing manager to focus on higher level revenue assurance and financial functions (Phase I)

> Adding an operator-in-training position (Phase II) to the Wastewater Treatment Group which could provide additional labor resources to plant staff and ensuring more seamless transitions through some anticipated operator retirements and, as soon as possible, a maintenance position (Phase III) to address the significant backlog of maintenance needs at the three Wastewater Plants and 25 Pump Stations.

> Increasing the Water Treatment Plant’s automation level and changing schedules, so that staffing levels could be reduced through attrition (Phase III) and/or shared with other portions of the organization (e.g. wastewater plant/pump station maintenance).

In addition to the organizational structure changes listed above, each of the proposed positions mitigates organizational or operational risks to Water Resources, as highlighted in the following table.
### Table 2: Risks Addressed by Proposed Additional Positions

<table>
<thead>
<tr>
<th>Phase</th>
<th>Position</th>
<th>Risks Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Water Resources Engineer</td>
<td>Reduces system failures and minimizes operating costs by increasing the ability to deliver critical capital projects and providing a resource to help with program activities such as optimizing operations activities (flushing, IPP, WWTP optimization, metering etc.).</td>
</tr>
<tr>
<td></td>
<td>Water Resources Policy &amp; Programs Manager</td>
<td>Insufficient resources for water quality program development and oversight lead to infrastructure failures and regulatory compliance issues (Integrated Planning, Industrial Pollution Prevention, Backflow program, FROG program, project review program etc.).</td>
</tr>
<tr>
<td></td>
<td>Customer Care II Position</td>
<td>Provides an administrative resource to deal with the neglected activities such as meter replacements, backflow and various other customer service activities, which have already led to revenue losses (meters) and additional system risks (backflow). Allows Billing Manager to focus on higher level revenue assurance and financial functions.</td>
</tr>
<tr>
<td>II</td>
<td>Water Resources Technician/Environmental</td>
<td>Insufficient resources for water quality program inspection, oversight, and enforcement activities lead to infrastructure failures and regulatory compliance issues; insufficient field resources for flow metering program needed for hydraulic/hydrologic model; insufficient resources for sampling program (up to 2 years) needed to evaluate impact of CSOs on Pine Barge Canal.</td>
</tr>
<tr>
<td></td>
<td>Compliance Officer</td>
<td></td>
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<tr>
<td></td>
<td>Wastewater Operator-in-Training</td>
<td>Mitigates the anticipated staff losses due to pending retirements and provides a resource to address the backlog of O&amp;M issues; adds resources for increased process sampling needs at Plants (important to optimization), assists with Industrial Pollution Prevention.</td>
</tr>
<tr>
<td></td>
<td>Water Resources Project Management Support</td>
<td>The many capital projects associated with the $30 million bond referendum surpass the Engineering Group’s capacity for capital project management, which slows the installation of critical infrastructure. Project accounting and logistical project management support are needed to ensure success.</td>
</tr>
<tr>
<td></td>
<td>(Limited Service)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Engineering Technician</td>
<td>Reduces the amount of technician-level work currently being done by engineers, who can more productively spend their time on capital delivery, planning and system optimization.</td>
</tr>
<tr>
<td></td>
<td>Customer Care I Position (Part-time)</td>
<td>Provides an administrative resource to deal with the neglected activities such as meter replacements, backflow and various other customer service activities, which have already led to revenue losses (meters) and additional system risks (backflow).</td>
</tr>
<tr>
<td></td>
<td>Wastewater Maintenance</td>
<td>Mitigates the anticipated staff losses due to pending retirements and allows maintenance staff to address their backlog, which will in turn reduce failures and associated problems.</td>
</tr>
</tbody>
</table>
Introduction

Assessment Purpose
The City of Burlington, Department of Public Works – Water Resources Division engaged Raftelis to perform an organizational review and staffing assessment (Assessment) to assess the effectiveness of the overall organizational structure of Water Resources and its ability to support the program and project management necessary for strong regulatory compliance, stewardship of natural resources, and proper investment in infrastructure. The Assessment focused on identifying performance and resource gaps, inclusive of staffing, as compared with industry best appropriate practices. Periodic objective assessments of different aspects of a utility are critical, as they ensure that the utility is meeting its mission in an effective and efficient manner, and that the utility can deliver sustainable levels of service in the face of evolving internal and external challenges. Such assessments are even more critical when an organization has identified latent challenges, such as those uncovered in late 2017 in its meter-to-cash-billing cycle, while it works to maintain forward momentum on challenges that face most Water Resources utilities: reinvestment in aging infrastructure, an ageing workforce, rate affordability, and meeting new regulatory obligations (e.g. Lake Champlain TMDL). Ultimately, the goal of the Assessment is to present recommendations that provide an opportunity to improve the performance of work processes, reduce long-term costs, and help to ensure a high-functioning organization capable of responding quickly and efficiently to current and future challenges.

The Assessment focuses on the Water Divisions’ organizational structure, staffing levels, and provided/expected service levels. After documenting and commenting on the utility’s current state, the Assessment considers future requirements, gaps that exist between the current and preferred (future) state, and the utility’s ability to address the identified gaps successfully. Finally, the Assessment includes suggested organizational structure changes to the different groups within Water Resources.

Overview of the City of Burlington and the Water Resources Division
The City of Burlington is the main regional center for commerce, tourism and education in northern Vermont. The city has an estimated population of just over 42,000 and a total area of 15.5 square miles. It is located on the eastern shore of Lake Champlain, about 45 miles south of the United States – Canada border. According to Census estimates, the median household income is approximately $46,754, but in 2016 approximately 26% of Burlington residents lived below the federal poverty line, compared to 16% in the state of Vermont.

Burlington is known for its focus on the environment and sustainability. In 2015, the city became the first in the US to run completely on renewable energy, and its Climate Action Plan and related initiatives strive to meet the needs of the present generation without compromising the ability of future generations to meet their own needs. As a result of this focus, the city has been recognized by the United Nations as a Regional Center of Expertise on sustainable development.

History of the Water Resources Division
In 1867, the Burlington City Council adopted a plan to create Burlington City Water Works, to combat waterborne diseases. Using the abundance of Lake Champlain, the City’s water system grew with its population, and in 1880 and 1888, two reservoirs were added with a combined capacity of 7 million gallons. In the early 1900s, the City moved forward with a rapid sand filtration plant to serve approximately 20,700 residents. This plant was expanded in 1948. In 1953 the City added its first wastewater treatment plant. Two additional wastewater plants were built in the early 1960s with all three plants upgrading to secondary treatment by 1973 and receiving a second upgrade in the early 1990s. A new water treatment plant and concrete reservoir covers were completed in 1984 and 1982, respectively.
The Burlington Stormwater Program was initiated in 2009 as part of an ongoing effort to meet state and federal water quality standards for Lake Champlain and other local rivers and streams. The Water Resources Division manages the City of Burlington’s water and wastewater systems, as well as its Stormwater Program.

Organizational Review and Staffing Assessment Methodology

The Raftelis Organizational Review and Staffing Assessment Team conducted interviews with Water Resources’ managers and personnel representing each functional group. These meetings began on August 8, 2018 as part of a previous phase of this engagement, focused on identifying improvements to Water Resources’ meter-to-cash cycle. Additional interviews were conducted with most of Water Resources’ staff, as well as staff from the Department of Public Works that support specific Water Resources activities, from October 15-17, 2018. In addition, the Assessment Team toured the water treatment facility, visited the largest wastewater treatment facility, and reviewed a host of information on the organization.

The Assessment included a review of previous reports and other relevant data including:

- Existing standard operating procedures (SOPs) related to the meter-to-cash cycle;
- Position descriptions;
- The Memorandum of Understanding related to collective bargaining (union) staffing for the Water Treatment Plant; and
- Existing organizational charts.

The Assessment Team compared quantitative and qualitative information against national benchmarking data, regional performance information from peer utilities, and from data gathered from Raftelis’ client database. The Team assessed organizational aspects against the American Water Works Association’s (AWWA) water and wastewater benchmarks and gathered additional benchmarking information from peer utilities of similar size and scope in New England.

The Assessment Team

The Assessment Team that participated in meetings and site visits included individuals with diverse backgrounds in engineering and planning, utility operations, and asset and utility management. Seth Garrison has performed utility management, operations, and staffing assessments all over the world for utilities of every size range from those serving less than 1,500 customers to those serving over one million. He has performed over a dozen reviews for New England utilities similar to Burlington’s Water Resources Division. He has a background in utility management, performance assessment, and asset management, and is a former utility manager, regulator, and current board member of a large regional water and wastewater utility in New England. Catherine Carter, a senior member of Raftelis’ Management Consulting group, specializes in water sector utility strategic planning, assessments, and project management. Specialists in planning and finance from Raftelis assisted the core team by providing reviews of the Water Resources information, insights, and recommendations.
Staffing Assessment
Water Resources, City of Burlington

Organizational Structure, Staffing, and Other Considerations

Water Resources is a division of the City of Burlington, Department of Public Works (DPW). Water Resources consists of six general sectors of operation: Water Distribution and Meters, Wastewater Treatment, Water Treatment, Engineering, Stormwater, and Customer Service/Billing. Each group reports to the DPW Assistant Director for Water Resources. There are 43 full time equivalent (FTE) positions in Water Resources, which currently includes one vacancy. These full-time positions do not include the part-time, temporary position in the Customer Service/Billing group or the three temporary positions in the Water Distribution group. Water Resources also typically employs 1-3 interns for tasks within various groups, including wastewater, stormwater, and engineering. There is modest amount of labor sharing between Water Resources and the DPW Streets Division, which provides some maintenance and construction services for the Stormwater and Wastewater systems. Figure 1, on the next page, depicts the organizational structure of the Water Resources Division.

