



**Bedford County, Virginia and
the City of Bedford, Virginia**

Bedford Utilities Consolidation Report

Wiley|Wilson Comm. No. 212026.00

September 27, 2012



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TABLE OF CONTENTS

	<u>Page</u>
1.0 EXECUTIVE SUMMARY	
1.1 Background and Purpose.....	1-1
1.2 Policies and Procedures.....	1-1
1.3 Infrastructure Assessment.....	1-2
1.4 Water Characteristics.....	1-3
1.5 Operations.....	1-4
1.6 Service Area.....	1-5
1.7 Rates.....	1-7
1.8 Conclusion and Summary of Recommendations	1-8
2.0 POLICIES AND PROCEDURES	
2.1 Background.....	2-1
2.2 Policies and Procedures.....	2-1
2.3 Standard Specifications and Details.....	2-3
2.4 Conclusions.....	2-5
3.0 INFRASTRUCTURE ASSESSMENT	
3.1 Background.....	3-1
3.2 City of Bedford Infrastructure.....	3-3
3.3 Bedford County Public Service Authority Infrastructure.....	3-21
4.0 WATER CHARACTERISTICS	
4.1 Background.....	4-1
4.2 Comparison of Water Quality Parameters for Average/Normal Conditions	4-3
4.3 Comparison of Water Quality Parameters for Extreme/Unusual Conditions.....	4-9
4.4 Conclusions.....	4-12
5.0 OPERATIONS	
5.1 Background.....	5-1
5.2 Organizational Structure.....	5-1
5.3 Strategic Planning	5-3
5.4 Facility Integration	5-6
5.5 Efficiencies	5-7
5.6 Transfer of Permits.....	5-9
5.7 BCPSA Sewer Agreement with the City of Lynchburg	5-9
5.8 BCPSA Water Agreements with the City of Lynchburg and the Western Virginia Water Authority	5-10
6.0 SERVICE AREA	
6.1 Background.....	6-1
6.2 Joint Authority Service Areas	6-2
6.3 Conclusions.....	6-5



TABLE OF CONTENTS

7.0 RATES

7.1	Background.....	7-1
7.2	Comparison of Existing Rates.....	7-1
7.3	Consolidated Rates.....	7-10

APPENDICES

Appendix A: Water and Sewer System Mapping

Appendix B: Rate Consultant's Report

LIST OF TABLES

Table 4-1	Hardness Classification Scale	4-4
Table 4-2	Comparison of Hardness Classifications for Average/Normal Conditions.....	4-5
Table 4-3	Comparison of Finished Water Alkalinity	4-6
Table 4-4	Comparison of Finished Water pH.....	4-6
Table 4-5	Comparison of Finished Water Chlorine Residual	4-7
Table 4-6	Comparison of Finished Water Temperature (Degrees C).....	4-7
Table 4-7	Comparison of Finished Water Turbidity.....	4-8
Table 4-8	Comparison of Finished Water Iron and Manganese.....	4-9
Table 7-1	Average Residential Customer Charges with Existing Rates.....	7-4
Table 7-2	Residential Charges for Existing Rates with 1" Meter	7-6
Table 7-3	Commercial Charges for Existing Rates with 1" Meter.....	7-7
Table 7-4	Commercial Charges for Existing Rates with 2" Meter.....	7-8
Table 7-5	Commercial Charges for Existing Rates with 6" Meter.....	7-9

LIST OF FIGURES

Figure 4-1	Finished Water Hardness, April 2010	4-10
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TABLE OF CONTENTS

Figure 4-2	Finished Water Hardness, September 2010	4-11
Figure 5-1	General Personnel Organizational Chart	5-3
Figure 7-1	Charges for Existing Residential Rate Structures	7-5
Figure 7-2	Residential Charges for Existing Rates with 1" Meter	7-6
Figure 7-3	Commercial Charges for Existing Rates with 1" Meter.....	7-7
Figure 7-4	Commercial Charges for Existing Rates with 2" Meter.....	7-8
Figure 7-5	Commercial Charges for Existing Rates with 6" Meter.....	7-9

This report was prepared solely for the use of Bedford County, the City of Bedford, and the Bedford County Public Service Authority for this project. It is a statement of professional opinion based on information available at the time of preparation. It represents conditions at a specific time which is identified in the report and these conditions may change. To develop this report, the standard of care applicable to professional services was used.



EXECUTIVE SUMMARY

1.1 BACKGROUND AND PURPOSE

The City of Bedford is currently in the process of transitioning from City to Town status. A Voluntary Settlement Agreement, dated September 14, 2011, between the City and Bedford County establishes the covenants by which the City Utilities Department and the Bedford County Public Service Authority will be merged into a new joint water and sewer authority. Provisions in the Voluntary Settlement Agreement require the County and the City to commission studies necessary to complete the consolidation and develop a Utility Consolidation Agreement providing for the creation of the new Joint Authority, so that a Utility Consolidation Agreement can be developed and executed by the City, County, and County Authority. Guidelines for the consolidation of the City and County Authority systems were set forth in the Voluntary Settlement Agreement.

This study was commissioned to evaluate a number of issues that will affect the Joint Authority. These issues include policies and procedures, infrastructure assessment, operations, service area connections, rates and user fees, and operational permits. The findings of the study of these issues are presented in this report. The information contained in this report is based on input provided by personnel from Bedford County, the City of Bedford, and the Bedford County Public Service Authority.

1.2 POLICIES AND PROCEDURES

The Bedford County Public Service Authority (BCPSA) provided a copy of its current Operating Policy Manual along with copies of its Master Specifications and Standard Details to City of Bedford personnel for their review. City and BCPSA personnel have met to discuss these documents. The BCPSA staff is currently in the process of updating the Master Specifications and Standard Details. City comments have been considered and certain revisions are being incorporated into these documents as they are being updated to help facilitate the consolidation of the City Utilities Department and the BCPSA. The cooperative actions taken by City and BCPSA personnel at this time to incorporate City comments will help to minimize the number of changes to these documents that may be needed after the consolidation takes place. Incorporation of City comments also allows the City to begin using these documents prior to the reversion and creation of the new Joint Authority. It is anticipated that the updated Master Specifications and Standard Details will be submitted to the Virginia Department of Health this spring for their review.



EXECUTIVE SUMMARY

1.3 INFRASTRUCTURE ASSESSMENT

Site visits and reviews of BCPSA and City water supply, water and wastewater treatment, water and wastewater pumping stations, and water storage facilities were made. Lists of the facilities were provided by BCPSA and City staff and site visits were made to assess the general condition and performance of the facilities. City water system facilities evaluated included the City water treatment plant, Big Otter River intake and pump station, one well system, three water system storage tanks, and the Stoney Creek Reservoir. City wastewater facilities include the City's wastewater treatment plant and twelve wastewater system lift stations throughout the City's collection system. BCPSA water facilities include the Highpoint water treatment plant and intake, four well systems, eight water system storage tanks, and three water pump stations. BCPSA wastewater facilities include two wastewater treatment plants and nine wastewater system lift stations. The BCPSA water and wastewater facilities are distributed among the various BCPSA service areas within the County. Lists of the evaluated City and BCPSA facilities are included in Section 3.1 of this report.

Each of the active water and wastewater facilities was visited with City and BCPSA personnel. Evaluation of equipment inventories for the City and BCPSA was not included in the infrastructure assessment for this study. It is understood that the utility consolidation will not consider condition of the existing facilities as a factor influencing the consolidation. However, in general, the visited facilities were found to be in good operating condition and well maintained. Detailed descriptions of the evaluated facilities are included in Sections 3.2 and 3.3 of this report.

It is noted that evaluations of the water distribution piping and sewer collection piping were not included in the infrastructure assessment for this study. City and BCPSA personnel recognize that pipeline infrastructure, both water and sewer, is the largest component of their respective systems. Due to the pipeline infrastructure being buried underground, it is difficult to access, and difficult to know with certainty the condition of the water and sewer lines. Therefore, the pipeline components of the water and sewer infrastructure present the largest unknown and the largest potential for future infrastructure maintenance and repairs.



EXECUTIVE SUMMARY

1.4 WATER CHARACTERISTICS

The new Authority is required to provide the City of Bedford with a backup water source in accordance with the terms of the Voluntary Settlement Agreement. One of the stated concerns by the City of Bedford is that the water quality of the backup source may differ from the current source and have an adverse impact on the City's commercial/industrial water customers. This section presents an analysis that identifies common water quality concerns for residential and commercial/industrial customers and then evaluates the suitability of potential back-up water sources in terms of the identified water quality parameters. Water characteristics of finished water from the City of Bedford, BCPSA, and the City of Lynchburg were evaluated to determine what significant differences exist in the treated water from each of the jurisdictions.

Water quality parameters that were evaluated include: turbidity, pH, hardness, alkalinity, iron, manganese, temperature, and chlorine residual. Water characteristics were compared under average/normal conditions and extreme/unusual conditions. Water characteristics from both potential backup water sources are similar for most of the parameters evaluated. The notable difference is the hardness of the various sources. Under average/normal conditions, the City of Lynchburg water with the Pedlar Reservoir as the primary source is very similar to the City of Bedford water with finished water classified as "Soft", while the BCPSA High Point WTP normally produces finished water that is classified as "Moderately Hard." Under extreme/unusual conditions, the City of Lynchburg water with the James River as the primary source is also classified as "Moderately Hard." However, approximately 89 percent of the water produced at the City of Lynchburg Abert WTP during 2010 and 2011 was from the Pedlar Reservoir.

There are several notable effects of increasing the hardness of a water source. One effect is that minerals can precipitate leaving deposits on fixtures, sinks, tubs, and water heaters. From a commercial/industrial perspective, these deposits may result in increased soap consumption, fabric deterioration and discoloration in commercial laundry, increase fouling in atomizing spray devices, and also increase the concentration of dissolved solids, i.e. dissolved minerals, in boiler make-up water. These types of deposits can also reduce the efficiency of boiler systems. Other effects include larger soap consumption affecting dishwashing, laundry and personal hygiene uses, deterioration of fabrics, and possibly water taste.



EXECUTIVE SUMMARY

It is recommended that the new Joint Authority conduct a more in-depth study to assess the specific effects of blending the City of Bedford WTP's soft finished water with a backup source providing moderately hard finished water. It is recommended that the study identify (1) potential blending scenarios, (2) coordinate with industrial customers to determine concentration thresholds at which increased hardness/TDS will affect their processes and (3) evaluate different treatment techniques that which may be required to reduce hardness. This may include point-of-use techniques to meet specific industrial customer requirements.

1.5 OPERATIONS

The existing organizational structures of both the City of Bedford and the BCPSA were evaluated. A recommended general personnel organizational chart was developed for the new Joint Authority. Section 5.2 includes the recommended organizational chart, as well as additional information used in its development. This chart provides a starting point for the Joint Authority. The organizational structure will be modified over time to suit the needs of the Joint Authority.

Current City Utilities and BCPSA staffing levels are such that they cannot be reduced without impacting operations and customer service. In addition, it is anticipated that several additional full-time employees will likely be needed to support the increased customer base of the Joint Authority. Accounting and Customer Service personnel currently serving the City will likely remain with the Town when the Joint Authority is formed. Therefore, additional employees to serve in these departments would be hired by the Joint Authority.

Various aspects of the current City utility and BCPSA operational strategies will need to be evaluated by the Joint Authority as the two entities are integrated. Identified areas for future study by the Joint Authority fall within the general categories of strategic planning, facility integration, potential efficiencies to be gained by the combination of current City and BCPSA assets and facilities, and the transfer of existing contracts and permits to the Joint Authority. The strategic planning category includes items such as how to deal with disinfection byproducts as the water systems are connected, zinc compliance at the BCPSA Moneta Wastewater Treatment Plant, and the City's consent order for reduction of rainfall derived infiltration and inflow. These are items that center around system expansion, regulatory compliance, and capital improvements.



EXECUTIVE SUMMARY

Facility integration items are operational items identified by the City and BCPSA staff as the facilities were evaluated. These items will need to be addressed as the systems are integrated. These items include consolidation of meter reading technology, standardization of lift station details, and standardization of certain water treatment chemicals. For the efficiencies category, the potential for gaining efficiencies includes items such as combining laboratory operations, consolidation of solids handling from the three wastewater treatment plants, the handling of after-hours emergency calls, and the potential cross-training of operations staff from the City and the BCPSA.

The Virginia Department of Health and the Department of Environment Quality were contacted to determine the process for transfer of water and wastewater permits from the City of Bedford and the BCPSA to the new Joint Authority. For water treatment facilities, the Virginia Department of Health requires a Waterworks Permit Application to be submitted, accompanied by a description of the organizational structure of the new Authority, along with identification of which positions are responsible for compliance with drinking water standards and sampling protocols. For wastewater facilities, the Department of Environmental Quality requires a letter requesting a Minor Modification to the existing permits. The letter should include the name of the new Authority and identification of personnel who will be responsible for submitting Discharge Monitoring Reports for the facilities. No fees are required for transfer of water or wastewater permits.

1.6 SERVICE AREA

Existing water and sewer system maps from the City and BCPSA have been reviewed. the City is currently providing water and sewer service to limited areas of the County, generally located close to the City/County line. The consolidation of the City Utilities Department and the BCPSA into a Joint Authority will provide increased opportunity to expand both water and sewer service into the current portions of the County that will be incorporated into the Town Limits by the Phase 1, 2, and 3 Boundary Adjustment Areas described in the Voluntary Settlement Agreement. In addition, there are other areas of the County not located with the designated Boundary Adjustment Areas that may also be candidates for expansion of services beyond the future Town limits.



EXECUTIVE SUMMARY

There are a number of actions related to water and sewer service areas that are recommended to be taken by the new Joint Authority in the near-term after the Authority is formed. These include preparation of a Utility Master Plan study for providing water and sewer service to the phased Boundary Adjustment Areas, as well as other surrounding areas. It is recommended that the Utility Master Plan study consider prioritization of service to any parcels where the landowner has requested service in the past, as well as parcels where the current well or septic drain fields are documented as experiencing problems. The study could also consider extension of service beyond the phased Boundary Adjustment Areas to connect existing customers that are currently on well systems, such as in BCPSA's Hillcrest service area. In addition to evaluating new infrastructure required to serve these areas, consideration should be given to the capacity of the existing systems and what improvements may be needed if additional customers are added.

Current system mapping includes GIS (Graphical Interface Systems) that are being maintained by the City and BCPSA. It is recommended that the new Joint Authority combine the GIS mapping into one system so that all utility mapping is kept up-to-date in one database. The new Joint Authority will need to study both GIS systems and determine which better serves the needs of the Joint Authority. When evaluating systems, the new Authority should also consider interfacing of the GIS system with water and sewer system models.

The BCPSA currently maintains water and sewer models of their systems. The City does not currently maintain models for either of their systems. At one time the City maintained a water model that was originally prepared for the City by a consultant. It is recommended that the new Joint Authority evaluate modeling software packages and consider adding the Town's systems to the water and sewer models. The system-wide water model could be a useful tool when considering options for interconnection between the current BCPSA and City water systems. The development of a model of the current City sewer system could be useful when considering the addition of new service areas and their potential impacts to the capacity of the City's sewer system.



EXECUTIVE SUMMARY

1.7 RATES

The existing rate structures and user fees from the City and BCPSA were compared to determine what differences exist and to develop a framework for equalizing the rates and fees. Differences between the current City and BCPSA rates are described and examples are given to demonstrate the differences for residential and commercial customers with different sizes of water meters. A detailed comparison of the existing rate structures is included in Section 7.2.

Based on discussions with City and County personnel a number of modifications to the current City and BCPSA rate schedules are required to consolidate their existing rate schedules. A rate consultant, Paul Cumiskey, from the firm PJ Sun, LLC, was retained to provide a detailed analysis of the current rate structures and to provide recommendations and guidelines for the consolidated rate structure of the new Joint Authority. The objectives of Mr. Cumiskey's work were to (1) recommend a preferred water and sewer rate structure for the new authority, (2) develop initial rates that will be effective on or around July 1, 2013 and (3) devise a strategy to transition from the initial rates to the preferred rate structure over a ten year time frame. Mr. Cumiskey's report is summarized in Section 7.3. A full copy of his report, along with referenced Exhibits and Schedules, is included in Appendix B for reference.

Based on discussions with a working group made up of BCPSA and City representatives, a recommended rate structure that includes a combination of fixed charges by meter size and uniform water and sewer volume rates for all customers except large industrial customers, was agreed upon. It was also agreed that the new Authority should have separate water and sewer volume rates for residential and commercial customers, versus large volume industrial customers. The proposed 10-year target water and sewer rates for residential and commercial customers are \$5.00 and \$7.00 per thousand gallons. The proposed 10-year target water and sewer rates for large volume industrial customers are \$3.00 and \$6.00 per thousand gallons. In addition, it is recommended that the City's current schedule of Minimum Bills begin to be phased out over a 10-year period. However, it is recognized that it will likely take between 10 and 15 years to completely phase out the City Minimums from the proposed rate structure.



EXECUTIVE SUMMARY

It is important to recognize that the annual rates developed and included as part of the proposed rate consolidation structure, were developed as part of a general planning process. Going forward, the new Authority's Board of Directors will need to monitor and adjust the rates annually based on changing circumstances.

1.8 CONCLUSIONS AND SUMMARY OF RECOMMENDATIONS

Based on the findings of this study a number of recommendations have been made and discussed in detail through each section of this report. Recommendations are made based on data gathered and input provided by City of Bedford, Bedford County, and Bedford County Public Service Authority personnel. To facilitate the transition, consideration should be given to implementation of the recommendations prior to formation of the Joint Authority. City utilities and BCPSA staff have begun discussions on many of the topics included in this study. Continuation of these efforts will be beneficial to the County, Town, Joint Authority staff, and current City and BCPSA customers.

Recommendations contained in the Sections 2 through 7 of this report are summarized below. It is recommended that the Joint Authority, with the support of the County, City, and BCPSA, take the following actions:

Section 2 – Policies and Procedures

- Utilize the BCPSA's Operating Policy Manual as the starting point for development of their Operating Policy Manual, and that BCPSA and City staff continue discussions regarding potential modifications that can be made prior to the formation of the Joint Authority to ease the transition when the new authority is formed.
- Utilize the BCPSA's Master Specifications and Standard Details, and that the City begin using these documents prior to formation of the Joint Authority after changes suggested by the City have been incorporated.

Section 4 – Water Characteristics

- Conduct an in-depth study to assess the specific effects of blending the City of Bedford WTP's soft finished water with a backup source providing moderately hard finished water. It is recommended that the study identify (1) potential blending scenarios, (2) coordinate with industrial customers to determine concentration thresholds at which increased hardness/TDS will



EXECUTIVE SUMMARY

affect their processes and (3) evaluate different treatment techniques that which may be required to reduce hardness.

Section 5 – Operations

- Adopt a Personnel Organizational Chart similar to that presented in Section 5.2, and that the Joint Authority be organized into seven departments, including: Operations, Maintenance, Engineering, Customer Service, Financial, Information Systems, and Human Resources.
- Meet with the County, City, and BCPSA to discuss the assignments of current employees into the various department and positions, prior to formation of the Joint Authority.
- Consider adding staff in the Customer Service, Accounting, and Information Systems departments to serve the larger combined customer base, prior to the formation of the Joint Authority.
- Consider including the position of Assistant Director as part of the Joint Authority executive staff.
- Evaluate the effects of the LT2ESWTR on disinfection by-products compliance, specifically the Locational Running Annual Average.
- Continue the efforts started by the BCPSA to bring the Moneta WWTP into compliance with its Total Recoverable Zinc limit, and quantify whether septage receiving negatively impacts compliance.
- Continue on-going efforts started by the BCPSA to study options for removing the Lake Vista Sanitary Lift Station from service and potentially replacing it with a gravity sewer to the City of Lynchburg system.
- Continue efforts started by the City of Bedford to satisfy the DEQ Consent Order to reduce rainfall derived infiltration and inflow from the City sewer system and to evaluate implementation of a long term strategy to effectively reduce SSOs in the collection system.
- Continue efforts started by the BCPSA to develop a long term strategy for continued expansion of the Smith Mountain Lake water system to serve BCPSA well systems and other privately owned water systems so that the current wells and associated tanks and treatment systems can be taken off line.
- Develop a long-term strategy to determine where fluoridation of drinking water will be implemented and/or continued and how to address the issue as the water systems are interconnected.



EXECUTIVE SUMMARY

- Study the use of corrosion inhibitors in drinking water to determine the types used at the different water treatment plants, if there are any adverse effects when blended or changed, and the cost/benefits to implementing a common corrosion inhibitor prior to interconnecting the water systems.
- Continue efforts started by the City and BCPSA staff to evaluate whether the different meter reading technologies used by the City and the BCPSA can be merged.
- Develop unified standards for future wastewater lift stations and determine to what extent existing City wastewater lift stations should be standardized and connected to a central SCADA system.
- Evaluate the infrastructure improvements, operational changes and VPDES permit implications required to combine solids operations, and determine the extent of efficiencies that can be achieved.
- Evaluate the improvements, operational changes and permit implications required to combine laboratory operations, and determine the extent of efficiencies that can be achieved.
- Evaluate the current City and BCPSA policies for after-hours on-call employees, and continue discussions regarding development of new policies for inclusion in the Joint Authorities Operating Policy Manual prior to formation of the Joint Authority.
- Evaluate how efficiencies can be gained by integrating staff responsibilities and cross-training between BCPSA and City of Bedford facilities. Evaluation should consider reducing travel time, reducing overtime, inventorying staff experience, and summarizing attendance and licensure requirements at each facility.
- Transfer existing Virginia Department of Health Waterworks Permits and Department of Environmental Quality Wastewater Permits from the City of Bedford and the BCPSA to the Joint Authority.
- Transfer the BCPSA's existing Regional Sewage Treatment Plant Agreement with the City of Lynchburg from the BCPSA to the Joint Authority.
- Transfer the BCPSA's existing water purchase agreements with the City of Lynchburg and the Western Virginia Water Authority from the BCPSA to the Joint Authority.



EXECUTIVE SUMMARY

Section 6 – Service Area

- Prepare a Utility Master Plan to evaluate providing service to the Phased Boundary Adjustment areas and provide direction on interconnections between the City's water and sewer systems and the BCPSA's water and sewer systems.
- Evaluate the existing GIS mapping capabilities of the City and the BCPSA, and develop a strategy for combining the data contained in both systems into one consolidated GIS database.
- Evaluate the existing water and sewer system modeling capabilities of the City and the BCPSA, and develop consolidated system models.

Section 7 – Rates

- Modify the current City and BCPSA rate schedules to consolidate the existing rates.
- Adopt the rate structure recommended and described in Mr. Cumiskey's Rate Analysis Report. A full copy of the report, along with referenced exhibits and schedules, is included in Appendix B for reference.



POLICIES AND PROCEDURES

2.1 BACKGROUND

When the City Utilities Department and the BCPSA are merged, current policies and procedures from both organizations will be combined to create a unified set of policies and procedures that will govern the operation of the new Joint Authority. Over the years, the BCPSA has developed a comprehensive set of operational policies and procedures that have been modified from time to time as required. The City Utilities Department has operated as a department within the City, and therefore has not developed detailed policy and procedural guidelines independently from the City. To facilitate the creation of the policies and procedures for the Joint Authority, the Bedford County Public Service Authority (BCPSA) provided a copy of its current Operating Policy Manual along with copies of its Master Specifications and Standard Details to City of Bedford personnel for their review. City personnel have reviewed the documents provided by the BCPSA and have met with BCPSA personnel a number of times to discuss the content of these documents, as well as potential changes to these documents.

2.2 POLICIES AND PROCEDURES

The BCPSA routinely updates its policies and procedures as necessary. However, a comprehensive internal review was begun in 2008. The review continued into 2011 and a number of updates to the BCPSA's Operating Policy Manual have been made, with the last updates taking place in October 2011. A copy of the updated manual was provided to City administrative and utilities personnel for their review. A copy is also available on the BCPSA web site (www.bcpsa.com) for public review. City utilities personnel have met with BCPSA personnel on a number of occasions and have discussed various components of the BCPSA's current Operating Policy Manual.



POLICIES AND PROCEDURES

The BCPSA's Operating Policy Manual includes the following chapters:

Chapter 1	Governance
Chapter 2	Customers
Chapter 3	Connections
Chapter 4	System Development
Chapter 5	Water System
Chapter 6	Wastewater System
Chapter 10	Engineering
Chapter 11	Operations
Chapter 12	Maintenance
Chapter 13	Finance
Chapter 14	Information Systems
Chapter 20	Employee Handbook
Chapter 21	Safety
Chapter 22	Emergency Response

In addition, each of the listed chapters contains various sub-sections that discuss the BCPSA's current guidelines and practices for operation.

Based on the City's review and general accordance with the guiding principles of the policies and procedures contained within the BCPSA's Operating Policy Manual, it is recommended that the BCPSA manual be used by the new Joint Authority as a starting point for the development of the Joint Authority's Operating Policy Manual. It is recognized that some level of modifications will be required in the majority of sections of the current BCPSA manual so that they can be customized for use by the new Joint Authority. However, in many of cases, the modifications required will be minor. In cases requiring minor changes and those requiring significant changes, the existing BCPSA manual will provide a good starting point for the development of the Joint Authority's policies and procedures.

Consolidation of the existing City and BCPSA policies and procedures in some cases will result in immediate changes. In other cases, changes resulting in the consolidation of policies and procedures will be more slowly moving in their implementation. It should be recognized that in some cases it may not be prudent or practical to enforce policies immediately. In these cases, the Joint Authority will need to establish a time-line for implementation of the policies that does not create a financial or operational burden on the Joint Authority.



POLICIES AND PROCEDURES

2.3 STANDARD SPECIFICATIONS AND DETAILS

The BCPSA and City each have standards for specifications and details used in the construction of water and sewer infrastructure. The BCPSA is currently in the process of updating their Master Specifications and Standard Details and anticipates submitting the updated documents to the Virginia Department of Health this spring for their review. A copy of the updated specifications and details was provided to City utilities personnel for their review. A copy is also available on the BCPSA web site for public review.

The last major update of BCPSA's standards was in 2004. The process of preparing the current updated standards included the review by the City of Bedford utility personnel, a comparison to the Western Virginia Water Authority (WVWA) standards, and working with the BCPSA Maintenance Department personnel. In addition, input was solicited from local contractors, material suppliers, and engineering firms. Comparison to the WVWA standards was made to ensure coordination between the two authorities where they interconnect.

The updated BCPSA Master Specifications include the following sections:

Division 1	General Requirements
Section 01 33 00	Submittal Procedures
Section 01 66 00	Product Deliver, Storage, and Handling Requirements
Division 2	Existing Conditions
Section 02 41 00	Demolition
Division 3	Concrete
Section 03 33 00	Cast-in-Place Concrete
Section 03 41 00	Precast Structural Concrete
Division 31	Earthwork
Section 31 00 00	Earthwork
Section 31 10 00	Site Clearing
Section 31 23 33	Trenching and Backfilling
Section 31 25 00	Erosion and Sedimentation Controls
Division 32	Exterior Improvements
Section 32 10 00	Bases, Ballasts, and Paving
Section 32 31 13	Chain Line Fences and Gates



POLICIES AND PROCEDURES

Section 32 91 19.13	Topsoil Placement and Grading
Section 32 92 19	Seeding
Division 33	Utilities
Section 33 03 00	Utility Pipe and Materials
Section 33 04 00	Valves and Cocks
Section 33 05 00	Common Work Results for Utilities
Section 33 10 00	Water utilities
Section 33 12 13.13	Water Supply Backflow Preventer Assemblies
Section 33 12 19	Water utility Distribution Fire Hydrants
Section 33 30 00	Sanitary Sewerage Utilities

Appendices

Appendix A	Standard Details
Appendix B	Waiver and Material Approval Request Forms
Appendix C	Test Table and Data Sheets
Appendix D	Bedford County Erosion & Sediment Control Ordinance and Seeding Requirements
Appendix E	Meter Setting Parts List

City utilities personnel have met with BCPSA personnel on a number of occasions and have discussed various components of the BCPSA's current standard specifications and details, and potential changes to these documents. City comments have been considered and certain revisions are being incorporated into these documents as they are being updated to help facilitate the consolidation of the City Utilities Department and the BCPSA. Revisions made to address City comments include the addition of devices and details, such as sewer lateral check valves and sewer pier details. In addition, BCPSA and City Utilities personnel have had discussions regarding the application of specific pipe material requirements by project. With the inclusion of City Utilities personnel comments into the BCPSA Master Specifications and Details, City personnel have indicated that they intend to start using the updated BCPSA Master Specifications and Standard Details for City projects prior to the merger and formation of the Joint Authority.



POLICIES AND PROCEDURES

2.4 CONCLUSIONS

The efforts made by City Utilities personnel to review the BCPSA Operating Policy Manual, Master Specifications, and Standard Details, and to meet with BCPSA to discuss the documents will benefit the Joint Authority. The use of the BCPSA Operating Policy Manual as a starting point for the development of the new Joint Authority policies and procedures will save personnel time and energy when the Joint Authority is formed. In addition, the cooperative actions taken by City and BCPSA personnel to incorporate City comments into the BCPSA Master Specifications and Standard Details will help to minimize the number of changes to these documents that may be needed after the consolidation takes place. Incorporation of City comments into the standard specifications and details also allows the City to begin using these documents prior to the reversion and creation of the new Joint Authority.

Review of policies and procedures related to personnel issues were not included in scope of this study. It is recommended that the City Utilities and BCPSA staff continue to meet to discuss sections of the Operating Policy Manual dealing with personnel issues so decisions can be made regarding treatment of differences between the existing City and BCPSA personnel policies and procedures.

It is recommended that the City and BCPSA continue to review and discuss the BCPSA Operating Policy Manual so that potential changes can be noted and the manual can be readily updated and adopted by the Joint Authority when the utility consolidation takes place. It is further recommended that as decisions are made, the City and BCPSA begin making changes in their respective policies and procedures to implement the new unified policies and procedures prior to formation of the Joint Authority. This will allow for a smoother transition when the Joint Authority is formed.

In addition, it is recommended that the City begin using the BCPSA Master Specifications and Standard Details after City suggestions have been incorporated.

Continual review of the documents discussed in this section of the report will be required as the new authority is formed, to ensure that all potential water and sewer system project conditions have been identified and addressed adequately.



INFRASTRUCTURE ASSESSMENT

3.1 BACKGROUND

A cursory review of City and BCPSA water and wastewater treatment, pumping, and storage facilities was made by visiting each site with City and BCPSA personnel. City facilities were visited Monday, March 5th. Brian Key from the BCPSA was present, along with Dennis Wood from the City as each City site was visited. The City sites visited include the following:

- Wastewater Treatment Plant
- Wastewater Lift Station 1 (Nichols Road)
- Wastewater Lift Station 2 (Whitfield Drive)
- Wastewater Lift Station 3 (Orange Street)
- Wastewater Lift Station 4 (Belmont Street)
- Wastewater Lift Station 5 (Oliver Street)
- Wastewater Lift Station 6 (Peaks Road)
- Wastewater Lift Station 7 (Mustang Road)
- Wastewater Lift Station 8 (Whitfield Drive)
- Wastewater Lift Station 9 (Elm Street)
- Wastewater Lift Station 10 (Towngate Road)
- Wastewater Lift Station 11 (Minute Men Drive)
- Wastewater Lift Station 12 (Village Court)
- Stoney Creek Reservoir (Wheats Valley Road)
- Big Otter River Water Booster Pump Station (Peaks Road)
- Water Well System (Peaks Road)
- Water Treatment Plant and Tank (Turkey Mountain Road)
- 1.5 and 1.0 MG (million gallon) Water Storage Tanks (Helm Street)

BCPSA facilities were visited Wednesday, March 7th and Wednesday March 14th. Dennis Wood from the City was present, along with Brian Key from the BCPSA as each BCPSA site was visited. The BCPSA sites visited include the following:

- BCPSA Office Facility (Falling Creek Road)
- Moneta Wastewater Treatment Plant
- Montvale Wastewater Treatment Plant
- Wastewater Lift Station 1 (Bridgewater Bay)
- Wastewater Lift Station 2 (Downtown Moneta)
- Wastewater Lift Station 3 (Moneta WWTP)
- Wastewater Lift Station 4 (Camp 24)
- Montvale Wastewater Lift Station



INFRASTRUCTURE ASSESSMENT

- New London Wastewater Lift Station
- Forest Middle School Wastewater Lift Station
- Farmington Wastewater Lift Station
- Lake Vista Wastewater Lift Station
- Lake Forest Water Well System and Tank
- Valley Mills Crossing Water Well System and Tank
- Mountain View Shores Water Well System and Tank
- Hillcrest Water Treatment Plant and Tank
- Smith Mountain Lake 1.0 MG Elevated Water Storage Tank
- New London 1.0 MG Elevated Water Storage Tank
- Altha Grove Water Storage Tank
- Fox Runn Water Booster Pump Station
- Woods Landing Water Booster Pump Station
- High Point Water Intake Pump Station
- High Point Water Treatment Plant

Mapping of the City and BCPSA areas served by the facilities listed above was provided by the City and BCPSA for reference and inclusion in this report. Prints of the provided water and sewer system mapping are included in Appendix A for reference.

