2012 Infrastructure
Capital Improvement Plan

FOR THE

Village of Perry

Water Treatment Plant and Distribution Network
Wastewater Treatment Facility and Collection System
Village Hall Energy Audit

Village of Perry
46 North Main Street
Perry, NY 14530

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Acronyms

Btu .... British thermal units
CAP .... Cement asbestos pipe (also known as “asbestos cement pipe”)
CBOD ($CBOD_5$) .... (5-day) carbonaceous biochemical oxygen demand
CDBG .... Community Development Block Grant
CFA .... Consolidated Funding Application
CIP .... Cast iron pipe
CPL .... Clark Patterson Lee
CWSRF .... Clean Water State Revolving Fund
DIP .... Ductile iron pipe
DWSRF .... Drinking Water State Revolving Fund
EER .... Energy efficiency ratio
EPA .... United States Environmental Protection Agency
FBRR .... Filter Backwash Recycling Rule
GAC .... Granular activated carbon
G/FLRPC .... Genesee/Finger Lakes Regional Planning Council
GIGP .... Green Innovation Grant Program
gpd .... Gallons per day
gpm .... Gallons per minute
HAA5 .... Haloacetic acids (five)
HHS .... United States Department of Health and Human Services
HP .... Horsepower
HVAC .... Heating, ventilation, and air conditioning
ICIP .... Infrastructure Capital Improvement Plan
I/I .... Inflow and infiltration
kW .... Kilowatt (10^3 watts)
kWh .... Kilowatt-hour
lb/d .... Pounds per day
lb/10^3cf/d .... pounds per thousand cubic feet per day
LCR .... Lead and Copper Rule
LF .... Linear feet
LT1ESWTR .... Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR .... Long Term 2 Enhanced Surface Water Treatment Rule
MBH .... One thousand British thermal units per hour
MCL .... Maximum contaminant level
mgd .... Million gallons per day
mg/L .... Milligrams per liter (10^{-3} grams per liter)
MHI .... Median household income
MWBE/EEO .... Minority and Women in Business Enterprise/Equal Employment Opportunity
µg/L .... Micrograms per liter (10^{-6} grams per liter)
NTU .... Nephelometric Turbidity Units
NYS .... New York State
NYSDEC .... New York State Department of Environmental Conservation
NYSDOH .... New York State Department of Health
NYSDOT .... New York State Department of Transportation

NYSEFC .... New York State Environmental Facilities Corporation
NYSERDA ....New York State Energy Research and Development Authority
NYSHCR .... New York State Homes & Community Renewal
psi ....Pounds per square inch
PVC .... Polyvinyl chloride
SCADA .... Supervisory control and data acquisition
SEER .... Seasonal energy efficiency ratio
sf... Square feet
SPDES .... State Pollution Discharge Elimination System
Stage 1 DBPR .... Stage 1 Disinfectant Byproduct Rule
Stage 2 DBPR .... Stage 2 Disinfectant Byproduct Rule
TCR .... Total Coliform Rule
TEFC .... Totally enclosed, fan-cooled
TOC .... Total organic carbon
TSS .... Total suspended solids
TTHM .... Total trihalomethanes
UCMR3 .... Unregulated Contaminant Monitoring Rule 3
US .... United States
USDA .... United States Department of Agriculture
USEDA... United States Economic Development Administration
USGS .... United States Geological Survey
VFD .... Variable frequency drive
VOC .... Volatile organic compound
W .... Watt
WCHD .... Wyoming County Health Department
WQIP .... Water Quality Improvement Project
WTP .... Water treatment plant
WWTF .... Wastewater treatment facility

2012 ICIP Introduction

The Village of Perry has commissioned Clark Patterson Lee (CPL) to perform a comprehensive update of its Infrastructure Capital Improvement Plan (ICIP) that was published in 2001. This 2012 update to the ICIP focuses on potable water treatment and distribution, wastewater collection and treatment, and energy usage at the Village Hall on Main Street.

The Village of Perry is located in the eastern part of Wyoming County, straddling the boundary between the Town of Perry and the Town of Castile. The southwestern portion of the Village is bounded by the northern end of Silver Lake, which is located within the Genesee River Watershed.

The Village provides potable water for residents and businesses within the Village of Perry, north of the Village in Perry Center, some areas in the Town of Castile, and to Letchworth State Park. The water treatment plant (WTP) for the Village produces an average of 0.530 million gallons per day (mgd) of potable water for consumption, and it has a permitted production capacity of 1.60 mgd. The Village has approval to take a maximum of 2.0 mgd from Silver Lake.

Wastewater collection services are provided as well to Village residents and businesses, and to some areas of the Town of Castile. The wastewater treatment facility (WWTF) for the Village treats an average daily flow of 0.692 mgd, with a permitted average daily flow capacity of 0.97 mgd.

Intended Use of the 2012 ICIP

The 2012 ICIP is divided into twelve chapters and fifteen appendices, with an additional appendix devoted entirely to figures. Chapters 1 through 5 involve potable water treatment and distribution. Chapters 6 through 10 concern wastewater treatment and collection. Chapter 11 includes the energy audit performed at the Village Hall, and Chapter 12 describes potential funding opportunities the Village may be able to pursue. The figures and appendices are all included at the end of this report.

The ICIP is intended to provide a comprehensive status update for the water and sewer utility systems and equipment in the Village, to give the Village the opportunity to prepare for some inevitable upgrades that will be necessary, as well as to provide a glimpse into some potential unplanned upgrades that may be required. By suggesting timelines for planned projects, the Village will be able to budget for some of these projects, and will be able to have an idea as to how various long-term projects can fit together without causing massive problems in the Village's budget.

The chapters are written to accompany each other in various ways, and suggestions for related chapters, figures, and appendices are provided near the beginning of each chapter. In this way, chapters, figures, and appendices from the 2012 ICIP can be more easily incorporated or removed for funding applications, grant submissions, or for review of specific aspects of the water or wastewater systems in the Village. By selecting different chapters and appendices to include and pass over for various funding opportunities or for sharing information, the Village can tailor this ICIP more specifically for all of its potential future uses.

1. Water Treatment Plant

1.1 Introduction

The Village of Perry WTP was constructed in the 1950s and was extensively upgraded as part of a 1994 project. The WTP treats an average daily flow of 0.530 mgd of potable water, with a permitted capacity of 1.60 mgd. The Village has approval to take up to 2.0 mgd from Silver Lake.

The plant utilizes clarification and filtration processes to treat water from Silver Lake and distribute it for consumption throughout the Village and some adjacent areas in the Town of Perry and the Town of Castile. Figure 1 at the end of this report shows the location of the WTP in the Village. Figure 2 shows an aerial photograph of the WTP site, and Figure 3 shows a schematic of the water treatment process flow at the WTP. Appendix A includes photographs of the WTP site.

Chapter 1 of this ICIP will provide a thorough evaluation of the processes and facilities used at the water treatment plant. The results of this evaluation will be used to highlight areas in need of improvement in order to consistently meet the criteria in the Safe Drinking Water Act at the present time as well as into the future.

1.1.1 Scope of Chapter

The scope of this chapter on the WTP has been divided into the eight tasks listed below.

Task 1.A Meet with Village staff to gain additional information regarding current WTP operations.

Task 1.B Review the 2001 ICIP to reevaluate the existing conditions and history of the existing WTP, updating any improvements since the 2001 ICIP.

Task 1.C Determine future customer demands, and analyze existing as well as potential future regulatory requirements for drinking water.

Task 1.D Analyze current treatment methods and facilities at the WTP, using the *Recommended Standards for Water Works, 2007 Edition* (commonly referred to as the "10 States Standards" for Water Works) and the Safe Drinking Water Act as bases for evaluation.

Task 1.E Perform an energy audit at the WTP.

Task 1.F Work with Village staff to identify shortcomings and desired improvements at the WTP. This task will include a discussion of projects that are currently underway (such as the proposed change of the filter media to include granular activated carbon, or GAC) as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the WTP.

Task 1.G Analyze potential improvements, including associated costs, required to meet current and future regulatory requirements.

Task 1.H Provide conclusions and recommendations for improvements to the WTP, including associated costs.

1.1.2 Related Sections

1.1.2.1 Related Chapters of the 2012 ICIP

The following chapters of the 2012 ICIP are relevant to this chapter.

- 2012 ICIP Introduction
- Chapter 3- Recommendations for WTP Improvements
- Chapter 5- Water Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- Chapter 2- Water Distribution Network
- Chapter 4- Recommendations for Water Distribution Network Improvements
- Chapter 12- Potential Funding Sources

1.1.2.2 Figures

The following figures for the 2012 ICIP are relevant to this chapter.

- Figure 1- WTP, WWTF, Village Hall Location Map
- Figure 2- WTP Aerial Photograph
- Figure 3- WTP Existing Treatment Process Schematic

1.1.2.3 Appendices

The following appendices to the 2012 ICIP are relevant to this chapter.

- Appendix A- WTP Site Photographs
- Appendix B- Summary of Monthly Water System Operation Reports, 2009-2010
- Appendix C- WTP Process Calculations
- Appendix D- Energy Use Data for WTP and Standpipe Road Tank

1.2 WTP Background

The WTP is located on Standpipe Road in the southwestern part of the Village adjacent to Silver Lake. The plant was constructed in 1954 as a clarification and filtration plant, and the water source for the WTP is the Silver Lake. In 1994 the plant was upgraded to reduce effluent turbidity, which included refurbishing the filters, replacing valves, and installing a supervisory control and data acquisition (SCADA) system to help with monitoring of the plant.

Figure 2 at the end of this report shows an aerial photograph of the WTP site, and Figure 3 shows a water treatment process schematic for the WTP. Appendix A shows photographs from the WTP site.

The WTP draws water from Silver Lake primarily through either a 14-inch diameter or a 10-inch diameter pipe and into a wet well underneath the low-lift intake pump station. Starting in 2007, sodium permanganate has been injected into the 14-inch intake pipe to prevent the build-up of zebra mussels, but this has not been necessary since 2009. Should inspections reveal the presence of zebra mussels in the intake pipes, this practice of injecting sodium permanganate will begin again.

The low-lift pumps pump the water into the 31-foot by 30-foot, 4-inch rectangular up-flow clarifier located inside the WTP building. The bottom end of the clarifier was completely rebuilt in 2008, as inspections revealed that the bottom scrapers were severely corroded. Chlorine and polyaluminum chloride (SternPAC) are injected into the water feed as it enters the up-flow clarifier, to disinfect the water and to aid in flocculation, respectively.

Clarifier effluent flows by gravity into the three rapid sand filters, each being 13 feet by 14 feet, and each containing a media depth of 22 inches. Presently, filter 1 and filter 2 are filled with only sand, while filter 3 consists of approximately 50% sand and 50% granular activated carbon (GAC). Filter 3 recently completed a pilot study, and the goal is to switch filter 1 and filter 2 to be an approximate 50/50 split of sand and GAC. The results of the pilot study have been reviewed and approved by the New York State Department of Health (NYSDOH). The filters are each backwashed daily.

After being filtered, the treated water is then injected with fluoride and chlorine, for boosting dental health and for disinfection, respectively. The water then flows into the 350,000-gallon underground clear well located behind the WTP building. The high-lift pumps located in the pipe gallery below the filters and clarifier draw water from the clear well and pump it into the distribution network, to the 750,000-gallon elevated water storage tank on Standpipe Road adjacent to the WTP. Orthophosphate is injected into the water prior to being pumped into the distribution network as a corrosion inhibitor.

The amount of water treated and stored by the WTP is controlled by adjusting the speeds of the variable frequency drives (VFDs) for the low-lift and/or high-lift pumps at the WTP. Adjusting the relative speeds of these pumps allows the Village to fill or draw down the clear well on site and the nearby elevated storage tank.

The pneumatic actuators in the pipe gallery below the filters and clarifier were all replaced in 2008 with new electric actuators. The pipe gallery also includes the high-lift pumps that pump treated effluent into the distribution network, magnetic flow meters, pipes to and from the clear well behind the WTP, and liquid chlorine day tanks.

The SternPAC and orthophosphate solutions are delivered in 55-gallon drums, and these are stored in the clarifier room, where the day tanks and injection equipment for these chemicals are also located. Sodium permanganate is stored in smaller drums in the clarifier room, but the injection equipment is located in the low-lift intake pump station. A separate room within the clarifier room contains storage of the 55-gallon drums containing the fluosilicic acid for fluoride injection, as well as the day tank and injection equipment for the fluoride. Liquid sodium hypochlorite is stored in bulk in a dedicated room in the WTP building, and the day tanks and injection equipment for pre- and post-chlorination are located in the pipe gallery.

1.3 Discussion of WTP Tasks

Task 1.A: Meeting with Village

Meet with Village staff to gain additional information regarding current WTP operations.

CPL met with the Superintendent of Public Works, the Chief Operator of the WTP and WWTF, and other WTP operators to inspect the WTP and discuss issues at the plant. Discussions with the staff allowed CPL to better understand the treatment processes and the challenges currently facing the operators. The Village also provided a "wish list" of major and minor projects that it would like to undertake to ensure that the WTP could continue to produce high-quality drinking water for Village residents. To aid in analysis of plant processes, the Village provided treatment data and reports as well as energy data to CPL.