The general responsibilities of the Water Resources Division include, but are not limited to, the following:

- Operating and maintaining the water treatment facility and three wastewater treatment facilities;
- Staffing the water treatment facility 24 hours a day, 7 days per week, and the wastewater facilities 7:00 AM – 3:00 PM, Monday through Friday, with additional shifts over the weekend or as needed during irregular flow events;
- Performing routine sample collections and monitoring, including monitoring for illicit discharges;
- Capital planning, project management, and capital construction;
- Compliance reporting for water, wastewater, and stormwater;
- Handling customer inquiries and outreach regarding billing, water quality, etc.;
- Billing customers for water, wastewater, and stormwater;
- Financial management, analysis and forecasting, and budgeting for Water Resources;
- Developing and managing grants, loans and other issuances of debt;
- Meter installation, reading, testing, and maintenance;
- Operating and maintaining the water distribution and wastewater collection networks;
- Developing and managing stormwater programming to reduce combined sewer overflows (CSOs);
- Completing the stormwater project review process for development permits;
- Marking lines in a timely manner for DigSafe;
- Public outreach (facility tours, school visits, etc.); and
- Development and publication of water quality reports

Subsequent sections describe each group within Water Resources (responsibilities, staffing levels, etc.), as well as recommendations for improving each group’s service delivery ability.
Figure 1: Current DPW Organizational Structure

Staffing Assessment
Water Resources, City of Burlington
Staffing Assessment
Water Resources, City of Burlington

**Water Resources Staffing Recommendation Overview**

Based on the responsibilities, workloads, and the staffing comparisons presented throughout this memo, the Assessment Team believes that the total number of permanent FTEs in Water Resources is close to, but slightly lower, than the number of positions that will eventually be required to meet current and desired service levels. However, the Assessment Team believes that the distribution of those positions is somewhat inefficient, with too many resources allocated to activities such as water treatment plant operations and maintenance (O&M) and too few resources allocated to activities such as preventative maintenance (PM), engineering and compliance programs. As such, staffing levels will likely need to increase more substantially in the short term, and then be reduced again through attrition over the long term. The table below highlights the current and proposed permanent FTE staffing levels for the six functional areas within Water Resources.

**Table 2: Current and Proposed Staffing Levels**

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4 Includes 1 to 1.25 FTEs funded by CWRP bond for next four years. Depending on needs, longer term could see addition of an Engineering Technician

5 In the shorter term, this total includes two potential “limited service” or “temporary” positions: a limited service position (Bond projects support) and a potentially “temporary” Wastewater Operator-in-Training (could be eliminated in the future pending other reorg goals and decreased level of retirement risk in work group). This total also includes a part-time customer care position if additional resources are required after evaluating Phase I Customer Service/Billing reorganization sufficiency. The long-term need for positions will need to be evaluated within a 3-year window.

Table 2 assumes that the recommendations discussed throughout this memo are executed, including:

- Shifting the field customer service/meter personnel from Water Distribution to Customer Service/Billing, to strengthen accountability for metered revenue and enhance customer service (Phase I)
- Adding one permanent engineer (Phase I), as well as an engineering/environmental technician (Phase III), which could be shared between the Water Quality group and the Engineering group (note that in addition to these positions, Water Resources has 1.25 FTEs authorized through the $30 million bond referendum, which will likely be limited service positions).
> Creating a Water Resources Policy and Programs Group, to include a Water Resources Policy and Programs Manager (Phase I), an Environmental Compliance Officer/Water Resources Technician (Phase II), and a reclassified Stormwater Program Coordinator (Phase I)

> Creating a customer service lead position to support water quality program administration (backflow, industrial pollution prevention, FROG), general education/outreach, capital project outreach and other customer service activities as well as to allow the billing manager to focus on higher level revenue assurance and financial functions (Phase I)

> Adding an operator-in-training position (Phase II) to the Wastewater Treatment Group, which could provide additional labor resources to plant staff and ensuring more seamless transitions through some anticipated operator retirements and, as soon as possible, a maintenance position (Phase III) to address the significant.

> Increasing the Water Treatment Plant’s automation level and changing schedules, so that staffing levels could be reduced through attrition (Phase III) and/or shared with other portions of the organization (e.g. wastewater plant/pump station maintenance).

Note that Raftelis has laid out both its short and long-term staffing recommendation for Water Resources, but the sequencing of the changes should have some flexibility. This will allow Water Resource to adjust staffing based on the changing schedules of capital and programmatic activities, as well as the changing nature of regulatory compliance activities. Water Resources’ long-term proposed organizational chart is shown in Figure 2.
Staffing Assessment
Water Resources, City of Burlington
Figure 2: Proposed Water Resources Organizational Chart

Note: Existing positions are shown in blue, recommended positions are shown in green, and existing positions that have moved to a new group are shown in orange. Reallocation or reduction of the number of Water Treatment positions can only occur once project backlog of maintenance is reduced.
While the proposed total number of positions is close to what exists now within Water Resources, the proposed arrangement of FTEs will likely take a few years to achieve, given several factors:

> The collective bargaining agreement (including the Memorandum of Understanding) governing Water Treatment Plant staffing is not currently configured to allow for single-operator or unattended shifts, as detailed in a separate Water Treatment Plant Staffing and Scheduling Memo prepared by Raftelis for Water Resources. In addition, the lack of full automation prevents unattended operations. Changes to union agreements and equipment (including SCADA) would be required to reduce the number of FTEs in the Water Treatment group. This reduction would likely occur through attrition due to retirements or employee departures but could occur through cross-training with Wastewater Maintenance.

> Existing employees may not want to switch positions, and/or may lack the expertise to fill the proposed new positions.

> Water Resources has a need for updated and formalized standard operating procedures (SOPs) and policies, to support individuals moving into new positions.

For Water Resources to return to approximately the same staffing level after an initial increase in its number of positions, the organization needs to be strategic in how it allocates resources, including its use of contractors/consultants. The Assessment Team found that in several instances, PM activities like hydrant and valve maintenance were performed infrequently or inconsistently. Instead, crews are focusing on projects that could reasonably be contracted out, such as water main re-lining/replacement and service installations. While it may seem cost-effective in the short term to use employees rather than contractors for some activities, doing so deters delivering core maintenance activities, which impacts long-term costs. Contractors/consultants should be used for non-core activities and/or when using them provides lower long-term costs and higher service levels. Water Resources currently has a significant backlog in several operational areas, including large meter testing, valve exercising, line flushing, and hydrant inspection/maintenance activities. Many utilities perform these activities using in-house resources since they are core activities of the utility and it’s hard to outsource them at lower costs. Construction activities, such as pipe re-lining and replacement, require special equipment that is not utilized year-round by utilities in the Northeast. That is why very few perform these activities in-house. Certain programmatic activities like backflow programs and design services require certifications and unique expertise. Utilities sometimes do these activities in-house and sometimes contract them out, depending on the nature of the work. Water Resources should thoroughly look at the pros and cons of each approach.

**Water Resources Management Considerations**

As part of this staffing evaluation, the Assessment Team considered the need for additional positions within Water Resources’ senior leadership team, which currently consists of the Assistant Director – Water Resources, Utility Billing Administrator, the Senior Engineer, the Wastewater Facilities Manager, and the Stormwater Program Manager. These supervisory/management positions assist in handling policy formation, financial planning, the development of programs and an array of complex special projects that Water Resources frequently encounters. Many of these activities are currently handled by or require the significant participation of the DPW Assistant Director of Water Resources. The Assessment Team considered a deputy for the Assistant Director, because of these responsibilities and given that position’s span-of-control (six direct reports). The deputy position would lessen the manager-to-reports ratio and allow the Assistant Director to focus more time on personnel management, visiting work sites, process improvements, state-wide policy and legislative engagement activities, leading efforts to update the City’s water and wastewater ordinances, and leading and/or overseeing new program development. Ultimately, the Assessment Team concluded that the organization should make the other changes outlined in the report first, including expanding the job functions of key existing personnel (e.g. elevating Utility Billing Administrator to be the Customer Care and Finance
Staffing Assessment
Water Resources, City of Burlington

Manager) and adding programmatic support through the creation of the Water Resources Policy and Programs Manager position, as they will add additional capacity and may accomplish the same goal of increasing the Assistant Director's capacity to focus on long-term, big picture action items. Increasing available FTEs at the Customer Care level could also provide some lower level administrative support (scheduling, logistics, filing) to the Assistant Director, which would allow the Assistant Director to focus on higher level tasks. Water Resources should reexamine this decision after the other recommended organizational changes are made.

Given that the Assessment’s proposed changes will take time to achieve and execute, the Assessment Team has considered the sense of priority for adding new positions. A suggested schedule for hiring is shown by phase in Table 3 above. In the Assessment Team’s opinion, all these positions are relatively high priority, but the highest priority positions to advance are the Water Resources Policy and Programs Manager (with an associated downgrade of the Stormwater Program Manager position to Stormwater Coordinator), the Customer Care II position, and at least one of the additional Engineers/Engineering group positions, due to the heightened level of activity related to the bond referendum and capital projects. Subsequently, the other positions relating to Water Resource Programs, Engineering, and Wastewater Facilities should be addressed. Once these positions have been added and the organization has an opportunity to adjust to the new staff, other positions should be analyzed and evaluated. A suggested timeline for organizational changes is discussed later in the Assessment.

Organizational Structure Considerations

Like many other municipalities in New England, Water Resources’ organizational structure has clearly defined groups to support activities related to water treatment and distribution; wastewater treatment; facilities maintenance; meter reading and maintenance; customer service and billing; engineering, etc. Historically, this organizational structure has worked reasonably well in Burlington and at numerous other utilities. However, managing water, wastewater, and stormwater are becoming more complex, demanding multidisciplinary approaches and highly coordinated activities rather than compartmentalized solutions. Regulations are changing rapidly and evolving to encompass new areas and requirements. This changing environment stresses the traditional utility organizational structure because of the following historical characteristics:

- Change happened slowly. Infrastructure was designed to last decades, many activities were routine or repetitive (sampling, PM, etc.), and regulations changed infrequently.

- Employees generally had a long tenure in their positions, learning through experience from more senior and longer tenured employees. Utilities lacked well-developed training programs because employees had time to learn by doing.