Evaluation of equipment inventories for the City and BCPSA was not included in the infrastructure assessment for this study. In addition, evaluations of the water distribution piping and sewer collection piping were not included in the infrastructure assessment for this study. It was noted by both the City and BCPSA personnel that water and sewer pipeline infrastructure is the largest component of the respective systems. Due to the pipeline infrastructure being buried underground, it is difficult to access, and difficult to know with certainty the condition of the water and sewer lines. Therefore, the pipeline components of the water and sewer infrastructure present the largest unknown and the largest potential for future infrastructure maintenance and repairs.

It is understood that the utility consolidation will not consider condition of the existing facilities as a factor influencing the consolidation. In general, the visited facilities were found to be in good operating condition and well maintained. Descriptions of the City and BCPSA facilities evaluated are included in Sections 3.2 and 3.3 below.



INFRASTRUCTURE ASSESSMENT

3.2 CITY OF BEDFORD INFRASTRUCTURE

Wastewater Treatment Plants

The City of Bedford owns and operates one (1) wastewater treatment plant (WWTP). The following summaries describe the key characteristics of each WWTP. Based on site visits and discussions with City staff, the WWTP is in good operating condition and significant deficiencies were not observed.

Facility Name	City of Bedford WWTP
Narrative Process Description:	The City of Bedford WWTP liquid stream process includes an influent flow equalization and wet weather detention basins; influent pump station; headworks consisting of a mechanical bar screen and grit removal; secondary treatment consisting of a two-train activated sludge process; secondary clarification consisting of two circular clarifiers; tertiary filtration consisting of four deep bed sand filters; disinfection consisting of chlorination and dechlorination; post-aeration. The solid stream process includes aerobic digestion consisting of two aerobic digesters; septage acceptance station; dewatering consists of belt filter press and conveyance to roll-off dumpsters.
WWTP Design Flow:	2 MGD
Reliability Class:	Class 1
SCADA Connectivity:	On-site PLC with localized SCADA





INFRASTRUCTURE ASSESSMENT

Sanitary Lift Stations

The City of Bedford owns and operates twelve (12) sanitary lift stations. The following summaries describe the key characteristics of each lift station. Based on site visits and discussions with City staff, all lift stations are in good operating condition. As recommended herein, the new Authority should determine to what extent existing lift stations should be standardized and connected to a central SCADA system. BCPSA and City Staff indicated that the new Authority will adopt the current BCPSA pump station standards. Several lift stations would require significant maintenance or upgrades within a 3 to 5 year period in order to come into alignment with those standards.

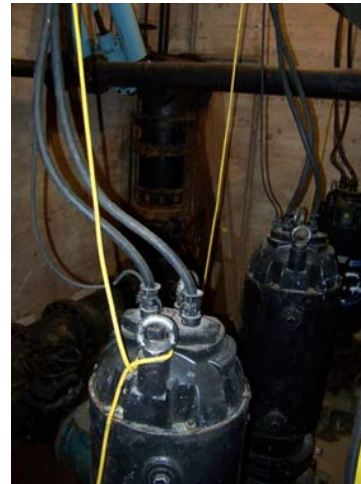
Facility Name	Lift Station No. 1 – Nichols Road
Pump Configuration:	Triplex Submersible Pumps located in Dry Well with Influent grinder and Manual Bar Rack Bypass.
Number of Pumps:	3
Design Flow Rate / Total Dynamic Head:	1 pump – 1,967 gpm, 2 pumps – 2,597 gpm, 3 pumps – 2,897 gpm
Emergency Generator:	Yes – Caterpillar (all generators serviced by Carter)
SCADA Connectivity:	On-site PLC, no connectivity, SEI control panel, Honeywell Teletrend digital recorder
Additional Lift Station Description:	Lift station located in pre-cast concrete building with concrete drywell below building and stair access. Controls are located in the pre-cast concrete building. Site is fenced. Water constantly fed to grinders to keep lubricated. No flow monitoring. Hoist/trolley system for lifting pumps to ground floor. Drywell exhaust system for fresh air. Pumps to Station #2.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 2 – Whitfield Drive
Pump Configuration:	Triplex Submersible Pump located in Dry Well with Influent grinder and manual bar rack bypass
Number of Pumps:	3
Design Flow Rate / Total Dynamic Head:	1 pump – 1,987 gpm, 2 pumps – 3,060 gpm, 3 pumps – 3,630 gpm
Emergency Generator:	Yes – Caterpillar
SCADA Connectivity:	On-site PLC, no connectivity
Additional Lift Station Description:	Lift station located in pre-cast concrete building with concrete drywell below building and stair access. Controls are located in the pre-cast concrete building. Site is fenced. Highest flow pump station, half City wastewater flows through this station. Grinders too small for peak flows, gates opened during high flow events.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 3 – Orange Street
Pump Configuration:	Triplex Submersible Pump located in Dry Well with Influent grinder and manual bar rack bypass
Number of Pumps:	3
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	Yes
SCADA Connectivity:	On-site PLC, no connectivity
Additional Lift Station Description:	Lift station located in pre-cast concrete building with concrete drywell below building and stair access. Controls are located in the pre-cast concrete building. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 4 – Belmont Street
Pump Configuration:	Smith & Loveless Duplex Dry Well Centrifugal Solids Handling Pumps in Vault Adjacent to Wetwell.
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	No
SCADA Connectivity:	None – Local Audio and Visual Alarm
Additional Lift Station Description:	Lift station located in below grade vault requiring Permit Confined Space Entry to service pumps, valves and controls. Site is not fenced. Pumps to Station #3. Emergency pump connection.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 5 – Oliver Street
Pump Configuration:	Smith & Loveless Duplex Suction Lift Pumps in Below Grade Vault Above Wetwell with Vacuum Suction Pump
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	No
SCADA Connectivity:	None
Additional Lift Station Description:	Lift station located in below grade vault requiring Permit Confined Space Entry to service pumps, valves and controls. Site is not fenced. A vacuum suction pump is required to maintain prime of pumps. Back-up floats. Some corrosion in wetwell. Emergency pump connection. Pumps to Station #4.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 6 – Peaks Road
Pump Configuration:	Duplex Submersible Pump located in Dry Well with Influent grinder and manual bar rack bypass
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	Yes –Western Branch Diesel
SCADA Connectivity:	On-site PLC, no connectivity
Additional Lift Station Description:	Lift station located in block/concrete building with drywell below building and stair access. Controls are located in the building. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 7 – Mustang Road
Pump Configuration:	Smith & Loveless Duplex Suction Lift Pumps in Below Grade Vault Above Wetwell with Vacuum Suction Pump
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	Yes - Kohler
SCADA Connectivity:	None
Additional Lift Station Description:	Lift station located in below grade vault requiring Permit Confined Space Entry to service pumps, valves and controls. Site is not fenced. A vacuum suction pump is required to maintain prime of pumps. Emergency pump connection.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 8 – Whitfield Drive
Pump Configuration:	Smith & Loveless Duplex Suction Lift Pumps in Below Grade Vault Above Wetwell with Vacuum Suction Pump
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	No
SCADA Connectivity:	None
Additional Lift Station Description:	Lift station located in below grade vault requiring Permit Confined Space Entry to service pumps, valves and controls. Site is not fenced. A vacuum suction pump is required to maintain prime of pumps. Access road through field, not in easement. Easement adjacent to creek following power lines. Emergency pump connection. Pumps to Station #2.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 9 – Elm Street
Pump Configuration:	Duplex Submersible Lift Station
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	No
SCADA Connectivity:	None
Additional Lift Station Description:	Site is not fenced. Located behind house. Pumps to gravity on Longwood. Serves several houses. Access through yard, no road.

//No Photograph//



INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 10 – Towngate Road
Pump Configuration:	Duplex Submersible Pumps located in Dry Well
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	Yes
SCADA Connectivity:	On-site PLC, no connectivity
Additional Lift Station Description:	<p>Lift station located in block/concrete building with concrete drywell below building and stair access. Controls are located on ground floor. Site is fenced.</p> <p>Pump Disconnects located in drywell.</p> <p>PD Blower and Diffusion System in place to minimize odor. PD Blower was not functioning correctly at time of site visit.</p>





INFRASTRUCTURE ASSESSMENT

Facility Name	Lift Station No. 12 – Village Court
Pump Configuration:	Duplex Submersible Pumps located in Dry Well
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	Unknown
Emergency Generator:	No
SCADA Connectivity:	None
Additional Lift Station Description:	Davit cranes provided for pump retrieval. Controls are located on external rack. Site is fenced.



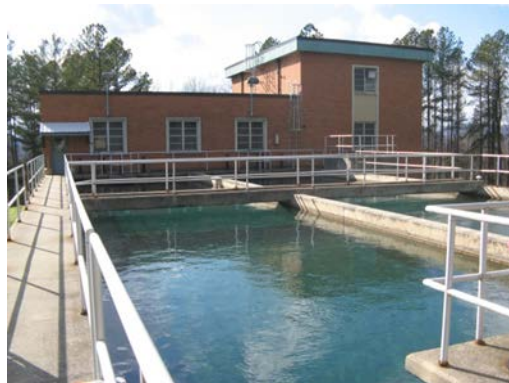


INFRASTRUCTURE ASSESSMENT

Water Treatment Plants

The City of Bedford owns and operates one (1) water treatment plant (WTP). The following describes the key characteristics of the WTP. Based on site visits and discussions with City staff, the WTP is in good operating condition and no major deficiencies were observed.

Facility Name	City of Bedford WTP
Narrative Process Description:	<p>The City of Bedford WTP liquid stream processes include raw water intake at the City of Bedford Reservoir with gravity flow the WTP; pre-oxidation; rapid mix/coagulation with alum addition; single multi-stage tapered flocculation; two train sedimentation; two train multi-media filtration; disinfection by chlorination; clearwell.</p> <p>The City of Bedford WTP residuals stream processes include filter backwash pumps and two sludge lagoons to hold backwash waste and intermittent sedimentation basin solids.</p>
Design Capacity:	3.0 MGD based on source limitations
Operator Classification:	Class II
SCADA Connectivity:	None





INFRASTRUCTURE ASSESSMENT

Raw Water Sources

The City of Bedford owns and operates one reservoir, one well system and one raw water intake pump station to supplement flows from the reservoir. The following summaries describe the key characteristics of each raw water source. Based on site visits and discussions with City staff, all raw water sources are in good operating condition and significant deficiencies were not observed.

Facility Name	Stoney Creek Reservoir
Safe Yield Withdrawal Capacity:	1.8 million gallons per day. City has full withdrawal rights to 100% of the water in the reservoir.
Full Pond Storage:	156 million gallons
Additional Notes:	Reservoir transmits raw water the City of Bedford WTP by gravity flow. The intake structure is located in the reservoir and is only accessible by boat. The City owns and controls the reservoir. Public boat access is prohibited. The dam and spillway structure were recently reconstructed.





INFRASTRUCTURE ASSESSMENT

Facility Name	Big Otter River Well System
Capacity:	0.6 million gallons per day permitted capacity
On-Site Treatment:	Chlorination with Sodium Hypochlorite
Emergency Generator:	No
SCADA Connectivity:	None
Additional Notes:	Capacity limited to approximately 0.15 million gallons per day due to slow well recharge rates. Wells used to supplement river withdrawal during dry periods when additional water is needed to supplement reservoir.





INFRASTRUCTURE ASSESSMENT

Facility Name	Big Otter River Raw Water Pump Station
Capacity:	1.5 million gallons per day
Number of Pumps:	2 Vertical Turbine Booster Pumps
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	None
Additional Notes:	City does not have a river withdrawal permit for this pump station and intake. This is a grandfathered withdrawal. City withdrawal is limited to a maximum of 50% of the river flow.





INFRASTRUCTURE ASSESSMENT

Water Storage Tanks

The City of Bedford owns and operates three (3) water storage tank. The following summaries describe the key characteristics of each water storage tank. Based on site visits and discussions with City staff, all water storage tanks are in good operating condition and significant deficiencies were not observed.

Facility Name	City of Bedford Water Treatment Plant Water Storage Tank
Type of Tank:	Welded Steel Ground Storage Tank
Tank Volume:	1.0 million gallons





INFRASTRUCTURE ASSESSMENT

Facility Name	Helm Street Storage Tank No. 1
Type of Tank:	Concrete Ground Storage Tank with Welded Steel Roof
Tank Volume:	0.968 million gallons



Facility Name	Helm Street Storage Tank No. 2
Type of Tank:	Concrete Ground Storage Tank with Welded Steel Roof
Tank Volume:	1.5 million gallons





INFRASTRUCTURE ASSESSMENT

3.3 BEDFORD COUNTY PUBLIC SERVICE AUTHORITY INFRASTRUCTURE Wastewater Treatment Plants

Bedford County Public Service Authority owns and operates two (2) wastewater treatment plants (WWTP). Key characteristics of each are described in the following summaries. Based on site visits and discussions with BCPSA staff, all WWTPs are in good operating condition and significant deficiencies were not observed.

Facility Name	Moneta WWTP
Narrative Process Description:	The Moneta WWTP liquid stream process includes an influent pump station; headworks consisting of a mechanical bar screen and vortex grit removal; secondary treatment consisting of a two-train four stage process (Pre-Anoxic – Aerobic – Post-Anoxic – Post-Aerobic) utilizing Biowheels in the Aerobic stage; internal recirculation, RAS and WAS pumping; secondary clarification consisting of two rectangular chain and flight clarifiers; tertiary filtration consisting of single train cloth disk filter; disinfection consisting of two train UV system; post-aeration. The Moneta WWTP solid stream process includes aerobic digestion consisting of two aerobic digesters; septage acceptance station; dewatering consists of belt filter press and conveyance to roll-off dumpsters.
WWTP Design Flow:	0.5 MGD
Reliability Class:	Class 1
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Facility Name	Montvale WWTP
Narrative Process Description:	<p>The Montvale WWTP liquid stream process includes a headworks consisting of a bar screen; secondary treatment consisting of a single-train MLE process (Pre-Anoxic – Aerobic) utilizing Biowheels in the Aerobic stage; internal recirculation, RAS and WAS pumping; secondary clarification consisting of one rectangular chain and flight clarifies; disinfection consisting of single train UV system.</p> <p>The Montvale WWTP solid stream process includes aerobic digestion consisting of one aerobic digester; sludge is hauled for off-site disposal.</p>
WWTP Design Flow:	0.05 MGD
Reliability Class:	Class 1
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Sanitary Lift Stations

Bedford County Public Service Authority owns and operates eight (8) sanitary lift stations. The following summaries describe the key characteristics of each lift station. Based on site visits and discussions with BCPSA staff, all lift stations are in good operating condition and significant deficiencies were not observed.

Facility Name	Moneta Lift Station No. 1 – Bridgewater Bay
Pump Configuration:	Duplex Submersible Pump Station with Manual Trash Rack
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	1,000 GPM / 148 FT
Emergency Generator:	Yes - Olympian
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located in a pre-cast concrete building. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Moneta Lift Station No. 2 – Downtown Moneta
Pump Configuration:	Duplex Submersible Pump Station with Manual Trash Rack
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	358 GPM / 153 FT
Emergency Generator:	Yes - Caterpillar
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located in a pre-cast concrete building. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Moneta Lift Station No. 4 – Camp 24 Site
Pump Configuration:	Duplex Submersible Pump Station
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	80 GPM / 89 FT
Emergency Generator:	Yes - Caterpillar
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is installed in manhole. Controls are located on exterior control rack. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Montvale Lift Station
Pump Configuration:	Duplex Submersible Pump Station
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	45 GPM / 74 FT
Emergency Generator:	No – Generator Connection
SCADA Connectivity:	On-site PLC with Dial-Up connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located on exterior control rack. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	New London Lift Station
Pump Configuration:	Duplex Submersible Pump Station
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	750 GPM / 249 FT
Emergency Generator:	Yes – Detroit Diesel
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with manual hoist over the wetwell to facilitate pump retrieval. Controls are located in a pre-cast concrete building. Site is fenced. Odor control (currently Potassium Permanganate or Bioxide) is provided by feeding a chemical into the wetwell on a continuous basis.





INFRASTRUCTURE ASSESSMENT

Facility Name	Farmington Lift Station
Pump Configuration:	Duplex Submersible Pump Station with Manual Trash Rack
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	455 GPM / 209 FT
Emergency Generator:	Yes - Caterpillar
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located in a pre-cast concrete building. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Forest Middle School Lift Station
Pump Configuration:	Duplex Submersible Pump Station with Manual Trash Rack
Number of Pumps:	2
Design Flow Rate / Total Dynamic Head:	199 GPM / 119 FT
Emergency Generator:	Yes - Kohler
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located on an exterior equipment rack. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Facility Name	Lake Vista Lift Station
Pump Configuration:	Triplex Submersible Pumps in Series with dedicated End Suction Pumps
Number of Pumps:	6 (3 sets of 2 pumps)
Design Flow Rate / Total Dynamic Head:	1,060 GPM / 283 FT
Emergency Generator:	Yes – Cummins Diesel
SCADA Connectivity:	On-site PLC with Dial-Up connectivity to BCPSA SCADA network
Additional Lift Station Description:	Lift station is equipped with mono-rail over the wetwell to facilitate pump retrieval. Controls are located in the pump room. Site is fenced.





INFRASTRUCTURE ASSESSMENT

Water Treatment Plants

Bedford County Public Service Authority owns and operates one (1) surface source water treatment plant (WTP). The following describes the key characteristics of the WTP. Based on site visits and discussions with BCPSA staff, the WTP is in good operating condition. It was identified that the backwash residual infiltration galleries at the High Point WTP are failing and an alternate means of disposal will be required within 1 to 5 years. It was also noted that the BCPSA intends to replace the High Point WTP within the next 3 to 5 years with a new WTP at the Camp 24 site. For the purposes of this study, well systems with on-site treatment are included in the Well System section.



INFRASTRUCTURE ASSESSMENT

Facility Name		High Point WTP
Narrative	Process	<p>The High Point WTP liquid stream processes include raw water intake and pumping at Smith Mountain Lake; pre-oxidation using potassium permanganate; raw water storage (68,000 gallons); two train pressurized membrane filtration consisting of skid mounted self-contained units (Pall); disinfection by chlorination; clearwell (47,100 gallons); finished water pumping.</p> <p>The High Point WTP residuals stream processes include membrane backwash pumps and tanks (skid mounted); backwash waste storage tank; single train backwash recovery membrane skid; chemical clean residual storage tank; two backwash residual infiltration galleries.</p>
Description:		
Design Capacity:		1.0 MGD
Operator Classification:		Class II
SCADA Connectivity:		On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Well Systems

Bedford County Public Service Authority owns and operates four (4) well systems, three (3) of which incorporate on-site treatment. The following summaries describe the key characteristics of each well system. Based on site visits and discussions with BCPSA staff, all well systems are in good operating condition and significant deficiencies were not observed. It was noted that the BCPSA intends to extend a waterline to the Lake Forest Well System to provide service from the High Point WTP.

Facility Name	Lake Forest Well System
Number of Wells / Capacity:	2 Wells – Capacities Not Known
Number of Pumps:	2 Well Pumps / 2 Booster Pumps
Booster Pump Design Flow Rate / Discharge Pressure:	154 GPM / 138 GPM
On-Site Tanks:	10,000 Gallon Well Storage Tank and 2,000 Gallon Pressure Tank
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	None





INFRASTRUCTURE ASSESSMENT

Facility Name	Valley Mills Crossing Well System
Number of Wells / Capacity:	1 Well – 16 GPM
Number of Pumps:	1 Well Pump / 2 Booster Pumps
Booster Pump Design Flow Rate / Discharge Pressure:	Well Pump – 24 GPM @ 300 FT / Booster Pump
On-Site Tanks:	15,000 Gallon Standpipe
On-Site Treatment:	Continuous chlorination using a metering pump and solution tank activated with the well pump.
Emergency Generator:	No
SCADA Connectivity:	None





INFRASTRUCTURE ASSESSMENT

Facility Name	Mountain View Shores Well System and Treatment Plant
Number of Wells / Capacity:	5 Wells – Total Capacity of 134 GPM
Number of Pumps:	5 Well Pumps / 2 Booster Pumps / 1 Backwash Pump
Booster Pump Design Flow Rate / Discharge Pressure:	Booster Pumps: 100 GPM @ 110 FT Backwash Pump: 10 GPM
On-Site Tanks:	Ground Storage Bolted Glass-lined Tank Finished Water Standpipe
On-Site Treatment:	Pressure Filtration with Manganese Greensand and Anthracite Chemical Treatment with Potassium Permanganate, Soda Ash and Aqua Mag Disinfection by Sodium Hypochlorite
Emergency Generator:	No
SCADA Connectivity:	Ethernet SCADA PLCs onsite





INFRASTRUCTURE ASSESSMENT

Facility Name	Hillcrest Well System and Treatment Plant
Number of Wells / Capacity:	3 Wells – Total Capacity of 42 GPM
Number of Pumps:	3 Well Pumps / 2 Booster Pumps
Booster Pump Design Flow Rate / Discharge Pressure:	Booster Pumps: 50 GPM
On-Site Tanks:	22,500 Well Storage Tank Four 100 gallon pressure tanks
On-Site Treatment:	Chemical Treatment with Aqua Mag Disinfection by Sodium Hypochlorite
Emergency Generator:	No
SCADA Connectivity:	None





INFRASTRUCTURE ASSESSMENT

Water Storage Tanks

Bedford County Public Service Authority owns and operates four (4) water storage tanks. The following summaries describe the key characteristics of each water storage tank. Based on site visits and discussions with BCPSA staff, all water storage tanks are in good operating condition and significant deficiencies were not observed. It is noted that the Stewartsville Tank was not visited because is currently not in service.

Facility Name	Smith Mountain Lake Elevated Storage Tank
Type of Tank:	Welded Steel on Concrete Column (Composite)
Tank Volume:	1 MG
Number of Pumps:	2 Recirculation Pumps
Recirculation Pump Rate:	440 GPM @ 62 FT
On-Site Treatment:	Re-Chlorination with Sodium Hypochlorite
Emergency Generator:	No
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Facility Name	New London Elevated Storage Tank
Type of Tank:	Welded Steel on Concrete Column (Composite)
Tank Volume:	1 MG
Number of Pumps:	2 Recirculation/Booster Pumps
Recirculation Pump Rate:	425 GPM @ 53 FT
On-Site Treatment:	Re-Chlorination with Sodium Hypochlorite
Emergency Generator:	No
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Facility Name	Altha Grove/Cottontown Road Ground Storage Tank
Type of Tank:	Concrete (Crom)
Tank Volume:	1.2 MG
Number of Pumps:	None
Recirculation Pump Rate:	N/A
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	On-site PLC with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Facility Name	Stewartsville Tank (Currently Out of Service)
Type of Tank:	Glass-Lined Bolted Steel (Aquastore)
Tank Volume:	1.0 MG
Number of Pumps:	1 Recirculation/Booster Pump
Recirculation Pump Rate:	Unknown
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	PLC onsite with dial-up connectivity to BCPSA SCADA network

Note: the Stewartsville Tank is currently out-of-service and not needed due to improvements within the Western Virginia Water Authority's water system, which supplies water to the Stewartsville area. Therefore, the Stewartsville Tank site was not visited and the tank was not evaluated.

//No Photograph//



INFRASTRUCTURE ASSESSMENT

Water Booster Pump Stations

Bedford County Public Service Authority owns and operates two (2) water booster pump stations. The following summaries describe the key characteristics of each booster pump station. Based on site visits and discussions with BCPSA staff, all water booster pump stations are in good operating condition and significant deficiencies were not observed.

Facility Name	Fox Runn Booster Pump Station
Number of Pumps:	2
Booster Pump Design Flow Rate / Discharge Pressure:	50 GPM
On-Site Tanks:	Five 100 gallon pressure tanks
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	PLC onsite with Ethernet connectivity to BCPSA SCADA network





INFRASTRUCTURE ASSESSMENT

Facility Name	Woods Landing Booster Pump Station
Number of Pumps:	2
Booster Pump Design Flow Rate / Discharge Pressure:	20 GPM
On-Site Tanks:	Two 50 gallon pressure tanks
On-Site Treatment:	None
Emergency Generator:	No
SCADA Connectivity:	PLC onsite, future SCADA connection in progress





WATER CHARACTERISTICS

4.1 BACKGROUND

The new Authority is required to provide the City of Bedford with a backup water source in accordance with the terms of the Voluntary Settlement Agreement. One of the stated concerns by the City of Bedford is that the water characteristics of the backup source may differ from the current source and have an adverse impact on some of the City's commercial/industrial water customers. This section presents an analysis that identifies common concerns related to different water characteristics affecting residential and commercial/industrial customers, and then evaluates the suitability of potential back-up water sources in terms of the identified parameters.

Bedford County has identified the City of Lynchburg and BCPSA's High Point Water Treatment Plant (WTP) as potential sources for a backup water supply. The City of Lynchburg has two water treatment plants, Abert and College Hill, which both use the Pedlar Reservoir and the James River as sources of raw water. The City of Lynchburg WTPs normally treat water from the same raw water source. This minimizes differences in water from one area of the City to another and allows the City to provide water with consistent characteristics to all of its customers. Due to the characteristics of the raw water, the City prefers to take 100% of its supply from the Pedlar Reservoir. However, during dry time periods, the Pedlar Reservoir supply is supplemented by water from the James River. When this occurs, the raw water from both sources is blended and conveyed to both treatment plants to maintain consistency from one plant to the other. Therefore, treated water entering the distribution system from the Abert and College Hill treatment facilities has similar characteristics. In addition, except in extreme circumstances, water from the City of Lynchburg's distribution system to the BCPSA's Forest Central system normally comes from the Abert WTP due to the locations of the lines interconnecting the two systems. Therefore, for the purposes of this report, water from Abert WTP is considered as a comparison to finished water produced by the City of Bedford and BCPSA.

The BCPSA High Point WTP uses Smith Mountain Lake for its source of raw water. The BCPSA has previously studied alternatives for supplying finished water to the City of Bedford by bringing water from the Forest area or from Smith Mountain Lake. They have also evaluated providing service to the City of Bedford and the Forest Central Service Area from the Smith Mountain Lake Central Service Area. The BCPSA is currently preparing a Preliminary Engineering Report to describe the treatment and distribution system improvements that would be required to increase the treatment capacity using Smith Mountain Lake as the source, and has also



WATER CHARACTERISTICS

applied for the permit to increase its raw water withdrawal limit from Smith Mountain Lake. In addition, financial impacts of various alternatives for construction of water system infrastructure required to serve the City of Bedford and the Forest Central system have been evaluated.

Utilizing the City of Lynchburg's Abert WTP as the back-up source would involve extending a waterline from the existing Forest Service Area to the City of Bedford. All water currently supplied to the Forest Central Service Area comes from the Abert WTP. Utilizing the High Point WTP as the back-up source would involve expanding the withdrawal capacity from Smith Mountain Lake, additional treatment capacity at or near the existing High Point WTP, and extending a waterline from the treatment facility to the City of Bedford.

Water characteristic data was assembled for finished water produced by the City of Bedford WTP and both potential backup sources for years 2010 and 2011. The following list indicates water characteristic parameters that were provided by each facility, with the exception of Iron and Manganese data which was not included in the information provided for the City of Bedford WTP.

Water Characteristic Parameters

1. Turbidity
2. pH
3. Hardness
4. Alkalinity
5. Iron
6. Manganese
7. Temperature
8. Chlorine Residual

The available water characteristic data was analyzed to identify differences between the finished water from each facility that may affect the different end users. End users were classified as either residential users or commercial/industrial users. Residential uses include tap water, laundry, dish washing, and showering/bathing. Commercial/industrial uses include industrial processes. During discussions with City of Bedford, several industrial uses were identified as being especially sensitive to changing water characteristics including commercial laundry, boiler make-up water, cooling water, and atomizing-spray processes.



WATER CHARACTERISTICS

Common water characteristic concerns that impact residential customers include taste and odor, mineral deposits and discoloration of fixtures, discoloration and deterioration of fabric during laundry, deposits and corrosion in water heaters and sedimentation. Common water characteristic concerns for commercial/industrial users include dissolved solids for boiler make-up water, fouling from organic (i.e. algae) or inorganic (i.e. mineral deposits) sources, staining or deterioration of fabrics and corrosion of process equipment and pipes.

Each of the concerns for residential and commercial/industrial uses can be impacted by numerous water parameters, many of which are not required to be monitored and thus were not provided for this analysis. The following analysis will focus on how the concerns identified above are impacted by the parameters provided and identify additional water parameters that could be sampled in the future to provide more in-depth analysis.

4.2 COMPARISON OF WATER QUALITY PARAMETERS FOR AVERAGE/NORMAL CONDITIONS

Finished water data from all three treatment facilities for years 2010 and 2011 was assembled for comparison purposes. In comparing the available raw data, most of the water characteristic parameters identified previously were routinely measured on a weekly basis by all three facilities. Two parameters, Iron and Manganese, were available on a daily basis from the Highpoint WTP, on an annual basis from the Abert WTP, and were not provided for the City of Bedford WTP.

Each of the parameters has been used to compare and contrast the two potential back-up water sources for the City of Bedford. Because finished water characteristics can deviate significantly from “average/normal” conditions throughout the year due to adverse weather or operational impediments this analysis will separately evaluate both “average/normal” conditions and “extreme/unusual” conditions.

Hardness is the most relevant common water parameter available to evaluate potential impacts of the different water sources to sensitive commercial/industrial water users as well as aesthetic characteristics to the general public. Hardness is a measure of minerals such as calcium, magnesium, iron and manganese in water. As shown in the following analysis, the finished water hardness for both the High Point WTP, under “average/normal conditions”, and the Abert WTP, under “extreme/unusual” conditions, differ significantly from the City of Bedford WTP.



WATER CHARACTERISTICS

The City of Bedford indicated that several commercial/industrial water customers have expressed specific concerns about potential adverse effects on processes including commercial laundry, boiler make-up water and atomizing spray processes. Changing hardness may have an impact on these processes as described below.

There are several notable effects of increasing the hardness of a water source. One effect is that minerals can precipitate leaving deposits on fixtures, sinks, tubs and water heaters. From a commercial/industrial perspective, these deposits may result in increased soap consumption, fabric deterioration and discoloration in commercial laundry, increase fouling in atomizing spray devices and also increase the concentration of dissolved solids, i.e. dissolved minerals, in boiler make-up water. These types of deposits can also reduce the efficiency of boiler systems. Other effects include larger soap consumption affecting dishwashing, laundry and personal hygiene uses, and deterioration of fabrics. The taste of the water can also be impacted by hardness, with some people generally preferring the taste of the water they are accustomed to, regardless of the hardness of the water.

Hardness is generally classified into four different ranges, from Soft water to Very Hard water. The following table shows the Hardness Classification Scale recommended by the AWWA's Water Quality and Treatment handbook.

Table 4-1: Hardness Classification Scale

Hardness Range (mg/l as CaCO ₃)	Hardness Classification
0 – 75	Soft
75 – 150	Moderately Hard
150 – 300	Hard
> 300	Very Hard

The finished water hardness for each potential water source was compared with the City of Bedford WTP's finished water hardness using the industry accepted classification scale.



WATER CHARACTERISTICS

**Table 4-2: Comparison of Hardness Classifications for
Average/Normal Conditions**

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	Soft	Moderately Hard	Soft
Quarter 2	Soft	Moderately Hard	Soft
Quarter 3	Soft	Moderately Hard	Soft
Quarter 4	Soft	Moderately Hard	Soft
Average (mg/l)	32	114	20

The hardness classifications were determined by utilizing the average hardness at each facility for each quarter for years 2010 and 2011. As shown in the table above, the average hardness for finished water from the City of Lynchburg Abert WTP and for the City of Bedford WTP are both classified as Soft. The average hardness for the High Point WTP is classified as Moderately Hard.

Alkalinity is related to hardness in that it indicates whether the hardness is a “normal” type of hardness, referred to as “carbonate” hardness, or a less common type of hardness, “non-carbonate hardness”. Non-carbonate hardness can indicate elevated sulfur, nitrate, silica, and chloride concentrations. Similar to hardness, the finished water alkalinity at the City of Lynchburg Abert WTP under average/normal conditions is very similar to the City of Bedford WTP whereas the High Point WTP has a consistently higher alkalinity. The following table summarizes the average alkalinity by quarter for 2010 and 2011.



