

TOWN OF
Leicester
MASSACHUSETTS

Leicester Water & Sewer District
W&S Infrastructure Study, Final Report
December 2021

restore

enhance

sustain

maintain



transform your environment

westonandsampson.com

427 Main Street, Suite 400
Worcester, MA 01608
tel: 508.762.1676



TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	i
LIST OF FIGURES.....	ii
LIST OF TABLES.....	iii
1.0 INTRODUCTION / OVERVIEW	1-1
1.1 Assessment Process	1-2
2.0 STAKEHOLDER CHARACTERIZATIONS	2-1
2.1 Water Districts.....	2-3
2.1.1 Cherry Valley-Rochdale Water District	2-4
2.1.2 Hillcrest Water District.....	2-8
2.1.3 Leicester Water Supply District	2-12
2.2 Sewer Districts	2-21
2.2.1 Cherry Valley Sewer District	2-23
2.2.2 Leicester Water Supply District – Sewer District.....	2-24
2.2.3 Hillcrest Sewer District	2-28
2.2.4 Oxford Rochdale Sewer District	2-29
2.3 Moose Hill Reservoir and Moose Hill Water Commission	2-32
2.4 Stiles Lake Water District	2-37
3.0 CURRENT ASSESSMENT OF DISTRICT CONDITIONS - SUMMARY	3-1
3.1 Financial	3-1
3.1.1 Cherry Valley – Rochdale Water District.....	3-1
3.1.2 Hillcrest Water District.....	3-3
3.1.3 Leicester Water Supply District - Water	3-4
3.1.4 Summary of Water District's Key Financial Metrics	3-5
3.1.5 Cherry Valley Sewer District	3-5
3.1.6 Hillcrest Sewer District	3-6
3.1.7 Leicester Water Supply District - Sewer	3-7
3.1.8 Oxford-Rochdale Sewer District.....	3-8
3.1.9 Summary of Sewer District's Key Financial Metrics	3-8
3.2 Structure and Organization	3-9
4.0 ORGANIZATIONAL & MANAGERIAL STRENGTHS & WEAKNESSES (LEICESTER).....	4-1
5.0 MANAGEMENT OPTIONS	5-1
5.1 Water District Consolidation Options	5-2
5.1.1 Status Quo: Retain and Enhance Current Water Districts including planned consolidation of LWSD Water and HWD	5-2
5.1.2 Consolidate to a single water district	5-4
5.1.3 Consolidate to a Town Water Department/Division.....	5-7

5.2 Sewer District Consolidation Options..... 5-9

5.2.1 Status Quo Option – Retain & Enhance Current Sewer Districts..... 5-9

5.2.2 Consolidate into two sewer districts: LWSD/HSD/ORSD and CVSD 5-11

5.2.3 Consolidate into a single sewer district..... 5-14

5.2.4 Consolidate to a Town Sewer Department/Division 5-16

5.3 Options for Combined Water & Sewer Districts 5-18

5.3.1 Consolidate All Current Districts into One Water & Sewer District..... 5-18

5.3.2 Incorporate water and sewer into a Town Department of Public Works 5-20

5.4 Purchase by investor-owned utility company 5-21

6.0 MANAGEMENT OPTIONS6-1

6.1 Consolidation Options Summary 6-1

6.2 “Most Advantageous” Option(s) 6-5

LIST OF FIGURES

Figure 1 Water Districts Map

Figure 2 Sewer Districts Map

Figure 3 Rock Well No. 1 Pump Station

Figure 4 Rock Well No. 2 Pump Station

Figure 5 Water Treatment Facility

Figure 6 Treatment Systems

.....

LIST OF TABLES

Table 2.1	Primary Enabling Legislation
Table 2.2	Date of Adoption of By-laws and Rules
Table 2.3	Water District Comparison Table
Table 2.4	Cherry Valley Water District Finished Water Distribution 2015-2019
Table 2.5	Hillcrest District Finished Water Distribution 2015-2019
Table 2.6	Water Supply Source
Table 2.7	Water Storage Tank Characteristics
Table 2.8	Leicester District Finished Water Distribution 2015-2019
Table 2.9	Sewer District Summary Table
Table 2.10	Comparison of Sewer District Flows 2016-2019 (mgd)
Table 2.11	Cherry Valley Sewer District – Sewage Flow Summary Table
Table 2.12	Leicester Sewer District Monthly Flow Summary – Average Daily Floors (mgd)
Table 2.13	2014 – 2019 ORSD Flow Data (Total Flow Treated IN/MGD)
Table 3.1	CV- RWD Key Financial Metrics
Table 3.2	HWD Key Financial Metrics
Table 3.3	LWSD-W Key Financial Metrics
Table 3.4	Annual Water Bill Comparison
Table 3.5	CVSD Key Financial Metrics
Table 3.6	HSD Key Financial Metrics
Table 3.7	LWSD-S Key Financial Metrics
Table 3.8	HWD-S Key Financial Metrics
Table 3.9	Annual Sewer Bill Comparison
Table 6.1	Water District Consolidation Options – Options 1-3

Table 6.2..... Water District Consolidation Options – Options 4-7

Table 6.3..... Water District Consolidation Options – Options 89-10

.....

LIST OF APPENDICES

Appendix A Organization Materials

Appendix A-1 Enabling Acts

Appendix A-2 Bylaws

Appendix A-3 Regulations

Appendix A-4 HR Policies

Appendix A-5 Financial Policies

Appendix B Moose Hill Documents

Appendix B-1 Authorizing Agreements

Appendix B-2 Leicester-SCS-WRC O&M Agreement

Appendix B-3 Leicester-LWSD IMA

Appendix B-4 Feasibility Study, SEA, 2008

Appendix B-5 Feasibility Study, Whitewater Consultants, 2017

Appendix B-6 DEP Correspondence

Appendix C Financial Metrics

\\wse03.local\WSE\Projects\MA\Leicester\Leicester W&S Infrastructure Review Report FINAL\Leicester Review of Technical Status of Water Sewer District Infrastructure FINAL REPORT.docx

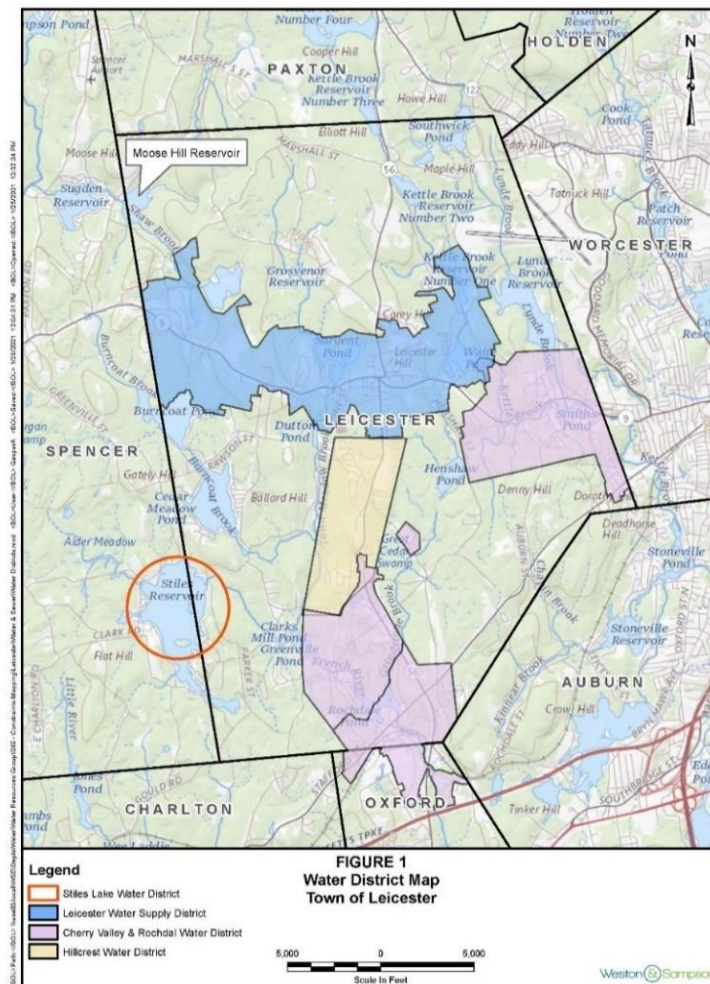
.....

1.0 INTRODUCTION / OVERVIEW

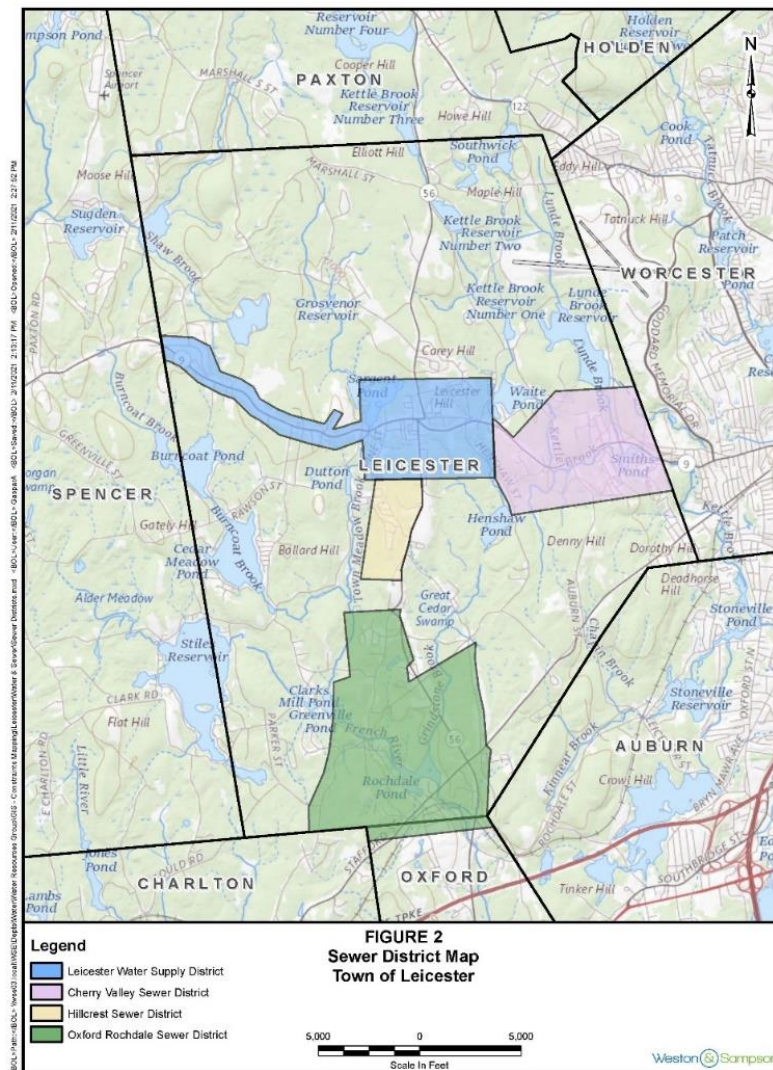
The Town of Leicester engaged the consulting team comprised of Weston & Sampson, Resilient Civil Engineering, Raftelis Financial Consultants, and the Collins Center to prepare a comprehensive study of the operational and fiscal condition of the seven water and sewer districts in the town and to evaluate potential consolidation alternatives for these districts. The following report documents our findings.

A detailed review of the current technical design and operational conditions of the water and sewer districts was conducted to provide a baseline for the evaluation of potential future organizational options available to the Town of Leicester and the water and sewer districts currently providing services within their respective District boundaries. Other sections of this report will discuss the legal and institutional organizations of each of the water and sewer districts. This section deals with the technical and operational aspects of each of the water and sewer districts as they are presently constituted and operated.

The three Water Districts currently operating within specified areas in Leicester include the Cherry Valley-Rochdale Water District (CV-RWD); the Leicester Water Supply District (LWSD) and the Hillcrest Water District (HWD). Figure 1 shows the approximate service areas of each water district.



There are four sewer districts operating within designated service areas in Leicester including the Cherry Valley Sewer District (CVSD); the sewer district operated by the LWSD; the Hillcrest Sewer District and the Oxford-Rochdale Sewer District (ORSF). Figure 2 shows the approximate service areas of each sewer district.



This section is further broken down into three subsections including:

- Water Districts
- Sewer Districts
- Moose Hill Reservoir – Potential for Development as a Public Water Supply

1.1 Assessment Process

A Request for Information was distributed to each district for response covering a wide range of information including technical data, historical demand and flow data, treatment operations, permitting

status and compliance, past five years of Annual Statistical Reports (Water Districts) and Massachusetts Department of Environmental Protection (MassDEP) Wastewater Reports called Discharge Monitoring Reports (DMRs) asset management reports, emergency response plans, capital improvement plans and overall financial information (O&M budgets, rates, debt service). Additional information was also requested for enabling legislation, governance, and related management operations which are discussed elsewhere in this report.

Based on the technical information received from each district, System Summaries were compiled and are presented for both Water and Sewer Systems in the following sections of this Technical Assessment. The following section provides a summary of the pertinent information common to each water district. This Summary section is intended to serve as a baseline from which combinations of districts can be evaluated under future organizational options. A similar summary section is also presented for the sewer districts in advance of the sewer system summaries.

In addition to the data and related information provided by the Districts in response to the Information Request, meetings were convened with members of the Project Team and the staff and officers of each respective District. Any apparent gaps in the information base were resolved through the meeting process and any follow-up that took place. Annual reports such as the Annual Statistical Report (ASR) required to be updated and submitted annually by all community water systems in Massachusetts were obtained from the MassDEP Central Regional Office (MassDEP CERO). Other MassDEP documents reviewed included the most recent Sanitary Surveys, Administrative Consent Orders (ACO's) or other Enforcement Actions currently on file and in effect through the MassDEP CERO.

2.0 STAKEHOLDER CHARACTERIZATIONS

Overview

Each district was established by a separate special act of the Massachusetts Legislature over a 118-year period beginning in 1888 with the creation of the Leicester Water Supply District.¹ See table 2.1 for a list of the primary enabling legislation for each district. All of the districts are governed in a manner similar to the open town meeting form of government in Massachusetts with an elected executive (i.e., Board of Commissioners) and legislative body that is open to all voters residing in the district. Initially, managing officers for most of the districts were elected by the annual meeting but recent changes to by-laws allow the appointment of clerk, treasurer, and superintendent by the Board of Commissioners. Some of the districts have executed inter-agency agreements providing for shared management and operation.

The Board of Commissioners convene an annual meeting. A Moderator selected by the voters present at that meeting presides over the annual meeting. Annual meetings are generally not well-attended, which is typical of water and sewer districts in Massachusetts. Membership on the boards of each district is characterized by low turnover with little or no competition for positions and the same is true for most managing officers. None of the districts formally plan for succession of Commissioners or other officers.

Each district has adopted by-laws and rules and regulations. The most recently revised rules and regulations are 7 years old (ORSD); the most recently adopted by-laws are 6 years old (LWSD). By-laws are essential to the administration of the districts while rules and regulations are essential to the proper operation of the systems. Both should undergo periodic review to ensure consistency with law, regulation, and actual practice. See Table 2.2 for a list of bylaws and regulations by date of adoption¹. Although there is no standard timeframe for review, rules and regulations should be reviewed every 5 years and anytime a significant regulation or permit condition is changed by federal or state authorities. By-laws are less likely to require revision and can be reviewed less often.

While the districts have taken steps towards professional management of their finances by appointing rather than electing treasurers, none appear to have job descriptions that adequately describe the necessary skills, education, experience, and work performance for these positions. Specifically, two districts (CV-RWSD and ORSD) have provided job descriptions. In the case of ORSD, there is no job description for Treasurer and the descriptions for operations personnel are 25 years old. CV-RWSD's Treasurers job description includes a fairly extensive list of duties, but lacks mention of educational and experiential qualifications, required training or certification, needed skills or abilities, and other factors such as the level of confidentiality that the job requires. Complete job descriptions are an important management tool as they set forth the standards for the job, the expectations of the organization and help meet legal requirements established in, for example, anti-discrimination and fair labor statutes.

Along with moving to appointed treasurers, many of the districts share Treasurers to improve efficiency. However, it is not clear what the recruitment and selection process has looked like in the past for these positions. The project team noted that although there is no certification process that is entirely applicable to district treasurers, certification, and professional development through the Massachusetts Collectors & Treasurers Association (MCTA) is likely relevant. Although there are portions of the program that are not relevant, e.g., Collectors, the MCTA Treasurer certification program covers many beneficial topics, such as, cash control procedures, short- and long-term borrowing, municipal finance law, ethics, capital

¹ See Appendix A for copies of by-laws and rules and regulations.

budgeting and financing, and procurement. The districts would likely benefit from further professionalization of these positions through job descriptions, a rigorous recruitment and selection process as vacancies occur, and more support for training and ongoing professional development of individuals holding the position.

In general, the districts have seen a great deal of longevity in leadership positions. The stability that comes from successfully retaining competent leadership should not be understated. All organizations will eventually experience turnover in key positions. The loss of institutional knowledge when this turnover occurs can be substantial. Having basic human resources (HR) and financial management structures in place will help ensure smooth transitions. For example, it appears that only one district has formal HR policies and another an employee handbook. One reports conducting employee performance evaluations. However, none appear to have formal, written financial policies and procedures and while this may be typical of similar water and sewer districts in Massachusetts, these are worthy endeavors. Additionally, some of the districts do not have a debt management plan or a robust capital planning process. The project team recognizes that many of these occur, but that they rely on individual knowledge and habit rather than being established or documented in the management structure.

Table 2.1: Primary Enabling Legislation

District	Enabling Legislation	Notes
Cherry Valley-Rochdale Water Supply	Chapter 105 of 1996	Replaces c.381 of 1910 and amended by c. 112 of 2006.
Cherry Valley Sewer	Chapter 33 of 1998	Replaces c.729 of 1963
Hillcrest Sewer District	Chapter 612 of 1954	
Hillcrest Water District	Chapter 358 Acts of 1950	
Leicester Water Supply	Chapter 171 Acts of 1888-water Chapter 181 of 1893-sewer	amended by c.230 of 1895.
Oxford-Rochdale Sewer	Chapter 250 acts of 1957	

Table 2.2: Date of Adoption of By-laws and Rules

District	By-laws	Rules and Regulations	Notes
Cherry Valley-Rochdale Water Supply	2014	1989	
Cherry Valley Sewer	Date Unknown	Date Unknown	By-laws refer to chapter 729 of the Acts of 1963 which was repealed in 1998.
Hillcrest Sewer District	2004	2003	
Hillcrest Water District	2000	2000	
Leicester Water Supply	2015	2001	
Oxford-Rochdale Sewer	1997	2014	

2.1 Water Districts

Table 1 presents a summary of the relevant technical measures of each of the three water districts operating within specified portions of the town of Leicester. The provision of the information for each district in this table provides a helpful reference for considering possible combinations of district systems in a variety of future organizational options.

For example, since a consolidation of the LWSD with the HWD is already in the process of a contemplated merger, based on the information summarized in Table 1, the merged district would serve 1100 service connections with a service population of 2,900 people. The combined water system would include about 31.65 miles of water mains.

Table 2.3. Water District Comparison Table

DESCRIPTION	CV-R WD	LEICESTER WSD	HILLCREST WD
# OF SERVICE CONNECTIONS	1244	707	393
% METERED	100	100	100
Sources of Supply	Worcester	6 wells, not all operational	1 well and LWSD to supplement
Available Design Supply Capacity with currently operating wells (MGD)		0.387	0.086
Available Supply Capacity with wells at current reduced pumping rates (MGD)		0.288	0.086
Available Supply with Largest Source off-line (MGD)		0.243	Get water from LWSD if well offline
Storage Capacity (MG)	1.02	1.2	0.37
Usable Storage (MG)	0.924	1.1	0.135
Miles of Water Main	19	25.15	6.5
Winter Population	N/R	3200	1500
Summer Population	N/R	2700	1250
Residential Service Connections	1167	608	387
Residential Institutional Service Connections	4	32	1
Commercial/Business Service Connections	60	59	2
Municipal Service Connections	10	8	3
Other Service Connections	3		
Total Service Connections	1244	707	393

Table 2.3. Water District Comparison Table			
Residential Gallons per Capita per Day	33	47	75 (est.)
Population Served	3,685	1,900	1,000
Unaccounted for Water in 2019	13.50%	3%	N/R
WMA Registered Volume (MGD)*	0.27	0.19	Below WMA threshold
WMA Permitted Volume (MGD)*	0	0	Below WMA threshold
WMA Authorized Volume (MGD)*	0.27	0.19	Below WMA threshold
*Note Registration is for wells in Blackstone Basin, District has additional wells in French Basin not large enough to trigger WMA thresholds			
Average Daily Use (MGD)	0.205	0.11	0.08
Maximum Day Demand (MGD)		0.27	0.097
Able to meet Maximum Day Demand with Largest Source Off-line (DEP requirement)	Yes, supplied by Worcester	No	No
Comments	100% of demand is supplied by connection with the City of Worcester	LWSD struggles to meet maximum day demand with available supply. LWSD is pursuing interconnection with Worcester to supplement wells and potentially replace wells located in Paxton.	HWD gets water from LWSD to supplement demand routinely.
Capital Projects Planned for next 5 Years	\$3,000,000 - \$6,000,000	\$5,010,000 to \$6,767,000	\$884,000 to \$1,122,000
Capital Projects Planned for the 6 to 20 Year Schedule	\$2,500,000 - \$5,000,000	\$2,569,000 to \$3,092,000	\$1,505,000 to \$1,835,000

The complete water system summaries for the Cherry Valley-Rochdale, Leicester Water Supply and Hillcrest Water Supply Districts are presented in the following sections.

2.1.1 Cherry Valley-Rochdale Water District

The Cherry Valley and Rochdale Water District (CV-RWD) is currently enabled by Chapter 105 of the Acts of 1996 as amended by Chapter 112 of the Acts of 2006 (the CV-RWD Act). The CV-RWD Act provides for a three-member Board of Water Commissioners to be elected at the annual meeting to three-year staggered terms. The Board is responsible for creating a warrant for the annual meeting and appointing a district clerk and district treasurer who hold office for one year or until a successor is chosen. The meeting Moderator is elected at the beginning of each annual meeting.

The CV-RWD manages all “physical and administrative” aspects of the Cherry Valley Sewer District (CVSD) under an agreement last executed in 2015 which can be terminated only after a 2/3rds vote of both Boards. The districts’ officers and staff are fully integrated; they share a Treasurer, Clerk, Superintendent, and operations staff. The CVRWD continues to operate independently in all other respects and holds an annual meeting to approve appropriations and take other action.

The CV-RWD supplies water to approximately 1244 customers and 3685 residents.

The existing water system includes two permitted water sources including Henshaw Pond and the Grindstone Well. Due to water quality concerns, CV-RWD was ordered by the Massachusetts Department of Environmental Protection (MassDEP) to stop using the Henshaw Pond surface water supply. As of October 2016, CV-RWD stopped all operation of both sources and began purchasing water from the City of Worcester.

The water distribution system has three water storage facilities, one permanent interconnection with Worcester, two emergency interconnections, and includes approximately 19 miles of water mains ranging in diameter from 1 inch to 12-inch.

Water Sources

The CV-RWD owns two permitted sources, the Grindstone Well (bedrock well) and Henshaw Pond (surface water supply) neither of which are currently utilized as all water supply is purchased from the City of Worcester.

The Grindstone Well is an 8-inch diameter bedrock well-constructed to a depth of approximately 483 feet that is located adjacent to the western edge of Henshaw Pond. The well has a MassDEP approved pumping rate of 80 gallons per minute (gpm) or 0.11 mgd. The well was activated in June 2005 and is equipped with a 10 HP submersible pump capable of pumping 80 gpm. When in service, the well is pumped through the treatment facility for the removal of arsenic, uranium, and radon. Water quality from this well meets all other state and federal requirements with the exception of pH, which is adjusted prior to its entry into the distribution system. The Grindstone Well is currently an inactive source. CV-RWD is in the process of requesting approval from MassDEP to return the well to active status. CV-RWD would also need to review the operating and maintenance cost to produce and treat the water from this source to determine if it is cost effective to operate this well versus purchasing the 0.11 mgd from the City of Worcester.

Henshaw Pond had been the primary source of potable water for the CV-RWD since 1912. It has a storage capacity of 97 mg and a safe yield of 0.375 mgd. When in use, the reservoir was pumped through a slow sand filtration system prior to entering a 0.1 mg water storage clearwell. As stated, this supply is currently not in service and the CV-RWD would have to construct a new water treatment facility to utilize the pond as a water supply source.

CV-RWD currently purchases all potable water from the City of Worcester through a metered interconnection. The water purchase agreement allows for a maximum of an annual average day of 270,000 gallons.

Treatment

The CV-RWD has two water treatment facilities. The Grindstone Well Treatment Plant (Grindstone WTP) and Henshaw Pond Treatment Plant (Henshaw WTP) are located adjacent to each other on the North side of Henshaw Pond.

Untreated water from the Grindstone Well was pumped to the treatment building through approximately 1,000 feet of 6-inch ductile iron transmission main. The treatment train consists of a granular ferric hydroxide ion exchange filter for the removal of arsenic, followed by an ion exchange filter for the removal of uranium, and a low-profile bubble aeration unit for radon reduction. Treated water was blended with treated water from Henshaw Pond.

When in service, a 7.5 HP, 500 gpm low lift pump transferred water from Henshaw Pond through slow sand filter into a clearwell. High- and low-level sensors in both the sand filters and the clearwell control the pump. Chlorine dioxide was injected into the water prior to filtration to meet the contact time requirement of the Surface Water Treatment Rule by utilizing the designed detention time of the filtration process. The filter effluent flowed through under drains into the underground clearwell. The finished water from the Henshaw WTP was combined with the treated well water from the Grindstone WTP prior to high lift distribution pumps. The 30 HP, 500 gpm high lift pump would draw the combined water from the Henshaw WTP clearwell and the Grindstone WTP 6-inch pipe and deliver it to the distribution system through an 8-inch transmission main. The distribution water was treated with chemicals after the high lift pumps. The pH of the water was increased through the use of potassium hydroxide. Chlorine gas was added for disinfection, and corrosion control was provided through the use of zinc orthophosphate. The chemicals were housed in the existing pump house and were flow paced from the 500 gpm high lift pumps. The system was equipped with continuous pH and chlorine monitoring, high and low pH and chlorine alarms, and an interlock with the high lift pumps.

Storage

The CV-RWD has three water storage tanks including the Greenville Tank and two West Street Tanks. The Greenville Tank, located in the southwestern portion of the system off Pleasant Street in Rochdale, was constructed in 1971 and is a 0.5 MG concrete tank 60 feet diameter and about 24.5 feet high with an overflow elevation of approximately 911 feet. The West Street Tanks, located in the northeastern portion of the system off West Street in Cherry Valley, were constructed in 1994 and are 0.212 MG steel tanks each 42.5 feet diameter and 20 feet high with overflow elevations of approximately 911 feet.

Booster Pumping

A booster pumping system housed at the Henshaw Pond Treatment Plant boosts water from the West Street Tanks to the Greenville Tanks.

Worcester Interconnection

One hundred (100%) percent of the water system demands of the CV-RWD are currently met by the purchase of treated finished water from the City of Worcester. A number of improvements were necessary to enable CV-RWD to receive and distribute finished water from Worcester. Improvements included meter installation, pumping station improvements and water main installation.

Table 2.4. Cherry Valley Water District Finished Water Distribution 2015 – 2019 (MG)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2015	7.6	7.419	8.312	7.951	9.815	8.595	8.065	8.101	7.511	7.237	6.578	6.688	93.601
2016	6.956	7.128	7.889	7.951	9.43	9.745	9.378	9.103	8.732	8.893	6.635	8.554	100.344
2017	10.771	5.884	9.263	5.546	6.519	6.413	6.413	5.743	5.558	5.743	5.558	5.743	79.153
2018	6.045	6	6.045	5.85	6.045	5.85	6.045	6.045	5.85	6.229	6.631	6.627	73.263
2019	5.801	5.791	5.952	5.809	6.75	6.508	6.571	6.834	6.427	6.071	6.071	6.219	74.71

Staffing

The CV-RWD includes a Superintendent who serves as the operations head over both the Water and Sewer Districts. He meets the DEP requirements for a Grade 2T Treatment license and a 2D Distribution license.

In addition to the Superintendent there are two distribution operators who also hold 2D Operators licenses.

The operations staff divide their time between the water district and sewer districts with about 80% of their time devoted to water operations and the remaining 20% focused on sewer system operations.

It is important to note that there is a considerable commitment to mutual support shared by each of the districts in their respective day-to-day operations, even in the absence of formal mutual aid agreements. This has been a long-standing practice which the districts confirm remains firmly embedded in the informal established working relationships among the various Districts serving Leicester water and sewer customers.

The district staffing also includes a Treasurer and a Clerk, both of whose time is also generally split in a similar division as the operations staff between the water district and the sewer district functions. The Clerk also serves as the Billing Clerk and Secretary to the District Boards of Directors.

The Directors are each paid a stipend.

Capital Improvement Plans

A "Water Distribution System Study" was prepared for the CV-RWD by Tata & Howard dated September 2018 which included recommendations for two phases of hydraulic system improvements. Phase 1 included seven specific recommended improvements with a total estimated cost of \$6,742,000. Phase 2 included six action items with a total estimated cost of \$3,421,000.

2.1.2 Hillcrest Water District

The Hillcrest Water District (HWD) is enabled by Chapter 358 of the Acts of 1950 (the HWD Act). The HWD Act provides for a three-member Board of Water Commissioners to be elected at the annual meeting to three-year staggered terms. The Board is responsible for creating a warrant for the annual meeting and appointing a district clerk and district treasurer who hold office until a successor is chosen. The meeting Moderator is elected at the beginning of each annual meeting.

The HWD is supplied water through an inter-agency agreement with the LWSD and has no operational staff of its own. The Board of Commissioners continues to meet and select a clerk and treasurer. Although it has elected the LWSD treasurer as its treasurer, there is no requirement that it do so.

For all intents and purposes, the HWD is managed and operated by the LWSD. The district pays the equivalent of 8 hours per week of the LWSD superintendent's salary for "monitoring of the system; response to after-hours emergencies; monthly, quarterly, and annual reports to the Massachusetts Department of Environmental Protection (DEP). However, the agreement does not provide for maintenance and repair of the HWD distribution system. Therefore, our characterization of the adequacy of its staff and state of its management is as described for the LWSD.

The Hillcrest Water District (HWD) supplies water to 393 customers and approximately 1,000 residents. Since the system serves a population less than 3,300 people, it is defined as a Small System. Average day demand is approximately 67,000 gallons per day (gpd) and the maximum day demand is approximately 116,400 gpd.

The existing water system includes one active water supply well, one inactive water supply well, one water treatment facility, one water storage tank, an interconnection with Leicester Water Supply District (LWSD) and about 6.5 miles of water main ranging in size from 1-inch to 8-inches diameter.

Water Sources

The HWD has two ground water supply wells including Rock Well No. 1 (Well 01G) and Rock Well No. 2 (Well 02G). Rock Well No. 1 is the only well currently active. Any additional water supply is purchased from the LWSD via an interconnection.

Figure 3. Rock Well No. 1 Pump Station



Rock Well No. 1, located at Pleasant St. and Lehigh Road, supplies the majority of the drinking water to the HWD. Rock Well No. 1 is a bedrock well drilled to a total depth of 550 feet. It was originally constructed in 1955 to a depth of 400 feet and deepened in 1984 to its current depth. The well has an approved pumping volume of 86,000 gpd and is equipped with a submersible pump rated for 60 gpm. The Zone 1 radius for Rock Well No. 1 is 389 feet. The HWD does not currently have complete control over the Zone 1 area which includes portions of Rte. 56, local roads, residential areas, and parking areas.

Figure 4. Rock Well No. 2 Pump Station



Rock Well No. 2 is located just west of Rock Well No. 1 and has not been used as a source of supply since 2001 because it greatly impacts the available water in Well No. 1. Currently the submersible pump and steel column pipe have been removed from this well. **Table 2.5** provides information on these two water supply sources.

Table 2-5. Water Supply Sources		
Source	Rock Well #1	Rock Well #2
DEP ID	2151002-01G	2151002-02G
Status	Active	Inactive*
Location	Leicester	Leicester
Basin	French	French
Type	Bedrock Well	Bedrock Well
Date Installed	1955	1975
Maximum Pump Rate	60 gpm	--
Approved Pumping Volume	86,000 GPD	--
Well Depth	550 ft	592 ft
Pump Setting Depth	504 ft	No pump
Pump Type	Submersible	
Pump Motor Size	20 HP	
VFD	Yes	

*Well has been offline since 2001 because it is interconnected with the aquifer that supplies water to Well No. 1.

Treatment

Figure 5. Water Treatment Facility



The HWD has one water treatment facility for treatment of the water pumped from Rock Well No. 1. The treatment Facility (2151002-01T) is located adjacent to the Rock Well No. 1 near the intersection of Pleasant Street and Lehigh Road. The treatment facility was approved for operation on March 13, 2009 and has a design capacity of 86,000 gallons per day (gpd). Treatment is provided for the removal of iron, manganese, arsenic, uranium, and hydrogen sulfide.

Figure 6. Treatment Systems



Flow is directed to the water treatment facility from Rock Well No. 1 through a 6-inch ductile iron pipe. Raw water is first filtered through a 50-micron Harmsco cartridge filter. Filtered water is then treated with sodium hypochlorite and directed through two Greensand Pressure Filters (SOM's) operated in parallel. Iron and manganese are removed by oxidation with sodium hypochlorite, filtration, and absorption to GreensandPlus media. The addition of sodium hypochlorite also oxidizes any Arsenic III in the raw water to the Arsenic V precipitated state which can then be co-precipitated

and filtered out in further treatment processes. Filtered water then flows through two AIX treatment vessels. Each is operated in parallel. They contain Purolite A300E media, an anion exchange resin that is used to remove arsenic and uranium from the raw water. The A300E resin is periodically regenerated on-site with a supersaturated sodium chloride (salt) brine solution. Before discharging to a 3000-gallon precast concrete clearwell below the facility floor, treated water is polished by passing through a vessel with Purolite A33E media. The intent of the Purolite A33E media is to remove any traces of arsenic that might have made it past the previous processes. The A33E media is not backwashed and is regenerated off site at a Purolite facility in Philadelphia, PA. The facility finished water is disinfected with sodium hypochlorite before it flows by gravity into the clearwell. Water is withdrawn from the clearwell and routed to the distribution system using a vertical turbine High Lift Pump.

Storage

The HWD has one water storage tank located at the north end of Lehigh Road adjacent to the Leicester Memorial School. The original 1964 tank was a welded steel standpipe tank with a diameter of 24 feet

and a sidewall height of 110 feet. This tank was replaced with a glass fused steel Aquastore tank in 2019. The tank is about 25 feet in diameter and 111 feet straight shell. Overflow elevation is approximately 1048 feet above Mean Sea Level (MSL).

Distribution

The HWD water system is operated as a single pressure zone with normal pressures generally ranging from 35 psi to 110 psi depending upon the specific geographical location. The distribution system is comprised of approximately 6.5 miles of water main ranging in size from 1-inch to 8-inches in diameter.

Interconnections

The HWD has one interconnection with the LWSD equipped with a meter and pressure reducing valve. They are located in a vault just off the pavement at the corner of Pleasant Street and Newfield Street. There is a 3-inch meter in the interconnection vault that is used for measuring LWSD water that is transferred to the HWD distribution system. The piping to and from the interconnection vault is a 6-inch ductile iron pipe. The pressure reducing valve between the two systems is currently inoperable, therefore flows are directed to the HWD system by manually throttling a 6-inch gate valve just after the interconnection vault. Currently, the gate valve is opened or closed depending on water needs of the HWD.

The interconnection is only used seasonally to supplement water supplied by Rock Well No. 1.

Operations

The hydraulics of the HWD are primarily controlled by the water level in the storage tank. Levels typically fluctuate between 100 feet and 110 feet. The tank water level controls the operation of the well and the water treatment plant. The facilities are programmed to turn on when the water level in the tank reaches 103 feet and turn off when the water level reaches 108 feet to 110 feet.

Table 2.5. Hillcrest Water District Finished Water Distribution 2015 – 2019 (MG)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2015	1.773	1.755	1.921	1.745	1.882	1.757	2.121	2.772	2.49	2.132	2.008	2.122	24.481
2016	2.239	2.216	2.327	2.197	2.478	2.819	2.533	2.179	2.056	2.075	2.092	2.267	27.478
2017	2.413	2.284	2.557	2.405	2.532	2.61	2.413	2.43	2.304	2.347	2.209	2.295	28.801
2018	2.573	2.278	2.518	2.455	2.509	2.455	2.133	1.931	1.854	1.905	1.87	2.427	26.908
2019	2.517	2.348	2.618	2.375	2.421	2.511	2.565	2.309	2.457	2.33	2.325	2.581	29.357

Staffing

MassDEP allows the same operators that work for the LWSD to conduct operations of the HWD. MassDEP has classified LWSD as a 2T and 1D system and HW-D as a 1T and Very Small System (VSS) D system. Acknowledging that the LWSD operators maintain the HWD system, MassDEP allows a

minimum of 2 full time drinking water licensed operators for treatment and distribution of both systems. The LWSD staff keep track of their hours worked on the HWD system to bill the HWD accordingly.

The HWD has a part-time treasurer and billing position that averages about 25 hours per month (note more hours during the billing months and less during non-billing months so 25 hours per month is an average). The HWD has a part-time clerk position that is a stipend position for recording meeting minutes. Additionally, HWD pays LWSD about \$200 per month toward the LWSD for their clerk to answer phones, deposit checks, etc. for HWD. Finally, the HWD has three Commissioners, separate from the LWSD commissioners, which are also stipend positions.

2.1.3 Leicester Water Supply District

The Leicester Water Supply District (LWSD) provides both water and sewer service and is enabled by Chapter 171 of the Acts of 1888 and Chapter 181 of the Acts of 1893 (the LWSD Acts) for water and sewer, respectively. The LWSD Acts provide for a three-member Board of Commissioners to be elected at the annual meeting to three-year staggered terms. The LWSD Acts do not identify specific officers, instead granting the Commissioners the power to appoint officers, as necessary. The District by-laws grant the Commissioners the responsibility for appointing "...The Treasurer; Assistant Treasurer; Clerk; Moderator and Auditor..." for a term not exceeding three years.

Chapter 171 of the Acts of 1888 contains provisions that are unique to the LWSD amongst all the Leicester districts. First, section 5 states that the LWSD *"...may make such contract with individuals, corporations, and the town of Leicester for supplying water as may be agreed upon and (sic) may extend its pipes for that purpose subject to the direction of the selectmen of the town of Leicester, through the streets and highways of said town lying outside the corporate limits of said district."* This seems to enable the LWSD, with the consent of the Leicester selectmen to expand to any other portion of the town.³ Second, section 13 states, in part, *"The said town of Leicester shall (emphasis added) have the right at any time to take, by purchase or otherwise, the franchise, corporate property and all rights and privileges of said district on payment to said district of the total cost of its franchise, works and property of any kind..."*. Section 13 goes on in some detail including a provision requiring approval by a 2/3rds vote of Town Meeting. Taken together and provided they withstand legal scrutiny these provisions indicate that the creation of a town-wide water district is contemplated by the Act and creates a path for doing so. It is unclear whether this provision extends to the sewer district created by chapter 181. This provision of the LWSD act will be explored further later in this report.

Both administrative and operational staff appear to be adequate, but as is the case in the Cherry Valley districts, Superintendent splits time between the office and the field which is standard practice for small and some medium size systems. However, it requires relying on members of the Board of Commissioners and consultants to assist with planning improvements to the system, financial planning, or organizational management. For example, a master plan and asset management plan have been completed and implemented. As discussed in Section 2.0, efforts should also be put toward organizational management needs that require attention from the district personnel or retained consultants. For example, LWSD would likely benefit from additional field personnel to free-up the superintendent to address unmet needs.

The LWSD supplies water to the Hillcrest Water District and provides wastewater treatment for a portion of the Hillcrest Sewer District. The details of these inter-agency agreements are discussed in subsequent sections of this report.

The Leicester Water Supply District (LWSD) was established in 1888 to service the central village of Leicester. Components of that early system, including Pierce Spring and the Jim Dandy Well. Sections of cast-iron water mains are still in service today. The system at that time was a gravity system with water flowing from the dug wells and springs in Paxton to an open reservoir (30 feet diameter and 40 feet high) located on Carey Hill just north of the central village of Leicester.

Today the LWSD supplies water to approximately 683 customers and 1,900 residents. Since the system serves a population less than 3,300 the system is defined as a Small System. Average day demands are about 0.23 mgd and maximum day demands are about 0.3 mgd. Note that the LWSD does not experience as much change from winter to summer demands as other systems since they provide water to Becker College, increasing their winter demands. Becker College's water use decreases in the summer when other customers' demand increases.

The existing water system includes six water supply wells, five MassDEP designated water treatment facilities, a transmission main booster pump station, two water storage tanks, one system booster pump station and about 25 miles of water main ranging in size from 2-inch to 16-inch diameter. The LWSD is classified as a Treatment T-2 and Distribution D-2 system.