- There was a limited pool of potential employees that had operator licenses and/or the required skills to fill positions, so the utility grew and developed these skills internally. This internal skill development was beneficial in that developing systems and training modules to support employees helped to foster internal advancement and operational redundancy.

- Employees accepted the reality that opportunities for career advancement were infrequent. Advancement often required the person filling the position above them to retire. Many employees preferred to spend their full career with a utility, so a gradual hands-on training and development program ensured that when opportunities arose, staff were well-positioned and qualified to advance.

These historical characteristics are prevalent across the utility industry today but appear to be slowly changing to adjust to the new paradigm. According to the AWWA, the average new utility employee will stay in a position for a much shorter duration than their predecessors have. The industry average tenure is now 5-7 years for new employees, where it was common to have employees with more than 20 years of service in the past. With the mass retirement of operators and the overall reduction in public sector employees in the northeast, it is becoming very hard to find qualified people for utility positions. Most utilities find it very challenging to hire
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qualified people who are willing to work in positions where advancement is relatively slow and the pay is less than in the private sector.

Water Resources can follow the lead of many other progressive utilities by considering organizational changes and building programs that accommodate a more dynamic workforce and job market, as well as the long-term needs of the utility. While the Water Division is not facing a mass wave of retirement immediately, the employees in several key positions will be eligible for retirement in the next 2-5 years. The Division’s success will depend on its ability to build the necessary structure and implement training and development programs to position staff to grow professionally, and to ensure that its wage compensation is commensurate with other water resources utilities in the region. The organizational structure changes could occur over several years, which would give employees, the City of Burlington, and labor union ample time to adjust.

Other Resource Needs

Additional resources may be necessary to support efficient and effective staffing. Simply adding new positions without giving them the tools and resources to do their jobs efficiently is a waste of money. The tools include items like appropriate software and specialized equipment. New technology additions could include an Interactive Voice Response (IVR) phone system for routing calls after hours and when the phones are busy; a backflow software program or module (or outsourcing this activity); a Computerized Maintenance Management System (CMMS) program to track PM and other asset management activities; and billing system upgrades. These resources are linked directly to Water Resources’ success and should be considered as the organization evaluates shifting positions and staffing levels. As mentioned previously, several of the operational areas within Water Resources would benefit from updated and formalized policies and SOPs. Billing/Revenue Assurance SOPs are being evaluated and updated as part of a separate scope of work between Raftelis and the Water Resources division.
Water Distribution/Meters

The City of Burlington has approximately 122 miles of water mains in its distribution system, as highlighted in the figure below. While water pipes generally last 75-100 years or more (depending on installation and soil conditions), almost half of Burlington’s system is more than 75 years old, and almost 25% is more than 100 years old. The system’s age presents challenges because main breaks and leaks generally occur more frequently as pipes age, and reactive repairs tends to be more expensive. The City also has more than 900 hydrants, which are critical for public fire protection.

Figure 3: Water Mains Operated and Maintained by Water Resources

Water Resources meters just over 10,200 accounts within the City. The following table shows the distribution of water meter sizes.
Table 3: Meter Sizes and Numbers of Customers

<table>
<thead>
<tr>
<th>Water Meter Size</th>
<th>Number of Customers*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/8”</td>
<td>8,183</td>
</tr>
<tr>
<td>3/4”</td>
<td>934</td>
</tr>
<tr>
<td>1”</td>
<td>417</td>
</tr>
<tr>
<td>1.5”</td>
<td>217</td>
</tr>
<tr>
<td>2”</td>
<td>411</td>
</tr>
<tr>
<td>3”</td>
<td>24</td>
</tr>
<tr>
<td>4”</td>
<td>13</td>
</tr>
<tr>
<td>6”</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note: This list includes residential and commercial services, but does not include separate fire lines

Organization

There are 12 full-time equivalents (FTEs) in the Water Distribution/Meter Analysts group. This group includes a Water Resources Manager (also referred to as Field Services Manager) and one currently vacant position. The group has three working foremen and eight water distribution/meter analysts, as well as three temporary positions. Though some cross-training has occurred within this group, two of the technicians focus primarily on meter installation and maintenance, meter reading and verifications, site visits to resolve scheduled and emergency meter issues, and service terminations, while the other six are focused on maintaining the distribution system. One of the working foremen has also been designated to split time between meter activities and responding to DigSafe requests, with the latter requiring most of his time each week. This resource arrangement essentially results in a meter crew of two people and two distribution crews of four people.
Existing and Future Service Levels

Water Distribution

The Water Distribution group is responsible for performing skilled maintenance, repairs, and construction work on Water Resources’ water distribution system. This includes water main repair and replacement, pipe relining, and PM activities like exercising valves, line flushing, and testing hydrants. For the last three years or so, one of the most significant projects for this group has been pipe re-lining, which was done through contractors for the first year, but still required significant effort from Water Resources’ staff. The project is now being performed through a combined group of contractors (primarily for open dig replacement and the relining itself) and in-house resources. Water Resources allocated in-house resources to the project to reduce contractor costs, accelerate the schedule to improve outcomes for the public, and to more fully utilize crews, who did not have a structured program for meter, valve, hydrant and main maintenance that fully occupied their time.

In order to complete the PM activities are recommended by the industry and documented in various AWWA specifications and manuals, Water Resources needs to reevaluate the ratio of services provided in-house vs. contracted out and consider how that ratio could be optimized to ensure that critical maintenance activities are accomplished. Specifically, the Assessment Team believes that Water Resources should have its crews focused primarily on executing a well-defined PM program and addressing system failure (leaks and breaks), while predominantly using contractors for capital improvements and pipe re-lining/replacement. A well-defined PM program would include schedules for distribution system inspections, testing, and maintenance. For example, AWWA recommends exercising all valves in a system at least every three years, inspecting and maintaining hydrants on a regular schedule, conducting unidirectional main flushing annually, and inspecting and
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Maintaining curb boxes. A structured program to address these needs is not being conducted at Water Resources. Contractors can and do perform some of these PM activities at other systems, but they are almost always done by specialty contractors at a premium price. In addition, contractors usually help for a finite period to resolve significant backlogs or to kick-start a new programmatic effort. The Assessment Team does not believe that using contractors is a good long-term solution for PM. PM is a core activity of a utility and Water Resources appears well-equipped and staffed to do this type of work. There is more than enough PM and emergency work to keep the existing distribution staff busy in perpetuity.

The following table highlights water distribution staffing levels at other regional utilities in New England. Note that this table is for comparative purposes only and does not purport to convey a ranking of performance by metric. In some cases, there may be fewer staff, but also lower levels of performance and service. Each organization is not performing exactly the same activities making direct comparisons impossible. Assuming that three of the FTEs in Water Resources’ group are exclusively focused on meter activities and DigSafe response, the group has eight FTEs focused on water distribution activities, plus the Water Resources Manager. This is generally in line with the resources available at other utilities.

Table 4: Water Distribution Staffing Levels at New England Utilities

<table>
<thead>
<tr>
<th>Organization</th>
<th>Organization Type</th>
<th>Approximate No. of Connections</th>
<th>Average Flow: Water (MGD)</th>
<th>Water Distribution Staff</th>
<th>Average MGD/FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowell Regional Water</td>
<td>City Department</td>
<td>25,000</td>
<td>15</td>
<td>17</td>
<td>0.88</td>
</tr>
<tr>
<td>Billerica Water Department</td>
<td>City Department</td>
<td>12,460</td>
<td>4</td>
<td>6</td>
<td>0.66</td>
</tr>
<tr>
<td>Portland Water District</td>
<td>Quasi-Municipal</td>
<td>65,000</td>
<td>21.5</td>
<td>40</td>
<td>0.54</td>
</tr>
<tr>
<td><strong>Burlington Water Resources</strong></td>
<td>City Department</td>
<td><strong>10,200</strong></td>
<td><strong>4</strong></td>
<td><strong>8</strong>*</td>
<td><strong>0.50</strong></td>
</tr>
<tr>
<td>Waterbury Bureau of Water</td>
<td>City Department</td>
<td>28,000</td>
<td>14.5</td>
<td>30</td>
<td>0.48</td>
</tr>
<tr>
<td>Manchester Water Works</td>
<td>City Department</td>
<td>29,200</td>
<td>17.5</td>
<td>40</td>
<td>0.43</td>
</tr>
<tr>
<td>Lawrence Water and Sewer Division</td>
<td>City Department</td>
<td>12,000</td>
<td>7</td>
<td>19</td>
<td>0.37</td>
</tr>
<tr>
<td>Haverhill Water Division</td>
<td>City Department</td>
<td>17,100</td>
<td>5.3</td>
<td>16</td>
<td>0.33</td>
</tr>
<tr>
<td>Pennichunk Water Works</td>
<td>Private</td>
<td>24,000</td>
<td>10.2</td>
<td>33</td>
<td>0.31</td>
</tr>
</tbody>
</table>

*Note: Water Resources staff shown are those primarily focused on maintaining the distribution system; this does not include meter-focused positions nor the general 1 FTE allocated to DigSafe marking.*

Meter Analysts
The Meter Analyst group is responsible for all things meters, including meter installation/removal, reading, testing, and maintenance. Water Resources uses a vehicle-based meter reading system Automatic Meter Reading (AMR) system, which was recently upgraded to achieve a more than an 80% reduction in the amount of time necessary to do an initial read of all of Burlington’s water meters, from 2-3 days, to approximately four hours.
After the initial read, meter analysts pull an exception report and work with customer service to follow up on bad reads. Depending on the cause of the bad reads, meters may be pulled for testing and/or replaced.