WATER CHARACTERISTICS

Table 4-3: Comparison of Finished Water Alkalinity

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	15	93	16
Quarter 2	21	98	31
Quarter 3	36	85	43
Quarter 4	25	82	30

Based on a comparison of the average monthly alkalinity and hardness for all water sources, it appears that almost all of the hardness from the Abert WTP, High Point WTP and the City of Bedford is carbonate hardness.

Similarly, the finished water pH of water produced at the Abert WTP and the High Point WTP is very similar to the City of Bedford WTP finished water pH. Changing pH can have an adverse effect on the rate of fouling and precipitation in industrial processes. The following table summarizes the average pH by quarter for 2010 and 2011.

Table 4-4: Comparison of Finished Water pH

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	7.5	8.1	7.5
Quarter 2	7.4	7.7	7.4
Quarter 3	7.3	7.4	7.5
Quarter 4	7.5	7.8	7.5

Different finished water pH levels may also indicate different corrosivity characteristics in the finished water. As noted in Section 5, it is recommended that



WATER CHARACTERISTICS

the Joint Authority evaluate the compatibility of corrosion inhibitors in the different systems.

Two of the parameters, Chlorine Residual and Temperature, are measured for the finished water of each WTP. The following tables summarize the average finished water chlorine residual and temperature by quarter for 2010 and 2011. While there are minor variations between these parameters, these variations are not expected to have an adverse impact on either residential or commercial/industrial uses. Potential effects on end users are more dependent on the configuration of the distribution system than on the measured concentration leaving the treatment plant. The required distribution system configuration to provide a backup water supply was not evaluated as part of this study.

Table 4-5: Comparison of Finished Water Chlorine Residual

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	1.6	1.2	1.3
Quarter 2	1.6	1.2	1.3
Quarter 3	1.7	1.2	1.5
Quarter 4	1.7	1.4	1.4

Table 4-6: Comparison of Finished Water Temperature (Degrees C)

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	5	8	9
Quarter 2	16	14	22
Quarter 3	23	20	27
Quarter 4	12	15	17



WATER CHARACTERISTICS

The two parameters noted above also strongly influence the formation of disinfection byproducts in the distribution system. Thus the interaction between these parameters and water age should be examined in more depth as part of the evaluation of Disinfection Byproducts recommended in Section 5.

The finished water turbidity for each facility is very similar as shown in following table summarizing the average finished water turbidity by quarter for 2010 and 2011. It is notable that the High Point WTP has consistently lower turbidity due to the membrane filtration process compared to media filtration at the City of Bedford WTP and the City of Lynchburg Abert WTP.

Table 4-7: Comparison of Finished Water Turbidity (NTU)

	City of Bedford WTP	BCPSA High Point WTP	City of Lynchburg Abert WTP
Quarter 1	0.11	0.06	0.08
Quarter 2	0.08	0.06	0.07
Quarter 3	0.08	0.06	0.08
Quarter 4	0.09	0.06	0.07

The finished water iron and manganese were provided on an annual basis for the Abert WTP, on a daily basis for the High Point WTP and were not provided for the City of Bedford WTP. The following table shows the average iron and manganese concentrations on an annual basis for the Abert WTP and the High Point WTP.

There are several potential adverse effects that may occur when iron and manganese exceed certain levels including taste and odor, laundry discoloration and mineral deposition. The AWWA's Water Quality and Treatment handbook cites iron levels exceeding 0.3 mg/l for laundry discoloration, 0.04 to 0.1 mg/l for taste, and manganese levels of 4 to 30 mg/l for taste. As shown in the following table, the average iron and manganese concentrations for both backup water sources are below these thresholds.



WATER CHARACTERISTICS

Table 4-8: Comparison of Finished Water Iron and Manganese

	BCPSA High Point WTP	City of Lynchburg Abert WTP
Iron – 2010	< 0.01	< 0.01
Iron – 2011	< 0.01	< 0.01
Manganese – 2010	< 0.01	< 0.01
Manganese – 2011	< 0.01	< 0.01

4.3 COMPARISON OF WATER QUALITY PARAMETERS FOR EXTREME/UNUSUAL CONDITIONS

The previous analysis compared several parameters under average/normal conditions on a quarterly basis for each of the identified potential backup water sources to average conditions for City of Bedford water. As noted above, hardness is the most relevant parameter to evaluate potential impacts of the different water sources to sensitive commercial/industrial water users as well as aesthetic characteristics to the general public. Hardness was also noted as one of the finished water parameters exhibiting the most change between water sources. In order to present a more comprehensive analysis of this parameter, it is necessary to look at “extreme/unusual” conditions that are representative of extended periods where hardness may be higher or lower than the averages identified previously.

The City of Lynchburg’s Abert WTP has two water sources, Pedlar Reservoir and the James River. The extreme condition for the Abert WTP was identified as operating using only the James River source. The Pedlar Reservoir is considered a superior source compared to the James River. However, the James River is utilized in varying proportions up to 100 percent during extremely dry periods or when maintenance/repair activities dictate. Approximately 89 percent of water produced by the City of Lynchburg during 2010 and 2011 was from the Pedlar Reservoir.



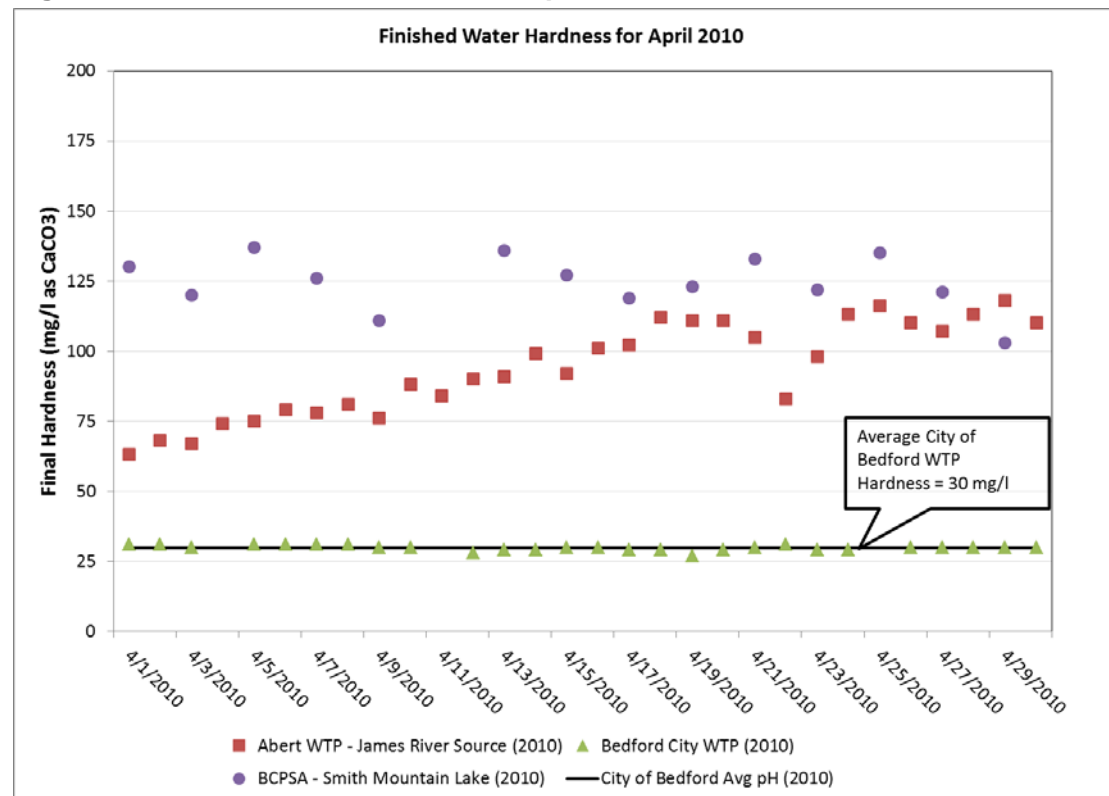
WATER CHARACTERISTICS

In order to quantify the effect of the differing water sources at the Abert WTP, the following analysis compares hardness during two months, April 2010 and September 2010, during which the Abert WTP operated for extended periods using the James River as the sole source. These were the only two periods during which the James was the sole source for an extended period (>15 consecutive days) during 2010 and 2011. The selected periods included all of April 2010 and September 11th thru 30th 2010.

The High Point WTP has one source, Smith Mountain Lake. Smith Mountain Lake is an impoundment of the Roanoke River. While the intake is located in a bay and not in the main channel, the source does exhibit a degree of natural variability expected of a river source. River sources tend to demonstrate variability as a result of extreme wet or dry periods and other seasonal variations.

As shown below in Figures 4-1 and 4-2, there were significant hardness differences between the City of Bedford WTP finished water, the BCPSA High Point WTP and the City of Lynchburg Abert WTP using James River source water.

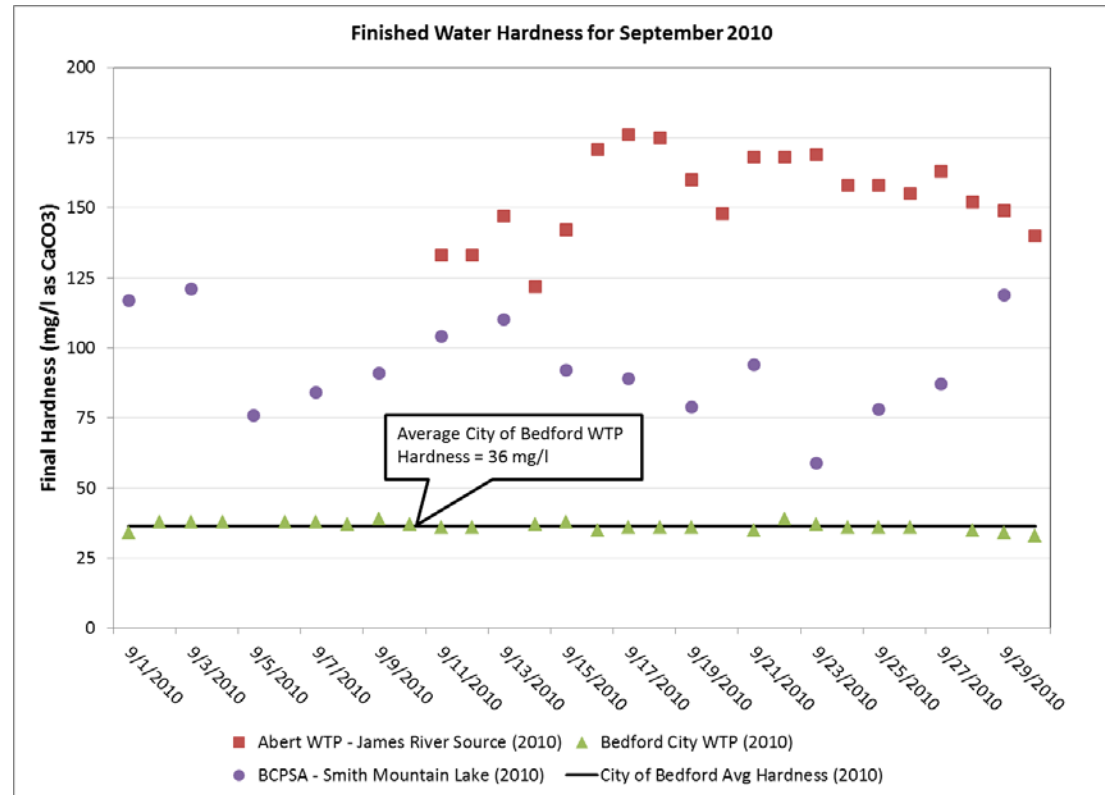
Figure 4-1: Finished Water Hardness, April 2010





WATER CHARACTERISTICS

Figure 4-2: Finished Water Hardness, September 2010



For both of these time periods, both the BCPSA High Point WTP under normal/average conditions, and City of Lynchburg Abert WTP under extreme/unusual conditions, report significantly higher hardness, with a range of 3 to 5 times that reported by the City of Bedford WTP. The BCPSA High Point WTP reported an average/normal hardness ranging from 75 mg/l to 150 mg/l. During the two extended periods where the Abert WTP used only the James River source, the reported hardness ranged from 70 mg/l to 175 mg/l.

Also, as depicted in these figures, the City of Bedford hardness remains very consistent year round. During the two time periods being compared, the City of Bedford WTP reported an average hardness between 30 and 36 mg/L as CaCO₃.



WATER CHARACTERISTICS

4.4 CONCLUSIONS

From a long term perspective, looking at quarterly averages, both potential backup water sources, the High Point WTP and the Abert WTP are similar in terms of most of the water characteristic parameters identified in this analysis. It is noted that these parameters may have impacts on operational considerations identified in Section 5, including Disinfection Byproducts and Corrosion Inhibitors.

The notable difference between the backup water sources is the Hardness and Alkalinity. As noted herein, the alkalinity for each source is primarily carbonate alkalinity which correlates with hardness. Thus, the analysis focused on differences in finished water hardness. The City of Lynchburg Abert WTP normally produces finished water that is classified as "Soft" when the source of water is the Pedlar Reservoir. This is similar to the City of Bedford WTP primarily because the Bedford Reservoir is similar to Pedlar Reservoir. The High Point WTP normally produces finished water that is classified as "Moderately Hard".

When extreme conditions are considered, specifically when the Abert WTP utilizes the James River source, there is potential for the Abert WTP to produce "Moderately Hard" water similar in character to the High Point WTP. Therefore, under certain conditions, both identified alternate water sources will produce water with significantly greater hardness than currently produced by the City of Bedford WTP.

It is recommended that the new Joint Authority conduct a more in-depth study to assess the specific effects of blending the City of Bedford WTP's soft finished water with a backup source providing moderately hard finished water. It is recommended that the study (1) identify potential blending scenarios, (2) coordinate with industrial customers to determine concentration thresholds at which increased hardness/TDS will affect their processes, and (3) evaluate different treatment techniques which may be required to reduce hardness. This may include point-of-use techniques to meet specific industrial customer requirements.



OPERATIONS

5.1 BACKGROUND

The formation of the new Joint Authority will require the merger of the organizational structures of the City and BCPSA. This will include operations, maintenance, engineering, customer service, and other departments and personnel within the new Authority.

In addition, existing operational strategies currently employed by the City and BCPSA will need to be evaluated as the operations of the two existing separate entities are integrated into the new Joint Authority. This includes strategic planning, facility integration, and potential efficiencies to be gained by the combination of current City and BCPSA assets and facilities, and the transfer of existing contracts and permits to the Joint Authority. Based on conversations with City and BCPSA staff, some areas and items that will require study and/or actions that will be required by the Joint Authority have been identified. For the purposes of this study a time frame of three to five years was considered.

5.2 ORGANIZATIONAL STRUCTURE

The existing organizational structures of both the City and the BCPSA have been reviewed. Organization charts provided by the City and BCPSA staff were used as the starting point for preparing the recommended general organization structure for the new Joint Authority. Various positions and departments from the current City and BCPSA organizational charts were included in the development of the proposed general personnel organizational chart.

Figure 5-1 contains a general personnel organization chart that has been prepared for the new Joint Authority. This general organization chart is intended to be a starting point for the new Authority, not a final destination. It is understood that the positions indicated on the proposed organization chart will be filled in and modified over time to suit the needs of the new Authority. It indicates general positions only and does not attempt to fill in names of current City and BCPSA employees. Assignment of current City and BCPSA employees to various positions will be a task to be undertaken by the new Authority Board of Directors and Executive Staff as the new Authority is being formed. Based on observations and conversations with City and BCPSA staff, personnel levels of both entities are currently at a level where they cannot be reduced further without impacting operations and customer service. Therefore, it is anticipated that as the new Authority is formed, City and BCPSA personnel will likely continue in their current assignments. Over the early months and years, as the new Authority grows and as procedures and operations



OPERATIONS

become more established, some personnel assignments and positions may be modified to better suit the needs of the new Authority.

As the proposed organizational chart was prepared, consideration was given to the structure and positions that will be required to run the Joint Authority. In addition to operations, maintenance, and engineering personnel, the Joint Authority will be responsible for its own customer service, financial, information systems, and human resources staff. Support staff for these positions will not be provided by the County or the Town of Bedford. Therefore, these positions are included in the proposed organizational chart for the Joint Authority.

The City Utilities Department currently allocates approximately \$300,000 to the City for administrative support services the City provides the Utilities Department. While most of this will be able to be handled by the new Authority with existing BCPSA positions, some new employees will be needed immediately to handle some of the work performed by the City administrative staff. It is likely that these positions will be in Customer Service, Accounting, and Information Systems. These additional positions are included in the Rate Analysis section of this report.

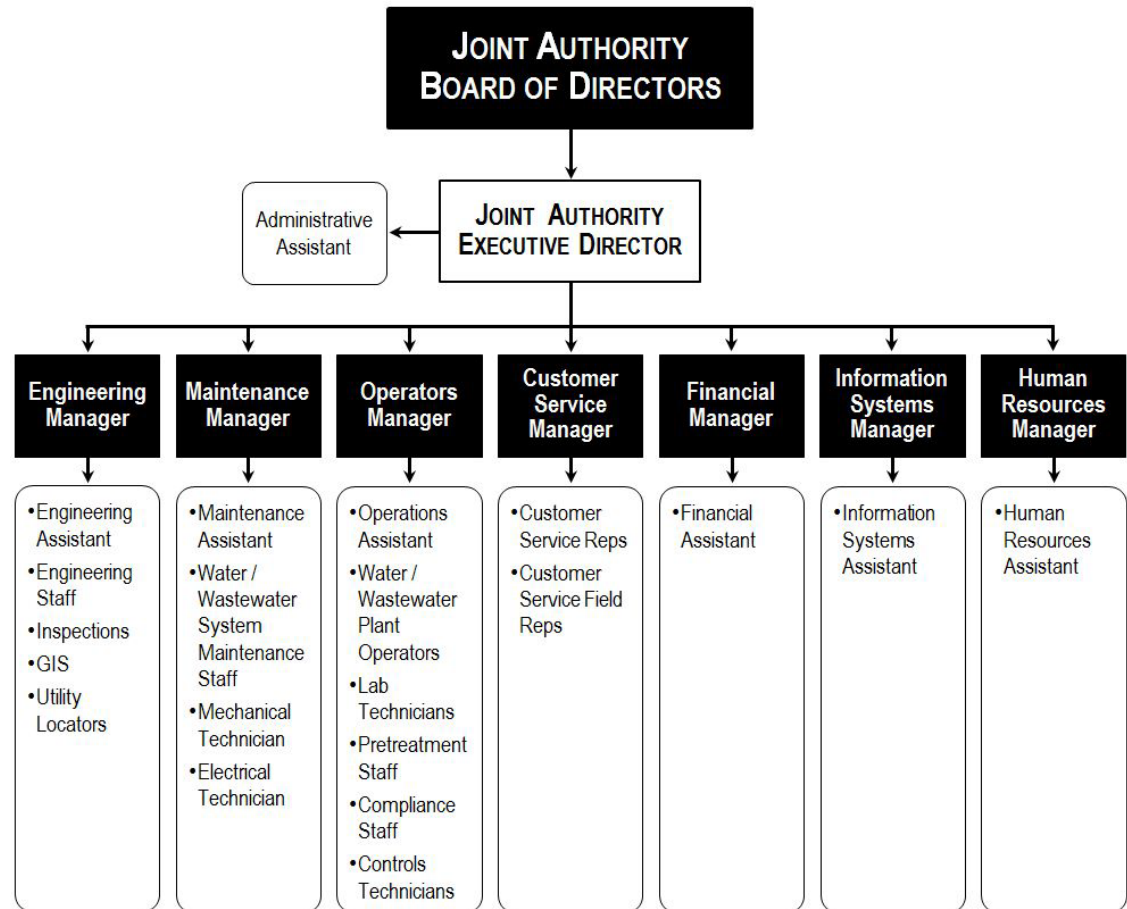
The Executive Director for the Joint Authority will report directly to the Authority Board of Directors. It is recommended that the Authority also consider including the position of an Assistant Director as part of the executive staff. It is recommended that the Joint Authority be organized into seven departments that are overseen by Executive Director. Each department would have a Department Manager that answers directly to the Executive Director. These departments would include Operations, Maintenance, Engineering, Customer Service, Financial, Information Systems, and Human Resources.

If an Assistant Director is included on the executive staff, it is anticipated that the Assistant Director could be a separate position, or also could be one of the seven Department Managers. With an Assistant Director on staff, the Executive and Assistant Directors would share responsibility for oversight of the seven departments, with some departments reporting directly to the Executive Director and some reporting directly to the Assistant Director. If the Assistant Director is also a Department Manager, then he/she would have responsibilities to manage one department directly and to also oversee other departments.



OPERATIONS

Figure 5-1: General Personnel Organizational Chart



5.3 STRATEGIC PLANNING

The following recommended items that require study and/or action by the new Joint Authority center around system expansion, regulatory compliance and capital improvements. Both the City of Bedford and the BCPSA have been proactive in addressing strategic planning needs. The following issues were identified by City and BCPSA staff as upcoming strategic planning needs that, in most cases, have been identified and efforts are on-going toward a solution.



OPERATIONS

Disinfection Byproducts

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) establishes an increasingly strict monitoring program for Disinfectant Byproducts (DBPs) which are Primary Drinking Water Standards. Due to the long retention times in the current BCPSA system, and the potential for increased retention times as the County provides a back-up water source to the City as stipulated in the reversion agreement, it is recommended that the Joint Authority evaluate the effects of the LT2ESWTR on DBP compliance, specifically the Locational Running Annual Average (LRAA) requirements that will be implemented in coming years. These requirements are intended to identify the locations in the system most susceptible to high DBP concentrations and apply the Primary Drinking Water Standards for DBPs to those locations.

Total Recoverable Zinc Compliance at Moneta WWTP

The Moneta WWTP received a limit for Total Recoverable Zinc in the most recent permit renewal. The WWTP must achieve compliance within 4 years of the effective date of the permit, i.e. June 2014. BCPSA staff indicated that they are actively investigating strategies to come into compliance with the Zinc limit. These efforts will be continued under the new Joint Authority.

Septage Receiving Impact on Total Recoverable Zinc Compliance at Moneta WWTP

BCPSA staff indicated that septage receiving at the Moneta WWTP may be a source of metals loading, particularly Total Recoverable Zinc, to the WWTP. As noted above, the Moneta WWTP is required to come into compliance with a VPDES permit limit for Total Recoverable Zinc. The Joint Authority will have to continue on-going efforts to quantify whether septage receiving negatively impacts compliance with the Total Recoverable Zinc limit and to determine the most efficient means to accept septage at the WWTP.



OPERATIONS

Replacing Lake Vista Sanitary Lift Station with Gravity Sewer

The Lake Vista pump station experiences transient hydraulic conditions on a regular basis, i.e. water hammer/vibration, that result in very high maintenance requirements. BCPSA staff indicated that submersible pumps are replaced roughly every three years. Typical pump life for a submersible sewage pump is 10 to 20 years. It is recommended that the new Joint Authority continue on-going efforts started by BCPSA staff to study options for removing the lift station from service. One option that BCPSA staff indicated should be considered is routing sanitary flows by gravity to the City of Lynchburg system.

City of Bedford Sanitary Sewer Consent Order

The City of Bedford is currently under a Consent Order with the Department of Environmental Quality (DEQ) to reduce rainfall derived infiltration and inflows (RDII) that cause high peak flows at the City of Bedford WWTP and periodic sanitary sewer overflows (SSO) in the collection system. The new Authority will be required to continue to meet the terms of the Consent Order. It is recommended that the Joint Authority evaluate implementation of a long term strategy to effectively reduce SSO's in the collection system.

Lakes System Extensions

BCPSA currently owns and operates three well systems that are part of the Lakes Water System service area in subdivisions surrounding Smith Mountain Lake. These systems were previously privately owned water systems that were turned over to BCPSA. It is recommended that the new Authority continue current efforts by BCPSA to develop a long term strategy for continued expansion of the central BCPSA Lakes Water System to serve the well systems and other privately owned water systems adjacent to the current service area. This would allow the current wells and associated tanks and treatment systems to be taken off line and abandoned.



OPERATIONS

5.4 FACILITY INTEGRATION

During site visits with City of Bedford and BCPSA staff, several operational items were identified that will need to be addressed as the new Joint Authority integrates the existing City and BCPSA facilities. BCPSA and City of Bedford staff have been pro-actively discussing these issues. Two of the items identified, Meter Reading Technology and Sanitary Lift Station Standards, should be addressed during Authority formation because they impact how the new Authority will operate on a day to day basis. The other two items, fluoridation and corrosion inhibitors should be addressed as the Authority determines how their water systems will be interconnected.

Fluoridation

The new Authority will have to determine whether to implement/continue fluoridation as the Authorities water systems are interconnected. The City of Bedford practices fluoridation at the Bedford WTP. BCPSA does not practice fluoridation at the High Point WTP; however, all water purchased from the City of Lynchburg is fluoridated. It is recommended that the Joint Authority develop a long term strategy to determine where fluoridation will be implemented and/or continued and how to address the issue as the water systems are interconnected.

Corrosion Inhibitors

As the new Authority's water systems are interconnected to provide the City of Bedford with a backup source of supply as required by the reversion agreement, the Authority will have to determine if corrosion inhibitors currently in use at the BCPSA, City of Bedford WTP and City of Lynchburg WTPs are compatible. A study should be prepared to determine the types of corrosion inhibitors currently in use, if there are adverse effects when blended, and if there are adverse effects when water systems that have been exposed to a certain corrosion inhibitor are exposed to a new corrosion inhibitor. The Joint Authority should consider determining if there are cost and operational benefits to implementing a common corrosion inhibitor across all water systems prior to interconnection.

Meter Reading Technology

During site visits at the BCPSA and City of Bedford facilities, it was determined that the two entities utilize different meter reading technologies. The new Authority will have to evaluate whether it is cost effective to maintain two different systems or to integrate the two systems. It is recommended that the Joint Authority evaluate whether the different meter reading technologies can be merged without changing



OPERATIONS

individual meter transmitting devices and develop a program to integrate meter reading technology going forward. The City has provided a meter to the BCPSA for evaluation of meter reading equipment. The BCPSA staff has contacted the different meter manufacturers and has begun the process of evaluating what equipment can be used to effectively read both types of meters.

Sanitary Lift Station Standards

BCPSA and City of Bedford have a total of 21 sanitary lift stations. Both BCPSA and the City of Bedford have different standards for construction, SCADA connectivity and appurtenances at their lift stations. It is recommended that the new Authority develop unified standards for future lift stations and formulate a strategy for integrating lift station infrastructure at the existing lift stations in the City of Bedford system and the BCPSA system. Several key issues that should be addressed regarding pump station integration include SCADA connectivity, emergency power, site fencing and lighting and sewershed consolidation.

5.5 EFFICIENCIES

The following recommended items that require study and/or action by the new Authority center around areas where the new Authority can gain efficiencies, both financially and operationally. During site visits with BCPSA and City of Bedford staff, several operational items were identified that will need to be studied to determine the extent of possible efficiency gains.

Combined WWTP Solids Handling

BCPSA and City of Bedford staff indicated that they believe operational and financial efficiencies can be achieved by combining solids handling operations between the City of Bedford WWTP, the Montvale WWTP and the Moneta WWTP. It is recommended that the new Authority evaluate the infrastructure improvements, operational changes, and Virginia Pollutant Discharge Elimination System (VPDES) permit implications required to combine solids operations, and determine the extent of efficiencies that can be achieved. The evaluation should include quantifying required solids disposal requirements under the respective VPDES permits, an inventory of equipment at each facility, and a cost evaluation to determine the extent of cost savings from combining the facilities solids handling operations and possible resumption of composting.



OPERATIONS

Combined Laboratory Operations

BCPSA and City of Bedford staff indicated that they believe operational and financial efficiencies can be achieved by combining laboratory operations between all City and BCPSA WWTPs and WTPs. It is recommended that the new Joint Authority evaluate the improvements, operational changes, and permit implications required to combine laboratory operations, and determine the extent of efficiencies that can be achieved. The evaluation should include quantifying required testing programs at each facility, an inventory of equipment at each facility, a summary of required laboratory certification requirements and a cost evaluation to determine the extent of cost savings from combining the facilities laboratory operations and reducing contract laboratory costs.

After Hours Emergency Calls

BCPSA and City of Bedford staff indicated that they believe operational efficiencies can be gained by utilizing the combined operations and maintenance staffs from both entities to change how after hours emergency calls are handled. Currently this type of call is handled by employees who are off-duty (on-call). In the future, these calls may be able to be routed to employees that are on duty during non-normal business hours. This could reduce overtime pay as well as payment for on-call services. It is recommended that the BCPSA and City of Bedford staff evaluate their current policies for after-hours on-call employees, and continue discussions regarding development of a new unified policy for after-hours emergency calls.

Facility Staffing

BCPSA and City of Bedford staff indicated that they believe operational and financial efficiencies can be achieved by integrating staff responsibilities and cross-training between BCPSA and the City of Bedford facilities. It is recommended that the new Authority evaluate innovative methods to reduce travel time, reduce overtime and provide cross-training to selected staff. The evaluation should include inventorying staff experience, licensure and training, summarizing staff attendance and licensure requirements at each facility and a cost evaluation to determine the extent of cost savings derived from integrating BCPSA and City of Bedford staff responsibilities.



OPERATIONS

5.6 TRANSFER OF PERMITS

The following discussion outlines the process for transferring permits for waterworks and wastewater collection and treatment facilities to the new Joint Authority. In order to determine the appropriate process for transferring permits, Wiley|Wilson contacted the Virginia Department of Health Office of Drinking Water District Engineer, James Reynolds, and the Department of Environmental Quality Water Permit Writer, Bob Tate, responsible for the City of Bedford and BCPSA facilities permits. Both agencies indicated that there would be no apparent problems in transferring the permits for waterworks and wastewater collection and treatment facilities.

Waterworks Facilities

The City of Bedford and BCPSA will be required to submit a Waterworks Permit Application to the Virginia Department of Health, Office of Drinking Water, and Danville Office. The Application must be accompanied by a brief description of the organizational structure of the new Authority indicating the positions that are responsible for compliance with drinking water standards and sampling protocols. The PWSID number for each facility will not be changed. No fee is required.

Wastewater Facilities

The City of Bedford and BCPSA will be required to submit a letter requesting a Minor Modification to the existing permits for each facility. The letter should include the name of the new Authority as it should appear on the permits and the positions and/or personnel who will be responsible for submitting Discharge Monitoring Reports. This will not involve re-issuing permits for any facility. No fee is required.

5.7 BCPSA SEWER AGREEMENT WITH THE CITY OF LYNCHBURG

The BCPSA is currently a party to a Regional Sewage Treatment Plant Agreement with the City of Lynchburg. There are no specific provisions for transfer of the Agreement from the BCPSA to another entity. However, there is a provision in Article XIV of the Agreement related to amendments to the Agreement. This article states that "This agreement may be amended or modified, in whole or in part, by mutual consent of the parties hereto, by a written document of equal formality and dignity, duly executed by the authorized representative of the parties hereto."



OPERATIONS

By this article, the Agreement can be modified to delete references to the BCPSA and replace them with the name of the new Joint Authority. Legal counsel for the Joint Authority should explore this further and initiate the appropriate changes to the existing Agreement.

5.8 BCPSA WATER AGREEMENTS WITH THE CITY OF LYNCHBURG AND THE WESTERN VIRGINIA WATER AUTHORITY

The BCPSA is currently a party to two water purchase agreements, one with the City of Lynchburg and one with the Western Virginia Water Authority (WVWA). The BCPSA purchases water from the City of Lynchburg to serve customers in the Forest Central Service Area. The BCPSA does not currently have an independent water source to serve the Forest Central area. Therefore, they currently rely exclusively on the purchase of water from Lynchburg to serve this area. The existing water purchase agreement with Lynchburg will have to be modified to reflect the formation of the new Joint Authority.

The BCPSA also has a water purchase agreement with the WVWA. The BCPSA currently sells water to WVWA at Smith Mountain Lake for its customers in Franklin County. In addition, the BCPSA purchases water from WVWA to provide service to the Stewartsville service area. The purchase of water from WVWA to serve Stewartsville has allowed the BCPSA to take its existing Stewartsville tank and booster station off-line. The existing water purchase agreement with WVWA will have to be modified to reflect the formation of the new Joint Authority.



SERVICE AREA

6.1 BACKGROUND

Existing water and sewer mapping from the City and BCPSA has been reviewed. The City is currently providing water and sewer service to customers within the City limits as well as to a limited number of customers in portions of the County, generally located close to the City/County line. The City has approximately 2,627 water customers and 2,383 sewer customers located within the City limits and approximately 658 water and 282 sewer customers located in the County. City water and sewer system mapping is available online through the City's GIS system at the following web address:

<http://bedfordgis.bedfordva.gov/bedfordcity/mainmap.asp>

In addition, pdf files of the City's water and sewer system mapping were provided for reference and inclusion in this report. Prints of the water and sewer system mapping are included in Appendix A for reference.