Wells

The LWSD has six groundwater supply wells as listed in **Table 2.6**. The oldest sources (Jim Dandy Well and Pierce Spring) date to the time of the founding of the water system. The actively used sources include Paxton Wells No. 2 and 3 and Rawson Well.

Paxton Well No. 1 is located off Grove Street in Paxton. This well can only be pumped in the summer since the well pump discharge exits the building above grade, is exposed for about five linear feet of pipe and then continues below grade to Pierce Spring. Currently, Paxton Well No. 1 is off-line since this well pumps directly to the Pierce Spring Reservoir, bypassing disinfection treatment.

Paxton Wells No. 2 and No. 3 are also located off Grove Street in Paxton. Both wells receive treatment for the removal of arsenic.

Jim Dandy Well is located 550 feet north of Well 3. This well is a 9-foot hand dug well and is classified as groundwater under the direct influence (GWUDI) of surface water. It requires treatment in compliance with the Surface Water Treatment Rule (SWTR) and is currently off-line.

Whittemore Street Rock Well No. 4 is located off Whittemore Street in Leicester and is currently off-line due to elevated levels of arsenic, uranium, radium, and radon.

Rawson Rock Well No. 5 is located off Rawson Street in Leicester and receives treatment for the removal of manganese, arsenic, uranium, and radon.

Pierce Spring is located at the Grove Street well field. It acts as a water storage reservoir for the wells in Paxton. The spring is octagonal in shape, the walls are constructed of stone laid in cement and covered with a wooden structure and shingled roof. With a storage volume of approximately 60,000 gallons, the spring is about 30 ft in diameter and 12 ft deep. Water from Paxton Well No. 1 discharges directly to the spring before flowing to the distribution system. Water from Paxton Wells No. 2, No. 3 and Jim Dandy Well each discharge to the 12-inch transmission main that routes water from the Paxton well fields to

the water tanks in Leicester. The transmission main is also connected to Pierce Spring. Finished well water can either fill Pierce Spring or fill the water tanks at Carey Hill in Leicester.

The water level in Pierce Spring controls the operation of the Paxton Wells. The bottom of the spring is not watertight so in times of high groundwater, a small amount of groundwater can flow into the spring, while in times of low groundwater, a small amount of water can be lost to the surrounding ground.

There are no standby power facilities at the Paxton well field. The LWSD uses a trailer mounted portable generator to service the well field if there is an extended power outage. The main power panel adjacent to Pierce Spring has a three-phase weatherproof receptacle to connect the stand-by generator to the power feed for the wells. The generator has been successfully used during several storm events. The most memorable time was the ice storm in 2012.

Table 2.6. Water Supply Sources

Source	Paxton Rock Well No. 1	Paxton Rock Well No. 2	Paxton Rock Well No. 3	Jim Dandy Well	Whittemore Street Rock Well No. 4	Rawson Rock Well No. 5	Pierce Spring
DEP ID	2151000-01G	2151000-02G	2151000-03G	2151000-04G	2151000-05G	2151000-06G	2151000-07G
Status	Not currently pumped*	Active	Active	Not currently pumped*	Not currently pumped*	Active	Active
Location	Paxton	Paxton	Paxton	Paxton	Leicester	Leicester	Paxton
Basin	Blackstone	Blackstone	Blackstone	Blackstone	French	French	Blackstone
Type	Bedrock Well	Bedrock Well	Bedrock Well	Dug Well	Bedrock Well	Bedrock Well	Covered Stone Lined Reservoir
Date Installed	1908	1948	1955	1908	1961	1981	1888
Maximum Pump Rate	50 gpm	86 gpm	100 gpm	66 gpm	50 gpm	201 gpm	--
Safe Yield	0.072 MGD	0.10 MGD	0.072 MGD	0.104 MGD	0.072 MGD	0.274 MGD	0.023 MGD
Well Depth	127 ft	537 ft	700 ft	9 ft	1,000 ft	200 ft	--
Pump Setting Depth	120 ft	315 ft	315 ft	--	315	170 ft	--
Pump Type	Submersible	Submersible	Submersible	Centrifugal End Suction	Submersible	Submersible	--
Pump Motor Size	5 HP	5 HP	5 HP	7-1/2 HP	10 HP	20 HP	--
VFD	Yes	Yes	Yes	Yes	No	Yes	

*Wells not currently pumped for water quality purposes.

Treatment

The LWSD has five MassDEP identified treatment facilities. They range from simple chemical feed facilities to more complex treatment plants for removal of arsenic, uranium, and radon.

Treatment Facility 01T is located at the Paxton Street Booster Station which is located adjacent to water storage tanks on Carey Hill. At this location polyphosphate is added to assist in achieving corrosion control. Sodium hypochlorite is added for disinfection coupled with a 4-log disinfection pipe loop at the end of the Paxton Well transmission main before the water enters the storage tanks.

Treatment Facility 02T is located at the Whittemore Street Rock Well Pump Station. Previously, this facility housed chemical feed equipment for the addition of polyphosphate for corrosion control. At present, the chemical feed equipment has been removed and this facility is off-line.

Treatment Facility 03T is the Rawson Street Water Treatment Facility located adjacent to the Rawson Street Rock Well Pump Station. This facility provides treatment for the removal of manganese, arsenic, uranium, and radon along with disinfection. The following treatment processes are in use at this facility:

- Chemical feed systems are provided for addition of sodium hypochlorite ahead of the greensand filters and for post treatment disinfection. Polyphosphate is also added for corrosion control.
- Manganese is removed using pressure filtration with manganese oxide coated media, (GreensandPlus by Inversand). Three filters are provided, each rated for 67 gpm. All three filters operate in parallel. Raw well water flows are automatically reduced to less than 140 gpm when a filter is backwashing.
- Uranium and arsenic are removed using Purolite's A300E resin, a strongly basic gel anion exchange resin designed for the removal of alkalinity, uranium, arsenic, and nitrate. This resin is regenerated on-site with a sodium chloride (salt) brine solution. Two 4-ft diameter x 6-ft side wall vessels are provided. There are two treatment trains each with a rated capacity of 100 gpm.
- Each A300E vessel is followed by vessels containing A33E resin. A33E resin is a highly porous hybrid anion ion exchange resin infused with iron oxide, making the media selective for arsenic. Since there is almost no arsenic that leaves the A300E vessels, it is anticipated that the A33E media will last over 10 years before it will need to be removed for regeneration offsite. Vessels containing A33E media are 4-ft diameter with a 6 ft side wall. There are two vessels: one for each 100-gpm treatment train.
- Radon is removed at the WTP through aeration using the Lowry Fine Bubble Aeration Unit. Outside air is used for aeration of the finished water and radon gases are also exhausted outside the north side of the WTP building.
- Disinfection is achieved through the addition of sodium hypochlorite just after the Lowry aerator. Finished water is stored in a below grade 6,000 gallon clearwell at the treatment facility.
- Finished water from the clearwell is pumped into the distribution system via a 200-gpm vertical turbine water pump operating at 250 feet of total dynamic head.
- The operation of the Rawson facilities are controlled by the level of the water in the water tanks at Carey hill.

Treatment Facility 04T is the Jim Dandy Water Treatment Facility located at the Jim Dandy Pump Station. In 2002, cartridge filters and sodium hypochlorite feed equipment were installed since the source is designated as GWUDI of surface water. Three cartridge filters are provided in series to provide filtration from 5-micron, 1 micron to 0.35-micron pore sizes. When in operation, sodium hypochlorite was injected

before the filters. A turbidimeter and residual chlorine analyzer are also provided for this facility. The turbidimeter is physically located at the Paxton Rock Well No. 3 Pump Station. This source and treatment facility are currently off-line.

Treatment Facility 05T is the Grove Street Water Treatment Facility. The WTP treats water from Paxton Rock Wells No. 2 and No. 3. This facility is located as an addition to the Paxton Rock Well No. 3 Pump Station. This facility provides treatment for the removal of arsenic along with disinfection. The following treatment processes are in use at this facility:

- Arsenic is removed using Purolite's FerriX A33E resin which is a highly porous hybrid anion ion exchange resin infused with iron oxide, making the media selective for arsenic. There are two sets of vessels that service each well. Each vessel is 42-inches in diameter with a 6'-0" sidewall. The vessels operate in a lead lag fashion. Arsenic water quality is monitored between the lead and lag vessels. When the treated water arsenic levels after the lead vessel reach 8 ug/l, the media in the lead vessel is removed and sent off site for regeneration. If Wells 2 & 3 continue to be used on an 18 hour per day basis, media regeneration is required for each lead vessel once per year. Piping at the facility allows for interchanging which vessel is in the lead position. Therefore, when media is sent out for regeneration, the lag vessel can act as the lead and the wells can continue to operate until the media is reinstalled.
- Disinfection is achieved through the addition of sodium hypochlorite. The finished water from both treatment trains are routed to the transmission main just before they leave the building. Sodium hypochlorite is added at this point using a peristaltic chemical metering pump.

Storage

The LWSD has two water storage tanks located on Carey Hill off Paxton Street (Route 56), just north of Leicester High School. These tanks are welded steel standpipes. Tank 1 (north tank) was constructed in 1940 and Tank 2 (south tank) was constructed in 1961. More information about each tank is presented in Table 2.7.

Table 2.7. Water Storage Tank Characteristics

Characteristic	Tank 1 (North Tank)	Tank 2 (South Tank)
Date Constructed	1940	1961
Manufacturer	CBI	PDM
Type	Welded Steel Standpipe	Welded Steel Standpipe
Capacity	600,000 gallons	600,000 gallons
Diameter	50 feet	51 feet
Height	40 feet	40 feet
Base Elevation	El. 1074 feet	El. 1074 feet
Overflow	El. 1114 feet	El. 1114 feet
Typical Operating Levels	37.5-39.0 feet	37.5-39.0 feet
Mixing	None	None
Altitude Valve	None	None

Water flows directly from the Paxton wells and Pierce Spring to these tanks through an 8-inch and 12-inch diameter cast iron water main together approximately 5 miles in length. Water District records indicate the transmission main was installed in 1886. There are no customers connected to the transmission main.

Paxton Street Booster Station

Adjacent to the water storage tanks is the Paxton Street Booster Station constructed in the 1960s. This facility houses the booster pumps that are used to increase transmission main flows to 130 gpm to assist in keeping the water tanks full. Two constant speed end suction centrifugal pumps are provided. Each pump is a Goulds Model 3656 pump with 3 HP WEG motor. Only one pump operates at a time. Finished Paxton well water flows through either of the booster pumps when on. When the pumps are off, water flows through a silent check valve and by-pass piping to the booster pump discharge piping and on to the water tanks at a flow of approximately 40 gpm, depending on the water level in Pierce Spring. The booster pumps operate on a lead and stand-by basis.

The Booster Station houses a residual chlorine analyzer to monitor the chlorine residual in the water from Pierce Spring and Paxton Rock Wells after the water has traveled through the 8 & 12-inch diameter water transmission main and disinfection pipe loop. The water from Paxton is treated with sodium hypochlorite at the Paxton Water Booster Station. In 2016 a new water main loop line was constructed at the water storage tanks just before the Booster Station. The loop line is 500 linear feet and constructed of 12-inch diameter Class 52 cement lined ductile iron pipe. The purpose of the loop is to provide 4-log disinfection for viruses for the water from the Paxton wells prior to entry into the distribution system.

Disinfection 4-log certification monitoring, and alarm requirements are achieved through use of residual chlorine analyzers and SCADA programming. Residual chlorine analyzers continuously monitor chlorine to verify levels remain above the minimum needed to achieve 4-log compliance (greater than 0.3 mg/L) and below high levels that would indicate an overfeed event. The chemical feed pump rates are paced by the Paxton Booster Station flow meter. Should the residual chlorine level decrease below 0.3 mg/L, the chemical pump rate would be increased by the operator. Note that the current low-level alarm is set for 0.5 mg/L. High level alarms are also provided to notify operators of a potential overfeed event; a high high-level alarm will trigger an alarm and shut down the facility.

Chemical feed equipment is also provided for the addition of polyphosphate for corrosion control.

The Hyland Booster Pump skid is in a room adjacent to the main booster pump room. The booster pump provides domestic water to the Carey Hill Estates Subdivision. This booster pump skid has four vertically oriented centrifugal pumps. Two pumps are variable speed with 2 HP motors and two pumps are variable speed with 15 HP motors. This system can pump from 0 to 290 gpm. Flows from the booster station are controlled by discharge system pressure. Insufficient pressure is alarmed by the SCADA system.

The Booster Station also houses an emergency generator and transfer switch. The generator is capable of supplying emergency power for operation of both booster pump systems.

Mount Pleasant Booster Station

The Mount Pleasant Booster Station is located at 1350 Main Street (Rte. 9) just east of Tractor Supply Co. Constructed in 2004, this station has three pumps, two for domestic flows and one for fire flows.

These pumps boost water pressure to the west end of the system to keep pressures between 60 to 100 psi. The domestic pumps are Grundfos CR 16 Model vertical multi-stage pumps capable of approximately 85 gpm at 112 feet of head. They have 5 HP motors and variable frequency drives (VFDs). The pumps operate lead-lag, with the lead pump starting when the pressure decreases to 50 psi and the lag pump starting if the pressure cannot be maintained at 50 psi. The fire pump is an end suction centrifugal pump with a 25 HP WEG motor. Two Wessels Model FXA-800L hydropneumatic (bladder) tanks are provided. Each tank has a volume of 211 gallons, which equates to about 80 gallons usable storage. This facility is also equipped with an emergency generator.

Distribution System

The LWSD water system is operated under one pressure zone with normal pressures generally ranging from 35 psi to 110 psi depending upon the specific geographical location. The distribution system is comprised of approximately 25 miles of water mains ranging in size from 2-inch to 16-inch diameter. The distribution mains range in age and material. The oldest main is cast iron installed at the creation of the water system in 1888, such as the 5 mile long 8-inch & 12-inch diameter transmission main from Pierce Spring to the Paxton Street Water Storage Tanks.

Interconnections

The LWSD has interconnections with the neighboring Paxton Water Department, Cherry Valley & Rochdale Water District and Hillcrest Water District. Currently the LWSD supplies water to the Hillcrest Water District (HWD) through a metered interconnection with pressure reducing valve located in a vault just off Pleasant Street at Newfield Street. This supply is used by HWD to supplement its own single source water supply. The LWSD operators operate the Hillcrest system. The LWSD controls the amount of water supplied to the Hillcrest Water District, based on HWD water demands & the ability of LWSD to keep their water tanks full. There is a 3-inch meter in the interconnection vault that is used for measuring HWD system use. The piping to and from the interconnection vault is a 6-inch ductile iron pipe. Since the pressure reducing valve between the two systems is currently inoperable, flows are directed to the HWD system by throttling a 6-inch valve just after the interconnection vault.

Emergency hydrant to hydrant connections are available to connect Leicester's system to the Paxton water system and the Cherry Valley Rochdale system. The Paxton interconnection is located on Route 56 at the intersection with Asnebumskit Road. The Cherry Valley interconnection is located on Route 9 on the east end of the District. At each location, the respective systems have hydrants at the location that can be connected using a 2-inch diameter fire hose. Water from the Paxton system must be reduced in pressure before connecting to the LWSD transmission main. Water from Cherry Valley must be pumped to the LWSD system at the interconnection.

The LWSD is currently pursuing a permanent interconnection with the City of Worcester to provide supplemental water supply. The intent is to have this facility operational by 2023. Additional details regarding the interconnection project include the following:

- Waters from the Paxton Wells (currently on-line) and Jim Dandy Well (currently off-line) are piped to the District's water system through a 5-mile-long transmission main that was constructed in 1888. The Massachusetts Department of Environmental Protection (MassDEP) is requiring water treatment improvements to continue using the wells located in Paxton. Additionally, there are significant questions and concerns about the integrity and condition of the transmission main. The size and scope of infrastructure improvements required to continue using these supplies makes the purchase of water from the City of Worcester a viable alternative to help maintain the fiscal sustainability of the District.

- When the District was formed in 1888, the enabling Act (Chapter 171, Acts of 1888) allowed the District to take and hold the waters of Rawson Brook and the waters of Kettle Brook in the Town of Paxton, provided the water taken from Kettle Brook not exceed an average daily quantity of 200,000 gallons per day (gpd) or 0.2 million gallons per day (mgd). Note that the District currently holds a water withdrawal registration amount of 0.19 mgd for the supplies located in Paxton.
- Subsequently, c. 230 of the Acts of 1895 authorized the District to take and hold the waters of Asnebumskit Pond in the Town of Paxton and water sources connected therewith, subject to the conditions and restrictions named in the enabling, c. 171, Acts of 1888.
- In a July 19, 2019, letter to the Office of Water Resources, Department of Conservation and Recreation (DCR), a request was made for a streamlined and expedited permitting process for the proposed purchase of water from the City of Worcester. On September 9, 2019, Ms. Michele Drury confirmed that the DCR legal counsel had reviewed the July 19, 2019, request and the supporting documents and concluded that there would be no increase in the interbasin transfer so that an interbasin transfer permit application would not be required. Additionally, legal counsel had determined that based on the enabling acts the District had rights to 0.2 mgd from the Blackstone Basin and no restrictions on the amount from the Nashua Basin.
- The District's request was formally presented and discussed at the October 10, 2019, Water Resources Commission (WRC) meeting. The WRC determined that the Interbasin Transfer Act does not apply to the proposed water purchase from the City of Worcester since there is no increase in the present rate of interbasin transfer. These findings were documented by DCR in a letter dated October 16, 2019.
- The District is in communications with the City of Worcester to purchase 0.3 mgd from the City. The District proposes to convey treated water from the City's water system to the District's water system through the construction of an interconnection at Bailey Street/Mulberry Street with a metered booster pumping station and approximately 2 miles of 8 or 12-inch diameter water main. This infrastructure would be installed within existing disturbed areas (i.e., along/within paved roadways).
- The District's intent is for the interconnection to serve as a supplemental source with flow rates similar to those obtained from the Paxton Wells. The interconnection supply and Rawson Wells will be used to fill the water storage tanks. The water from the storage tanks will be used for domestic, fire and emergency demands.
- A flow test was conducted by the City on their system at Bailey Road near Fox Meadow Drive using hydrants located near 92 Bailey Road and 126 Bailey Road. The results of the flow test indicate that flows of approximately 600 – 650 gallons per minute (gpm) have a pressure drop of 0 – 2 pounds per square inch (psi), a negligible pressure drop that would not impact the pressure within the City's system.
- Once the interconnection is operational, the District will remove the Paxton Wells from its operations. The interconnection supply, Rawson Well and Whittemore Well (currently off-line well) will be used to fill the District's water storage tanks. The water from the storage tanks will be used for domestic, fire and emergency demands. Conceptually, the booster pumping system will be designed to withdraw flows in the range of 100 – 600 gpm from the City's system which would have no impact on the City's water pressures on the suction side of the pump. The design flow rates will be determined during the conceptual design process including evaluation of the number of pumps and if a fire pump should be included.
- The District is proceeding with the design of the proposed interconnection as described concurrently to efforts with the City to formalize a water purchase agreement during 2021.

System Operations

The LWSD water system is equipped with a Supervisory Control and Data Acquisition (SCADA) system. The main SCADA computer is located at the LWSD Wastewater Treatment Plant. Communications with remote sites are through a radio telemetry system with the exception of the Rawson Well and Treatment Facility which are connected to the SCADA system via fiber optic cables. For the Paxton well field, the radio antenna is located on the Jim Dandy Well Pump Station. Fiber optic cables connect the Jim Dandy Well Pump Station with the Rock Wells and Pierce Spring. On occasion, the SCADA system experiences communications failures. However, all facilities except those at Rawson Street will operate on their own without the supervision of the SCADA system.

The operation of the Paxton Rock Wells is controlled by the water level in the Pierce Spring by a pressure transducer. Pierce Spring is typically maintained between 8 ft to 10 ft. Water levels can drop to 3 feet if system demands require additional water at the water tanks in Leicester. The SCADA system alarms if the level in the spring falls below 3 feet. Historically, the Paxton Rock Wells No. 1 and No. 2 were not operated simultaneously since pumping Well No. 1 will cause the water level in Well No. 2 to decrease. Therefore, Well No. 1 is only operated alone or with Well No. 3. Well No. 1 is presently off-line, so current operations call for Well No. 2 and Well No. 3 to operate concurrently depending on system demands.

Rawson Rock Well No. 5 and Treatment Facility operate based on the water level in the Paxton Street Tanks. The well pump is activated when the water level drops to 37.6 feet and stops when the water level reaches 39.0 feet. When the Rawson Street facilities are called to operate, the well pump initially pumps to waste for about 90 seconds and then water is directed to the WTP and operations there start. The treatment facility finished water pump is activated based on the water level in the clearwell. This pump starts at 3.8 feet and stops at 3.0 feet. The controls at the water plant regulate the speed of the finish water pump to maintain 3.5 feet of water in the clearwell.

The Paxton Street Booster Pump Station pumps normally operate based on the water level in the Paxton Street Tanks. They can be manually started or stopped by an operator if system conditions require this condition. When in automatic, the booster pumps will start when the water level in the water tanks is at 37.5 feet and stop when the water level reaches 39.0 feet.

The operators have the ability to operate the system in Hand Mode. This allows them to over-ride the automatic triggers if needed. For example, when the water level in Pierce Spring is low (less than 4 feet), the operators normally would turn the tank booster pumps off, until the water level in the spring recovers to greater than 5 feet. Often times the operators override the SCADA controls and place the Paxton Booster Pump(s) in Hand in an effort to maintain 0.2 mg/l residual chlorine levels in the water coming from Paxton. The thought is that higher flows from Paxton (135 gpm) mean the Paxton well pumps (Wells No. 2 and No. 3) and Paxton Water Treatment Facility are operational feeding chlorine into the transmission main, which helps maintain chlorine levels at the water tanks.

Table 2.8. Leicester District Finished Water Distribution 2015 – 2019 (MG)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2015	5.710	5.595	6.292	6.094	6.801	6.084	6.093	6.195	6.271	5.824	5.284	5.234	71.478
2016	5.501	5.473	5.600	5.616	5.714	5.287	5.149	5.214	5.192	5.290	4.915	4.776	63.727
2017	4.832	4.671	5.073	5.152	4.914	4.778	4.772	4.844	4.726	5.031	4.786	4.502	58.082
2018	4.668	4.072	4.511	4.712	4.986	5.002	4.749	4.619	4.476	4.537	4.240	4.300	54.873
2019	4.400	4.035	4.278	4.300	4.768	4.437	4.510	4.671	4.340	4.570	4.262	4.093	52.662

Staffing

District required to have a minimum of 4 fully licensed operators (2 wastewater and 2 drinking water) for both the LWSD and HWSD. The licensed operators are cross trained to cover for water/wastewater in an emergency. Refer to the MassDEP letter dated August 26, 2015, for the minimum requirements.

The LWSD has one full-time Superintendent who manages both water and wastewater operations and holds operator licenses that are higher grades of the other operator licenses since this position has responsible charge of operations. The Superintendent divides time between water and wastewater to support both since 4 operators is the minimum required. The Superintendent spends more time supporting wastewater operators than drinking water operators due to the complexity of the WWTP. The LWSD has two full-time licensed wastewater operators and two full-time licensed drinking water operators (one handles treatment and the other distribution) and both service the LWSD and HWD systems.

The LWSD employs a part-time treasurer and billing position with duties averaging about 21.5 hours per week. Currently the treasurer is at the LWSD office from 9:30 am to 2 pm Monday through Thursday and 9:30 am to 1 pm on Friday. The LWSD employs a clerk position with duties averaging about 24 hours per week. The LWSD also has three Commissioners which are stipend positions.

2.2 Sewer Districts

Information common to all four sewer districts is presented in Table 2.9. Table 2.10 provides a summary of the monthly and annual sewage flows reported for each sewer district from 2016 thru 2019. Note that the monthly data for the CVSD is reported in terms of Total Flow in Million Gallons (MG). The annual totals for the CVSD were divided by 365 to derive the daily flow in Million Gallons Per Day (MGD) for demonstrating the comparative information across all district flow reporting.

Presenting the information for each district provides a helpful reference for considering possible combinations of systems in any of a variety of future organizational options. Average daily flows for example can be added to estimate the total flows from any proposed combination of sewer districts that might be considered under alternative district or town consolidation options.

Table 2.9. Sewer District Summary Table

	LWSD - Sewer	HSD	ORSD	CVSD
Number of Customers	683	260	1021	437
Wastewater discharge point	LWSD WWTF	LWSD and ORSD	ORSD WWTF	Worcester/Upper Blackstone
WWTF Construction Date	1900	(system constructed in 2003)	1971	NA
WWTF Major Upgrade Date	1988	NA	1996, 2010	NA
WWTF design capacity (MGD)	0.35	NA	0.5	NA
WWTF Discharge point	Town Meadow Brook	NA	French River	NA
NPDES Permit issued	2005	NA	2005	NA
NPDES Permit number	MA0101796	NA	MA0100170	NA
Gravity main (miles)	15	4.5	15	9.8
Force main (miles)	3.2	0.25	1.7	
Number of pump stations	8	3	4	5
Dry weather flows (MGD)	0.14	*	0.32	0.1
Estimated I/I	42%			
Capital projects planned	WWTF upgrade required but waiting for renewed NPDES to properly design facility	Planning to dissolve HSD into LWSD and ORSD	WWTF upgrade required but waiting for renewed NPDES to properly design facility	
Additional comments	CWMP recommended WWTF upgrade to 0.732 MGD	Flows split b/w LWSD * ORSD		

Table 2.10. Comparison of Sewer District Flows 2016 - 2019 (mgd)

YEAR	Leicester Sewer District	Oxford-Rochdale Sewer District	Cherry Valley Sewer District
2016	0.119	0.224	0.095
2017	0.126	0.27	0.152
2018	0.15	0.346	0.142
2019	0.138	0.319	0.089

The complete sewer system summaries for the Cherry Valley, Leicester, Hillcrest and Oxford-Rochdale Sewer District are presented in the following sections.

2.2.1 Cherry Valley Sewer District

The Cherry Valley Sewer District (CVSD) is currently enabled by Chapter 33 of the Acts of 1998 (the CVSD Act). The CVSD Act provides for a three-member Board of Sewer Commissioners to be elected at the annual meeting to three-year staggered terms. The Board is responsible for creating a warrant for the annual meeting and appointing a district clerk and district treasurer who hold office until a successor is chosen. The meeting Moderator is elected at the beginning of each annual meeting.

The by-laws for the district are out of date as they refer to enabling legislation that was repealed by the CVSD Act, however the Board has adopted a comprehensive set of rules and regulations.

The CVSD is managed in all “physical and administrative” aspects by the CVRWD under an agreement last executed in 2015 which can be terminated only after a 2/3rds vote of both Boards. The districts’ officers and staff are fully integrated; they share a Treasurer, Clerk, Superintendent, and operations staff. The CVSD continues to operate independently in all other respects and holds an annual meeting to approve appropriations and take other action.

The Superintendent indicated that the administrative staff is adequate, but that the operations are understaffed. The project team concurs but points out that the Superintendent splits time between the office and the field leaving little time for planning improvements to the system, financial planning, or organizational management. For example, there is little in the way of capital planning, financial policies, or written job descriptions.

The Cherry Valley Sewer District (CVSD) was officially formed in 1963 through Chapter 729 of the Acts of 1963. In 1995, as part of the reconstruction of Route 9, the Commissioners obtained funding for the Route 9 Interceptor Sewer which would anchor the full build-out of the sewer system. In 1998 the District successfully amended chapter 729 as amended and was replaced by Chapter 33 of the Acts of 1998.

The main provision of chapter 729 was the revision of the District boundaries which led to the reduction in the size of the District to its current configuration. In 1999 the District was successful in securing USDA-RD for the funding of the full build-out of the District. The build-out would include three Phases spanning from 2000 through 2004.

In Phase I, the project included the design and construction of sanitary sewer service to 573 dwelling units connecting this system to the existing Route 9 Interceptor Sewer.

In Phase II, the project included the design and construction of the McCarthy Avenue pump station, Redfield Road Pump Station, and the connection of the associated streets in the McCarthy Avenue neighborhood.

In Phase III, the project included the design and construction of the following pump stations: McCarthy Avenue, Church Street and Willow Hill Road and the connection of the remainder of the streets within the Cherry Valley Sewer District.

Currently the District has 5 pump stations and 9.8 miles of collection pipe. The District currently services 437 homes.

Sewage is discharged to the City of Worcester sewer system and transported to the Upper Blackstone Water Pollution Abatement District (UBWPAD) for treatment. Treated wastewater is discharged to the Blackstone River.

The District headquarters are located at 148 Henshaw Street, Leicester, MA 01524.

Table 2.11. Cherry Valley Sewer District - Sewage Flow Summary Table (MG)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Avg Monthly Flow (mg)	Total Annual Flow (mg)	Avg Daily Flow (mgd)
2016	2.28	3.02	3.645	3.154	2.335	1.926	1.579	1.596	2.308	3.811	4.047	4.99	2.891	34.691	0.095
2017	5.417	5.143	5.239	6.239	5.494	4.978	3.047	3.398	3.472	3.971	4.2	4.774	4.614	55.372	0.152
2018	5.157	5.773	6.609	6.619	5.026	3.091	1.826	2.317	2.547	2.968	5.509	4.817	4.355	52.259	0.143
2019	4.381	3.022	3.389	4.3	3.258	1.812	1.841	1.581	1.375	1.923	2.331	3.347	2.713	32.560	0.089
2020	3.094	2.703	3.039	4.131	4.256	1.949							3.195	38.344	0.105
AVG	4.066	3.932	4.384	4.889	4.074	2.751	2.073	2.223	2.426	3.168	4.022	4.482	3.541	42.490	0.116

Staffing

Refer to discussion of Staffing in Section 2.1.1. The same staff also operate the sewer system. The Superintendent estimates that about 80% of staff time is spent on Water System operations while the remaining 20% of staff time is devoted to sewer system operations.

2.2.2 Leicester Water Supply District – Sewer District

The Leicester Water Supply District (LWSD) provides both water and sewer service and is enabled by Chapter 171 of the Acts of 1888 and Chapter 181 of the Acts of 1893 (the LWSD Acts) for water and sewer, respectively. The LWSD Acts provide for a three-member Board of Commissioners to be elected at the annual meeting to three-year staggered terms. The LWSD Acts do not identify specific officers, instead granting the Commissioners the power to appoint officers, as necessary. The District by-laws grant the Commissioners the responsibility for appointing "...The Treasurer; Assistant Treasurer; Clerk; Moderator and Auditor..." for a term not exceeding three years.

Chapter 171 of the Acts of 1888 contains provisions that are unique to the LWSD amongst all the Leicester districts. First, section 5 states that the LWSD "...may make such contract with individuals, corporations, and the town of Leicester for supplying water as may be agreed upon and may extend its pipes for that purpose subject to the direction of the selectmen of the town of Leicester, through the streets and highways of said town lying outside the corporate limits of said district." This seems to enable the LWSD, with the consent of the Leicester selectmen to expand to any other portion of the town.³ Second, section 13 states, in part, "*The said town of Leicester shall (emphasis added) have the right at any time to take, by purchase or otherwise, the franchise, corporate property and all rights and privileges of said district on payment to said district of the total cost of its franchise, works and property of any kind...*". Section 13 goes on in some detail including a provision requiring approval by a 2/3rds vote of Town Meeting. Taken together and provided they withstand legal scrutiny these provisions indicate that the creation of a town-wide water district is contemplated by the Act and creates a path for doing so. It is unclear whether this provision extends to the sewer district created by chapter 181. This provision of the LWSD will be discussed in greater detail later in this report.

Both administrative and operational staff appears to be adequate, but as is the case in the Cherry Valley districts, Superintendent splits time between the office and the field which is standard practice for small and some medium systems. However, this requires that members of the Board or retained consultants assist with planning improvements to the system, financial planning, or organizational management. For

example, an asset management plan has been completed and implemented. As discussed in Section 2.0, efforts should also be put toward organizational management needs that require attention from the district personnel or retained consultants. For example, LWSD would likely benefit from additional field personnel to free-up the superintendent to address unmet needs.

The LWSD provides wastewater treatment to a portion of the Hillcrest Sewer District. The details of inter-agency agreements are discussed in subsequent sections of this report.

The LWSD operates a sewer collection and treatment system which serves approximately 683 customers. The LWSD accepts flow from an additional 131 customers within the Hillcrest Sewer District (HSD). Flow from both the LWSD and HSD customers is treated at the LWSD wastewater treatment facility (WWTF).

The LWSD sewer system consists of about 15 miles of gravity sewer, 3.2 miles of force main, 8 pump stations and a 0.35 MGD wastewater treatment facility. The LWSD WWTF was originally constructed in the early 1900's. The plant has been upgraded several times with the last major upgrade completed in 1988. The 2011 average daily flows to the facility were estimated to be 0.24 MGD during dry weather conditions. The plant discharges to nearby Town Meadow Brook.

LWSD is permitted (NPDES permit issued 2010, MA0101796) to discharge 0.35 MGD (average monthly) of treated municipal wastewater via outfall 001 to the French River (Note: the outfall previously discharged to Dutton Pond (Segment MA42015) but was relocated to Town Meadow Brook -- downstream from Dutton Pond Dam. The permit incorrectly states the discharge is to the French River.)

The facility is required to monitor acute whole effluent toxicity and chronic whole effluent toxicity twice a year using *Ceriodaphnia dubia*. The facility's maximum daily permit limits for whole effluent toxicity are $LC50 \geq 100\%$ and $CNOEC > 62\%$.

A wastewater treatment facility upgrade is being planned for the facility according to an Environmental Notification Form (ENF) filed in December 2008. The ENF (#14352) indicates that a draft CWMP has been developed and an expansion and upgrade of the facility was recommended (0.732 MGD). I/I estimates at the facility were estimated to account for 42% of the total flow. The permit includes seasonal limits on BOD, total suspended solids (TSS), fecal coliform bacteria, total residual chlorine, total ammonia-nitrogen (NH₃-N), total phosphorus (TP), as well as limits on total copper. This permit has expired, and the District is waiting for EPA to issue a revised NPDES permit. The District has held off on WWTP upgrades until the permit is revised and discharge limits identified.

The LWSD currently owns and operates eight (8) Wastewater Pump Stations (WWPS) for the LWSD and operates three (3) WWPS Pump Stations for the Hillcrest Sewer District. The 8 sewer pumping stations within the district were constructed from the mid 1990's to early 2000's.

The LWSD sewer system generally consists of the following components:

1. Wastewater Treatment Facility with 0.35 MGD approved flows, located at 124 Pine Street, Leicester
2. Holcomb Street Sewer Pump Station
3. Homestead Lane Sewer Pump Station
4. Main Street Sewer Pump Station
5. Manville Street Sewer Pump Station

6. Paxton Street Sewer Pump Station
7. Rawson Street Pump Station
8. Town Beach Sewer Pump Station
9. Waite Street Sewer Pump Station
10. Approximately 520 manholes
11. About 15 miles of gravity sewer ranging in size from 6-inch to 16-inches diameter.
12. About 3.2 miles of force main ranging from 2-inch to 8-inches diameter.
13. Main Office with associated equipment.

Leicester Water Supply District (LWSD) Wastewater Treatment Facility (WWTF)

This facility (conventional activated sludge with advanced treatment) was constructed in 1985 and has seen no major upgrades since completion. The facility operated well but is mostly the result of efforts associated with the operations staff. Equipment has been repaired and/or replaced to the point that a modernization project is needed. We visited that facility on December 9, 2020 and were notified that the facility was having operational issues related to a failure of the belt filter press and a clarifier drive failure. This facility is operating under an old NPDES permit which expired in 2015. The current facility utilizes chemical for phosphorous precipitation to meet a seasonal permit limit of 0.2 mg/l. There has been no word from regulators on when a Draft and Final permit for the facility will be issued. The operator knows that a modernization is needed for many aspects of the facility but is hesitant to move forward with upgrades until a new NPDES permit is issued.

It is our belief that within the next 2-3 permit cycles that a Total Nitrogen Limit will be implemented, as the flow is discharged to the French River and ultimately ends up in Long Island Sound. We would expect the Total Nitrogen limit to range from 3-8 mg/l. This will result in the need for a future project to add some sort of denitrification process, typically a de-nite filter or anoxic zones. A budget of about \$1M-\$2M should be set aside for this project alone. The operators also expressed concern with a potential reduction in the seasonal phosphorous limit to 0.1 mg/l. Should this occur, we would expect the facility to need to optimize chemical addition and to continue with their use of a polishing filter for the effluent prior to discharge. The filtration system may also need to be optimized. A budget of \$0.5M to \$1M should be allocated for future potential phosphorous reduction upgrades.

Discussions with the operator indicated that they were uncertain as to the type of treatment facility that is envisioned for the future. Options discussed with various engineers have focused on the continuation of conventional activated sludge treatment or a conversion to a Sequencing Batch Reactor (SBR). The latest engineer assisting the LWSD seemed to be on-board with a continuation of the conventional activated sludge approach, and an interim expansion to 0.575 mgd. The options for improving the facility included the following:

1. New Headworks Facility
2. Two new larger diameter clarifiers
3. Aeration Basin Rehab,
4. Additional Biological Treatment
5. Upgrade to Sludge Handling Capabilities
6. Rehabilitation of the Sand Filter, and
7. Increase in the size of the Chlorine Contact Tank.

Per the WWTF operator, the engineer that envisioned the above changes estimated the project to cost approximately \$10M, ten years ago. ENR projections alone would drive this project cost up to \$14M to \$15M (in 2025 dollars). Additionally, these costs do not include the significant increase in O&M costs that a new facility with more stringent treatment goals and greater treatment capacity/volume may have.

During the brief tour of the facility, the following observations/potential projects were identified:

- The headworks facility is tight and does not do a good job removing rags. A new larger headworks facility with mechanical screening and improved grit removal should be provided. - \$2M+/- to \$2.5M+/-,
- Mechanical surface aerators should be replaced with diffused aeration - \$1.5M+/-,
- New larger diameter (40-foot) clarifiers are desired for improved surface overflow rates - \$2M+/- to \$3M+/-
- Improved solids dewatering and conveying should be provided - \$1.5M+/- to \$2M+/-,
- Underground fuel storage tank needs to be replaced with compliant dual walled UST or AST - \$0.1M+/-
- Blast and Re-Coat structural elements on ABW Sand Filter - \$0.1M+/-
- Provide Containment for Ferric Chloride (may require modifications to shed roof) - \$0.05M+/-
- Future Total Nitrogen Upgrade - \$1.5M+/- to \$3M+/-
- Future Phosphorous Removal upgrades - \$0.5M+/- to \$1.0M+/-
- Unscheduled Repair Allowance and Contingency (20%) - \$1.8M+/- to \$2.6M+/-
- **Total - \$11M+/- to \$15.8M+/-**

Any project moving forward should have established goals with respect to the ability to handle increases in flow in a phased approach. Tankage should be designed for ultimate flow projections, while equipment that may be in use for 20+ years prior to an ultimate flow increase can be replaced as part of a larger upgrade project in the future.

It should be noted that data from an Asset Management Plan for the LWSD contained 103 items related to Treatment which are recommended for completion over a 30-year period. The Total Value assigned to these improvements was \$5,154,000. Additionally, as part of a Draft CWMP completed by SEA Consultants, Inc. in 2007, the LWSD WWTF was recommended to be expanded to 0.732 mgd of capacity and converted to a Sequencing Batch Reactor (SBR) facility over a five (5) phase project. Back in 2007, SEA estimated the project to cost \$12,800,000 (inclusive of 35% engineering and contingencies). With an ENR projection of the 2007 cost to 2025 costs, it is estimated that this project could cost on the order of \$20M-\$25M. The review completed on 12/9/20 cannot be viewed to be as comprehensive and complete as other previously completed studies, including the Asset Management planning.

Table 2.12. Leicester Sewer District Monthly Flow Summary - Average Daily Flows (mgd)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVG
2016	0.168	0.177	0.162	0.153	0.109	0.084	0.071	0.102	0.075	0.091	0.102	0.13	0.119
2017	0.163	0.142	0.141	0.234	0.144	0.129	0.088	0.074	0.08	0.099	0.115	0.104	0.126
2018	0.136	0.176	0.177	0.194	0.122	0.078	0.088	0.129	0.127	0.143	0.157	0.168	0.141
2019	0.157	0.132	0.156	0.238	0.155	0.095	0.092	0.087	0.092	0.115	0.138	0.198	0.138
2020	0.165	0.153	0.151	0.193	0.129	0.081	0.08	0.073	0.079				
AVG	0.158	0.156	0.157	0.202	0.132	0.093	0.084	0.093	0.091	0.112	0.128	0.15	

Staffing

Refer to LWSD Staffing summary included in Section 2.1.3.

2.2.3 Hillcrest Sewer District

The Hillcrest Sewer District (HSD) is enabled by Chapter 612 of 1954 (the HSD Act). However, the HSD was not active until about 1999 when the Board was elected, district boundaries expanded and voted to build the collection system. The HSD Act provides for a three-member Board of Commissioners to be elected at the annual meeting to three-year staggered terms. The Board is responsible for creating a warrant for the annual meeting and appointing a district clerk and district treasurer who hold office until a successor is chosen. The meeting Moderator is elected at the beginning of each annual meeting.