The two meter analysts who focus exclusively on meters are rarely able to perform the testing and replacement activities recommended by the industry in order to ensure that the systems’ meters are reading accurately and that all consumption is being captured and transmitted appropriately. Water Resources has a significant backlog for meter testing and replacement. Many meters have passed their useful life and are well beyond the testing frequency for their size as recommended by the AWWA, which states that testing as frequently as annually may be appropriate for larger meters (AWWA M6 Manual, pg. 58). Leaving meters in place past their useful life often means the utility is losing revenue, since meters lose accuracy and under-register usage over time (AWWA M6 Manual, pg. 59). This is most concerning for larger meters, because of the relatively high flows they record. Water Resources should be able to reduce its backlog and meet required testing standards over time, if resources are dedicated to these functions as described in this document.

The Assessment Team goes into more detail about addressing the significant backlog of meters that are overdue for testing and/or replacement in a separate Meter-to-Cash memo. In summary, utilities have employed a wide variety of techniques to reduce their backlog. Hiring temporary staff or a contractor to perform systematic replacements/testing is common, especially when a large percentage of the meters are old and there is a desire to replace them with new technology. Several outsource large meter testing. Other systems have tried to optimize resources for greater efficiency. For example, they have purchased more automated meter test benches or conducted studies to try and determine which meters are losing the most revenue, so they can prioritize their efforts. In the Assessment Team’s opinion, many of the short-term solutions perpetuate the same problem — not devoting appropriate ongoing resources to meter testing and replacement. The Assessment Team believes that the best solution is to have a consistent program with appropriate resources that test/replace a suitable fraction of the meters every year. Using this approach will get Water Resources to where they need to be over the long term.

The following table highlights meter-related staffing at Water Resources and other New England utilities.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Organization Type</th>
<th>Approximate No. of Accounts</th>
<th>Total Meter Staff</th>
<th>Meter Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Champlain Water District</td>
<td>Quasi-Municipal</td>
<td>6,500</td>
<td>5</td>
<td>1 Retail foreman, 4 meter readers</td>
</tr>
<tr>
<td>Kennebunk, Kennebunkport, and Wells</td>
<td>Quasi-Municipal</td>
<td>14,000</td>
<td>5</td>
<td>1 Meter reader, 1 meter shop technician, 3 field ops positions</td>
</tr>
<tr>
<td>Portland Water District</td>
<td>Quasi-Municipal</td>
<td>65,000</td>
<td>4</td>
<td>1 Customer service position, 3 field operations positions</td>
</tr>
<tr>
<td>Portsmouth Water Division</td>
<td>City Department</td>
<td>12,000</td>
<td>3</td>
<td>1 Supervisor, 2 meter technicians</td>
</tr>
<tr>
<td><strong>Burlington Water Resources</strong></td>
<td><strong>City Department</strong></td>
<td><strong>10,200</strong></td>
<td><strong>2</strong></td>
<td><strong>2 Meter analysts</strong></td>
</tr>
</tbody>
</table>

Raftelis found that Water Resources’ staffing levels are appropriate for reading meters and responding to customer service requests, especially with the transition to AMR. However, Water Resources will need to assign additional FTEs or fully dedicate the existing FTEs to the metering functions to initiate a more sustainable
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meter and backflow management approach, including testing/replacing meters on a more regular basis. One way to accomplish this would be to streamline the DigSafe function and perhaps shift responsibility to one of the other individuals in Water Distribution, to allow one of the Working Foreman to focus exclusively on meters, help to reduce the backlog in this area, and to provide additional redundancy for the group. Executing the DigSafe program reportedly requires most of one FTE. However, other utilities have found that better mapping (GIS), improved locating/management tools, and better routing have reduced the time requirements to address DigSafe requests. If re-lining projects are transitioned to being implemented more fully by contractors, Water Distribution should have a greater bench of available resources. Raftelis recommends either assigning a single Water Distribution employee to respond to DigSafe requests or rotating the responsibility between several employees. These options would allow the Working Foreman to assist the other meter technicians with proactive meter activities, while reducing the backlog of maintenance, meter testing, and other activities.

Water Distribution/Meter Analyst Recommendations

The following discussion outlines recommendations for the Water Distribution/Meter Analyst group.

Use a Contractor to Complete Re-lining and Replacement Projects

Recommendation: Re-focus Water Distribution personnel on completing essential, currently neglected, PM activities, leaving one FTE, most likely a Working Foreman, to coordinate with an assigned Water Resources engineer and the contractor to ensure quality work.

A considerable percentage of Water Distribution’s available resources is currently supporting re-lining projects, leading to lapses in PM. Initially, these projects used contractors, but were moved in-house to better manage coordination, improve performance, accelerate schedules, and reduce lining project costs. While the Assessment Team recognizes that re-lining projects can be completed less expensively using internal resources, use of internal staff comes at the expense of other core functions. While one person in Water Distribution should still be assigned to coordinate with the contractor and ensure high-quality work, reducing the FTEs involved in the larger scale capital projects allows the rest of the Water Distribution group to address the PM backlog, and absorb the DigSafe responsibility from the meter crew.

Move the Meter Analyst Group under the Utility Billing Administrator

Recommendation: Move the three meter services FTEs (two analysts and one working foreman) from Meter/Distribution Field Services to Customer Service, so that everyone touching the meter-to-cash cycle reports to a single manager, while ensuring that these three FTES are made available to Field Services during emergencies when extra personnel are needed.

Customer Service and Meter Services are collectively responsible for the meter-to-cash cycle, so coordination is paramount. These groups now report through different parts of the organization, which has led to a lack of alignment of operational priorities, inefficient data handoffs, and some lapses that impact customers. Many utilities have elected to include meter service functions in their customer service groups to address these challenges, with meter services either reporting to a customer service manager exclusively, or to both a customer service manager and a field services manager via a dotted line reporting structure. The Assessment Team believes that there is enough work to have dedicated field resources working in and reporting to the Utility Billing Administrator (Customer Care and Finance Manager). Of course, during emergencies these Meter Services staff members would remain available to assist with main repairs, snow plowing, and other duties. It would also be expected that Distribution Field Services might also, from time to time, assist Meter Services during emergencies or staff shortages and vice versa.
DigSafe Responsibility

**Recommendation:** Streamline the DigSafe response process and assign it to Water Distribution.

Executing the DigSafe program reportedly requires most of one FTE. It is unclear whether there are things that can be done to reduce this burden. Other utilities have found that better mapping (GIS), improved locating/management tools, and better routing have reduced the time requirements to address DigSafe requests. The assigned individual that handles DigSafe requests now is part of the three-person meter team, which means that the meter group operates short-handed much of the time. If re-lining projects are handled by contractors, Water Distribution should have a greater bench of available resources. Rotating responsibilities so that a Water Distribution employee could support the DigSafe program would allow the Working Foreman to assist the other meter technicians with proactive meter activities, as well as address the backlog of maintenance, meter testing and other activities. It would also allow Water Resource to understand and measure the various elements that contribute to the productivity of the program.
Wastewater Facilities Group

Burlington has three wastewater plants to treat raw sewage: Main Plant (13 MGD peak capacity, designed for 5.3 MGD in dry weather), East Plant (1.2 MGD capacity), and North Plant (2.0 MGD capacity). Domestic and industrial sewage is treated to levels that ensure public health and the biological integrity of the waters that receive discharges from these facilities, with the product being highly treated water that meets stringent federal standards. Additionally, much of the City’s stormwater is collected and treated at the Main Plant prior to discharge into Lake Champlain. In addition to being responsible for O&M at the three wastewater treatment plants (WWTPs), the Wastewater Facilities group also operates and maintains the system’s 25 pump stations.

The Main Plant was originally constructed in 1953, the North Plant in 1961, and the East Plant in 1963. All three plants were upgraded in the early 1970s to provide secondary treatment (biological treatment and improved pollutant removal). The plants were upgraded again in the late 1980s and early 1990s to improve biological nutrient removal and at Main Plant, to add the wet weather treatment system, detailed in the figure below.

![Treatment Process at the Main Plant: Dry and Wet Weather](image)

Organization

The Wastewater Facilities group has 13 FTEs, including the Wastewater Facilities Manager. The group is subdivided into Main Plant and Biosolids Operators (three plant operators and one senior plant operator); Wastewater Plant Mechanics (one plant mechanic and one senior plant mechanic); and Plant Operators for the North and East WWTP and Pump Stations (five plant operators and one chief operator). The organizational chart below shows that the Main Plant and Bio Solids Operators and the Wastewater Plant Mechanics report to the Wastewater Facilities Manager, while the Plant Operators for the North and East WWTPs and Pump Stations report to the Chief Operator, who then reports to the Wastewater Facilities Manager. The plant operators are not typically shared between the three WWTPs, and little cross-training between the Main Plant and the North or East Plants has been conducted. One of the plant operators has been designated to manage the laboratory sampling and other activities. Typically, the WWTPs are staffed 7:00 AM – 3:00 PM, Monday through Friday, with partial shifts over the weekend and operators on-call to respond in the event of extreme wet weather events.
Existing and Future Service Levels

The Wastewater Facilities group is responsible for operating and maintaining the system’s three WWTPs and 25 pump stations. While a thorough evaluation of the treatment plants was outside the scope of this Assessment, the Raftelis team did discuss the infrastructure with the Wastewater Facilities leadership and operators. Generally, the plants are reported to be in fair condition, with two significant upgrades and numerous minor upgrades anticipated for the next five years, as a result of the recently approved bond referendum. The referendum included approximately $1 million for disinfection upgrades and $4 million for clarifier upgrades. While the plants are automated at a fairly high level, and not staffed full time, further opportunities for automation were reported. Though some pump stations were reported to be in fair condition due to recent upgrades and increased contractor utilization, 11 have been identified as needing near term upgrades and were included as part of the recent bond issuance.

While not part of this study, the Assessment Team noted that it is very unusual for a community the size of Burlington to have three separate WWTPs. This situation was discussed with WWTP operations staff, who pointed out several major engineering challenges with combining facilities as well as the historical and geographic reasons for multiple facilities. The opportunities and challenges associated with combining facilities should be reviewed by an engineering firm. This review should consider not only capital costs, but also the long-term costs associated with permit compliance, operations, staffing and maintenance.
The Wastewater Facilities group manages to fulfill its major functional responsibilities, but several people in the group are relatively close to retirement, and there is minimal redundancy in skills. This will create some gaps in the near future and/or increased overtime. It may also lead to additional deferred maintenance.