Specific goals and concerns of the Village for the WTP were discussed in the visits and conversations with Village staff. Some of the primary goals discussed include:

- installing a second up-flow clarifier to provide redundancy at this step,
- installing a fourth rapid filter to provide redundancy,
- constructing bulk storage facilities for chemical storage of SternPAC used in water treatment, and
- reinstalling a gas chlorination system for disinfection to replace the existing liquid chlorination system.

Task 1.B: Reevaluating 2001 ICIP

Review the 2001 ICIP to reevaluate the existing conditions and history of the existing WTP, updating any improvements since the 2001 ICIP.

In reviewing the 2001 ICIP, CPL has noted the following major improvements to the WTP.

- The WTP has switched from using gas chlorination for disinfection to liquid sodium hypochlorite. This change was analyzed in the 2001 ICIP.
- The Village no longer uses liquid powdered activated carbon as a treatment aid in the summer months. SternPAC is now used year-round.
- The 2001 ICIP describes the intake pipe as 97 feet long and approximately 14 feet below the water surface of Silver Lake. This has been modified, and currently there are two intake pipes for the WTP that are each approximately 240 feet long. The primary pipe is approximately 17 feet below the water surface, and the backup pipe is roughly 23 feet below the water surface.

- ❖ The Village has installed the infrastructure necessary to inject sodium permanganate into the raw water intake pipe in order to combat the buildup of zebra mussels. This is done on an as-needed basis, when intake pipe inspections reveal excessive zebra mussel buildup.
- ❖ Each of the 19 actuators and valves in the pipe gallery of the WTP were replaced in 2008. The valve controllers for the actuators were all replaced in 2010 and 2011.
- ❖ Estimated demand in the 2001 ICIP was 0.660 mgd. This is modified for this ICIP to reflect updated flow monitoring data and demand changes in the distribution system. The updated estimated demand for the WTP is 0.530 mgd, which was the average daily flow from 2009 through 2010.
- ❖ The phosphate chemical feed system was relocated from the chlorine room to the clarifier room.
- ❖ The depth of media and the backwashing procedures in the rapid filters have changed from what was described in the 2001 ICIP.
- ❖ The Village rebuilt the high-lift pumps in 2007, including replacing the bearings in the motors.

Task 1.C: Future Demands and Regulatory Requirements

Determine future customer demands, and analyze existing as well as potential future regulatory requirements for drinking water.

Future Flow Demands

The 2010 U.S. Census shows a population in the Village of 3,673. Historical population data for the Village was obtained from the United States Census Bureau, and the population projections were obtained from the Genesee/Finger Lakes Regional Planning Council (G/FLRPC) Regional Population Forecasts, published in 2003.

VILLAGE OF PERRY POPULATION TRENDS

Year	Population	Percent Change	Status
1970	4,538	-2.0%	Historical Population (Census)
1980	4,198	-7.5%	Historical Population (Census)
1990	4,219	0.5%	Historical Population (Census)
2000	3,945	-6.5%	Historical Population (Census)
2010	3,673	-6.9%	Historical Population (Census)
2010*	3,910*	-0.9%*	Forecast (G/FLRPC)*
2020	3,900	-0.3%	Forecast (G/FLRPC)
2030	3,901	0.0%	Forecast (G/FLRPC)
2040	3,903	0.1%	Forecast (G/FLRPC)

*The G/FLRPC population forecast published in 2003 estimated a population of 3,910 in 2010 in the Village of Perry. The percent decrease of 0.9% is based on the difference from the 2000 Census population to the population forecast by the G/FLRPC for 2010. The percent changes for 2020 through 2040 are based on the G/FLRPC population forecasts for 2010 through 2040.

The 2010 Census data shows that the Village population has decreased sharply from what was forecasted by the G/FLRPC. The actual population change from 2000 to 2010 was similar to the population decrease in the Village from 1990 to 2000. The regional population forecast compiled in 2003 by the G/FLRPC predicted that the population of the Village would remain relatively stable from 2010 through 2040, decreasing by 0.2% over that time. The Village provides water service for areas outside of the Village, but for the purposes of this report the rate of growth of these areas is assumed to be similar to the rate of growth in the Village.

The table below shows the average daily potable water production at the WTP in 2009 and 2010. The data is taken from the monthly water system operation reports submitted to the Wyoming County Health Department (WCHD), which are summarized in Appendix B.

WTP AVERAGE DAILY POTABLE WATER PRODUCTION, 2009 – 2010 (MGD)

Month	2009	2010
January	0.521	0.462
February	0.568	0.466
March	0.555	0.489
April	0.509	0.481
May	0.518	0.513
June	0.588	0.563
July	0.649	0.599
August	0.553	0.600
September	0.529	0.549
October	0.503	0.531
November	0.466	0.527
December	0.439	0.549
Annual Average	0.533	0.528
OVERALL AVERAGE	0.530	

The WTP currently treats 0.530 mgd of water from Silver Lake, which is well under the permitted average daily flow of 1.60 mgd. The table above shows that the monthly demands vary throughout the year, peaking in the summer months. The greatest average daily demand for one month occurred in July 2009, with an average daily output of 0.649 mgd. This represents an increase of 22% from the overall average from 2009 through 2010. The lowest average daily demand for one month was 0.439 mgd, occurring in December 2009, which represents a 17% decrease from the overall average during this time period.

The excess capacity is approximately 1.07 mgd, and assuming an average daily consumption of 250 gallons per day (gpd) per household, this excess capacity would be able to serve 4,280 additional households. Based on the population projections from the

G/FLRPC, which estimate a stable population in the Village through 2040, it is likely that any additional demands on the system would come from expansion of the distribution network into neighboring towns, rather than from increases in the Village population.

Discussions for possible expansions of the Village of Perry distribution network include expansions through the Towns of Perry and Covington. One of these expansions could involve extending almost 3½ miles of water main north along New York State (NYS) Route 246 to Lagrange Road in the Town of Covington. This would provide a connection point for some potential future projects originating in the northern part of the Town of Covington. This project would serve approximately 30 residences, which would add approximately 7,500 gpd to the overall demand, assuming an average consumption of 250 gpd per residence.

Another potential expansion project proposes to expand the distribution network eastward along United States (US) Route 20A. The water line would be extended over 2 miles from Perry Center to the Wyoming County/Livingston County border, where interconnection with water line in the Town of Leicester may be possible. This would also serve approximately 30 residences, adding approximately 7,500 gpd to the water demand, assuming an average consumption of 250 gpd per residence. With these two projects considered together, the total water demand for the Village would increase from 0.530 mgd to 0.545 mgd.

There are no significant expansions in the Town of Castile that are planned for the near future.

The excess capacity at the Perry WTP may allow the Village to be used as a source of treated water for other areas in Wyoming County. This would be potentially complicated by the fact that the current WTP could not operate within the 10 States Standards for Water Works at its permitted capacity of 1.60 mgd and its water supply capacity from Silver Lake of 2.0 mgd. The present demands of the existing distribution network do not require the facility to expand. If the WTP is to be expanded to reliably provide 1.60 mgd of high-quality potable water, the Village would likely need additional funding.

Wyoming County is currently evaluating possibilities for creating a county agency to oversee coordination of water distribution network expansion projects by various municipalities in the county. Such an agency would be capable of coordinating between different municipalities for water supply projects, for example coordinating an agreement between the Village of Perry and a nearby town or village to provide funding to expand a WTP to allow Perry to serve this neighboring town or village. Such a scenario for the Village would not be likely in the immediate future, but it could be a reality for the Village in the future.

For the purposes of this report, the current design demand will be taken as the average daily output from 2009 and 2010, which was 0.530 mgd. The long-term future output demand will assume the addition of 15,000 gpd from the projects along NYS Route 246 into the Town of Covington and along US Route 20A to the county border. This sum will be increased by 5% to conservatively account for internal growth within the Village, which is considered to be conservative because of recent population trends in the Village. Thus, the future design demand for the Village would be 0.573 mgd; however, due to the varying demands throughout the year, the average daily output for the peak month will be used instead of this future design demand for WTP process calculations. The month with the greatest average daily output in 2009 and 2010 was July 2009, with an average daily output of 0.649 mgd. The peak day output occurred in July 2009 as well, with a potable water output of 0.735 mgd.

WTP DESIGN POTABLE WATER OUTPUTS

Existing Average Daily Output (2009-2010)	0.530 mgd
Peak Month Average Daily Output (July 2009)	0.649 mgd
Peak Day Output	0.735 mgd
Permitted Plant Output Capacity	1.60 mgd

Current and Future Drinking Water Regulations

Around the time the 2001 ICIP was published, the United States Environmental Protection Agency (EPA) had recently strengthened regulations on drinking water quality. The new rules that were discussed in the 2001 ICIP were the Filter Backwash Recycling Rule, Stage 1 of the Disinfectant Byproduct Rule, and Long Term 1 Enhanced Surface Water Treatment Rule. Since that time, a number of rules have been modified or enacted, including Stage 2 of the Disinfectant Byproduct Rule, Long Term 2 Enhanced Surface Water Treatment Rule, and the Arsenic Rule. Revisions to the Total Coliform Rule were proposed by the EPA in 2010, a new round of the Unregulated Contaminant Monitoring Rule will be upcoming beginning in 2013, and regulations regarding radon in water supplies were proposed in 1999 but have yet to be enacted. Potential upcoming regulations include changes to the Lead and Copper Rule, the Ground Water Rule, and fluoride drinking water regulations. The sections below are discussions about each of these rules and the feasibility of the Village to meet each of these rules consistently into the future.

Filter Backwash Recycling Rule (FBRR)

The FBRR was released by the EPA in 2001, and it requires that recycled filter backwash water, sludge thickener supernatant, and liquids from dewatering processes at a WTP must be returned to a point in the plant where the water would undergo all treatment processes. In addition, if the backwash water is to be recycled at a plant, the plant must notify the regulatory agency with details about the system. The purpose of this rule is to reduce the potential for contaminants washed out of the filters to pass through the treatment plant by bypassing any treatment processes. If backwash water is not recycled, the water must be treated or discharged to a location approved by the state.

Instead of recycling backwash water, the WTP sends backwash flows into the nearby sanitary sewer pump station to be pumped to the Village WWTF. If the Village wishes to implement backwash recycling at the plant in the future, the requirements of this rule would have to be met. This would include returning recycled flows to a proper point at the plant (likely the up-flow clarifier), notifying and providing detailed information about the intended process to the NYSDOH for approval, and performing a one-time, month-long self-assessment of the backwashing and recycling process at the WTP.

Stage 1 Disinfectant Byproduct Rule (Stage 1 DBPR)

Stage 1 DBPR established maximum levels for chlorine residuals as well as for disinfection byproducts in potable water, and sets requirements for percent removal of total organic carbon (TOC) from potable water. Studies have shown that disinfection byproducts may be carcinogenic or may cause reproductive or developmental problems, and disinfection byproducts are the result of chlorine residuals in the water combining with TOC. By limiting these two building blocks, the formation of disinfection byproducts would be inhibited. Full compliance with Stage 1 DBPR was required starting in 2004.

Under Stage 1 DBPR, samples for disinfectant residual testing must be taken at the same time and place as samples for total coliform testing, and the disinfectant residual test results from all locations within the distribution network must be averaged together in determining the compliance of the system. The process of averaging all test results from different locations within the distribution network will be modified by Stage 2 Disinfection Byproduct Rule, discussed below. The maximum residual disinfectant level for chlorine or chloramines is 4.0 milligrams per liter (mg/L) as Cl_2, as a running annual average. The Village must collect and test four samples per month, due to the population of the service area.

TOC removal requirements are determined based on the alkalinity and the TOC concentrations in the source water. Requirements may vary monthly if these source water characteristics vary. The average alkalinity of the water in Silver Lake, compiled from the samples taken from 2009 through 2010, was 107 mg/L as $CaCO_3$. The average TOC concentration of samples taken from Silver Lake in the summer of 2011 was 4.35 mg/L. With these two values, the Village would have to remove 35% of the TOC of the source water in order to comply with Stage 1 DBPR.

Two types of disinfection byproducts must be monitored under Stage 1 DBPR. The first group includes four species of trihalomethanes, which is referred to as total trihalomethanes (TTHM). The maximum contaminant level (MCL) for TTHM in the water supply is 0.080 mg/L, as an annual average. The second group consists of five types of haloacetic acids (HAA5), and the MCL for HAA5 is 0.060 mg/L, as an annual average. Because of the size of its service population, the Village must sample every quarter at the WTP.

The Village is in the process of evaluating GAC media for the rapid filters in order to improve TOC removal efficiencies. Preliminary testing of the GAC filter under the pilot testing performed in the summer of 2011 showed that the GAC filter did improve TOC removal efficiencies in the treated water. In five of the six tests performed, the removal efficiency was greater than 35%, with the sixth test exhibiting a removal efficiency of 33%.