Wastewater generated by the HSD is conveyed in part to the LWSD and in part to the Oxford-Rochdale Sewer District (ORSF). There are Inter-governmental agreements in place between HSD and both ORSF and LWSD. These agreements provide only for the treatment of wastewater. The project team could locate no agreement for operation and maintenance of the collection system. As is the case with the HWD, the HSD has no staff or officers and is managed by the LWSD with no written agreement to do so.

As authorized under the provisions of Chapter 612 of the Acts of 1954, the HSD boundaries are coterminous with the HWD delineation. The HSD and HWD have separate Boards of Commissioners and clerks. The HSD and HWD share a common Superintendent and operations staff.

The HSD sewer system generally consists of the following components:

1. Pine Street Pump Station
2. Laurelwood Avenue Pump Station
3. Sterling Street Pump Station
4. About 4.5 miles of 8-inch gravity sewer.
5. About 0.25 miles of 4-inch force main.

The 3 pump stations were all constructed in 2002-2003.

HSD has approximately 260 customer connections. Flow from about 131 customers discharges to the LWSD for treatment at the LWSD WWTP. Flow from remaining customers discharges to the ORSD for treatment at the ORSD WWTP. As sewer flows are not metered at the source, the flows from the HSD customers are reflected in the flows reported for the LWSD and ORSD, respectively.

The HSD is headquartered at the LWSD office located at 124 Pine Street, Leicester, MA.

Staffing

Operations for the HSD are handled by the LWSD. The LWSD staff keep track of their hours worked on the HSD system to bill the HSD accordingly. The HSD has a part-time treasurer and billing position averaging about 15 hours per month (note more hours during the billing months and less during non-billing months so 15 hours per month is an average). The HSD pays the ORSD \$4,500 per year to complete the billing for HSD. The HSD clerk is an annual elected, stipend position for recording meeting minutes. The HSD has Three Commissioners, separate from the LWSD commissioners which are also stipend positions.

2.2.4 Oxford Rochdale Sewer District

The Oxford Rochdale Sewer District (ORS D) is enabled by Chapter 250 of the Acts of 1957 (the ORSD Act). The ORSD Act provides for a three-member Board of Water Commissioners to be elected at the annual meeting to three-year staggered terms. The Board is responsible for creating a warrant for the annual meeting and appointing a district clerk and district treasurer who hold office for one year or until a successor is chosen. The meeting Moderator is elected at the beginning of each annual meeting.

Oxford-Rochdale Sewer District (ORS D) currently serves 1,021 customer connections. The ORSD owns, operates, and maintains approximately 15 miles of gravity sewer, 1.7 miles of sewer force main, 4 pump stations, and a 0.50 MGD wastewater treatment facility. The system serves about 3% of the Town of Oxford's population or approximately 300 residents who discharge wastewater flows to the treatment facility along with about 79 customers within the Hillcrest Sewer District (HSD). The ORSD is operated in an office building located at the wastewater treatment facility at 28 Comins Road, North Oxford, MA

The ORSD system includes a wastewater treatment plant (WWTP), 4 sanitary sewer pump stations and 14.5 miles of sewer pipe with approximately 381 manholes.

The original wastewater treatment facility was built in 1971 and has been upgraded in 1996 and 2010 to increase plant capacity. The WWTP is an aerated lagoon WWTP with advanced treatment, mechanical screen, two lined 180,000-gallon lagoons with floating aerators, two 45-foot diameter final clarifiers, 180

square foot ABW filter, chlorine gas; chlorine contact tank; discharges to French River and permitted for 0.50 MGD. The WWTP has chemical feed systems for PAC, sodium aluminate, chlorine gas and bisulfite. There are rotary lobe pumps for RAS and WAS and three 10,000-gallon sludge holding tanks. The WWTP also includes an Admin Building with offices and conference room, storage under with garage doors, a laboratory and 20 ft x 20 ft RAS/WAS pump building.

Oxford-Rochdale Sewer District is permitted (permit issued 6/22/05, MA0100170) to discharge 0.5 MGD (average monthly) of treated municipal wastewater via outfall 001 to the French River. The facility is required under the current permit to conduct quarterly whole effluent toxicity tests using *Ceriodaphnia dubia*. The facility's maximum daily permit limits for whole effluent toxicity are $LC50 \geq 100\%$ and $CNOEC \geq 17\%$. The permit includes seasonal limits on CBOD, total suspended solids (TSS), fecal coliform bacteria, total residual chlorine, total ammonia-nitrogen (NH₃-N), total phosphorus (TP), as well as limits on total copper. This permit has expired, and the District is waiting for EPA to issue a revised NPDES permit. The District has held off on WWTP upgrades until the permit is revised and discharge limits identified.

For the four sanitary sewer pump station, three stations have duplex 100 gpm Gorman Rupp pumps (Virginia Drive, Park Lane, Pleasant Street) and 1 station (Clark Street Station) has two 350 gpm Gorman Rupp pumps that serve Hillcrest Sewer District and upper parts of collection system. All the pump stations have buildings, and the Clark Street Pump Station has standby power.

The sewer collection system has about 15 miles of sewer (6-inch to 21-inch) including 21-inch RCP to the WWTP from Comins Road, 18-inch pipe up Mill Street to Stafford St, with the majority of the remaining 8-inch ACP and PVC pipe. The system includes about 1.7 miles of low-pressure sewers (1.5-inch to 6-inch) equipped with E1 pumps.

Oxford Rochdale Sewer District (ORSD) WWTF

This facility (aerated lagoon with advanced treatment) appears to be very well run and in decent shape. The facility was upgraded in 1995 and included an increase in capacity from 184,000 gpd to 500,000 gpd. The operator noted that a NPDES permit renewal application was submitted in 2014, and to date they have not seen a Draft or Final permit issued. The facility started enhanced chemical treatment for phosphorous removal in the late 1990s (seasonal limit of 0.2 mg/l). The operator is hesitant to move forward with any upgrades to the facility until they have a permit in hand, and due to the fact that the facility is running well. Recent upgrades/additions to the WWTF include a mechanical bar screen and RAS pumps. The operator noted that there is approximately \$780,000 set aside as a WWTF stabilization fund that will be used to offset some of the costs of future upgrades. The operator noted that upgrade projects are typically funded through USDA loans rather than SRF loans.

It is our belief that within the next 2-3 permit cycles that a Total Nitrogen Limit will be required, as the flow is discharged to the French River and ultimately ends up in Long Island Sound. We would expect the Total Nitrogen limit to range from 3-8 mg/l. This will result in the need for a future project to add some sort of denitrification process, typically a de-nite filter or anoxic zones. A budget of about \$1M-\$2M should be set aside for this project alone. The operators also expressed concern with a potential reduction in the seasonal phosphorous limit to 0.1 mg/l. Should this occur, we would expect the facility to need to optimize chemical addition and optimize effluent filtration. This could add \$0.5M to \$1M should this be required.

During the brief tour of the facility, the following observations/potential projects were identified:

- SC #2 – Steel Weirs/Baffles are deteriorating and should be replaced with FRP units – \$50,000+/-
- SC #2 – Corrosion was noted on the clarifier mechanism. Recommend blasting and re-coating – \$60,000+/-
- MCCs in RAS Building – The MCCs in the RAS Building are outdated and difficult to service. Replace with newer technology - \$150,000+/-
-
- Future Total Nitrogen Upgrade - \$1.5M+/- to \$3M+/-
- Future Phosphorous Removal upgrades - \$0.5M+/- to \$1M+/-
- Unscheduled Repair Allowance and Contingency (20%) - \$0.5M+/- to \$0.9M+/-
- **TOTAL - \$2.75M+/- to \$5.2M+/-**

It should be noted that data from an Asset Management Plan for the ORSD contained 89 items related to Treatment which are recommended for completion over a 50+ year period. The Total Value assigned to these improvements was \$2,614,500. The review completed on 12/9/20 cannot be viewed to be as comprehensive and complete as other previously completed studies, including the Asset Management planning.

Table 2.13. 2014 – 2019 ORSD Flow Data (Total Flow Treated (MG/MGD))

Month	2014	2015	2016	2017	2018	2019
January	9.905 / .320	7.686 / .248	7.656 / .247	10.220 / .330	9.670 / .312	12.950 / .418
February	7.002 / .250	5.188 / .185	9.304 / .321	8.443 / .302	10.58 / .378	10.12 / .361
March	11.870 / .383	8.968 / .289	10.450 / .337	9.150 / .295	12.320 / .397	11.460 / .370
April	11.460 / .382	11.620 / .387	9.565 / .319	13.570 / .452	12.670 / .422	14.150 / .472
May	9.044 / .292	6.200 / .200	7.314 / .236	10.240 / .330	9.749 / .314	11.950 / .385
June	5.369 / .192	6.683 / .239	5.044 / .168	8.429 / .281	6.102 / .204	7.735 / .258
July	4.265 / .138	5.49 / .177	4.204 / .136	6.531 / .211	6.935 / .224	6.636 / .214
August	3.877 / .125	4.170 / .135	4.563 / .147	5.114 / .165	9.573 / .309	6.246 / .201
September	3.952 / .132	4.072 / .136	4.224 / .141	4.855 / .162	9.765 / .329	5.573 / .191
October	5.061 / .163	4.738 / .153	5.514 / .178	5.514 / .178	11.350 / .366	7.299 / .235
November	5.4564 / .182	4.876 / .163	5.825 / .194	8.147 / .272	14.250 / .475	9.089 / .303
December	10.800 / .348	6.140 / .198	8.095 / .261	8.247 / .266	13.160 / .424	13.370 / .431
TOTAL	88.059	75.831	81.758	98.460	126.124	116.578
Daily Avg	.241	.208	.224	.270	.346	.319

Staffing

The ORSD is required to have a minimum of 2 fully licensed wastewater operators work full time Monday through Friday. On the weekends, the ORSD is allowed to have one operator stop by the WWTP for 2 hours on Saturday and 2 hours on Sunday. When an operator takes vacation, they are allowed to have one operator working. Should emergencies occur, they call the LWSD to provide operators to assist.

The ORSD has a full-time Superintendent who maintains a current wastewater operator license. The Superintendent swaps weekends with the other wastewater operator. The ORSD employs one full-time licensed wastewater operator. The ORSD is a Grade 4 system. The superintendent is the chief operator and holds a Grade 5 license. The assistant operator holds a Grade 4 license. The ORSD employs a treasurer and billing position which averages about 15 hours per week. Currently the treasurer is in office at ORSD in the afternoons after the LWSD office hours (the same person fulfills LWSD, HWSD, HSD and ORSD treasurer positions). The ORSD clerk is a stipend position as are the three commissioner positions.

2.3 Moose Hill Reservoir and Moose Hill Water Commission

Moose Hill Reservoir was authorized under the provisions of Public Law 566 Small Watershed Program administered by the US Department of Agriculture Soil Conservation Service. The dam was constructed in 1966 impounding Shaw Brook for the purposes of flood control storage capacity, water supply and low flow augmentation. Sponsoring Local Organizations signed on to the Watershed Work Plan Agreement dated September 28, 1962; the Supplemental Watershed Work Plan Agreement No. 1 dated June 29, 1962, and Supplemental Watershed Work Plan Agreement No. 2 dated April 1968. Sponsoring Local Organizations included the Southern Worcester County Conservation District, Northern Worcester County Conservation District, Town of East Brookfield, Town of Leicester, and the Massachusetts Water Resources Commission. An Agreement was then executed between the Commonwealth of Massachusetts and the Town of Leicester dated December 12, 1972, for the purpose of construction of the Moose Hill Reservoir as a multi-purpose floodwater retarding and municipal water supply structure. An Operation and Maintenance Agreement was executed between the Soil Conservation Service, the Massachusetts Water Resources Commission and the Town of Leicester dated September 22, 1978.

The Moose Hill Reservoir Dam is currently owned and controlled by the Massachusetts Department of Conservation & Recreation (DCR), as successor to the Water Resources Commission referenced as a signatory Sponsoring Local Organization in the agreements listed above. The Town of Leicester continues to share in the costs of operation and maintenance in accordance with the 1978 Operation and Maintenance Agreement. The Town's share of the annual costs is 33.2%.

The Moose Hill Water Commission is the designated department of the Town of Leicester which is responsible for coordination of payments for the town's share of the costs of operation and maintenance of the reservoir and for coordination of any plans for the development of the reservoir as a source of public water supply. The Commission is administratively within the Leicester Planning & Economic Development Department.

The agreements referenced above are included in Appendix B-1.

An Intermunicipal Agreement (IMA) was executed between the Leicester Water Supply District (LWSD) and the Town of Leicester dated May 13, 2003, to provide an interim water supply and sewer connection for the rezoned portion of Route 9 West to assist the Town in promoting the rezoned Route 9 West corridor for business activities. The IMA goes on to state that: "It is understood that current District plant capacities for water and sewer are limited and will only provide an interim solution. Therefore, the long-range goal of the Town and the District shall be the development of the Moose Hill Reservoir and/or Shaw Pond as a primary water source for the entire Town."

The IMA includes 18 numbered paragraphs describing the actions taken or to be taken by the District and the Town, respectively. Specific water and sewer lines listed to be financed by the Town and constructed under a Massachusetts Highway Project 600858-02 include a water line in Route 9 and water booster station as part of a joint Town/District construction project; a sewer line in Route 9 and West Main Street and Sewer Pump Station on or adjacent to Town Beach Road (IMA paragraphs 4 and 5). Paragraph 10 calls for the District to construct and own a water storage tank at the District's expense "at a later date to provide fire flow storage and future water storage from the Moose Hill Reservoir facility."

Paragraph 13 states: "Once Moose Hill Reservoir facility water is provided to the water mains; the water mains shall also become a distribution/transmission main from the Moose Hill Reservoir facility. The booster pump station shall become a standby station in the event the Moose Hill Reservoir facility is taken offline or place out of service. Any connections made to the water main between the facility and the Route 9/Route 56 intersection shall be metered for water and the District shall compensate the Town for the water used. The rate for water so metered shall be determined by the formula described on "Exhibit 3" attached hereto." A file search has been unable to locate a copy of the referenced Exhibit 3. It remains unclear as to whether the Town or the District initially drafted the referenced formula which presumably describes the basis of compensation from the Strict to the Town for the purchase of the water delivered to the District from the Moose Hill Reservoir facility. The complete Agreement for Expansion of Water and Sewer Service Along Route 9 Between Leicester Water Supply District and Town of Leicester is included in Appendix B-3.

Feasibility Studies

Subsequent to the execution of the IMA between the Town and LWSD, LWSD engaged the services of SEA Consultants, Inc. to produce the first of two studies to evaluate the feasibility and costs required to develop Moose Hill as a source of public water supply.

Two studies were conducted to evaluate the feasibility and costs to develop Moose Hill as a source of public water supply. The first of these was prepared by SEA Consultants, Inc. (SEA) dated June 2008. This study considered that Moose Hill was capable of supplying up to 1.5 Million Gallons per Day (MGD) based on the reliable watershed yield of the reservoir. This would be subject to review and approval of the MassDEP and treatment requirements under the Safe Drinking Water Act and the actual yield could be less than 1.5 MGD. The study estimated the cost for development of a drinking water supply at Moose Hill Reservoir at \$8,886,000 (in 2008 dollars), including costs for the following listed items:

1A 1.5 MGD Surface Water Treatment Plant	\$4,500,000 (2008 dollars)
1B Land Acquisition/Site Development	Not Specified
2 Transmission Main (16" DI Pipe)	\$1,375,000 (2008 dollars)

W&S INFRASTRUCTURE REVIEW

Leicester

3	0.50 MGD Elevated Storage Tank	\$1,530,000 (2008 dollars)
4	Surface Water Intake	Not Included
5	Residuals Force Main & PS	Not Included
	Sub-Total	\$7,405,000 (2008 dollars)
	Engineering Services (Design, Procurement, Construction Svc.)	\$1,481,000 (2008 dollars)
	Permitting	Not Included
	TOTAL	\$8,886,000 (2008 dollars)

The second study was conducted in 2017 by Whitewater Consultants and their project partner Environmental Partners Group. This study focused on developing:

1. Planning level capital and operation and maintenance cost estimates for the potential water system infrastructure improvements associated with a new surface water treatment plant at the Moose Hill Reservoir and connection to the Town's existing water system, and
2. A forecast of the implementation schedule for the project, starting with a more detailed feasibility study through design, permitting and construction completion.

Table 2, Summary of Typical New England Surface Water Quality provided the only water quality information specific to Moose Hill Reservoir, dated 1996. Water quality reported on included Turbidity (0.5 – 1.5 NTU); Color (50 – 130 CU); pH (5.5 – 7.0 SU); Iron (0.07 – 0.7 mg/L); and Manganese (0.03 – 0.3 mg/L). Hardness, Coliform and Organics were listed in Table 2, but no data was included for these parameters.

Table 3 – Draft Capital Cost Estimate of Water Treatment Plant and Distribution System Improvements substantially updated the 2008 cost estimates producing a total capital cost estimate of \$20,173,681 (in 2017 dollars), estimated as follows:

1A	1.5 MGD SW Treatment Plant	\$10,233,945 (2017 dollars)
1B	Land Acquisition/Site Development	Not Included
2	Finished Water Transmission Main	\$1,787,5000 (2017 dollars)
3	0.50 MG Water Storage Tank	\$2,065,500 (2017 dollars)
4	Surface Water Intake	\$600,750 (2017 dollars)
5	Residuals Force Main & PS	\$1,451,250 (2017 dollars)*
	Sub-Total	\$16,138,945 (2017 dollars)
	Engineering Services	\$4,034,736 (2017 dollars)
	Public Outreach & Permitting	\$750,000 (2017 dollars)
	TOTAL	\$20,173,681 (2017 dollars)

*Not including discharge treatment costs. For example, if residuals are discharged to the LWSD, the WWTF requires expansion to accept this flow since the existing WWTF does not have the capacity to accept this additional volume. An alternative would be to discharge to the Spencer WWTF, however, it is understood that this facility does not have the capacity to accept the additional flow either. Another alternative would involve trucking of residuals to a treatment facility with the capacity to accept such materials. A line item should be included in the above costs for WWTF expansion and upgrade due to the significant burden the existing nearby WWTFs would have for receiving residuals from the surface water treatment facility.

The study also included a projected cost forecast for 2025 of \$27,609,076.

Table 5 of this study also estimated the annual operation and maintenance costs for a 1.5 MGD water treatment plant at \$796,072 (2017 dollars).

The referenced feasibility studies are provided as Appendices B-4 and B-5, respectively.

Water Supply Approval Process – Massachusetts Department of Environmental Protection (MassDEP)
MassDEP has provided the Moose Hill Water Commission with two letters providing documentation of the process required for Leicester to develop Moose Hill Reservoir as a source of public drinking water. The first such letter is dated November 9, 1987, from James Fuller, then Deputy Regional Environmental Engineer for the Department of Environmental Quality Engineering (DEQE), forerunner to MassDEP. Mr. Fuller indicates that engineers from his office completed a review of the SEA report “Preliminary Design Report, Moose Hill Reservoir Water Treatment Facility, March 1986” and states that: “Based on this report, this office approves the Moose Hill Reservoir as a source for a public water supply.”

The letter goes on to require that plans and specifications of treatment facilities to address drinking water regulations are required to be submitted and approved by this office prior to use of this supply and prior to construction of the treatment facilities. The letter further points out the obligation of other required permits and approvals including the Interbasin Transfer Act, Water Management Act and MEPA. Finally, the letter indicates that “the Moose Hill Reservoir presently does not serve any customers. Steps should then be taken to enter into agreements with any or all of the three water districts in the Town of Leicester to provide them with this water.”

The second correspondence from DEP to the Moose Hill Commission is dated November 3, 2008, from Marielle Stone, Section Chief of the Central Regional Office Drinking Water Program of the MassDEP. This letter outlines in detail the process and procedures required to be met in order to establish a new drinking water source and treatment facility in order for the Moose Hill Reservoir to be used as a source of public drinking water. Included among an extensive list of studies and reports is a Preliminary Report and Site Examination for a Source Greater than 70 GPM (BRP WS 17). The Preliminary Report must include:

1. Details of the proposed location of the intake structure;
2. A bathymetric map of Moose Hill Reservoir.
3. Mapping of the watershed, the reservoir and its tributaries, DEP Zones A, B and C, and proposed sampling locations.
4. Mapping of land use, ownership, and potential sources of contamination within the watershed.
5. Mapping of the potential water supply service areas, water and sewer districts, and possible service interconnections.
6. Population projections to be served by Moose Hill Reservoir for use in developing Water Needs Forecasts by DCR.

7. Detailed estimates of capital, operation and maintenance costs and the method(s) to finance capital charges and operational expenses.
8. Completion of relevant portions of the Site Screening package, including:
 - a. Early Notice of the Proposed Project in the Environmental Monitor.
 - b. Water Conservation Plan for Public Water Suppliers; and
 - c. Alternatives Analysis.

MassDEP specifies that it must conduct a Site Examination which will include an evaluation of the proposed water quality sampling program covering a minimum of one year of sampling for some eleven categories of water quality parameters.

MassDEP letters are included in Appendix B-6

Current Status

Since the submission of the Draft Final Moose Hill Reservoir Feasibility Study Update, dated July 27, 2017, no specific actions have been taken to recognize Moose Hill Reservoir as an approved source of public water supply as specified by MassDEP. The watershed and bathymetric mapping specified in the MassDEP correspondence referenced above has not been developed as of this time. The water quality sampling of the reservoir specified by MassDEP has not been initiated. No specific budget requests appear to have been made or acted upon in the context of town meeting actions with reference to determining the suitability of Moose Hill Reservoir as a new water source or how water drawn from Moose Hill Reservoir would be made available to the Districts providing drinking water within their respective service areas. While the IMA between the Town and the LWSD appears to remain in effect, initiation of new discussions between the Town and all of the water districts would be prudent with regard to the future use of Moose Hill Reservoir as a possible town-wide source of public water supply.

For the purposes of the current assignment to evaluate the potential options for restructuring the delivery of water and sewer services within the Town of Leicester, Moose Hill Reservoir continues to represent a potential source of drinking water, subject to the approval of MassDEP and determination of treatment and distribution system requirements in the amount of 1.5 MGD. The current average daily demand total for the three current water districts is about 1.2 MGD. As such, it is possible to envision a future scenario in which Moose Hill could be developed as a source of public water supply capable of meeting the present-day water demands of the existing service areas of the existing water districts.

As a first step towards determining whether the development of Moose Hill as a drinking water supply would be cost-effective an analysis was conducted to compare the potential costs to develop and then operate a treatment facility meeting DEP requirements from Moose Hill Reservoir to the costs of purchasing treated water from the City of Worcester. This analysis used the current purchase price per ccf from Worcester applied to the 1.5 mgd design basis for a water supply developed using Moose Hill Reservoir as its source of supply. Purchase of a daily volume of 1.5 million gallons per day (~732,000 ccf per year) of water from Worcester at \$3.63 per ccf produces an annual cost of \$2,656,800. Estimating the costs to develop a water supply at Moose Hill including treatment facility, intake, storage tank and additional water mains and related costs resulted in estimated total capital costs of approximately \$30 Million. In addition, the costs of annual operation and maintenance costs were estimated in the range of from \$860,000 to \$1.5 Million.

Assuming an issuance cost of 1% of the total capital cost results in a total principal cost of \$30,300,000. Bond costs were estimated based on an interest rate of 4.0% over a 30-year return period resulting in an annualized debt service cost of \$1,752,252. Adding the range of annual O&M costs to the annual debt service cost results in total annual costs that range from \$2,612,252 to \$3,252,252. This preliminary

cost comparison does not make any assumptions regarding possible changes in Worcester's charge basis over time. At this stage, it would not appear that development of Moose Hill to meet the demands of the service areas associated with the water districts as presently constituted would result in rate reductions for the short-term. However, it is necessary when evaluating new water supply sources to look out longer than 10 to 20-years.

In evaluating the potential development of Moose Hill for future water supply use, it would also be prudent to consider the future water demands, both for the water districts presently in place and for any plans to extend water service to any other areas within the Town of Leicester. It would be critical to consider whether the ability to provide 1.5 MGD will prove sufficient against future demand projections (which are beyond the scope of the current study) or expansion of water service to areas of town which are currently unserved by any of the existing water districts. Finally, it would also be prudent to consider whether the City of Worcester supply may become limited in its ability to meet the demands of the Leicester service areas at any point in the future.

2.4 Stiles Lake Water District

The Stiles Lake Water District was established in 1976 pursuant to chapter 476 of the Acts of 1976. Although the provisions of this enabling act mirror the description of a water district established for the purpose of providing water supply and distribution services within the boundaries established, the sole purpose for the creation of this water district was to provide an organizational framework for residents abutting Stiles Lake to be able to manage the finances and regulatory obligations as owners of the dam at the outlet of the lake. These purposes have been confirmed in discussions with the Chair of the Stiles Lake Water District. At present, there are no public water supply services provided by this district; nor are there plans to do so in the foreseeable future. All residents within the defined district boundary as described in the enabling act rely on private wells for their water supply purposes. For these reasons, no further assessment is required in relation to the Stiles Lake Water District. Future consideration may be given to the activation of this district giving due regard to the language of its enabling act which does in fact describe a typical water district, similar to the enabling act legislation for each of the other water districts operating within the town of Leicester.

3.0 CURRENT ASSESSMENT OF DISTRICT CONDITIONS - SUMMARY

3.1 Financial

In addition to current technical and regulatory assessments of each of the Districts it is important to understand their current financial conditions. These financial condition assessments are important to paint a full picture of the Districts currently but are critical to understanding the financial and customer impacts associated with the consideration and analysis of any future consolidation options. In order to perform an initial financial assessment, the following information was requested of and reviewed for each District.

- Historical and current operating budgets, in as much detail as possible for categorization and planning purposes.
- Annual debt service schedules for outstanding debt.
- Historical comprehensive annual financial reports or other audited or unaudited annual financial reporting documents.
- Annual reserve fund balances restricted and unrestricted, and any policied sources and uses.
- Future capital expenditures and any known sources of funding.
- Existing rates, user charges, and miscellaneous fees; and
- Detailed historical customer and billing information.

The following sections present an existing snapshot of the rate and financials of each of the Districts.

3.1.1 Cherry Valley – Rochdale Water District

The Cherry Valley – Rochdale Water District (CVRWD) has an annual operating budget of approximately \$1.3 million. The CVRWD's largest cost drivers currently include payroll and related expenses, an intermunicipal agreement payment to the City of Worcester, and annual debt service payments. These three annual cost items alone account for almost two-thirds of the CVRWD's current annual revenue requirements.

The CVRWD's total annual revenue is currently \$1.3 million; made up predominantly by user charges to customers through monthly water rates. The District currently employs a four-tier inclining block rate structure along with a monthly fixed charge. Other miscellaneous, and comparatively small, sources of revenue for the CVRWD include customer penalties, tower rental payments, interest income, etc.

The CVRWD is currently operating in a structural cash surplus. This means that on an annual basis, currently, the CVRWD is collecting more from revenues than it is spending. The District also has an unrestricted fund balance of approximately \$300,000. Although CVRWD will most likely be required to implement rate increases in the future to generate the additional revenues needed to adequately support future capital expenditures, which are presented in Section 2 of this report, those rate increases should be moderate and reasonable. In order to understand on a deeper level, the financial, rate, and customer impact situation currently faced by the CVRWD and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered. To provide context, the following definitions can be referred to for

purposes of understanding each metric. These definitions carry through the remainder of this section for each of the Districts.

- Typical Annual Bill – Represents an annual water or sewer bill for a residential customer with a 5/8" meter and using 60 hundred cubic feet (Ccf) or 45,000 gallons of water annually.
- Annual Cost per Connection – Instead of calculating an actual bill defined by an assumed amount of consumption, as presented by the Typical Annual Bill, this metric simply takes each District's total annual revenue requirements and divides by the total amount of connections.
- Cost per Billable Unit – This is another metric utilized to portray total annual revenue requirements in a comparative manner. Total annual revenue requirements are divided by the total annual billable units by District. Billable units are typically in the format of Ccf or thousand gallons.
- Annual Revenue Requirements – The total annual cash needs of each District, currently. Please note that these revenue requirements will change over time to reflect inflationary adjustments as well as additional capital expenditures.
- MHI Burden – MHI, or Median Household Income, has historically been used in the water and sewer industry as a comparative metric for purposes of defining whether water and sewer bills are affordable for customers. MHI Burden takes the Typical Annual Bill and divides it into the service areas' MHI. Historically, any MHI Burden in excess of 2.0% for water or sewer bills individually, would be considered unaffordable. There have been opponents of this metric in the industry, pointing to the fact that MHI income levels do not necessarily represent the income of the most economically disadvantaged customers. To reflect this, lower income levels are utilized for comparison purposes, which will be presented utilizing the LQI Burden below.
- % of HH Living in Poverty – Represents the percent of households in the service area which are currently living in poverty. This is a good metric for understanding the general affordability issue at hand.
- Total Annual Revenue – The total annual revenue currently being collected by each respective District. This reflects all revenue sources, not just user charges. This value does not reflect future rate increases, no matter how necessary they are.
- LQI Burden – As discussed in the definition for MHI Burden, this metric operates in the same manner, but utilizes the upper limit income of the lowest quintile of households for purposes of comparing a Typical Annual Bill to. This is thought to be more indicative of the burden water or sewer bills place on a truly economically disadvantaged household.
- Bills in Hours of Min. Wage – Represents the number of hours someone would have to work, earning minimum wage, to pay for the Typical Annual Bill. This is assuming Massachusetts' existing minimum wage of \$12.75.

Table 3.1. CV RWD Key Financial Metrics

Typical Annual Bill \$998	Annual Cost per Connection \$1,415	Cost per Billable Unit \$16.57
Annual Revenue Requirements \$1,303,956	MHI Burden 1.64%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$1,563,382	LQI Burden 2.12%	Bill in Hours of Min. Wage 74.0

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.2 Hillcrest Water District

The Hillcrest Water District (HWD) has an annual operating budget of approximately \$299 thousand. The HWD's largest cost drivers currently include payroll and related expenses, annual professional services, and debt service. These three annual cost items account for almost half of the HWD's current annual revenue requirements, although it should be noted that the HWD's existing debt service is adequately managed and not a hindrance to customers' bills.

The HWD's annual revenue is currently \$296 thousand; made up predominantly by user charges to customers through quarterly water rates. The District currently employs a two-tier inclining block rate structure along with a quarterly minimum charge which includes 2 hundred cubic feet (Ccf) of usage. The HWD has other miscellaneous revenue sources, such as other charges and interest income, but are negligible in its grand total of revenue.

The HWD is currently operating an about break-even operation from a revenue versus costs standpoint. The District has a healthy unrestricted fund balance of about 40% of its annual revenue stream. Assuming adequate financing of the HWD's future capital expenditure needs, future rate increases will be required, albeit to a manageable degree.

In order to understand on a deeper level, the financial and rate situation currently faced by the HWD and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

Table 3.2. HWD Key Financial Metrics

Typical Annual Bill \$480	Annual Cost per Connection \$761	Cost per Billable Unit \$13.46
Annual Revenue Requirements \$298,950	MHI Burden 0.79%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$295,811	LQI Burden 1.02%	Bill in Hours of Min. Wage 35.6

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.3 Leicester Water Supply District - Water

The Leicester Water Supply District's water operations (LWSD-W) has an annual operating budget of approximately \$777 thousand. Its largest cost drivers currently include payroll and related expenses, engineering and capital related costs, and debt service.

The LWSD-W's annual revenue is currently \$787 thousand; made up predominantly by user charges to customers through quarterly water rates. The District currently employs a three-tier inclining block rate structure along with a quarterly fixed charge. The LWSD-W has other miscellaneous revenue sources, such as interest income, connection fees, and annual rental fees.

The LWSD-W is currently operating a structural cash surplus with a healthy unrestricted fund balance of over 20% of its annual revenue stream. Assuming adequate financing of the LWSD-W's future capital expenditure needs, future rate increases will be required, albeit to a manageable degree.

In order to understand on a deeper level, the financial and rate situation currently faced by the LWSD-W and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

Table 3.3. LWSD-W Key Financial Metrics

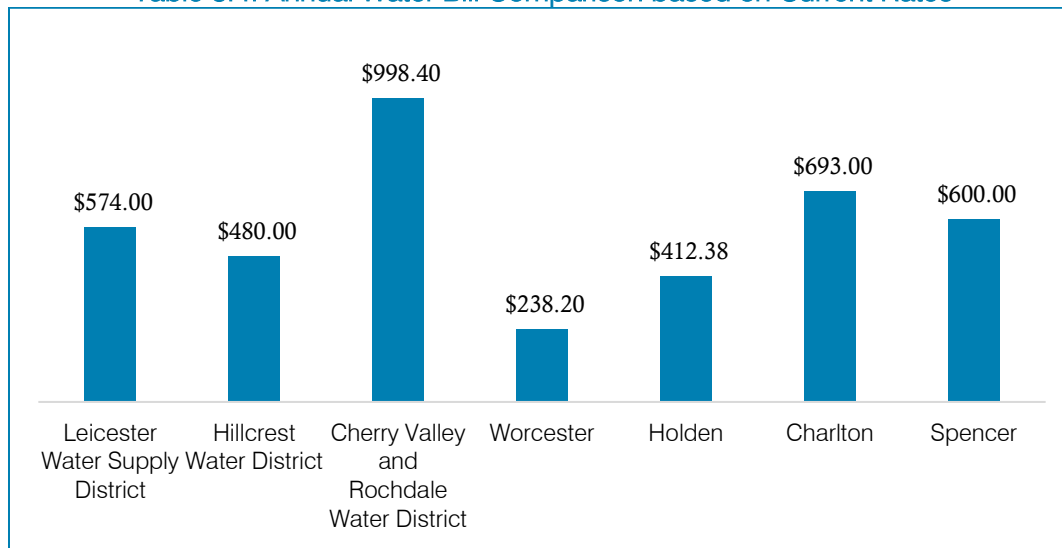
Typical Annual Bill \$574	Annual Cost per Connection \$990	Cost per Billable Unit \$12.37
Annual Revenue Requirements \$777,042	MHI Burden 0.94%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$787,452	LQI Burden 1.22%	Bill in Hours of Min. Wage 42.5

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.4 Summary of Water District's Key Financial Metrics

The graphic in Appendix C provides side-by-side comparisons of the various water districts. At this time, the Weston and Sampson project team are drawing no firm conclusions as to the importance in the magnitude of differences between the comparative metrics between districts and are instead presented for information purposes only at this time. As the project proceeds as planned, and various consolidation options are considered, these comparative metrics will be utilized to help formulate and compare options over structure and time. Included in Appendix C, but also worthy of being presented here in the body of this report is a comparison of an annual water bill, presented for all 3 water districts, as well as 4 neighboring municipal water utilities. Bills are presented on an annual basis and assume a residential customer with 60 Ccf of annual consumption and a 5/8" meter, where applicable and rates differentiate by meter size.

Table 3.4. Annual Water Bill Comparison based on Current Rates



3.1.5 Cherry Valley Sewer District

The Cherry Valley Sewer District (CVSD) has an annual operating budget of approximately \$894 thousand. CVSD's largest cost drivers currently include payroll and related expenses, wholesale wastewater treatment costs, and debt service. These three annual cost items account for over 80% of the CVSD's current annual revenue requirements. Cherry Valley's annual debt service requirements alone account for almost half of its annual revenue requirement. Although, it should be noted that the CVSD's loans with USDA have been recently refinanced, reducing the District's annual revenue requirements by over \$160k, or approximately 18%.

The CVSD's annual revenue is currently \$760 thousand; made up predominantly by user charges to customers through monthly sewer rates. The District currently employs a four-tier inclining block rate structure along with a monthly fixed charge. Other miscellaneous, and comparatively small, sources of revenue for the CVSD include liens and interest income.

The CVSD has in recent years operated in a structural cash deficit, although with the aforementioned USDA loans refinancing, the District is anticipated to begin breaking even. In addition, the District also has a current unrestricted fund balance which is negative. In order to remove CVSD's negative unrestricted cash balance, a rate increase would be required. This would be on top of recent rate increases of significant magnitudes, as well as future required rate increases to support inflationary changes, capital expenditures, and replenishing of the District's unrestricted fund balance, bringing the District's bills even more significantly higher than comparative customer bills as other surrounding sewer utilities. Please see section 3.2.2.5 for a chart of comparisons.

In order to understand on a deeper level, the financial and rate situation currently faced by the CVSD and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

Table 3.5. CVSD Key Financial Metrics		
Typical Annual Bill \$1,929	Annual Cost per Connection \$1,909	Cost per Billable Unit \$38.63
Annual Revenue Requirements \$893,505	MHI Burden 3.17%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$760,071	LQI Burden 4.10%	Bill in Hours of Min. Wage 142.9

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.6 Hillcrest Sewer District

The Hillcrest Sewer District (HSD) has an annual operating budget of approximately \$338 thousand. The HSD's largest cost drivers currently include outside services, treatment related costs, and annual debt service. Although it should be noted that the HSD has adequate funds from betterment fees to retire its existing debt service, and as such HSD's existing debt service is not supported by, or influencing, rates.

The HSD's annual revenue is currently \$300 thousand; made up predominantly by user charges to customers through quarterly rates. The District currently employs a flat rate per customer, irrespective of water usage, meter size, or customer classification. The HSD receives other revenue sources, in addition to its flat fees, of other charges and investment earnings.

The HSD is currently operating an about break-even operation from a revenue versus costs standpoint. The District has a healthy unrestricted fund balance of about 60% of its annual revenue stream. Assuming adequate financing of the HSD's future capital expenditure needs, future rate increases will be required, albeit to a manageable degree.

In order to understand on a deeper level, the financial and rate situation currently faced by the HSD and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

Table 3.6. HSD Key Financial Metrics		
Typical Annual Bill \$540	Annual Cost per Connection \$861	Cost per Billable Unit \$15.23
Annual Revenue Requirements \$338,240	MHI Burden 0.89%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$299,577	LQI Burden 1.15%	Bill in Hours of Min. Wage 40.0

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.7 Leicester Water Supply District - Sewer

The Leicester Water Supply District's sewer operations (LWSD-S) has an annual operating budget of approximately \$657 thousand. Its largest cost drivers currently include payroll and related expenses, and engineering and capital related costs.

The LWSD-S's annual revenue is currently \$671 thousand; made up predominantly by user charges to customers through quarterly sewer rates. The District currently employs a two-tier inclining block rate structure along with a quarterly fixed charge. The LWSD-S has other miscellaneous revenue sources, such as interest income, connection fees, and assessments and betterments.

The LWSD-S is currently operating a structural cash surplus with a healthy unrestricted fund balance of over 20% of its annual revenue stream. Assuming adequate financing of the LWSD-S's future capital expenditure needs, future rate increases will be required, albeit to a manageable degree.

In order to understand on a deeper level, the financial and rate situation currently faced by the LWSD-S and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

Table 3.7. LWSD-S Key Financial Metrics		
Typical Annual Bill \$551	Annual Cost per Connection \$837	Cost per Billable Unit \$10.46
Annual Revenue Requirements \$657,042	MHI Burden 0.91%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$671,706	LQI Burden 1.17%	Bill in Hours of Min. Wage 40.8

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.8 Oxford-Rochdale Sewer District

The Oxford-Rochdale Sewer District (ORSD) has an annual operating budget of approximately \$546 thousand. The ORSD's largest cost drivers currently include payroll and capital related investments and maintenance.

The ORSD's annual revenue is currently \$610 thousand; made up predominantly by sewer user charge revenue. The District currently employs a flat annual charge for sewer, irrespective of the amount of water a customer uses, or its meter size or customer classification. The ORSD has other miscellaneous revenue sources but are negligible in its grand total of revenue.

The ORSD is currently operating a structural cash surplus with a healthy unrestricted fund balance of approximately 50% of its annual revenue stream. Assuming adequate financing of the ORSD's future capital expenditure needs, future rate increases will be required, albeit to a manageable degree.

In order to understand on a deeper level, the financial and rate situation currently faced by the ORSD and its customers, the following metrics have been compiled in tabular format. These data will be relied upon as needed for comparison purposes as consolidation options are considered.