The BCPSA is currently providing water and sewer service to various areas in Bedford County, the largest of which are the Forest Central and the Smith Mountain Lake Central systems. The Smith Mountain Lake Central service area includes the bulk sale of water to the Western Virginia Water Authority to serve portions of Franklin County at Smith Mountain Lake. The BCPSA currently has a total of 8,794 water and 1,628 sewer customers located in the County service areas. The BCPSA is not currently providing service to any customers located within the Phase 1, 2, and 3 Boundary Adjustment Areas described in the Voluntary Settlement Agreement. BCPSA water and sewer system mapping is available online through BCPSA's GIS system at the following web address:

<http://www.onlinegis.net/VaBedford/>

In addition, a pdf file showing the BCPSA water and sewer service areas was provided for reference and inclusion in this report. A print of the water and sewer service area drawing is included in Appendix A for reference.



SERVICE AREA

6.2 JOINT AUTHORITY SERVICE AREAS

The consolidation of the City Utilities Department and the BCPSA into a Joint Authority will provide increased opportunity to expand both water and sewer service into the current portions of the County that will be incorporated into the Town Limits by the Phase 1, 2, and 3 Boundary Adjustment Areas described in the Voluntary Settlement Agreement. In addition, there are other areas of the County not located with the designated Boundary Adjustment Areas that may also be candidates for expansion of services beyond the future Town limits.

With the addition of the phased boundary adjustment areas, the land area of The Town will be significantly larger than that of the City. The City is currently providing limited service to some customers located within the phased boundary adjustment areas. Over the years, there have also been a number of requests made to the City and BCPSA for water and/or sewer service in these areas. For various reasons, including limited near-by infrastructure and the costs of line extensions, many of these requests have not been granted. It should be anticipated that as these areas are incorporated into the Town limits, the number of requests for water and sewer service will increase, both from those who have previously requested service and those who have not.

Preparation of a Utility Master Plan study for providing water and sewer service to the phased boundary adjustment areas, as well as other surrounding areas, would provide the Joint Authority with information regarding the feasibility of extending service into these areas. Information gained from the Master Plan study would include a basis for water demand and sewer flow projections, route alternatives for line extensions, location alternatives for storage and pumping improvements, and opinions of probable costs for the evaluated alternatives. In addition, the Master Plan would provide guidelines for the timing of improvements, and would look at the financial feasibility of the service area extensions.

Other additional items that could be included in the study would be to contact the Virginia Department of Health (VDH) and the Virginia Department of Environmental Quality (VDEQ) to determine where there are known problems with existing wells and septic drain fields. A property owner survey could also be conducted for parcels located within the phased boundary adjustment areas to determine which owners may desire water and/or sewer service. The Master Plan could then consider the prioritization of line extensions to areas with known problems and areas where a high percentage of property owners would likely connect.



SERVICE AREA

The Master Plan should also consider extensions of service that would connect to existing BCPSA service areas and other private well systems located near the future Town limits. The BCPSA currently provides water service to approximately 50 residential customers in the Hillcrest neighborhood, located west of the City, just south of Route 460 off of Wheatland Road. The Hillcrest water system is a well system, which includes wells, a standpipe storage tank, and a small block building that houses the chemical feed equipment, pressure tanks, and pumps. During periods with little rainfall, this system, as well as surrounding individual wells, is known to experience water supply problems. It would be beneficial to connect this system to a City water system line, which is located less than 1 mile away at the intersection of Wheatland Road and Route 460. This connection would eliminate operation of a well water system and would also make water service available to approximately 40 additional customers along Wheatland Road. In addition to this system operated by the BCPSA, there are other well systems located east and north of the current City limits. The owners of these well systems could be contacted to determine their interest in connecting to the City system.

In addition to evaluating new infrastructure required to serve the phased boundary adjustment areas and other areas located outside of the new Town limits, the Master Plan should consider the capacity of the existing systems and what improvements to existing utility infrastructure may be required when additional customers are added. The capacity of the existing City water and sewer systems to serve the potential service area expansions may be used to help determine the location and timing of service line extensions beyond the current City limits. The cost of system improvements would need to be factored into the opinions of probable costs prepared for the Master Plan study. This would likely include a detailed evaluation and study of portions of the City's distribution, collection, and treatment systems. Section 3 of this study provides additional information on the existing utility infrastructure. The evaluation of the existing water distribution and sewer collection systems would answer questions related to how many customers can be added, what bottlenecks exist in the systems, and what capital improvements are needed. This evaluation would also take into account work required to satisfy the Consent Order that the City is currently under from VDEQ to reduce inflow and infiltration in the sewer collection system, with the understanding that eliminating inflow and infiltration increases available sewer capacity in the existing system piping and infrastructure.



SERVICE AREA

One tool that would be useful to the Joint Authority, both in The Town and throughout the County would be the consolidation of system data and mapping into a combined GIS system. Current City and BCPSA system mapping includes GIS data, referenced above in Section 6.2. Separate systems are currently being maintained by the City and BCPSA. A combined GIS system, with all utility data and mapping updated in one database would be useful as an operational and planning tool to the Joint Authority. The Joint Authority will need to study both existing GIS systems and determine which better serves the needs of the Joint Authority moving forward. An evaluation of the existing systems should consider ease of data transfer into a consolidated database and interfacing of the GIS system with water and sewer system models. The evaluation should also consider new system software and interface packages that may not have been considered when the individual systems were developed.

Another tool that would be useful when considering utility expansions beyond the current City limits would be water and sewer system models. The BCPSA currently owns and maintains both water and sewer system models of their systems. The BCPSA uses Bentley software products, including WaterGEMS for their water model and SewerCAD for their sewer system model. For the sewer model, the BCPSA has purchased the SewerGEMS sewer modeling package, but has not yet converted their model from SewerCAD to SewerGEMS. The primary difference between these two packages is that SewerGEMS is a GIS-integrated model, while SewerCAD is an AutoCAD based model. The BCPSA SewerCAD model is fairly accurate and up to date; however, the water model needs to be updated and calibrated.

The City does not currently maintain models for either of their systems. At one time the City maintained a Cybernet water model, which was originally prepared for the City by a consultant. However, due to computer changes and not upgrading the program, the City is not able to run the model at this time. Cybernet was originally developed by the Haestad Methods Company, and was the precursor to WaterCAD prior to Bentley's purchase of the Haestad Methods Company. The City has copies of their model files, which could likely be imported into the newer version of the WaterCAD program and incorporated into the BCPSA WaterGEMS model. Due to the differences between the City's Cybernet model and the current version of WaterGEMS, the conversion of this file may require the assistance from Bentley's technical support personnel.



SERVICE AREA

Updated water and sewer system models that include the City and BCPSA systems would be useful to the Joint Authority. The largest benefit to the Joint Authority would be in the evaluation of interconnections between water systems, including the connection of a back-up water supply to the City system, and evaluating expansions of the City's system into the phased boundary adjustment areas and beyond.

It is recommended that the new Joint Authority evaluate modeling software packages and consider adding the Town's systems to the BCPSA's water and sewer models. The development of a model of the current City sewer system could be useful when considering the addition of new service areas and their potential impacts to the capacity of the City's sewer system. The Joint Authority will need to evaluate modeling packages to determine what best meets its near-term and long-term needs. The evaluation should consider ease of inputting data from both systems and interfacing of the consolidated GIS system with the consolidated water and sewer system models. The evaluation should also consider the current modeling packages used by the BCPSA and City, as well as packages from other software developers that may offer enhanced features that would be useful to the personnel running the models.

6.3 CONCLUSIONS

A number of actions related to expansion, interconnection, and management of water and sewer service areas are recommended to be taken by the new Joint Authority. The urgency to take action on the items discussed above will be determined in part by the needs of existing customers, as well as requests from potential new customers. These actions will better enable the Joint Authority to serve their customers and will improve the efficiency and decision making capabilities of the Joint Authority.

Recommended actions include the preparation of a Utility Master Plan study, water and sewer system modeling of the combined City and BCPSA systems, and consolidated GIS mapping. The Utility Master Plan study would evaluate alternatives for providing service to the Phased Boundary Adjustment areas, and would also provide direction on interconnections between the City systems and existing BCPSA customers, such as those served by the Hillcrest water system. A Utility Master Plan would provide information regarding improvements required to serve these areas, and could also provide information regarding the capacity of the existing City systems to serve these areas.



SERVICE AREA

In addition, development of combined water and sewer system models of the City and BCPSA systems, and combining the existing City and BCPSA GIS mapping would be useful to the Joint Authority as operational tools and would also be useful during preparation of the Utility Master Plan. It is recommended that the Joint Authority evaluate the existing GIS mapping and modeling software being used by the City and BCPSA, and develop new combined mapping and modeling of the water and sewer systems.



RATES

7.1 BACKGROUND

Exhibit 7 of the Voluntary Settlement Agreement is titled *Principles Governing the Creation of the Bedford Regional Utility Authority*. Three paragraphs within Exhibit 7, Paragraphs 6, 7, and 8, have some impact on the rates and collection of accounts for the new Joint Authority. Paragraph 6 of Exhibit 7 of the Voluntary Settlement Agreement indicates that the initial rate structure of the new Joint Authority will have different water and sewer rates for former City customers and former BCPSA customers. Also, that it is agreed that within 10 years of the merger it is expected that the rates will be equalized through cost efficiencies and economies and not through disproportionate increases to the former City of Bedford users. Paragraph 7, in part, indicates the need for special rate classifications for large users. Finally, Paragraph 8 allows the new Joint Authority to utilize the City/Town billing systems for collection of water and sewer accounts, and allows the Town to charge the new Authority for that service.

These three paragraphs provide some initial guidance for the new Joint Authority to use when establishing a new equalized rate structure. The discussion below provides additional guidance and recommendations.

7.2 COMPARISON OF EXISTING RATES

The existing water and sewer rate structures from the City and BCPSA were compared to identify differences in the current structures. Monthly water and sewer charge calculations utilizing the current rate structures were made to aid with the comparison.

There are a number of differences in the current rate structures of the BCPSA and the City. The City water and sewer rates include monthly base charges based on water meter size and a scaled consumption charge per gallon that steps down in defined increments as the customer uses more water. The City's monthly base charge also includes consumption up to the amount equal to the monthly base charge. Once the monthly base amount is exceeded by the consumption, the consumption charge is applied for the amount of water used that month to determine the monthly cost of water and sewer service. After the consumption charges are calculated Capital Recovery Fees, based on the water meter size, are added to calculate the total monthly water and sewer charges. In addition, the City rates include different base charges and scaled consumption charges for residential and commercial customers located within the City limits and customers the City currently serves that are located in the County.



RATES

The application of the BCPSA rate structure differs from the City approach. The BCPSA water and sewer rates include monthly base charges based on water meter size and a flat consumption charge per gallon that does not vary by the amount of water used. In addition, the BCPSA monthly base charges for water and sewer do not include any consumption. BCPSA customers are charged for every gallon of water used in addition to the monthly base rate, and there is no differentiation between residential and commercial customers.

The current average residential customer of the BCPSA has a 5/8" meter and uses approximately 4,300 gallons per month. The average existing City residential customer has a 3/4" meter and uses approximately 4,000 gallons per month. The BCPSA and the City currently have approximately 8,220 and 2,840 residential customers, respectively. Based on these figures, the anticipated average residential customer of the new Joint Authority will use approximately 4,200 gallons of water per month.

An example of how the City and BCPSA water rates are calculated is detailed below. For the purposes of the below comparison, an average water consumption of 4,200 gallons per month will be used.

BCPSA water rate calculation:

- Base charge for 5/8" meter = \$10.00, does not include any consumption
- Consumption charge for 4,200 gallons multiplied by the rate of \$5.40 per 1,000 gallons = $4,200 \times \$5.40 / 1,000 = \22.68
- Total monthly charge = Base + Consumption
= \$10.00 + \$22.68
= \$32.68 (water only)

City water rate calculation (City customers):

- Base charge for 3/4" meter = \$14.82, includes consumption up to the base charge amount
- Consumption charge for 4,200 gallons multiplied by the stepped rate of \$4.16 per 1,000 gallons for the first 3,000 gallons and \$3.05 per 1,000 gallons for up to the next 7,000 gallons = $3,000 \times \$4.16 / 1,000 + (4,200 - 3,000) \times \$3.05 / 1,000 = \$12.48 + \$3.66 = \$16.14$
- Capital Recovery Fee for 3/4" meter = \$0.55



RATES

- Total monthly charge = Consumption + Capital Recovery Fee (Base not included since Consumption amount exceeds the Base charge)
= \$16.14 + \$0.55
= \$16.69 (water only)

City water rate calculation (County customers):

- Base charge for 3/4" meter = \$22.55, includes consumption up to the base charge amount
- Consumption charge for 4,200 gallons multiplied by the stepped rate of \$6.24 per 1,000 gallons for the first 3,000 gallons and \$4.58 per 1,000 gallons for up to the next 7,000 gallons = $3,000 \times \$6.24 / 1,000 + (4,200 - 3,000) \times \$4.58 / 1,000 = \$18.72 + \$5.50 = \$24.22$
- Capital Recovery Fee for 3/4" meter = \$0.55
- Total monthly charge = Consumption + Capital Recovery Fee (Base not included since Consumption amount exceeds the Base charge)
= \$24.22 + \$0.55
= \$24.77 (water only)

the City and BCPSA sewer rate structures are calculated and applied similarly to their water rate structures. For the average customer described above, the current City and BCPSA rates would yield the following charges per month.

BCPSA sewer rate calculation:

- Base charge for 5/8" meter = \$10.00, does not include any consumption
- Consumption charge for 4,200 gallons multiplied by the rate of \$7.00 per 1,000 gallons = $4,200 \times \$7.00 / 1,000 = \29.40
- Total monthly charge = Base + Consumption
= \$10.00 + \$29.40
= \$39.40 (sewer only)

City sewer rate calculation (City customers):

- Base charge for 3/4" meter = \$20.73, includes consumption up to the base charge amount
- Consumption charge for 4,200 gallons multiplied by the stepped rate of \$5.40 per 1,000 gallons for the first 3,000 gallons and \$5.40 per 1,000 gallons for up to the next 7,000 gallons = $3,000 \times \$5.40 / 1,000 + (4,200 - 3,000) \times \$5.40 / 1,000 = \$16.20 + \$6.48 = \$22.68$



RATES

- Capital Recovery Fee for 3/4" meter = \$9.09
- Total monthly charge = Consumption + Capital Recovery Fee (Base not included since Consumption amount exceeds the Base charge)
= \$22.68 + \$9.09
= \$31.77 (sewer only)

City sewer rate calculation (County customers):

- Base charge for 3/4" meter = \$31.12, includes consumption up to the base charge amount
- Consumption charge for 4,200 gallons multiplied by the stepped rate of \$8.10 per 1,000 gallons for the first 3,000 gallons and \$8.10 per 1,000 gallons for up to the next 7,000 gallons = $3,000 \times \$8.10 / 1,000 + (4,200 - 3,000) \times \$8.10 / 1,000 = \$24.30 + \$9.72 = \$34.02$
- Capital Recovery Fee for 3/4" meter = \$9.09
- Total monthly charge = Consumption + Capital Recovery Fee (Base not included since Consumption amount exceeds the Base charge)
= \$34.02 + \$9.09
= \$43.11 (sewer only)

The charges calculated above are summarized below in Table 7-1.

Table 7-1: Average Residential Customer Charges with Existing Rates

Jurisdiction	Water Only	Sewer Only	Total Water and Sewer
BCPSA	\$32.68	\$39.40	\$72.08
City (City customer)	\$16.69	\$31.77	\$48.46
City (County customer)	\$24.77	\$43.11	\$67.88

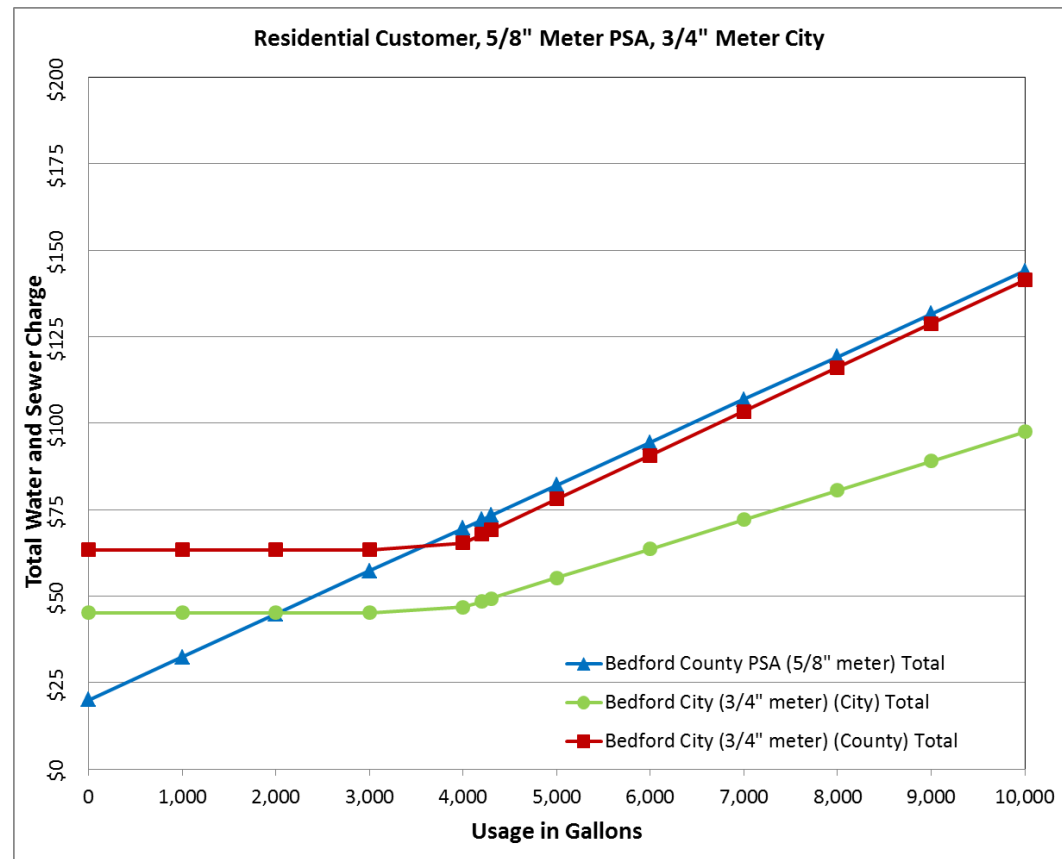
From the rate calculations summarized in Table 7-1, it can be noted that for an average demand of 4,200 gallons per month, the current BCPSA and City(County) rate structures both result in total charges that are higher than the current City(City) customers, and that the BCPSA charges are slightly higher than the City(County) charges.

The following figure shows a graph of usage versus total charges for the current BCPSA, City(City), and City(County) rate structures.



RATES

Figure 7-1: Charges for Existing Residential Rate Structures



As shown on Figure 7-1, for monthly usage of less than approximately 2,030 gallons per month, the current BCPSA charges are less than the City(City) and the City(County) charges. Usage between approximately 2,030 and 3,490 gallons per month, results in the current BCPSA charges being higher than the current City(City) charges, but less than the current City(County) charges. Monthly usage greater than approximately 3,490 gallons per month results in the current BCPSA charges being somewhat higher than the City(City) and slightly higher than the City(County) rates.

Similar calculations and comparisons can be made for residential and commercial customers for various size meters and various monthly consumptions. Below is a comparison for a residential customer using a 1" meter, as well as comparisons for commercial customers using 1", 2", and 6" meters.



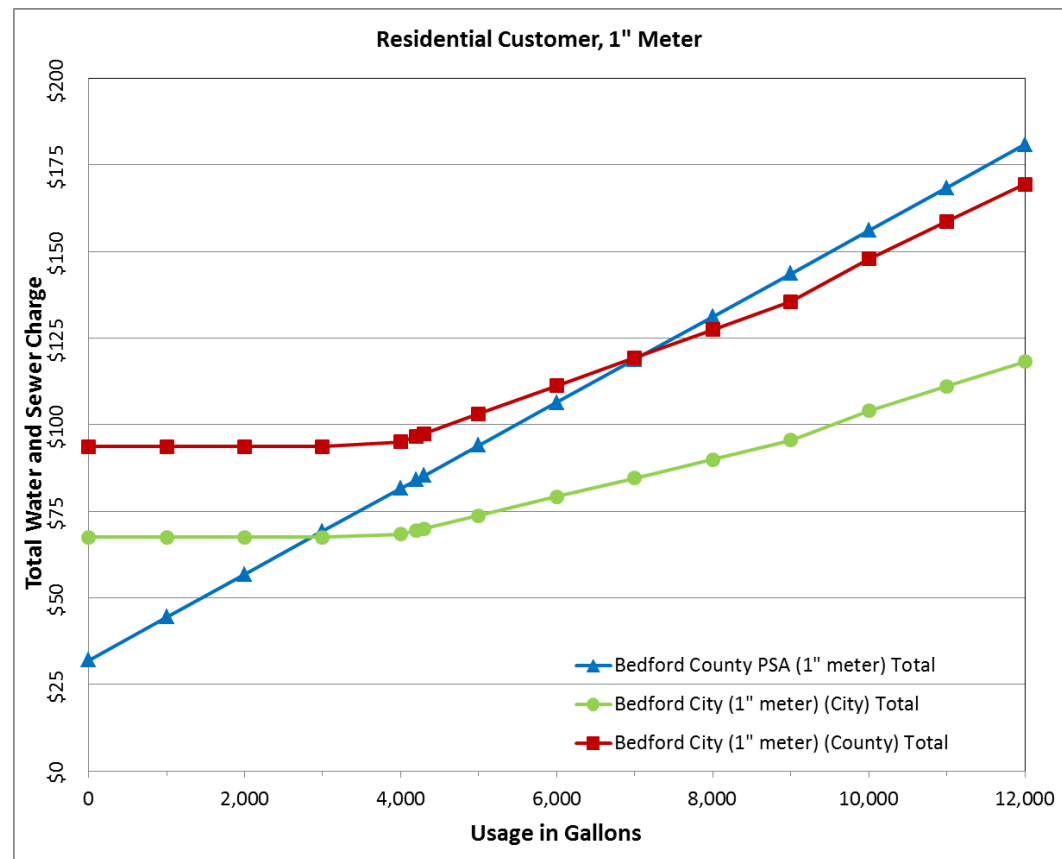
RATES

The charges summarized below in Table 7-2 are based on the current BCPSA and City residential rate structures for customers with a 1" meter, using 4,200 gallons per month. Figure 7-2 shows a graph of usage versus total charges for the current BCPSA, City(City), and City(County) rate structures for customers with a 1" meter. With the 1" meter, the BCPSA charges are closer to the City(City) charges than with the smaller residential meters described previously in Table 7-1 and Figure 7-1.

Table 7-2: Residential Charges for Existing Rates with 1" Meter

Jurisdiction	Water Only	Sewer Only	Total Water and Sewer
BCPSA	\$38.68	\$45.40	\$84.08
City (City customer)	\$31.56	\$37.86	\$69.42
City (County customer)	\$47.38	\$49.20	\$96.58

Figure 7-2: Residential Charges for Existing Rates with 1" Meter





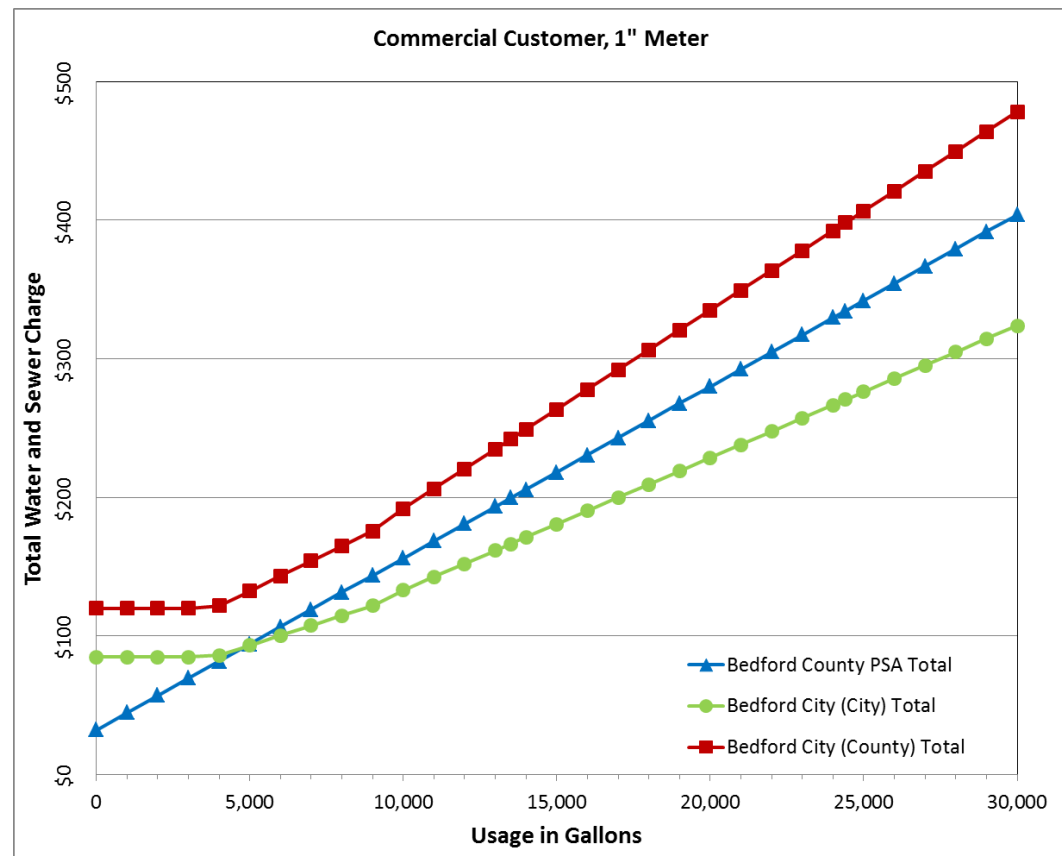
RATES

Table 7-3 and Figure 7-3 are based on the current BCPSA and City commercial rate structures for customers with a 1" meter, using 20,000 gallons per month. BCPSA's and the City's current average monthly commercial customer usage is approximately 13,500 gallons and 24,400 gallons, respectively. Therefore, an average monthly usage of 20,000 gallons is used for this comparison.

Table 7-3: Commercial Charges for Existing Rates with 1" Meter

Jurisdiction	Water Only	Sewer Only	Total Water and Sewer
BCPSA	\$124.00	\$156.00	\$280.00
City (City customer)	\$75.45	\$152.98	\$228.43
City (County customer)	\$112.74	\$222.38	\$335.12

Figure 7-3: Commercial Charges for Existing Rates with 1" Meter





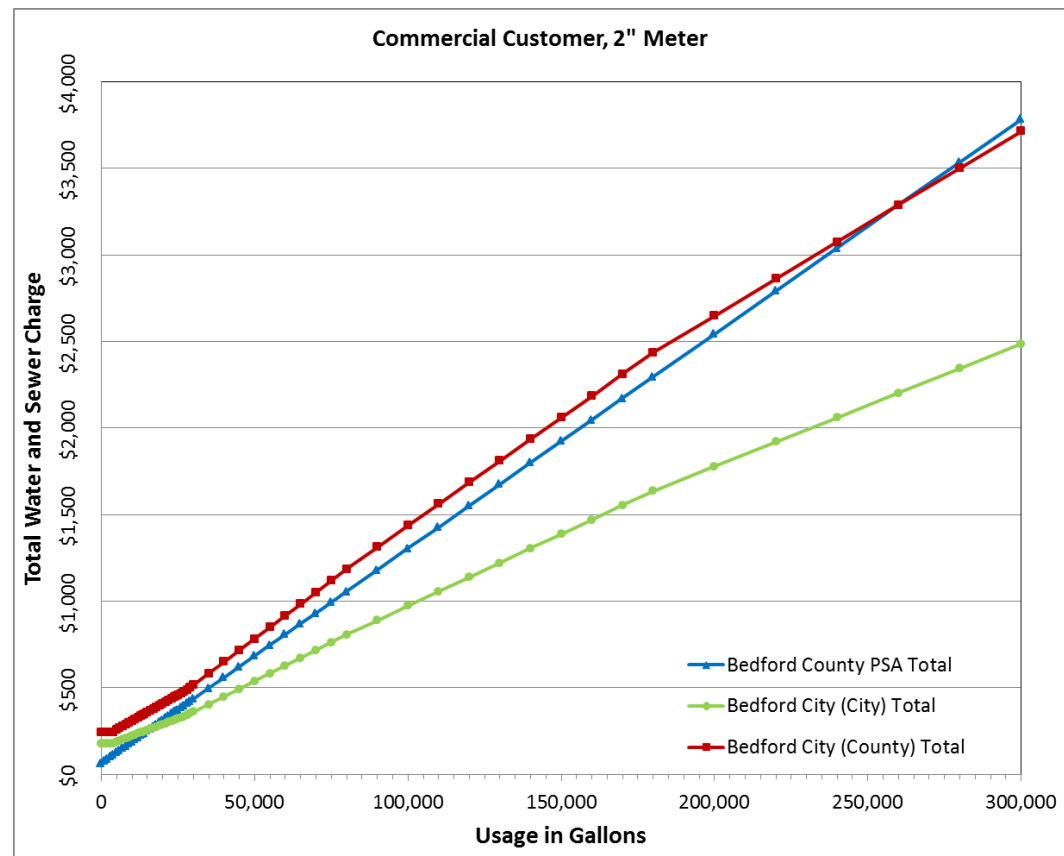
RATES

Table 7-4 and Figure 7-4 are based on the current BCPSA and City commercial rate structures for customers with a 2" meter, using 200,000 gallons per month. It is anticipated that customers with 2" meters will likely use a significantly higher volume of water than those with 1" meters. Therefore, an average monthly usage of 200,000 gallons is used for this comparison.

Table 7-4: Commercial Charges for Existing Rates with 2" Meter

Jurisdiction	Water Only	Sewer Only	Total Water and Sewer
BCPSA	\$1,112.00	\$1,432.00	\$2,544.00
City (City customer)	\$556.33	\$1,221.44	\$1,777.77
City (County customer)	\$835.62	\$1,812.54	\$2,648.16

Figure 7-4: Commercial Charges for Existing Rates with 2" Meter





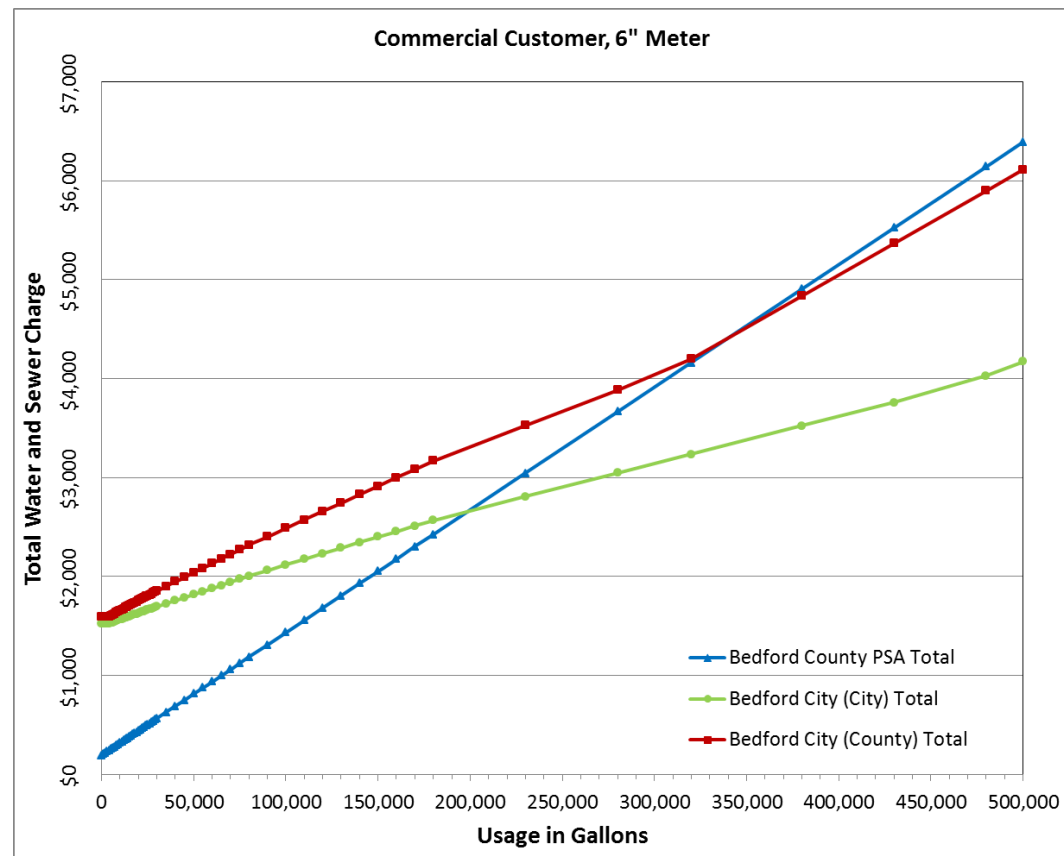
RATES

Table 7-5 and Figure 7-5 are based on the current BCPSA and City commercial rate structures for customers with a 6" meter, using 500,000 gallons per month. It is anticipated that customers with 6" meters will likely use a significantly higher volume of water than those with 2" meters. Therefore, an average monthly usage of 500,000 gallons is used for this comparison.