Data included on the monthly water system operation reports for the WTP shows that the Village consistently complies with the chlorine residual limit, at the outflow point from the WTP as well as throughout the distribution system. From 2009 through 2010, the average chlorine residual at the entry point to the distribution system was 1.685 mg/L as Cl_2. The average chlorine residual at various locations throughout the distribution network for all tests taken from 2009 through 2010 was 0.88 mg/L as Cl_2.

Stage 2 Disinfectant Byproduct Rule (Stage 2 DBPR)

Stage 2 DBPR was put the Federal Registry in 2006 to modify the monitoring procedures established in Stage 1 DBPR. Based on the population of the service area, the Village will be required to begin meeting monitoring requirements of Stage 2 DBPR by October 2013. Test results will begin being evaluated for compliance with Stage 2 DBPR one year later.

Under Stage 2 DBPR, public water providers must perform an Initial Distribution System Evaluation, where the locations with the highest disinfection byproduct concentrations must be identified. Testing for disinfection byproducts would then be taken at those points, and the locational running annual average would be used to determine compliance. This marks a change from Stage 1 DBPR, where the results from all test locations were averaged together to determine compliance. The MCLs for TTHM and HAA5 would remain unchanged, at 0.080 mg/L and 0.060 mg/L, respectively. Any other requirements in Stage 1 DBPR not superseded by Stage 2 DBPR would remain in full effect, including meeting TOC removal requirements or the alternative compliance requirements.

The Village completed the Initial Distribution System Evaluation and it was accepted by the WCHD. The testing points proposed in this evaluation will be used to determine the locational running annual averages required for Stage 2 DBPR.

Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR)

LT1ESWTR was issued in 2002 to regulate the removal of microorganisms in potable water, which can cause disease and illness. Full compliance with LT1ESWTR was required beginning in 2005. Specifically, this rule targeted the microorganism *Cryptosporidium* in public water systems serving less than 10,000 people that use surface water for a water source. *Cryptosporidium* was not targeted by previous rules passed as part of the Safe Drinking Water Act, as it is more resistant to typical disinfection techniques. By targeting *Cryptosporidium*, LT1ESWTR would reduce diseases and illnesses caused by this pathogen, which can be fatal especially for the most vulnerable populations.

This rule was implemented to balance the effects of Stage 1 DBPR in lowering the disinfectant residuals in potable water, as well as to more specifically target *Cryptosporidium* in addition to other pathogens. Compliance with LT1ESWTR is enforced by ensuring 99% (2-log) removal of *Cryptosporidium* from the raw water, as well as requiring low turbidity in filtered water. Monitoring must be performed on both the combined filter effluent and the effluent from the individual filters. With a conventional filtration treatment system at the WTP, the Village must ensure that 95% of potable water samples in a month must have a turbidity of less than 0.3 Nephelometric Turbidity Units (NTU), with a maximum turbidity level of 1.0 NTU. Turbidity must be measured and recorded every four hours to comply with LT1ESWTR. An additional requirement of the rule is that all new reservoirs to be constructed must be covered.

Based on the data provided on the monthly water system operation reports submitted to the WCHD, the Village has an average turbidity of 0.130 NTU in its combined filter effluent in 2009 and 2010, with the maximum reading recorded over these two years being 0.261 NTU. These are in compliance with LT1ESWTR. The Village has also met the required 2-log removal of *Cryptosporidium* from the raw source water.

If the Village wishes to make a significant change to its disinfection practices, which would likely include changing from using liquid sodium hypochlorite to chlorine gas, the Village may be required by the state under LT1ESWTR to create a disinfection profile and benchmark to ensure that the new system would be at least as effective as the existing system.

Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)

LT2ESWTR was published in 2006 to modify testing requirements specified in LT1ESWTR. Instead of testing treated water for *Cryptosporidium*, public water providers must test source water for indicator organisms instead, such as *E. coli*. If levels for *E. coli* are determined to be higher than the specified "trigger levels," then source water samples must be analyzed for the presence of *Cryptosporidium*. The WTP is then assigned a removal efficiency based on the concentration of *Cryptosporidium* in the source water.

This regular source water testing period for *E. coli* began in 2008 and finished in 2009, which resulted in the Village not being required to test for *Cryptosporidium*. Under LT2ESWTR, another round of testing the source water for *E. coli* begins in 2017, and similar restrictions will be imposed if *E. coli* levels are greater than the trigger levels. If the Village continues to find *E. coli* levels below the trigger levels, then no further testing for *Cryptosporidium* would be required under LT2ESWTR.

Arsenic Rule

The Arsenic Rule was published in 2001. A new MCL was established and became effective in 2006, setting the maximum arsenic concentration to be 10 micrograms per liter (µg/L). The rule also changes reporting requirements for systems that show elevated levels of arsenic. Since this rule came into effect, the Village has had no problems meeting its requirements.

Total Coliform Rule (TCR)

The TCR was published in 1989 and became effective in 1990. In 2010, revisions were proposed to strengthen the requirements of the rule and to update provisions in other rules that reference the analytical methods and other requirements in the TCR, such as the Public Notification Rule. The proposed revisions would require systems to take corrective actions if they have previously had issues with coliform contamination in the distribution system. The Village has not consistently shown any problems with coliform contamination in the distribution system, and will likely see minimal impact from these revisions to the TCR.

Lead and Copper Rule (LCR)

In 1991, the EPA published regulations to control lead and copper in the drinking water, specifically targeting the materials used in the distribution network. In 2007, revisions were passed to set clear goals and processes for locating the source of lead or copper in a water system and educating consumers. Water suppliers had to take steps to limit corrosion in the distribution network, test source water for lead, determine levels of lead in tap water for consumers with lead service lines or lead-based solder in the plumbing system, and educate consumers about how to reduce their exposure to lead.

In the spring of 2011, the EPA hosted a public meeting to discuss on environmental justice issues in regards to upcoming regulatory efforts. Some of these upcoming regulatory efforts include revisions to the LCR and implementing regulatory actions for perchlorate treatment and carcinogenic volatile organic compounds (VOCs). The goal of the meeting was to get feedback on different ways to ensure the upcoming regulations would be fair for all people regardless of race, color, national origin, or income. While no new revisions for LCR have been proposed as of the publishing of this ICIP, this meeting is an indication that revisions to the LCR may be coming in the future.

Radon Rule (proposed)

The Radon Rule was first proposed in 1999, but has yet to be finalized and implemented. This rule would not apply to systems that use surface water as the exclusive water source for their systems, and would thus not apply to the Village.

Unregulated Contaminant Monitoring Rule 3 (UCMR3)

The UCMR3 builds on the first two phases of the UCMR, which require public water systems to test for unregulated contaminants for a 12-month period. All public water systems serving over 10,000 people would be required to test for the 28 unregulated chemicals selected, along with a representative sample of 800 public water systems serving 10,000 or fewer people. In addition, a representative sample of 800 public water systems serving 1,000 or fewer people would be required to test for two types of unregulated viruses. Testing would be required to take place for any 12-month period between 2013 and 2015. It is not certain that the Village would be selected as one of the 800 public water systems serving 10,000 or fewer people to take part in this round of monitoring.

Ground Water Rule

The Village is not required to meet the requirements of the Ground Water Rule, as this rule only applies to systems that use ground water as the source of public drinking water. The Village uses surface water from Silver Lake as its source water.

Review of Fluoride Drinking Water Regulation

The EPA released new risk and exposure assessments for fluoride in drinking water in January 2011. This is the first step in reviewing current fluoride drinking water regulations. Currently, the federal MCL for fluoride in drinking water is 4.0 mg/L. In New York State, the maximum concentration level allowed in drinking water is 2.2 mg/L, including naturally occurring levels. The target fluoride concentration in water in New York State is 1 mg/L.

The United States Department of Health and Human Services (HHS) is working with the EPA to determine fluoride levels that will still provide dental health benefits while minimizing any long-term risks associated with excessive fluoride ingestion. The HHS proposed its recommendation to be 0.7 mg/L of fluoride in drinking water. The EPA is in the process of determining if it will lower its MCL and or its maximum contaminant level goal.

Task 1.D: Analyzing Treatment Methods and Facilities

Analyze current treatment methods and facilities at the WTP, using the Recommended Standards for Water Works, 2007 Edition *(commonly referred to as the "10 States Standards" for Water Works) and the Safe Drinking Water Act as bases for evaluation.*

The treatment process at the WTP begins with the low-lift pumps conveying water to the up-flow clarifier. From the up-flow clarifier, water flows into the rapid sand filters, after which it is pumped into the distribution system or directed into the clear well behind the plant. This task will evaluate each step of the process in relation to the 10 States Standards for Water Works, in addition to examining the facilities employed at each step.

Figure 3 at the end of this report shows a schematic of the water treatment process at the WTP. Appendix A at the end of this report shows site photographs of the WTP, and Appendix C shows process calculations for the WTP.

Low-lift Intake Pump Station

The low-lift intake pump station provides the water for the WTP. Two intake pipes, one being 14 inches in diameter and the other being 10 inches, extend approximately 240 feet each into Silver Lake. The 14-inch pipe is roughly 17 feet below the water surface, and the 10-inch pipe is roughly 23 feet below the water surface of the lake. These two pipes supply water to a wet well underneath the low-lift pump station. A valve located just outside the entrance of the wet well switches flow between the two intake pipes, but this valve is inoperable, so only the 14-inch pipe is used for the raw water intake presently.

The 14-inch intake pipe has experienced problems with zebra mussels, so in 2007 the Village installed a sodium permanganate system to eliminate this problem. This chemical feed system was operated primarily during the summer months. The pipes are now inspected by divers on an annual basis, and the presence of zebra mussels has not been noted since 2009. As a result, the sodium permanganate system has not been used since 2009, but the equipment remains in the pump building for future use, should zebra mussels be detected in the future.

Two 20 horsepower (HP) vertical turbine pumps draw water out of the wet well and up to the treatment building, and the staff alternates the use of each pump. Each pump is installed with a VFD. The motors for the pumps are mounted in a small enclosure that also houses the sodium permanganate injection system. Pump 1 was rebuilt in 2006, and pump 2 was rebuilt, with a new motor installed, in 2011.

Access to the pumps for maintenance is severely limited by the small dimensions of the building. The pumps can be pulled out of the building through two hatches in the roof of the building, but the hatches are small and it can be difficult to move the pumps through them. The building is heated by an electric heater in the corner, but the presence of louvers on the walls and on the door prevents the building from retaining much heat.

The masonry pump station is surrounded by a security fence that is 10 feet high with barbed wire on top and a locked gate for employee access. An alarm light is mounted on the outside of the building to allow staff to determine the operational status of the equipment in the building without having to enter the fenced-in area and building. The floor of the building is concrete, with a concrete equipment pad for mounting the pumps and motors.

A steel hatch in the floor provides access to the wet well, but this hatch is showing signs of rust, and the small size of the building hinders access to the wet well. The location of the hatch close to the doorway could present a safety hazard for employees entering the building, as the steel would be slippery if it were to get wet from one of the pumps leaking, which was the case in two recent visits to the site by CPL.

The pump station complies with the minimum requirements for a raw water intake pump station as listed in Part 6 of the 10 States Standards for Water Works.

Up-flow Clarifier

Water from the low-lift pump station comes into the WTP building in the pipe gallery, where liquid sodium hypochlorite is injected into the raw water pipe for pre-chlorination. This water then enters into the 31-foot by 30-foot, 4-inch rectangular up-flow clarifier, with a water depth of 13.5 feet. The water enters into a cone in the center of the tank, which provides an area to mix in the SternPAC coagulant/flocculent. The clarifier was designed to handle a flow of 1.0 mgd.

Once SternPAC is mixed in, the water flows up through a sludge blanket to the collection trough at the water surface. The sludge blanket is typically maintained at a thickness of roughly 8 feet, and it aids in filtering out flocs as the water flows through it. Sludge from the clarifier is wasted to the nearby sanitary pump station, to be conveyed back to the WWTF for treatment. The bottom scrapers in the tank that aid in sludge collection were completely rebuilt in 2008, after the discovery that they were severely corroded. A visual inspection of the outside of the central cone did not reveal any signs of corrosion.

Clarified water flows into the collection trough through small submerged orifices in the side walls of the trough, only a few inches below the water surface. The trough is showing signs of surface corrosion. Water from the troughs is collected and conveyed to the three rapid filters by gravity.

The gear drive in the center of the tank that turns the bottom scrapers has been cause for concern for plant staff, as it must be inspected daily to ensure it has not failed. In order to perform this visual inspection, the steel plate on the walk way over the gear drive has been removed, leaving an opening in the walkway and presenting a safety concern for anyone walking near that area. Other than this issue, the walkway appeared to be in very good condition.

The clarifier room contains a hatch that provides equipment access to the pipe gallery below it. Above the hatch is a steel I-beam that is labeled, "1.5 TON MAX," with a pair of holes cut in the web between the flanges to allow the beam to be used as a crane to lift equipment in and out of the pipe gallery.