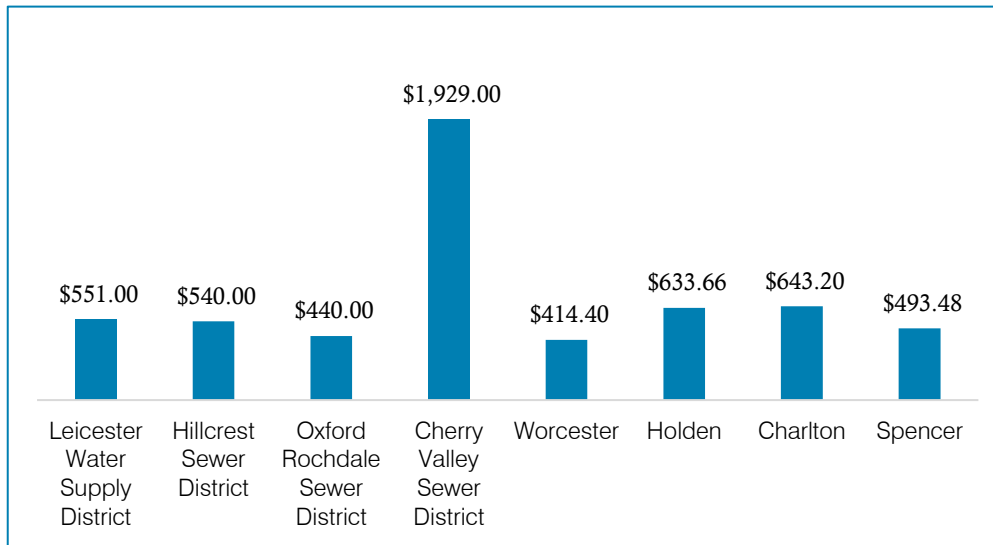
Table 3.8. ORSD Key Financial Metrics		
Typical Annual Bill \$440	Annual Cost per Connection \$511	Cost per Billable Unit \$3.58
Annual Revenue Requirements \$544,587	MHI Burden 0.72%	% of HH Living in Poverty 4.1%
Total Annual Revenue \$610,227	LQI Burden 0.94%	Bill in Hours of Min. Wage 32.6

Table Note: MHI = Median Household Income; LQI = Lowest Quintile Income; HH = Households

3.1.9 Summary of Sewer District's Key Financial Metrics

Table 3.9 provides side-by-side comparisons of the various sewer districts. At this time, the Weston and Sampson project team are drawing no firm conclusions as to the importance in the magnitude of differences between the comparative metrics between districts and are instead presented for information purposes only at this time. As the project proceeds as planned, and various consolidation options are considered, these comparative metrics will be utilized to help formulate and compare options over structure and time. Included in Appendix D, but also worthy of being presented here in the body of this report is a comparison of an annual sewer bill, presented for all 4 sewer districts, as well as 4 neighboring municipal sewer utilities. Bills are presented on an annual basis and assume a residential customer with 60 Ccf of annual water consumption and a 5/8" meter, where applicable and rates differentiate by meter size.

Table 3.9. Annual Sewer Bill Comparison based on Current Rates



3.2 Structure and Organization

Each of the 6 districts were established by separate special acts of the Massachusetts Legislature over a 118-year period beginning in 1888 with the creation of the Leicester Water Supply District.^[1] All of the districts are governed in a manner similar to the open town meeting government in Massachusetts with an elected executive (i.e., Board of Commissioners) and legislative body that is open to all voters residing in the district. Initially, managing officers for most of the districts were elected by the annual meeting but recent changes to by-laws allow the appointment of clerk, treasurer, and superintendent by the Board of Commissioners. Some of the districts have executed inter-agency agreements providing for shared management and operation.

The Board of Commissioners convene an annual meeting. A Moderator selected by the voters present at that meeting presides over the annual meeting. Annual meetings are generally not well-attended. Membership on the boards of each district is characterized by low turnover with little or no competition for positions and the same is true for most managing officers. None of the districts formally plan for succession of Commissioners or other officers.

Each district has adopted by-laws and rules and regulations. The most recently revised rules and regulations are 7 years old (ORSD); the most recently adopted by-laws are 6 years old (LWSD). By-laws are essential to the administration of the districts while rules and regulations are essential to the proper operation of the systems. Both should undergo periodic review to ensure consistency with law, regulation, and actual practice. See Table 2.2 for a list of bylaws and regulations by date of adoption^[4]. Although there is no standard timeframe for review, rules and regulations should be reviewed every 5 years and anytime a significant regulation or permit condition is changed by federal or state authorities. By-laws are less likely to require revision and can be reviewed less often.

While the districts have taken steps towards professional management of their finances by appointing rather than electing treasurers, none appear to have job descriptions that adequately describe the necessary skills, education, experience, and work performance for these positions. Specifically, two districts (CV-RWSD and ORSD) have provided job descriptions. In the case of ORSD, there is no job

description for Treasurer and the descriptions for operations personnel are 25 years old. CV-RWSD the Treasurers job description is a fairly extensive list of duties, but lacks mention of educational and experiential qualifications, required training or certification, needed skills or abilities, and other factors such as the level of confidentiality that the job requires. Complete job descriptions are an important management tool as they set forth the standards for the job, the expectations of the organization and help meet legal requirements established in, for example, anti-discrimination and fair labor statutes.

Along with moving to appointed treasurers, many of the districts share Treasurers to improve efficiency. However, it is not clear what the recruitment and selection process has looked like in the past for these positions. The project team noted that although there is no certification process that is entirely applicable to district treasurers, certification, and professional development through the Massachusetts Collectors & Treasurers Association (MCTA) is likely relevant. Although there are portions of the program that are not relevant, the MCTA Treasurer certification program covers many beneficial topics, such as, cash control procedures-, short- and long-term borrowing, municipal finance law, ethics, capital budgeting and financing, and procurement. The districts would likely benefit from further professionalization of these positions through job descriptions, a rigorous recruitment and selection process as vacancies occur, and more support for training and ongoing professional development of individuals holding the position.

In general, the districts have seen a great deal of longevity in leadership positions. The stability that comes from successfully retaining competent leadership should not be understated. All organizations will eventually experience turnover in key positions. The loss of institutional knowledge when this turnover occurs can be substantial. Having basic human resources and financial management structures in place will help ensure smooth transitions. For example, it appears that only one district has formal HR policies and another an employee handbook. There are no formal employee performance evaluations or written financial policies and procedures. While this may be typical of similar water and sewer districts in Massachusetts, these are worthy endeavors. Additionally, some of the districts do not have a debt management plan or a robust capital planning process. The project team recognizes that many of these occur, but in many cases, they rely on individual knowledge and habit rather than being established or documented in the management structure.

[\[1\]](#) See Appendix A for copies of by-laws and rules and regulations.

4.0 ORGANIZATIONAL & MANAGERIAL STRENGTHS & WEAKNESSES (LEICESTER)

The strengths of the districts are rooted in the involvement of a core group of leaders who have devoted their careers to the success of these organizations. Each district has enjoyed a great deal of stability in their management as commissioners tend to stay on for extended periods. They have employed qualified, capable, and appropriately licensed superintendents to manage the operations. Administratively they are in the hands of dedicated and hands-on treasurers and staff who juggle the needs of multiple districts and provide customer service that is highly responsive to their customers. They appear to take seriously their fiduciary responsibilities and ensure that there are periodic external financial audits.

There is also a great deal of cooperation among the districts. Several inter-agency agreements are in place providing joint management of districts and districts appear to cooperate very well ad hoc. For example, there are two treasurers in place to oversee the finances of 6 districts and three superintendents who oversee their operation. Although formal inter-agency agreements exist between some of the districts, they do not cover all of the financial and operational relationships, nor do they cover every aspect of the formalized relationships.

Organizationally, the districts are challenged by being small, and increasing and extensive regulation. On the other hand, the districts have mitigated these challenges through stability in leadership, strong technical ability, and well-established long-term relationships.

The districts essentially operate as independent “towns” organized to provide water and/or sewer services to discrete geographic areas. Governed by voters in attendance at an annual meeting and an elected Board of Commissioners, the districts most resemble Massachusetts Open Town Meeting in its most elementary form. State and federal laws and regulations governing the spectrum of management functions from human resources to finance to the environment have developed and evolved as to require increased specialization and greater technical skill from municipal officials. In response, towns have adapted the original Open Town Meeting form through special acts, charters, and extensive by-laws to professionalize management to one degree or another.

In the 20th century some towns began to absorb the various water districts that existed within their boundaries. They benefitted from being subject to the full panoply of town policy, the oversight of various committees, and financial infrastructure. Perhaps most important is the ability of the town to pledge its full faith and credit towards the construction and improvement of water and sewer facilities. In this way, the per capita cost of improvements were minimized as they were spread over the property base of the entire town. After the adoption of proposition 2 ½ the trend towards enterprise funds accelerated. Separating water and sewer revenues from the town property tax base strengthened the ability to finance improvements.

None-the-less, many small districts continue to successfully provide water and sewer service in Massachusetts. These districts benefit from being separate entities from towns by having greater rate-payer control of finances, access to financing through the US Department of Agriculture which provides grant dollars to small systems as compared with medium or large systems that tend to receive funding in the form of loans, and a high degree of customer service.

The size of the districts tends to exacerbate any structural weakness that may exist by making them less

efficient. Small districts, by definition, have a limited base upon which to recover their costs. Naturally, they will seek to minimize overhead, and administrative costs as demonstrated by the Districts sharing of administrative and operational staff. They will train their focus on the cost to meet the minimum technical standards for the provision of service. Left with few resources to devote to non-operational costs, the districts lack the means to develop and implement policies, procedures, and instruments without relying on retained consultants. Imagine for a moment that every town department had to develop its own financial and human resources infrastructure and the inefficiency becomes apparent.

The project team has noted that current efforts to consolidate, for example LWSD and HWD, have the effect of mitigating these apparent inefficiencies. In effect, these districts recognize some of the limitations and have taken positive steps.

These challenges are evidenced by a lack of formal financial or personnel policies, few written job descriptions, or qualifications, and limited strategic planning. Even the smallest organizations need to concern themselves with a myriad of personnel policies from access to communication technology to workplace violence prevention. Financial policies are also of paramount importance in assuring accuracy and accountability. Appendix A contains lists of recommended financial and personnel policies. The districts should conduct audits of the extent to which they meet the recommendations.

The size of the districts can also lead to financial stress. The provision of water and sewer service is highly regulated with increasingly stringent standards. Capital improvements and replacements bring significant cost of construction and financing. Wastewater and drinking water treatment facilities, for example, are made up of a system of components that are necessary whether the facility is large or small. In this way, the costs are, to a degree, fixed. Systems must spread these costs over time and their base of customers. High fixed costs spread over a small customer base will result in higher per unit user fees, as demonstrated by the recent experience of the Cherry Valley Sewer District.

.....

5.0 MANAGEMENT OPTIONS

The assessment of existing conditions in each of the seven water and sewer districts serving portions of Leicester as presented in Chapters 1 – 4 of this report resulted in the presentation of their respective strengths and weaknesses. The main issue to be faced by each district is its ability to maintain financial stability and viability in light of established capital needs, future regulatory permit requirements driving additional facility upgrades, and the need to distribute those costs over a relatively small and fixed customer base. The example of the economic conditions and sewer rates required by the Cherry Valley Sewer District resulting from it having to distribute an unwieldy debt burden on an extremely limited customer base may represent an extreme example of this type of financial impact but is nevertheless instructive for other small water and sewer utility districts including those operating in Leicester. There are financial limitations for any utility and incurring too much debt to reasonably recover through its customer base can cause severe financial challenges and may lead to bankruptcy.

The purpose of this Chapter is to describe and lay out the various service delivery options available to the Town, the Districts and the customers served for the continued provision of water and sewer services in the most cost-efficient and reliable manner possible, particularly considering the potential impacts of future regulatory and emerging contaminant issues facing Leicester and other communities throughout the Commonwealth of Massachusetts.

The options as presented begin from the perspective of maintaining separate management options for water and sewer-based functions. Organizing the options along such functional lines allows for more focused examination of costs and the distribution of costs over a common set of customers and enables consideration of personnel requirements including management positions, licensed operators, and operational support function staff. Options based on separation according to function can then be merged to consider combined water and sewer districts or departments. Plans to consolidate within existing districts such as are contemplated between the LWSD and HWD are acknowledged and considered as an on-going commitment to be completed in a relatively short term. This consolidation is essentially treated as a completed arrangement, acknowledging that additional contracts and possibly legislation may yet be required to complete the process.

The principal options for the various districts in Leicester and their technical, financial, and organizational considerations along with considerations around implementation include the following:

5.1 Water District Consolidation Options

5.1.1 *Status Quo: Retain and Enhance Current Water Districts including planned consolidation of LWSD Water and HWD*

Overview

This option would result in two operational water districts consisting of the existing Cherry Valley-Rochdale Water District and the consolidated LWSD-HWD District. This option would likely retain the current staffing of the LWSD-HWD operation as well as the office support staff. Each district would maintain its own Board of Directors. Some reduction in annual budgets for common line-item expenditure categories would be reasonable to assume. (In Budget Categories such as consultants, insurance, independent audit, legal counsel, and others.) The two major features of this option that represent enhancement include the phasing out of separate rate districts within the combined LWSD-HWD District and amending the enabling legislation of both the merged LWSD-HSD and the CVRWD to enable streamlined cooperation between the districts in the areas of financial management, and human resources administration. Major issues remaining to be addressed include resolution of the Maximum Day Demand problem within the combined LWSD-HWD district; the continuing reliance on the purchase of water from Worcester by CVRWD; the continued need to operate and maintain two geographically separate service areas within the CVRWD; and the continuing need to address hydraulic issues in both CVRWD service areas.

- a. Technical considerations: In presenting the discussion of technical considerations, it is important to note that there are a number of ongoing activities that will continue to proceed to implementation regardless of any of the organizational options that are presented. Such activities include leak detection and repair, improvements already accounted for in capital improvement plans and rate setting processes, metering upgrades, improvements relating to system hydraulics and other capital improvements that support compliance with DEP regulations, orders, and requirements. Such activities will not be further discussed and are assumed to continue, regardless of the organizational options being presented.
 - i. Cherry Valley-Rochdale Water District – Assumes continued progress on implementation of hydraulic improvements per 2017 Hydraulics Study recommendations. This option also includes consideration of the reactivation of the Grindstone Well together with a review of the feasibility of reactivating Henshaw Pond. Each of these source activation options should be evaluated against the reduction in both demand and purchase costs for Worcester water that could potentially be reduced by activation of these sources
 - ii. Leicester Water Supply District – Hillcrest Water District – This option assumes that the two separate districts will work toward consolidation of the water supply district functions into a single new water district. This option assumes the Implementation of capital improvement option 4 as outlined in the water supply alternative source evaluation most recently completed by others, which includes provisions for purchasing water from Worcester to enable meeting the maximum day demand of the combined systems requiring a new interconnection to receive water from the Worcester system at appropriate operating pressures of the Leicester-Hillcrest distribution system.
- b. Financial considerations: There are likely few financial benefits with Option 1, other than the minimal reduction in annual revenue requirements associated with consolidating some shared services between LWSD and HWD due to the formalization of their consolidation. Although, with this formalization, the newly consolidated District can begin the process of

merging its currently separate rates and rate structures. This could be accomplished by phasing out the currently separate rates over time by designing a base rate structure for all customers within the newly combined district, and an additional fee to recover the existing debt service of the prior separate districts. Once the existing debt is paid off, all customers would converge to the same rate structure. This would mean they only need to compromise on sharing O&M for the two sets of infrastructure. Although this process does not provide immediate financial relief to the districts or their customers, it does further the process of consolidation while at the same time does not burden new customers with the debt service-related revenue requirements of the old district's operations. In addition, the consolidation of services would create greater efficiency moving forward with regard to operational and capital coordination, along with general financial planning and rate setting.

- c. Organizational considerations: Enhancing and formalizing the financial management and human resources functions of each district based on the implementation of best practices should be a primary goal of any option under consideration. However, consolidation will not, in and of itself, accomplish the goal. Policies and procedures still need to be developed by each district to address the challenges identified earlier in this report. Policy development requires a certain base-line level of effort that every organization must meet. Repeating this base-line effort multiple times for small organizations with little to differentiate them is inefficient. Therefore, the project team encourages the districts to collaborate on the development and implementation of policies and procedures. For example, the districts could develop common sets of financial and human resource policies. They could go so far as to centralize and share an accounting system, jointly process payroll and accounts payable, and convert to a single meter reading, billing, and collection system. These measures will create greater transparency, consistency, and take advantage of economies of scale. Under this option, the new LWS-HWD and the CVRWD would retain their separate identities through selection of directors and officers, set their own rates, establish their own rules and regulations, as well as by continuing to separately operate the treatment and distribution systems. This means that a certain level of inefficiency will remain as two small organizations attempt to do, essentially, the same thing with separate resources. Option 2, below, begins to envision a scenario where a maximum level of efficiency and organizational effectiveness may be achieved.
- d. Implementation process: These changes can be initiated and implemented by the existing leadership, however special legislation to create the new LWS-HWD and, potentially, to amend the CVRWD enabling legislation to allow for streamlined cooperation between the districts, will be necessary. In this case, the special legislation could be simply amending the LWSD to expand its boundaries to include HWD and be filed by the local representative. Since a consolidation is already planned, then an extensive public process seems unnecessary. If language needs to be inserted to enhance the ability of the LWS-HWD and CVRWD to cooperate, then add it to the same bill. Once constituted, the districts could pursue several options or combinations of options for implementation of policies, procedures, and shared services. For example, the Town could provide, through an inter-governmental agreement, human resources, and legal functions on an as needed basis. The Town is also a potential source for treasury and accounting services as qualified public sector financial managers are becoming increasingly difficult to recruit and retain. Alternatively, the districts could agree to jointly develop policies and share personnel. They could also procure some or all these services in the private sector.

5.1.2 Consolidate to a single water district

Overview

This option contemplates a complete consolidation of the operation, maintenance, and management of all three current water districts into a single operational and administrative water district. A single Board of Directors would manage the consolidated district. The consolidated district would likely establish a Superintendent/Chief Superintendent position to direct and manage operations, maintenance, and management of the district. Such a consolidated district would benefit from the creation of centralized support functions including human resources, accounting functions and a unified chart of accounts for budgeting and financial control purposes. Current rate and billing structures would be phased to produce a single rate and billing structure that would apply throughout the consolidated district. Water resource planning and management would become streamlined, permitting source treatment, management, and development to be accomplished on a system-wide basis, enabling consideration of in-town surface and groundwater source options in addition to inter-municipal water purchase options.

- a. Technical considerations: A single water district will be able to develop and manage available water supply sources to reliably meet maximum day demand as well as ensure redundancy with a point of connection with Worcester in each of the high- and low-pressure zones. This option assumes that the combined water systems will work to maximize the use of water from all available local sources to limit dependence on the purchase of Worcester water on a system-wide scale. The reactivation of available wells within Leicester will be a priority for the merged district with supplemental water purchased from Worcester. A system-wide review of pressure zones and hydraulic connection should be undertaken to determine whether a consolidated system could be operated such that the hydraulic issues for the Rochdale portion of the CVRWD system could be resolved by a new connection at the Hillcrest-CVRWD systems, with water for the Cherry Valley portion of the system from the Grindstone Well. This option also creates an opportunity for the consideration of the role that could potentially be met by efforts to establish Moose Hill Reservoir as a local water source potentially capable of minimizing or eliminating the need to purchase water from Worcester. This consideration assumes a continued effort to demonstrate the reliable safe yield of Moose Hill and demonstration of its suitability as a water supply source subject to the treatment requirements of MassDEP.
- b. Financial considerations: Option 2 would present financial benefits with regard to some cost savings associated with the consolidation of shared services such as financial reporting, billing and collection, human resources, etc. Although these savings would not be of significant magnitude to drastically reduce future rate impacts on customers, they would provide some benefit, and would also allow for greater efficiency and more effective financial planning. These efficiencies would not reduce annual revenue requirements enough to warrant consolidation for this reason alone, especially when considering the customer impacts associated with cost sharing between all districts, which currently have very different customer bills and financial situations.

Option 2 could see the convergence of rate structures between the districts over time, rather than immediately upon consolidation. This would limit the perception, and reality, of an immediate subsidy between District customers by creating a base rate designed to collect all operating expenses and future capital costs, with separate add-on rates for each formally

separate district's customer to recover those district's respective existing debt service payments. As the existing debt service is retired, the newly consolidated district's rates would converge into a unified rate. If a convergence of rates did not occur over time, but rather immediately upon consolidation, there would be significant customer impacts associated with a shift in costs. For example, although a typical CVRWD customer would see their bill decrease from \$998 to \$807, a typical LWSD customer would see their bill increase to \$807 from \$574. This drastic shift in cost burdens would likely not generate much political or customer acceptance.

- c. **Organizational considerations:** Enhancing and formalizing the financial management and human resources functions of each district based on the implementation of best practices should be a primary goal of any option under consideration. Option 2 creates the greatest opportunity, thus far, for achieving a high level of organizational efficiency among the water supply districts. A consolidated district would more easily implement the needed financial management and HR enhancements for more efficient and effective operations. While the temptation to simply re-arrange resources from the existing districts is understandable as simply reducing the number of commissioners and officers will streamline decision making, the project team encourages the creation of a new organizational structure from top to bottom. Human and financial resources should be developed in light of operational need rather than historic patterns. For example, a structure could be created where operational and administrative personnel report to a single manager with broad authority to oversee policy development and implementation, manage human, financial, and physical resources, and plan for the future capital needs of the district. A single district would be able to centralize accounting, payroll, and accounts payable; and convert to a single meter reading, billing, and collection system. These measures will create greater transparency, consistency, and take advantage of economies of scale. A further benefit of greater transparency is that economic development planning with the Town of Leicester would be streamlined with one water district.
- d. **Implementation process.** This option may require the repeal of the special acts that enabled the CVRWD, LWSD, and HWD. Care would need to be taken to ensure that repealing the LWSD act would not impact its ability to continue to operate the sewer district. These acts would be replaced by a new special act. Alternatively, one district could be kept and amended to encompass the others. The enabling acts for the other two would be repealed. For example, the LWSD could be retained and expanded while CVRWD and HWD would be repealed. Keeping LWSD could be advantageous as it contains language allowing its takeover by the town at a future date. Typically, special acts that affect municipal government are created through the adoption of so-called "home-rule petitions" by the local legislative body. These petitions are forwarded to the Massachusetts Legislature for consideration. The Legislature has the authority to pass, reject, or amend the petition. In general, the Legislature requires evidence of public support before acting on a petition. It may add additional conditions for implementation such as the requirement of a referendum. Although the various districts are organized in a manner similar to a town, the project team finds no evidence that they are considered municipalities for the purpose of home rule. This, however, does not bar a district or districts from seeking special legislation through the constitutionally guaranteed right of free petition. While possible, this process would be unwieldy. Instead, the project team recommends that any special legislative effort be shepherded by town government for the following reasons:

- I. A major tenet of home rule in Massachusetts is that it places limitations on the legislature's ability to act on an individual municipality without its consent (usually in the form of a HR petition). In this case, the legislature would not be acting upon a municipality, but a collection of districts within a municipality. As these districts include a large portion of the municipality, it is the opinion of the project team that any action should be taken in the spirit of home rule. Therefore, a request initiated by the districts in the form of a joint resolution and developed into a petition by the town seems to be the best path forward.
- II. Special acts can be quite complex, especially when they are crafted to grant districts the ability to finance capital projects through borrowing or to exercise eminent domain. Therefore, they need to be vetted by both general and bond counsel. Utilizing one set of counsel to draft the legislation (rather than having each district engage their own) would be more efficient and cost effective. Creating a single methodology for measurement of public support would help ensure an accurate and equitable result as well as provide a consistent level of transparency. Leicester is a town of strong village identities, and the water and sewer districts are emblematic of this reality. Public support can be measured in many ways, i.e., surveys, public forums, Town Meeting action, or referendum, but whatever combination of methods is used, the town is best situated to ensure that each district is given equal opportunity to be heard.

Special legislation will need to contain transitional provisions that would allow the continued operation of the former districts while the new district is formed and organized. In addition, it is customary to require ratification by the voters before the act can be implemented. In summary, the process would include the following steps:

1. The development of a framework that outlines the new district including its governance structure, boundaries, powers, and limitations.
2. A process to engage the existing districts to reach consensus around the proposed framework.
3. Drafting, by town and bond counsel, of the special act to ensure it meets all legal requirements.
4. Submission of the proposed special act to Town Meeting for consideration.
5. Submission to the legislature for approval, at which time it will be vetted by House and/or Senate Counsel.
6. Once signed by the Governor, returned to the town for ratification by the voters.

Once constituted, the new district could pursue several options or combinations of options for implementation of policies, procedures, and service delivery. For example, the new district could restructure the organizations such that most or all support functions are provided in-house. Alternatively, as with option 2, the Town could provide through an inter-governmental agreement human resources and legal functions on an as needed basis. The Town is also a potential source for treasury and accounting services as qualified public sector financial managers are becoming increasingly difficult to recruit and retain. The district could also procure some or all these services in the private sector.

5.1.3 Consolidate to a Town Water Department/Division

Overview

This option would merge all three existing water districts into a single town water department. This could be accomplished as either a water department or a division within the existing Department of Public Works. Either a Department Head or Division Director would oversee a unified chain of command within the operations staff and a consolidated office staff administered under existing Town Human Resources policies and procedures. Among the options for consolidation of water districts this option can provide the most comprehensive savings in terms of a unified chart of accounts for budget planning and administration. Like Option 3, this option would permit the development of a transitional rate structure from the current three districts (or pressure zones or sub-districts as presently formed). This option also provides a sound basis and framework for the planning and administration of local water resources available for use by the fully consolidated town-based water service areas. This option further eliminates the need for the Moose Hill Water Committee by making all water decisions by the Water Department a town-focused and managed process for planning and implementing future water supply source development decisions.

- a. Technical considerations: This option continues to reflect the same or similar efforts discussed in the option above with respect to consideration of activating the most expansive use and development of water sources available within the town to reduce or remove the requirement for continued purchase of water from Worcester and to continue with system improvements that enhance the operation and hydraulic efficiency of the distribution system. This includes continued examination of Moose Hill Reservoir as a significant water source, subject to treatment and cost equivalency and the reactivation of groundwater wells along with continued Investigation/pursuit of other town-owned water sources.
- b. Financial considerations: This option could result in very similar financial implications as outlined in Option 2, but in addition would allow for a newly created water enterprise fund to utilize the Town's credit capabilities for financing future capital needs. The consolidation of financial services, customer service and billing, etc. within the Town's existing departments could provide cost-saving benefits, but again, like Option 2, would not result in meaningful cost savings.

Also, like Option 2, Option 3 would allow for a convergence of rates, but if not done slowly over many years would result in significant customer impacts. Those customers currently paying CVRWD rates would experience an immediate reduction in their bill (approximately -19%), whereas LWSD and HWD customers would experience an immediate increase (approximately 40%). Additionally, rates would subsequently increase as major pending infrastructure projects are implemented such as the LWSD-Worcester interconnection

One potential benefit to this option would be the possibility of future expansion of the customer base, due to the elimination of the Districts' existing defined boundaries, to help spread the cost burden across more customers, and all else being equal, reducing customer bills.

- c. Organizational considerations: The benefits would be similar to option 2, above in that decision making would be streamlined and the organization could be re-imagined.

Moreover, the department would benefit from being integrated with the town as it would “gain” human resource and financial policies to the extent that they exist in town government and by becoming users of the town’s existing accounting, payroll, accounts payable, and treasury services. Further, integration with the town’s wage, benefits, and classification plan would, arguably, improve employee recruitment and retention. In addition, expansion to serve additional customers would be simplified as the service will no longer be bound by the defined district boundaries. If the Town does move forward with a new DPW, a water division could be incorporated furthering the efficiencies brought about by joining the town.

- d. Implementation process. This option would require the repeal of the special acts that enabled the CVRWD, LWSD, and HWD. Care would need to be taken to ensure that repealing the LWSD act would not impact its ability to continue to operate the sewer district. As in option 2 the special act that repeals the current districts acts would contain transitional language to allow the current districts to operate for a specified period of time while the town creates the department. Unlike option 2, these acts would NOT be replaced by a new special act. Instead, Town Meeting could create a water department through the adoption of a by law and water enterprise fund. Therefore, the town would not only shepherd the process, it would also initiate and carry it out. Of course, a robust planning effort would be required that fully engages stakeholders and vets the implications of making such a comprehensive change.

5.2 Sewer District Consolidation Options

5.2.1 Status Quo Option – Retain & Enhance Current Sewer Districts

Overview

This option retains the four current sewer districts in their present legislatively established service areas. This includes the recognized interconnections and reliance of the Hillcrest Sewer District on the sewer and wastewater treatment facilities operated by the LWSD and ORSD. Correcting amendments to address boundary issues are advised for the LWSD and HSD. The ORSD would continue to operate and manage both its sewer system and wastewater treatment facility. A simply correcting amendment would be recommended to resolve minor boundary issues resulting from its provision of sewer service to a few connections that are otherwise located within the Hillcrest Sewer District designated boundary.

A sub option that could be considered under this heading would formalize the consolidation of the LWSD Sewer and Wastewater Treatment functions and the HSD. The principal modification associated with this option involves the formal consolidation of the LWSD and a portion of the HSD into one sewer and treatment district and the ORSD and another portion of the HSD into another sewer and treatment district. This merger reflects the current working arrangements that already exist among the three districts in terms of shared staffing for sewer operations, accounting, and billing operations and to which district HSD's sewer flows. Separate Boards of Directors would be authorized to manage the consolidated districts.

This option retains the Cherry Valley SD in its current form. The Cherry Valley Sewer District would continue its connection and reliance on both the Worcester sewer system and the Upper Blackstone Clean Water District for transportation and treatment of its sewage. This option does not provide any resolution of the fiscal issues associated with past debt affecting sewer rates in the CVSD.

a. Technical considerations:

The discussion of technical considerations also considers the routine maintenance and inspection practices of the collection systems, pumping stations and force mains operating within each of the existing sewer districts. Routine repairs in response to such inspections along with the replacement of parts and the maintenance and calibration of flow meters are assumed to continue in each of the options discussed. Continued monitoring of Infiltration/Inflow conditions in all collection systems remains a priority activity to control metered sewer volumes for cost and rate control purposes.

Within this option, no changes are expected to the existing collection systems or the obligation of the Cherry Valley Sewer District to continue reliance on use of the Worcester sewer system to transport sewage flows to the Upper Blackstone Clean Water District for treatment. It is assumed that upgrades and improvements to the Leicester and Oxford Rochdale wastewater treatment plants will proceed through the stages of design and construction to assure compliance with the applicable NPDES permit requirements.

b. Financial considerations: There are likely few financial benefits with this option, other than the minimal reduction in annual revenue requirements associated with consolidating some shared services. Although, with the formalization of LWSD and a portion of HSD consolidation, the newly consolidated District can begin the process of merging its currently separate rates and rate structures. This could be accomplished by phasing out the currently

separate rates over time by designing a base rate structure for all customers withing the newly combined district, and an additional fee to recover the existing debt service of the prior separate districts. Once the existing debt is paid off, all customers would merge to the same rate structure. This would mean they only need to compromise on sharing O&M for the two sets of infrastructure. Although this process does not provide immediate financial relief to all of the districts or their customers, even for the assumed consolidation of LWSD and HSD, it does further the process of consolidation while at the same time does not burden new customers with the debt service-related revenue requirements of the old district's operations. In addition, the consolidation of services would create greater efficiency moving forward with regard to operational and capital coordination, along with general financial planning and rate setting. Unfortunately, this option fails to improve the financial situation of the CVSD.

- c. Organizational considerations: Enhancing and formalizing the financial management and human resources functions of each district based on the implementation of best practices should be a primary goal of any option under consideration. However, consolidation will not, in and of itself, accomplish the goal. Policies and procedures still need to be developed by each district to address the challenges identified earlier in this report. Policy development requires a certain base-line level of effort that every organization must meet. Repeating this base-line effort multiple times for small organizations with little to differentiate them is inefficient. Therefore, the project team encourages the districts to collaborate on the development and implementation of policies and procedures. For example, the districts could develop common sets of financial and human resource policies. They could go so far as to centralize and share an accounting system, jointly process payroll and accounts payable, and convert to a single meter reading, billing, and collection system. These measures will create greater transparency, consistency, and take advantage of economies of scale. Under this option, the new LWS-HSD, ORSD-HSD, and the CVSD would retain their separate identities through selection of directors and officers, set their own rates, establish their own rules and regulations, as well as by continuing to separately operate the treatment and distribution systems. This means that a certain level of inefficiency will remain as two small organizations attempt to do, essentially, the same thing with separate resources. Option 6, below, begins to envision a scenario where a greater level of efficiency and organizational effectiveness may be achieved.
- d. Implementation process: These changes can be initiated and implemented by the existing leadership, however special legislation to create the new LWS-HSD and ORSD-HSD, and potentially, to amend the CVSD enabling legislation to allow for streamlined cooperation between the districts, will be necessary. In this case, the special legislation could be simply amending the LWSD and ORSD to expand their boundaries to include HSD and be filed by the local representative. Since a consolidation is already planned, then an extensive public process seems unnecessary. If language needs to be inserted to enhance the ability of the LWS-HSD, ORSD-HSD, and CVSD to cooperate, then adding it to the same bill. Once constituted, the districts could pursue several options or combinations of options for implementation of policies, procedures, and shared services. For example, the Town could provide, through an inter-governmental agreement, human resources, and legal functions on an as needed basis. The Town is also a potential source for treasury and accounting services as qualified public sector financial managers are becoming increasingly difficult to recruit and retain. Alternatively, the districts could agree to jointly

develop policies and share personnel. They could also procure some or all these services in the private sector.

5.2.2 Consolidate into two sewer districts: LWSD/HSD/ORSD and CVSD

Overview

This option consolidates the LWSD/HSD and ORSD/HSD into a single sewer district encompassing the operation and maintenance of both the interconnected sewer systems and both wastewater treatment facilities. CVSD continues to rely on the Worcester sewer system for transport of wastewater to the UBCWD for treatment. The LWSD/HSD/ORSD consolidation would be run by a single Board of Directors. There are a variety of operational staff alignments possible in this merged district. Sewer system operation & maintenance could be managed under one operations center with both treatment facilities under a separate operations center. These options can be used to streamline staffing to comply with DEP requirements as well as provide cross-training and functional deployment of licensed personnel. While this option provides significant opportunities for fiscal and operational efficiencies for the LWSD/HSD/ORSD consolidated district, this option does not resolve financial issues faced by the CVSD.

- a. Technical considerations: This option does not result in any changes to the technical considerations previously described under previous sewer district options.
- b. Financial considerations: There are likely few direct and immediate financial benefits with this option, other than the minimal reduction in annual revenue requirements associated with consolidating some shared services. Although, with the formalization of a LWSD, HSD, and ORSD consolidation, the newly consolidated District can begin the process of merging its currently separate rates and rate structures. This could be accomplished by phasing out the currently separate rates over time by designing a base rate structure for all customers withing the newly combined district, and an additional fee to recover the existing debt service of the prior separate districts. Once the existing debt is paid off, all customers would merge to the same rate structure. This would mean they only need to compromise on sharing O&M for the two sets of infrastructure. Although this process does not provide immediate financial relief to all of the districts or their customers, it does further the process of consolidation while at the same time does not burden new customers with the debt service-related revenue requirements of the old district's operations. In addition, the consolidation of services would create greater efficiency moving forward with regard to operational and capital coordination, along with general financial planning and rate setting. Unfortunately, this option fails to improve the financial situation of the CVSD or the incredibly high sewer bills that its customers are currently paying.
- c. Organizational considerations: Enhancing and formalizing the financial management and human resources functions of each district based on the implementation of best practices should be a primary goal of any option under consideration. Option 6 creates the greatest opportunity, thus far, for achieving a high level of organizational efficiency among the sewer districts. A consolidated district would more easily implement the needed financial management and HR enhancements for more efficient and effective operations. While the temptation to simply re-arrange resources from the existing districts is understandable as simply reducing the number of commissioners and officers will streamline decision making, the project team encourages the creation of a new organizational structure from top to bottom. Human and financial resources should be developed considering

operational needs rather than historic patterns. For example, a structure could be created where operational and administrative personnel report to a single manager with broad authority to oversee policy development and implementation, manage human, financial, and physical resources, and plan for the future capital needs of the district. A consolidated district would be able to centralize accounting, payroll, and accounts payable; and convert to a single meter reading, billing, and collection system. These measures will create greater transparency, consistency, and take advantage of economies of scale. That being said, this does not address CVSD organizational challenges, but other consolidated districts can achieve the needed financial management and HR enhancements for more efficient and effective operations. Economic development planning with the Town of Leicester would be streamlined with fewer sewer districts.

- d. Implementation process. This option may require the repeal of the special acts that enabled the ORWD, LWSD, and HSD. Care would need to be taken to ensure that repealing the LWSD act would not impact its ability to continue to operate the water district. Alternatively, one district could be kept and amended to encompass the others. The enabling acts for the other two would be repealed. For example, the LWSD could be retained and expanded while ORWD and HSD would be repealed. These acts would be replaced by a new special act. Typically, special acts that affect municipal government are created through the adoption of so-called “home-rule petitions” by the local legislative body. These petitions are forwarded to the Massachusetts Legislature for consideration. The Legislature has the authority to pass, reject, or amend the petition. In general, the Legislature requires evidence of public support before acting on a petition. It may add additional conditions for implementation such as the requirement of a referendum. Although the various districts are organized in a manner similar to a town, the project team finds no evidence that they are considered municipalities for the purpose of home rule. This, however, does not bar a district or districts from seeking special legislation through the constitutionally guaranteed right of free petition. While possible, this process would be unwieldy. Instead, the project team recommends that any special legislative effort be shepherded by town government for the following reasons:
 - i. A major tenet of home rule in Massachusetts is that it places limitations on the legislature's ability to act on an individual municipality without its consent (usually in the form of a HR petition). In this case, the legislature would not be acting upon a municipality, but a collection of districts within a municipality. As these districts include a large portion of the municipality, it is the opinion of the project team that any action should be taken in the spirit of home rule. Therefore, a request initiated by the districts in the form of a joint resolution and developed into a petition by the town seems to be the best path forward.
 - ii. Special acts can be quite complex, especially when they are crafted to grant districts the ability to finance capital projects through borrowing or to exercise eminent domain. Therefore, they need to be vetted by both general and bond counsel. Utilizing one set of counsel to draft the legislation (rather than having each district engage their own) would be more efficient and cost effective.
 - iii. Creating a single methodology for measurement of public support would help ensure an accurate and equitable result as well as provide a consistent level of transparency. Leicester is a town of strong village identities, and the water and sewer districts are emblematic of this reality. Public support can be measured in many ways, i.e., surveys, public forums, Town Meeting action, or referendum, but

whatever combination of methods is used, the town is best situated to ensure that each district is given equal opportunity to be heard.

Special legislation will need to contain transitional provisions that would allow the continued operation of the former districts while the new district is formed and organized. In addition, it is customary to require ratification by the voters before the act can be implemented. In summary, the process would include the following steps:

1. The development of a framework that outlines the new district including its governance structure, boundaries, powers, and limitations.
2. A process to engage the existing districts to reach consensus around the proposed framework.
3. Drafting, by town and bond counsel, of the special act to ensure it meets all legal requirements.
4. Submission of the proposed special act to Town Meeting for consideration.
5. Submission to the legislature for approval, at which time it will be vetted by House and/or Senate Counsel.
6. Once signed by the Governor, returned to the town for ratification by the voters.

Once constituted, the new district could pursue several options or combinations of options for implementation of policies, procedures, and service delivery. For example, the new district could restructure the organizations such that most or all are provided in-house. Alternatively, as with option 5, the Town could provide through an inter-governmental agreement human resources and legal functions on an as needed basis. The Town is also a potential source for treasury and accounting services as qualified public sector financial managers are becoming increasingly difficult to recruit and retain. The district could also procure some or all these services in the private sector.

5.2.3 Consolidate into a single sewer district

Overview

This option involves the dissolution of the existing sewer districts and the establishment of a single sewer district to assume all operational, fiscal and management functions associated with sewer system and wastewater treatment facility operations and maintenance. A single Board of Directors would be set up. A Superintendent or other similarly titled position would assume overall responsibility for operations and other core functions on a day-to-day basis. This merger would enable the implementation of central support functions and staffing for accounting and human resources as well as centralize several other line items in a centralized chart of accounts. This arrangement also lends itself to consideration of internal functional staffing alignments for sewer system operations and wastewater treatment system operations recognizing the specific licensing requirements for both categories of system operations. This option also opens the door to consideration of alternative routing of sewage generated in the Cherry Valley service area to treatment at a local WWTF (Wastewater Treatment Facility) and eliminate the costs associated with reliance on the Worcester system to transport wastewater to the UBCWD. This option also provides opportunities for consideration of alternative rate structures, leading to a uniform rate structure, and the implementation of enterprise accounting systems.

- a. Technical considerations: With all four sewer districts consolidated into a single district, an option to reroute sewage from the Cherry Valley Sewer District to the Oxford Rochdale Wastewater Treatment Facility might be considered. This would include intercepting the Cherry Valley sewage flows prior to entering the Worcester sewer system and connecting to the ORSD WWTF via a series of pumping stations, force mains and gravity sewers from Main Street to Stafford Street and down Route 56 to the main sewer line delivering flows to the treatment facility in Oxford. It is estimated that such a system would require about 3.5 miles of forces mains, an additional 1.5 miles of gravity sewer and a minimum of three pumping stations to accomplish. Such a system is estimated to cost around \$6.5 million. This approach needs to be studied further including refinement of the cost estimate and an assessment of other sewer service options such a piping configuration might support. The capacity of the Oxford Rochdale WWTF also needs to be carefully examined to ensure that it can accommodate this additional flow without risking additional costs for expansion and permitting.
- b. Financial considerations: Option 6 would present financial benefits with regard to some cost savings associated with the consolidation of shared services such as financial reporting, billing and collection, human resources, etc. Although these savings would not be of significant magnitude to drastically reduce future rate impacts on customers, they would provide some benefit, and would also allow for greater efficiency and more effective financial planning. These efficiencies would not reduce annual revenue requirements enough to warrant consolidation for this reason alone, especially when considering the customer impacts associated with cost sharing between all districts, which currently have very different customer bills and financial situations

Option 6 could see the convergence of rate structures between the districts over time, rather than immediately upon consolidation. This would limit the perception, and reality, of an immediate subsidy between District customers by creating a base rate designed to collect all operating expenses and future capital costs, with separate add-on rates for each formally separate district's customer to recover those district's respective existing debt service payments. As the existing debt service is retired, the newly consolidated district's rates

would converge into a unified rate. If a convergence of rates did not occur over time, but rather immediately upon consolidation, there would be significant customer impacts associated with a shift in costs. For example, although a typical CVSD customer would see their bill decrease from \$1,929 to \$821, a typical LWSD customer would see their bill increase to \$821 from \$551. This drastic shift in cost burdens would likely not generate much political or customer acceptance.