Table 7-5: Commercial Charges for Existing Rates with 6" Meter

Jurisdiction	Water Only	Sewer Only	Total Water and Sewer
BCPSA	\$2,796.00	\$3,596.00	\$6,392.00
City (City customer)	\$1,267.52	\$2,903.82	\$4,171.34
City (County customer)	\$1,897.81	\$4,214.92	\$6,112.73

Figure 7-5: Commercial Charges for Existing Rates with 6" Meter





RATES

7.3 CONSOLIDATED RATES

The results of the rate comparison described above in Section 7.2 were presented to City and County personnel. The desire of the City and County is to move from the existing rate structures to consolidated residential and commercial rates for all Joint Authority customers, and that the rate consolidation will generally take place over a 10-year period.

Based on discussions with City, County, and BCPSA personnel a number of modifications to the current City and BCPSA rate schedules are required to consolidate their existing rate schedules. A rate consultant, Paul Cumiskey, from the firm PJ Sun, LLC, was retained to provide a detailed analysis of the current rate structures and to provide recommendations and guidelines for the consolidated rate structure of the new Joint Authority. The objectives of Mr. Cumiskey's work were to (1) recommend a preferred water and sewer rate structure for the new Authority, (2) develop initial rates that will be effective on or around July 1, 2013 and (3) devise a strategy to transition from the initial rates to the preferred rate structure over a ten year time frame. Mr. Cumiskey's report is summarized below. A full copy of his report, along with referenced Exhibits and Schedules, is included in Appendix B for reference.

As described above in Section 7.2, the current water and sewer rate structures and rates of the BCPSA and the City differ significantly. The BCPSA rate structure includes fixed monthly water and sewer charges that increase by meter size plus uniform water and sewer rates per thousand gallons of use. By contrast the City has multiple fixed charges and a declining block rate structure. The City's fixed charges and declining block rates also vary by four separate customer classes which include City Residential, City Commercial, County Residential and County Commercial. The City's rate structure is further complicated by the use of minimum bills that vary by customer class and meter size. Exhibit A of Mr. Cumiskey's report in Appendix B includes the rate schedules in effect at the date of this report for the BCPSA and City.



RATES

Based on discussions with a working group made up of BCPSA, City, and County representatives a recommended rate structure was agreed upon. The recommended rate structure includes a combination of fixed charges by meter size and uniform water and sewer volume rates for all customers except large industrial customers. The fixed charges apply to all customers and are intended to provide the new Authority with a degree of revenue stability. The fixed charges are designed to recover overhead, meter reading and customer billing costs plus debt service payments.

It was also agreed that the new Authority should have separate industrial water and sewer volume rates for large customers that employ many local residents and make a significant contribution to the local tax base. The proposed ten year target large industrial customer water and sewer volume rates are \$3.00 and \$6.00 per thousand gallons, respectively. By comparison the ten year target water and sewer rates for all other customers, residential and commercial, are \$5.00 and \$7.00 per thousand gallons, respectively.

Based on historical usage, the working group identified five current customers that should be billed the industrial volume rates. Estimates of these customers' water and sewer use and proposed annual bills over the next ten years are included in Exhibits B and C of Mr. Cumiskey's report in Appendix B.

A plan was developed to transition from the current rate structures and rates of the BCPSA and City to the preferred rate structure over a ten year timeline. This plan included the development of target rates based on projected net revenue requirements in FY 2023. The net revenue requirements and calculation of the target rates in FY 2023 are included in Exhibit D of Mr. Cumiskey's report in Appendix B.

Once the target rates were determined a transition plan was developed that generated sufficient revenue to recover the net revenue requirements in each year of the ten year timeline. In order to ensure sufficient revenues are generated each year and to avoid large bill increases to certain customers it will be necessary to maintain the minimum bill concept for former City customers. Presently the annual difference between the amounts billed at the stated City rates and the minimum bill amounts is in excess of \$500,000. Many of the minimum bills will be phased-out over the ten-year transition timeline as fixed charges and volume rates increase.



RATES

However, in order to lessen the burden of rate increases to the current City customers, it will likely take an additional five years or more to completely phase-out the minimum bill features in the rate structure.

The full transition plan is detailed in the worksheets included in Exhibit E of Mr. Cumiskey's report in Appendix B. Schedules 3 and 4 of Exhibit E include the opening rates that are expected to be in effect as of July 1, 2013 when the new Authority is scheduled to be in place. These schedules also suggest annual changes to the rates over the ten year transition timeline. Schedules 6 through 8 of Exhibit E also provide annual comparisons of the bill impact to different customer classes in dollar and percentage terms. In summary the average annual customer bill impact for different customer groups during the ten year transition timeline is as follows:

- Most PSA customers will likely see annual bill increases of less than 2%
- County residential and commercial customers will likely experience negligible bill increases and some may see small bill decreases
- City residential customers with less than 4,000 gallons of water and sewer use will experience either no increase or small bill increases
- City residential customers with 4,000 gallons or more of water and sewer use will experience bill increases in the 3% to 4% range
- City residential customers with water only service (approximately 90 customers) and that use over 4,000 gallons of water use per month will experience bill increase in the 4% to 5% range
- City commercial customers with water only service (approximately 25 customers) will experience bill increases in the 4% to 7% range.

The small increases for City served County customers are due to the fact that their current volume rates are higher than the target rates developed for FY 2023. Conversely, the larger increases for City residential and commercial customers are due to the fact their current rates are so much lower than the FY 2023 target rates. It is also noteworthy that approximately 45% of City and City served County residential customers currently receive a minimum bill. These customers will see no bill increases until the water and sewer rates increase to the amount of the minimum bill.



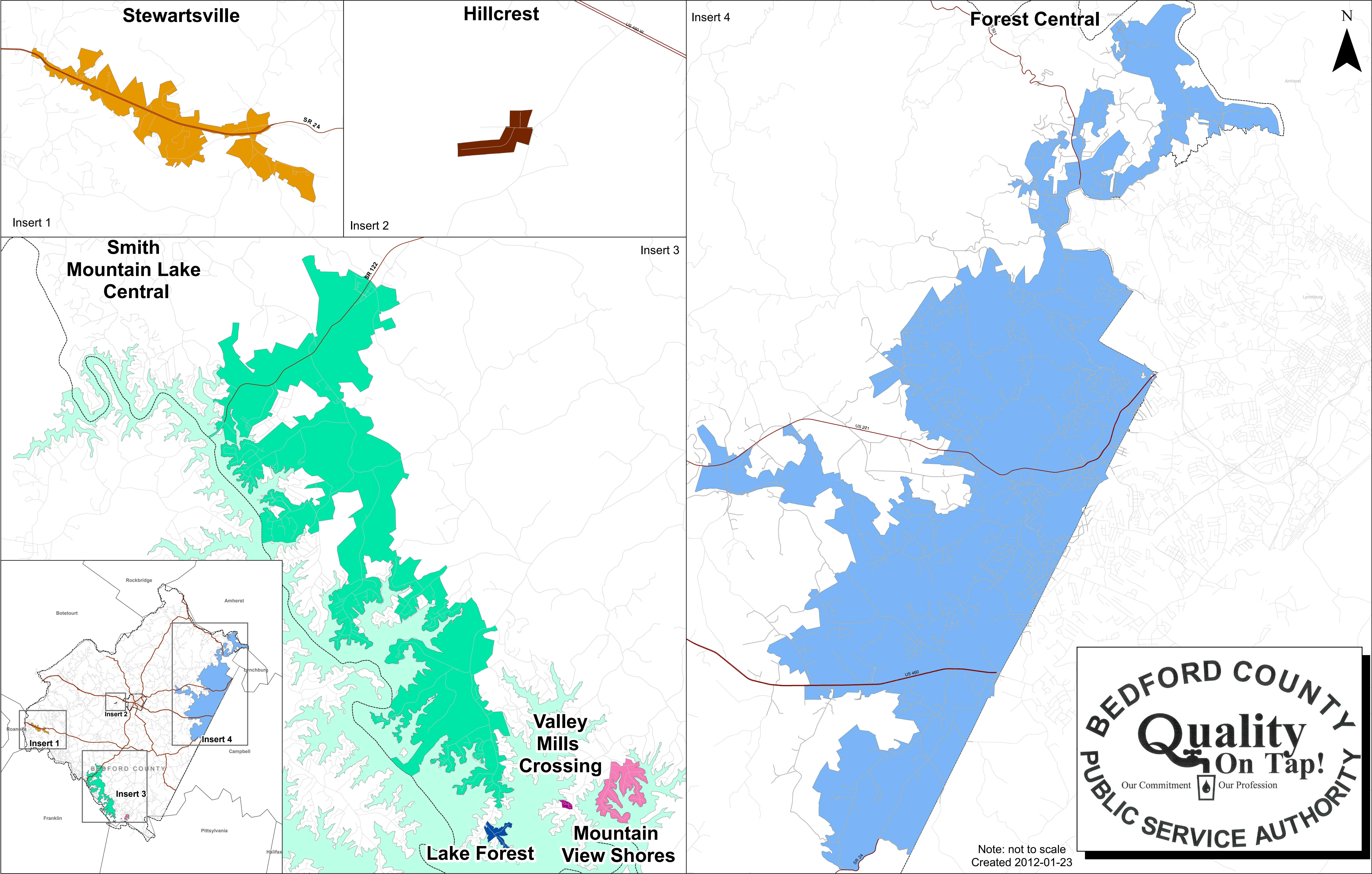
RATES

It is important to recognize that the annual rates developed and included as part of Exhibit E in Appendix B were developed as part of a general planning process. Going forward, the new Authority's Board of Directors will need to monitor and adjust the rates annually based on changing circumstances.

A full copy of the report, along with referenced Exhibits and Schedules, is included in Appendix B for reference.

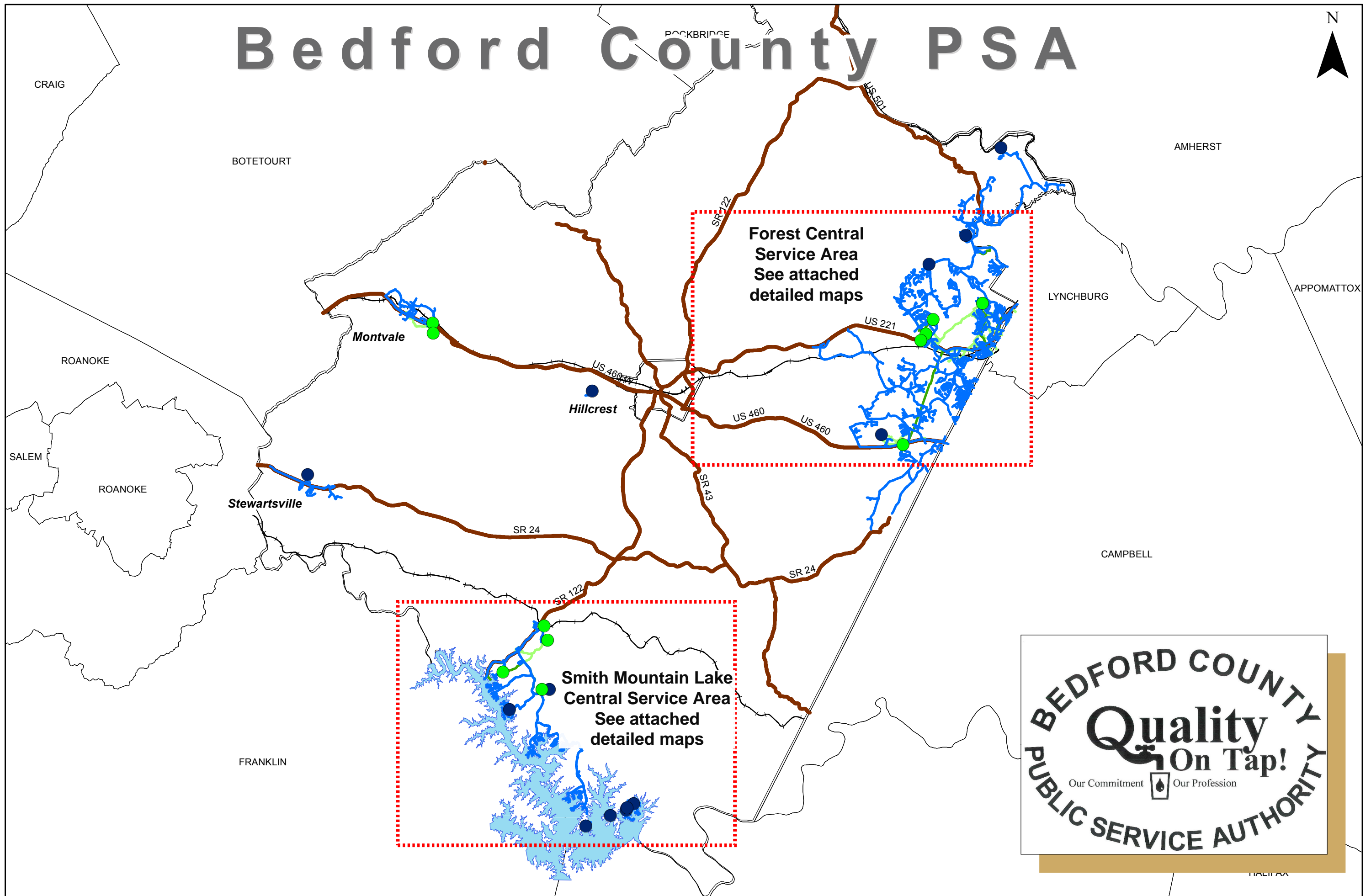
Appendix A

Water and Sewer System Mapping



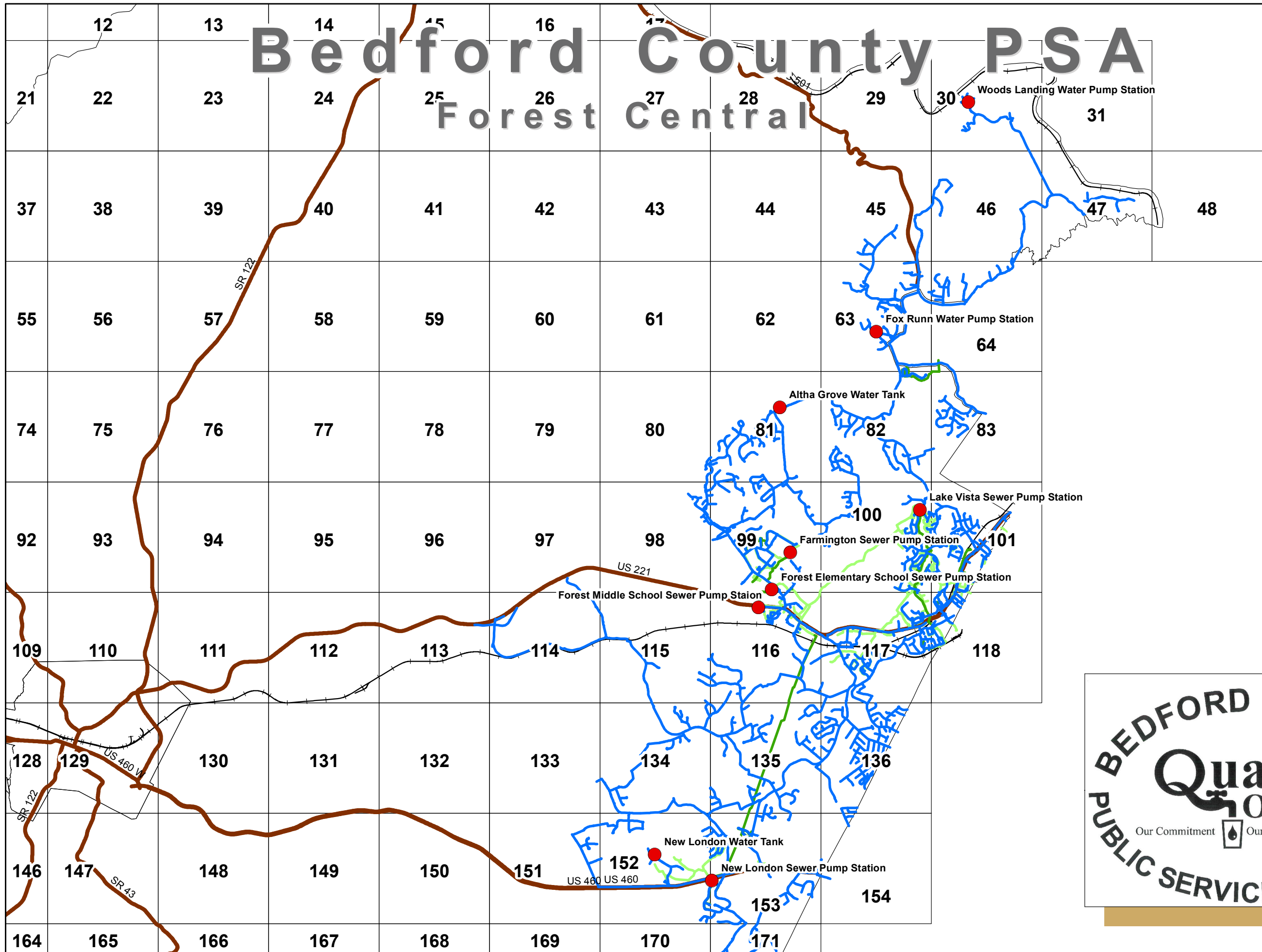
Bedford County PSA

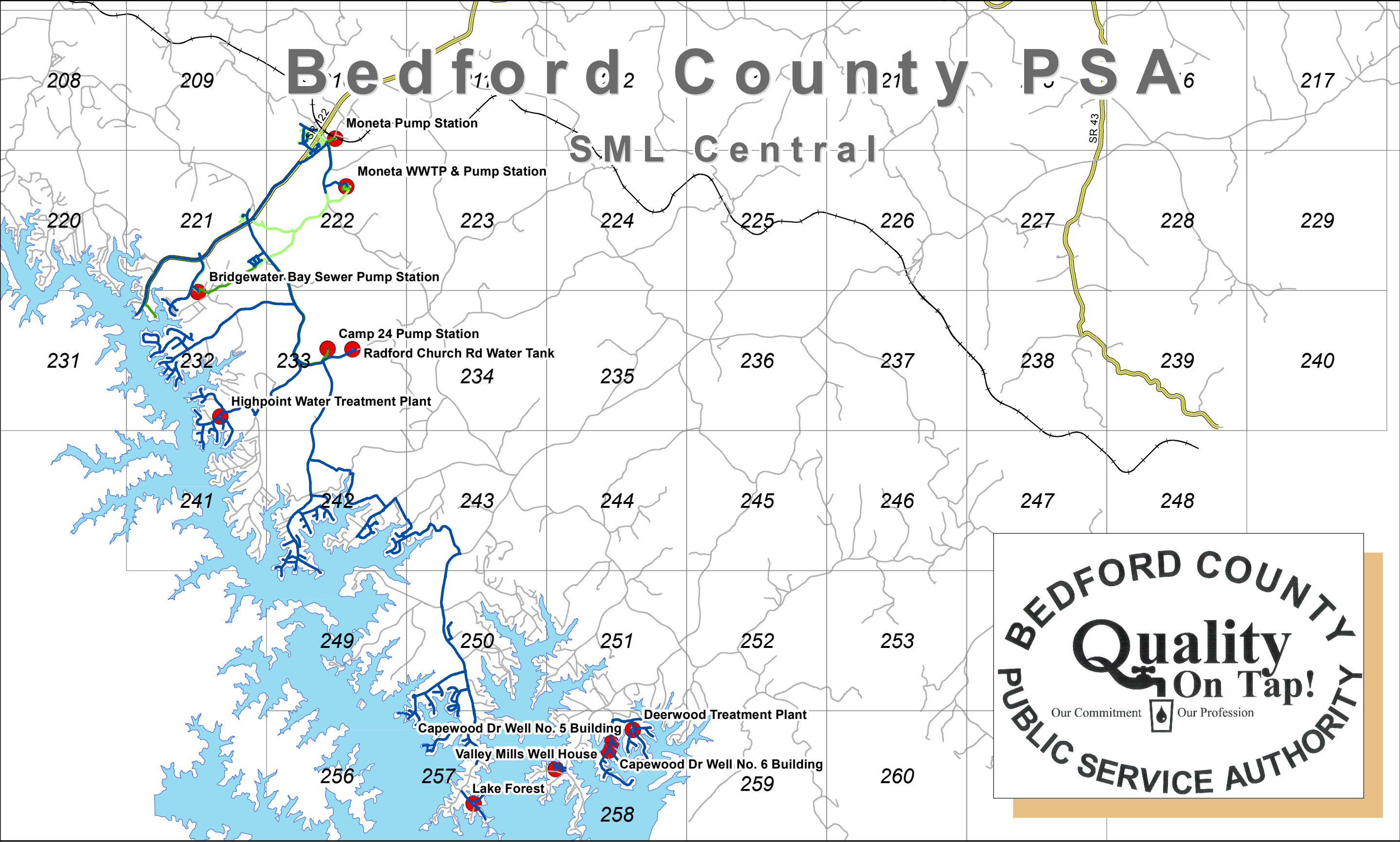
N



Bedford County PSA

Forest Central





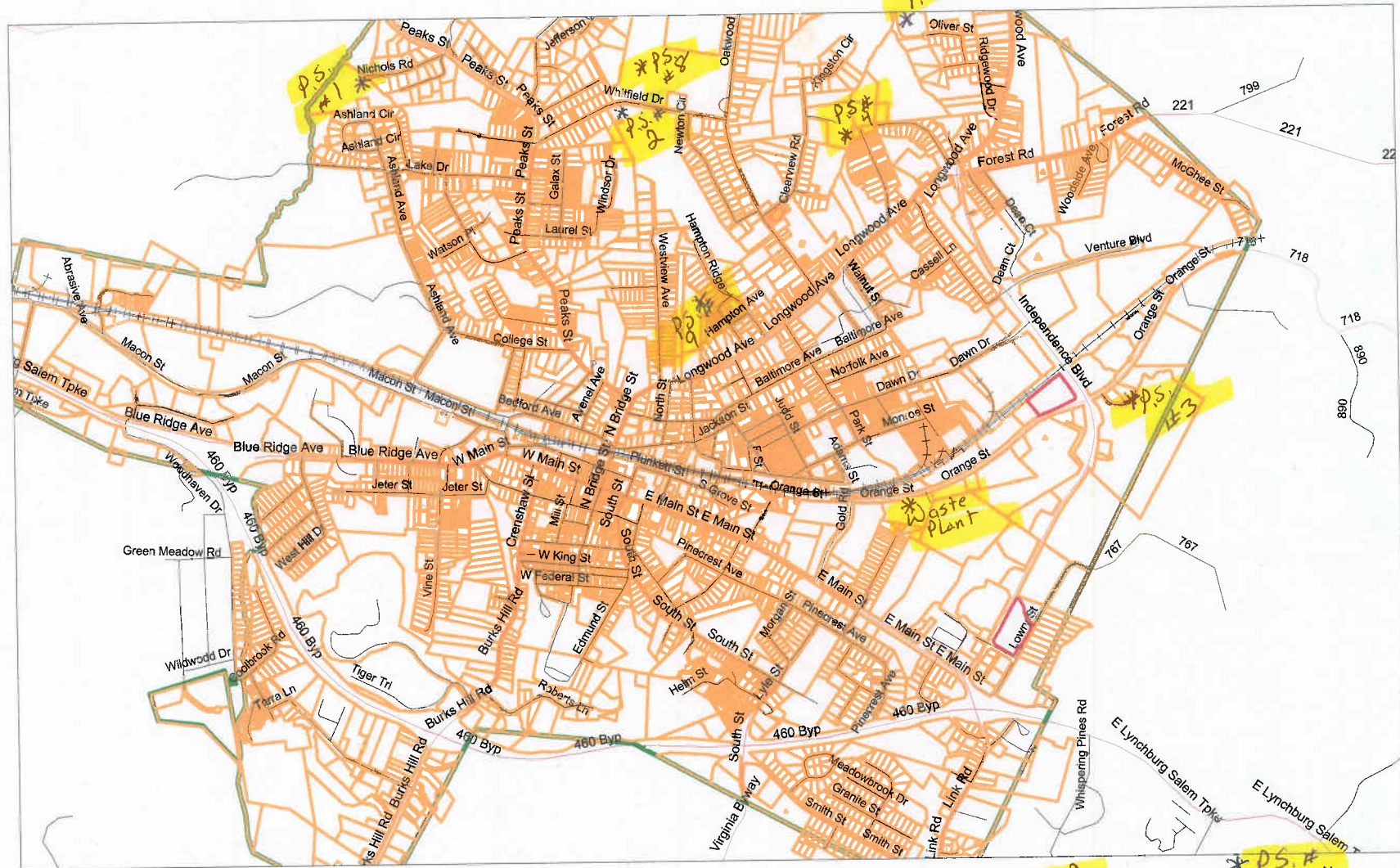
BedfordCityPublic

* P.S. #11
Liberty High

* P.S. #6
At 43 N
Peaks Rd.

P.S. #5

Industrial Development
Planning and Community
Transportation
Tax Parcels



* P.S. #7
Mustang Rd.

* P.S. #13

* P.S. #12
Link Rd.

* P.S. #10
Towngate Rd.

SCALE 1 : 30,019



Boundaries

- Town Boundaries
- County Boundary

Road Network

- Highways
- Roads

◆ SML Channel Markers

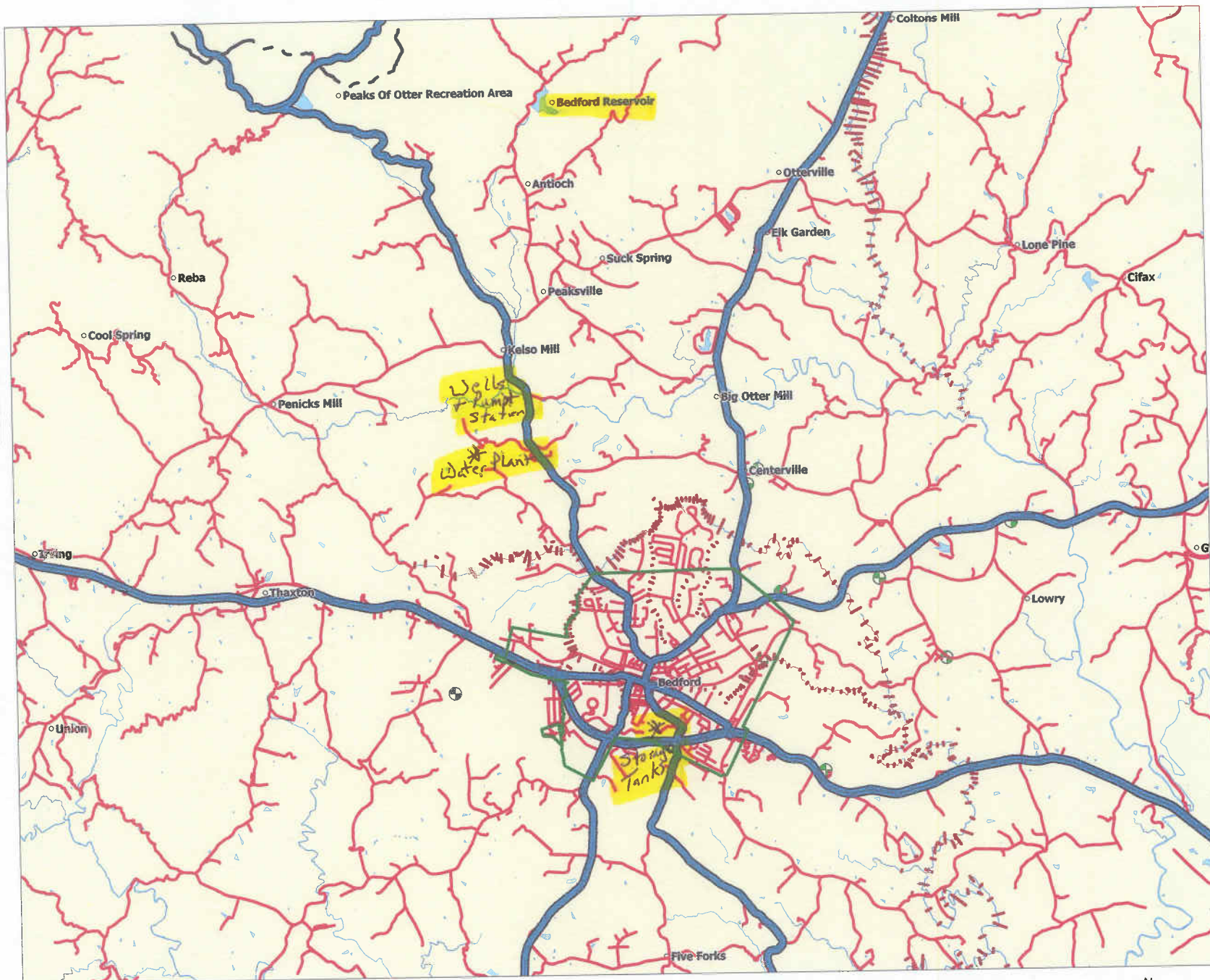
— Base Flood Elevation

■ Water

○ PlaceNames

Zoning Overlay Districts

- ⊕ Well Heads



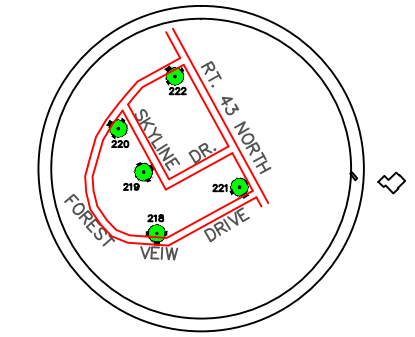
SCALE 1 : 116,499





- RED HYDRANT UNDER 500 GALS PER MIN.
- YELLOW HYDRANT 500 TO 1000 GALS PER MIN.
- GREEN HYDRANT OVER 1000 GALS PER MIN.