The sizing calculations for the up-flow clarifier were performed for four different flow conditions: the average daily flow of 0.530 mgd, the peak month flow of 0.649 mgd, the peak day flow of 0.735 mgd, and the permitted maximum flow of 1.60 mgd. For each of these flow rates, the flocculation detention time, weir loading rate, up-flow rate, and clarifier detention time were calculated, with the calculations shown in Appendix C.

For flocculation detention time, up-flow rate, weir loading rate, and clarifier detention time, the clarifier is undersized for the permitted maximum flow rate. For the other three flow conditions (average daily flow, peak month, and peak day), the clarifier is properly sized for all of these four criteria specified in the 10 States Standards.

There is no redundancy at the flocculation and clarification steps, as required under section 4.1.a. The WTP has only one flocculation area, and it is located within the one clarifier, so if either of these units needs to be taken offline for maintenance or repairs there would be no means for clarification at the plant.

The clarifiers meet the remaining applicable requirements in section 4.1.5 of the 10 States Standards.

Rapid Sand Filters

Clarified water enters the three rapid sand filters, operated in parallel. Each filter is 13 feet by 14 feet, with a surface area of 182 square feet. The total surface area for all three filters is 546 square feet. The depth of media in each filter is approximately 22 inches.

Two of the three rapid filters use only sand for the entire 22-inch media depth. The third filter recently completed a pilot study evaluating the effectiveness of using GAC and sand as the filter media. GAC aids in removal of dissolved impurities while improving the flow characteristics of the filter, resulting in a greater flow capacity for the filter and typically better effluent taste quality.

In filter 3, a 10-inch depth of sand was replaced with 10 inches of GAC in the filter in March and April of 2011, and the filter was placed back on-line by May 2011. Discussions with plant operators have indicated that the media is working better than expected, and the plan is to install GAC in filters 1 and 2 in the spring of 2012.

Water from the three filters is combined in a clear well below the filters, where the fluosilicic acid and sodium hypochlorite are mixed in for dental health and for post-chlorination, respectively. It is from this well that treated water is either conveyed to the 350,000-gallon clear well behind the WTP or pumped into the distribution network. After passing through the high-lift pumps on its way into the distribution network, the treated water is injected with orthophosphate, used as a corrosion inhibitor to increase the lifespan of the pipes in the distribution network.

Each filter is backwashed daily, but the backwash routine varies for filter 3, which uses GAC and sand in the filter media, versus filters 1 and 2, which presently use only sand. A letter from CPL to the WCHD dated April 27, 2011 outlines the backwash procedures for the WTP rapid filters and records some results of backwashing in each filter. For filters 1 and 2, the backwash process begins with two minutes of air scour. After these two minutes, this air scour is combined with wash water for an eight-minute period, and then washed for eight more minutes with the air scour turned off. Then the bed is rinsed for five minutes. The flow for washing the beds during that 16-minute period is roughly 1,370 gallons per minute (gpm), which works out to roughly 7.5 gpm/square foot (sf).

In filter 3, the backwash routine begins with two minutes of air scouring. After these two minutes, the filter is washed for 16 minutes with no air scouring. The bed is then rinsed for five more minutes after the washing. The flow rate of the wash water is approximately 1,200 gpm, which is approximately 6.6 gpm/sf. This lower backwash rate is used without any air scouring in filter 3 because it was determined that fine media particles would be lost at a higher wash rate and/or air scouring.

For filters 1 and 2, the bed expansion during backwashing is roughly eight inches. In filter 1, testing results showed a head loss prior to backwashing of 7.0 pounds per square inch (psi), and a head loss after backwashing of 2.1 psi. Turbidity in filter 1 prior to backwashing was 0.039 NTU, and after backwashing it was 0.068 NTU. In filter 2, the head loss dropped from 8.0 psi before backwashing to 2.5 psi after backwashing, and the turbidity rose from 0.065 NTU prior to backwashing to 0.093 NTU afterwards. In filter 3, the bed expansion was also approximately eight inches. The head loss prior to backwashing was 4.7 psi, compared to 1.6 psi after backwashing, and the turbidity rose from 0.09 NTU before backwashing to 0.14 NTU after backwashing.

The sand media was replaced most recently in 2003 and then again in 2006 in filters 1 and 2. The media in filter 3 was installed in March and April of 2011 prior to the pilot study, and it is anticipated that the GAC used in filter 3 will need to be regenerated every three years. The media in filters 1 and 2 will be replaced with the same configuration as in filter 3, and the backwash routine will be modified to mirror that of filter 3 presently. The blowers used for the air scouring and their controls are housed in a shed behind the WTP building.

The flow rate through the clarifiers was compared to the 10 States Standards paragraph 4.2.1.2, which states that typical flow rates through rapid filters range from 2 to 4 gpm/sf, but that the reviewing authority shall review all engineered designs to ensure appropriate flow values. 10 States Standards also states in paragraph 4.2.1.3, "Where more than two filter units are provided, the filters shall be capable of meeting the plant design capacity at the approved filtration rate with one filter removed from service." Therefore, the actual flow rates were calculated for when all three filters at the WTP are up and running as well as when one of the three units is offline.

Under permitted day output conditions, the filtration rate when one filter taken offline is 3.05 gpm/sf. When all three filters are running, the flow rate through the rapid filters is 2.04 gpm/sf. These values comply with the typical flow rates recommended in the 10 States Standards, but they are much greater than the average daily flow filtration rates of 0.67 gpm/sf for all three filters running and 1.01 gpm/sf for one filter offline.

The 10 States Standards set the minimum requirements for backwash flow to be 15 gpm/sf, with a recommended minimum of 20 gpm/sf. For filters containing GAC, a minimum backwash flow rate of 10 gpm/sf is acceptable. The actual backwash flow rates of the filters, at 7.5 gpm/sf for the sand-only filters and 6.6 gpm/sf for the GAC filter, are lower than these minimum standards, but these rates have been optimized for efficient filter cleaning at the WTP and these processes have been approved by the WCHD.

The filters meet the remaining requirements in section 4.2.1 of the 10 States Standards.

Pipe Gallery

The pipe gallery is located in the basement underneath the floors around the up-flow clarifier and the three rapid filters. The pipe gallery contains the pipes that feed the clarifier and filters and the 19 actuator valves that control flow, as well as the day tanks for the liquid sodium hypochlorite used for pre- and post-chlorination and the high-lift pumps that convey potable water flows into the distribution network.

The pipe gallery contains a 12-inch raw water influent line and a 14-inch line conveying clarified water to the filters, 6-inch, 8-inch, 10-inch, and 12-inch potable water lines, 14-inch backwash effluent pipes, and 4-inch air lines. In the floor of the pipe gallery there are two 14-inch potable water lines conveying potable water to and from the 350,000 gallon clear well behind the WTP. All of the pipes in the pipe gallery are painted with colors indicating their use, in accordance with paragraph 2.14 in the 10 States Standards for Water Works.

The 14-inch potable water pipes to and from the large clear well behind the building are located under the floor of the pipe gallery, and the trenches are covered with painted steel grates. These grates are showing signs of corrosion on the steel surface in a number of locations, and in many cases these grates can be slippery and pose a safety concern for plant staff. In one area at the bottom of the stairs to the pipe gallery, the grates in the main walkway are covered by wood planks to prevent slipping, but these planks protrude approximately one inch above the floor, creating a potential tripping hazard.

The 19 actuator valves in the pipe gallery were all replaced in 2008, complete with electric actuators that have local station overrides and manual overrides in case power to the actuators is cut off. The valve controllers are located next to the rapid filters, and the controllers for the valves to each tank are all brand new as of 2010 or 2011.

Two magnetic flow meters are located in the pipe gallery as well. One is on the 12-inch raw water intake line to the up-flow clarifier, and the other is on the 12-inch potable water line going out to the distribution network. The pipe gallery also contains a sampling sink, with spigots from each type of water pipe (potable, backwash, raw water) located over the sink.

The high-lift pumps in the pipe gallery were rebuilt in 2007, and the bearings in the motors were replaced at this time. The pumps leak slightly, which leaves water on the ground in the pipe gallery and creates potentially slippery floors, especially near the pumps themselves. The motors for the pumps are at least 10 years old.

The pipe gallery also holds two liquid sodium hypochlorite day tanks for pre- and post-chlorination of the drinking water. These tanks are fed by the bulk storage tanks located one floor above. A bottle of eye rinse is located near the day tanks for safety purposes, as are latex gloves to be used when handling the injection equipment.

There is presently no means for dehumidification in the pipe gallery. Having dehumidification would aid in preserving the pipes in the gallery, as well as allow paint to bond more effectively to the pipes to provide more protection for the pipes, as some of the pipes showed signs of corrosion. It would also reduce the possibility of slipping on the damp tile floor in the pipe gallery.

Clear Well for Potable Water Storage

Behind the WTP building is an underground clear well, with a capacity of approximately 350,000 gallons. The combined filter effluent from the three rapid filters is injected with fluorine and chlorine, and then flows by gravity into the underground clear well. The water in the clear well is finished potable water, but it does not contain orthophosphate. Water is drawn from the clear well by the high-lift pumps, injected with the orthophosphate, and pumped into the distribution network and nearby elevated water storage tank.

The water level in the clear well is controlled by adjusting the relative speeds of the high-lift and low-lift pumps. By increasing the speed of the high-lift pumps relative to the low-lift pumps, the level in the wet well can be drawn down, and vice-versa. The level sensors in the clear well are tied into the SCADA system, but speed control on the pumps is performed manually by WTP operators. The well is taken off-line and inspected annually.

Two 14-inch pipes convey water flows to and from the clear well. These pipes are outfitted with valves located in a valve vault behind the WTP building. Because of the depth of this vault, it is classified as a confined space, complicating access to the valves. The valves are generally worked only a few times per year, but each time requires following the steps required for entering a confined space. There are no means for working the valves without entering the vault.

The roof of the clear well is at ground level and is made of concrete, but it is showing cracks that have some vegetation growing in the cracks. The cracks in the roof promote concerns that the clear well may have rain water leaking into the clear well, or that it may in the near future if these issues are not corrected. The hatches on the access manholes to the well are old and showing signs of corrosion.

Chemical Addition and Storage

Five different chemicals are used during the treatment process at the WTP: sodium permanganate for controlling zebra mussels in the intake pipes, sodium hypochlorite for disinfection, polyaluminum chloride (SternPAC) used as a coagulant/flocculent, fluosilicic acid used as a dental health additive, and orthophosphate for protecting the distribution network from corrosion.

Sodium permanganate is stored in 30-gallon drums in the clarifier room. The injection equipment, including the day tank, injection pumps, and secondary containment, is located within the low-lift pump station building. The intake pipes are inspected annually, and the results of the annual inspections have shown that sodium permanganate has not been necessary since 2009. The equipment is still intact in the pump station, should it be required in the future. The typical timeframe for using sodium permanganate is during the summer months.

Liquid sodium hypochlorite is used for disinfection of the water and to maintain a minimum chlorine residual in the distribution network. Chlorine is injected into the water at two points: the first is on the raw water line from the low-lift pumps prior to entering the up-flow clarifier, and the second is in the combined filter effluent clear well underneath the filters. This chemical is delivered and stored in two bulk containers stored in a dedicated room that is only accessible from outside the building. These two bulk containers feed two day tanks in the pipe gallery, with one tank used for pre-chlorination and one for post-chlorination. The typical chlorine concentration in the potable water at the point where it enters the distribution network is approximately 1.7 mg/L.

SternPAC is injected into the water in the center cone of the up-flow clarifier, and it is mixed into the water at the entry point. SternPAC is delivered and stored in 55-gallon drums, and it is stored in the clarifier room of the WTP. The day tank and the injection equipment are also located in the clarifier room.

Fluosilicic acid is stored in a dedicated room off of the clarifier room. The acid is injected into the combined filter effluent clear well underneath the rapid filters, at the same point as the post-chlorination injection, and it is added to leave a fluoride residual to improve dental health in the Village. It is delivered and stored in 55-gallon drums, and it is stored along with the day tank and injection equipment in its dedicated room. Much of the metal in the room, including electric outlets and the back of the metal door, shows signs of corrosion, likely due to the presence of the acid.

Orthophosphate is added in the potable water pipe just after the high-lift pumps and just before entering the distribution network. It is delivered and stored in 55-gallon drums in the clarifier room, and the day tank and injection equipment are housed in the clarifier room as well.

Storing the SternPAC and orthophosphate drums in the clarifier room takes up a lot of floor space in the room. Some of these drums are stored on top of the hatch to the pipe gallery. Emergency access to the pipe gallery would first require moving these drums of chemicals, and the presence of these drums could provide a challenge to completing work involving moving equipment in and out of the pipe gallery.

The clarifier room does have an eye wash station, and gloves and a face shield are located near the day tanks for handling the chemical injection equipment. The fluosilicic acid room does not have this equipment, but it is within close proximity to the eye wash station in the clarifier room. The low-lift pump station has an emergency eye rinse bottle near the chemical equipment. Eye rinse bottles are also kept on-hand in the chlorine bulk storage room and on the wall next to the chlorine day tanks. Gloves are provided at each chemical station.