- c. Organizational considerations: Enhancing and formalizing the financial management and human resources functions of each district based on the implementation of best practices should be a primary goal of any option under consideration. Option 6 builds upon the opportunity for achieving a high level of organizational efficiency achieved in Option 5 among the sewer districts. A single district would more easily implement the needed financial management and HR enhancements financial management and HR enhancements needed for more efficient and effective operations. While the temptation to simply re-arrange resources from the existing districts is understandable as simply reducing the number of commissioners and officers will streamline decision making, the project team encourages the creation of a new organizational structure from top to bottom. Human and financial resources should be developed considering operational need rather than historic patterns. For example, a structure could be created where operational and administrative personnel report to a single manager with broad authority to oversee policy development and implementation, manage human, financial, and physical resources, and plan for the future capital needs of the district. A single district would be able to centralize accounting, payroll, and accounts payable; and convert to a single meter reading, billing, and collection system. These measures will create greater transparency, consistency, and take advantage of economies of scale. A further benefit of greater transparency is that economic development planning with the Town of Leicester would be streamlined with one sewer district.
- d. Implementation: The steps for implementation of this option would be nearly identical to Option 5 except that the Special Legislation would include CVSD.

5.2.4 Consolidate to a Town Sewer Department/Division

Overview

Implementation of this option would result in the elimination of the four current sewer districts and the creation of a centralized Town sewer department or a sewer division within the existing Department of Public Works. A Department Head or Division Director would oversee a unified chain of command within the operations staff and a consolidated office staff administered under existing Town Human Resources policies and procedures. Among the options for consolidation of sewer districts this option can provide the most comprehensive savings in terms of a unified chart of accounts for budget planning and administration. Like Option 6, this option would permit the development of a transitional rate structure from the current districts into a town-wide based rate structure. Compliance with all DEP NPDES WWTF permits would become the responsibility of the town. This option would provide a clearly defined structure for planning future sewer system connection policies and facilities planning on a town-wide basis, without the boundary restrictions created by district boundaries. Financing planned capital projects for both sewer system improvements and WWTF upgrades can be based on the full faith and credit of the town. As a town department, the sewer department can consider alternative sewage transport routes and alternative treatment locations to enable the area currently served by the CVSD to reduce or eliminate its dependence on Worcester and UBCWD.

- a. Technical considerations: This option enables consideration of the same or similar technical considerations as described for Option 6 above. I/I inspection and manhole inspection and repair remain a priority activity for the consolidated sewer system.
- b. Financial considerations: This option could result in very similar financial implications as outlined in the above Option 6 considering full district consolidation, but in addition would allow for a newly created sewer enterprise fund to utilize the Town's credit capabilities for financing future capital needs. The consolidation of financial services, customer service and billing, etc. within the Town's existing departments could provide cost saving benefits, albeit minimally. One potential benefit to this option would be the possibility of future expansion of the customer base, due to the elimination of the Districts' existing defined boundaries, to help spread the cost burden across more customers, and all else being equal, reducing customer bills.
- c. Organizational considerations:
The benefits would be similar to option 6, above in that decision making would be streamlined, and the organization could be re-imagined. Moreover, the department would benefit from being integrated with the town as it would "gain" human resource and financial policies to the extent that they exist in town government and by becoming users of the town's existing accounting, payroll, accounts payable, and treasury services. Further, integration with the town's wage benefits, and classification plan would, arguably, improve employee recruitment and retention. In addition, expansion to additional customers would be easier because the service will no longer be bound by the defined district boundaries. If the Town does move forward with a new DPW, a water division could be incorporated furthering the efficiencies brought about by joining the town. If the former Becker College facility becomes a municipal facility, those costs would necessarily be assumed on a town wide basis.
- d. Implementation considerations: The implementation considerations are nearly identical as for creation of a new water department in option 3. This option would require the repeal of the special acts that enabled the ORSD, CVSD, LWSD, and HSD. Care would need to be taken to ensure that repealing the LWSD act would not impact its ability to continue

to operate the water district. Unlike option 5, these acts would NOT be replaced by a new special act. Instead, Town Meeting could create a sewer department through the adoption of a by law and sewer enterprise fund. Therefore, the town would not only shepherd the process, but it would also initiate and carry it out. Of course, a robust planning effort would be required that fully engages stakeholders and vets the implications of making such a comprehensive change.

5.3 Options for Combined Water & Sewer Districts

5.3.1 Consolidate All Current Districts into One Water & Sewer District

Overview

This option would result in dissolving the existing water and sewer districts and replacing them with a single combined water and sewer district. The enabling legislation would establish the boundaries of the new district to incorporate the entire extent of the areas served by the current districts. A new Board of Directors would need to be specified, including whether it should be expanded from the current three member boards typical of the current district boards to a five- or seven-member board based on the complexities of a single larger district responsible for management of both water and sewer functions. Similarly, the internal organization structure of the combined district would need to consider appointing a single chief superintendent with assistant superintendents for water and sewer operations including wastewater treatment or consider an additional assistant superintendent for wastewater treatment. The consolidated district would continue with at least the same number of operation staff as currently employed and may require additional operators should additional facilities and/or upgraded facilities require. Consolidation into a single district would facilitate the creation of central human resource management and accounting systems. Separate budget line accounts would still be needed to support separate water and sewer rate computations and administration. Billing functions would be able to be consolidated as well. Additional savings can be realized through common support functions such as audits, insurance, banking, legal services, and related line items.

- a. Technical considerations: This option assumes the continued operation of the existing sewer systems and the operation of both the Leicester and Oxford Rochdale WWTF's and includes consideration for the relocation of the Cherry Valley Sewer System to connect to the Oxford Rochdale WWTF. This option presumes that all necessary improvements and upgrades will be made to both WWTF's as required for NPDES permit compliance. This option also includes consideration of each water system consideration previously described in relation to the water district consolidation options.
- b. Financial considerations: The financial considerations, limited benefits, and shifts of cost burden issues would be nearly identical to those of Options 6 and 7 above. One potential benefit to this option would be the possibility of future expansion of the customer base, due to the elimination of the Districts' existing defined boundaries, to help spread the cost burden across more customers, and all else being equal, reducing customer bills.
- c. Organizational considerations: The benefits would be similar to options 6 and 7, above in that decision making would be streamlined and the organization could be re-imagined. Moreover, the department would benefit from being integrated with the town as it would "gain" human resource and financial policies to the extent that they exist in town government and by becoming users of the town's existing accounting, payroll, accounts payable, and treasury services. Further, integration with the town's wage, benefits, and classification plan would, arguably, improve employee recruitment and retention. In addition, expansion to additional customers would be easier because the service will no longer be bound by the defined district boundaries. If the Town does move forward with a new DPW, a water division could be incorporated furthering the efficiencies brought about by joining the town. If the former Becker College facility becomes a municipal facility, those costs would necessarily be assumed on a town wide basis.
- d. Implementation process: The town could choose to pursue special legislation or adopt MGL Chapter 40N. The process of adopting special legislation would be the same as for

the other district consolidation options. On the other hand, adoption of MGL 40N would be a simpler process. MGL 40N, also known as the Model Water and Sewer Reorganization Act, is a local option statute created for the purpose of establishing a water and sewer district. Perhaps, the most well-known example of a district established in this way is the Springfield Water and Sewer Commission. In essence, Leicester Town Meeting would vote to adopt this statute and petition the legislature to repeal the various special acts that created the current districts along with transitional provisions. The advantages of 40N are that it is a fully vetted and comprehensive statute that is in use in Massachusetts. It also could be implemented more quickly by avoiding the drafting, and vetting process needed to create new legislation.

5.3.2 *Incorporate water and sewer into a Town Department of Public Works*

Overview

Creation of a town-wide water and sewer department can be accomplished by adoption of MGL c. 40N, Home Rule petition, or other statutory authority. This option incorporates many of the advantages and opportunities described in relation to other options described above. This option can take advantage of the extensive cross-training among the operations staffs of the several districts who are intimately familiar with the water, sewer, and wastewater treatment systems currently in service. This option also provides an opportunity for improved coordination among other town departments and functions. Departmental budgets and setting of water and sewer user charge systems can be proposed, reviewed, and set on a town-wide service area basis. This option carries advantages similar to those previously stated for other options proposed for town-run water and sewer systems, respectively.

- a. Technical considerations: This option includes all of the water and sewer system technical considerations previously discussed.
- b. Financial considerations: This option would have identical considerations as outlined for Options 3 and 7.
- c. Organizational considerations:
The benefits would be similar to options 6, 7 and 8, above in that decision making would be streamlined and the organization could be re-imagined. Moreover, the department would benefit from being integrated with the town as it would “gain” human resource and financial policies to the extent that they exist in town government and by becoming users of the town’s existing accounting, payroll, accounts payable, and treasury services. Further, integration with the town’s wage, benefits, and classification plan would, arguably, improve employee recruitment and retention. In addition, expansion to additional customers would be easier because the service will no longer be bound by the defined district boundaries. If the Town does move forward with a new DPW, a water division could be incorporated furthering the efficiencies brought about by joining the town. If the former Becker College facility becomes a municipal facility, those costs would necessarily be assumed on a town wide basis.
- d. Implementation considerations. These would be identical to creating either a water or sewer department as explained earlier in this chapter.

5.4 Purchase by investor-owned utility company

Investor-owned Utilities (IOU) can be an efficient and cost-effective alternative to traditional government owned and structured water and sewer utilities. One of the main advantages of IOU is their access to capital markets to fund essential upgrades and system improvements. Often, an IOU can take advantage of serving several small to medium sized systems and spread the cost of capital over a wider population than a municipality or utility district would be able to do. The bargaining power of a privately owned and operated IOU can also result in savings across many areas of routine purchases required for the day-to-day operation and maintenance of water and sewer districts and small municipal systems. In Massachusetts, investor-owned utilities are subject to the state Department of Public Utilities (DPU). DPU participates in rate setting, complaint resolution and oversight of IOUs under its authority. There are several examples of IOU's operating water and/or sewer systems in Massachusetts including:

- Aquarion Water Company of MA
- American Water Company
- Whitinsville Water Company
- East Northfield Water Company
- Pinehills Water Company
- Agawam Springs Water Company
- Housatonic Water Works
- Mountain Water Systems
- Colonial Water Company
- Plymouth Water Company

The acquisition of district or town owned systems by an IOU will primarily be based on a determination of the present fair market value of the existing system, including assets, liabilities, and incurred debt. The IOU will likely consider the financial history of the system including rates and budgets and audits, as well as potential future earnings and stability. Different IOUs may have a wide range of other factors to consider in making an acquisition decision.

A critical question for consideration is how such an offer to sell might be structured by any one or several of the districts or by the town of Leicester. Another consideration is whether there might be any advantage in dealing with the town as a single point of contact as opposed to negotiating with individual districts to negotiate a purchase agreement with an IOU. Any proposed sale will be subject to review and approval of the DPU.

While there remain several satisfactorily operated water companies in Massachusetts, it is noted that the Town of Milford MA voted to approve the purchase of the Milford Water Company in August 2021 for \$79 million. Dramatic rate increases, prolonged boil water orders and mismanagement allegations were all listed as motivating factors in this acquisition. Similarly, the Town of Hingham and Town of Barnstable purchased back their water systems from private water companies to regain control of their water systems.

Notwithstanding the potential of an unsatisfactory result, the potential advantages of acquisition by an experienced IOU can include the following:

.....

- Oversight of rates and budgets by an independent state agency in the Department of Public Utilities (DPU)
- Improvements in system efficiency
- Savings in municipalities time and money
- Reduction of public sector risks.
- Allows specialized services to be provided by specialized utility experts.

Potential disadvantages may include the following:

- Possible rate increases.
- Accountability to the customer.
- Reduces local control over the water supply.
- Privatizing water costs more than government financing (private utilities are allowed to include profit in their operating costs).
- Can lead to employment losses.
- Can be challenging to reverse.

Should Leicester decide to further consider the option of privatization, the Project Team would recommend the appointment of a special committee to identify potential interested parties; determine their specific interests and financial requirements and to report back to the full Select Board their findings and recommendations.

The options presented in Chapter 5 represent a comprehensive listing of management approaches and essential considerations for the operation, maintenance and functioning of water and sewer districts within the Town of Leicester. This analysis includes consideration of both historical and potential sources of water supply within the Town of Leicester that have been identified for potential development and use within the various management structures described. While it is recognized that there are additional existing water resources within the Town of Leicester that are or have been dedicated as sources of water supply, those sources must be acknowledged as under the ownership and control of other water systems and are not available for consideration as water supply sources available to the Town of Leicester or any of the existing Water Districts or any of the possible districts or town organizations as reflected as consolidation options. Such sources include but may not be limited to Shaw Pond (owned by the Town of Spencer); and Kettle Brook Reservoirs 1, 2 3 & 4 and Lynde Brook Reservoir, all of which are owned by the City of Worcester.

6.0 MANAGEMENT OPTIONS

6.1 Consolidation Options Summary

Ten consolidation options are presented in Chapter 5. These options range from simply acknowledging planned consolidations already in the initial stages of implementation (i.e., merger of Hillcrest Water District into Leicester Water Supply District – Water Supply) to consolidation of all water districts into a single water district; consolidation of all sewer districts into a single sewer district; consolidation of the respective water and sewer operations into a town department structure; adoption of MGL c. 40N creating a Water & Sewer Commission to replace all of the current water and sewer districts; and the option of acquisition of water and sewer districts by a privately owned enterprise. Each of these options were summarized in a presentation to the Leicester Select Board, District representatives and the public via a public meeting convened on November 16, 2021. The pros and cons of each of the presented options are summarized in the following Tables 6-1, 6-2, and 6-3:

TABLE 6-1. WATER DISTRICT CONSOLIDATION OPTIONS – OPTIONS 1 - 3

	OPTION 1: Status Quo w/LWSD Water-HWD Consolidation	OPTION 2: Consolidation of Water Districts into Single, Unified District	OPTION 3: Creation of Town Water Department
PROS	<ul style="list-style-type: none"> - Improves collaboration - Strengthens internal efficiencies - Allows for continued progress on planned hydraulic and other source and system improvements 	<ul style="list-style-type: none"> - Achieves high-level of organizational efficiency - Aids economic development planning with the Town of Leicester - Meets maximum day demands - Potential to expand reliance on local sources/reduce dependency on Worcester water purchase - Expands and unifies customer base 	<ul style="list-style-type: none"> - Full integration with the Town's human resources and financial systems/policies - Potential incorporation into proposed Department of Public Works - Enhances financial management through enterprise fund and grant eligibility - Maximizes user base - Unifies ownership of water rights and maximizes control of GW and SW sources of supply locally - Streamlines regulatory reporting and permitting - Increased opportunities for cross-training of personnel
CONS	<ul style="list-style-type: none"> - Continues inherent inefficiencies - Minimal potential savings - Continued reliance on Worcester water purchase - Minimal opportunity to integrate distribution systems - Limited District customer bases 	<ul style="list-style-type: none"> - Continued reliance on Worcester required until local sources can be activated - Continued need for intermunicipal agreement for Moose Hill progress - Public concern of reducing Cherry Valley bills while increasing all others, in the short term 	<ul style="list-style-type: none"> - Short-term learning curve adjustments in Finance, Purchasing, Regulatory Compliance, Funding & other areas - Continued reliance on Worcester required until local sources can be activated - Public concern of reducing Cherry Valley bills while increasing all others, in the short term

TABLE 6-2. WATER & SEWER DISTRICT CONSOLIDATION OPTIONS – OPTIONS 4 - 7

	OPTION 4: Retain Status Quo (w/ Potential Consolidation of Half of HSD w/ LWSD and Half w/ ORSD)	OPTION 5: Consolidate CVSD, LWSD & HSD Into One District, ORSD to Remain	OPTION 6: Consolidation of All Sewer Districts in a Single District	OPTION 7: Consolidate All Sewer Districts into Town Sewer Department
PROS	<ul style="list-style-type: none"> - Improves collaboration - Maintains regulatory compliance - Ensures new NPDES Permit Compliance & Treatment System Upgrades - Optimizes utilization of current operations staff 	<ul style="list-style-type: none"> - Achieves high-level of organization efficiency - Aids economic development planning with the Town of Leicester - Expands customer base - Opens opportunities to explore alternative route for CVSD served area to avoid Worcester/Upper Blackstone costs 	<ul style="list-style-type: none"> - Achieves high-level of organization efficiency - Aids economic development planning with the Town of Leicester - Provides maximum opportunity for cross-training of operations personnel - Unifies rate structures - Simplifies boundaries - Simplifies regulatory compliance & reporting - Expands sludge disposal options 	<ul style="list-style-type: none"> - Full integration with the Town's Human Resources and Financial Systems/ Policies - Potential incorporation into proposed Department of Public Works - Enhances financial management through an enterprise fund
CONS	<ul style="list-style-type: none"> - Continued inherent inefficiencies - Continues CVSD limited customer base - Continued reliance and costs for use Worcester system for transport and Upper Blackstone for treatment by CVSD - Limited opportunity to consider alternative system configurations 	<ul style="list-style-type: none"> - Potential inequity in shifting burden for existing debt service requirements - Potential for capacity increase in discharge permits - Potential for significant capital costs to expand wastewater treatment facility to treat additional flow 	<ul style="list-style-type: none"> - Issue of representation by Oxford System users - Potential inequity in shifting burden for existing debt service requirements - Potential to increase flow limits in NPDES permits - Potential for significant capital costs to expand one or both wastewater treatment facilities to treat additional flow 	<ul style="list-style-type: none"> - Issue of representation by Oxford System users - Potential inequity in shifting burden for existing debt service requirements - Potential to increase flow limits in NPDES permits - Potential for significant capital costs to expand one or both wastewater treatment facilities to treat additional flow

TABLE 6-3. WATER & SEWER DISTRICT CONSOLIDATION OPTIONS – OPTIONS 8 – 10

	OPTION 8: Consolidate into a Single Water/Sewer District	OPTION 9: Consolidate into a Town Water/Sewer Department	OPTION 10: Ownership of District Systems by Privately Owned Company
PROS	<ul style="list-style-type: none"> - Achieves a high level of organizational efficiency - Aids economic development planning with the Town of Leicester - Maximizes control over water supply sources - Maximizes opportunities for cross-training operations personnel - Maximizes opportunities for cross-training operations personnel - Provides largest possible service population - Provides opportunities for maximizing distribution and collection system inefficiencies 	<ul style="list-style-type: none"> - Full integration with the Town's human resources and financial systems and policies - Potential incorporation into proposed Department of Public Works - Enhances financial management through an enterprise fund 	<ul style="list-style-type: none"> - Oversight of rates and budgets by an independent state agency in the Department of Public Utilities (DPU) - Improvements in system efficiency - Savings in Town's time and money - Reduction of public sector risks - Allows specialized services to be provided by specialized utility experts
CONS	<ul style="list-style-type: none"> - Learning curve for achieving operational efficiencies in water and sewer systems - Learning curve in administration of financial, billing, accounting, and collection services - Need to put in place staffing structure, policies, job descriptions and HR structure - Still have the potential capital costs to improve infrastructure identified in the other options 	<ul style="list-style-type: none"> - Short-term learning curve for achieving operational efficiencies in water and sewer systems - Learning curve in administration of financial, billing, accounting, and collection services - Need to put in place staffing structure, policies, job descriptions and HR structure - Still have the potential capital costs to improve infrastructure identified in the other options 	<ul style="list-style-type: none"> - Privatizing water costs more than government financing (private utilities are allowed to earn a profit recovered through rates) - Possible rate increases - Accountability to the customer - Reduces local control over the water supply - Can lead to employment losses - Can be challenging to reverse

6.2 “Most Advantageous” Option(s)

Over the course of our study of the existing Districts, one of the most critical observations relates to the decision-making authority diffused over the six separate District Boards. Each Board of Directors is charged with the responsibility to exercise control and decision making limited to the consideration of the needs and efficiency of service delivery to the portion of the Leicester or other community served by each District. Not only is there no obligation to consider the needs or efficiencies to be gained by cooperation with other Districts, there is also no obligation for them to consider the needs or requirements of the Leicester community as a whole. This disconnect gives rise to inefficiencies relating for example to coordination of economic development review; incorporation of potential water sources such as Moose Hill for the use and benefit of all water districts; and sharing of financial accounting systems and human resource functions across District boundaries.

These considerations lead to the conclusion that the “most advantageous” options for further consideration by the Town should include those options which establish a single point of decision-making authority across all current Districts which would be recognized and accountable to the service population served by that entity. This puts the highest priority for consideration on either Options 8 or 9, the consolidation into either a single water and sewer district or Town department. Each of these options accomplishes the creation of a single District Board of Directors or in the alternative, a Water & Sewer Commission organized under the provisions of MGL, c. 40N, and result in the establishment of a single managing legislative body directly accountable to both the water and sewer served populations within the Town of Leicester. It should be noted that Option 10, the ownership of the District systems by a privately owned company, also accomplishes the goal of establishing a single point of decision making authority. However, the associated removal of local control, as well as other potential cons detailed earlier in this Chapter, make Option 10 less advantageous than either Option 8 or 9.

It remains to be seen how effective the planned consolidation of the Leicester Water Supply District ‘s Water Division and the Hillcrest Water District will improve the management and operation of the water systems being merged. It would be equally worthwhile for these two districts to move forward with the consolidation of the sewer operations of LWSD and Hillcrest Sewer District resulting in one significant consolidation of these functions. The completion of the complete merger of the LWSD and Hillcrest water and sewer functions would be a significant step forward towards the development of a comprehensive consolidation including the Cherry Valley-Rochdale Water and Cherry Valley Sewer Districts under the umbrella of either a single combined District or under a 40N based Water & Sewer Commission. Each of these steps would enable consideration of additional physical improvements that could relieve CVSD of its exclusive reliance on Worcester and Upper Blackstone for the transport and treatment of the sewage generated by the limited-service area of this sewer district.

A. The Case for Town Action

- 1) There is broad recognition that the currently fragmented districts present financial, organizational, and technical challenges that are more difficult to overcome due to the limitations of their size.
- 2) This project has come to conclusions entirely consistent with prior studies & recommendations.
- 3) There are good reasons for the Town to act now, including:

- i. The presence of unsustainable rates and subsequently unaffordable water and sewer bills.
 - ii. Opportunities to address water supply needs
 - iii. Opportunities to coordinate planning and accommodate economic development within areas with available water and sewer services.
 - iv. The ability to obtain financing supported by the Town's full-faith-and-credit
 - v. The transparency and accountability of the Town through Town meeting, the Select Board oversight, and coordination with the Town Administrator and other Town departments.
 - vi. Town Meeting and Select Board meeting also accord greater visibility and should increase public awareness of water and sewer issues.
 - vii. Support and oversight by the DOR Office of Local Services.
 - viii. Availability of ARPA and other state and federal funding opportunities that are controlled by the Town.
- 4) There is no indication that further study will result in different conclusions. The next step is to develop a plan of action and begin implementation.

B. Key Financial Implications and Considerations

- 1) Designing and implementing a rate structure that provides full funding in a fair and equitable manner is critical. Establishing consolidation, but maintaining separate rates is possible, but does nothing to, in the short-term, provide relief to ratepayers, particularly those customers of the Cherry Valley Sewer District. Should it be desired to consolidate rate structures while maintaining adequate funding, and also taking into consideration the current significant differences in customers' bills between the Districts, it will require outside funding or subsidization. It should be noted that the source of subsidization, in the short-term, could include all Town taxpayers, not just those customers currently receiving a water or sewer bill. This issue will likely be the largest speed bump on the road to consolidation.
- 2) In the event of a consolidation into either a water, sewer, or combined Town department, it would need to be understood how the acquisition of District assets, both financial and physical, will be acquired by the entity selected for consolidation. If a purchase is required, determining how District assets are valued and where the funds for the associated payment would go will need to be considered. These funds would mostly likely be turned over for deposit into a newly created enterprise fund(s), for financial viability and capital needs. If purchased by a private company, the question of where an associated payment would go becomes even more uncertain.

C. Key Steps to Implementation

- 1) Develop a comprehensive stakeholder engagement plan to insure a transparent and inclusive process for choosing among the options. Plan should involve town and district leadership, including legislators, ratepayers, and taxpayers.
- 2) Engage appropriate officials from the DEP and DLS in ongoing discussions of options around regulatory and municipal finance implications.
- 3) Conduct a comprehensive rate study to develop alternative rate designs, both current and future, that address inequities resulting from fragmented districts and diffused decision making.
- 4) Initiate discussions with Town Counsel and local legislative delegates to draft legislation including Town Meeting Warrant Articles as may be necessary and appropriate to cure defects in existing enabling acts; accomplish all purposes required for implementation of the selected consolidation option; and place as may be required all votes and actions necessary by any or all Districts, the Select Board and Town Meeting.
- 5) Continue to track emerging sources of state and federal infrastructure financing that may become applicable and for which the Town or any Water or Sewer District or other consolidation entity may be deemed eligible to receive to accomplish any aspect of the consolidation efforts; finance by loan or grant or any combination of such all eligible capital expenditures for the improvement, upgrade and energy efficiency of water, sewer and treatment facilities; and to effect the purposes of any proposed final consolidation option on behalf of their respective service populations.

APPENDIX A

Organization Materials

APPENDIX A-1

Enabling Acts

APPENDIX A-2

Bylaws

APPENDIX A-3

Regulations

APPENDIX A-4

HR Policies

APPENDIX A-5

Financial Policies

APPENDIX B

Moose Hill Documents

APPENDIX B-1

Authorizing Agreements

APPENDIX B-2

Leicester-SCS-WRC O&M Agreement

APPENDIX B-3

Leicester-LWSD IMA

APPENDIX B-4

Feasibility Study, SEA, 2008

APPENDIX B-5

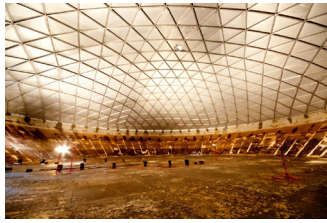
Feasibility Study, Whitewater Consultants, 2017

APPENDIX B-6

DEP Correspondence

APPENDIX C

Financial Metrics



restore

enhance

sustain

maintain

ADDENDUM TO FINAL REPORT

TASK 1 REPORT

January 2022

TOWN OF
Leicester
MASSACHUSETTS

Comprehensive Analysis of Current
Conditions of Six Water & Sewer Districts,
Leicester, Massachusetts



transform your environment

westonandsampson.com

427 Main Street, Suite 400
Worcester, MA 01608
tel: 508.762.1676



Table of Contents

Water & Sewer Districts Analysis Presentation 5.5.211

Water & Sewer Districts Analysis Technical Review Presentation 7.13.2123

Water & Sewer Districts Analysis Financial Review Presentation 9.28.2165

Water & Sewer Districts Analysis Review of Consolidation Options Presentation 11.16.2192

RCAP Analysis of Cherry Valley Sewer District Loan Repayment Impacts119

WATER & SEWER DISTRICTS ANALYSIS PRESENTATION

May 5, 2021

Water & Sewer Districts Analysis



May 5, 2021

Project Team

Team Leader: Weston & Sampson Engineers

- Leah Stanton PE, Vice President
- Joe McGinn, Sr. Project Manager



Resilient Civil Engineering, P.C.

- Kristen Berger, P.E., ENV SP
-



Raftelis Financial Consultants, Inc.

- David Fox, Senior Manager
-



The Collins Center for Public Management (UMASS Boston)

- Sarah Concannon, Director of Municipal Services
- David Colton, Project Manager



Leicester Water & Sewer Districts Study

PROJECT PRESENTATION

WEDNESDAY, MAY 5, 2021

6:00 PM

GoToMeeting Virtual Meeting

AGENDA

1. Welcome David Genereux, Town Administrator
2. Introduction Doug Belanger, Moderator
3. Presentation Weston & Sampson Project Team
4. Meeting Open for Q&A

Leicester Water & Sewer Districts Study



PURPOSE – Provide the Town of Leicester with:

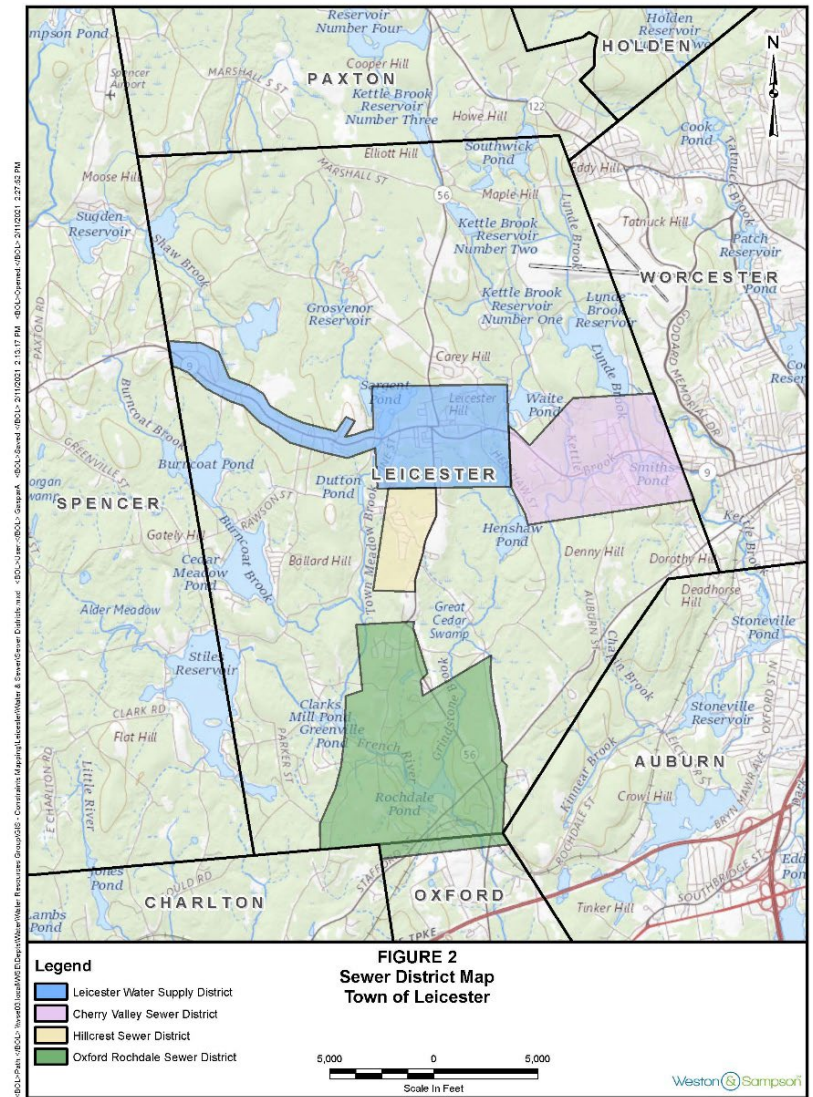
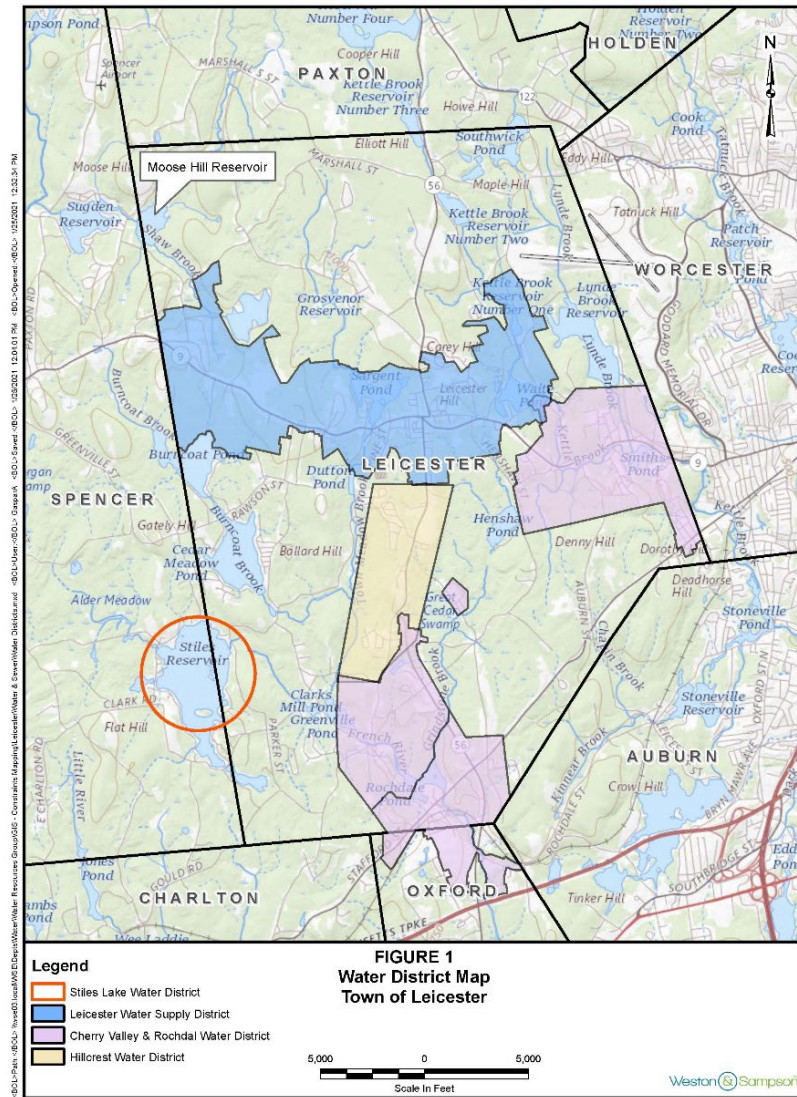
1. ASSESSMENT OF CURRENT DISTRICTS:
 - Organizational structures
 - Technical service capabilities
 - Financial condition
 - Areas of potential improvement
2. Analysis of organizational alternatives for the continued provision of water and sewer services

Tonight's Presentation will focus on Item 1.

Water & Sewer Districts:

- Cherry Valley-Rochdale Water District
- Cherry Valley Sewer District
- Leicester Water Supply District
 - Provides both Water and Sewer Services
- Hillcrest Water District
- Hillcrest Sewer District
- Oxford-Rochdale Sewer District

Water & Sewer Districts



Leicester Water & Sewer Districts Study

METHODOLOGY

- Project Kick-off Meeting
- Requests for Information Issued; Information Provided
- Meetings & Interviews with District Staff & Directors
 - Follow up meetings & communications
- Project Team Meetings
- File Reviews, discussions and meetings with MassDEP CERO; DCR
- File Reviews – Town Administrator
- Personal Interviews with Past District and Town Personnel
- Production of Draft Report on Current District Assessments



rawpixel

Leicester Water & Sewer Districts Study

LEICESTER WATER DISTRICT MEASURES COMPARISON			
DESCRIPTION	CVRWD	LEICESTER WSD	HILLCREST WSD
# OF SERVICE CONNECTIONS	1244	707	393
% METERED	100	100	100
Sources of Supply	Worcester	6 wells, not all operational	1 well and LWSD to supplement
Available Design Supply Capacity with currently operating wells (MGD)		0.387	0.086
Available Supply Capacity with wells at current reduced pumping rates (MGD)		0.288	0.086
Available Supply with Largest Source off-line (MGD)		0.243	Get water from LWSD if well off line
STORAGE CAPACITY (MG)	1.02	1.2	0.37
USABLE STORAGE (MG)	0.924	1.1	0.135
MILES OF WATER MAIN	19	25.15	6.5
SERVICE CONNECTIONS	1244	707	393
POPULATION SERVED	3,685	1,900	1,000
RESIDENTIAL GALLONS PER CAPITA PER DAY (RGPCD)	33	47	75 (est.)
UNACCOUNTED FOR WATER IN 2019	13.50%	3%	N/R
WMA REGISTERED VOLUME (MGD)	0.27	0.19	Below WMA threshold
WMA PERMITTED VOLUME (MGD)	0	0	Below WMA threshold
WMA AUTHORIZED VOLUME (MGD)	0.27	0.19	Below WMA threshold
AVERAGE DAILY USE (MGD)	0.205	0.11	0.08
MAXIMUM DAY DEMAND (MGD)		0.27	0.097
Capital Projects Planned for next 5 Years	\$3,000,000 - \$6,000,000	\$5,010,000 to \$6,767,000	\$884,000 to \$1,122,000
Capital Projects Planned for the 6 to 20 Year Schedule	\$2,500,000 - \$5,000,000	\$2,569,000 to \$3,092,000	\$1,505,000 to \$1,835,000

* N/R - Not Reported

Technical Strengths and Challenges - Water

- Leicester Water Supply District – Water
 - Completed capital planning
 - Balancing demands and supply
 - Water supply quantity and quality
 - Future capital needs
- Hillcrest Water District
 - Storage tank replacement complete
 - Water mains need attention
- Cherry Valley-Rochdale Water District
 - Cost of reliance on Worcester treated water
 - Management of separated service areas
- Limited Local Water Source Options
 - Moose Hill Reservoir
 - Henshaw Pond
 - Other sources



Leicester Water & Sewer Districts Study

SEWER DISTRICT SUMMARY TABLE				
	LWSD - Sewer	HSD	ORSD	CVSD
Number of Customers	683	210	1021	437
Wastewater discharge point	LWSD WWTF	LWSD and ORSD	ORSD WWTF	Worcester/Upper Blackstone
WWTF Construction Date	1900	NA	1971	NA
WWTF Major Upgrade Date	1988	NA	1996, 2010	NA
WWTF design capacity (MGD)	0.35	NA	0.5	NA
WWTF Discharge point	Town Meadow Brook	NA	French River	NA
NPDES Permit issued	2005	NA	2005	NA
NPDES Permit number	MA0101796	NA	MA0100170	NA
Gravity main (miles)	15	4.5	15	9.8
Force main (miles)	3.2	0.25	1.7	
Number of pump stations	8	3	4	5
Dry weather flows (MGD)	0.14	*	0.32	0.1
Estimated I/I	42%			
Capital projects planned	WWTF upgrade required but waiting for renewed NPDES to properly design facility	Planning to dissolve HSD into LWSD and ORSD	WWTF upgrade required but waiting for renewed NPDES to properly design facility	
Additional comments	CWMP recommended WWTF upgrade to 0.732 MGD	Flows split b/w LWSD * ORSD		

Technical Strengths and Challenges - Sewer

- Leicester Water Supply District – Sewer
 - WWTF treats flow from LWSD and HSD
 - Pending WWTF upgrade to address age and future discharge permit requirements
- Oxford-Rochdale Sewer District
 - WWTF treats flow from ORSD and HSD
 - Pending WWTF upgrade to address age and future discharge permit requirements
- Hillcrest Sewer District
 - Only has collection system with relatively new infrastructure
- Cherry Valley Sewer District
 - Flow transported to Worcester then to UBWPAD
 - Costs to Transport & Treat Beyond Local Control



ORGANIZATIONAL & MANAGERIAL STRENGTHS

Core leadership devoted to the success of these organizations.

Overall stability in management.

Move from elected to appointed Treasurers.

Qualified, capable, and licensed superintendents.

Dedicated and hands-on treasurers and staff.

Highly responsive customer service.

Regular periodic external financial audits.

High level of cooperation among the districts.

ORGANIZATIONAL & MANAGERIAL CHALLENGES



Small customer base.



Low participation rate at annual meetings and little competition for board seats.



Gaps in inter-agency agreements.



Fewer resources for non-operational matters.

Strategic planning
Financial policies.
Human resource policy.
Written job descriptions.