RIDGEWOOD 43 NORTH



INDUSTRIAL OWNED HYDRANTS

- 8 - RUBATEX
- 2 - BONTAX
- 2 - WALTEX
- 3 - BELDING CORTICELL
- 1 - MOORE CHAIRS
- 2 - FRANK CHERVAN
- 5 - OLD WOOLEN MILL
- 1 - GOLDEN WEST FOODS

RTE 122 SOUTH
(MONETA ROAD)

- 269
- 270
- 271
- 272
- 273
- 274
- 275
- 276
- 277
- 278
- 279
- 280
- 281
- 282
- 283
- 284

RTE 122 NORTH
(BIG ISLAND HIGHWAY)

- 340
- 341
- 342
- 343
- 344
- 345
- 346

RTE 714 SOUTH
(FALLING CREEK ROAD)

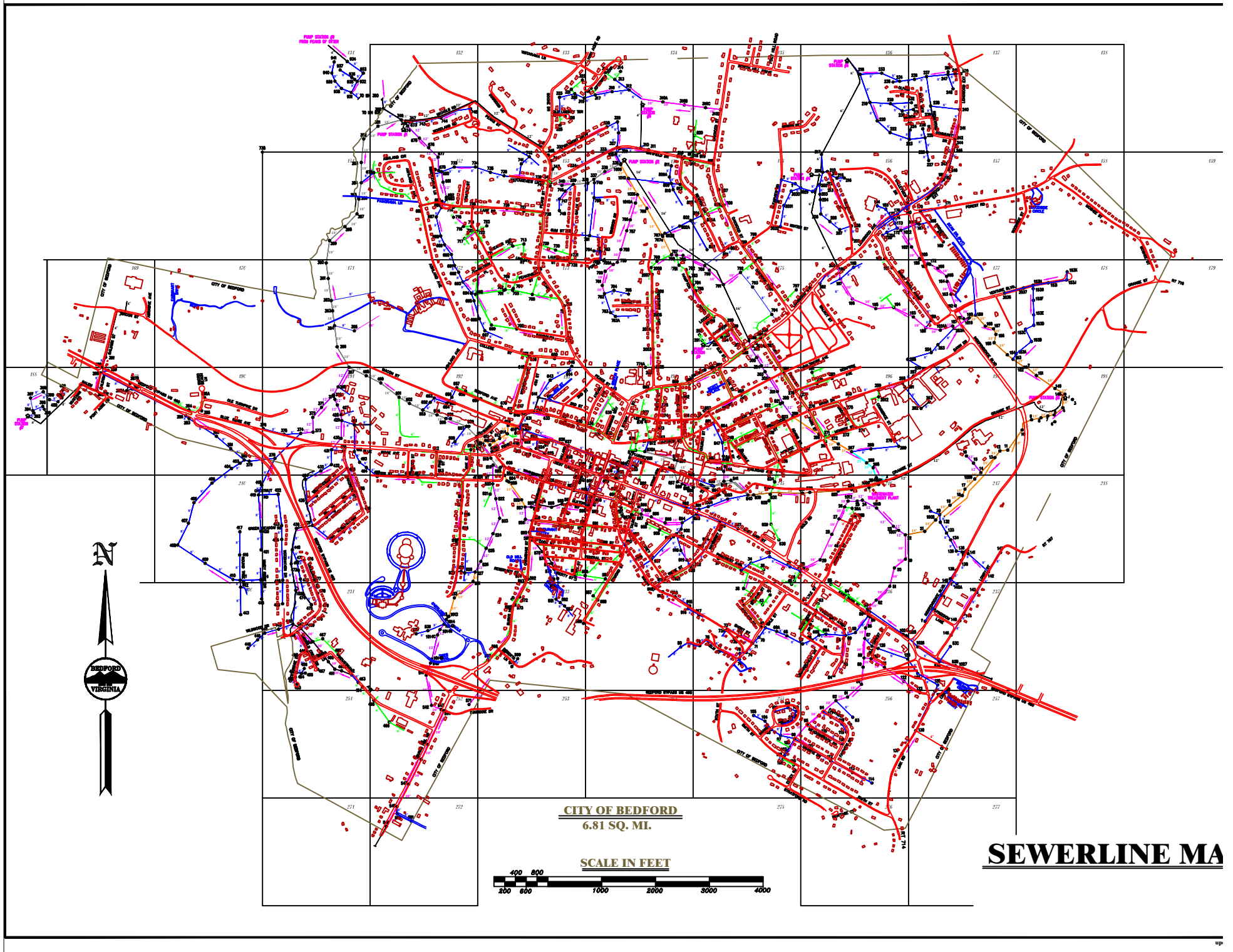
- 321
- 322
- 326
- 327

SPECIAL HYDRANTS

- 213 SAUNDERS FARM
- 214 300' FROM MOUNTAIN VIEW RD ON RT. 1125
- 215 ON 43 ACROSS FROM COUNTRY CLUB CLUBHOUSE
- 216 BIG OTTER PUMPING STATION
- 217 200' FROM ROSE ARRINGTONS STORE AT NORTHSIDE
- 83 COUNTY NURSING HOME
- 287 WHISPERING PINES TRAILOR COURT

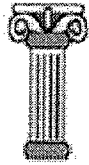
CITY OF BEDFORD

2007



Appendix B

Rate Consultant's Report



PJ Sun, LLC

**Providing Services to the
Water Industry**

June 12, 2012

Mr. Dennis W. Knight, Jr., P.E.
Vice President
Wiley & Wilson
127 Nationwide Drive
Lynchburg, Virginia 24502-4271

Dear Mr. Knight:

This letter provides a summary of our work related to the development of a transition rate plan for the new water and sewer authority to be formed in Bedford County. The objective of our work was to (1) recommend a preferred water and sewer rate structure for the new authority, (2) develop initial rates that will be effective on or around July 1, 2013 and (3) devise a strategy to transition from the initial rates to the preferred rate structure over a ten year time frame.

Current & Recommended Rate Structures

Currently the water and sewer rate structures and rates of the Bedford County Public Service Authority (PSA) and the City of Bedford (City) differ significantly. The PSA rate structure includes fixed monthly water and sewer charges that increase by meter size plus uniform water and sewer rates per thousand gallons of use.

By contrast the City of Bedford has multiple fixed charges and a declining block rate structure. The City's fixed charges and declining block rates also vary by four separate customer classes which include City Residential, City Commercial, County Residential and County Commercial. The City's rate structure is further complicated by the use of minimum bills that vary by customer class and meter size. Exhibit A includes the rate schedules in effect at the date of this report for the PSA and City.

Based on discussions with a working group made up of PSA and City representatives a recommended rate structure was agreed upon. The recommended rate structure includes a combination of fixed charges by meter size and uniform water and sewer volume rates for all customers except large industrial customers. The fixed charges apply to all customers and are intended to provide the new authority with a degree of revenue stability. The fixed charges are designed to recover overhead, meter reading and customer billing costs plus debt service payments.

It was also agreed that the new authority should have separate industrial water and sewer volume rates for large customers that employ many local residents and make a significant contribution to the local tax base. The proposed ten year target industrial water and sewer volume rates are \$3.00 and \$6.00 per

thousand gallons, respectively. By comparison the ten year target water and sewer rates for all other customers are \$5.00 and \$7.00 per thousand gallons, respectively.

The working group identified five current customers that should be billed the industrial volume rates. Estimates of these customers' water and sewer use and proposed annual bills over the next ten years are included in Exhibits B and C.

Transition Plan

A plan was developed to transition from the current rate structures and rates of the PSA and City to the preferred rate structure over a ten year timeline. This plan included the development of target rates based on projected net revenue requirements in FY 2023. The net revenue requirements and calculation of the target rates in FY 2023 are included in Exhibit D.

Once the target rates were determined a transition plan was developed that generated sufficient revenue to recover the net revenue requirements in each year of the ten year timeline. In order to ensure sufficient revenues are generated each year and to avoid large bill increases to certain customers it will be necessary to maintain the minimum bill concept for former City customers. Presently the annual difference between the amounts billed at the stated City rates and the minimum bill amounts is in excess of \$500,000. Many of the minimum bills will be phased-out over the ten year transition timeline as fixed charges and volume rates increase. However, it will likely take an additional five years or more to completely phase-out the minimum bill features in the rate structure.

Customer Impact

The full transition plan is detailed in the worksheets included in Exhibit E. Schedules 3 and 4 of Exhibit E includes the opening rates that are expected to be in effect as of July 1, 2013 when the new authority is scheduled to be in place. These schedules also suggest annual changes to the rates over the ten year transition timeline.

Schedules 6 to 8 of Exhibit E also provide annual comparisons of the bill impact to different customer classes in dollar and percentage terms. In summary the average annual customer bill impact for different customer groups during the ten year transition timeline is as follows:

- Most PSA customers will likely see annual bill increases of less than 2%
- County residential and commercial customers will likely experience negligible bill increases and some may see small bill decreases
- City residential customers with less than 4,000 gallons of water and sewer use will experience no to little bill increases
- City residential customers with 4,000 gallons or more of water and sewer use will experience bill increases in the 3% to 4% range
- City residential customers with water only service (approximately 90 customers) and that use over 4,000 gallons of water use per month will experience bill increase in the 4% to 5% range
- City commercial customers with water only service (approximately 25 customers) will experience bill increases in the 4% to 7% range.

The small increases for County customers are due to the fact that their current volume rates are higher than the target rates developed for FY 2023. Conversely, the larger increases for City residential and commercial customers is due to the fact their current rates are so much lower than the FY 2023 target rates. It is also noteworthy that approximately 45% of City and County residential customers currently receive a minimum bill. These customers will see no bill increases until the water and sewer rates increase to the amount of the minimum bill.

It is important to recognize that the annual rates developed and included as part of Exhibit E were developed as part of a general planning process. Going forward, the new authority board will need to monitor and adjust the rates annually based on changing circumstances.

XXXX

It has been our pleasure to work with you and to assist the PSA and City develop the water and sewer transition plan for the new authority. Please call me if you have any questions or need additional information.

Regards,



Paul J. Cumiskey

Exhibits:

- A - Current PSA and City Rates
- B - Large Industrial Water Customer Rates and Charges
- C - Large Industrial Sewer Customer Rates and Charges
- D - FY 2023 Revenue Requirements and Rates
- E - Transition Plan Schedules

**Exhibit A
Current Rates**

Meter Size or Usage	Bedford County PSA			Bedford City						Differences (Based on Total)	
				(City)			(County)				
	Water	Sewer	Total	Water	Sewer	Total	Water	Sewer	Total	In Town	Out of Town
Commodity Charges per 1000 gallons - Residential											
first 3,000	\$5.40	\$7.00	\$12.40	\$4.16	\$5.40	\$9.56	\$6.24	\$8.10	\$14.34	\$2.84	(\$1.94)
next 7,000	\$5.40	\$7.00	\$12.40	\$3.05	\$5.40	\$8.45	\$4.58	\$8.10	\$12.68	\$3.95	(\$0.28)
next 20,000	\$5.40	\$7.00	\$12.40	\$2.20	\$4.95	\$7.15	\$3.30	\$7.45	\$10.75	\$5.25	\$1.65
next 50,000	\$5.40	\$7.00	\$12.40	\$2.09	\$4.64	\$6.73	\$3.14	\$6.96	\$10.10	\$5.67	\$2.30
next 100,000	\$5.40	\$7.00	\$12.40	\$1.98	\$4.26	\$6.24	\$2.98	\$6.38	\$9.36	\$6.16	\$3.04
next 500,000	\$5.40	\$7.00	\$12.40	\$1.75	\$3.59	\$5.34	\$2.63	\$5.38	\$8.01	\$7.06	\$4.39
next 680,000	\$5.40	\$7.00	\$12.40	\$1.65	\$3.13	\$4.78	\$2.47	\$4.69	\$7.16	\$7.62	\$5.24
Commodity Charges per 1000 gallons - Commercial											
first 3,000	\$5.40	\$7.00	\$12.40	\$5.54	\$7.18	\$12.72	\$8.32	\$10.80	\$19.12	(\$0.32)	(\$6.72)
next 7,000	\$5.40	\$7.00	\$12.40	\$4.06	\$7.18	\$11.24	\$6.11	\$10.80	\$16.91	\$1.16	(\$4.51)
next 20,000	\$5.40	\$7.00	\$12.40	\$2.95	\$6.60	\$9.55	\$4.41	\$9.92	\$14.33	\$2.85	(\$1.93)
next 50,000	\$5.40	\$7.00	\$12.40	\$2.78	\$6.16	\$8.94	\$4.18	\$9.27	\$13.45	\$3.46	(\$1.05)
next 100,000	\$5.40	\$7.00	\$12.40	\$2.64	\$5.66	\$8.30	\$3.98	\$8.51	\$12.49	\$4.10	(\$0.09)
next 500,000	\$5.40	\$7.00	\$12.40	\$2.32	\$4.76	\$7.08	\$3.49	\$7.16	\$10.65	\$5.32	\$1.75
next 680,000	\$5.40	\$7.00	\$12.40	\$2.19	\$4.16	\$6.35	\$3.30	\$6.26	\$9.56	\$6.05	\$2.84
Monthly Base Charges - Residential											
5/8"	\$10.00	\$10.00	\$20.00								
3/4"	\$13.00	\$13.00	\$26.00	\$15.37	\$29.82	\$45.19	\$23.10	\$40.21	\$63.31	(\$19.19)	(\$37.31)
1"	\$16.00	\$16.00	\$32.00	\$31.56	\$35.91	\$67.47	\$47.38	\$46.30	\$93.68	(\$35.47)	(\$61.68)
1-1/2"	\$24.00	\$24.00	\$48.00	\$51.74	\$50.98	\$102.72	\$77.71	\$61.37	\$139.08	(\$54.72)	(\$91.08)
2"	\$32.00	\$32.00	\$64.00	\$75.98	\$69.17	\$145.15	\$114.13	\$79.56	\$193.69	(\$81.15)	(\$129.69)
Monthly Base Charges - Commercial											
3/4"	\$13.00	\$13.00	\$26.00	\$20.43	\$36.64	\$57.07	\$30.81	\$50.58	\$81.39	(\$31.07)	(\$55.39)
1"	\$16.00	\$16.00	\$32.00	\$41.95	\$42.73	\$84.68	\$63.22	\$56.67	\$119.89	(\$52.68)	(\$87.89)
1-1/2"	\$24.00	\$24.00	\$48.00	\$68.81	\$57.80	\$126.61	\$103.69	\$71.74	\$175.43	(\$78.61)	(\$127.43)
2"	\$32.00	\$32.00	\$64.00	\$101.04	\$75.99	\$177.03	\$152.26	\$89.93	\$242.19	(\$113.03)	(\$178.19)
4"	\$64.00	\$64.00	\$128.00	\$434.53	\$179.01	\$613.54	\$657.91	\$192.95	\$850.86	(\$485.54)	(\$722.86)
6"	\$96.00	\$96.00	\$192.00	\$1,188.07	\$330.37	\$1,518.44	\$1,243.74	\$344.31	\$1,588.05	(\$1,326.44)	(\$1,396.05)

Exhibit B
Large Industrial Water Customer Rates and Charges

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
Annual Water Volum	A											
Barr Labs	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	
Golden West	17,541	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	
Cintas	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	
Winoa	6,478	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	
Bedford Weaving	5,764	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	
Rubertex / Other	-	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
	62,471	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	
Industrial Rate	A											
Barr Labs	5.05	5.40	5.14	4.88	4.62	4.36	4.10	3.84	3.58	3.32	3.00	
Golden West	2.37	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	3.00	
Cintas	2.34	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	3.00	
Winoa	2.67	2.75	2.78	2.81	2.84	2.87	2.90	2.93	2.96	2.99	3.00	
Bedford Weaving	2.85	2.90	2.91	2.92	2.93	2.94	2.95	2.96	2.97	2.98	3.00	
Rubertex	0.00	2.90	2.91	2.92	2.93	2.94	2.95	2.96	2.97	2.98	3.00	
												10 YR.
Annual Water Bill												Change
Barr Labs	89,424	95,585	90,983	86,381	81,779	77,176	72,574	67,972	63,370	58,767	54,315	-43%
Golden West	41,634	42,019	43,070	44,120	45,171	46,221	47,272	48,322	49,373	50,423	52,524	25%
Cintas	35,018	35,969	36,868	37,767	38,666	39,566	40,465	41,364	42,263	43,163	44,961	25%
Winoa	17,317	17,705	17,898	18,091	18,284	18,477	18,670	18,863	19,056	19,250	19,314	9%
Bedford Weaving	16,427	16,666	16,724	16,781	16,839	16,896	16,954	17,011	17,069	17,126	17,241	3%
Rubertex	-	14,500	14,550	14,600	14,650	14,700	14,750	14,800	14,850	14,900	15,000	3%
Total annual	199,820	222,444	220,092	217,740	215,388	213,036	210,684	208,333	205,981	203,629	203,355	
Fixed charges	-	10,800	13,500	16,200	18,900	21,600	24,300	27,000	29,700	32,400	35,280	
	199,820	233,244	233,592	233,940	234,288	234,636	234,984	235,333	235,681	236,029	238,635	
Note:												
A. Actual amounts included for reference purposes. Industrial rate in FY 2013 equals actual billed amounts / actual use.												

Exhibit C
Large Industrial Sewer Customer Rates and Charges

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
Annual Sewer Volum	A											
Barr Labs	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	
Golden West	12,013	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	
Cintas	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	
Winoa	4,334	384	384	384	384	384	384	384	384	384	384	
Bedford Weaving	868	851	851	851	851	851	851	851	851	851	851	
Rubertex	-	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
	49,903	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	
Industrial Rate	A											
Barr Labs	6.95	6.89	6.79	6.68	6.58	6.49	6.39	6.29	6.20	6.11	6.00	
Golden West	4.86	4.96	5.07	5.18	5.29	5.41	5.52	5.64	5.76	5.89	6.00	
Cintas	4.45	4.58	4.72	4.87	5.02	5.17	5.33	5.49	5.66	5.83	6.00	
Winoa	5.33	5.40	5.46	5.53	5.59	5.66	5.73	5.80	5.87	5.94	6.00	
Bedford Weaving	6.69	6.89	6.79	6.68	6.58	6.49	6.39	6.29	6.20	6.11	6.00	
Rubertex	0.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	
												10 YR.
Annual Sewer Bill	A											Change
Barr Labs	123,037	121,960	120,130	118,329	116,554	114,805	113,083	111,387	109,716	108,070	106,206	-13%
Golden West	58,379	59,475	60,754	62,060	63,395	64,758	66,150	67,572	69,025	70,509	71,886	21%
Cintas	66,679	68,713	70,808	72,968	75,194	77,487	79,850	82,286	84,796	87,382	89,922	31%
Winoa	23,115	2,073	2,097	2,123	2,148	2,174	2,200	2,226	2,253	2,280	2,304	11%
Bedford Weaving	5,810	5,863	5,775	5,689	5,603	5,519	5,437	5,355	5,275	5,196	5,106	-13%
Rubrtex	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	0%
Total annual	277,020	288,084	289,566	291,168	292,893	294,743	296,720	298,826	301,064	303,437	305,424	
Fixed charges	-	7,200	11,184	15,168	19,152	23,136	27,120	31,104	35,088	39,072	39,360	
	72,489	295,284	300,750	306,336	312,045	317,879	323,840	329,930	336,152	342,509	344,784	
Notes:												
A. Actual amounts included for reference purposes. Industrial rate in FY 2013 equals actual billed amounts / actual use.												
1. Shaded items in 2013 are billed as sewer only accounts. All other customers are included in City commercial revenue calculations in FY 2013.												
2. Winoa sewer use in 2011 was 4,334 thousand gallons. Decrease in FY 2013 is due to change in metering.												

Exhibit D
FY 2023 Revenue Requirements and Rates

		Water	Water	Sewer	Sewer	Cust. Service
Revenue Requirements	Total	Volume	Fixed	Volume	Fixed	Adm.
Water operations	3,004,181	3,004,181				
Sewer operations	3,659,914			3,659,914		
Customer service & adm.	1,504,234					1,504,234
Contract operations	127,350			127,350		
Debt service	4,381,000		2,821,000		1,560,000	
PAYGO - CAPEX	553,694	276,847		276,847		
CIP - debt service	647,000	86,000			561,000	
	13,877,372	3,367,028	2,821,000	4,064,111	2,121,000	1,504,234
Offsets:						
Industrial volume charges	-582,000	-238,000		-344,000		
Bedford debt contributions	-2,000,000		-1,000,000		-1,000,000	
Facility fees	-272,000		-217,600		-54,400	
Contract operations	-127,350			-127,350		
Rentals	-120,492					-120,492
Penalties & adm. Fees	-100,000					-100,000
Cross subsidy		1,300,000		-1,300,000		
All other	-56,000					-56,000
	-3,257,842	1,062,000	-1,217,600	-1,771,350	-1,054,400	-276,492
Net Revenue Requirements	10,619,531	4,429,028	1,603,400	2,292,761	1,066,600	1,227,741
Bill Units						
Estimated 1,000 gallons billed		890,000		328,000		
Number of meter ERUs			15,400		6,600	
Number of bills issued						160,000
Cost rates		\$ 4.98	\$ 8.68	\$ 6.99	\$ 13.47	\$ 7.67
	USE	\$ 5.00	\$ 8.80	\$ 7.00	\$ 13.00	\$ 7.00
Notes:						
1. Water fixed charge equals water fixed charge (\$8.80) + Customer service adm. Charge (\$7.00)						
2. Fixed charges are increased by meter size based on AWWA equivalents.						

Exhibit E
Translation Plan Schedules

Table of Contents

	Schedule
Financial Projection Assumption	1
Financial Projections	2
Monthly Water Rates	3
Monthly Sewer Rates	4
Monthly Water Bill Comparisons	5
Monthly Sewer Bill Comparisons	6
Monthly Water & Sewer Bill Comparisons	7
Annual Water & Sewer Revenues	8
PSA Water Revenues	9
PSA Sewer Revenues	10
City Residential Water Revenues	11
City Residential Sewer Revenues	12
City Commercial Water Revenues	13
City Commercial Sewer Revenues	14
County Residential Water Revenues	15
County Residential Sewer Revenues	16
County Commercial Water Revenues	17
County Commercial Sewer Revenues	18
Industrial Water Revenues	19
Industrial Sewer Revenues	20
Minimum Water Break-Even Analysis	21
Minimum Sewer Break-Even Analysis	22

New Authority Baseline Financial Projections
Key Assumptions

Sch. 1

1. Reversion Agreement is assumed to be effective July 1, 2013 (FY 2014). All assets and liabilities of the PSA and City's Water & Sewer Fund are assumed to be combined as of July 1, 2013 (FY 2014) except as noted below
2. Total City debt transferred to the New Authority will total \$10,167,572; no working capital deficits of either the City or the PSA will be transferred to the New Authority. Unreserved cash balance of the New Authority will be approximately \$200,000 on July 1, 2013.
3. No rate increases are assumed for the Baseline Projections
4. Customer growth of 1% is assumed to occur in previous Bedford City and PSA service areas
5. The Bedford County debt contribution of \$2.0 million per year will continue through-out the projections period.
6. Revenue sharing revenues of approximately \$415,000 are be discontinued effective July 1, 2013
7. All City and PSA staff will be transferred to the New Authority plus several additional employees will be hired July 1, 2013 (FY 2014)
8. Unless noted below, all expenses are assumed to increase 3% per year.
9. Interconnection of the water systems will occur consistent with Case III of the Morgan Keegan Report
10. Supply and purification expenses at the City's water treatment plant will increase \$100,000 in FY 2016 due to increases plant production
11. General & administrative expense allocations from the City's General Fund will be discontinued after FY 2013
12. PAYGO capital expenditures for the New Authority will total \$400,000 per year.
13. PSA CIP expenditures will be finance with 2 bond issues; \$1,365,000 in FY 2014 and \$7,440,000 in FY 2022; both issues will be at 20 year; 4% terms.

New Authority Baseline Financial Projections
(\$ in 000's)

Sch. 2

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenues:												
Water charges	\$ 5,889	\$ 5,948	\$ 6,008	\$ 6,068	\$ 6,128	\$ 6,189	\$ 6,250	\$ 6,312	\$ 6,374	\$ 6,437	\$ 6,501	\$ 6,565
Sewer charges	3,062	3,093	3,124	3,155	3,186	3,217	3,248	3,280	3,312	3,343	3,375	3,407
Revenue sharing	415	415	0	0	0	0	0	0	0	0	0	0
Bedford debt contribution	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Facility fees	69	272	272	272	272	272	272	272	272	272	272	272
Contract operations	92	95	98	101	104	107	110	113	117	120	124	127
Rentals	108	109	110	111	112	114	115	116	117	118	119	120
Penalties & adm. fees	100	100	100	100	100	100	100	100	100	100	100	100
All other	43	56	56	56	56	56	56	56	56	56	56	56
	11,778	12,088	11,767	11,862	11,958	12,054	12,151	12,249	12,348	12,447	12,547	12,648
Expenditures:												
Water operations	3,476	3,580	3,688	3,798	2,443	2,516	2,591	2,669	2,749	2,832	2,917	3,004
Sewer operations	2,644	2,723	2,805	2,889	2,976	3,065	3,157	3,252	3,349	3,450	3,553	3,660
Customer service & adm.	1,262	1,281	1,153	1,187	1,223	1,260	1,298	1,336	1,377	1,418	1,460	1,504
Contract operations	92	95	98	101	104	107	110	113	117	120	124	127
Debt service	3,524	3,424	3,394	3,387	4,768	4,765	4,741	4,680	4,462	4,395	4,380	4,381
PAYGO - CAPEX	400	412	424	437	450	464	478	492	507	522	538	554
CIP - debt service	0	0	100	100	100	100	100	100	100	100	647	647
	11,398	11,515	11,662	11,900	12,063	12,276	12,475	12,643	12,660	12,836	13,619	13,877
Net Revenue	\$ 380	\$ 573	\$ 105	\$ (38)	\$ (106)	\$ (222)	\$ (323)	\$ (394)	\$ (313)	\$ (390)	\$ (1,072)	\$ (1,230)

Notes:

1. Facility fees increase to \$272 due to assumed 1% growth
2. Revenue sharing of \$415 stops in FY 2014
3. Water operations decrease to \$2,443 in FY 2016 due to inter-connection
4. Customer service & adm. decrease to \$1,153 in FY 2014 due to decrease in City adm. allocation; net of staff increases
5. Debt service increases \$100 in FY 2013 and again to \$647 in FY 2022 due to debt issues to fund PSA related CIP

FIXED CHARGES	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
PSA Customers Fixed Charges											
5/8" & 3/4" meter	10.00	10.40	11.00	11.63	12.20	12.80	13.40	14.00	14.60	15.20	15.80
1" meter	16.00	16.64	18.25	19.85	21.45	23.05	24.65	26.25	27.85	29.45	31.12
1.5" meter	24.00	24.96	27.41	29.86	32.31	34.76	37.21	39.66	42.11	44.56	47.15
2" meter	32.00	33.28	37.48	41.68	45.88	50.08	54.28	58.48	62.68	66.88	71.13
3" meter	48.00	49.92	58.47	67.02	75.57	84.12	92.67	101.22	109.77	118.32	127.53
4" meter	64.00	100.00	116.00	132.00	148.00	164.00	180.00	196.00	212.00	228.00	245.00
6" meter	96.00	150.00	187.50	225.00	262.50	300.00	337.50	375.00	412.50	450.00	490.00
City/County Fixed Charges											
5/8" & 3/4" meter	0.56	0.73	0.95	1.23	1.60	2.08	2.70	3.38	4.05	4.87	5.94 Need 5+ years
1" meter	0.92	1.29	1.80	2.52	3.53	4.95	6.93	9.01	11.26	13.51	15.53 Need 5+ years
1.5" meter	1.84	2.58	3.61	5.05	7.07	9.90	13.36	16.70	20.04	23.05	25.35 Need 5+ years
2" meter	2.95	4.10	5.70	7.92	11.01	15.31	19.90	24.87	29.85	34.33	37.76 Need 5+ years
3" meter	5.53	7.63	10.53	14.53	20.06	27.68	35.98	44.98	53.97	62.07	68.27 Need 5+ years
4" meter	9.22	12.91	18.07	25.30	35.42	49.59	64.46	80.58	96.70	111.20	122.32 Need 5+ years
6" meter	18.44	25.82	36.14	50.60	70.84	99.17	128.93	161.16	193.39	222.40	244.64 Need 5+ years
Volume Charges:											
PSA customers	5.40	5.36	5.32	5.28	5.24	5.20	5.16	5.12	5.08	5.04	5.00
City Residential											
First 3,000	4.25	4.32	4.39	4.46	4.54	4.61	4.69	4.77	4.84	4.92	5.00
Next 7,000	3.11	3.26	3.42	3.58	3.76	3.94	4.13	4.33	4.54	4.76	5.00
Next 20,000	2.25	2.44	2.64	2.86	3.09	3.35	3.63	3.93	4.25	4.61	5.00
Next 50,000	2.13	2.44	2.64	2.86	3.09	3.35	3.63	3.93	4.25	4.61	5.00 Eliminate this block
City commercial											
First 3,000	5.65	5.58	5.51	5.44	5.37	5.31	5.24	5.17	5.11	5.05	5.00 Rate decreases
Next 7,000	4.14	4.22	4.31	4.39	4.48	4.57	4.66	4.76	4.85	4.95	5.00
Next 20,000	3.01	3.16	3.32	3.48	3.66	3.84	4.03	4.24	4.45	4.67	5.00
Next 50,000	2.84	3.01	3.19	3.38	3.59	3.80	4.03	4.27	4.53	4.80	5.00
Next 100,000	2.69	2.86	3.05	3.25	3.46	3.69	3.93	4.18	4.45	4.74	5.00
Next 500,000	2.36	2.54	2.73	2.93	3.15	3.39	3.64	3.92	4.21	4.52	5.00
Over 680,000	2.24	2.86	2.73	2.93	3.15	3.39	3.64	3.92	4.21	4.52	5.00 Eliminate this block
County Residential											
First 3,000	6.37	6.21	6.06	5.90	5.76	5.61	5.47	5.34	5.20	5.07	5.00 Rate decrease
Next 7,000	4.68	4.70	4.73	4.75	4.77	4.80	4.82	4.85	4.87	4.89	5.00
Next 20,000	3.36	3.50	3.65	3.80	3.96	4.13	4.30	4.48	4.67	4.87	5.00
Next 50,000	3.20	3.50	3.65	3.80	3.96	4.13	4.30	4.48	4.67	4.87	5.00 Eliminate this block

Bedford New Authority
Water Rate Schedule

Sch. 3

FIXED CHARGES	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
County commercial												
First 3,000	8.49	8.07	7.66	7.28	6.92	6.57	6.24	5.93	5.63	5.35	5.00	Rate decrease
Next 7,000	6.23	6.11	5.98	5.86	5.75	5.63	5.52	5.41	5.30	5.19	5.00	Rate decrease
Next 20,000	4.50	4.55	4.59	4.64	4.68	4.73	4.78	4.82	4.87	4.92	5.00	
Next 50,000	4.27	4.33	4.40	4.47	4.53	4.60	4.67	4.74	4.81	4.88	5.00	
Next 100,000	4.06	4.13	4.20	4.28	4.35	4.43	4.51	4.58	4.66	4.75	5.00	
Next 500,000	3.56	3.68	3.80	3.92	4.05	4.18	4.31	4.45	4.60	4.75	5.00	
Over 680,000	3.36	3.68	3.80	3.92	4.05	4.18	4.31	4.45	4.60	4.75	5.00	Eliminate this block

FIXED CHARGES	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
PSA Customers Fixed Charges											
5/8" & 3/4" meter	10.00	10.32	10.64	10.96	11.28	11.60	11.92	12.24	12.56	12.88	13.00
1" meter	16.00	16.64	19.79	22.94	26.09	29.24	32.39	35.54	38.69	41.84	41.00
1.5" meter	24.00	24.96	30.46	35.96	41.46	46.96	52.46	57.96	63.46	68.96	68.00
2" meter	32.00	33.28	42.88	52.48	62.08	71.68	81.28	90.88	100.48	110.08	109.00
3" meter	48.00	49.92	69.37	88.82	108.27	127.72	147.17	166.62	186.07	205.52	205.00
4" meter	64.00	100.00	138.00	176.00	214.00	252.00	290.00	328.00	366.00	404.00	410.00
6" meter	96.00	150.00	233.00	316.00	399.00	482.00	565.00	648.00	731.00	814.00	820.00
City / County Fixed Charges											
5/8" & 3/4" meter	9.27	9.55	9.83	10.13	10.43	10.75	11.07	11.40	11.74	12.10	13.00
1" meter	15.48	16.72	18.06	19.50	21.06	22.75	24.56	26.53	28.65	30.94	41.00
1.5" meter	30.86	33.33	36.00	38.87	41.98	45.34	48.97	52.89	57.12	61.69	68.00
2" meter	49.40	53.60	58.15	63.10	68.46	74.28	80.59	87.45	94.88	102.94	109.00
3" meter	92.66	101.00	110.09	120.00	130.80	142.57	155.40	169.39	184.63	201.25	205.00
4" meter	154.49	169.94	186.93	205.63	226.19	248.81	273.69	301.06	331.16	364.28	410.00
6" meter	308.87	339.76	373.73	411.11	452.22	497.44	547.18	601.90	662.09	728.30	820.00
Volume Charges:											
PSA customers	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
City residential											
First 3,000	5.51	5.64	5.78	5.92	6.06	6.20	6.35	6.51	6.66	6.82	7.00
Next 7,000	5.51	5.64	5.78	5.92	6.06	6.20	6.35	6.51	6.66	6.82	7.00
Next 20,000	5.05	5.22	5.39	5.57	5.75	5.94	6.14	6.34	6.55	6.76	7.00
Next 50,000	4.73	5.22	5.39	5.57	5.75	5.94	6.14	6.34	6.55	6.76	7.00
City commercial											
First 3,000	7.33	7.29	7.26	7.22	7.18	7.15	7.11	7.08	7.04	7.01	7.00
Next 7,000	7.33	7.33	7.26	7.22	7.18	7.15	7.11	7.08	7.04	7.01	7.00
Next 20,000	6.73	6.76	6.78	6.81	6.84	6.87	6.89	6.92	6.95	6.98	7.00
Next 50,000	6.29	6.36	6.43	6.50	6.57	6.64	6.72	6.79	6.87	6.94	7.00
Next 100,000	5.78	5.89	6.00	6.12	6.23	6.35	6.47	6.59	6.72	6.85	7.00
Next 500,000	4.86	5.04	5.23	5.43	5.63	5.84	6.06	6.29	6.52	6.77	7.00
Over 680,000	4.24	5.04	5.23	5.43	5.63	5.84	6.06	6.29	6.52	6.77	7.00
County residential											
First 3,000	8.27	8.13	7.98	7.84	7.71	7.57	7.44	7.31	7.18	7.06	7.00
Next 7,000	8.27	8.13	7.98	7.84	7.71	7.57	7.44	7.31	7.18	7.06	7.00
Next 20,000	7.60	7.54	7.48	7.42	7.36	7.30	7.24	7.18	7.13	7.07	7.00
Next 50,000	7.10	7.54	7.48	7.42	7.36	7.30	7.24	7.18	7.13	7.07	7.00