One operator at the Main Plant has been designated as having laboratory subject matter expertise, but laboratory duties for processing samples and conducting testing are shared as part of a rotation at the Main Plant, with some laboratory work being outsourced. While Wastewater Facilities has on-call contracts for some maintenance support activities (e.g. HVAC, electrical, and plumbing), maintenance in general presents a challenge both because the group that does it at the WWTPs is small and the learning curve is steep. Shifting or sharing maintenance resources with the water treatment plant would be helpful to address this gap. Additionally, Water Resources does not have an in-house instrumentation resource, so those activities need to be outsourced.

The following table shows a staffing comparison with other wastewater treatment groups in New England.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Organization Type</th>
<th>Approximate Population Served</th>
<th>Wastewater Staff</th>
<th>Number of WWTPs</th>
<th>Average Flow – Wastewater (MGD)</th>
<th>Wastewater MGD / Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowell Wastewater City Department</td>
<td>100,000</td>
<td>21</td>
<td>1</td>
<td>30</td>
<td>1.43</td>
<td></td>
</tr>
<tr>
<td>Waterbury WPC Department</td>
<td>110,000</td>
<td>24</td>
<td>1</td>
<td>21</td>
<td>0.88</td>
<td></td>
</tr>
<tr>
<td>Haverhill Wastewater Division City Department</td>
<td>65,000</td>
<td>13</td>
<td>1</td>
<td>10</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>Nashua Wastewater Department City Department</td>
<td>100,000</td>
<td>20</td>
<td>1</td>
<td>11</td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>Portsmouth Wastewater Division City Department</td>
<td>22,000</td>
<td>13</td>
<td>2</td>
<td>5.9</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td><strong>Burlington Water Resources</strong> City Department</td>
<td><strong>42,000</strong></td>
<td><strong>13</strong></td>
<td><strong>3</strong></td>
<td><strong>5.3</strong></td>
<td><strong>0.41</strong></td>
<td></td>
</tr>
<tr>
<td>Billerica Wastewater Division City Department</td>
<td>45,000</td>
<td>12</td>
<td>1</td>
<td>3.9</td>
<td>0.33</td>
<td></td>
</tr>
</tbody>
</table>

Discussions with both the Wastewater Facilities group and Water Resources leadership identified a need for increased laboratory activity in the future, with more frequent sampling and testing due to the need for tighter process control, as well as a concern for the lack of redundancy in the group, particularly amongst the maintenance staff, which leads to decreased service levels and gaps in PM. The maintenance function will be increasingly important as infrastructure continues to age and the utility begins the many capital projects discussed previously.

**Wastewater Facilities Recommendations**

The following discussion outlines recommendations for the Wastewater Facilities group.
Designate Laboratory Resources

**Recommendation:** Continue concentrating one FTE in a laboratory role and add an additional Operator-in-Training or Wastewater Technician position.

Water Resources leadership recognizes that more stringent regulatory requirements have increased the need for laboratory resources dedicated to sampling and testing, as well as enhanced process controls and data analysis. By focusing one FTE on the laboratory, but allowing them to help in other operations capacities during emergencies or when short staffed, Water Resources creates some needed backup capacity. Where it makes economic sense, Water Resources could also expand the number and types of testing completed on-site and/or bring some of the work that has been outsourced back in-house. Again, this should only occur where there is a clear cost savings and measurable operations benefit.

There are pluses and minuses to consider if the lab-focused position is moved out of the Main Plant’s work rotation. On the plus side this may allow the position to perform additional testing, but on the minus side it would stress the rotation for the other operators. Adding either an Operator-in-Training or a Wastewater Technician position, to be shared across the three plants, could be beneficial to cover some service gaps created and provide additional redundancy for the Wastewater Facilities group. There may even be an opportunity to have the position participate in the on-call rotation for each WWTP. However, this would require a good familiarity with each plant and deliberate cross-training. Note that Raftelis believes that the lab-focused position should be held by a licensed operator who has the skills and training to assist with operating the plant. In our opinion, Water Resources does not have a large enough operation to justify a dedicated lab manager that does not have operator capabilities.

Add an Additional Maintenance Employee

**Recommendation:** Designate an additional FTE to the Wastewater Maintenance group.

The Wastewater Maintenance group represents an organizational risk for Water Resources. One of the two employees in this group is senior and has accumulated considerable benefits, including four weeks of vacation time each year. The time required for a new employee to become fully productive in this area is long, because of the varied responsibilities and technical competencies required. The upcoming capital projects will stretch this group further. Creating a position within this group would also allow Water Resources to address some of the backlog of maintenance work, attend to the upcoming capital work and provide a succession plan for the departure of the two senior employees. It may also allow Water Resources to perform some of the work that is currently being outsourced – for example, if the person hired had instrumentation expertise, Water Resources could save on contractors, and potentially use that expertise to support both Water and Wastewater.

**Recommendation:** Study the full costs and opportunities of combining WWTPs.

The Assessment Team noted that it is very unusual for a community the size of Burlington to have three separate WWTPs. The opportunities and challenges associated with combining facilities should be reviewed by an engineering firm. This review should consider not only capital costs, but also the long-term costs associated with permit compliance, operations, staffing and maintenance. Note that this is a long-term recommendation that should not impact planned-short term wastewater projects anticipated as part of the $30 million bond. It should be approached as a 20 plus year program of changes.
Water Treatment Group

The Water Treatment Group manages water production and storage and is responsible for the Burlington Water Treatment Plant (WTP), the reservoir, two high tanks, and the reservoir pump house, as well as the old ground tank at Redstone tank. The WTP has a maximum capacity of 10 MGD, and an average production of 3.5-4 MGD. The plant treats the water it produces to Safe Drinking Water Act (SDWA) standards, which is reportedly straightforward compared to many other WTPs, given the high-quality, stable water in Lake Champlain. Operations staff report that raw (source) water turbidity is frequently below .5 NTU and typically is less than 3 NTU during seasonal lake turnover and during large storms. Water Resources is a member of the Partnership for Safe Drinking Water, which offers tools to improve performance above and beyond even proposed regulatory levels. Maintaining membership requires meeting water quality standards that are typically more stringent than State requirements.

Burlington’s WTP adds a basic array of chemicals including coagulants, chlorine (Sodium Hypochlorite), fluoride, and an orthophosphate corrosion inhibitor to reduce lead and copper levels. Chemical addition and pumping are controlled by a Supervisory Control and Data Acquisition (SCADA) system in the WTP’s control room. This technology allows the operators to run the plant primarily from the control room. Given the stable nature of the source water quality, relatively few operational changes are required per shift to maintain water quality that complies with SDWA standards. Water Treatment staff report that the water quality in Lake Champlain is sufficiently predictable that neither jar testing nor the use of filter columns is required.

Perhaps the biggest challenge in operating and maintaining the WTP is its age. The WTP has been updated and modified many times over its 100 plus year history with the last significant upgrade occurring in the 1980s. For a WTP of that age, the facility is reasonably well-maintained and operating as designed. However, the building itself is showing its age, as many of the windows need to be replaced, there are several pieces of old equipment throughout the system (both at the WTP and the pumphouse reservoir) that need to be rehabilitated or replaced, and the Chief Operator reports that there are still numerous smaller equipment and electrical projects that need completion. Additionally, both of the building structures at the Reservoir and the old ground tank at the Redstone high tank are in severe need of rehabilitation. The two high service tanks have also recently been inspected and need an estimated $1.4 M of rehabilitation. Because the WTP is older and hasn’t been updated significantly in many years, it has higher maintenance demands than similarly sized, newer facilities are to be expected. The higher level of maintenance required impacts maintenance staffing but has a minimal impact on WTP operations.

Note that the immediacy of addressing some repair and maintenance needs is somewhat reduced because the WTP enjoys significant additional capacity. This extra capacity allows the WTP to operate comfortably with several pieces of equipment out of service and others operating at reduced capacity. For example, the operators report that during most of the year the WTP only requires one of its four raw water pumps to supply the system, which leaves three pumps as backups. This allows the maintenance staff to take extra time attending to failures and maintenance issues, assuming that companion assets are kept in working order. At many other facilities the loss of a raw water pump would be a major emergency, because of limited redundancy.

Organization

The Water Treatment group has nine FTEs - one chief operator, whom all the other positions report to, one senior plant mechanic/operator, three plant mechanics/operators, and four plant operators. Generally, one operator and one mechanic staff the plant 24 hours a day, seven days a week. While the chief operator works 7:30 AM –4 PM, Monday-Friday, shifts for the rest of the group are 12-hours, from 6:00 to 6:00, and are rotated between day and night shifts. Within a 28-day rotation, each operator/mechanic pair works seven 12-hour day shifts and seven 12-hour night shifts.
Existing and Future Service Levels

As referenced in the WTP Staffing and Scheduling Memo prepared by Raftelis in October 2018, staffing at water treatment facilities varies widely across New England (See Appendix A). Larger facilities with water sources that are more difficult to treat are often staffed 24 hours per day with 7-10 total staff, while smaller WTPs utilizing less difficult to treat source water (such as lakes) tend to only have staffing 8-16 hours per day. Historical practices, levels of technology, and collective bargaining agreements greatly influence staffing. There is a clear industry trend toward less staffing and attended operation only 8-12 hours per day at facilities less than about 20 MGD. This trend is driven by tightening budgets and the increased use of SCADA and additional monitoring technology.