ORGANIZATIONAL & MANAGERIAL FUTURE CONCERNS



Rising costs driven by regulatory compliance



Rising costs driven by developing adequate water and/or treatment capacity supply



Shortage of qualified financial managers in the labor market



Shortage of qualified technical managers in the labor market

ORGANIZATIONAL & MANAGERIAL OPPORTUNITIES

Expand inter-district cooperation
and sharing of resources

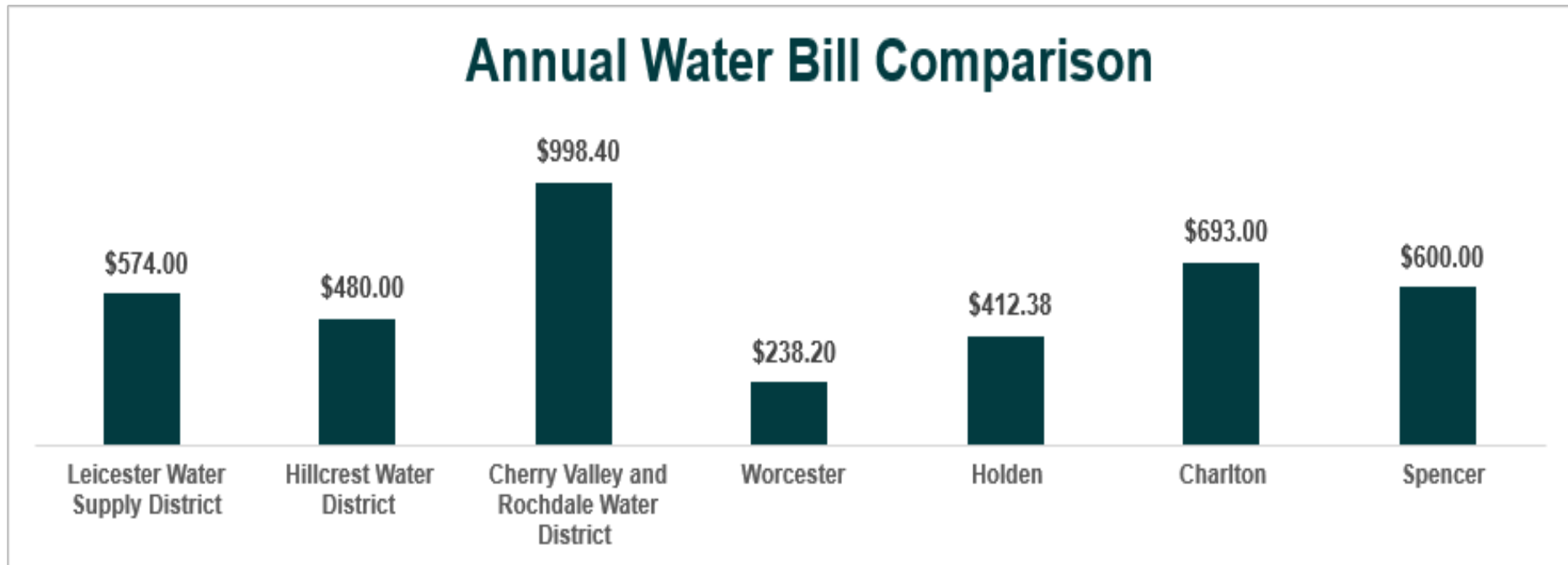
Re-examine existing inter-
governmental agreements for
completeness

- Enhance human resources management capacity through targeted professional development, policy implementation, and more structured HR procedures

Strengthen financial management
through training and policy
implementation

More consistent review of Rules
and Regulations.

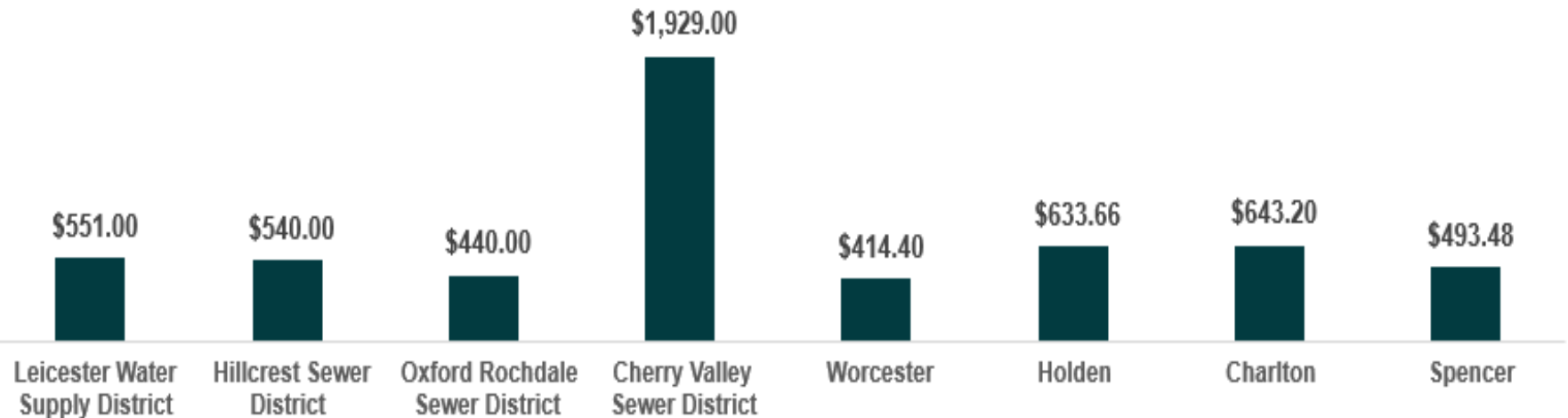
Leicester Water & Sewer Districts Study



- Assumes annual water consumption of 60 Ccf (approximately 45,000 gallons) and a 5/8" meter, where applicable.

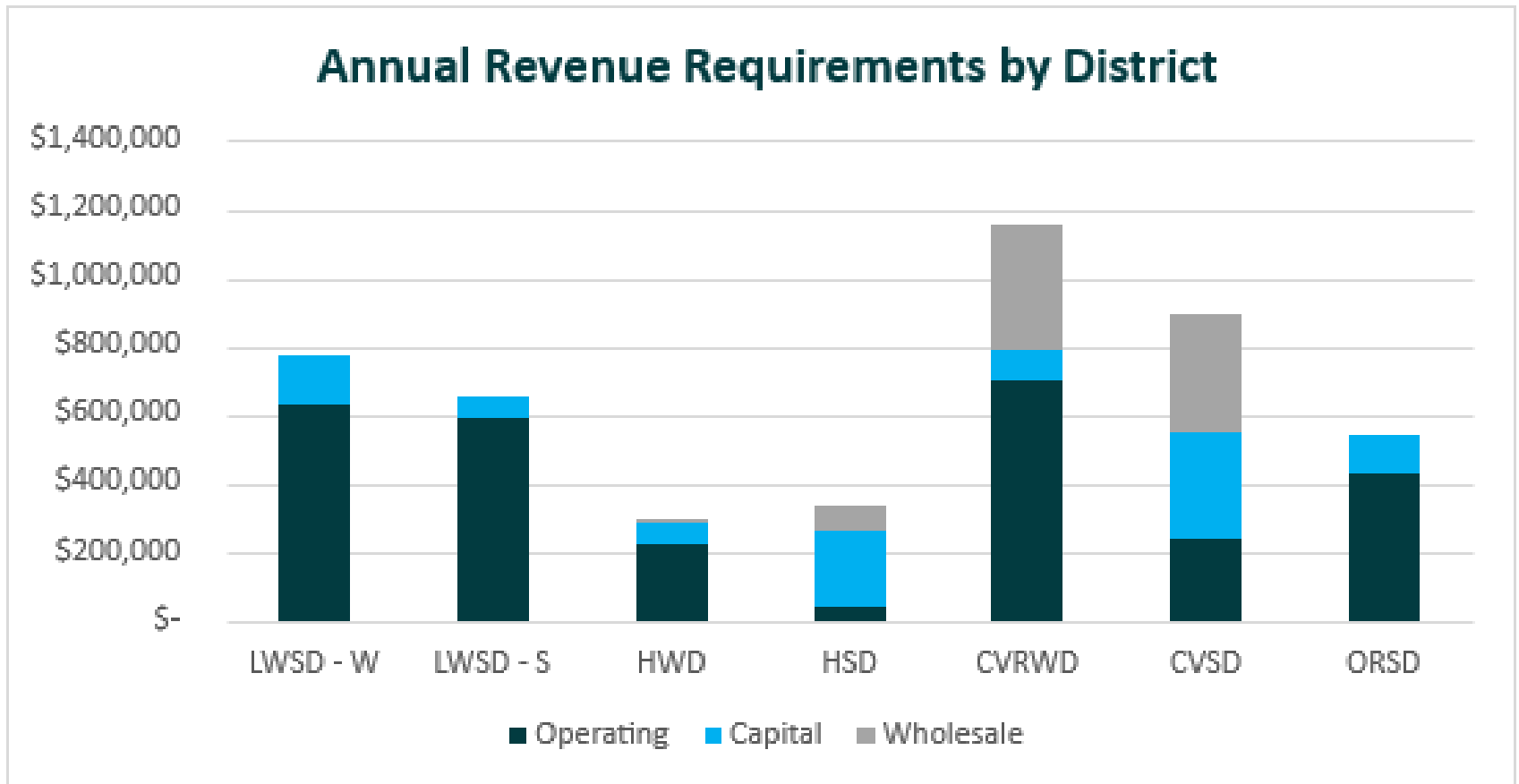
Leicester Water & Sewer Districts Study

Annual Sewer Bill Comparison



- Assumes annual water consumption of 60 Ccf (approximately 45,000 gallons) and a 5/8" meter, where applicable.

Leicester Water & Sewer Districts Study



Financial Summary

High fixed and contractual costs related to debt service and wholesale service agreements limit ability to control costs

Costs, unfortunately, are only going to continue to increase in order to deal with increased regulations and necessary capital improvements

Small and homogenous customer bases do not allow for a reasonable distribution of costs, nor an opportunity for changes to rate design to limit customer impacts

Existing rates, and subsequent bills, in some cases, are abnormally high as compared to the rest of the industry from a local, regional, and national perspective

Many of the Districts' customers are already economically disadvantaged, with no options for implementing increasingly common customer assistance programs

Next Steps



thank you

westonandsampson.com

WATER & SEWER DISTRICTS ANALYSIS TECHNICAL REVIEW PRESENTATION

July 13, 2021

Water & Sewer Districts Analysis Technical Review



July 13, 2021

Project Team

Team Leader: Weston & Sampson Engineers

- Leah Stanton PE, Vice President
- Joe McGinn, Sr. Project Manager



Resilient Civil Engineering, P.C.

- Kristen Berger, P.E., President



Raftelis Financial Consultants, Inc.

- David Fox, Senior Manager



The Collins Center for Public Management (UMASS Boston)

- Sarah Concannon, Director of Municipal Services
- David Colton, Project Manager



Leicester Water & Sewer Districts Study



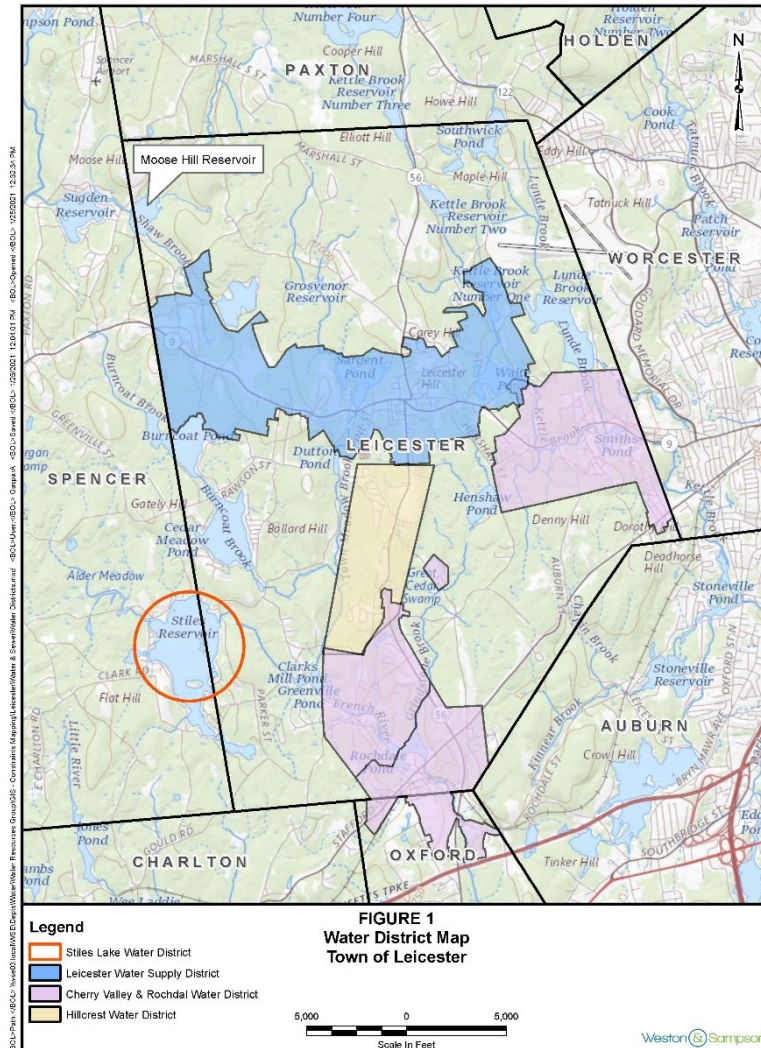
PURPOSE – Provide the Town of Leicester with:

1. ASSESSMENT OF CURRENT DISTRICTS:
 - a. Organizational structures
 - b. Technical service capabilities**
 - c. Financial condition
 - d. Areas of potential improvement
2. Analysis of organizational alternatives for the continued provision of water and sewer services

Tonight's Presentation will focus on Item 1b.

Water District Map

- Cherry Valley-Rochdale Water District
- Leicester Water Supply District
 - Provides both Water and Sewer Services
- Hillcrest Water District



Technical Strengths and Challenges

Recap - Water

- Leicester Water Supply District – Water
 - Completed capital planning
 - Balancing demands and supply
 - Water supply quantity and quality
 - Future capital needs
- Hillcrest Water District
 - Storage tank replacement complete
 - Water mains need attention
- Cherry Valley-Rochdale Water District
 - Cost of reliance on Worcester treated water
 - Management of separated service areas
- Limited Local Water Source Options
 - Moose Hill Reservoir
 - Henshaw Pond
 - Other sources



LWSD & HWD – Current Supplies

- LWSD Wells located in Paxton
 - Rock Wells 1, 2, 3 (Grove St. Paxton)
 - Jim Dandy Well
 - Pierce Spring
- LWSD Wells located in Leicester
 - Rock Well 4 (Whittemore)
 - Rock Well 5 (Rawson)
- Hillcrest Water District
 - Rock Well 1



LWSD

Wells located in Paxton

- Rock Wells 1, 2, 3 (Grove St. Paxton)
 - Well 1 off-line
 - Wells 2 and 3 treated to remove Arsenic
- Jim Dandy Well
 - Off-line, needs treatment for Surface Water Treatment Rule compliance
- Pierce Spring



Wells located in Leicester

- Rock Well 4 (Whittemore)
 - Off-line, needs treatment to remove arsenic, uranium, radium and radon
- Rock Well 5 (Rawson)
 - Treated to remove manganese, arsenic, uranium and radon

- | | | | |
|--|-----|--|-----------------------|
| | <6" | | Well |
| | 6" | | Stand Pipe |
| | 8" | | Pump Station |
| | 10" | | Booster Station |
| | 12" | | Water Treatment Plant |
| | 16" | | |

RAWSON ST ROCK W#5





Mt. Pleasant
Booster

Hillcrest

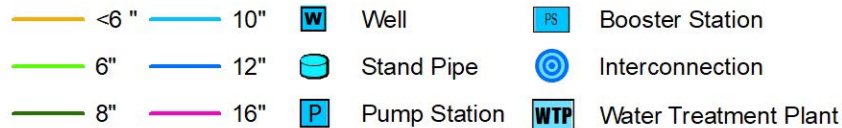
HWD

ROCK WELL #4

RAWSON ST
ROCK W#5

Hillcrest Water District

- Rock Well 1
 - Treated to remove iron, manganese, arsenic, uranium and hydrogen sulfide



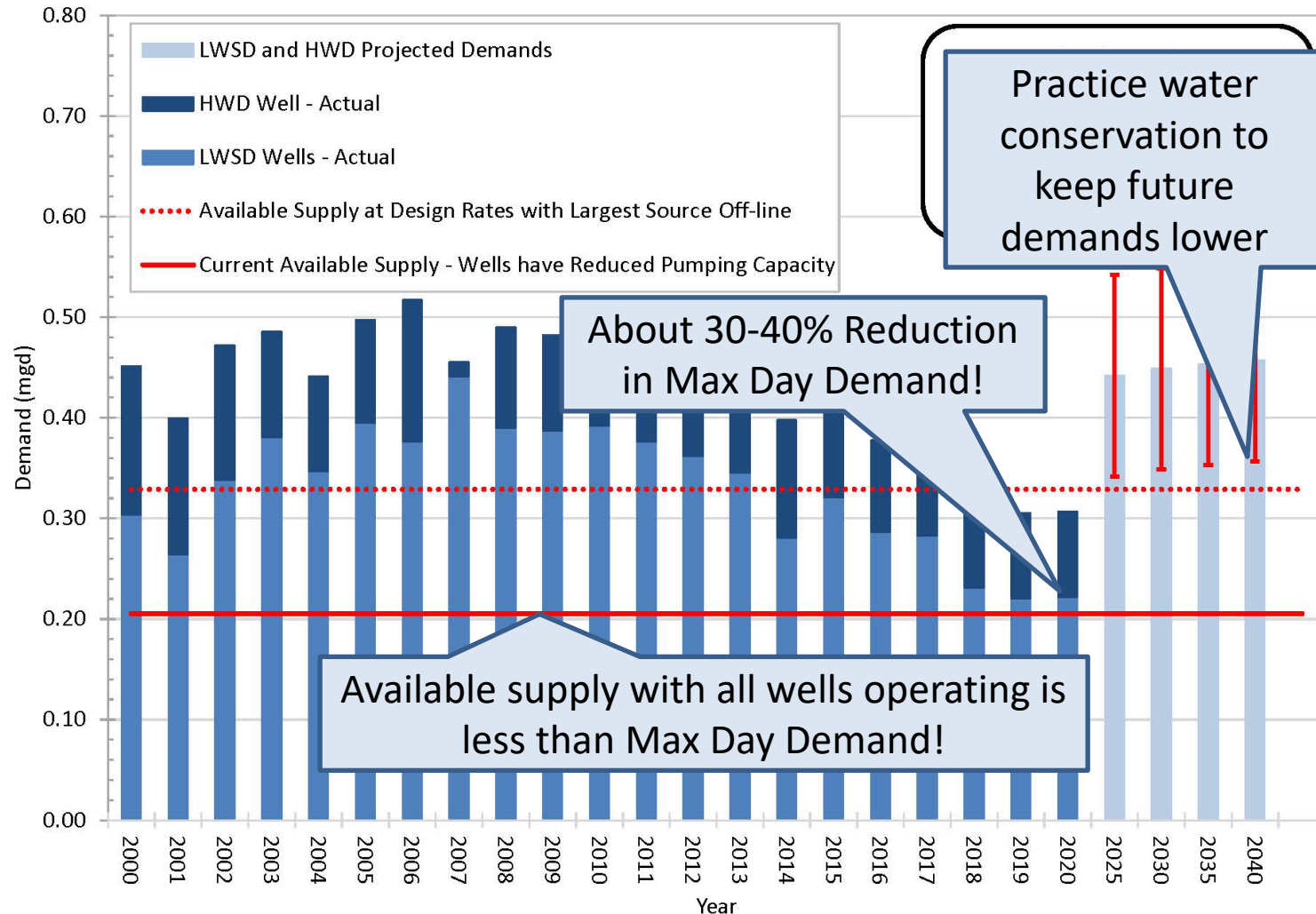
MassDEP Regulation

- MassDEP Guidelines for Public Water Suppliers Chapter 7 requires that with any supply pump out of service, the remaining pump(s) shall be capable of providing the maximum daily pumping demand of the system.
- Intent to supply max day demand with source water and not storage tank



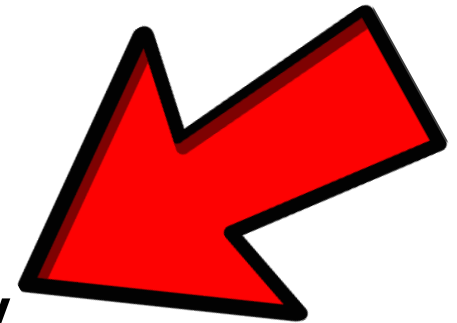
Max Day Demand & Supply

Actual and Projected Maximum Day Demand Compared with Available Supply



Max Day Demand & Supply

- What does the graph show?
 - Max Day Demand down 30-40% over time: improved water conservation, identified and removed water leaks
 - Current pumping capability of wells is less than Max Day Demand & rest of the water is provided by storage
 - Cannot fill water storage tanks on Max Day Demand
 - Future Max Day Demand can be kept lower by continuing water conservation practices even during dry summers when customers typically use more water
- **Additional water supply needed as soon as possible to avoid a water supply emergency**



What is LWSD doing about Supply?

- ✓ Cleaning and re-developing wells
 - Efforts have not improved withdrawal capability
- ✓ Identifying & removing leaks from mains & service lines
 - Efforts have lowered demand – big help!
- ✓ Initiated the process to install a replacement well for Well 5
 - Goal to regain production capacity at this site
- ✓ Conducted Alternative Source Study
- ✓ Initiated design of interconnection with Worcester
 - Identified as most advantageous solution
- Will continue to explore other supply alternatives

LWSD – Water Supply Alternatives

- LWSD Secured Grant through Water Management Act Grant
- Alternative Source Study concluded June 30, 2021
- Study by Wright-Pierce and ResilientCE
 - Considered 5 alternative sources that could get more water supply within a few years
- LWSD pursuing additional grants



LWSD Supply Alternative 1 – Paxton Well Improvements

- Improvements Required
 - Rehabilitation of 5-mile Transmission Main
 - New Water Treatment Facility located at end of Transmission Main for Surface Water Treatment Rule compliance
- Challenges
 - Significant capital cost
 - Wells losing capacity; level of groundwater at the wells is lowering
 - Will the wells continue to produce into the future?



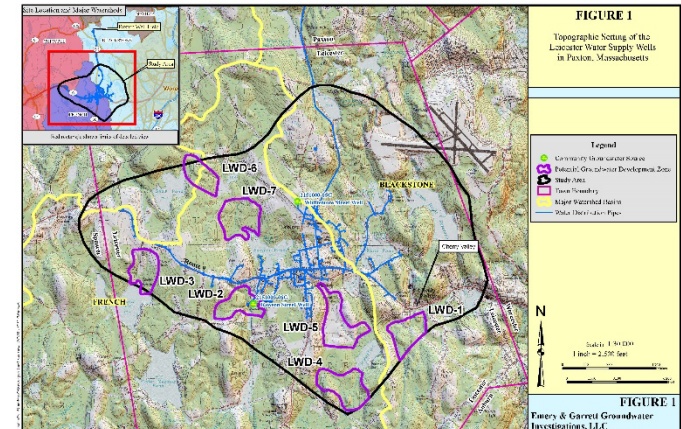
LWSD Supply Alternative 2 – French Basin Well Improvements

- Continued use of Rawson Well 5, Hillcrest Water District Well 1 and reactivation of Whittemore Well 4
 - Inactivation of Paxton Wells
 - Supplemental Water from Interconnection
- Challenges
 - WMA Permit required
 - Ongoing efforts to regain production capacity of Well 5
 - Capital improvements required to reactivate Well 4 including rehab of pump station and new treatment facility
 - Still require supplemental water from another source such as interconnection



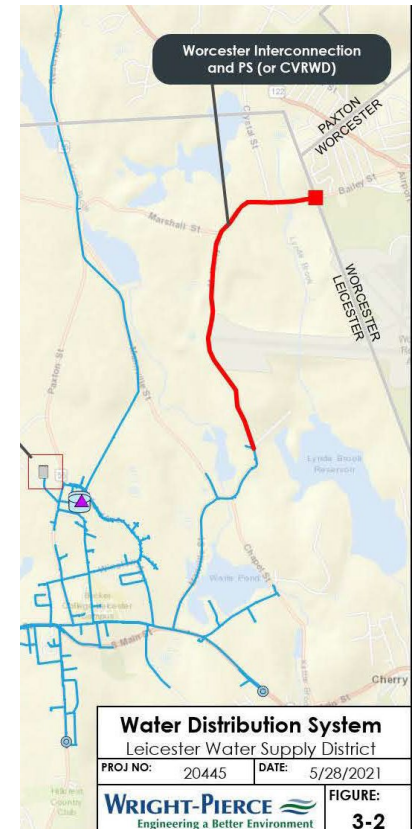
LWSD Supply Alternative 3 – New Source Development

- Groundwater Exploration and Development study
 - Identified several possible parcels
 - Further testing and study needed
- Challenges
 - Long implementation time from initial study to production well
 - No field work conducted at this time
 - Many uncertainties:
 - Pumping rate,
 - Water quality,
 - Land ownership



LWSD Supply Alternative 4 – Worcester Interconnection

- Continued use of Rawson Well 5
- Construction of permanent interconnection with Worcester
 - Metered booster pump station at Bailey St.
 - 2 miles transmission main along Marshall St. and Mulberry St.
- Challenges
 - Interbasin Transfer Act – Resolved and Not subject to this as determined by Water Resources Commission
 - Capital costs
 - Water purchase agreement and costs

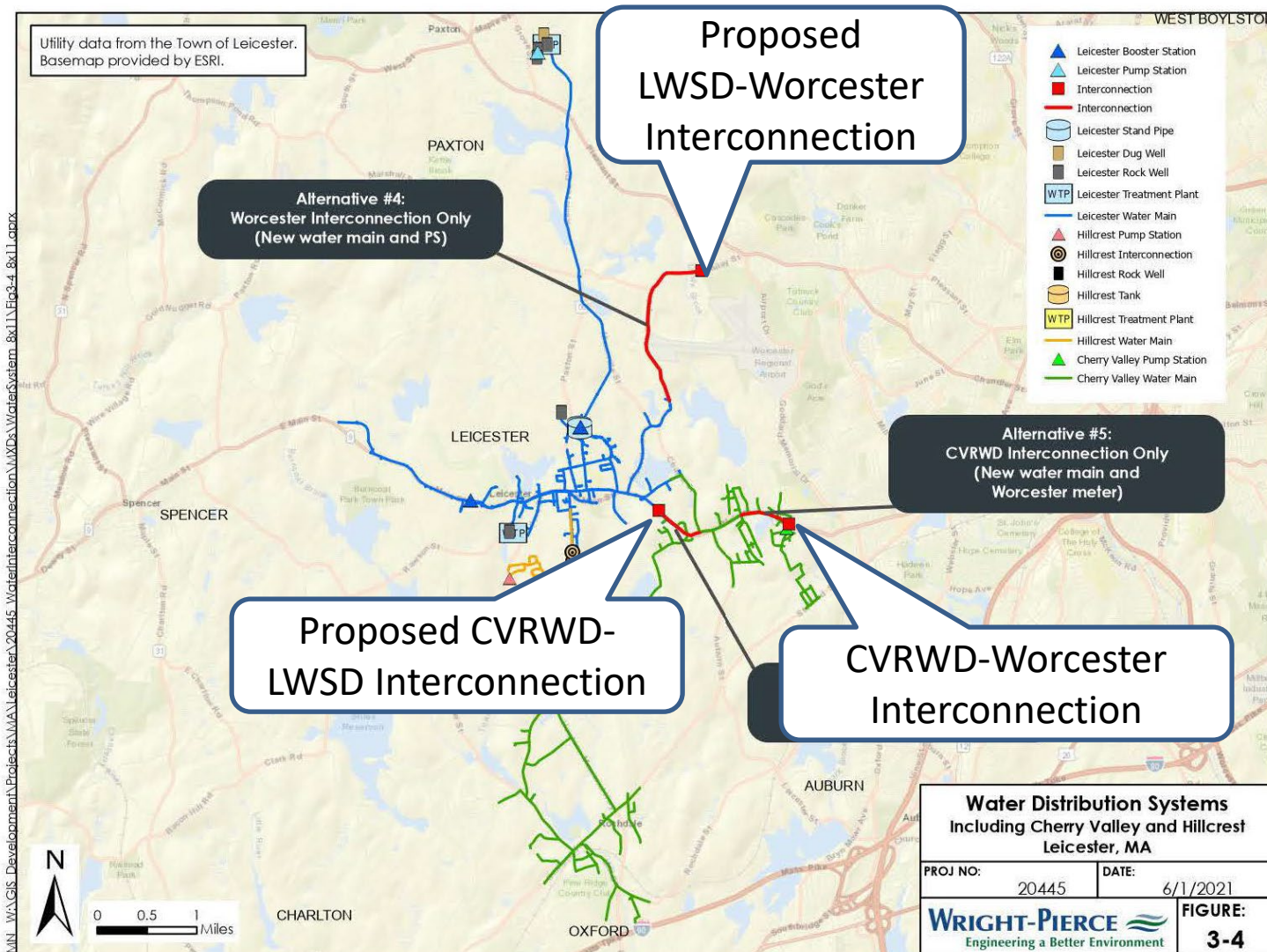


LWSD Supply Alternative 5 – CVRWD Interconnection

- Continued use of Rawson Well 5
- Construction of permanent interconnection with CVRWD
 - Metered booster pump station at Main St.
 - Replacement of CVRWD-Worcester master meter
 - Replacement of 2,400 ft water main in Worcester
 - Replacement of 11,000 ft water main in CVRWD
 - Replacement of 2,400 ft water main in LWSD
- Challenges
 - Hydraulic analysis showed significant water main improvements needed due to undersized mains and aging infrastructure
 - Requires booster pumping at LWSD-CVRWD line to pump from 40 psi (CVRWD system) to 120 psi (LWSD system)
 - Capital costs
 - Water purchase agreement and costs



Potential LWSD-Worcester Interconnections



Moose Hill Reservoir

- Not part of LWSD alternative source study due to timeline, identified as potential long term future solution for Town
- Challenges:
 - Subject to EPA/DEP Water Treatment Requirements per SWTR
 - Projected Costs of Treatment & Associated Costs of Development - \$30M (does not include residuals disposal costs)
 - Need to Understand the Hydrology, Hydraulics and Limnology of Moose Hill Reservoir & Watershed
 - Piloting to Determine Treatment Requirements
 - Need to Determine Land Area Requirements for Treatment Facility
 - Need to Site Pumping, Storage and Distribution Components
 - Connections to Intended User System(s)
 - Long duration project to achieve completion



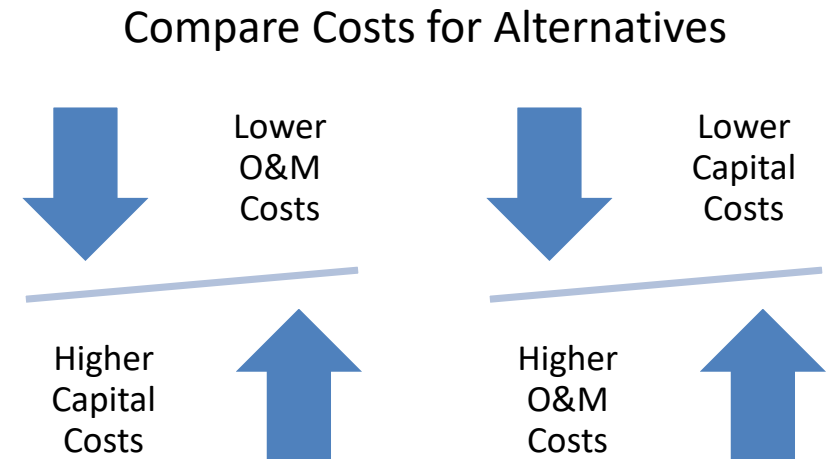
LWSD Comparison of Alternatives

Alternative	Order-of-Magnitude Capital Costs	Approximate Time to Activation
Alternative 1 – Paxton Well Improvements	\$16,800,000	3 – 5 years
Alternative 2 – French Basin Well Improvements (includes interconnection)	\$10,700,000	3 – 5 years
Alternative 3 – New Source Development	\$9,800,000	5 – 10 years
Alternative 4 – Worcester Interconnection	\$4,700,000	2 years
Alternative 5 – CVRWD Interconnection	\$8,600,000	3 – 5 years
Moose Hill Reservoir	\$30,000,000*	10 – 20 years

*Cost does not include water treatment facility residuals disposal costs.

LWSD Comparison of Supply Alternatives

- Present Worth Costs
 - Account for Capital and Operation & Maintenance (O&M) Costs
 - Way to compare cost of alternatives that have different capital costs and annual O&M costs
 - Uses Engineering Economics tables and equations to convert annual O&M costs over 20-years to present day dollars
- O&M Costs for Supply Alternatives include items such as (not all items required for each alternative):
 - Water purchase (out of City rate)
 - Electrical
 - Chemicals
 - Treatment process needs
 - Process residuals disposal
 - Additional Labor



LWSD Comparison of Supply Alternatives

Alternative	Order-of-Magnitude Present Worth Comparison (Capital + 20 Year O&M Costs)	Notes
Alternative 1 – Paxton Well Improvements	\$20.8 million	O&M Costs assume 3% increase in costs per year. Cost comparisons do not include interest on loans. Costs are ballpark values since there are many uncertainties for most alternatives.
Alternative 2 – French Basin Well Improvements (includes interconnection)	\$16.3 million	
Alternative 3 – New Source Development	\$11.1 million	
Alternative 4 – Worcester Interconnection	\$12.8 million	
Alternative 5 – CVRWD Interconnection	\$16.7 million	
Moose Hill Reservoir	\$35.4 million	

LWSD Comparison of Alternatives

Alternative	Benefits	Challenges
Alternative 1 – Paxton Well Improvements	District controlled water supply	Wells are losing capacity, High capital cost
Alternative 2 – French Basin Well Improvements (includes interconnection)	District controlled water supplemented by interconnection	Interconnection still required, Water purchase cost
Alternative 3 – New Source Development	District controlled water supply Lowest Present Worth Cost	Longer duration project, Many project uncertainties
Alternative 4 – Worcester Interconnection	Reliable source of water to supplement Well 5, Second interconnection for Leicester, Low Present Worth Cost, Shortest implementation time	Water purchase cost
Alternative 5 – CVRWD Interconnection	Reliable source of water from Worcester through CVRWD to supplement Well 5	Water purchase cost, Single interconnection location, Significant infrastructure improvements required
Moose Hill Reservoir	Town controlled water supply, Potential significant volume of water in comparison to other local sources	High capital & present worth costs, Long duration project, Project uncertainties

LWSD Water Supply Near Future Solutions

- ✓ Interconnection with Worcester
 - Most advantageous to resolve ongoing and urgent water supply needs of LWSD.
- ✓ Continue to pursue Well 5 replacement well
- ✓ Continue to implement interconnection with Worcester at Bailey Street
 - Supplemental water to LWSD
 - Backup connection to Cherry Valley system
 - DEP noted in Sanitary Survey this was needed
 - Valuable for supply redundancy & resiliency to reduce vulnerability now and in future

LWSD Water Supply Long Term Solutions

- Once interconnection is active, make Paxton Wells inactive
- Goal - rely on Well 5 & HWD Well 1 and supplement with water from Worcester to keep purchase cost lower
- Continue to explore other options for water supply to meet future needs.
 - New sources - groundwater and surface water?
 - Rehabilitate existing sources?

CVRWD Water Supply

- Current water supply from Worcester
- Challenges
 - Cost of reliance on Worcester water
 - Costs about \$385,000 per year
 - Grindstone Well currently inactive
 - Design to reactivate approved by MassDEP
 - New phosphate & chlorine feed systems, replace filter media, new equalization tanks, pumps and SCADA
 - Bid work Fall 2021
 - Ballpark budget \$500,000 to be updated before bid
 - Will supply Rochdale system up to 110,000 gpd (current average day demand is 80,000 gpd)
 - Worcester water will still feed Cherry Valley system
 - Henshaw Pond currently inactive and would need new water treatment facility

Other Water Infrastructure Needs

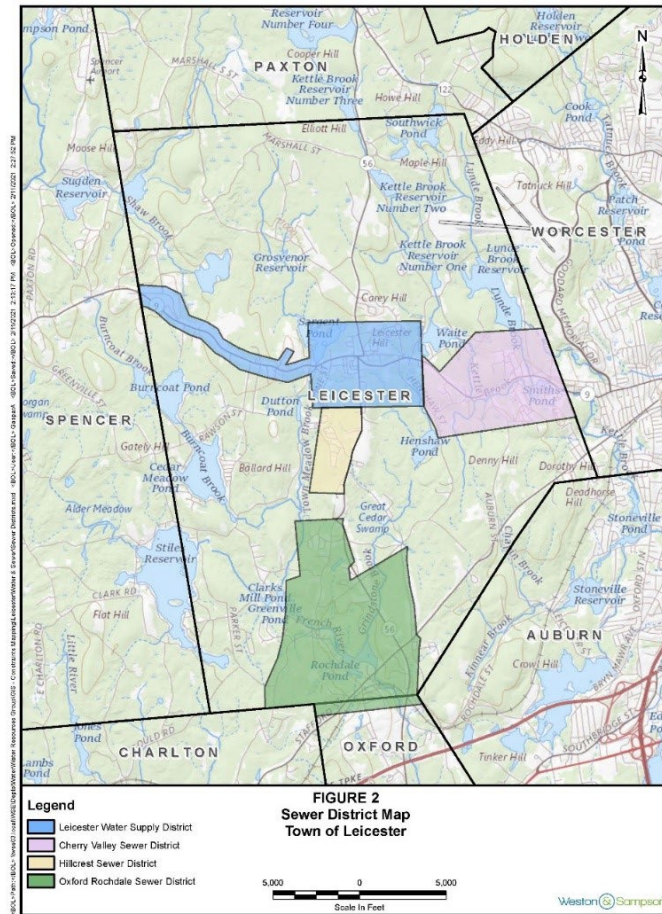
- All three systems have completed Hydraulic Studies and Capital Improvement Plans
- Undersized Water Mains
- Aging Water Mains
 - LWSD – Cast Iron Pipe
 - HWD – AC Pipe
 - CVRWD – Cast Iron Pipe



Water Infrastructure Take Away

- Water supply solutions
 - More than one solution!
 - Additional supply for both immediate and long term needs
 - Diversify supply for sustainability and resiliency
- Care for aging water mains

Sewer District Map

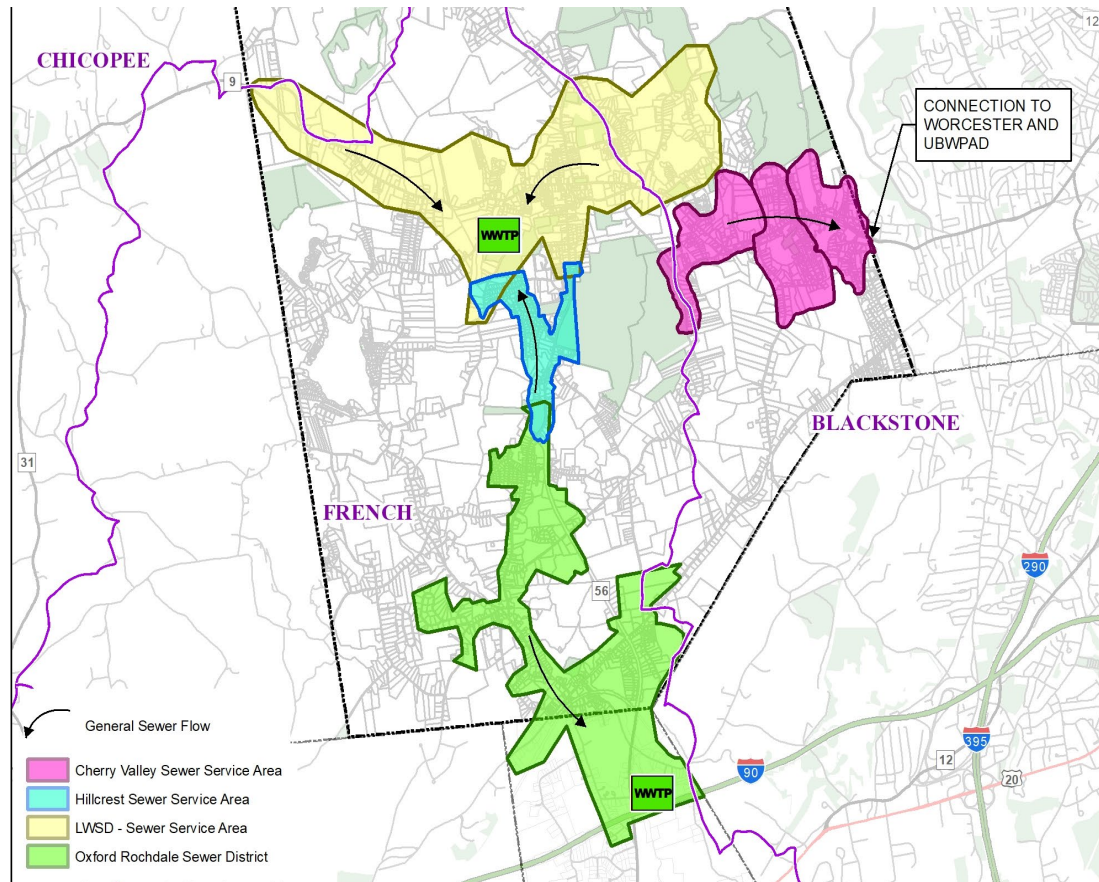


- Cherry Valley Sewer District
- Leicester Water Supply District
 - Provides both Water and Sewer Services
- Hillcrest Sewer District
- Oxford-Rochdale Sewer District

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts



Technical Strengths and Challenges – Recap Sewer

- Leicester Water Supply District – Sewer
 - WWTF treats flow from LWSD and HSD
 - Pending WWTF upgrade to address age and future discharge permit requirements
- Oxford-Rochdale Sewer District
 - WWTF treats flow from ORSD and HSD
 - Pending WWTF upgrade to address age and future discharge permit requirements
- Hillcrest Sewer District
 - Only has collection system with relatively new infrastructure
- Cherry Valley Sewer District
 - Flow transported to Worcester then to UBWPAD
 - Costs to Transport & Treat Beyond Local Control



Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

Sewer District Data Summary

DISTRICT	Number of Connections	Average Daily Flow (mgd)	Gravity Sewers (Miles)	Force Mains (Miles)	Pump Stations	Discharge To WWTP
LWSD	683	0.14	15	3.2	8	LWSD WWTP
HSD	260	---	4.5	0.25	3	LWSD/ORSD WWTP
ORSD	1021	0.32	15	1.7	4	ORSD WWTP
CVSD	437	0.10	9.8		5	Worcester/Upper Blackstone WPAD

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

Wastewater Treatment Plant Summary Information

WWTP	Design Capacity (mgd)	Receiving Water	NPDES Permit No.	NPDES Permit Status
LWSD	0.35	Town Meadow Brook	MA0101796	Draft Permit Issued
ORSD	0.50	French River	MA0100170	Draft Permit Issued
Worcester/UBWPAD	56	Blackstone River	MA0102369	

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

LWSD WWTP - Proposed Nutrient & Metals NPDES Permit Limits

Parameter	Discharge Limits: Average Monthly	Average Weekly	Maximum Daily
Total Phosphorus (April 1 – October 31)	0.11 mg/L		
Total Phosphorus (Nov. 1 – March 31)	1.0 mg/L		
Ammonia Nitrogen (April 1 – April 30)	6.2 mg/L	10 mg/L	15 mg/L
Ammonia N (May 1 – May 31)	5 mg/L	5 mg/L	7.5 mg/L
Ammonia N (June 1 – Oct. 31)	2 mg/L	2 mg/L	3 mg/L
Total Recoverable Copper	12.2 ug/L		18.8 ug/L
Aluminum	87 ug/L		

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

LWSD WWTP - Capital Improvements Status

- Headworks Improvements \$2.0 M – 2.5 M
- Aeration System Improvements \$1.5 M
- Clarifier Improvements \$2 M – 3 M
- Sludge Dewatering/Conveyor Improvements \$1.5 M – 2 M
- Nitrogen Removal Upgrade \$1.5 M – 3 M
- Phosphorus Removal Upgrade \$0.5 M – 1 M
- Minor Action Items \$2.0 M – 2.6 M
- Contingency \$2.0 M – 2.6 M
- TOTAL \$11 M - \$15.8 M

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

ORSD WWTP - Proposed Nutrient & Metals NPDES Permit Limits

Parameter	Discharge Limits: Average Monthly	Average Weekly	Maximum Daily
Total Phosphorus (April 1 – October 31)	0.2 mg/L		
Total Phosphorus (Nov. 1 – March 31)	1.0 mg/L		
Ammonia Nitrogen (April 1 – April 30)	10 mg/L	10 mg/L	15 mg/L
Ammonia N (May 1 – May 31)	5 mg/L	5 mg/L	7.5 mg/L
Ammonia N (June 1 – Oct. 31)	2 mg/L	2 mg/L	3 mg/L
Total Recoverable Copper	10.4 ug/L		15.4 ug/L
Aluminum	123 ug/L		

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

ORSD WWTP Capital Improvements Status

- Total Nitrogen Removal Upgrade \$1.5 M – 3 M
- Total Phosphorus Removal Upgrade \$0.5 M – 1 M
- Minor Action Items \$0.6 M – 0.9 M
 - TOTAL \$2.6 M – 4.9 M

Leicester Water & Sewer District Study

Technical Issues Presentation

Sewer Districts

FACTORS IMPACTING COSTS OF SEWER SYSTEM UPGRADES/EXPANSION:

- TOPOGRAPHY - Dictates pumping needs
 - Pumps require energy, force mains, telemetry, operation & maintenance
 - Pump stations can impact DEP staffing requirements for certified operators
- SUBSURFACE CONDITIONS – May impact pipeline and pump station construction
 - Till and hardpan soil conditions may require heavy construction methods and pipe bedding
 - Shallow depth to bedrock can require heavy construction methods (blasting)
 - Groundwater conditions can require dewatering during construction and require water-tight construction methods and materials
- PUMP STATIONS - Require Emergency Power Provision

SEWER/WWTP TAKE-AWAYS

- Sewer systems are generally in good condition (age and pipe materials)
- I/I Remains a challenge in some areas
- Pumping Station O&M remains a priority
- New NPDES Permits for LWSD & ORSD WWTPs guide upgrades and improvements at both facilities.
 - Both plants are operating within capacity limits
 - Deferred improvements can move forward
 - Nutrient (Phosphorus) and Metals Limits impact capital costs of improvements
- Cherry Valley SD has no feasible short-term alternative to Worcester – UBWPAD connection
 - CVSD could consider long-term options to connect to ORSD
 - Cost and Capacity will be critical issues

thank you

westonandsampson.com

WATER & SEWER DISTRICTS ANALYSIS FINANCIAL REVIEW PRESENTATION

September 28, 2021

Water & Sewer Districts Analysis Financial Review



September 28, 2021

Project Team

Team Leader: Weston & Sampson Engineers

- Leah Stanton PE, Vice President
- Joe McGinn, Sr. Project Manager



Resilient Civil Engineering, P.C.