Eliminate this block

Eliminate this block

Eliminate this block

FIXED CHARGES	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
County commercial												
First 3,000	11.01	10.53	10.06	9.62	9.20	8.79	8.40	8.04	7.68	7.34	7.00	Rate decrease
Next 7,000	11.01	10.53	10.06	9.62	9.20	8.79	8.40	8.04	7.68	7.34	7.00	Rate decrease
Next 20,000	10.12	9.76	9.40	9.07	8.74	8.42	8.12	7.83	7.55	7.28	7.00	Rate decrease
Next 50,000	9.46	9.18	8.90	8.63	8.37	8.12	7.88	7.64	7.41	7.19	7.00	Rate decrease
Next 100,000	8.68	8.50	8.32	8.14	7.97	7.81	7.64	7.48	7.32	7.17	7.00	Rate decrease
Next 500,000	7.30	7.27	7.24	7.21	7.18	7.16	7.13	7.10	7.07	7.04	7.00	Rate decrease
Over 680,000	6.38	7.27	7.24	7.21	7.18	7.16	7.13	7.10	7.07	7.04	7.00	Eliminate this block

Bedford New Authority
Monthly Water Bill Comparisons

Sch. 5

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
PSA Customers												
5/8" 1,000 gallons	15.40	15.40	15.76	16.32	16.91	17.44	18.00	18.56	19.12	19.68	20.24	20.80
5/8" 2,000 gallons	20.80	20.80	21.12	21.64	22.19	22.68	23.20	23.72	24.24	24.76	25.28	25.80
5/8" 4,000 gallons	31.60	31.60	31.84	32.28	32.75	33.16	33.60	34.04	34.48	34.92	35.36	35.80
5/8" 6,000 gallons	42.40	42.40	42.56	42.92	43.31	43.64	44.00	44.36	44.72	45.08	45.44	45.80
5/8" 8,000 gallons	53.20	53.20	53.28	53.56	53.87	54.12	54.40	54.68	54.96	55.24	55.52	55.80
1.5" 30,000 gallons	186.00	186.00	185.76	187.01	188.26	189.51	190.76	192.01	193.26	194.51	195.76	197.15
2" 50,000 gallons	302.00	302.00	301.28	303.48	305.68	307.88	310.08	312.28	314.48	316.68	318.88	321.13
City Residential												
5/8" 1,000 gallons	15.37	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68
5/8" 2,000 gallons	15.37	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68	15.68
5/8" 4,000 gallons	16.08	16.42	16.95	17.54	18.21	18.97	19.86	20.90	22.01	23.13	24.40	25.94
5/8" 6,000 gallons	22.18	22.64	23.47	24.38	25.38	26.49	27.74	29.16	30.67	32.22	33.93	35.94
5/8" 8,000 gallons	28.28	28.86	29.99	31.22	32.55	34.01	35.62	37.43	39.34	41.30	43.45	45.94
County Residential												
5/8" 1,000 gallons	23.10	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56
5/8" 2,000 gallons	23.10	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56	23.56
5/8" 4,000 gallons	23.85	24.35	24.06	23.84	23.69	23.64	23.72	23.94	24.23	24.53	24.98	25.94
5/8" 6,000 gallons	33.01	33.71	33.47	33.29	33.19	33.19	33.31	33.59	33.92	34.27	34.77	35.94
5/8" 8,000 gallons	42.17	43.07	42.88	42.75	42.70	42.74	42.91	43.23	43.62	44.01	44.56	45.94
City Commercial												
5/8" 4,000 gallons	21.23	21.65	21.69	21.78	21.95	22.20	22.57	23.08	23.66	24.23	24.95	25.94
1" 20,000 gallons	75.45	76.95	79.19	81.67	84.45	87.61	91.28	95.62	100.17	105.01	109.97	115.53
1.5" 30,000 gallons	105.84	107.97	112.08	116.66	121.81	127.73	134.64	142.39	150.22	158.26	166.20	175.35
2" 50,000 gallons	162.53	165.88	173.82	182.57	192.34	203.38	216.06	229.50	243.80	258.60	273.45	287.76
3" 100,000 gallons	301.26	307.46	324.96	344.15	365.41	389.20	416.16	444.94	475.61	507.56	539.96	568.27
4" 300,000 gallons	794.47	809.55	863.86	923.05	987.95	1059.62	1139.48	1224.49	1315.48	1411.52	1511.36	1622.32
County Commercial												
5/8" 4,000 gallons	31.62	32.26	31.03	29.92	28.93	28.09	27.42	26.94	26.57	26.25	26.11	25.94
1" 20,000 gallons	112.74	115.00	113.67	112.58	111.77	111.33	111.37	112.05	112.90	113.98	115.14	115.53
1.5" 30,000 gallons	157.73	160.92	160.41	160.29	160.66	161.69	163.62	166.25	168.84	171.50	173.89	175.35
2" 50,000 gallons	242.42	247.43	248.62	250.36	252.83	256.28	261.03	266.17	271.79	277.51	282.82	287.76
3" 100,000 gallons	449.95	459.31	464.79	471.23	478.93	488.32	499.95	512.43	525.75	539.22	551.95	568.27
4" 300,000 gallons	1190.76	1215.00	1241.63	1270.46	1302.07	1337.32	1377.38	1418.92	1462.49	1506.87	1550.46	1622.32

Bedford New Authority
Monthly Water Bill Comparisons

Sch. 5

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
% Changes													Annual
PSA Customers													Avg.
5/8" 1,000 gallons		0%	2%	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%
5/8" 2,000 gallons		0%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%	2%
5/8" 4,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
5/8" 6,000 gallons		0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
5/8" 8,000 gallons		0%	0%	1%	1%	0%	1%	1%	1%	1%	1%	1%	0%
1.5" 30,000 gallons		0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2" 50,000 gallons		0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
City Residential													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	3%	3%	4%	4%	5%	5%	5%	5%	5%	6%	5%
5/8" 6,000 gallons		2%	4%	4%	4%	4%	5%	5%	5%	5%	5%	6%	5%
5/8" 8,000 gallons		2%	4%	4%	4%	4%	5%	5%	5%	5%	5%	6%	5%
County Residential													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	-1%	-1%	-1%	0%	0%	1%	1%	1%	2%	4%	1%
5/8" 6,000 gallons		2%	-1%	-1%	0%	0%	0%	1%	1%	1%	1%	3%	1%
5/8" 8,000 gallons		2%	0%	0%	0%	0%	0%	1%	1%	1%	1%	3%	1%
City Commercial													
5/8" 4,000 gallons		2%	0%	0%	1%	1%	2%	2%	2%	2%	3%	4%	2%
1" 20,000 gallons		2%	3%	3%	3%	4%	4%	5%	5%	5%	5%	5%	4%
1.5" 30,000 gallons		2%	4%	4%	4%	5%	5%	6%	5%	5%	5%	6%	5%
2" 50,000 gallons		2%	5%	5%	5%	6%	6%	6%	6%	6%	6%	5%	6%
3" 100,000 gallons		2%	6%	6%	6%	7%	7%	7%	7%	7%	6%	5%	6%
4" 300,000 gallons		2%	7%	7%	7%	7%	8%	7%	7%	7%	7%	7%	7%
County Commercial													
5/8" 4,000 gallons		2%	-4%	-4%	-3%	-3%	-2%	-2%	-1%	-1%	-1%	-1%	-2%
1" 20,000 gallons		2%	-1%	-1%	-1%	0%	0%	1%	1%	1%	1%	0%	0%
1.5" 30,000 gallons		2%	0%	0%	0%	1%	1%	2%	2%	2%	1%	1%	1%
2" 50,000 gallons		2%	0%	1%	1%	1%	2%	2%	2%	2%	2%	2%	2%
3" 100,000 gallons		2%	1%	1%	2%	2%	2%	2%	3%	3%	2%	3%	2%
4" 300,000 gallons		2%	2%	2%	2%	3%	3%	3%	3%	3%	3%	5%	3%

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
PSA Customers												
5/8" 1,000 gallons	17.00	17.00	17.32	17.64	17.96	18.28	18.60	18.92	19.24	19.56	19.88	20.00
5/8" 2,000 gallons	24.00	24.00	24.32	24.64	24.96	25.28	25.60	25.92	26.24	26.56	26.88	27.00
5/8" 4,000 gallons	38.00	38.00	38.32	38.64	38.96	39.28	39.60	39.92	40.24	40.56	40.88	41.00
5/8" 6,000 gallons	52.00	52.00	52.32	52.64	52.96	53.28	53.60	53.92	54.24	54.56	54.88	55.00
5/8" 8,000 gallons	66.00	66.00	66.32	66.64	66.96	67.28	67.60	67.92	68.24	68.56	68.88	69.00
1.5" 30,000 gallons	234.00	234.00	234.96	240.46	245.96	251.46	256.96	262.46	267.96	273.46	278.96	278.00
2" 50,000 gallons	382.00	382.00	383.28	392.88	402.48	412.08	421.68	431.28	440.88	450.48	460.08	459.00
City Residential												
5/8" 1,000 gallons	29.82	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41
5/8" 2,000 gallons	29.82	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41	30.41
5/8" 4,000 gallons	30.69	31.31	32.12	32.95	33.79	34.67	35.56	36.48	37.42	38.39	39.38	41.00
5/8" 6,000 gallons	41.49	42.33	43.40	44.50	45.63	46.78	47.97	49.18	50.43	51.71	53.02	55.00
5/8" 8,000 gallons	52.29	53.35	54.69	56.06	57.46	58.90	60.38	61.89	63.44	65.03	66.66	69.00
County Residential												
5/8" 1,000 gallons	40.21	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02
5/8" 2,000 gallons	40.21	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02
5/8" 4,000 gallons	41.49	42.35	42.05	41.77	41.50	41.26	41.03	40.82	40.64	40.47	40.32	41.00
5/8" 6,000 gallons	57.69	58.89	58.30	57.73	57.19	56.67	56.17	55.70	55.25	54.83	54.43	55.00
5/8" 8,000 gallons	73.89	75.43	74.55	73.70	72.88	72.08	71.32	70.58	69.87	69.19	68.54	69.00
City Commercial												
5/8" 4,000 gallons	37.81	38.59	38.76	38.86	39.01	39.17	39.34	39.52	39.71	39.91	40.12	41.00
1" 20,000 gallons	152.98	156.08	157.48	158.46	159.82	161.29	162.89	164.62	166.51	168.56	170.77	181.04
1.5" 30,000 gallons	234.05	238.76	241.66	244.24	247.30	250.60	254.14	257.96	262.08	266.51	271.28	278.08
2" 50,000 gallons	375.44	383.10	389.11	394.99	401.52	408.50	415.95	423.92	432.44	441.57	451.35	459.08
3" 100,000 gallons	715.85	730.66	745.08	759.83	775.73	792.62	810.56	829.65	849.98	871.67	894.82	905.08
4" 300,000 gallons	1800.46	1838.09	1890.28	1944.57	2001.92	2062.29	2125.89	2192.97	2263.80	2338.67	2417.89	2510.08
County Commercial												
5/8" 4,000 gallons	52.29	53.31	51.65	50.08	48.61	47.22	45.91	44.69	43.54	42.47	41.47	41.00
1" 20,000 gallons	222.38	226.78	219.53	212.72	206.36	200.42	194.91	189.83	185.17	180.94	177.14	181.00
1.5" 30,000 gallons	336.65	343.36	333.70	324.71	316.39	308.74	301.76	295.45	289.82	284.88	280.64	278.00
2" 50,000 gallons	540.24	551.10	537.49	524.89	513.29	502.71	493.17	484.67	477.25	470.93	465.73	459.00
3" 100,000 gallons	1030.95	1051.76	1030.13	1010.23	992.10	975.77	961.29	948.72	938.13	929.60	923.20	905.00
4" 300,000 gallons	2631.56	2683.99	2651.39	2621.63	2594.82	2571.11	2550.63	2533.57	2520.10	2510.45	2504.86	2510.00

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
% Changes													Annual
PSA Customers													Avg.
5/8" 1,000 gallons		0%	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	2%
5/8" 2,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
5/8" 4,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
5/8" 6,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
5/8" 8,000 gallons		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1.5" 30,000 gallons		0%	0%	2%	2%	2%	2%	2%	2%	2%	2%	0%	2%
2" 50,000 gallons		0%	0%	3%	2%	2%	2%	2%	2%	2%	2%	0%	2%
City Residential													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	3%
5/8" 6,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	3%
5/8" 8,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	3%
County													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	-1%	-1%	-1%	-1%	-1%	-1%	0%	0%	0%	2%	0%
5/8" 6,000 gallons		2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	1%	-1%
5/8" 8,000 gallons		2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	1%	-1%
City Commercial													
5/8" 4,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	1%	1%	2%	1%
1" 20,000 gallons		2%	1%	1%	1%	1%	1%	1%	1%	1%	1%	6%	2%
1.5" 30,000 gallons		2%	1%	1%	1%	1%	1%	2%	2%	2%	2%	3%	2%
2" 50,000 gallons		2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
3" 100,000 gallons		2%	2%	2%	2%	2%	2%	2%	2%	3%	3%	1%	2%
4" 300,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	3%
County Commercial													
5/8" 4,000 gallons		2%	-3%	-3%	-3%	-3%	-3%	-3%	-3%	-2%	-2%	-1%	-3%
1" 20,000 gallons		2%	-3%	-3%	-3%	-3%	-3%	-3%	-2%	-2%	-2%	2%	-2%
1.5" 30,000 gallons		2%	-3%	-3%	-3%	-2%	-2%	-2%	-2%	-2%	-1%	-1%	-2%
2" 50,000 gallons		2%	-2%	-2%	-2%	-2%	-2%	-2%	-2%	-1%	-1%	-1%	-2%
3" 100,000 gallons		2%	-2%	-2%	-2%	-2%	-1%	-1%	-1%	-1%	-1%	-2%	-1%
4" 300,000 gallons		2%	-1%	-1%	-1%	-1%	-1%	-1%	-1%	0%	0%	0%	-1%

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
PSA Customers												
5/8" 1,000 gallons	32.40	32.40	33.08	33.96	34.87	35.72	36.60	37.48	38.36	39.24	40.12	40.80
5/8" 2,000 gallons	44.80	44.80	45.44	46.28	47.15	47.96	48.80	49.64	50.48	51.32	52.16	52.80
5/8" 4,000 gallons	69.60	69.60	70.16	70.92	71.71	72.44	73.20	73.96	74.72	75.48	76.24	76.80
5/8" 6,000 gallons	94.40	94.40	94.88	95.56	96.27	96.92	97.60	98.28	98.96	99.64	100.32	100.80
5/8" 8,000 gallons	119.20	119.20	119.60	120.20	120.83	121.40	122.00	122.60	123.20	123.80	124.40	124.80
1.5" 30,000 gallons	420.00	420.00	420.72	427.47	434.22	440.97	447.72	454.47	461.22	467.97	474.72	475.15
2" 50,000 gallons	684.00	684.00	684.56	696.36	708.16	719.96	731.76	743.56	755.36	767.16	778.96	780.13
City Residential												
5/8" 1,000 gallons	45.19	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09
5/8" 2,000 gallons	45.19	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09	46.09
5/8" 4,000 gallons	46.77	47.73	49.07	50.48	52.00	53.64	55.42	57.38	59.43	61.52	63.78	66.94
5/8" 6,000 gallons	63.67	64.97	66.87	68.88	71.00	73.27	75.71	78.35	81.11	83.93	86.95	90.94
5/8" 8,000 gallons	80.57	82.21	84.68	87.27	90.01	92.91	96.00	99.32	102.78	106.33	110.12	114.94
County Residential												
5/8" 1,000 gallons	63.31	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58
5/8" 2,000 gallons	63.31	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58	64.58
5/8" 4,000 gallons	65.34	66.70	66.11	65.61	65.20	64.90	64.75	64.77	64.87	65.00	65.29	66.94
5/8" 6,000 gallons	90.70	92.60	91.77	91.03	90.38	89.86	89.49	89.29	89.18	89.10	89.19	90.94
5/8" 8,000 gallons	116.06	118.50	117.43	116.45	115.57	114.82	114.22	113.81	113.49	113.20	113.09	114.94
City Commercial												
5/8" 4,000 gallons	59.04	60.24	60.45	60.64	60.96	61.37	61.91	62.60	63.37	64.14	65.07	66.94
1" 20,000 gallons	228.43	233.03	236.67	240.13	244.26	248.90	254.16	260.24	266.68	273.57	280.75	296.58
1.5" 30,000 gallons	339.89	346.73	353.74	360.90	369.12	378.33	388.78	400.35	412.29	424.77	437.48	453.43
2" 50,000 gallons	537.97	548.98	562.93	577.56	593.86	611.88	632.02	653.42	676.24	700.18	724.80	746.84
3" 100,000 gallons	1,017.11	1,038.12	1,070.04	1,103.98	1,141.14	1,181.82	1,226.72	1,274.59	1,325.60	1,379.23	1,434.78	1,473.35
4" 300,000 gallons	2,594.93	2,647.64	2,754.14	2,867.62	2,989.87	3,121.91	3,265.37	3,417.47	3,579.28	3,750.19	3,929.25	4,132.40
County Commercial												
5/8" 4,000 gallons	83.91	85.57	82.68	80.00	77.54	75.31	73.33	71.63	70.12	68.72	67.58	66.94
1" 20,000 gallons	335.12	341.78	333.20	325.30	318.13	311.75	306.28	301.88	298.07	294.93	292.27	296.53
1.5" 30,000 gallons	494.38	504.28	494.11	484.99	477.05	470.43	465.37	461.70	458.66	456.38	454.53	453.35
2" 50,000 gallons	782.66	798.53	786.11	775.25	766.12	758.99	754.20	750.85	749.04	748.43	748.54	746.76
3" 100,000 gallons	1,480.90	1511.07	1494.92	1481.46	1471.03	1464.08	1461.24	1461.15	1463.88	1468.82	1475.15	1473.27
4" 300,000 gallons	3,822.32	3898.99	3893.02	3892.08	3896.89	3908.43	3928.01	3952.48	3982.59	4017.32	4055.32	4132.32

	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
% Change													Annual
PSA Customers													Avg.
5/8" 1,000 gallons		0%	2%	3%	3%	2%	2%	2%	2%	2%	2%	2%	2%
5/8" 2,000 gallons		0%	1%	2%	2%	2%	2%	2%	2%	2%	2%	1%	2%
5/8" 4,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
5/8" 6,000 gallons		0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%
5/8" 8,000 gallons		0%	0%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%
1.5" 30,000 gallons		0%	0%	2%	2%	2%	2%	2%	1%	1%	1%	0%	1%
2" 50,000 gallons		0%	0%	2%	2%	2%	2%	2%	2%	2%	2%	0%	1%
City Residential													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	3%	3%	3%	3%	3%	4%	4%	4%	4%	5%	3%
5/8" 6,000 gallons		2%	3%	3%	3%	3%	3%	3%	4%	3%	4%	5%	3%
5/8" 8,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	3%	4%	4%	3%
County Residential													
5/8" 1,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 2,000 gallons		2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
5/8" 4,000 gallons		2%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	3%	0%
5/8" 6,000 gallons		2%	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	2%	0%
5/8" 8,000 gallons		2%	-1%	-1%	-1%	-1%	-1%	0%	0%	0%	0%	2%	0%
City Commercial													
5/8" 4,000 gallons		2%	0%	0%	1%	1%	1%	1%	1%	1%	1%	3%	1%
1" 20,000 gallons		2%	2%	1%	2%	2%	2%	2%	2%	3%	3%	6%	2%
1.5" 30,000 gallons		2%	2%	2%	2%	2%	3%	3%	3%	3%	3%	4%	3%
2" 50,000 gallons		2%	3%	3%	3%	3%	3%	3%	3%	4%	4%	3%	3%
3" 100,000 gallons		2%	3%	3%	3%	4%	4%	4%	4%	4%	4%	3%	4%
4" 300,000 gallons		2%	4%	4%	4%	4%	5%	5%	5%	5%	5%	5%	5%
County Commercial													
5/8" 4,000 gallons		2%	-3%	-3%	-3%	-3%	-3%	-2%	-2%	-2%	-2%	-1%	-2%
1" 20,000 gallons		2%	-3%	-2%	-2%	-2%	-2%	-1%	-1%	-1%	-1%	1%	-1%
1.5" 30,000 gallons		2%	-2%	-2%	-2%	-1%	-1%	-1%	-1%	0%	0%	0%	-1%
2" 50,000 gallons		2%	-2%	-1%	-1%	-1%	-1%	0%	0%	0%	0%	0%	-1%
3" 100,000 gallons		2%	-1%	-1%	-1%	0%	0%	0%	0%	0%	0%	0%	0%
4" 300,000 gallons		2%	0%	0%	0%	0%	1%	1%	1%	1%	1%	2%	1%

Bedford New Authority
Annual Water & Sewer Revenues

Sch. 8

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water:											
PSA customers	4,498,704	4,466,347	4,554,791	4,647,410	4,735,620	4,828,061	4,921,878	5,017,088	5,113,710	5,211,763	5,311,535
City residential	501,884	514,648	528,519	543,820	560,857	580,029	601,831	625,164	649,421	676,392	707,827
City commercial	456,123	358,688	369,580	381,670	394,915	409,526	425,461	442,496	460,625	479,806	499,432
County residential	201,298	201,867	202,672	203,777	205,264	207,240	209,848	212,746	215,745	219,369	225,480
County commercial	106,085	107,050	108,143	109,395	110,852	112,573	114,497	116,533	118,653	120,815	123,705
Industrial	-	233,244	233,592	233,940	234,288	234,636	234,984	235,333	235,681	236,029	238,635
Western Va. Auth.	156,650	161,350	166,190	171,176	176,311	181,600	187,048	192,660	198,440	204,393	210,525
	5,920,743	6,043,192	6,163,488	6,291,189	6,418,108	6,553,666	6,695,547	6,842,019	6,992,275	7,148,567	7,317,138
Sewer:											
PSA customers	1,189,352	1,209,372	1,237,608	1,266,289	1,295,419	1,325,006	1,355,054	1,385,571	1,416,563	1,448,036	1,462,789
City residential	782,913	801,174	819,915	839,369	859,564	880,531	902,300	924,906	948,383	972,766	716,346
City commercial	628,690	554,546	569,052	584,786	601,480	619,216	638,080	658,169	679,589	702,456	731,596
County residential	123,498	123,689	123,886	124,111	124,367	124,654	124,973	125,326	125,714	126,137	128,113
County commercial	175,720	173,314	171,068	168,988	167,080	165,350	163,806	162,458	161,314	160,387	160,336
Industrial	72,489	295,284	300,750	306,336	312,045	317,879	323,840	329,930	336,152	342,509	344,784
	2,972,661	3,157,378	3,222,279	3,289,879	3,359,956	3,432,635	3,508,054	3,586,360	3,667,715	3,752,290	3,543,965
Total revenues	8,893,404	9,200,570	9,385,766	9,581,068	9,778,063	9,986,301	10,203,601	10,428,380	10,659,989	10,900,856	10,861,103
Net requirements	9,041,000	9,132,000	9,261,000	9,420,000	9,628,000	9,821,000	9,986,000	9,999,000	10,170,000	10,948,000	11,202,000
Difference	(147,596)	68,570	124,766	161,068	150,063	165,301	217,601	429,380	489,989	(47,144)	(340,897)
Water	5,948,000	6,008,000	6,068,000	6,128,000	6,189,000	6,250,000	6,312,000	6,374,000	6,437,000	6,501,000	6,565,000
Sewer	3,093,000	3,124,000	3,155,000	3,186,000	3,217,000	3,248,000	3,280,000	3,312,000	3,343,000	3,375,000	3,407,000
Loss	0	0	38,000	106,000	222,000	323,000	394,000	313,000	390,000	1,072,000	1,230,000
Total	9,041,000	9,132,000	9,261,000	9,420,000	9,628,000	9,821,000	9,986,000	9,999,000	10,170,000	10,948,000	11,202,000
Difference %	-2%	1%	1%	2%	2%	2%	2%	4%	5%	0%	-3%
	A									B	B

Notes:

A. FY 2013 negative difference , if in fact it is realized, reduces the projected FY 2013 net revenue of \$573,000.

B. FY 2023 negative difference is due to \$630,000 increase in debt service resulting from purchase of sewer capacity from Lynchburg.

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	8,610	8,696	8,783	8,871	8,960	9,049	9,140	9,231	9,323	9,417	9,511
1" metes	176	178	180	181	183	185	187	189	191	192	194
1.5" meters	41	41	42	42	43	43	44	44	44	45	45
2" meters	12	12	12	12	12	13	13	13	13	13	13
3" meters	1	1	1	1	1	1	1	1	1	1	1
4" meters	1	1	1	1	1	1	1	1	1	1	1
6" meters	1	-	-	-	-	-	-	-	-	-	-
Volume	632,000	A 620,619	626,825	633,093	639,424	645,819	652,277	658,800	665,388	672,041	678,762
Mo. Revenues											
5/8" & 3/4" meters	86,100	90,439	96,614	103,142	109,307	115,830	122,472	129,235	136,122	143,133	150,271
1" metes	2,816	2,958	3,277	3,599	3,928	4,264	4,605	4,953	5,308	5,669	6,050
1.5" meters	984	1,034	1,146	1,261	1,378	1,498	1,619	1,743	1,870	1,998	2,135
2" meters	384	403	459	515	573	632	691	752	814	878	943
3" meters	48	50	60	69	79	88	98	109	119	129	141
4" meters	64	101	118	136	154	172	191	210	230	249	271
6" meters	96	-	-	-	-	-	-	-	-	-	-
Total month	90,492	94,986	101,673	108,723	115,420	122,484	129,677	137,003	144,462	152,056	159,810
Total year	1,085,904	1,139,829	1,220,081	1,304,676	1,385,036	1,469,804	1,556,130	1,644,034	1,733,541	1,824,674	1,917,726
Volume charges	3,412,800	3,326,518	3,334,710	3,342,733	3,350,584	3,358,257	3,365,748	3,373,054	3,380,169	3,387,089	3,393,809
Total annual	4,498,704	4,466,347	4,554,791	4,647,410	4,735,620	4,828,061	4,921,878	5,017,088	5,113,710	5,211,763	5,311,535
Proof	4499										
WVA	157										
Total	4656										
FY 2013	4650										

A. Barr Labs transferred to industrial rate in FY 2014. See Schedule 17.

Sch. 10

Proof	1189
FY 2013	1190

Bedford New Authority
City Residential Water Revenues

Sch. 11

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	2,230	2,252	2,275	2,298	2,321	2,344	2,367	2,391	2,415	2,439	2,463
1" metes	23	23	23	24	24	24	24	25	25	25	25
1.5" meters	1	1	1	1	1	1	1	1	1	1	1
2" meters	5	5	5	5	5	5	5	5	5	5	6
Minimum Bills											
5/8" & 3/4" meters	1,239	1,251	1,264	1,277	1,289	1,302	1,315	1,328	1,342	1,355	1,369
1" metes	19	19	19	20	20	20	20	20	21	21	21
1.5" meters	1	1	1	1	1	1	1	1	1	1	1
2" meters	4	4	4	4	4	4	4	4	4	4	4
Volume											
Minimum	27,894	27,894	27,894	27,894	27,894	27,894	27,894	27,894	27,894	27,894	27,894
First 3,000	35,052	35,403	35,757	36,114	36,475	36,840	37,208	37,580	37,956	38,336	38,719
Next 7,000	31,449	31,763	32,081	32,402	32,726	33,053	33,384	33,718	34,055	34,395	34,739
Next 20,000	3,226	3,258	3,291	3,324	3,357	3,391	3,424	3,459	3,493	3,528	3,564
Next 50,000	681	688	695	702	709	716	723	730	737	745	752
	98,302	99,006	99,717	100,435	101,161	101,894	102,634	103,381	104,136	104,898	105,668
Fixed Mo. Charges											
5/8" & 3/4" meters	555	729	957	1,256	1,649	2,166	2,843	3,590	4,351	5,273	6,498
1" metes	4	5	7	10	15	21	29	39	49	59	69
1.5" meters	-	-	-	-	-	-	-	-	-	-	-
2" meters	3	4	6	8	11	16	21	27	32	38	42
Total month	562	738	970	1,275	1,676	2,203	2,894	3,655	4,432	5,370	6,608
Total year	6,739	8,856	11,639	15,297	20,107	26,430	34,728	43,862	53,184	64,440	79,298
Minimum	239,658	239,658	239,658	239,658	239,658	239,658	239,658	239,658	239,658	239,658	239,658
Volume charges											
First 3,000	148,971	152,943	157,022	161,209	165,507	169,920	174,451	179,103	183,879	188,782	193,596
Next 7,000	97,806	103,575	109,685	116,155	123,006	130,262	137,945	146,082	154,698	163,823	173,696
Next 20,000	7,259	7,939	8,683	9,497	10,387	11,360	12,425	13,590	14,864	16,257	17,818
Next 50,000	1,451	1,676	1,833	2,005	2,193	2,398	2,623	2,869	3,138	3,432	3,761
Total annual	501,884	514,648	528,519	543,820	560,857	580,029	601,831	625,164	649,421	676,392	707,827

Proof 502
FY 2011 514

Bedford New Authority
City Residential Sewer Revenues

Sch. 12

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	2016	2,036	2,057	2,077	2,098	2,119	2,140	2,161	2,183	2,205	2,227
1" metes	20	20	20	21	21	21	21	21	22	22	22
1.5" meters	1	1	1	1	1	1	1	1	1	1	1
2" meters	4	4	4	4	4	4	4	4	4	4	4
Minimum Bills											
5/8" & 3/4" meters	811	819	827	836	844	852	861	870	878	887	896
1" metes	5	5	5	5	5	5	5	5	5	5	6
1.5" meters	0	-	-	-	-	-	-	-	-	-	-
2" meters	1	1	1	1	1	1	1	1	1	1	1
Volume											
Minimum	25,335	25,335	25,335	25,335	25,335	25,335	25,335	25,335	25,335	25,335	25,335
First 3,000	31,767	32,085	32,406	32,730	33,057	33,387	33,721	34,059	34,399	34,743	35,091
Next 7,000	28,582	28,868	29,156	29,448	29,743	30,040	30,340	30,644	30,950	31,260	31,572
Next 20,000	3,069	3,100	3,131	3,162	3,194	3,226	3,258	3,290	3,323	3,357	3,390
Next 50,000	639	645	652	658	665	672	678	685	692	699	706
	89,392	90,033	90,680	91,333	91,993	92,660	93,333	94,013	94,700	95,393	96,094
Fixed Mo. Charges											
5/8" & 3/4" meters	11,170	11,621	12,089	12,576	13,083	13,610	14,159	14,729	15,323	15,940	17,304
1" metes	232	253	276	301	329	359	391	427	465	508	679
1.5" meters	31	34	37	40	44	48	52	57	62	67	75
2" meters	148	162	178	195	214	234	257	281	308	338	361
Total month	11,582	12,070	12,580	13,112	13,669	14,250	14,858	15,494	16,158	16,853	18,420
Total annual	138,979	144,838	150,958	157,349	164,028	171,006	178,300	185,925	193,898	202,237	221,035
Minimum	292,890	292,890	292,890	292,890	292,890	292,890	292,890	292,890	292,890	292,890	292,890
Volume charges											
First 3,000	175,036	181,029	187,228	193,639	200,269	207,126	214,218	221,553	229,139	236,984	245,634
Next 7,000	157,487	162,879	168,456	174,224	180,190	186,359	192,740	199,340	206,165	213,224	221,006
Next 20,000	15,498	16,170	16,871	17,602	18,364	19,160	19,990	20,856	21,760	22,703	23,731
Next 50,000	3,022	3,367	3,513	3,665	3,824	3,989	4,162	4,343	4,531	4,727	4,941
Total annual	782,913	801,174	819,915	839,369	859,564	880,531	902,300	924,906	948,383	972,766	716,346