Burlington’s WTP is not currently set up for unattended operations, so one operator must be present whenever the facility is pumping and treating water to adjust flows, chemical dosage, etc. While the WTP does have a SCADA system that allows an operator to control most equipment remotely (from the control room), additional investments including more monitoring and telemetry equipment, additional SCADA programming and remote access (outside the building) would be needed to allow unattended operation for portions of the day. These investments would likely be relatively modest given the current level of SCADA implementation. Many facilities across New England operate with only one or two attended 8-hour shifts per day, using very similar SCADA technology and some additional alarming/call out capabilities. The following table highlights some of the water treatment staffing levels at comparable water utilities in New England.
Table 7: Staffing at Comparable Water Utilities in New England

<table>
<thead>
<tr>
<th>Community/Facility</th>
<th>Average Production (MGD)</th>
<th>Maximum Capacity (MGD)</th>
<th>No. of FTEs</th>
<th>Attended Hours per Day (Avg.)</th>
<th>No. of Shifts</th>
<th>Average MGD Produced /FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Champlain Water District (CWD)</td>
<td>8-10</td>
<td>20</td>
<td>5</td>
<td>24</td>
<td>3</td>
<td>1.6-2</td>
</tr>
<tr>
<td>Lowell, MA</td>
<td>15</td>
<td>20</td>
<td>10</td>
<td>24</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Lynn, MA</td>
<td>10-11</td>
<td>20</td>
<td>10</td>
<td>24</td>
<td>3</td>
<td>1.1</td>
</tr>
<tr>
<td>Bath, ME</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lawrence, MA</td>
<td>6.8-7</td>
<td>16</td>
<td>7</td>
<td>24</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Kittery Water District, ME</td>
<td>2.5</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Haverhill, MA</td>
<td>5.3</td>
<td>13.5</td>
<td>10</td>
<td>16</td>
<td>2</td>
<td>0.53</td>
</tr>
<tr>
<td>York Water District, ME</td>
<td>2-3</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>0.5-0.8</td>
</tr>
<tr>
<td>Maine Water - Biddeford &amp; Saco Division</td>
<td>4-5</td>
<td>10</td>
<td>8</td>
<td>16</td>
<td>2</td>
<td>0.5-0.6</td>
</tr>
<tr>
<td>Rochester, NH</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Keene, NH</td>
<td>2.2-2.5</td>
<td>6</td>
<td>4</td>
<td>__</td>
<td>__</td>
<td>0.5</td>
</tr>
<tr>
<td>Concord, NH</td>
<td>4-5</td>
<td>10</td>
<td>9</td>
<td>24</td>
<td>3</td>
<td>0.4-0.6</td>
</tr>
<tr>
<td>Kennebec Water District (Waterville, Winslow, and Oakland), ME</td>
<td>2-3</td>
<td>12</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>0.4-0.6</td>
</tr>
<tr>
<td><strong>Burlington, VT</strong></td>
<td><strong>3.5-4</strong></td>
<td><strong>10</strong></td>
<td><strong>9</strong></td>
<td><strong>24</strong></td>
<td><strong>2</strong></td>
<td><strong>0.4</strong></td>
</tr>
<tr>
<td>Portsmouth, NH</td>
<td>2.5-3.5</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>1</td>
<td>0.35-0.5</td>
</tr>
<tr>
<td>Kennebunk, Kennebunkport &amp; Wells Water District, ME</td>
<td>2-3</td>
<td>7</td>
<td>6</td>
<td>16</td>
<td>2</td>
<td>0.3-0.5</td>
</tr>
</tbody>
</table>

*Note: In this table, except for Burlington, 3 shifts indicate 24-hour staffing, 8 hours per shift, whereas less than 3 indicates at least some period of unattended operations. Burlington has two (2) 12-hour shifts, but is staffed 24-7 like Lowell, Lynn, Lawrence, Champlain Water District and Concord. Furthermore, note that CWD has ~4 additional “Water Quality Maintenance” staff that perform required sampling and small scale-maintenance.

There are advantages and disadvantages to the current staffing arrangement. Having at least two staff per shift can improve the safety of O&M personnel. If someone is injured, another person is at the WTP to initiate a response. Having 24-hour attended operations facilitates an immediate response if there is a problem with treatment. WTP staff are also available to respond to and/or direct after-hours calls on a range of subjects that come through the general Water Resources phone number. However, the value of these advantages can be significantly minimized with adjustments to practices and technology (such as staff-down notification systems and additional alarming for on-call staff) and the disadvantages of the staffing arrangement can present long term risk to the plant (See Appendix A). The disadvantages of the current 24-hour staffing arrangement include:
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> Insufficient mechanical staff on at the same shift to safely reduce the significant deferred maintenance projects such as valve replacements, filter bed renewal, projects involving plant shut down or more hazardous projects (confined space entry, ladder work);
> Inadequate contact time between the senior plant mechanic and other mechanics for training, supervision and project coordination;
> Reduced contact time between the senior mechanic and the chief operator/Water Resources engineering staff (only five days a month);
> High levels of overtime, due to each operator/mechanic having an average of four hours of built-in overtime each week due to the schedule, with additional overtime incurred for coverage of vacation or sick leave (the total overtime budget is $135,000 – a significant amount of which is for schedule-related overtime and “coverage” overtime, with only a small portion available for staff meetings, special projects, trainings, etc.);
> Less staffing during day when the plant is busier (weekly distribution sampling, chemical deliveries, coordination with other Water Resources staff, such as engineers) and when certain projects can only be accomplished (in daylight);
> Impact on chief operator’s available time (when duties have to be backfilled during the day) to focus on higher level tasks and continuous improvement efforts such as O&M manual development and Standard Operating Procedure (SOP) updates, safety enhancements, project coordination, coordination with other Water Resource staff; and,
> Reduced resources available for other Water Resources activities and functions.

Water Treatment Recommendations

The following discussion outlines recommendations for the Water Treatment group.

Schedule a Single Operator for Night and Weekend Shifts

**Recommendation:** Implement safety and process changes to allow for one operator on night/weekend shifts and reschedule the remaining staff to work on day shifts, pending upgrades to SCADA and other systems to allow unattended operation during portions of the day.

Raftelis believes that the Burlington WTP could easily and safely operate evenings and weekend shifts with a single operator, assuming required safety and process changes are initiated. These changes would include instituting procedures to ensure that if an operator was injured or incapacitated someone would respond promptly. At other facilities, the day shift is typically when major maintenance activities are completed, and most operations changes are made. Chemical deliveries, most testing and sampling, and most administrative tasks also occur during the day shift. It is typical at other facilities that the day shift typically has more O&M personnel and there is a plant manager or senior operator present. Off shifts at other facilities at Water Resources and at other utilities primarily include only process monitoring and minor adjustments.

Evaluate Requirements for Unattended Operation

**Recommendation:** Inventory and assess existing technology and identify operational, safety, and staffing requirements to move to unattended operation.

Raftelis recommends that the City of Burlington evaluate what investments are needed to allow unattended operation up to 16 hours per day. Typically, such investments can pay for themselves if the number of attended shifts can decrease, with personnel and positions being assigned to other areas within Water Resources. Moving to unattended operations would allow the Water Resources Division to focus additional staff and resources on deferred maintenance, capital upgrades, and process improvements, which are critical to keep the aging WTP working efficiently and effectively.
Use Recommended Shift Realignments to Address Maintenance Backlog

**Recommendation:** Address the backlog of maintenance work with reassigned staff during the day shift and assistance from engineering resources.

Despite having excess staffing resources because of the current shift schedule, there remains a backlog of maintenance work. If some of the resources on the night shifts are reassigned to the day shift, there should be more opportunity to address the backlog. However, the maintenance personnel will likely need some assistance from the engineering staff and/or an outside consultant working in close collaboration with the Chief Operator and Senior Operator/Mechanic to develop plans, priorities, etc.
Engineering Group

The Engineering group is focused primarily on capital project delivery, including project management of design engineering services, for Water Resources’ water, wastewater, and stormwater systems. In addition to capital project management the Engineering group also provides in-house design, GIS support, operations support, asset management support, project design review, water/sewer capacity review, program development technical support (e.g. pollution prevention, backflow prevention, meter sizing, etc.), special studies support, SCADA/PLC support, and energy management. The group’s workload is projected to increase dramatically with the recent passage of a $30 million wastewater/stormwater bond.

Organization

Water Resources’ Engineering group has four FTEs, with two Public Works Engineers and the Water Resources Infrastructure Asset Manager reporting to the Senior Public Works Engineer.

Existing and Future Service Levels

The Water Resources Engineering Group manages the utility’s infrastructure, including the design, build, permitting, and contract management processes, as well as providing oversight for water construction projects. They are also engaged in a number of asset management functions. Due to the age of the systems and the amount of deferred maintenance, the Engineering group is required to juggle multiple existing and future priorities, such as the following:

- $8.34 M of water system capital projects (the water main re-lining project and the water main replacement project);
- Upcoming water and wastewater treatment plant upgrades;
- Smaller maintenance projects (e.g. of the 26 active wastewater pump stations, 15 need some type of repair);
- Flow metering and other ongoing monitoring activities;
- Planning/engineering activities related to the Division’s Integrated Water Quality Plan.
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> Beginning an organizational shift to an asset management approach with work order management;
> Geographic Information Systems (GIS) documentation and management; and
> Review of and coordination with private and public projects.

The Engineering staff reported that they struggle to meet the utility’s capital management requirements at current staffing levels, especially tasks that require more than one member of the group at once (e.g. confined space entry for checking monitoring equipment). The Engineering group has augmented its staff through internships and the University of Vermont’s engineering capstone program in the past, but those resources can only be used for specific activities and types of tasks.

In addition to the group’s ongoing activities and existing priorities, the City just approved a $30 million bond referendum for improvements to the wastewater system. This work is anticipated to take approximately five years to complete but cannot be done exclusively with existing staff resources. The bond referendum does include funding for 1.25 FTEs over the course of the projects’ execution, which will partially close the gap, but an additional Water Resources Engineer is still necessary to address current demands.

Engineering Group Recommendations

The following discussion outlines recommendations for the Engineering group.

Add Additional Engineering Positions

**Recommendation:** Add a full-time permanent Engineer – Water Resources, in addition to the limited service position associated with the $30 million bond referendum, to the Engineering Group.