- Kristen Berger, P.E., President



Raftelis Financial Consultants, Inc.

- Dave Fox, Senior Manager



The Collins Center for Public Management (UMASS Boston)

- Sarah Concannon, Director of Municipal Services
- David Colton, Project Manager



Leicester Water & Sewer Districts Study

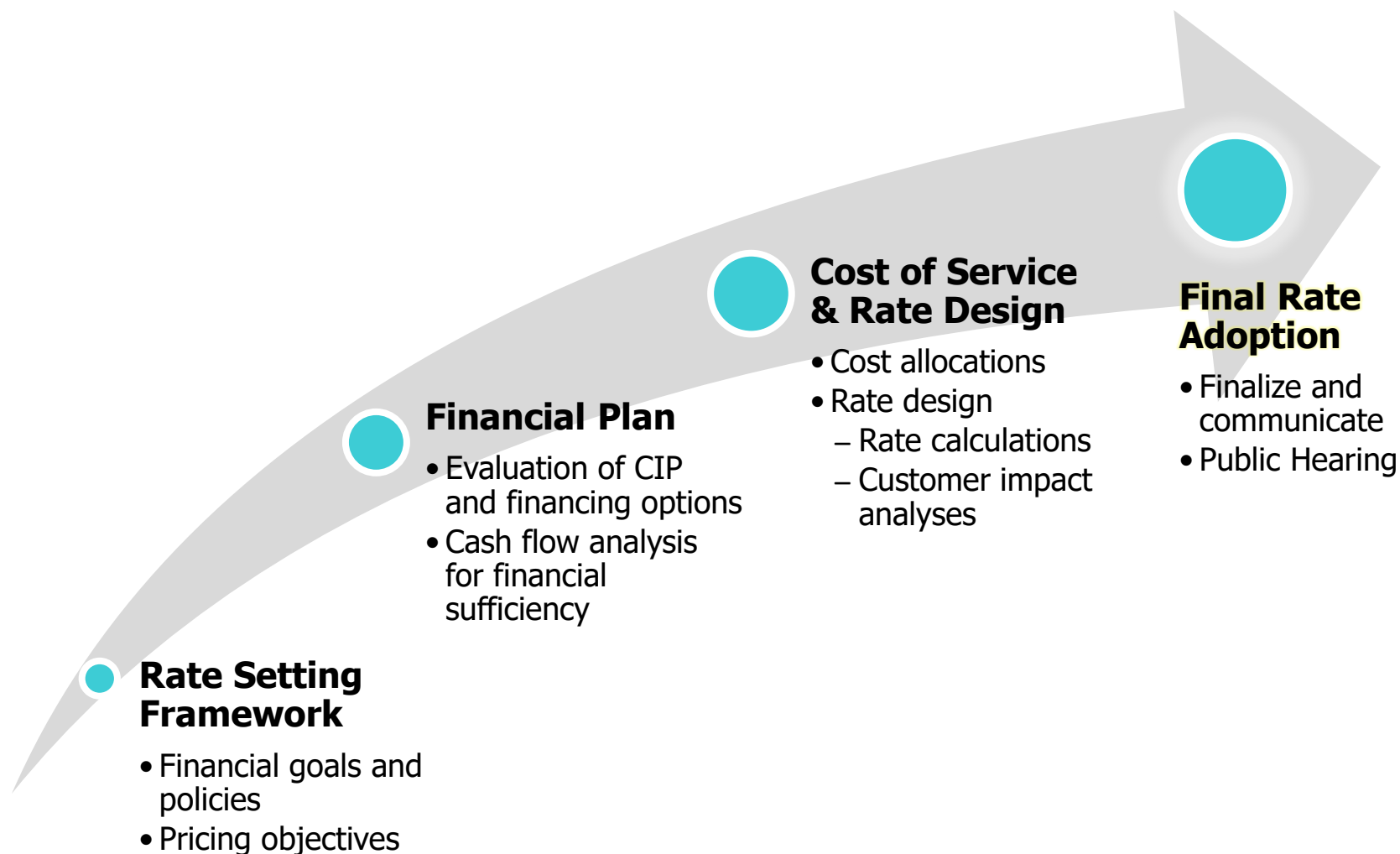


PURPOSE – Provide the Town of Leicester with:

1. ASSESSMENT OF CURRENT DISTRICTS:
 - a. Organizational structures
 - b. Technical service capabilities
 - c. Financial outlook**
 - d. Areas of potential improvement
2. Analysis of organizational alternatives for the continued provision of water and sewer services

Tonight's Presentation will focus on Item 1c.

RATE STUDY AT A GLANCE



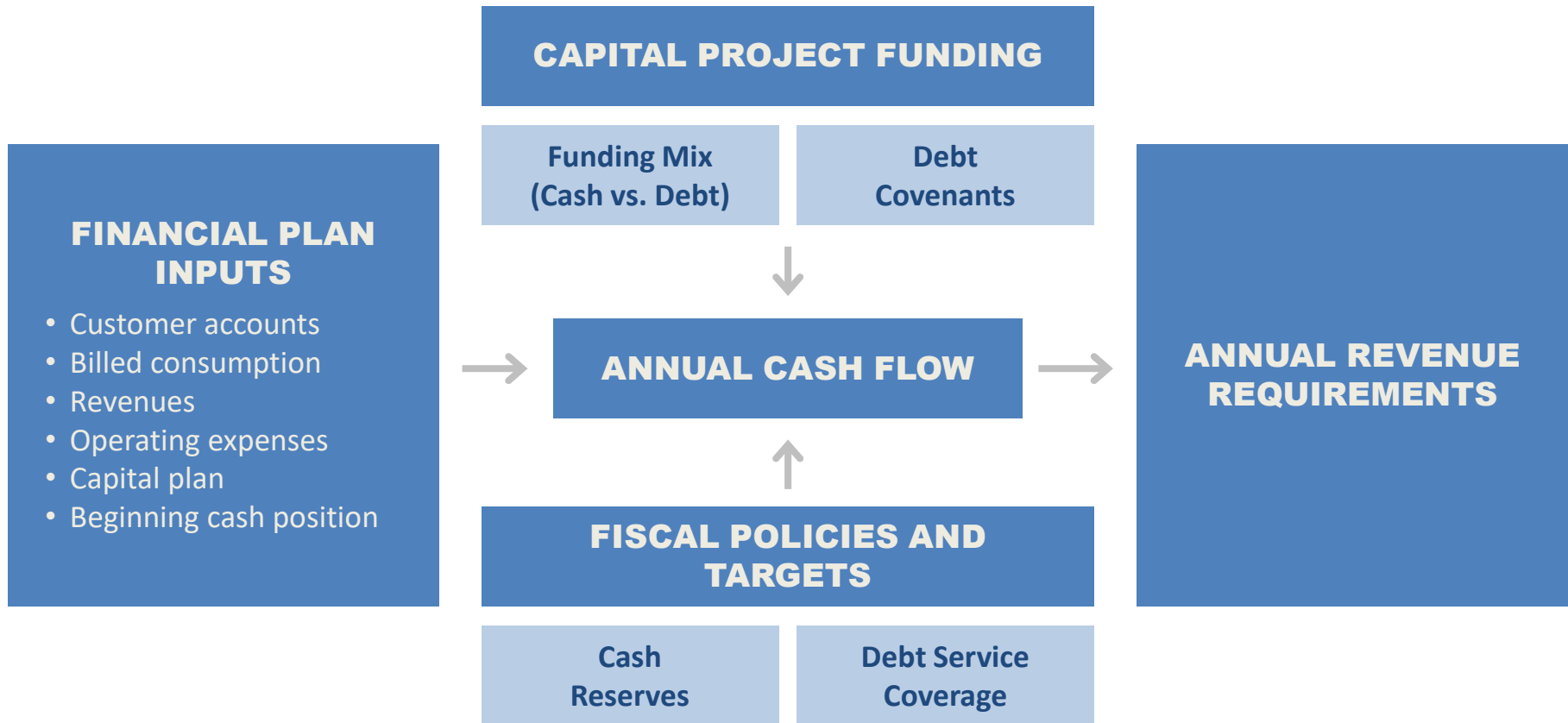
COMMON PRICING OBJECTIVES

Conservation	Funding Mechanism	Affordability	Equity and Allocation Methodologies	Administration
<ul style="list-style-type: none">• Reducing total annual demand• Reducing water waste• Reducing peak demand• Reducing outdoor water usage	<ul style="list-style-type: none">• Enhancing revenue stability• Ensuring financial sufficiency• Providing funding mechanisms for alternative water supply, conservation program	<ul style="list-style-type: none">• Minimizing customer impacts• Maintaining low average customer bills• Crafting rates that provide affordable water for essential uses	<ul style="list-style-type: none">• Allocating water supply equitably• Providing a drought management tool• Allocating capital costs equitably• Complying with government regulations and guidelines	<ul style="list-style-type: none">• Allowing cost-effective administration• Allowing easy implementation• Enhancing customer understanding

From Water and Wastewater Finance and Pricing: The Changing Landscape, 4th Edition

Revenue Requirements & Financial Planning

FINANCIAL PLAN ELEMENTS



Rate Design Considerations

Fixed Charges by Meter Size

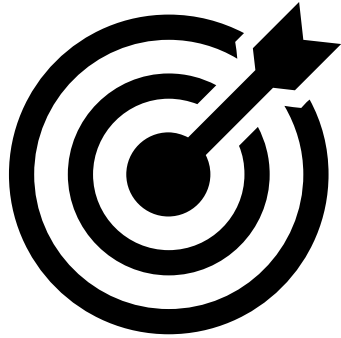
- Enhance revenue stability
- Disproportionately affect low-volume users

Fire Protection Charges

- Public and private
- Enhances revenue stability
- Mitigates cost recovery burden on retail customers

Lifeline Rates

- Provides “essential” usage at a lower volumetric rate
- Enhances customer affordability
- Limited benefit with homogenous customer base

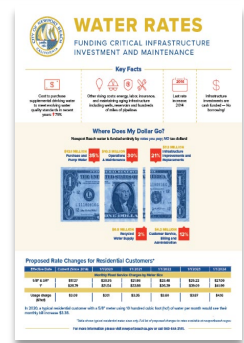
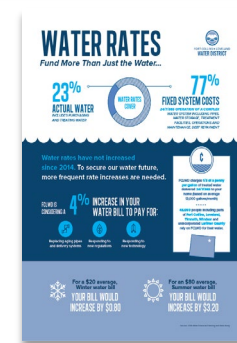
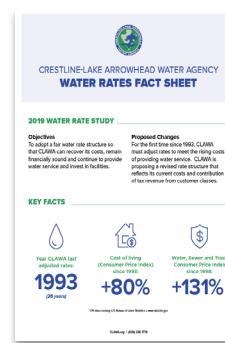
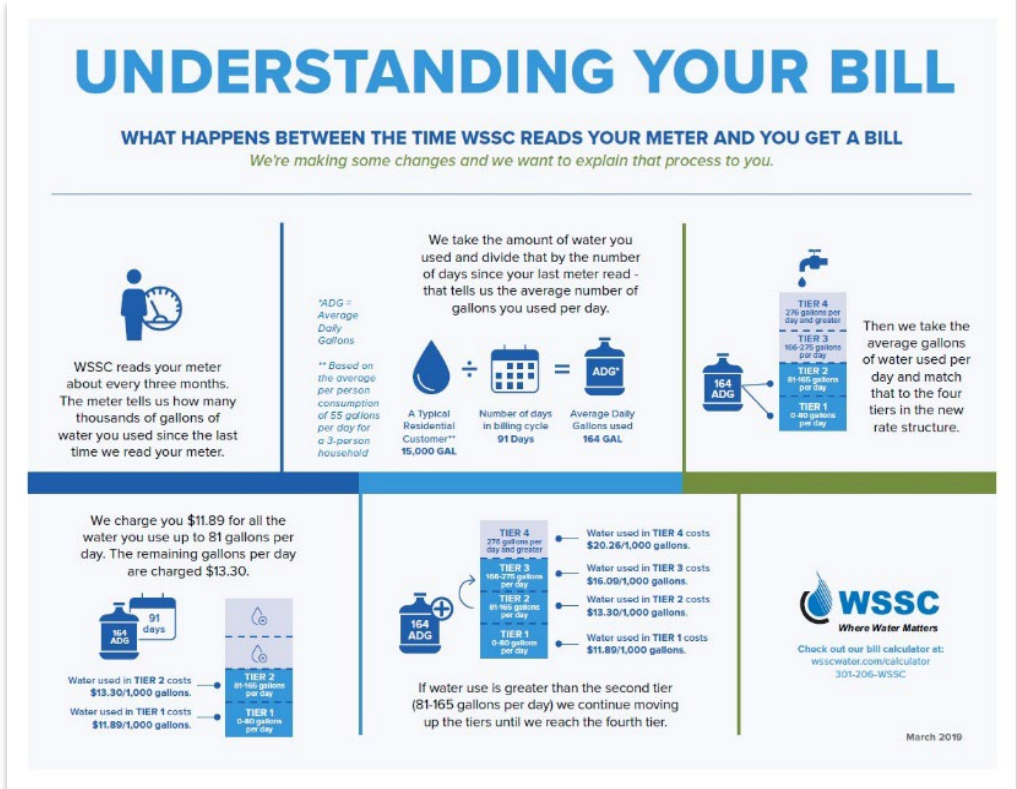


Options for Addressing Affordability

- **Bill Assistance Programs**
 - Bill discounts
 - Fixed bills
 - Write-offs
- **Rate Structure Options**
 - Lifeline rates
 - Alternative rate structures
- **Water Efficiency Options**
 - Conservation assistance
 - Leak detection / repair
 - Education
- **Other Measures**
 - Alternative billing practices
 - Financial counseling
 - Disconnection moratoria

Communication and Stakeholder Engagement

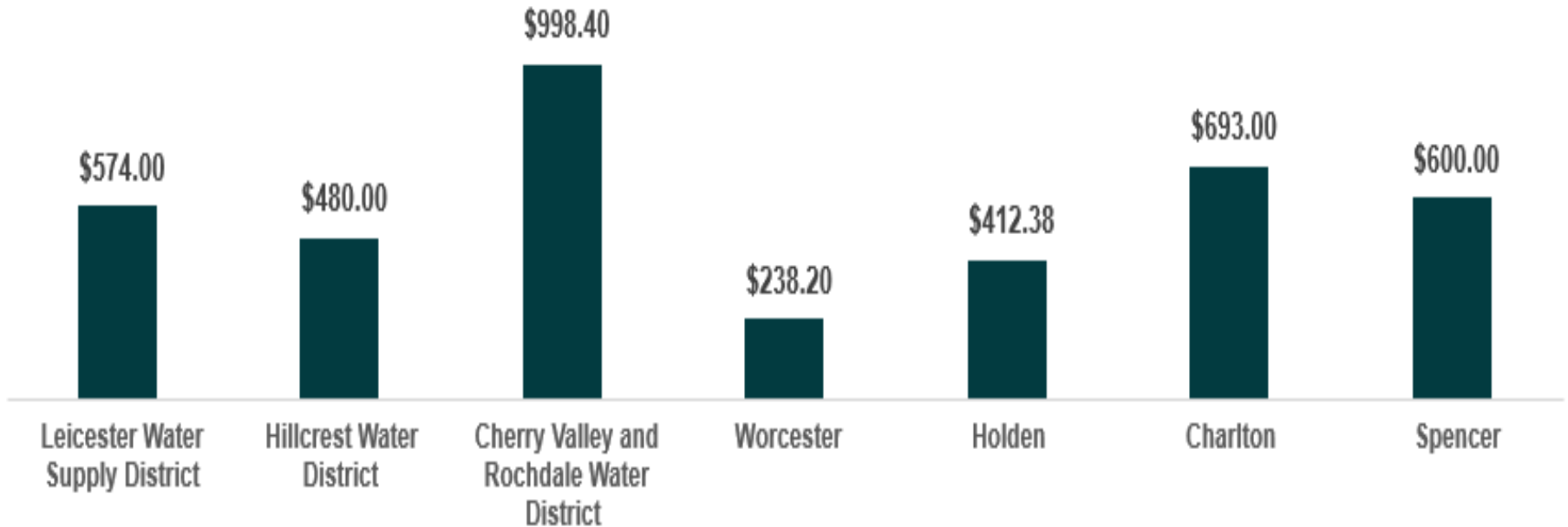
- What, why, how, and when?
 - What are you doing?
 - Why are you doing it?
 - How are you doing it?
 - How will it affect customers?
 - When will it take place?
- Integral to any successful rate and financial planning study
- Open houses, not town hall meetings
- Communicate the truth, before the narrative is created



Explore Outside Funding

- Although not a panacea, any and all outside funding will help
 - State and federal stimulus funds
 - Low-interest loans
 - Grants
 - LIWHAP

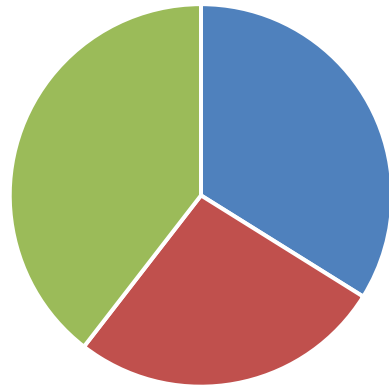
Annual Water Bill Comparison



- Assumes annual water consumption of 60 Ccf (approximately 45,000 gallons) and a 5/8" meter, where applicable.

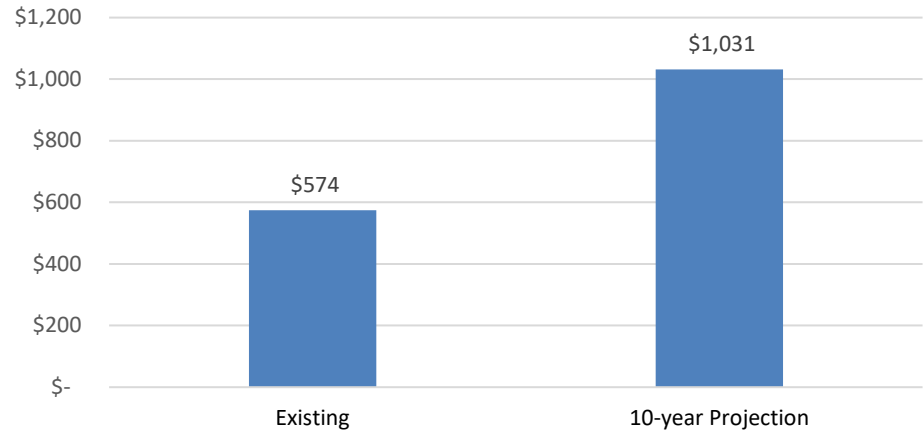
Leicester Water Supply District - Water

Distribution of Annual Revenue Requirements



■ Administrative ■ Operating ■ Capital

Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)

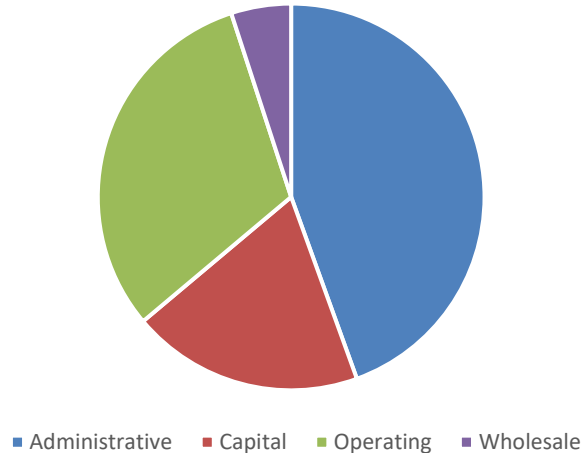


Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$574	\$1,009	\$12.61
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
0.94%	1.22%	42.5

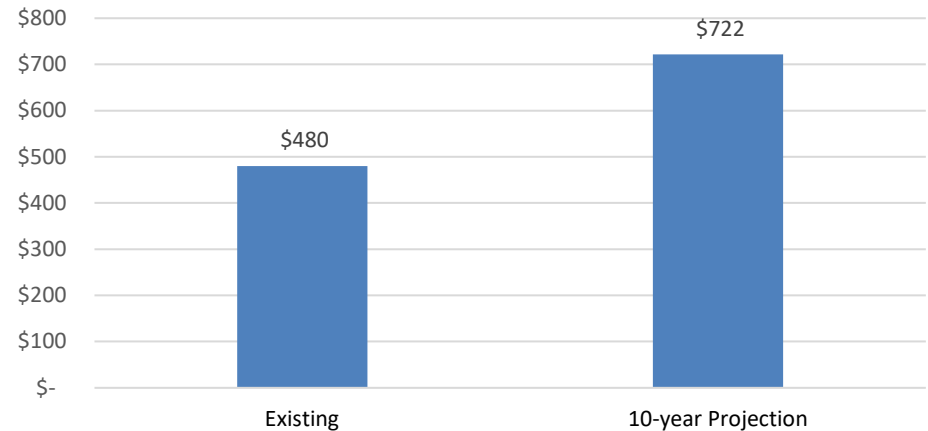
- Key issue is the need to finance significant future capital investment
- Average annual rate increases of approximately 6% are estimated over the next 10 years

Hillcrest Water District

Distribution of Annual Revenue Requirements



Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)

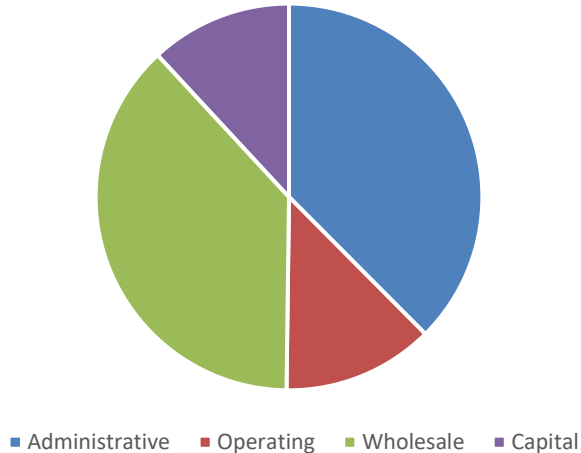


Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$480	\$761	\$13.46
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
0.79%	1.02%	35.6

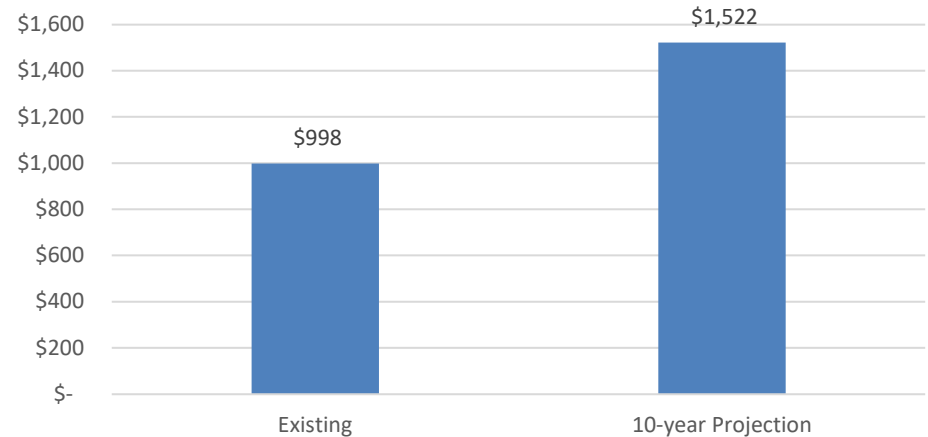
- Relatively high fixed costs limit ability to control bills
- Average annual rate increases of approximately 5% are estimated over the next 10 years

Cherry Valley and Rochdale Water District

Distribution of Annual Revenue Requirements



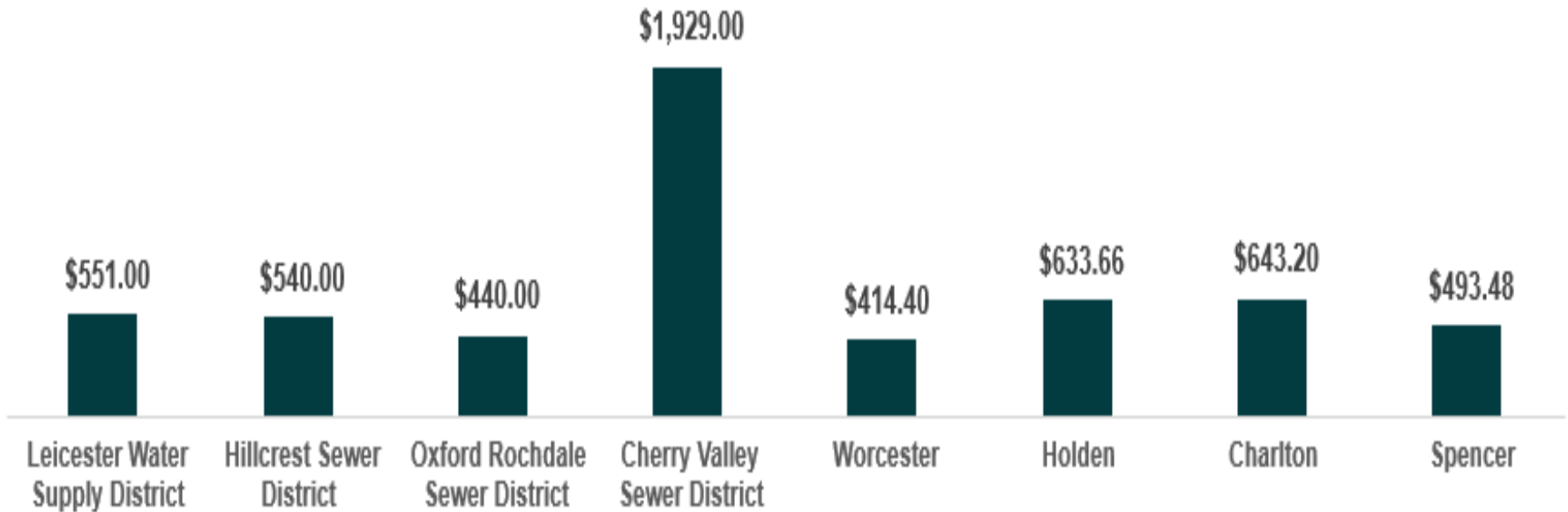
Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)



Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$998	\$896	\$16.90
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
1.64%	2.12%	74.0

- Key issue is the need to finance significant future capital investment and reliance on the City of Worcester
- Average annual rate increases of approximately 5% are estimated over the next 10 years

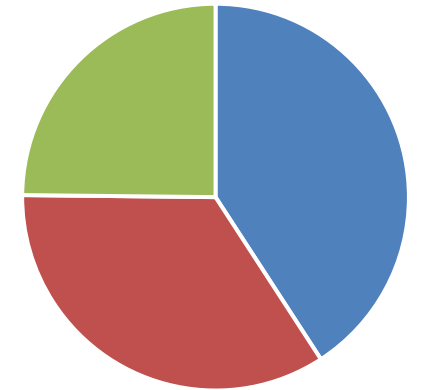
Annual Sewer Bill Comparison



- Assumes annual water consumption of 60 Ccf (approximately 45,000 gallons) and a 5/8" meter, where applicable.

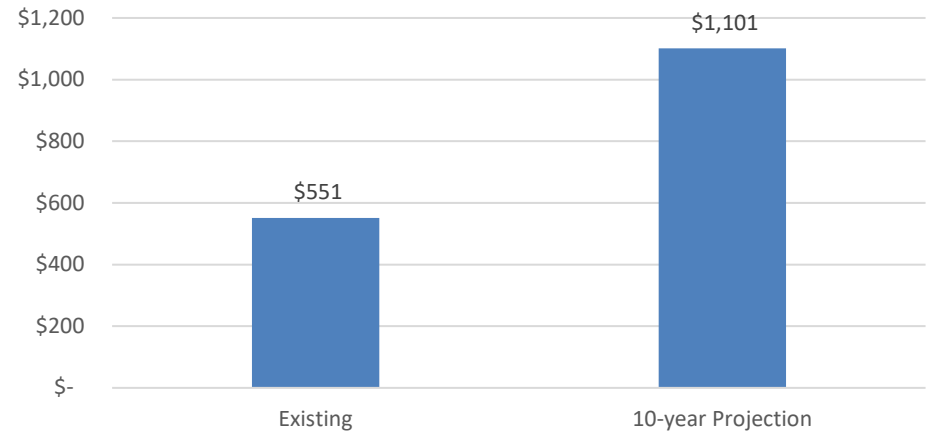
Leicester Water Supply District - Sewer

Distribution of Annual Revenue Requirements



■ Administrative ■ Operating ■ Capital

Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)

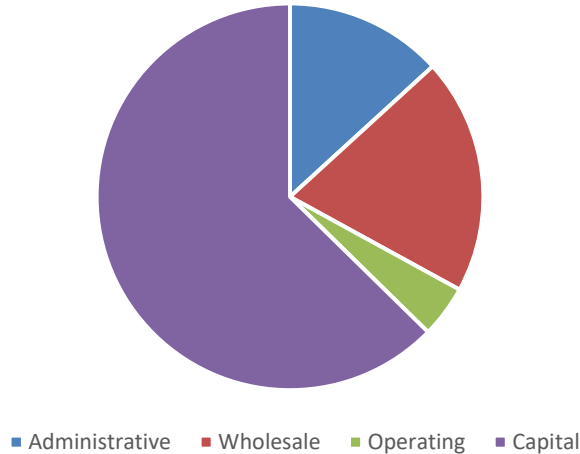


Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$551	\$837	\$10.46
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
0.91%	1.17%	40.8

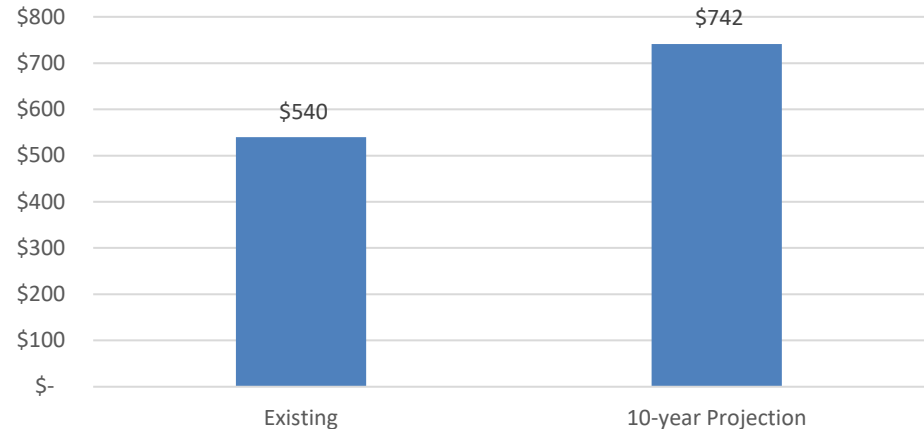
- Key issue is the need to finance significant future capital investment
- Average annual rate increases of approximately 7% are estimated over the next 10 years

Hillcrest Sewer District

Distribution of Annual Revenue Requirements



Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)

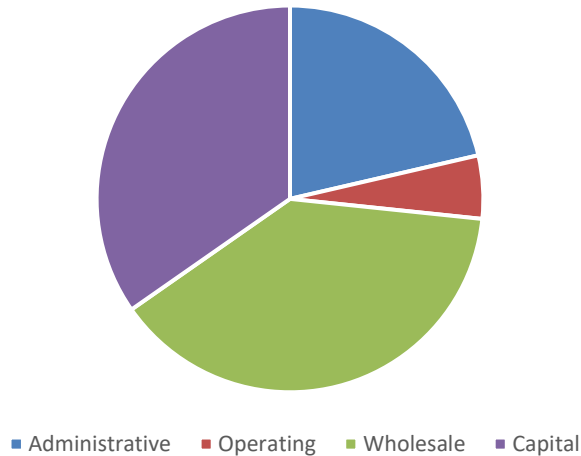


Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$540	\$861	\$15.23
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
0.89%	1.15%	40.0

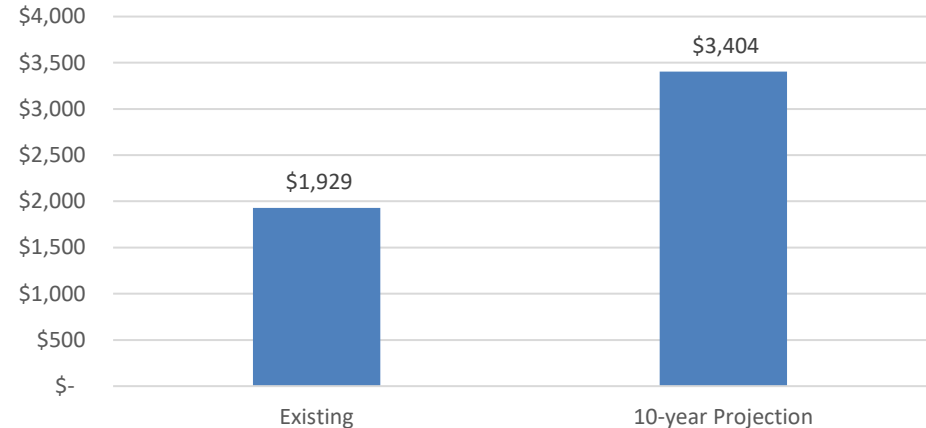
- Debt service managed by betterment fees and not a driver on rates
- Average annual rate increases of approximately 4% are estimated over the next 10 years

Cherry Valley Sewer District

Distribution of Annual Revenue Requirements



Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)

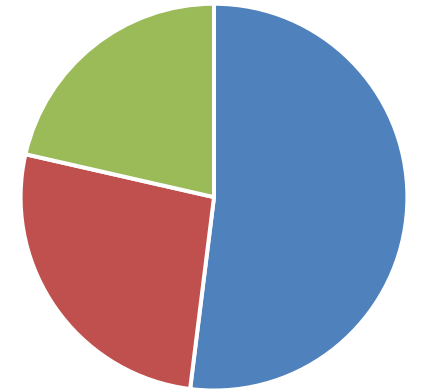


Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$1,929	\$1,909	\$38.63
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
3.17%	4.10%	142.9

- Significantly burdened by debt service and wholesale obligations, although existing USDA loan is in the process of being refinanced. The estimated impact would be an annual reduction in revenue requirements of over \$160k, or approximately 18%
- Average annual rate increases of approximately 6% are estimated over the next 10 years

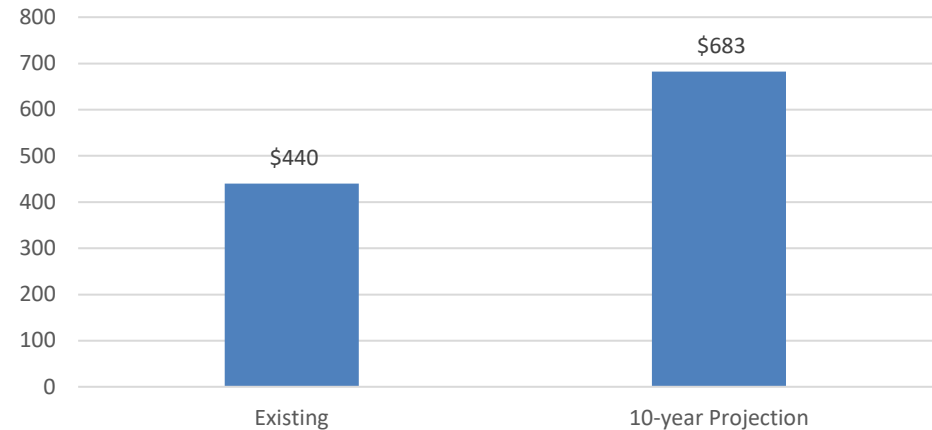
Oxford Rochdale Sewer District

Distribution of Annual Revenue Requirements



■ Administrative ■ Operating ■ Capital

Typical Annual Customer Bill
(5 Ccf month, 5/8" meter)



Typical Annual Bill	Annual Cost per Connection	Cost per Billable Consumption
\$440	\$511	\$3.58
MHI Burden	LQI Burden	Bill in Hours of Min. Wage
0.72%	0.94%	32.6

- Financing of necessary capital investment will continue to drive rates
- Average annual rate increases of approximately 5% are estimated over the next 10 years