2011 782
861

Bedford New Authority
City Commercial Water Revenues

Sch. 13

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units		A									
5/8" & 3/4" meters	218	220	222	225	227	229	231	234	236	238	241
1" metes	80	81	82	82	83	84	85	86	87	87	88
1.5" meters	25	25	26	26	26	26	27	27	27	27	28
2" meters	41	38	38	39	39	40	40	40	41	41	42
3" meters	9	9	9	9	9	9	10	10	10	10	10
4" meters	7	7	7	7	7	7	7	8	8	8	8
6" meters	3	0	0	0	0	0	0	0	0	0	0
Minimum Bills											
5/8" & 3/4" meters	168	170	171	173	175	177	178	180	182	184	186
1" metes	56	57	57	58	58	59	59	60	61	61	62
1.5" meters	15	15	15	15	16	16	16	16	16	16	17
2" meters	24	24	24	25	25	25	25	26	26	26	27
3" meters	4	4	4	4	4	4	4	4	4	4	4
4" meters	5	5	5	5	5	5	5	5	5	5	6
6" meters	2	2	2	2	2	2	2	2	2	2	2
Volume		A									
Minimum	18,560	18,560	18,560	18,560	18,560	18,560	18,560	18,560	18,560	18,560	18,560
First 3,000	4,002	3,898	3,937	3,976	4,016	4,056	4,097	4,138	4,179	4,221	4,263
Next 7,000	7,266	7,003	7,073	7,144	7,215	7,287	7,360	7,434	7,508	7,583	7,659
Next 20,000	13,325	12,468	12,593	12,719	12,846	12,974	13,104	13,235	13,367	13,501	13,636
Next 50,000	17,335	15,108	15,259	15,412	15,566	15,721	15,879	16,037	16,198	16,360	16,523
Next 100,000	18,577	13,963	14,103	14,244	14,386	14,530	14,675	14,822	14,970	15,120	15,271
Next 500,000	23,165	3,475	3,510	3,545	3,580	3,616	3,652	3,689	3,726	3,763	3,801
Over 680,000	16,663	622	628	635	641	647	654	660	667	674	680
	118,893	75,097	75,662	76,233	76,810	77,393	77,981	78,575	79,175	79,781	80,394
Mo. Revenues											
5/8" & 3/4" meters	28	37	48	63	83	109	143	181	220	266	328
1" metes	22	31	44	62	88	125	176	232	293	355	412
1.5" meters	18	26	37	52	74	104	142	179	217	252	280
2" meters	50	56	79	111	156	219	288	363	440	511	568
3" meters	28	39	54	75	104	145	191	241	292	339	377
4" meters	18	26	37	52	74	104	137	173	209	243	270
6" meters	18	(52)	(74)	(104)	(147)	(208)	(274)	(346)	(419)	(486)	(540)
Total month	183	163	225	312	432	598	804	1,024	1,252	1,480	1,695
Total annual	2,198	1,955	2,703	3,741	5,182	7,182	9,644	12,282	15,027	17,764	20,337

Bedford New Authority
City Commercial Water Revenues

Sch. 13

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Minimum	169,926	169,926	169,926	169,926	169,926	169,926	169,926	169,926	169,926	169,926	169,926
Volume charges											
First 3,000	22,611	21,748	21,691	21,634	21,578	21,521	21,464	21,408	21,352	21,296	21,316
Next 7,000	30,081	29,572	30,465	31,385	32,333	33,310	34,316	35,352	36,420	37,519	38,295
Next 20,000	40,108	39,405	41,789	44,317	46,999	49,842	52,857	56,055	59,447	63,043	68,180
Next 50,000	49,231	45,481	48,692	52,130	55,810	59,750	63,969	68,485	73,320	78,496	82,617
Next 100,000	49,972	40,002	43,028	46,283	49,784	53,551	57,602	61,959	66,647	71,688	76,356
Next 500,000	54,669	8,816	9,572	10,393	11,284	12,252	13,302	14,443	15,681	17,026	19,003
Over 680,000	37,325	1,782	1,713	1,860	2,020	2,193	2,381	2,585	2,807	3,048	3,401
Total annual	456,123	358,688	369,580	381,670	394,915	409,526	425,461	442,496	460,625	479,806	499,432
	456										
2011	451										

A. Industrial customer use transferred to industry rate. See Schedule 17.

Bedford New Authority
City Commercial Sewer Revenues

Sch. 14

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units		A									
5/8" & 3/4" meters	205	207	209	211	213	215	218	220	222	224	226
1" metres	72	73	73	74	75	76	76	77	78	79	80
1.5" meters	25	25	26	26	26	26	27	27	27	27	28
2" meters	36	35	35	36	36	36	37	37	38	38	38
3" meters	8	8	8	8	8	8	8	9	9	9	9
4" meters	6	6	6	6	6	6	6	6	6	7	7
6" meters	2	1	1	1	1	1	1	1	1	1	1
Minimum Bills											
5/8" & 3/4" meters	121	122	123	125	126	127	128	130	131	132	134
1" metres	21	21	21	22	22	22	22	23	23	23	23
1.5" meters	3	3	3	3	3	3	3	3	3	3	3
2" meters	2	2	2	2	2	2	2	2	2	2	2
3" meters	0	0	0	0	0	0	0	0	0	0	0
4" meters	0	0	0	0	0	0	0	0	0	0	0
6" meters	0	0	0	0	0	0	0	0	0	0	0
Volume		A									
Minimum	2,934	2,934	2,934	2,934	2,934	2,934	2,934	2,934	2,934	2,934	2,934
First 3,000	5,445	5,427	5,481	5,536	5,591	5,647	5,704	5,761	5,818	5,877	5,935
Next 7,000	9,389	9,315	9,408	9,502	9,597	9,693	9,790	9,888	9,987	10,087	10,188
Next 20,000	14,200	13,862	14,001	14,141	14,282	14,425	14,569	14,715	14,862	15,011	15,161
Next 50,000	16,401	15,365	15,519	15,674	15,831	15,989	16,149	16,310	16,473	16,638	16,804
Next 100,000	14,245	11,987	12,107	12,228	12,350	12,474	12,598	12,724	12,852	12,980	13,110
Next 500,000	13,709	7,846	7,924	8,004	8,084	8,165	8,246	8,329	8,412	8,496	8,581
Over 680,000	6,827	-	-	-	-	-	-	-	-	-	-
	83,150	66,736	67,374	68,018	68,669	69,327	69,991	70,661	71,338	72,022	72,713
Mo. Revenues											
5/8" & 3/4" meters	779	810	843	877	912	949	987	1,027	1,068	1,111	1,206
1" metres	789	861	939	1,025	1,118	1,219	1,330	1,451	1,582	1,726	2,310
1.5" meters	679	741	808	881	961	1,048	1,144	1,247	1,361	1,484	1,653
2" meters	1,680	1,768	1,937	2,123	2,326	2,549	2,794	3,061	3,355	3,676	3,932
3" meters	741	816	898	989	1,089	1,199	1,320	1,453	1,599	1,761	1,812
4" meters	927	1,030	1,144	1,271	1,412	1,569	1,743	1,937	2,152	2,390	2,717
6" meters	618	340	377	419	466	518	575	639	710	789	897
Total month	6,213	6,365	6,947	7,585	8,284	9,051	9,892	10,815	11,827	12,938	14,526
Total annual	74,552	76,382	83,364	91,018	99,410	108,612	118,704	129,776	141,923	155,253	174,311

Bedford New Authority
City Commercial Sewer Revenues

Sch. 14

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Minimum	68,768	68,768	68,768	68,768	68,768	68,768	68,768	68,768	68,768	68,768	68,768
Volume charges											
First 3,000	39,912	39,581	39,777	39,974	40,172	40,371	40,570	40,771	40,973	41,176	41,548
Next 7,000	68,821	68,279	68,274	68,612	68,951	69,293	69,636	69,980	70,327	70,675	71,314
Next 20,000	95,566	93,664	94,979	96,313	97,665	99,036	100,427	101,837	103,267	104,717	106,187
Next 50,000	103,162	97,709	99,772	101,878	104,028	106,224	108,467	110,757	113,095	115,482	117,631
Next 100,000	82,336	70,601	72,662	74,783	76,966	79,213	81,525	83,905	86,354	88,874	91,770
Next 500,000	66,626	39,561	41,456	43,440	45,520	47,699	49,983	52,376	54,883	57,511	60,067
Over 680,000	28,946	-	-	-	-	-	-	-	-	-	-
Total annual	628,690	554,546	569,052	584,786	601,480	619,216	638,080	658,169	679,589	702,456	731,596

Proof 629
FY 2011 619

A. Industrial customer use transferred to industry rate. See Schedule 18.

Bedford New Authority
County Residential Water Revenues

Sch. 15

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	588	594	600	606	612	618	624	630	637	643	650
1" metes	6	6	6	6	6	6	6	6	6	7	7
1.5" meters	-	-	-	-	-	-	-	-	-	-	-
2" meters	-	-	-	-	-	-	-	-	-	-	-
Minimum Bills											
5/8" & 3/4" meters	291	294	297	300	303	306	309	312	315	318	321
1" metes	5	5	5	5	5	5	5	5	5	5	6
1.5" meters	-	-	-	-	-	-	-	-	-	-	-
2" meters	-	-	-	-	-	-	-	-	-	-	-
Volume											
Minimum	7,068	7,068	7,068	7,068	7,068	7,068	7,068	7,068	7,068	7,068	7,068
First 3,000	10,308	10,411	10,515	10,620	10,727	10,834	10,942	11,052	11,162	11,274	11,386
Next 7,000	9,545	9,640	9,737	9,834	9,933	10,032	10,132	10,234	10,336	10,439	10,544
Next 20,000	1,524	1,539	1,555	1,570	1,586	1,602	1,618	1,634	1,650	1,667	1,683
Next 50,000	-	-	-	-	-	-	-	-	-	-	-
	28,445	28,659	28,875	29,093	29,313	29,535	29,760	29,987	30,216	30,448	30,682
Fixed Mo. Charges											
5/8" & 3/4" meters	166	218	287	376	494	649	852	1,076	1,304	1,580	1,947
1" metes	1	1	2	3	4	5	7	10	12	15	17
1.5" meters	-	-	-	-	-	-	-	-	-	-	-
2" meters	-	-	-	-	-	-	-	-	-	-	-
Total month	167	220	289	379	498	654	860	1,086	1,316	1,595	1,965
Total year	2,007	2,636	3,463	4,549	5,976	7,851	10,314	13,026	15,794	19,142	23,574
Minimum	83,838	83,838	83,838	83,838	83,838	83,838	83,838	83,838	83,838	83,838	83,838
Volume charges											
First 3,000	65,662	64,661	63,675	62,704	61,747	60,806	59,878	58,965	58,066	57,180	56,932
Next 7,000	44,671	45,343	46,025	46,718	47,421	48,135	48,859	49,595	50,341	51,099	52,718
Next 20,000	5,121	5,389	5,672	5,969	6,282	6,611	6,958	7,322	7,706	8,110	8,417
Next 50,000	-	-	-	-	-	-	-	-	-	-	-
Total annual	201,298	201,867	202,672	203,777	205,264	207,240	209,848	212,746	215,745	219,369	225,480

Proof 201
2011 203

Bedford New Authority
County Residential Sewer Revenues

Sch. 16

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	238	240	243	245	248	250	253	255	258	260	263
1" metes	0	-	-	-	-	-	-	-	-	-	-
1.5" meters	0	-	-	-	-	-	-	-	-	-	-
2" meters	0	-	-	-	-	-	-	-	-	-	-
Minimum Bills											
5/8" & 3/4" meters	101	102	103	104	105	106	107	108	109	110	112
1" metes	0	-	-	-	-	-	-	-	-	-	-
1.5" meters	0	-	-	-	-	-	-	-	-	-	-
2" meters	0	-	-	-	-	-	-	-	-	-	-
Volume											
Minimum	2,862	2,862	2,862	2,862	2,862	2,862	2,862	2,862	2,862	2,862	2,862
First 3,000	3,891	3,930	3,969	4,009	4,049	4,089	4,130	4,172	4,213	4,256	4,298
Next 7,000	3,174	3,206	3,238	3,270	3,303	3,336	3,369	3,403	3,437	3,471	3,506
Next 20,000	124	125	126	128	129	130	132	133	134	136	137
Next 50,000	47	47	48	48	49	49	50	50	51	51	52
	10,098	10,170	10,243	10,317	10,392	10,467	10,543	10,620	10,698	10,776	10,855
Fixed Mo. Charges											
5/8" & 3/4" meters	1,270	1,321	1,374	1,430	1,487	1,547	1,610	1,675	1,742	1,812	1,967
1" metes	-	-	-	-	-	-	-	-	-	-	-
1.5" meters	-	-	-	-	-	-	-	-	-	-	-
2" meters	-	-	-	-	-	-	-	-	-	-	-
Total month	1,270	1,321	1,374	1,430	1,487	1,547	1,610	1,675	1,742	1,812	1,967
Total annual	15,240	15,854	16,493	17,158	17,849	18,568	19,317	20,095	20,905	21,747	23,608
Minimum	48,554	48,554	48,554	48,554	48,554	48,554	48,554	48,554	48,554	48,554	48,554
Volume charges											
First 3,000	32,179	31,932	31,687	31,443	31,202	30,963	30,725	30,489	30,255	30,023	30,087
Next 7,000	26,249	26,048	25,848	25,649	25,452	25,257	25,063	24,871	24,680	24,491	24,542
Next 20,000	942	944	946	948	950	951	953	955	957	959	959
Next 50,000	334	358	359	359	360	361	361	362	363	363	363
Total annual	123,498	123,689	123,886	124,111	124,367	124,654	124,973	125,326	125,714	126,137	128,113

Proof 123
2011 132

Bedford New Authority
County Commercial Water Revenues

Sch. 17

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	40	40	41	41	42	42	42	43	43	44	44
1" metes	13	13	13	13	14	14	14	14	14	14	14
1.5" meters	8	8	8	8	8	8	8	9	9	9	9
2" meters	10	10	10	10	10	11	11	11	11	11	11
3" meters	0	0	0	0	0	0	0	0	0	0	0
4" meters	1	1	1	1	1	1	1	1	1	1	1
6" meters	0	0	0	0	0	0	0	0	0	0	0
Minimum Bills											
5/8" & 3/4" meters	22	22	22	23	23	23	23	24	24	24	24
1" metes	7	7	7	7	7	7	7	8	8	8	8
1.5" meters	3	3	3	3	3	3	3	3	3	3	3
2" meters	7	7	7	7	7	7	7	8	8	8	8
3" meters	0	0	0	0	0	0	0	0	0	0	0
4" meters	0	0	0	0	0	0	0	0	0	0	0
6" meters	0	0	0	0	0	0	0	0	0	0	0
Volume											
Minimum	1,691	1,691	1,691	1,691	1,691	1,691	1,691	1,691	1,691	1,691	1,691
First 3,000	1,134	1,145	1,157	1,168	1,180	1,192	1,204	1,216	1,228	1,240	1,253
Next 7,000	2,193	2,215	2,237	2,259	2,282	2,305	2,328	2,351	2,375	2,398	2,422
Next 20,000	3,356	3,390	3,423	3,458	3,492	3,527	3,562	3,598	3,634	3,670	3,707
Next 50,000	5,046	5,096	5,147	5,199	5,251	5,303	5,356	5,410	5,464	5,519	5,574
Next 100,000	3,610	3,646	3,683	3,719	3,757	3,794	3,832	3,870	3,909	3,948	3,988
Next 500,000	283	286	289	292	294	297	300	303	306	310	313
Over 680,000	-	-	-	-	-	-	-	-	-	-	-
	17,313	17,469	17,627	17,786	17,947	18,110	18,274	18,440	18,607	18,777	18,947
Mo. Revenues											
5/8" & 3/4" meters	10	13	17	23	30	39	52	65	79	96	118
1" metes	6	8	11	16	22	31	44	58	73	89	103
1.5" meters	9	13	18	26	37	52	71	90	108	126	140
2" meters	9	12	17	24	34	48	63	80	97	113	125
3" meters	-	-	-	-	-	-	-	-	-	-	-
4" meters	9	13	18	26	37	52	68	86	105	122	135
6" meters	-	-	-	-	-	-	-	-	-	-	-
Total month	43	60	83	115	160	223	298	379	462	545	621
Total annual	514	714	992	1,380	1,920	2,675	3,582	4,549	5,548	6,536	7,455

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Minimum	29,968	29,968	29,968	29,968	29,968	29,968	29,968	29,968	29,968	29,968	29,968
Volume charges											
First 3,000	9,628	9,238	8,864	8,505	8,160	7,830	7,513	7,208	6,916	6,636	6,263
Next 7,000	13,662	13,523	13,385	13,249	13,113	12,980	12,847	12,716	12,587	12,458	12,112
Next 20,000	15,102	15,406	15,715	16,031	16,353	16,682	17,017	17,359	17,708	18,064	18,536
Next 50,000	21,546	22,088	22,644	23,213	23,797	24,396	25,009	25,638	26,283	26,944	27,870
Next 100,000	14,657	15,062	15,479	15,907	16,348	16,800	17,265	17,743	18,234	18,739	19,938
Next 500,000	1,007	1,051	1,096	1,143	1,191	1,242	1,296	1,351	1,409	1,469	1,563
Over 680,000	-	-	-	-	-	-	-	-	-	-	-
Total annual	106,085	107,050	108,143	109,395	110,852	112,573	114,497	116,533	118,653	120,815	123,705

Proof 106
2011 105

Bedford New Authority
County Commercial Sewer Revenues

Sch. 18

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Water Bill Units											
5/8" & 3/4" meters	26	26	27	27	27	27	28	28	28	28	29
1" metes	8	8	8	8	8	8	8	9	9	9	9
1.5" meters	5	5	5	5	5	5	5	5	5	5	6
2" meters	5	5	5	5	5	5	5	5	5	5	6
3" meters	0	-	-	-	-	-	-	-	-	-	-
4" meters	1	1	1	1	1	1	1	1	1	1	1
6" meters	0	-	-	-	-	-	-	-	-	-	-
Minimum Bills											
5/8" & 3/4" meters	13	13	13	13	14	14	14	14	14	14	14
1" metes	2	2	2	2	2	2	2	2	2	2	2
1.5" meters	0	0	0	0	0	0	0	0	0	0	0
2" meters	0	0	0	0	0	0	0	0	0	0	0
3" meters	0	0	0	0	0	0	0	0	0	0	0
4" meters	0	0	0	0	0	0	0	0	0	0	0
6" meters	0	0	0	0	0	0	0	0	0	0	0
Volume											
Minimum	216	216	216	216	216	216	216	216	216	216	216
First 3,000	1,042	1,052	1,063	1,074	1,084	1,095	1,106	1,117	1,128	1,140	1,151
Next 7,000	1,854	1,873	1,891	1,910	1,929	1,949	1,968	1,988	2,008	2,028	2,048
Next 20,000	3,020	3,050	3,081	3,112	3,143	3,174	3,206	3,238	3,270	3,303	3,336
Next 50,000	4,974	5,024	5,074	5,125	5,176	5,228	5,280	5,333	5,386	5,440	5,494
Next 100,000	4,378	4,422	4,466	4,511	4,556	4,601	4,647	4,694	4,741	4,788	4,836
Next 500,000	1,413	1,427	1,441	1,456	1,470	1,485	1,500	1,515	1,530	1,545	1,561
Over 680,000	-	-	-	-	-	-	-	-	-	-	-
	16,897	17,064	17,232	17,402	17,574	17,748	17,923	18,100	18,279	18,460	18,642
Mo. Revenues											
5/8" & 3/4" meters	121	125	130	136	141	147	153	159	165	172	187
1" metes	93	101	111	121	131	143	156	171	186	203	272
1.5" meters	154	168	184	200	218	238	260	284	309	337	376
2" meters	247	271	297	325	356	390	428	469	514	563	602
3" meters	-	-	-	-	-	-	-	-	-	-	-
4" meters	154	172	191	212	235	261	291	323	359	398	453
6" meters	-	-	-	-	-	-	-	-	-	-	-
Total month	769	837	912	993	1,083	1,180	1,287	1,405	1,533	1,674	1,889
Total annual	9,230	10,048	10,942	11,921	12,992	14,165	15,449	16,855	18,396	20,085	22,667

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Minimum	8,672	8,672	8,672	8,672	8,672	8,672	8,672	8,672	8,672	8,672	8,672
Volume charges											
First 3,000	11,472	11,077	10,696	10,327	9,972	9,628	9,297	8,977	8,667	8,369	8,057
Next 7,000	20,413	19,710	19,031	18,375	17,742	17,131	16,541	15,972	15,422	14,891	14,336
Next 20,000	30,562	29,757	28,972	28,209	27,465	26,741	26,036	25,350	24,682	24,031	23,365
Next 50,000	47,054	46,099	45,163	44,246	43,348	42,468	41,606	40,761	39,934	39,123	38,461
Next 100,000	38,001	37,575	37,154	36,737	36,326	35,918	35,516	35,118	34,724	34,335	33,852
Next 500,000	10,315	10,376	10,438	10,500	10,563	10,626	10,689	10,753	10,817	10,882	10,926
Over 680,000	-	-	-	-	-	-	-	-	-	-	-
Total annual	175,720	173,314	171,068	168,988	167,080	165,350	163,806	162,458	161,314	160,387	160,336

176
2011 171

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
Annual Water Volume	A											
Barr Labs	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	
Golden West	17,541	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	17,508	
Cintas	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	
Winoa	6,478	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	6,438	
Bedford Weaving	5,764	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	5,747	
Rubertex / Other	-	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
	62,471	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	67,381	
Industrial Rate	A											
Barr Labs	5.05	5.40	5.14	4.88	4.62	4.36	4.10	3.84	3.58	3.32	3.00	
Golden West	2.37	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	3.00	
Cintas	2.34	2.40	2.46	2.52	2.58	2.64	2.70	2.76	2.82	2.88	3.00	
Winoa	2.67	2.75	2.78	2.81	2.84	2.87	2.90	2.93	2.96	2.99	3.00	
Bedford Weaving	2.85	2.90	2.91	2.92	2.93	2.94	2.95	2.96	2.97	2.98	3.00	
Rubertex	0.00	2.90	2.91	2.92	2.93	2.94	2.95	2.96	2.97	2.98	3.00	
Annual Water Bill												10 YR. Change
Barr Labs	89,424	95,585	90,983	86,381	81,779	77,176	72,574	67,972	63,370	58,767	54,315	-43%
Golden West	41,634	42,019	43,070	44,120	45,171	46,221	47,272	48,322	49,373	50,423	52,524	25%
Cintas	35,018	35,969	36,868	37,767	38,666	39,566	40,465	41,364	42,263	43,163	44,961	25%
Winoa	17,317	17,705	17,898	18,091	18,284	18,477	18,670	18,863	19,056	19,250	19,314	9%
Bedford Weaving	16,427	16,666	16,724	16,781	16,839	16,896	16,954	17,011	17,069	17,126	17,241	3%
Rubertex	-	14,500	14,550	14,600	14,650	14,700	14,750	14,800	14,850	14,900	15,000	3%
Total annual	199,820	222,444	220,092	217,740	215,388	213,036	210,684	208,333	205,981	203,629	203,355	
Fixed charges	-	10,800	13,500	16,200	18,900	21,600	24,300	27,000	29,700	32,400	35,280	
	199,820	233,244	233,592	233,940	234,288	234,636	234,984	235,333	235,681	236,029	238,635	

Note:

A. Actual amounts included for reference purposes. Industrial rate in FY 2013 equals actual billed amounts / actual use.

1. Annual water bill excludes fixed monthly fixed charges.

Barr Labs - 1-6" meter

Golden West - 1-4" meter + 1- 2" meter with little use

Cintas - 1-6" meter

Winoa - 1-6" meter

Bedford Weaving - 3 -2" meters

Rubertex - 1-4" meter assumed

Bedford New Authority
Industrial Sewer Revenues

Sch. 20

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	
Annual Sewer Volume	A											
Barr Labs	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	17,701	
Golden West	12,013	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	11,981	
Cintas	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	14,987	
Winoa	4,334	384	384	384	384	384	384	384	384	384	384	
Bedford Weaving	868	851	851	851	851	851	851	851	851	851	851	
Rubertex	-	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	
	49,903	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	50,904	
Industrial Rate	A											
Barr Labs	6.95	6.89	6.79	6.68	6.58	6.49	6.39	6.29	6.20	6.11	6.00	
Golden West	4.86	4.96	5.07	5.18	5.29	5.41	5.52	5.64	5.76	5.89	6.00	
Cintas	4.45	4.58	4.72	4.87	5.02	5.17	5.33	5.49	5.66	5.83	6.00	
Winoa	5.33	5.40	5.46	5.53	5.59	5.66	5.73	5.80	5.87	5.94	6.00	
Bedford Weaving	6.69	6.89	6.79	6.68	6.58	6.49	6.39	6.29	6.20	6.11	6.00	
Rubertex	0.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	
Annual Sewer Bill	A											10 YR. Change
Barr Labs	123,037	121,960	120,130	118,329	116,554	114,805	113,083	111,387	109,716	108,070	106,206	-13%
Golden West	58,379	59,475	60,754	62,060	63,395	64,758	66,150	67,572	69,025	70,509	71,886	21%
Cintas	66,679	68,713	70,808	72,968	75,194	77,487	79,850	82,286	84,796	87,382	89,922	31%
Winoa	23,115	2,073	2,097	2,123	2,148	2,174	2,200	2,226	2,253	2,280	2,304	11%
Bedford Weaving	5,810	5,863	5,775	5,689	5,603	5,519	5,437	5,355	5,275	5,196	5,106	-13%
Rubrtex	-	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	0%
Total annual	277,020	288,084	289,566	291,168	292,893	294,743	296,720	298,826	301,064	303,437	305,424	
Fixed charges	-	7,200	11,184	15,168	19,152	23,136	27,120	31,104	35,088	39,072	39,360	
	72,489	295,284	300,750	306,336	312,045	317,879	323,840	329,930	336,152	342,509	344,784	

Notes:

A. Actual amounts included for reference purposes. Industrial rate in FY 2013 equals actual billed amounts / actual use.

1. Shaded items in 2013 are billed as sewer only accounts. All other customers are included in City commercial revenue calculations in FY 2013.

2. Winoa sewer use in 2011 was 4,334 thousand gallons. Decrease in FY 2013 is due to change in metering.

Bedford New Authority
Minimum Water Break-Even Analysis

Sch. 21

	Min.	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
City Residential												
3/4" - 1,000	15.68	4.81	5.05	5.34	5.69	6.14	6.69	7.39	8.14	8.90	9.79	10.94
3/4" - 2,000	15.68	9.06	9.37	9.73	10.16	10.67	11.30	12.08	12.91	13.74	14.71	15.94
3/4" - 3,000	15.68	13.31	13.69	14.12	14.62	15.21	15.92	16.77	17.68	18.59	19.64	20.94
1" - 8,000	32.18	29.22	30.55	32.07	33.84	35.94	38.49	41.65	44.97	48.50	52.10	55.53
1.5" - 17,000	52.78	52.11	55.42	59.18	63.53	68.65	74.77	81.75	88.83	96.16	103.41	110.35
County Residential												
3/4" - 1,000	23.56	6.93	6.94	7.00	7.13	7.36	7.69	8.18	8.71	9.26	9.94	10.94
3/4" - 2,000	23.56	13.30	13.15	13.06	13.04	13.11	13.30	13.65	14.05	14.46	15.01	15.94
3/4" - 3,000	23.56	19.67	19.36	19.11	18.94	18.87	18.92	19.12	19.39	19.66	20.08	20.94
1" - 9,000	48.32	48.11	48.14	48.33	48.74	49.45	50.57	52.28	54.09	56.09	58.09	60.53
1.5" - 17,000	79.06	77.23	78.64	80.40	82.62	85.49	89.21	93.64	98.00	102.43	106.59	110.35
City Commercial												
3/4" - 3,000	20.84	17.51	17.47	17.48	17.55	17.72	18.00	18.42	18.90	19.38	20.00	20.94
1" - 9,000	42.78	42.71	43.36	44.18	45.21	46.54	48.29	50.62	53.06	55.69	58.33	60.53
1.5" - 17,000	70.19	68.84	71.00	73.52	76.52	80.17	84.70	89.95	95.16	100.45	105.50	110.35
2" - 28,000	103.06	105.64	110.82	116.94	124.33	133.40	144.74	156.94	170.02	183.30	195.89	208.27
3" - 81,000	256.70	256.35	270.52	286.18	303.67	323.45	346.14	370.36	396.19	422.97	449.87	473.27
4" - 149,000	443.23	442.96	470.61	501.20	535.40	574.13	618.66	665.75	716.05	768.43	821.42	867.32
6" - 465,000	1,211.83	1,208.17	1,295.37	1,391.12	1,497.00	1,615.07	1,748.11	1,889.92	2,042.09	2,202.70	2,369.13	2,569.64
County Commercial												
3/4" - 3,000	31.42	26.03	24.92	23.93	23.07	22.34	21.79	21.43	21.17	20.95	20.92	20.94
1" - 9,000	64.47	48.11	48.14	48.33	48.74	49.45	50.57	52.28	54.09	56.09	58.09	60.53
1.5" - 17,000	105.76	102.42	101.33	100.61	100.39	100.82	102.13	104.15	106.12	108.15	109.91	110.35
2" - 28,000	155.31	153.03	152.84	153.20	154.26	156.27	159.57	163.24	167.36	171.56	175.33	177.76
4" - 151,000	671.08	670.06	680.75	693.14	707.82	725.62	747.69	770.69	795.15	819.83	843.13	877.32
6" - 312,000	1,268.61	1,266.94	1,298.65	1,334.07	1,374.39	1,421.29	1,477.09	1,535.14	1,596.51	1,658.74	1,718.63	1,804.64

Note:

1. 5/8" and 3/4" meter minimum eliminated as shown.
2. All other - minimum starts to be eliminated in year shown.

Bedford New Authority
Minimum Sewer Break-Even Analysis

Sch. 22

	Min.	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
City Residential												
3/4" - 1,000	30.41	14.78	15.19	15.61	16.05	16.49	16.95	17.42	17.91	18.40	18.92	20.00
3/4" - 2,000	30.41	20.29	20.83	21.39	21.96	22.55	23.15	23.77	24.41	25.07	25.74	27.00
3/4" - 3,000	30.41	25.80	26.47	27.17	27.88	28.61	29.36	30.13	30.92	31.73	32.56	34.00
1" - 3,000	36.62	32.01	33.65	35.39	37.25	39.24	41.36	43.62	46.05	48.64	51.41	62.00
1.5" - 3,000	52.00	47.39	50.26	53.33	56.62	60.16	63.95	68.03	72.40	77.10	82.15	89.00
County Residential												
3/4" - 1,000	41.02	17.54	17.67	17.82	17.97	18.14	18.32	18.51	18.71	18.92	19.15	20.00
3/4" - 2,000	41.02	25.81	25.80	25.80	25.82	25.85	25.89	25.95	26.02	26.10	26.21	27.00
3/4" - 3,000	41.02	34.08	33.92	33.78	33.66	33.55	33.46	33.39	33.33	33.29	33.26	34.00
1" - 3,000	47.23	40.29	41.09	42.01	43.03	44.18	45.46	46.88	48.46	50.19	52.11	62.00
1.5" - 3,000	62.61	55.67	57.70	59.94	62.40	65.10	68.06	71.29	74.81	78.66	82.85	89.00
City Commercial												
3/4" - 3,000	37.37	31.26	31.43	31.61	31.79	31.99	32.19	32.41	32.63	32.87	33.12	34.00
1" - 3,000	43.58	37.47	38.60	39.83	41.16	42.61	44.19	45.90	47.76	49.78	51.96	62.00
1.5" - 3,000	58.96	52.85	55.21	57.77	60.54	63.54	66.79	70.31	74.12	78.25	82.71	89.00
2" - 3,000	77.50	71.39	75.48	79.93	84.76	90.01	95.73	101.93	108.68	116.00	123.96	130.00
3" - 3,000	120.76	114.65	122.88	131.86	141.66	152.35	164.01	176.74	190.62	205.76	222.27	226.00
4" - 3,000	182.59	176.48	191.82	208.70	227.29	247.74	270.25	295.03	322.29	352.29	385.30	431.00
6" - 3,000	336.97	330.86	361.64	395.50	432.77	473.77	518.88	568.52	623.13	683.22	749.32	841.00
County Commercial												
3/4" - 3,000	51.59	42.30	41.12	40.02	38.99	38.02	37.12	36.28	35.51	34.79	34.13	34.00
1" - 9,000	57.80	40.29	41.09	42.01	43.03	44.18	45.46	46.88	48.46	50.19	52.11	62.00
1.5" - 17,000	73.18	63.89	64.91	66.18	67.73	69.57	71.72	74.19	76.99	80.16	83.72	89.00
2" - 28,000	91.72	82.43	85.18	88.34	91.96	96.05	100.66	105.81	111.55	117.92	124.97	130.00
4" - 151,000	196.81	187.52	201.52	217.12	234.49	253.78	275.18	298.90	325.16	354.21	386.31	431.00
6" - 312,000	351.19	341.90	371.33	403.92	439.97	479.81	523.81	572.40	626.01	685.14	750.33	841.00



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