The requirements for chemical handling and storage listed in 10 States Standards part 5 are all met at the WTP. Despite this, improvements could be made to the ventilation in the sodium hypochlorite and fluosilicic acid rooms, and better eye-wash facilities could be installed instead of using eye rinse bottles.

Site Facilities at WTP

Security at the WTP site is satisfactory. While the low-lift pump station is surrounded by a 10-foot-tall security fence, there is no fencing on the rest of the site. The doors to the facility are locked at all times, and visitors request access through an intercom system. An alarm system is hooked up to the front door, but not to any other potential access points such as the other entry doors, garage doors, or windows.

Hatches to the backwash clear well, the potable water clear well, and the valve vault to the potable water clear well are all secured by padlock. Likewise, access to the blowers and controls located behind the building and the liquid chlorine bulk storage room is also secured by padlocks. There were two surveillance cameras installed at the site, but conversations with Village staff indicate that these are not presently operable.

The roof of the WTP was replaced in 2008 and 2009, and the new metal roof has not had any problems. In addition to the filters and clarifier, the WTP building also contains the main operator office and lab, and two garage bays. The main office is the office of the Chief Operator of the WTP and WWTF, but it also serves as the break room and as the lab for the WTP. The garage bays contain the tool bench and storage areas for the WTP.

A 125-kilowatt, diesel-powered generator mounted on a trailer is housed in the second garage bay, and it is hooked up as the emergency generator for the site. It is tested under load on a weekly basis and is capable of running the entire WTP in the event of a power outage. While the exhaust pipe is vented to the outside, operation of the generator for a long time with the garage doors closed could pose serious safety concerns at the site.

The SCADA system ties into a computer in the main office of the WTP. Conversations with plant staff indicate that the system is sufficient for the needs of the Village, but the staff would be open to more automation in the future.

Some of the electrical and plumbing facilities at the WTP are old, outdated, and/or corroded. The sink and the shower in the bathroom have been disconnected from the plumbing in the building. Some of the electrical fixtures have been replaced with plastic faces, but the most of the fixtures that still have metal faces show signs of corrosion, particularly in the fluosilicic acid room.

Most of the lighting fixtures at the plant have been upgraded to use more energy efficient fixtures and bulbs, including utilizing more efficient T-8 fluorescent lamps or compact fluorescent lamps. Some of the lighting facilities are insufficient at the plant; for instance, the lighting over the rapid filters is supplied only by a few floodlights and it is not bright on the walkway over the filters. Likewise, the lighting in the up-flow clarifier room is supplied by individual light bulbs spaced throughout the room that do not provide sufficient lighting and take a while to warm up. All of the windows at the plant were replaced in August 2010.

Task 1.E: WTP Energy Audit

Perform an energy audit at the WTP.

CPL performed an energy audit of the WTP. The energy audit addressed several potential energy conservation measures that would be applicable to the existing buildings and site facilities at the WTP. These potential conservation measures were compiled after site visits to the WTP and discussions with plant staff. Appendix D at the end of this report summarizes the energy bills for the WTP and Standpipe Road Tank from May 2009 through April 2011.

Intake Pump Station

The lighting system was the primary source of energy conservation examined at the intake pump station. There are two pumps at the intake pump station. Pump 1 was rebuilt in 2006, and pump 2 was rebuilt in 2011. The motor for pump 2 was also replaced in 2011. Both of these pumps have VFDs on the motors, and little energy savings would be generated from replacing the motors for these pumps.

The building is currently served by two 100-watt (W) incandescent light fixtures, which are controlled by a manual wall switch. One potential source of savings would be to replace the incandescent light bulbs with more efficient LED replacement bulbs. An LED bulb that would generate the same light as a 100W incandescent bulb would only require approximately 21W of input power, reducing the required power by 79%. In addition, the life expectancy of an LED bulb far exceeds that of traditional incandescent bulbs, often by a factor of 25 or more.

Assuming these lighting fixtures were to be turned on 24/7, the annual electrical consumption of the LED bulbs would be 370 kilowatt-hours (kWh), versus 1,750 kWh for the incandescent bulbs. Replacing the two bulbs at an approximate total cost of $160 would generate a simple payback period of approximately 1.1 years, based on an electrical cost of $0.113 per kWh. The approximate construction cost assumes that the lighting would be replaced by WTP personnel to reduce costs. Currently, there are no New York State Energy Research and Development Authority (NYSERDA) incentives for this measure.

The building uses a plug-in electric heater unit for heating the building. Replacing this would not gain the Village much energy savings. Adding insulation to the building is likely to have a greater impact on efficiency, but it would not create substantial savings.

Main WTP Building

Examination of the WTP building during site visits from CPL staff revealed that the building does not meet current NYS ventilation rates as required by the *Mechanical Code of New York State, 2010 Edition*. However, unless this building undergoes a major renovation or change of use, it is not required to be brought up to the current code requirements. As a result, if the Village were to replace the furnace in the building, it would likely be required to perform an extensive ventilation upgrade to the WTP. Bringing the building up to current code requirements for ventilation would significantly increase the amount of energy required to maintain code-required space temperatures.

Most of the lighting systems throughout the WTP building have been upgraded to consist primarily of T-8 lamps or compact fluorescent lamps. Based on the current Pre-Qualified Lighting Incentives program under the Existing Facilities Program offered by NYSERDA, replacing the remaining light fixtures would eligible for a total incentive of $210. Replacing these fixtures would generate electricity savings of an estimated 2,260 kWh per year, which would save approximately $235 per year at an electricity cost of $0.104 per kWh. Installation costs for replacing all of the remaining light fixtures would total an estimated $2,100, which calculates to a simple payback period of 8.9 years without the NYSERDA Pre-Qualified Incentives program, and 8.0 years with the incentives. The installation cost assumes that WTP staff would perform the work to replace the ballasts and lamps in order to reduce costs.

In areas where it does not pose safety issues, occupancy sensors have already been installed to control the lighting. In the remaining areas, the light is controlled by manual wall switches for individual rooms.

NYSERDA also offers a Pre-Qualified Incentives program for replacing inefficient motors. The following pumps/motors would likely qualify for incentives under this program.

- ❖ The flocculator motor in the up-flow clarifier would qualify for incentives. Discussions with plant staff indicated that the existing totally enclosed, fan-cooled (TEFC) 2 HP is at least 10 years old. Using the NYSERDA motor replacement incentives program, a TEFC 2 HP motor has an incentive of $60. The estimated replacement cost of the motor is approximately $800. Energy savings earned by replacing the motor are estimated to be a maximum of 1,225 kWh per year, or $128 annually. The simple payback period would then be 6.25 years without the NYSERDA incentive, and 5.8 years with the NYSERDA incentive.

- The motors for the high-lift pump would qualify for incentives. These two TECF 75 HP motors are also at least 10 years old. It is assumed that the efficiency of these motors is approximately 82%, based on the age and type of motors. Using the NYSERDA motor replacement incentives program, each TEFC 75 HP motor has an incentive of $300 if motors with approximately 95% efficiency are used. Total replacement costs, including installation, for the two motors would be an estimated $15,000, with maximum electrical energy reductions totaling an estimated 62,700 kWh per year, saving $6,500 annually. The simple payback period for this measure would be 2.3 years without the NYSERDA incentives, and 2.2 years with the incentives.

The Village uses a natural gas unit heater in the clarifier room for heat. Replacing this heater would not generate substantial savings for the Village. The fact that the temperature in this part of the building is generally kept at relatively low temperatures around 60°F would diminish any potential savings even further. The WTP building appears to be sufficiently insulated from a heating efficiency standpoint. Site visits by CPL indicated that there are no heat sources in the garages or in the bathroom at the WTP.

The Village uses a natural gas fired hot water heater, located in the pipe gallery. The tank is an Energy Star tank, so there is not much energy savings to be gained by replacing it. There are only a few fixtures for water use at the plant, and only the toilet in the bathroom would be a practical fixture to install water saving devices. A dual-flush or low-flush toilet may reduce water consumption at the plant, and an automatic toilet flush valve sensor, which uses very little power, could reduce the potential for leaking in the toilet. While these water-saving improvements would not have a measurable impact on energy consumption at the plant, it would help to make the WTP more environmentally sustainable.

Alternative Energy Sources

The Village currently uses conventional energy sources to power its treatment processes and distribution equipment at the WTP. Alternative sources of energy generated on site, such as harnessing wind energy or solar energy, could reduce energy bills of the Village and improve the overall environmental sustainability of the plant.

Wind Power

The Village has the potential to harness wind energy by installing a small wind turbine on the WTP site. This power could be stored and used to reduce the peak power demand at the site, or it could be used to supplement the energy consumption at the plant. Either way, it would reduce the electric bill for the site.

The location of the WTP on the banks of Silver Lake is favorable for harnessing wind energy. There are a few trees along the shoreline of Silver Lake, but a turbine could be installed at a greater height in order to prevent some of those trees from slowing down the wind.

Solar Energy

The potential for capturing solar energy at the plant is also favorable. The WTP building has no obstructions to southern exposure, so solar panels could be mounted on the roof of the building. As with wind power, the solar power captured at the site could be stored to reduce peak power loadings or it could be used to reduce energy consumption at the plant.

Task 1.F: Desired Improvements to WTP

Work with Village staff to identify shortcomings and desired improvements at the WTP. This task will include a discussion of projects that are currently underway, as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the WTP.

The staff for the WTP and distribution network was encouraged to point out desired improvements to the WTP during conversations and site visits by CPL. The Village also provided a list of priority items that ought to be addressed at the site.

Low-lift Intake Pump Building

- A new building for housing the low-lift pumps was discussed as a wish-list item from the Village. A new building would allow the Village to correct the potential safety issues with the existing building, including increasing separation distances between electrical equipment and potential water leaks. If a new building is not possible, then the following improvements to the existing facility are desired.
- The Village would like to replace pump 1 in the low-lift pump station.
- A new 14-inch backup intake pipe from Silver Lake is needed, complete with an operable valve to switch between the primary and backup pipe. The Village stated that the 10-inch pipe is too small for its purpose, and the valve to switch between the two intake pipes does not work.
- Bigger hatches, or one big hatch, in the roof of the building would allow for better access to the low-lift pumps in the case of repairs or replacement.

Up-flow Clarifier

- An additional up-flow clarifier is a priority item for Village staff to provide redundancy at the WTP.
- The installation of a coagulation/flocculation tank is also a priority item for Village staff, which would allow for more efficient operation of the up-flow clarifier by removing the coagulation/flocculation process from this tank.

- The sludge scraper gear drive in the center of the up-flow clarifier needs replacement, as Village staff must perform daily visual checks on this equipment to ensure no failures have occurred.
- More effective or brighter lighting in the up-flow clarifier room is desired by Village staff.

Rapid Sand Filters

- An additional sand filter is listed as a priority item by Village staff to provide redundancy at the WTP.
- The Village also wishes to alter the materials in filters 1 and 2 to be 50% GAC and 50% sand, as is the case with filter 3 presently. The Village has received approval from the WCHD to make this change in filter media for filters 1 and 2.

Chemical Handling/Storage

- The Village expressed the desire to change from liquid sodium hypochlorite for pre- and post-chlorination back to gaseous chlorine.
- A new building or an addition to the existing building to accommodate bulk chemical storage and delivery is a priority item listed by the Village to accommodate bulk storage of SternPAC. This may allow for price reductions for ordering SternPAC, in addition to reducing the number of 55-gallon chemical drums stored in the clarifier room.

Piping Gallery

- Better lighting in the gallery is desired by Village staff.
- New non-slip grating to cover the pipe trenches in the floor of the pipe gallery is also desired, as the current grating is old and slippery, especially when wet.
- Dehumidification in the pipe gallery is a desire of Village staff.

Clear Well

- New hatches for access to the clear well are desired by Village staff.
- A new roof or cover, or repairs to the existing cover, is a desire of the Village staff. The current roof shows signs of cracking and is in need of repairs to ensure no untreated water can enter the clear well.
- In the valve vault for the pipes to and from the clear well, the Village desires to be able to operate the valves without entering the vault. The vault is classified as a confined space, so accessing the vault is complicated and time-consuming.

WTP Site Improvements

- Improved security at the site is desired by Village staff. Presently, the only automated security system is on the front door. A comprehensive system for the windows, garage doors, other man-doors, etc. with surveillance would be ideal. A security fence would also be a desire of the Village to improve security at the site.

- Village staff discussed the need for a dedicated office for the WTP supervisor. Presently, the only office at the WTP site is used as break room and lab as well as an office.
- The blacktop pavement at the site has deteriorated in many locations, and needs to be replaced.
- An outdoor, secured shelter for storing the on-site portable generator is desired. Currently, the generator sits in the second garage bay.
- Another desire of the Village is to construct an access way from the outside of the WTP building directly into the pipe gallery, to provide simpler equipment access in and out of this area.
- The SCADA system for the WTP is approximately 20 years old, and the Village has expressed a desire to upgrade this computer monitoring system.
- A long-term desire of plant staff would be complete automation of the WTP, installed with capabilities for manual override. Such a system would automatically be able to adjust chemical feed rates, pump speeds, valve operations, etc., based off of levels in the clear well and water storage tanks, effluent turbidity levels, chlorine residuals, or consumer demand. Operation of all of these elements would be possible from a central location, which would improve employee efficiency at the WTP and allow for smoother operation of the WTP. The manual overrides would be necessary in case of emergency or in the case of the system malfunctioning.