Financial Summary

High fixed and contractual costs related to debt service and wholesale service agreements limit ability to control costs

Costs, unfortunately, are only going to continue to increase in order to deal with increased regulations and necessary capital improvements

Small and homogenous customer bases do not allow for a reasonable distribution of costs, nor an opportunity for changes to rate design to limit customer impacts

Existing rates, and subsequent bills, in some cases, are abnormally high as compared to the rest of the industry from a local, regional, and national perspective

Many of the Districts' customers are already economically disadvantaged, with no options for implementing increasingly common customer assistance programs

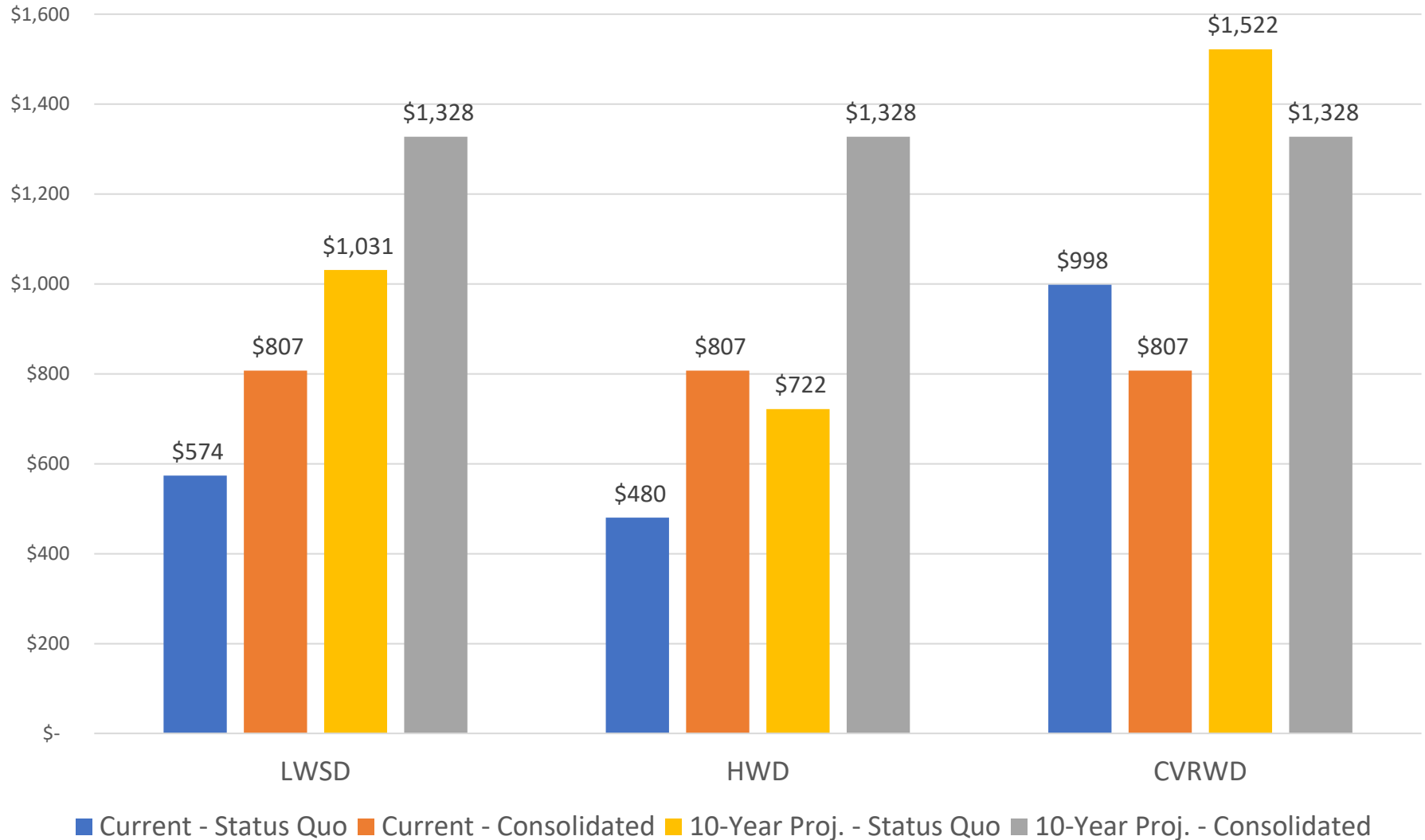
Impact Analysis of Consolidation

Assumptions:

- Revenue requirements were analyzed to determine those costs which could potentially be reduced due to consolidation (1/4 to 1/3 of costs). Under consolidation, these costs were reduced.
- Consolidation options assumed an annual cost per connection for comparison purposes. Rate design differences would have an impact.
- The 10-year forecast assumes inflationary increases in operating costs, as well as additional financing to support future capital improvements

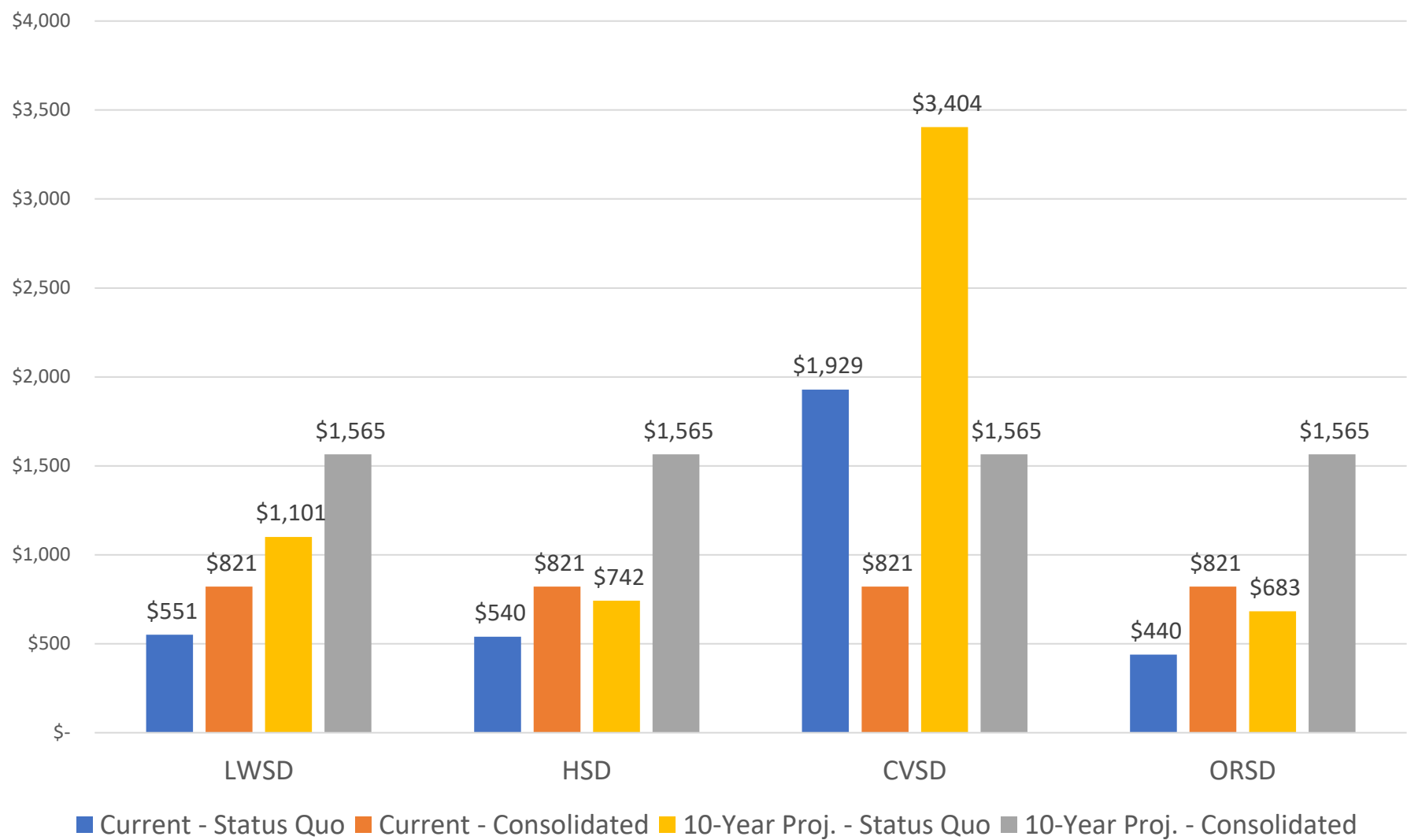
Water Customer Impact Analysis

Average Annual Customer Bill



Sewer Customer Impact Analysis

Average Annual Customer Bill



WHERE DO WE GO FROM HERE?

Although consolidation will create some efficiencies, it is unfortunately not a panacea. So what can be done?

Enhanced Financial
Planning & Rate
Studies

Frequent Customer
Outreach &
Communication

Exploration of
Outside Funding

Next Steps

- The Project Team will be holding a final presentation in the coming weeks to provide options for the Town and Districts' consideration
 - Pros/Cons
 - Technical elements
 - Financial impacts
 - Governance considerations

thank you

westonandsampson.com

WATER & SEWER DISTRICTS ANALYSIS REVIEW OF CONSOLIDATION OPTIONS PRESENTATION

November 16, 2021

Water & Sewer Districts Analysis Review of Consolidation Options



November 16, 2021

Project Team

Team Leader: Weston & Sampson Engineers

- Leah Stanton PE, Vice President
- Joe McGinn, Sr. Project Manager



Resilient Civil Engineering, P.C.

- Kristen Berger, P.E., President



Raftelis Financial Consultants, Inc.

- Dave Fox, Senior Manager



The Collins Center for Public Management (UMASS Boston)

- Sarah Concannon, Director of Municipal Services
- David Colton, Project Manager



Leicester Water & Sewer Districts Study



PURPOSE – Provide the Town of Leicester with:

1. ASSESSMENT OF CURRENT DISTRICTS:
 - a. Organizational structures
 - b. Technical service capabilities
 - c. Financial outlook
 - d. Areas of potential improvement
2. **Analysis of organizational alternatives for the continued provision of water and sewer services**

Tonight's Presentation will focus on Item 2.

Leicester Water & Sewer Districts Study

Evaluate Existing Districts:

- Cherry Valley – Rochdale Water District
- Cherry Valley Sewer District
- Leicester Water Supply District
 - Water
 - Sewer
- Hillcrest Water District
- Hillcrest Sewer District
- Oxford-Rochdale Sewer District

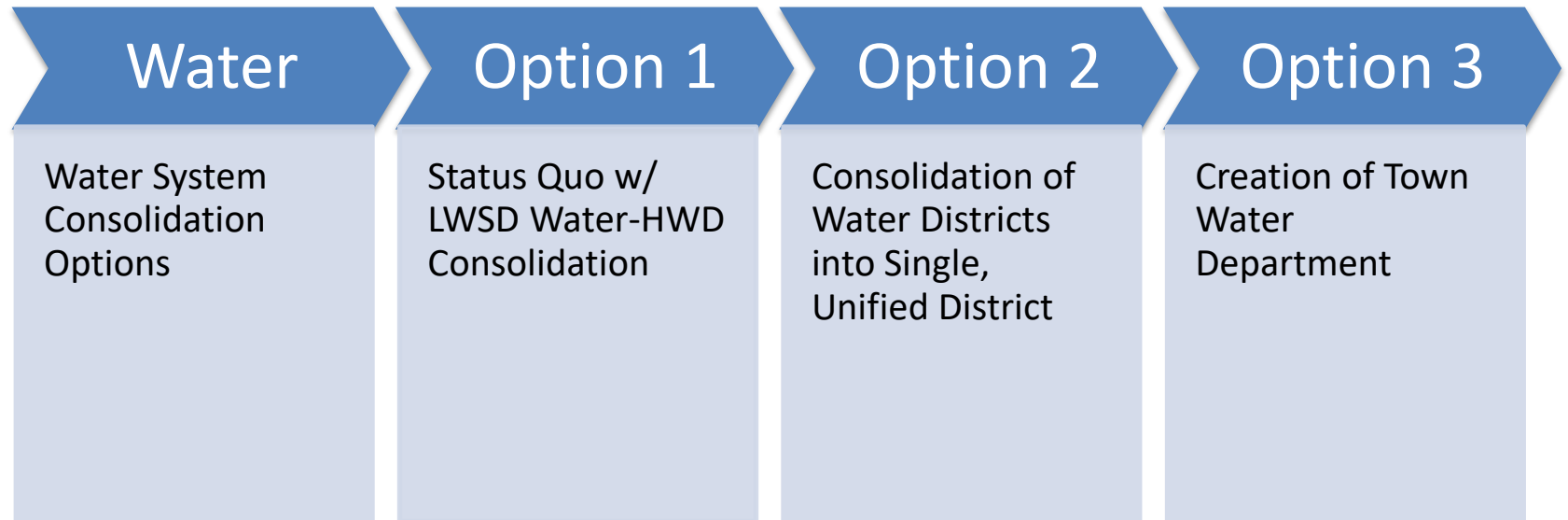
Leicester Water & Sewer Districts Study

Approach to District Consolidation

- Consolidation Efforts Already Underway Assumed to Continue
 - LWSD Water w/ HWD
- Potential Consolidation of Half of HSD into LWSD Sewer and other Half HSD into ORSD Acknowledged
- Options Organized by Function – Water, Sewer, Water/Sewer Combined, District Ownership, Town Department, & Private Utility Ownership

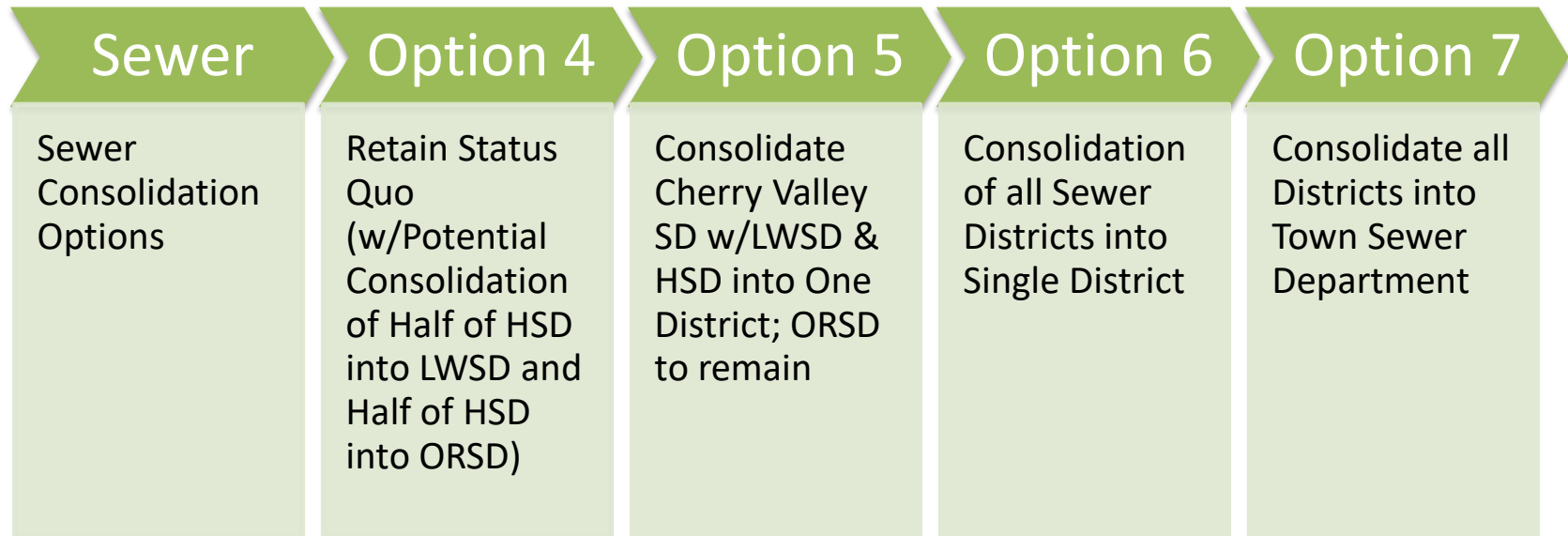
Leicester Water & Sewer Districts Study

Water



Leicester Water & Sewer Districts Study

Sewer



Leicester Water & Sewer Districts Study

Water & Sewer

Water & Sewer

Consolidate
Combined Service
Districts

Option 8

Consolidate into
Single Water/Sewer
District

Option 9

Consolidate into
Town Water/Sewer
Department

Option 1: Status Quo w/ LWSD Water – HWD Consolidation

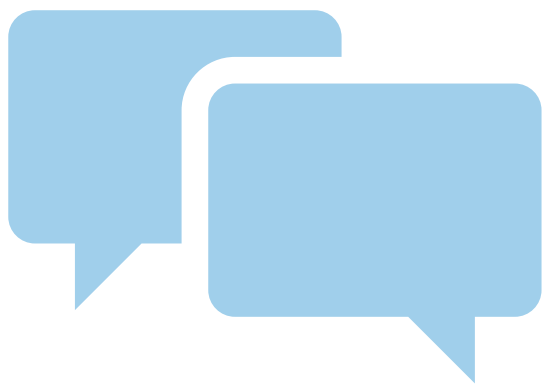
PROS	CONS
- Improves collaboration	- Continues inherent inefficiencies
- Strengthens internal efficiencies	- Minimal potential savings
- Allows for continued progress on planned hydraulic and other source and system improvements	- Continued reliance on Worcester water purchase
	- Minimal opportunity to integrate distribution systems
	- Limited District customer bases

Option 2: Consolidation of Water Districts into Single, Unified District

PROS	CONS
- Achieves high level of organizational efficiency	- Continued reliance on Worcester required until local sources can be activated
- Aids economic development planning with the Town of Leicester	- Continued need for intramunicipal agreement for Moose Hill progress
- Meets maximum day demands	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term
- Potential to expand reliance on local sources/reduce dependency on Worcester water purchase	
- Expands and unifies customer base	

Option 3: Creation of Town Water Department

PROS	CONS
- Full integration with the Town's human resources and financial systems/policies	- Short-term learning curve adjustments in Finance, Purchasing, Regulatory Compliance, Funding & other areas
- Potential incorporation into proposed Department of Public Works	- Continued reliance on Worcester required until local sources can be activated
- Enhances financial management through enterprise fund	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term
- Maximizes user base	
- Unifies ownership of water rights and maximizes control of GW and SW sources of supply locally	
- Streamlines regulatory reporting and permitting	
- Increased opportunities for cross-training of personnel	



Q & A

Option 4: Retain Status Quo (w/ Potential Consolidation of Half of HSD with LWSD and Other Half with ORSD)

PROS	CONS
- Improves collaboration	- Continued inherent inefficiencies
- Maintains regulatory compliance	- Continues CVSD limited customer base
- Ensures new NPDES Permit Compliance & Treatment System Upgrades	- Continued reliance and costs for use Worcester system for transport and Upper Blackstone for treatment by CVSD
- Optimizes utilization of current operations staff	- Limited opportunity to consider alternative system configurations

Option 5: Consolidate CVSD, LWSD & HSD into One District, ORSD to remain

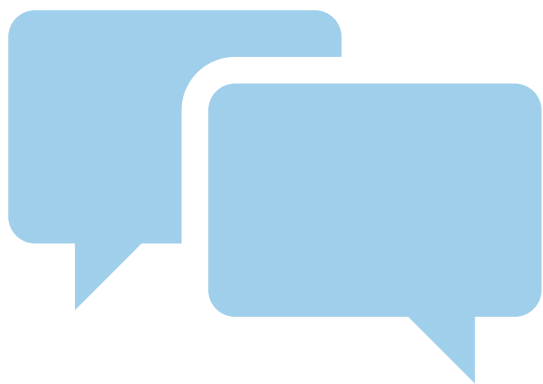
PROS	CONS
- Achieves high level of organization efficiency	- Potential inequity in shifting burden for existing debt service requirements
- Aids economic development planning with the Town of Leicester	- Potential for capacity increase in discharge permits
- Expands customer base	- Potential for significant capital costs to expand wastewater treatment facility to treat additional flow
- Opens opportunities to explore alternative route for CVSD served area to avoid Worcester/Upper Blackstone costs	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term

Option 6: Consolidation of All Sewer Districts into Single District

PROS	CONS
- Achieves high level of organization efficiency	- Issue of representation by Oxford System users
- Aids economic development planning with the Town of Leicester	- Potential inequity in shifting burden for existing debt service requirements
- Provides maximum opportunity for cross-training of operations personnel	- Potential to increase flow limits in NPDES permits
- Unifies rate structures	- Potential for significant capital costs to expand one or both wastewater treatment facilities to treat additional flow
- Simplifies boundaries	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term
- Simplifies regulatory compliance & reporting	
- Expands sludge disposal options	

Option 7: Consolidation of All Districts into Town Sewer Department

PROS	CONS
- Full integration with the Town's Human Resources and Financial Systems/Policies	- Issue of representation by Oxford System users
- Potential incorporation into proposed Department of Public Works	- Potential inequity in shifting burden for existing debt service requirements
- Enhances financial management through an enterprise fund	- Potential to increase flow limits in NPDES permits
	- Potential for significant capital costs to expand one or both wastewater treatment facilities to treat additional flow
	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term



Q & A

Option 8: Consolidate into a Single Water/Sewer District

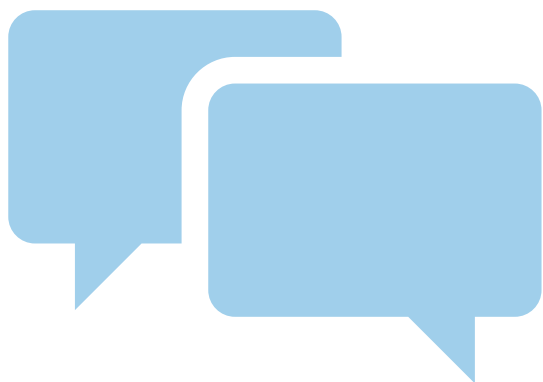
PROS	CONS
- Achieves a high level of organizational efficiency	- Learning curve for achieving operational efficiencies in water and sewer systems
- Aids economic development planning with the Town of Leicester	- Learning curve in administration of financial, billing, accounting and collection services
- Maximizes control over water supply sources	- Need to put in place staffing structure, policies, job descriptions and HR structure
-Maximizes opportunities for cross-training operations personnel	- Still have the potential capital costs to improve infrastructure identified in the other options
-Provides larges possible service population	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term
-Provides opportunities for maximizing distribution and collection system efficiencies	

Option 9: Consolidate into a Town Water/Sewer Department

PROS	CONS
- Full integration with the Town's human resources and financial systems and policies	- Short-term learning curve for achieving operational efficiencies in water and sewer systems
- Potential incorporation into proposed Department of Public Works	- Learning curve in administration of financial, billing, accounting and collection services
- Enhances financial management through an enterprise fund	- Need to put in place staffing structure, policies, job descriptions and HR structure
	- Still have the potential capital costs to improve infrastructure identified in the other options
	- Public concern of reducing Cherry Valley bills while increasing all others, in the short term

Option 10: Ownership of District Systems by Privately Owned Company

PROS	CONS
- Oversight of rates and budgets by an independent state agency in the Department of Public Utilities (DPU)	- Privatizing water costs more than government financing (private utilities are allowed to earn a profit recovered through rates)
- Improvements in system efficiency	- Possible rate increases
- Savings in Town's time and money	- Accountability to the customer
- Reduction of public sector risks	- Reduces local control over the water supply
- Allows specialized services to be provided by specialized utility experts	- Can lead to employment losses
	- Can be challenging to reverse



Q & A

Implementation Considerations

Home Rule does not apply to districts

Special Acts will be required

Town should lead the process

MGL Chapter 40N

LWSD language should be considered

Bond Counsel should be engaged

Public acceptance will be essential

Ancillary Considerations

Moose Hill Reservoir (MHR) Future Use

MHR is a significant potential source of water supply

Treatment will be required

Development of MHR will take time and money

Reliance on Worcester will need to continue until MHR and other local sources can be incorporated into a system-wide water plan

Inter-town options warrant further consideration

Funding Considerations

Application of ARPA Funds to offset debt & costs for needed Water & Sewer improvements

Prepare Now for Future Infrastructure Bill Financing Opportunities

Consider the value of centralized funding applications as opposed to competing applications

Where do we go from here?

Finalize W&S scope of work

- Receive feedback from Districts and stakeholders
- Finalize report
- Provide final report to Selectboard

Develop Implementation Plan

- Continued stakeholder engagement
- Reach consensus on direction
- Develop framework for implementation
- Implement

thank you

westonandsampson.com

RCAP ANALYSIS OF CHERRY VALLEY SEWER DISTRICT LOAN REPAYMENT IMPACTS

CHERRY VALLEY SEWER DISTRICT
BETTERMENT FINANCIAL ACCOUNTING 2002 THROUGH 2019



INCOME AND EXPENDITURES AS OF 1/8/2020							
Line #	Type	Description		Amount	Detail		Principal Interest
1	Income	Betterment Principal as of 1/6/2020		\$5,183,827	"Sewer Over the Years" Sheet2 (3), Line 25, Cell U36		\$5,183,827
2	Income	Betterment Interest		\$2,482,543	"Sewer Over the Years" Sheet2 (3), Line 26, Cell U37		\$2,482,543
3	Income	Total Collected		\$7,666,370			
4	Expended	Betterment Principal	-	\$2,111,033	"Cherry Valley Sewer" Sheet "Debt (2), Line 19, Cell U36	-	\$2,111,033
5	Expended	Betterment Interest	-	\$3,189,400	"Cherry Valley Sewer" Sheet "Debt (2), Line 19, Cell U36	-	\$3,189,400
6	Expended				Balance	=	\$3,072,794 -\$706,857
7	Expended	Principal used to pay Interest Deficit	-			-	\$706,857
8	Expended	Principal used to pay Operating Budget Deficit (Cumulative 2002 through 2019)	-	\$1,576,933	"Sewer Over the Years" Sheet2 (3), Line 18, Cell U25	-	\$1,576,933
					Balance	=	\$789,004
9		Bank Accounts/CD's as of 1/6/2020	-	\$861,000		-	\$861,000
10		Balance	=	-\$71,996	Balance	=	-\$71,996

ANALYSIS OF PROJECTED INCOME FROM BETTEREMENTS 1/08/2020							
Line #	Item					Principal	Interest
1	Number of betterments (approx..)		496				
2	Betterment per parcel (approximate)		\$ 11,911.50				
3	Sum of Betterment Principal (496 * 11,911.50)					\$5,908,104	
4	Betterment Principal Paid to Date				-	\$2,111,033	
5	Betterment Interest Paid to Date						\$3,189,400
6	Principal used to pay Interest Deficit				-	\$706,857	
7	Principal used to pay Operating Budget Deficit (Cumulative 2002 through 2019)				-	\$1,576,933	\$157,693.30
8	Outstanding Interest due to USDA			\$890,305.00			
9	Estimated Receivable Interest Due to Dist. from Residents			\$157,354.75			Interest deficit
10	Estimated Interest deficit (Must be paid out of Principal)			\$732,950.25	-	\$732,950	\$73,295.03
11	Outstanding Principal due to USDA				-	\$2,746,842	
12					Balance	=	-\$1,966,511

CHERRY VALLEY SEWER DISTRICT
PHASE I THROUGH PHASE III INTRASTRUCTURE IMPROVEMENTS



EXPENDITURES FOR PHASE I THROUGH PHASE III OF THE CVSD INFRASTRUCTURE IMPROVEMENTS															
Phase	Loan	Grant	Loan & Grant Sum	USDA Form 271	USDA Form 271 Expenditures Submitted and Approved						Sum Per Phase	Balance Per Phase	Transfers Between Phases		
					Admin.	Eng. Fees	Insp. Fees	Const.	Contin.	Additional Approved			Phase III to Phase I	Phase III to Phase II	Balance
I	1,650,000	1,350,000	3,000,000	PI 271 #23	20,000	460,298	444,917	2,336,681	0	170,961	3,432,858	-432,858	432,858		0
II	1,987,875	1,012,125	3,000,000	PII 271 #17	20,000	100,000	259,000	2,546,618	74,320	33,523	3,033,461	-33,461		33,523	62
III	1,220,000	780,000	2,000,000	PIII 271 #11	20,000	50,000	259,000	957,747	246,872	0	1,533,619	466,381	-432,858	-33,523	0
Sum	4,857,875	3,142,125	8,000,000								7,999,938				62
Project Cost Financed Through USDA															7,999,938

Additional project costs not financed through USDA:

Mass electric charges to connect the 2 pump stations and 2 grinder pumps.
 Legal fees for easement negotiations, for filing, etc. not reimbursed by RD
 Intermunicipal agrmt. Legal fees
 Intermunicipal agrmt. Eng. fees
 Other

CHERRY VALLEY SEWER DISTRICT
USDA LOAN REPAYMENT FOR PHASE I THROUGH PHASE III



DEBT PAYMENT FOR 2002 THROUGH 2019

Line #		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Sum
1	92-01 Balance	1,650,000	1,622,412	1,593,514	1,563,242	1,531,533	1,498,318	1,463,525	1,427,080	1,388,903	1,348,913	1,307,023	1,263,144	1,217,180	1,169,033	1,118,600	1,065,770	1,010,431	952,464	891,743	828,137	761,511	691,720	618,613	542,035	461,818	377,792	289,774	197,575	100,997	0	0	0	
2	Principal Payment	27,588	28,898	30,271	31,709	33,215	34,793	36,446	38,177	39,990	41,890	43,879	45,964	48,147	50,434	52,830	55,339	57,968	60,721	63,605	66,626	69,791	73,106	76,579	80,216	84,027	88,018	92,199	96,578	100,997	0	0	0	1,650,000
3	Interest Payment	78,375	77,065	75,692	74,254	72,748	71,170	69,517	67,786	65,973	64,073	62,084	59,999	57,816	55,529	53,133	50,624	47,995	45,242	42,358	39,337	36,172	32,857	29,384	25,747	21,936	17,945	13,764	9,385	4,797	0	0	0	1,422,758
4	Total Payment	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	105,963	3,072,758
5	Cumulative	105,963	211,926	317,889	423,852	529,815	635,778	741,741	847,704	953,667	1,059,630	1,165,593	1,271,556	1,377,519	1,483,482	1,589,445	1,695,408	1,801,371	1,907,334	2,013,297	2,119,260	2,225,223	2,331,186	2,437,149	2,543,112	2,649,075	2,755,038	2,861,001	2,966,964	3,072,758				
6	92-03 Balance		1,987,875	1,951,755	1,913,965	1,874,427	1,833,060	1,789,780	1,744,498	1,697,122	1,647,555	1,595,696	1,541,438	1,484,670	1,425,277	1,363,137	1,298,123	1,230,103	1,158,936	1,084,478	1,006,576	925,071	839,796	750,578	657,233	559,571	457,392	350,488	238,639	121,617				
7	Principal Pmt		36,120	37,790	39,538	41,367	43,280	45,282	47,376	49,567	51,860	54,258	56,768	59,393	62,140	65,014	68,021	71,167	74,458	77,902	81,505	85,274	89,218	93,345	97,662	102,179	106,905	111,849	117,022	121,617				1,987,875
8	Interest Pmt		91,939	90,269	88,521	86,692	84,779	82,777	80,683	78,492	76,199	73,801	71,291	68,666	65,919	63,045	60,038	56,892	53,601	50,157	46,554	42,785	38,841	34,714	30,397	25,880	21,154	16,210	11,037	5,625				1,596,960
9	Total Payment		128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	128,059	3,584,835
10	Cumulative		128,059	256,118	384,177	512,236	640,295	768,354	896,413	1,024,472	1,152,531	1,280,590	1,408,649	1,536,708	1,664,767	1,792,826	1,920,885	2,048,944	2,177,003	2,305,062	2,433,121	2,561,180	2,689,239	2,817,298	2,945,357	3,073,416	3,201,475	3,329,534	3,457,593	3,584,835				
11	92-05 Balance			1,220,222	1,200,419	1,179,932	1,158,496	1,136,073	1,112,610	1,088,062	1,062,379	1,035,508	1,007,395	977,981	947,206	915,008	881,322	846,077	809,202	770,621	730,257	688,025	643,840	597,612	549,245	498,642	445,698	390,306	332,351	271,716	208,277	141,904	72,461	
12	Principal Pmt			19,581	20,487	21,434	22,425	23,463	24,548	25,683	26,871	28,114	29,414	30,774	32,198	33,687	35,245	36,875	38,580	40,365	42,232	44,185	46,228	48,366	50,603	52,944	55,392	57,954	60,635	63,439	66,373	69,443	72,461	1,220,000
13	Interest Pmt			56,425	55,519	54,572	53,581	52,543	51,458	50,323	49,135	47,892	46,592	45,232	43,808	42,319	40,761	39,131	37,426	35,641	33,774	31,821	29,778	27,640	25,403	23,062	20,614	18,052	15,371	12,567	9,633	6,563	3,351	1,059,987
14	Total Payment			76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	76,006	2,279,987
15	Cumulative			76,006	152,012	228,018	304,024	380,030	456,036	532,042	608,048	684,054	760,060	836,066	912,072	988,078	1,064,084	1,140,090	1,216,096	1,292,102	1,368,108	1,444,114	1,520,120	1,596,126	1,672,132	1,748,138	1,824,144	1,900,150	1,976,156	2,052,162	2,128,168	2,204,174	2,279,987	
16	Principal	27,588	65,018	87,642	91,734	96,016	100,498	105,190	110,100	115,240	120,620	126,251	132,145	138,314	144,772	151,530	158,605	166,009	173,760	181,872	190,363	199,251	208,553	218,290	228,482	239,149	250,315	262,002	274,235	286,053	66,373	69,443	72,461	4,857,875
17	Interest	78,375	169,004	222,386	218,294	214,012	209,530	204,838	199,928	194,788	189,408	183,777	177,883	171,714	165,256	158,498	151,423	144,019	136,268	128,156	119,665	110,777	101,475	91,738	81,546	70,879	59,713	48,026	35,793	22,989	9,633	6,563	3,351	4,079,704
18	Total P & I	105,963	234,022	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	8,937,579
19	Cumul. Prin.	27,588	92,606	180,249	271,982	367,998	468,497	573,687	683,787	799,027	919,647	1,045,899	1,178,044	1,316,358	1,461,130	1,612,660	1,771,265	1,937,274	2,111,033	2,292,905	2,483,268	2,682,519	2,891,072	3,109,362	3,337,844	3,576,993	3,827,308	4,089,310	4,363,545	4,649,598	4,715,971	4,785,414	4,857,875	4,930,336
20	Cumul. Inst.	78,375	247,379	469,764	688,059	902,071	1,111,600	1,316,438	1,516,366	1,711,154	1,900,562	2,084,338	2,262,221	2,433,935	2,599,191	2,757,689	2,909,112	3,053,131	3,189,400	3,317,556	3,437,221	3,547,998	3,649,473	3,741,211	3,822,757	3,893,636	3,953,349	4,001,375	4,037,168	4,060,157	4,069,790	4,076,353	4,079,704	4,083,056
21	Cumulative P & I	105,963	339,985	650,013	960,041	1,270,069	1,580,097	1,890,125	2,200,153	2,510,181	2,820,209	3,130,237	3,440,265	3,750,293	4,060,321	4,370,349	4,680,377	4,990,405	5,300,433	5,610,461	5,920,489	6,230,517	6,540,545	6,850,573	7,160,601	7,470,629	7,780,657	8,090,685	8,400,713	8,709,755	8,785,761	8,861,767	8,937,579	0

Paid as of	Paid as of 2019	Balance Remaining as of 1/6/2020	Life of Loan
Principal	\$2,111,033	2,746,842	\$4,857,875
Interest	\$3,189,400	890,305	\$4,079,705
Total P & I	\$5,300,433	3,637,146	\$8,937,580

CHERRY VALLEY SEWER DISTRICT
HISTORICAL OPERATING BUDGET



Rate Increases					Rate Increase 1-5-05											Rate Increase 5-1-16	Structure Adjustment		Rate Increase 5-1-19	
Line #	Date	6/30/02	6/30/03	6/30/04	6/30/05	6/30/06	6/30/07	6/30/08	6/30/09	6/30/10	6/30/11	6/30/12	6/30/13	6/30/14	6/30/15	6/30/16	6/30/17	6/30/18	6/30/19	
1	Operating Revenue																			
2	Sewer betterments	926,036	662,461	559,833	524,409	234,255	486,524	262,582	201,915	240,176	160,389	116,623	154,053	124,695	104,568	130,756	84,158	132,666	77,728	deficit
3	Interest Income	287,590	228,616	203,158	211,429	196,851	180,822	174,741	174,670	123,714	151,494	110,409	89,422	82,410	84,758	53,868	46,609	36,238	45,744	deficit
4	Sewer User fees	17,869	47,600	83,896	147,350	225,256	228,126	247,820	155,807	229,522	213,991	212,544	239,431	224,479	207,322	233,253	276,546	382,848	420,546	
5	Sewer dumping Fees	7,608	7,090	13,888	8,032	8,166	1,796													
6	Permits	3,175	2,200	2,805	2,285	4,025	5,000	2,300												
7	other			5,512	39,127	16,805	22,982	47,782	1,422	27,856	32,937	26,135	28,616	34,585	44,666	14,188	6,742	24,930	9,469	
8	Total Operating Revenue	1,242,278	947,967	869,092	932,632	685,358	925,250	735,225	533,814	621,268	558,811	465,711	511,522	466,169	441,314	432,065	414,055	576,682	553,487	
	Operating Expenses																			
9	Operating Expenses	-127,862	-74,769	-201,487	-151,647	-183,549	-228,731	-317,069	-292,583	-326,083	-325,329	-349,159	-347,252	-415,545	-365,912	-428,302	-517,292	-560,192	-520,017	
10	I&I and other expenses														-59,655	-4,157	-461			
11	finance fees	-25,950	-320																	Annual Pmt
12	Loan (Principal and Interest)	-105,963	-234,022	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	-310,000	310,000
13	Total Operating Expenses	-259,775	-309,111	-511,487	-461,647	-493,549	-538,731	-627,069	-602,583	-636,083	-635,329	-659,159	-657,252	-725,545	-735,567	-742,459	-827,753	-870,192	-830,017	
14	Operating Rev-expenses	982,503	638,856	357,605	470,985	191,809	386,519	108,156	-68,769	-14,815	-76,518	-193,448	-145,730	-259,376	-294,253	-310,394	-413,698	-293,510	-276,530	
15	Operating Revenue (w/o Betterment Prin. & Int.)	28,652	56,890	106,101	196,794	254,252	257,904	297,902	157,229	257,378	246,928	238,679	268,047	259,064	251,988	247,441	283,288	407,778	430,015	4,246,330
16	Operating Expenses (w/o Betterment Prin. & Int.)	-153,812	-75,089	-201,487	-151,647	-183,549	-228,731	-317,069	-292,583	-326,083	-325,329	-349,159	-347,252	-415,545	-425,567	-432,459	-517,753	-560,192	-520,017	-5,823,323
17	Operating Rev.-Expenses	-125,160	-18,199	-95,386	45,147	70,703	29,173	-19,167	-135,354	-68,705	-78,401	-110,480	-79,205	-156,481	-173,579	-185,018	-234,465	-152,414	-90,002	-1,576,993
18	Cumulative profit / loss	-125,160	-143,359	-238,745	-193,598	-122,895	-93,722	-112,889	-248,243	-316,948	-395,349	-505,829	-585,034	-741,515	-915,094	-1,100,112	-1,334,577	-1,486,991	-1,576,993	
19	Principal Payments	27,588	65,018	87,642	91,734	96,016	100,498	105,190	110,100	115,240	120,620	126,251	132,145	138,314	144,772	151,530	158,605	166,009	173,760	2,111,033
20	Interest Payments	78,375	169,004	222,386	218,294	214,012	209,530	204,838	199,928	194,788	189,408	183,777	177,883	171,714	165,256	158,498	151,423	144,019	136,268	3,189,400
21	Total P & I Payments	105,963	234,022	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	310,028	5,300,433
22	Interest Surplus/Deficit	209,215	59,612	-19,228	-6,865	-17,161	-28,708	-30,097	-25,258	-71,074	-37,914	-73,368	-88,461	-89,304	-80,498	-104,630	-104,814	-107,781	-90,524	
23	Principle Surplus/Deficit	898,448	597,443	472,191	432,675	138,239	386,026	157,392	91,815	124,936	39,769	-9,628	21,908	-13,619	-40,204	-20,774	-74,447	-33,343	-96,032	
24	P & I Surplus/Deficit	1,107,663	657,055	452,963	425,810	121,078	357,318	127,295	66,557	53,862	1,855	-82,996	-66,553	-102,923	-120,702	-125,404	-179,261	-141,124	-186,556	
Betterments:																				
25	Principle Collected Cumulative	926,036	1,588,497	2,148,330	2,672,739	2,906,994	3,393,518	3,656,100	3,858,015	4,098,191	4,258,580	4,375,203	4,529,256	4,653,951	4,758,519	4,889,275	4,973,433	5,106,099	5,183,827	
26	Interest Collected Cumulative	287,590	516,206	719,364	930,793	1,127,644	1,308,466	1,483,207	1,657,877	1,781,591	1,933,085	2,043,494	2,132,916	2,215,326	2,300,084	2,353,952	2,400,561	2,436,799	2,482,543	