At existing work levels, the Engineering group will not meet its workload requirements, including managing existing capital projects, responding to unplanned or emergency needs, and providing technical support and resources for other Water Resources program development activities (e.g. continuing to support the backflow prevention program development, outreach around capital projects and private development, etc.). Given that those requirements will likely increase over the next five years, only adding the position associated with the bond referendum is insufficient. This position is in addition to the 1.25 FTEs that will be added as part of the $30 wastewater/stormwater bond.

**Recommendation:** Add a Full-time Engineering Technician to the Engineering Group.

The Engineering group’s functions include routine monitoring and other activities that do not require an engineer to perform. Engineers are currently fulfilling these responsibilities, which is unnecessarily expensive, because the group lacks support positions. Adding an engineering technician to this group would allow for some tasks to be delegated and could also support activities in other parts of the organization, such as stormwater program execution and industrial wastewater program implementation. Adding a technician would also support internal succession by setting up a career ladder within the Engineering group (Engineering Technician, Engineer, Senior Engineer), which supports employee growth and provides opportunities for advancement.

The following figure shows the proposed Engineering organizational chart.
Figure 9: Proposed Engineering Group Organizational Chart
Stormwater Program
The City of Burlington’s stormwater program was established in 2009 to address state and federal stormwater permit requirements. Fees are collected from residents, businesses, and other customers based on their property’s impervious area. Essentially, the City’s stormwater ordinance enables Water Resources to provide more comprehensive review of projects in the City; support the maintenance, repair, and replacement of stormwater infrastructure in the City; and support the continued development and implementation of a dedicated stormwater program to ensure regulatory compliance and to improve water quality.

Organization
The stormwater program is staffed by one FTE – the Stormwater Program Manager. This group has included part-time, temporary positions/internships in the past, but does not at this time.

Existing and Future Service Levels
The Stormwater Program Manager has wide-ranging responsibility, including:

> Capital Planning and Development – identifying, determining project feasibility, scheduling design/construction of capital work, developing/overseeing RFPs/RFQs, managing contracts, reviewing plans, and coordinating with other DPW capital priorities
> Managing Infrastructure – budgeting or adjusting budgets for emergency repairs, condition inventory work, maintenance of bioretention areas, subsurface systems, etc., and addressing See-Click-Fix issues
> Budget Planning and Administration – planning, tracking on-going spending, purchase order management, and grant writing, management, and oversight
> Ordinance (Chapter 26) Administration – technical review of incoming applications, developing standards, site/violation inspections, coordination of larger City projects
> State Permit Compliance – providing oversight of MS4 requirements, coordinating with the integrated planning team, reporting and compliance validation on the City’s other state permits, developing MOUs for state permits
> Outreach and Education – administering Adopt-a-Drain, participating in Clean Water Week, Kid’s Day, and other public events, managing a social media presence, responding to miscellaneous complaints, concerns, and questions, and providing technical assistance to homeowners who have drainage issues or are looking to make improvements

While this list is already varied, and presents challenges for one person to administer, the Assessment Team is aware of several other related activities that Water Resources needs to pursue and/or may pursue as regulations evolve. These activities include development and implementation of a backflow prevention program, development and implementation of an industrial pretreatment/fats, rags, oil, grease (FROG) program, identifying/creating resources for residential technical assistance/grants for stormwater retrofits, etc. Additionally, 10-15% of the funds associated with the recent bond referendum are designated for stormwater treatment and wet-weather retrofit projects, which will require additional organizational capacity to implement.

Water Resources Policy and Programs (Stormwater Program) Recommendations
The following discussion outlines recommendations for the Water Resources Policy and Programs group (Stormwater Program).

Rename the Group: Water Resources Policy and Programs

Recommendation: Shift the title of this functional area from Stormwater Program to Water Resources Policy and Programs to improve alignment between the title and the group’s responsibilities.
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Given the number of diverse programs that exist and are on the horizon for Water Resources, this group could be an umbrella for all policies, programs, and activities that touch water quality. Ideally, this will also help elevate the concept of stormwater management and mitigating negative water quality impacts across the organization, since the stormwater program is still relatively new to the organization but remains a vital part of Water Resources’ core responsibilities.

Increase Staffing for the Water Resources Policy and Programs Group

**Recommendation:** Create a Water Resources Policy and Program Manager position and share the recommended Engineering Technician position.

In addition to the existing Stormwater Program Manager position, which could be downgraded to a Stormwater Coordinator position, Water Resources would benefit from creating a higher level, overarching resource for water quality programming. Ultimately, this position (and the group) would be responsible for programmatic development and long-term financial planning related to water quality initiatives. Additionally, sharing the newly created Engineering Technician position would allow for some field tasks (inspection, monitoring, etc.) to be delegated, freeing up more time for program development and administration in water quality and stormwater.

**Recommendation:** Create a Water Resources Technician/Environmental Compliance Officer position to support development and enforcement of backflow prevention, industrial pretreatment, and other programs

Since environmental compliance is a varied and evolving topic, many similarly-sized utilities in New England have a variety of positions covering these functions. Some have dedicated resources specifically for managing backflow prevention programs, stormwater, and industrial pretreatment programs. This is especially true for the larger utilities. Several utilities have backflow prevention program coordinators, but in every case, this position is part of the Customer Service group. As such, the Assessment Team has addressed the administration (e.g. scheduling inspections, documenting compliance, etc.) of backflow prevention programming in the Utility Customer Service/Billing section. Of the utilities surveyed for this part of the study (Portland Water District, Champlain Water District, Portsmouth, and Kennebunk, Kennebunkport, and Wells), only Portland Water District had a dedicated resource for industrial pretreatment, which is a full-time position created in 2018 when it consolidated programs with the City of Portland. The other utilities indicated that the responsibilities were divided amongst several departments (e.g. technical support staff in engineering and customer service).
Figure 10: Proposed Water Quality Organizational Chart

- Assistant Director DPW Water Resources
- Senior Public Works Engineer – Water Resources
- Engineering Technician
- Water Resources Policy and Programs Manager
- Stormwater Program Manager
- Water Resources Technician/Environmental Compliance Officer
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Customer Service/Billing Group

The Customer Service and Billing group is responsible for billing, revenue collections, finance reporting/monitoring, delinquent account management and property transfers, among other administrative and customer service duties. This group serves as the primary point of contact for residents with questions about all things related to Water Resources. The group also coordinates the interactions between residents and Field Services for meter troubleshooting and infrastructure issues and improvements. The accuracy and helpfulness of staff within this division are key factors in how the public perceives the overall performance of Water Resources.

Organization

The Customer Service/Billing group has three FTEs, including two customer service positions who report to the Utility Billing Administrator, shown below. In the past this group has had additional staff, but due to attrition and budget restriction the number of staff have been reduced as workloads have increased. Additionally, as of this year this group has been augmented by a part-time, temporary position that assists with answering customer calls and engaging with walk-in customers at Water Resources’ administrative offices.

Figure 11: Customer Service/Billing Organizational Structure

Existing and Future Service Levels

The Customer Service/Billing group has myriad responsibilities related to:

> Revenue assurance, including following up on meter exceptions, scheduling customer appointments for meter service, creating, verifying, and mailing bills, revenue collections (through lockbox, autopay, credit cards and walk-ins), taking payments, etc.;
> Customer satisfaction, including responding to all queries via phone, email or walk ins in a timely and professional manner. This includes recording relevant comments or concerns in the Customer Information System (CIS);
> Account management, including execution of changes in the CIS for new accounts, deletions and meter asset information changes, coordinating tenant change overs and updating automatic debit information;
> Utility accounting, including creation of all Water Resources sales & adjustment reports and reconciliation of fund activity to the general ledger; and,
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- Public outreach, including content development and implementation via City website, social media and traditional media formats for educational opportunities, workshops, tours, and capital infrastructure improvements.

Given the requirements and responsibilities for these positions, the Assessment Team believes that two and a half FTEs is insufficient to achieve desired customer service levels. Given the seniority of the people in the current positions, which is tied to time off allowances, there are cumulatively several months out of the year when only one of the two FTEs in the customer service role are working, due to scheduled vacations etc. This barely allows them time to keep up with billing and daily customer service calls. There is very little time for other responsibilities and meter-to-cash management activities, such as coordinating a comprehensive meter testing and replacement program, providing administrative support for the cross-connection control (backflow) program, conducting quality/control and quality/assurance activities on meters and billing systems, training, planning, and process improvement. Because of the inadequate staffing, the Customer Service group has lacked capacity to update and improve its SOPs, and revenue is almost certainly being lost through aging meters and other avenues.

Staff reported that the Customer Service/Billing group used to have additional staff in previous years, but attrition and budget restriction have reduced the number despite an increasing number of responsibilities and workload. The following table shows customer care-related positions at other utilities in New England.

<table>
<thead>
<tr>
<th>Utility</th>
<th>Type of Organization</th>
<th>Number of Accounts</th>
<th>No. of Customer Service/Billing Employees and Titles</th>
<th>Does Meter Group Report Through Billing/Customer Service?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Champlain Water District</td>
<td>Quasi-Municipal, Wholesale Provider</td>
<td>6,500</td>
<td>1: Customer Service/Utility Billing Supervisor</td>
<td>Yes</td>
</tr>
<tr>
<td>Portsmouth Department of Public Works</td>
<td>City Department</td>
<td>8,500</td>
<td>3: Billing Supervisor, Billing Clerk</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Burlington Water Resources</strong></td>
<td><strong>City Department</strong></td>
<td><strong>10,200</strong></td>
<td><strong>3.5: Utility Billing Administrator, Customer Service Associate</strong></td>
<td><strong>No</strong></td>
</tr>
<tr>
<td>Kennebunk, Kennebunkport, and Wells</td>
<td>Quasi-Municipal</td>
<td>14,000</td>
<td>5: Front Office Supervisor, Billing Clerk, Accounts Payable Clerk</td>
<td>No</td>
</tr>
<tr>
<td>Portland Water District</td>
<td>Quasi-Municipal</td>
<td>54,000</td>
<td>14: Director of Customer Service, Customer Service Coordinator, Control Center Operator, Collections Coordinator, Program Manager, AMR Specialist</td>
<td>Partially</td>
</tr>
</tbody>
</table>
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With the Meter group, Customer Service/Billing is responsible for the meter-to-cash cycle and the utility’s revenue assurance processes, on which Water Resources has already taken significant action to ensure reliability. Such steps have included inspecting compound meters; installing a vehicle-based meter reading system (AMR), which has already reduced the time it takes to read the entire system’s meters by more than 80%; and improving SOPs to include additional detail and action-oriented steps. An inspection effort of all meters 1” or larger is current underway. As with any organization, there are many opportunities to increase effectiveness, but Water Resources has already been proactive in increasing operational efficiency and responding to the needs of its customers.