While this list reflects the desires of the Village staff, it does not necessarily cover all of the WTP issues identified in Task 1.D of this chapter.

Task 1.G: Potential WTP Improvements

Analyze potential improvements, including associated costs, required to meet current and future regulatory requirements.

The issues identified in Task 1.D of this chapter, the regulatory changes discussed in Task 1.C of this chapter, and the list of desired improvements identified in Task 1.F above all form the basis for this task. This task will identify potential improvements, roughly estimate costs and provide a brief discussion for such projects. Recommendations for which projects to pursue at the WTP will be discussed in Chapter 3.

The cost estimates provided for each potential improvement assume replacement in-kind. If the capacity of the WTP were to be increased up to between 1.5 mgd and 2.0 mgd, cost estimates would likely be increased due to the need for larger tanks and equipment.

New Intake Pipe to Low-lift Pump Station

This potential improvement proposes to replace the 10-inch intake pipe with a new 14-inch intake pipe. The existing 14-inch intake pipe would not be modified. The valve to switch between the intake pipes would also be replaced, as the existing valve is inoperable. If the capacity of the WTP were to be increased, the new intake pipe may have to be made larger than 14 inches.

Cost Estimate: $ 250,000

New Low-lift Pump Station

A new low-lift pump station would replace the existing low-lift pump station. The pump station would include plenty of space for pumping equipment and electrical elements to be separated to prevent potential safety and operational hazards. It would also provide more spacious access to the pumping equipment at the pump station, a dedicated area for chemical handling for the sodium permanganate used by the Village, and more space for plant staff to work while performing maintenance. The existing wet well would remain and would be reused in this potential project. If the capacity of the WTP were to be increased, the low-lift pumps would likely have to be upsized. This potential improvement could be perform in coordination with or independently from the New Intake Pipe to Low-lift Pump Station potential improvement discussed previously.

Cost Estimate: $ 350,000

Renovate Safety Concerns in Existing Low-lift Pump Station

This would propose to renovate the existing low-lift pump station in order to fix some of the deficiencies of the current station that are causing potential safety hazards. This includes refinishing the floor to facilitate drainage and reduce concerns for slipping, replacing the equipment access hatches with one large access to make equipment removal easier and safer for staff, and modifying all electrical equipment that poses safety hazards, such as replacing the electrical outlets without ground fault circuit interrupters. This potential improvement could be perform in coordination with or independently from the New Intake Pipe potential improvement discussed previously.

Cost Estimate: $ 35,000

Renovate Remaining Equipment in Low-lift Pump Station

This potential project involves renovating the low-lift pump station to fix issues that are considered to be an inconvenience or that reduce efficiency of the pump station. This includes replacing the door, creating a permanent mount for the electrical heater for the building, and renovating the chemical handling area to make it easier to use. If the capacity of the WTP were to be increased, the low-lift pumps may also need to be upsized. This potential improvement could be perform in coordination with or independently from the New Intake Pipe potential improvement discussed previously.

Cost Estimate: $ 15,000

New Up-flow Clarifier

The Village does not have any redundancy with its up-flow clarifier, and at the permitted daily flow rate of 1.60 mgd the existing clarifier does not comply with 10 States Standards for clarifier detention time, flocculation detention time, weir loading rate, or up-flow rate. A new clarifier would provide redundancy and allow the WTP to meet its permitted flow within the parameters set by the 10 States Standards. This would need to be enclosed in an expansion of the WTP building. If the WTP capacity were to be increased, the new clarifier would likely need to be made larger than it would need to be if the capacity is not increased.

Cost Estimate: $ 850,000

New Coagulation/Flocculation Tank

A new coagulation/flocculation tank would allow the Village to remove the flocculation process from the center cone of the up-flow clarifier. By removing the cone and the equipment in it, the capacity for the up-flow clarifier would increase, perhaps to the point where it would comply with 10 States Standards at the permitted daily flow rate of 1.60 mgd. A new tank would be designed to optimize flocculation/coagulation times, which could improve the quality of the effluent from the up-flow clarifier. This would need to be enclosed in an expansion of the WTP building. If the WTP capacity were to be increased, the new coagulation/flocculation tank would likely need to be made larger than it would need to be if the capacity is not increased.

Cost Estimate: $ 500,000

Renovate Existing Gears and Drives for Sludge Scraper in Clarifier

The sludge scraper drive and gears at the center of the existing up-flow clarifier would be replaced in this potential improvement. The existing gear must be visually inspected daily to ensure that no failures have occurred, and the equipment is old and outdated.

Cost Estimate: $ 25,000

Construct Two New Clarifiers and Convert Existing Clarifier into Rapid Filter

Constructing two new clarifiers with flocculation areas would allow the Village to provide redundancy at the flocculation and clarification steps while opening up the space used for the existing clarifier to be used for rapid filtration. The advantage of this alternative would be construction sequencing, as the two clarifier tanks could be installed without impacting plant operations, and then placed online. At that point, the existing clarifier would be taken off-line, allowing it to be converted into filters without impacting plant operations as well. This project would meet two of the most desired items for the Village by providing redundancy in the clarification step and adding an extra rapid filter. If the capacity for the WTP were to be increased, the size of the new filter and clarifier would need to be larger, and the backwash process would have to be evaluated to determine if it is sufficiently sized.

Cost Estimate: $ 1,750,000

New Rapid Filter

A fourth rapid filter would provide flexibility at the WTP and improve the quality of the potable water output from the plant. While the Village can meet the recommended 10 States Standards for filtration rate at the permitted daily flow of 1.60 mgd, taking one of the filters offline for backwashing or for routine maintenance stresses the other two filters. A new filter would relieve the pressure on the filters, particularly when one filter is taken offline, and provide redundancy at the plant. This new filter would need to be enclosed in an expansion of the WTP building. If the capacity for the WTP were to be increased, the size of the new filter would need to be larger, and the backwash process would have to be evaluated to determine if it is sufficiently sized.

Cost Estimate: $ 400,000

Change Rapid Filter Media to Include GAC

The Village has completed its pilot study for using GAC in the filter media for the rapid filters and has received approval from the WCHD to install GAC in the remaining filters. The GAC has already been purchased, and must only be installed in order to complete this improvement.

Cost Estimate: N/A (the project is nearly complete)

Replace Motors for High-lift Pumps

The motors for the high-lift pumps located in the pipe gallery are at least 10 years old, and NYSERDA offers Pre-Qualified Incentives for replacing these types of motors. In addition to these incentives, the Village would also save approximately $6,500 annually in energy costs by replacing the motors. At a replacement cost of approximately $15,000, the simple payback period would be 2.3 years. When the NYSERDA incentives are added in at $300 per motor, the payback period would decrease to 2.2 years. The motors would likely have to be upsized if the capacity of the WTP were to be increased. The pumps were rebuilt in 2007 and are not in need of replacement.

Cost Estimate: $ 15,000

SternPAC Bulk Storage Access

This potential improvement proposes to create a garage door-type access to the up-flow clarifier room so the Village could purchase SternPAC in 330-gallon totes instead of the current 55-gallon drums. This would offer a price reduction for the Village in purchasing its SternPAC.

The current price of SternPAC for the Village is $2.3517 per gallon. At an average daily use of 21.1 gallons, the cost per day for SternPAC is $49.62, and the cost per year is approximately $18,100.

The quoted price for a 330-gallon tote would be $2.3079 per gallon, with a refundable deposit for the tote. At an average daily use of 21.1 gallons, the cost per day for SternPAC would be reduced to $49.70, and the cost per year would be approximately $17,800, saving approximately $300 per year. These totes would last for approximately 2 weeks, compared to a need to replace the 55-gallon drums every 2½ days. At an estimated construction cost of $15,000, the simple payback for this project would be 50 years, but this project would also make operation and maintenance at the plant simpler for WTP staff.

Cost Estimate: $ 15,000

Gas Chlorination System

The Village replaced its gas chlorination with a liquid sodium hypochlorite disinfection system as a result of the analysis performed in the 2001 ICIP. The relatively cheap cost of gas chlorine may be a good reason to return to using gas chlorination, but the Village would have to make extensive upgrades to the chlorine storage room in order to accommodate gas chlorination in accordance with 10 States Standards. Ventilation would need to be upgraded, and all new piping would be required to create a side stream to accept the chlorine injection. This option would include all of the modifications required to comply with 10 States Standards on top of the cost of installing the chemical handling equipment.

Currently, the cost for sodium hypochlorite is approximately $7,600 per year. The estimated annual cost for chlorine gas would be approximately $2,800, generating a savings of approximately $4,800 per year. At an estimated construction cost of $40,000 to complete the necessary upgrades for using gas chlorination, this project has a simple payback cost of approximately 8.3 years.

Worker safety is a concern when using chlorine gas for disinfection. Equipment malfunctions or leaks pose a much more serious safety concern when chlorine gas is used than when liquid sodium hypochlorite is used. The Village would have to take extra care to ensure that all alarms and safety equipment works properly to ensure worker safety if chlorine gas were to be used for disinfection.

Cost Estimate: $ 40,000

Renovate Clear Well behind WTP

In the 2001 ICIP, some renovations to the 350,000-gallon clear well behind the WTP were recommended, including repairing the roof the tank. This has not been done, and the Village should pursue this in order to ensure that the clear well is completely sealed from the outside elements. Visual inspection of the tank roof shows that minor plants and grasses are growing in the cracks in the concrete of the roof, which indicates that there may be places were seepage could potentially get into the clear well.

The Village could rehabilitate the clear well, beginning by removing all of the plants and trees immediately adjacent to the clear well. The roof of the clear well should then be stripped down to the concrete, and any cracks, pits, and holes should be repaired, and a protective, waterproof membrane should be installed. The access manholes to the clear well should be replaced with newer, more secure, and safer access hatches. These steps will ensure that the clear well will be an effective storage tank for the Village, and will alleviate concerns about seepage into the tank. More work to the clear well may be required if the capacity of the WTP were to be increased.

Cost Estimate: $ 75,000

Above-ground Access to Operate Clear Well Valves

The Village could provide above-ground access to the valve vault on the pipes leading to and from the clear well. Presently, in order to work the valves in or out of the clear well, plant staff must meet all of the requirements necessary to enter a confined space, which presents safety concerns and requires a large amount of time just to work a valve. By coring holes in the roof of the vault, Village staff would be able to work the valves without having to enter the confined space, which would be safer for plant staff and would reduce costs for the Village.

Cost Estimate: $ 7,500

Mixing System in Standpipe Road Tank and/or Perry Center Tank

A mixing system in the Standpipe Road water storage tank and/or the Perry Center Water Storage Tank could help to reduce disinfection byproducts in the distribution network. The Village has not experienced major problems with meeting the requirements Stage 1 DBPR and is not expected to have any issues meeting the requirements of Stage 2 DBPR, but reducing disinfection byproducts should still be a priority for the Village to ensure that Stage 2 DBPR will continue to be accommodated in the future. Companies such as Solar Bee have products specifically for mixing potable water tanks and removing disinfection byproducts. Before such a project is undertaken, the Village should determine the concentration of disinfection byproducts in the water in the water storage tanks to determine if such an installation would be helpful in reducing disinfection byproducts in the distribution network.

Cost Estimates: Standpipe Road Tank: $ 55,000
Perry Center Tank: $ 45,000

WTP Site Improvements

There are many potential improvements to the WTP site beyond the improvements listed previously. In order to better evaluate the need for each of these improvements, they have been categorized into a few different groups.

Lighting

While many lighting fixtures at the plant have been upgraded to the newer, more energy efficient T-8 fluorescent lamps, the lighting in a few critical areas of the facility is poor, particularly in the up-flow clarifier room and over the filters. This makes maintenance operations and repairs difficult and potentially hazardous for plant staff. This potential improvement would include upgrading the remaining interior lighting fixtures and strategically installing new fixtures to provide effective lighting in some of the poorly lit areas of the building.

Cost Estimate: $ 5,000

Security System

The security system at the WTP is only wired for the front door. Windows, other doors, and other buildings on site (low-lift pump station, clear well) do not have any security system. This should be a priority of the Village to secure the site using an electronic alarm system. There is also no security fence around the site, and while enclosing the entire site with a fence could be logistically difficult, certain areas could be fenced off, such as the clear well.

Cost Estimate: $ 15,000

Pipe Gallery Trench Grating

The grates that span over pipe trenches in the floor of the pipe gallery are old and are very slippery when wet. Plant staff has taken to placing loose wooden boards over grates in high traffic areas to prevent slipping, which present their own problems. The Village should replace all of the grates in the pipe gallery with new, non-slip grates to eliminate slipping and tripping hazards.

Cost Estimate: $ 10,000

Pipe Gallery Improvements

The tile floor throughout the rest of the pipe gallery can also become slippery when wet, and some areas of the floor are prone to forming puddles. The floor should be renovated to a non-slip surface and better drainage to prevent puddle formation.

The pipe gallery is perpetually damp, as it does not have any dehumidification system. This expedites corrosion of equipment in the pipe gallery, and makes it difficult for paint to adhere to the pipes in the gallery when touch-up painting is required. Installing a de-humidifier may also reduce slipping concerns.

Cost Estimate: $ 15,000

Direct Outside Access from Pipe Gallery

Equipment access to the pipe gallery would be improved with this potential improvement. This proposes to install a direct exterior entrance to the pipe gallery. Presently, the only equipment access requires carrying the equipment up the stairs or hoisting it through a hatch in the clarifier room, using a beam on the ceiling as a crane. This would simplify access to the pipe gallery, making it safer and easier to remove or install heavy equipment.

Cost Estimate: $ 45,000

Dedicated Generator Pad

The diesel-powered generator currently sits in one of the garage bays at the WTP. While an exhaust vent was installed, this configuration presents a threat to operator safety. The generator is set to turn on automatically in case of a power outage, and if such a situation were to occur overnight, carbon monoxide or other deadly gases could pervade the WTP building, making the entire building dangerous to plant staff arriving in the morning. The generator should be stored in an area that is completely isolated from the rest of the WTP building, such as outside or in a separate, ventilated enclosure.

This possible improvement proposes to install a concrete generator pad adjacent to the WTP, complete with a roof and partial enclosure that is entirely secured from vandalism. The pad would be set up so that the generator could still be removed on its trailer if it is needed at a different site in the distribution network.

Cost Estimate: $ 20,000

Chief Operator Office at WTP

The chief operator for the water and sewer plants currently shares his office with the lab and employee break room. This proposes to install a private office for the chief operator to deal with personnel issues, keep files, make phone calls, and talk with visitors. This potential project proposes constructing a dedicated office within the rapid filter room.

Cost Estimate: $ 15,000

Basic SCADA Upgrade for WTP

One potential improvement for the Village would be to upgrade its SCADA system. The existing system is very old and the Village would like to replace it with a newer version. This would also involve upgrading any sensors and computers necessary to be compatible with a new version of the monitoring system.

Cost Estimate: $ 35,000

Comprehensive SCADA Control for WTP

One of the long-term goals for Village staff would be to have complete automated control of the treatment process by the SCADA system, with capabilities for manual overrides. Such a system would automatically determine and modify chemical feed rates, pump speeds, valve operations, backwash timing, etc. Controls would be based on inputs from various sources, including levels in the water tanks and clear well, turbidity of effluent water, chemical dosing concentrations, and anticipated demands by plant staff. The manual overrides would be available in case of emergency, system malfunction, or unusual operating circumstances (such as during a renovation project). This potential project would smooth operations at the WTP, reduce the potential for operator error, and allow control of the entire treatment process from a central location. Such a system may even be able to be controlled remotely as well.

Cost Estimate: $ 125,000

Repave Blacktop at WTP Site

Some of the blacktop at the WTP site is crumbling, which complicates paving/shoveling during winter weather and creates potholes and puddles. This potential improvement would repave the blacktop at the site, including in front of the garage bays, in front of the main WTP building, and down close to the low-lift pump station.

Cost Estimate: $ 20,000

Miscellaneous Site Electrical, Plumbing, and Maintenance

This potential improvement would budget a certain amount of money for miscellaneous improvements to the plant. These improvements would include touch-up painting around the site, re-pointing the exterior brick when it cracks, and replacing simple electric and plumbing fixtures. Some of these improvements could be completed by Village staff.

The age of the WTP is especially evident in some of its electrical and plumbing facilities. There are places scattered throughout the WTP site where the electrical outlets and fixtures have been upgraded, but in a number of places, these fixtures have not been upgraded and present a potential safety hazard at the site. In a number of places, the metal face plates have been corroded, wires are exposed, or outlets are located near places where water could potentially spray against the fixture or outlet. Nearly all of the metal in the fluosilicic acid room has shown signs of corrosion, including the entire inside face of the entrance door.

The sink and shower in the bathroom are disconnected from the plumbing of the building, which could cause a problem if an employee needs to shower off chemicals in an emergency. This concern would be rectified under this project. In addition, some of the sites that have use a bottle for eyewash would be replaced with a plumbed eyewash to ensure ample water supply in an emergency. The toilet could also be replaced with a low-flush or dual-flush toilet to reduce water consumption, with an automatic sensor-operated toilet flush valve installed to reduce the potential for leaking in the toilet.

Various places on the exterior brick of the building have experienced cracking. Areas with surface cracks would be repaired to prevent further problems. Some of the walls, particularly in the pipe gallery, have also experienced water damage, and painting would provide protection for the surfaces. These improvements could be performed incrementally over a period of a few years, or they could be included in a larger project.

Cost Estimate: $ 10,000 per year

Alternative Energy at the WTP

The Village may wish to pursue alternative energy sources at the WTP. The two most likely viable options would be to harness wind power or to capture solar power.

<u>*Harnessing Wind Power*</u>

The location of the WTP adjacent to Silver Lake is favorable for harnessing wind power. This potential improvement proposes erecting a wind turbine to generate power for the site, to be used to reduce peak power demand and/or to reduce total electricity consumption. In addition to the wind turbine, the Village would have to install equipment for controlling the wind turbine, converting and storing the power harnessed, and blending the captured power with power from the grid. The capital cost of such a project would likely be expensive, but it could significantly reduce electricity costs for the Village. In order to reduce the capital costs, the Village should be vigilant in looking for grants to install this type of technology.

Cost Estimate: $ 150,000

<u>*Capturing Solar Power*</u>

The other likely viable option for harnessing alternative energy sources at the WTP site would be to use solar power. There are no trees on the southern side of the building that would block the roof from southern exposure to the sun, and the solar panels could be installed on the roof of the building. Solar panels would have an advantage over wind turbines in that solar panels installed on the roof of the WTP building would likely be much less conspicuous than a wind turbine at the site.

As with the wind turbine, there would be some ancillary equipment required to operate the solar panel system, including equipment to convert and store the power captured and equipment for blending in the solar power with power from the grid. The capital cost of installing solar power at the WTP would be expensive, but the annual electricity cost would decrease substantially. The Village should also look for funding opportunities to reduce the upfront capital costs for installing solar power.

Cost Estimate: $ 200,000

Task 1.H: Recommendations for WTP Improvements

Provide conclusions and recommendations for improvements to the WTP, including associated costs.

Recommendations for improvements to the WTP are included in Chapter 3.

2. Water Distribution Network

2.1 Introduction

The Village of Perry WTP produces an average of 0.530 mgd of potable water, with a permitted capacity of 1.60 mgd. This potable water is distributed throughout the Village through approximately 29 miles of water main, ranging from 2 inches in diameter to 12 inches in diameter. Two elevated water storage tanks regulate the pressure of the water system in the Village, and the combined storage of these tanks is approximately 900,000 gallons.

Figure 1 at the end of this report shows the location of the WTP in the Village, and Figure 4 shows the extent of the drinking water distribution network in the Village.

Chapter 2 of this ICIP will provide a thorough evaluation of the facilities used throughout the water distribution network. The results of this evaluation will be used to highlight areas in need of improvement in order to consistently meet the criteria in the Safe Drinking Water Act at the present time as well as into the future.

2.1.1 Scope of Chapter

The scope of this chapter on the water distribution network has been divided into the eight tasks listed below.

Task 2.A Meet with Village staff to gain additional information regarding the current water distribution network operations.

Task 2.B Review the 2001 ICIP to reevaluate the existing conditions and history of the existing water distribution network, updating any improvements since the 2001 ICIP.

Task 2.C Update the water distribution system map in AutoCAD format, including redline changes based on recent modifications to the distribution system as provided by Village staff.

Task 2.D Update the computer-simulated hydraulic model to the current software version, incorporate all modifications to the existing distribution system, and analyze the model to identify hydraulic concerns in the distribution system.

Task 2.E Work with Village staff to identify shortcomings and desired improvements in the distribution network. This task will include a discussion of water main projects that are currently underway (such as the water main replacement on Borden Avenue) as well as projects under consideration for the near future (such as potential water main projects on Camp Road, Euclid Avenue, Walker Road, and Simmons Road), in order to provide a comprehensive evaluation of desired improvements to the distribution network.

Task 2.F Work with Village staff to specifically evaluate the potential need for water main improvements along Main Street. Particular emphasis in this task will be given to the Business District in the Village and to potential roadway improvements that may occur in the near future on Main Street. This task will include recommendations for any physical evaluations that may be required to better determine the condition and need for replacement of the existing Main Street water mains, beyond what is otherwise found in this scope of work.

Task 2.G Analyze potential improvements to the distribution network, including associated costs, required to ensure continued reliable water service in the Village.

Task 2.H Provide conclusions and recommendations for improvements to the water distribution network, including associated costs.

2.1.2 Related Sections

2.1.2.1 Related Chapters of the 2012 ICIP

The following chapters of the 2012 ICIP are relevant to this chapter.

- 2012 ICIP Introduction
- Chapter 4- Recommendations for Water Distribution Network Improvements
- Chapter 5- Water Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- Chapter 1- Water Treatment Plant
- Chapter 3- Recommendations for WTP Improvements
- Chapter 12- Potential Funding Sources

2.1.2.2 Figures

The following figures for the 2012 ICIP are specifically relevant to this chapter.

- Figure 1- WTP, WWTF, Village Hall Location Map
- Figure 4- Village Water Distribution Network

2.1.2.3 Appendices

The following appendices to the 2012 ICIP are relevant to this chapter.

- Appendix B- Summary of Monthly Water System Operation Reports, 2009-2010
- Appendix E- Results from 2011 Hydrant Flow Tests
- Appendix F- Hydraulic Modeling Calibration and Results

2.2 Distribution Network Background

The distribution network consists of approximately 29 miles of water main. Much of the water main in the Village is over 70 years old, and ranges in size from 2 inches in a few areas up to 12 inches. The pipe material also varies across the Village, with cast iron, asbestos cement, polyvinyl chloride (PVC), and ductile iron all used in various places.

The Village operates two elevated water storage tanks in the distribution network. The Standpipe Road water storage tank is located close to the WTP, and has a capacity of 750,000 gallons. The second tank is located near the intersection of United States Route 20A and New York State (NYS) Route 246 in Perry Center in the Town of Perry. This tank has a capacity of 150,000 gallons, and was constructed in 2003. The entire water distribution network, including both elevated tanks, is in the same pressure zone. Figure 4 at the end of this report shows the layout of the water distribution network within the Village.

2.3 Discussion of Distribution Network Tasks

Task 2.A: Meeting with Village

Meet with Village staff to gain additional information regarding the current water distribution network operations.

CPL met with the Superintendent of Public Works, the Chief Operator of the WTP and WWTF, and other WTP operators to inspect the WTP and discuss issues in the distribution network. Discussions with the staff allowed CPL to better understand the processes and the challenges currently facing the operators. The Village also provided a "wish list" of major and minor projects that it would like to undertake to ensure that the distribution network would continue to be able to provide reliable service for Village residents. To aid in analysis of the distribution system, the Village provided energy data and redline distribution network maps to CPL.

Task 2.B: Reevaluating 2001 ICIP

Review the 2001 ICIP to reevaluate the existing conditions and history of the existing distribution network, updating any improvements since the 2001 ICIP.

In reviewing the 2001 ICIP, CPL has noted the following major improvements to the distribution network.

- ❖ The distribution network has been updated to reflect the changes made since 2001. These changes are listed in Task 2.C of this chapter. Figure 4 at the end of this report shows the updated water distribution network. The hydraulic modeling discussed in Task 2.D in this chapter includes these updates as well.
- ❖ The 500,000-gallon ground storage tank off of NYS Route 246, located behind the high school, has been taken offline and bypassed. It is not in service.
- ❖ A new 150,000-gallon elevated water storage tank was constructed on NYS Route 246 near the intersection with United States (US) Route 20A, in the Town of Perry. This tank is operated by the Village of Perry and is located within the same pressure zone as the elevated water storage tank on Standpipe Road near the WTP.

Task 2.C: Review and Update Water Distribution Network Records

Update the water distribution system map in AutoCAD format, including redline changes based on recent modifications to the distribution system as provided by Village staff.