Because the Customer Service/Billing group and the Meter group are collectively responsible for the meter-to-cash cycle, coordination is paramount. They report through different parts of the organization, which has led to a lack of alignment of operational priorities, inefficient data handoffs, and some lapses that impact customers. Many utilities have elected to include meter service functions in their customer service groups to address these challenges, with meter services either reporting to a customer service manager exclusively, or to both a customer service manager and a field services manager via a dotted line reporting structure. The Assessment Team believes that there is certainly enough work to have dedicated Field Services resources working in and reporting to the Utility Billing Administrator (Customer Care and Finance Manager). Of course, during emergencies, these Meter Services staff would remain available to assist with main repairs and other duties.

In addition to revenue assurance needs, the Meter and Customer Service/Billing groups need to collaborate closely to develop, implement, and administer a backflow prevention program with programmatic guidance from other departments. Backflow requirements are in the City of Burlington’s ordinances, but programmatic activities are minimal. The ordinance specifies that service may be terminated as a means of enforcement, yet enforcement actions are not taken on a systematic basis. This is likely due to Water Resources lacking a backflow prevention resource to oversee the program. The following table shows how other utilities manage staffing around backflow prevention.

<table>
<thead>
<tr>
<th>Utility</th>
<th>Type of Organization</th>
<th>Number of Accounts</th>
<th>Dedicated Backflow Coordinator?</th>
<th>Reports Through?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Champlain Water District</td>
<td>Quasi-Municipal</td>
<td>6,500</td>
<td>Yes; the Customer Service/Utility Billing Supervisor administers this program part-time</td>
<td>Customer Service/ Utility Billing Supervisor</td>
</tr>
<tr>
<td>Portsmouth Department of Public Works</td>
<td>City Department</td>
<td>8,500</td>
<td>Yes; the Meter Supervisor administers the program part-time; two designated backflow inspectors/testers</td>
<td>Water Meter Billing and Backflow Division</td>
</tr>
<tr>
<td>Burlington Water Resources</td>
<td>City Department</td>
<td>10,200</td>
<td>No</td>
<td>N/A</td>
</tr>
<tr>
<td>Kennebunk, Kennebunkport, and Wells</td>
<td>Quasi-Municipal</td>
<td>14,000</td>
<td>Yes; Working part-time</td>
<td>Field Operations Supervisor</td>
</tr>
<tr>
<td>Portland Water District</td>
<td>Quasi-Municipal</td>
<td>54,000</td>
<td>Yes; Working part-time</td>
<td>Water Operations</td>
</tr>
</tbody>
</table>

Customer Service/Billing Group Recommendations

The following discussion outlines recommendations for the Customer Service/Billing group.
Staffing Assessment
Water Resources, City of Burlington

Expand the Customer Service/Billing Group

**Recommendation:** The Assessment Team recommends the following organizational structure modifications:

1) Create a new Customer Care II position to oversee all customer service activities and administer the backflow prevention program.
2) Move the meter services crew from Field Services to Customer Service/Billing, so that everyone touching the meter-to-cash cycle reports to a single manager, while making this crew available to Water Distribution during emergencies when extra personnel are needed.
3) Enrich the Utility Billing Administrator position to focus on higher level revenue assurance, customer care and financial functions.
4) After adding the Customer Care II position, evaluate workloads and consider formalizing the part-time customer service position as a permanent part-time position.

The figure below shows a proposed organizational structure for Customer Service/Billing group.

*Figure 12: Proposed Customer Service/Billing Group*
Summary of Recommendations

Raftelis’ assessment of the Burlington Water Resources Division identified a number of recommendations to make improvements to their organizational structure. The recommendations include staffing additions and organization changes intended to prepare the Division for the upcoming construction and upgrades, improve operational efficiency, support programmatic development, and ensure that PM is effectively managed. For convenience, the Assessment Team has summarized the recommendations and from each of the sections in the table below.

Table 10: Summary of Recommendations

<table>
<thead>
<tr>
<th>Organizational Area</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Distribution/Meter Analysts</td>
<td>Re-focus Water Distribution personnel on completing essential, currently neglected, PM activities, leaving one FTE, most likely a Working Foreman, to coordinate with an assigned Water Resources Engineer and the contractor and ensure quality work.</td>
</tr>
<tr>
<td></td>
<td>Move the three meter services FTEs (two analysts and one working foreman) from Field Services to Customer Service/Billing, so that everyone touching the meter-to-cash cycle reports to a single manager, while ensuring that these three staff members are made available to Field Services during emergencies when extra personal are needed.</td>
</tr>
<tr>
<td></td>
<td>Streamline the DigSafe response process and assign it to Water Distribution.</td>
</tr>
<tr>
<td>Wastewater Facilities</td>
<td>Continue concentrating one FTE in a laboratory role and add an additional Operator-in-Training or Wastewater Technician position.</td>
</tr>
<tr>
<td></td>
<td>Designate an additional FTE to the Wastewater Maintenance group.</td>
</tr>
<tr>
<td></td>
<td>Study the full costs and opportunities of combining WWTPs.</td>
</tr>
<tr>
<td>Water Treatment</td>
<td>Implement safety and process changes to allow for one operator on night/weekend shifts and reschedule the remaining staff to work on day shifts, pending upgrades to SCADA and other systems to allow unattended operation during portions of the day.</td>
</tr>
<tr>
<td></td>
<td>Inventory and assess existing technology, and identify operational, safety, and staffing requirements to move to unattended operation.</td>
</tr>
<tr>
<td></td>
<td>Address the backlog of maintenance work with reassigned staff during the day shift and assistance from engineering resources.</td>
</tr>
<tr>
<td>Engineering</td>
<td>Add a Full-time Engineer – Water Resources, in addition to the positions associated with the $30 million bond referendum, to the Engineering Group.</td>
</tr>
<tr>
<td></td>
<td>Add a Full-time Engineering Technician to the Engineering Group.</td>
</tr>
<tr>
<td>Water Resources Policy and Programs</td>
<td>Shift the title of this functional area from Stormwater Program to Water Resources Policy and Programs to improve alignment between the title and the group’s responsibilities.</td>
</tr>
<tr>
<td>(Stormwater Program)</td>
<td>Create a Water Resources Policy and Programs Manager position and share the recommended Engineering Technician position.</td>
</tr>
<tr>
<td></td>
<td>Create a Water Resources Technician/Environmental Compliance Officer position to support development and enforcement of backflow prevention, industrial pretreatment, and other programs.</td>
</tr>
<tr>
<td>Billing/Customer Service</td>
<td>The Assessment Team recommends the following organizational structure modifications:</td>
</tr>
<tr>
<td></td>
<td>&gt; Create a new Customer Care II position to oversee all customer service activities and develop/administer the backflow prevention program</td>
</tr>
<tr>
<td></td>
<td>&gt; Move the meter services crew from Field Services to Customer Service/Billing, so that everyone touching the meter-to-cash cycle reports to a single manager,</td>
</tr>
</tbody>
</table>
while making this crew available to Water Distribution during emergencies when extra personnel are needed.  

> Enrich the Utility Billing Administrator position to focus on higher level revenue assurance, customer care and financial functions.  

> Formalize the part-time customer service position as a permanent part-time position.

The Assessment Team recognizes that these recommendations will take time and resources to implement, and some have already been initiated by Water Resources. As previously noted, the highest priority recommendations include adding the Water Resources Policy and Program Manager, the Customer Care II position, and the additional Engineers, due to the increased workload relating to the bond referendum and other capital projects. The following table suggests a timeline for implementing high priority recommendations.

<table>
<thead>
<tr>
<th>Organizational Change</th>
<th>Proposed Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add a Water Resources Policy and Program Manager Position and shift the Stormwater Program Manager to a Stormwater Coordinator position</td>
<td>FY 2019</td>
</tr>
<tr>
<td>Move the Meter Group Under Customer Service/Billing</td>
<td>FY 2019</td>
</tr>
<tr>
<td>Add a Customer Care II Position</td>
<td>FY 2019</td>
</tr>
<tr>
<td>Reclassify the Utility Billing Administrator position to be a Customer Care and Finance Manager</td>
<td>FY 2019</td>
</tr>
<tr>
<td>Add Water Resources Engineer</td>
<td>FY 2019</td>
</tr>
<tr>
<td>Add a Water Quality Technician/ Environmental Compliance Officer</td>
<td>FY 2020</td>
</tr>
<tr>
<td>Add a Wastewater Operator-in-Training Position</td>
<td>FY 2020</td>
</tr>
<tr>
<td>Realign resources at the water treatment plant</td>
<td>FY 2019-2020</td>
</tr>
<tr>
<td>Evaluate and if needed add additional Project Management Support for Bond Projects</td>
<td>Early-Mid FY 2020</td>
</tr>
<tr>
<td>Add an Engineering Technician Position</td>
<td>Mid FY 2020</td>
</tr>
<tr>
<td>Add a Wastewater Plant Mechanic Position</td>
<td>FY 2021, or as possible</td>
</tr>
<tr>
<td>Evaluate Additional Laboratory Support</td>
<td>FY 2021, or as possible</td>
</tr>
</tbody>
</table>