CPL provided the Village with copies of the water distribution network maps that were included in the 2001 ICIP. The Village was asked to review these maps and make changes based on incorrect information and updates to the distribution network since 2001. Figure 4 at the end of this report and the hydraulic modeling of the system discussed below in Task 2.D reflect the redline changes made by Village staff. Changes to the record drawings include corrections to past versions of the water maps as well as modifications to the distribution network. The changes noted on the maps include:

- adding new 8-inch PVC from the end of Andrus Street to connect to North Center Street,
- correcting the material of the 6-inch main on Birchwood Acres to be CAP, not CIP,
- adding new 8-inch PVC main and abandoning the 4-inch main on Borden Avenue,
- removing the 6-inch CAP shown on Bradford Avenue,
- removing a hydrant and changing the 4-inch main to 6-inch CIP on Chestnut Street,
- changing the 10-inch main shown on Grove Street between Covington Street and Hawthorne Street to 6-inch CIP,
- adding the 8-inch PVC connection on Handley Street to Walnut Street,
- adding new 6-inch PVC loop and hydrants on June Drive,
- adding new 8-inch PVC main on Orchard Street and abandoning the 6-inch main,
- adding new 8-inch PVC north of the school on North Center Street and abandoning the 4-inch main,
- removing two hydrants on Needham Street,
- adding new 8-inch PVC and a hydrant on North Genesee Street,
- adding new 8-inch PVC and abandoning 4-inch main on Park Ave,
- adding new 8-inch PVC on Parker Lane,
- correcting the pipe on Safford Avenue to be galvanized 2-inch instead of 6-inch CIP,
- adding 8-inch PVC onto the end of Simmons Road,
- correcting the material of the 8-inch main on South Main Street and South Federal Street to be CAP, not CIP,
- abandoning the 4-inch main on Spring Street north of Dolbeer Street,
- adding 8-inch PVC on Stainton Place to abandon the 6-inch main,
- adding 6-inch CAP on Tuna Street,
- adding new 8-inch PVC and abandoning the 4-inch main on Walnut Street,

- adding 6-inch CIP on Washington Boulevard,
- adding 6-inch DIP connection to the high school from Watkins Ave,
- correcting the main on North Main Street between Elm Street and Hope Street to be 6-inch CIP, not 4-inch,
- removing from service the 500,000-gallon water storage tank behind the high school, installing a 6-inch main to bypass the tank, and
- adding a new 150,000-gallon elevated water storage tank just north of the intersection of NYS Route 246 and US Route 20A.

The distribution network has approximately 152,000 linear feet (LF) of water main within the Village boundary. This piping consists of roughly 3,000 LF of 2-inch main, 22,000 LF of 4-inch main, 48,000 LF of 6-inch main, 50,000 LF of 8-inch main, 12,000 LF of 10-inch main, and 17,000 LF of 12-inch main. Materials vary from asbestos cement to PVC to cast iron. Some of the water mains are over 80 years old. The distribution network was modeled for Task 2.D below, and the condition of the water main in the Village is assessed under that task.

Village is currently in the process of changing to a remote water meter read system, which should be completed within approximately five years. This system will allow for simpler readings of the water meters by allowing Village staff to collect information without leaving their truck.

Task 2.D: Hydraulic Modeling of Distribution Network

> *Update the computer-simulated hydraulic model to the current software version, incorporate all modifications to the existing distribution system, and analyze the model to identify hydraulic concerns in the distribution system.*

The computer-simulated hydraulic model for the distribution network was updated to be compatible with Bentley WaterCAD v8i, the current software version of WaterCAD. The modeling software allows the user to gain insight as to the probable condition of the pipes throughout the network being modified.

In order to calibrate the model, a series of hydrant flow tests were performed throughout the Village. The previous version of the hydraulic model was used as a starting point for the updated model, with the modifications discussed previously in Task 2.C worked into the model. The information collected in the flow tests was then used to calibrate the system. The results of the flow tests taken throughout the Village are included in Appendix E at the end of this report, and the results from the WaterCAD model are shown in Appendix F.

Calibration required modifying the Hazen-Williams *C* factor, which is used for pressurized pipe flow as a numeric approximation of the roughness of the inside of a pipe. Greater *C* factors correspond to smoother pipes. Changing the *C* factor of a pipe in the model will change the amount of pressure dissipated in the pipe due to friction between the flowing water and the pipe wall, which will affect the available fire flows in the system.

Calibrating the Model

The first step in setting up the model involved updating the previous version to the new software and making changes based on comments received from the Village, as discussed previously in Task 2.C. The previous model already had established elevations for the nodes and hydrants throughout the Village. The static pressures in conjunction with the measured water surface elevations in the main water storage tank on Standpipe Road, as well as United States Geological Survey (USGS) topographic maps, were used to set the remaining elevations. After the model was set up, the flow test results were input into the model and the *C* factors of the pipes in the model were modified to replicate the flow test results.

In the interest of simplifying the model, not all hydrants in the Village were input into the model. The hydrants used for flow testing and hydrants located near intersections of mains were included, as were selected hydrants used as indicators of the conditions of areas not meeting the other criteria.

Evaluating the Distribution System

After the model was calibrated, the system was evaluated. The criteria analyzed in the model include the size of the main, condition of the main (as modeled using the *C* factor), water quality in the distribution network, working pressures of the system, and available fire flow.

Water Main Sizes

The 10 States Standards for Water Works states in section 8.2.2, "The minimum size of water main which provides for fire protection and serving fire hydrants shall be six-inch diameter." There are many areas in the Village that serve fire hydrants and provide for fire protection that have 4-inch diameter main. The small size of the main restricts the amount of water that can flow through the pipe, thereby limiting the amount of fire flow available in an emergency.

For Task 2.E below, the Village identified 20 areas that contain 4-inch diameter main that it wishes to replace with larger diameters. Some of these problem areas in particular were modeled for this report, with the results discussed later within this task.

Condition of Water Main

The condition of the water main throughout the Village was assessed according to the *C* factor that was assigned to the pipes during calibration of the model. Different pipe materials generate different *C* factors, but most new pipes used for water distribution networks are assumed to have *C* factors ranging from 120 to 150. Pipes with *C* factors above 80 or 90 are generally considered to be in good condition, and pipes with *C* factors below 50 are generally considered to be in poor condition.

Within the water model, the Village has over 53,000 LF of water main that has a *C* factor of 50 or less, which is approximately 35% of the total length of water main in the Village. Over 25,000 LF of water main, or 16% of the total water main in the Village, has a *C* factor of 40 or less. *C* factors significantly lower than 40 could indicate severe corrosion or other problems in the main, such as large leaks. With 16% of the water main in the Village having a *C* factor less than 40, this could indicate widespread problems in the distribution network.

Almost 11,000 LF of water main has a *C* factor of 30 or less, representing approximately 7% of the entire water main length in the Village. These low *C* factors are likely indicators of serious problems within the distribution system, such as a break in the main or corrosion that is severely limiting flow through the pipes. Alternatively, *C* factors less than 30 could indicate an incorrect starting assumption, such as a valve that is partially closed in the system that is not modeled. Such issues were clarified with Village staff to minimize the potential for incorrect assumptions in the water model.

Some areas of 4-inch mains with *C* factors of 30 or less include mains along Benedict Street, Olin Avenue, Watkins Avenue, Pine Street, and North Federal Street. The area of Benedict Street between Watkins Avenue and Main Street has pipes with *C* factors less than 2, which suggests a large break in the water main, a closed valve in the area, or such severe corrosion in the main that water can barely flow through the pipe.

Some areas with 6-inch or larger mains that have *C* factors of 30 or less include mains along Walker Street, Euclid Street, Lake Avenue, and Camp Road in the southwest area of the Village, as well as part of Covington Street, North Center Street, North Main Street, and Standpipe Road.

Water Quality in the Distribution Network

In order to improve the quality of service, reduce head loss, and minimize the potential for stagnant water within the distribution network, dead ends should be minimized by making appropriate tie-ins whenever practical.

Where dead end mains occur, they need to be provided with a fire hydrant if fire flows and pressures are sufficient. If flows and pressures are not sufficient, then an approved flushing hydrant or blow-off for flushing purposes should be installed in order to allow Village staff to flush out stagnant water that may sit in the dead end main. Flushing devices should be sized to provide flows that will result in a velocity through the flushed water main of at least 2.5 feet per second.

There are several dead-end water mains within the Village distribution network. In many cases, there are no practical tie-ins available to eliminate the dead ends.

Working Pressures of the System

Section 8.2.1 of the 10 States Standards for Water Works regards pressure in the distribution network:

> *The system shall be designed to maintain a minimum pressure of 20 psi [pounds per square inch] at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the*

distribution system should be approximately 60 to 80 psi and not less than 35 psi.

The minimum pressure of 20 psi specified in the 10 States Standards is required for all flow conditions, including peak flow periods as well as fire flow conditions. Typically, the maximum pressure allowed in a system is 120 psi; pressures greater than this can result in damage to the main or damage to the services.

The entire Village is on one pressure zone, controlled by the elevation in the elevated water storage tank on Standpipe Road. The elevated water storage tank at Perry Center, just north of the intersection of NYS Route 246 and US Route 20A, is also on the same pressure zone as the Standpipe Road Tank. The lowest static pressures in the Village occur in the areas with the highest elevations in the Village, particularly near the Standpipe Road tank, on Birchwood Acres, and at the southern border of the Village on NYS Route 39.

In the northwestern part of the Village, working pressures are in the range of 50 psi to 60 psi. In the north-central part of the Village, between North Main Street and North Center Street, the working pressures are in the ideal range of 60 psi to 80 psi. In the northeastern part of the Village, which is lower in elevation than much of the rest of the Village, the static pressures are typically between 80 psi and 100 psi. A few areas on Water Street have static pressures of greater than 100 psi and as high as 120 psi, particularly near the eastern end near the WWTF.

Available Fire Flow

Fire hydrants for fire protection are available throughout the Village. One of the issues is insufficient flows available at some hydrants, particularly hydrants located on 4-inch main. This conflicts with the 10 States Standards section 8.2.2, which requires 6-inch minimum diameter main for areas serving fire hydrants and providing fire protection.

Minimum fire flows are established by the appropriate State Insurance Services Office, but typical residential requirements have a minimum of 500 gallons per minute (gpm) available at each hydrant. For more densely populated areas, such as the business district on Main Street, the minimum requirement is typically 1,000 gpm or greater.

Fire flow was calculated for each hydrant using the WaterCAD computer model of the Village distribution network. The fire flows were calculated to maintain a minimum residual pressure of 20 psi, as per 10 States Standards.

The available fire flows in the Village range from as low as 16 gpm on Benedict Street to up to over 4,000 gpm on Standpipe Road. In most cases, the fire flow is the least in areas with 4-inch main, and greatest in areas with 12-inch main. In the areas of Benedict Street at Watkins Avenue and North Federal Street at Pine Street and Cherry Street, where 4-inch main is the primary size, available fire flows are less than 500 gpm. Benedict Street and Watkins Avenue in particular have available fire flows less than 200 gpm due to very low *C* factors in the pipes in this area.

Other areas with low fire flows include areas along Walker Street and Euclid Avenue in the southwest part of the Village near Silver Lake. Most of the *C* factors in this area are less than 25, indicating some problems in the flow characteristics of the pipe, such as a leak or severe corrosion.

On some of the dead end mains in the Village, the available fire flow is reduced. This is the case for Simmons Road, Handley Street, Tempest Street, Davis Avenue, and Page Circle, where the available fire flows are less than 500 gpm at each location.

Alternatives Considered

Two alternatives were modeled to evaluate how it would impact available fire flows and pressures in the distribution network. The alternatives involved upsizing mains, cleaning and/or lining mains with low *C* factors, or attempting to tie in dead end mains, but there were few opportunities to make such connections.

Alternative 1: Clean and line all mains with C factors less than 40

The first alternative proposes to clean and line all water mains that have *C* factors less than 40. This alternative assumes that the cleaning process in each main will raise the *C* factor to 80. By cleaning the pipe and thereby raising the *C* factor, the goal is to reduce pressure loss due to friction between the flowing water and the pipe walls. This would help to improve available fire flows.

This improved available fire flows in areas that currently have low *C* factors, but it did not help areas at dead ends or areas that were not close to the affected pipes. The area of the 4-inch main at Benedict Street and Watkins Avenue saw dramatic increases in available fire flow, raising the flows up to 600 gpm to 800 gpm from existing available fire flows of less than 200 gpm. Fire flows along the 4-inch main on North Federal Street were also raised up to over 500 gpm when they were previously less than 500 gpm. While fire flows on Euclid Avenue and Walker Road improved by over 300 gpm, the fire flows at the end of Euclid Avenue were still less than the typical minimum threshold of 500 gpm.

Alternative 2: Upsize all 4-inch mains, clean and line mains with C factors less than 40

This alternative proposes to upsize all 4-inch mains to 8-inch mains and to clean and line all water mains with *C* factors less than 40 that are not affected by the upsizing. The new 8-inch mains will be assumed to have *C* factors of 120, and any pipes that are cleaned will be assumed to have a *C* factor of 80.

In areas where the 4-inch main runs parallel to a larger main on the same street, this main was not upsized, but instead it was assumed that the 4-inch main was abandoned and all hydrants and services were transferred to the larger size main. In particular, the 4-inch main on Lake Street east of Chestnut Street, the 4-inch main on Tuna Street, and the 4-inch main near the end of St. Helena Street were assumed to be abandoned for this alternative.

This alternative produced better available fire flow results than alternative 1. Available fire flows along North Federal Street increased up to over 1,900 gpm in alternative 2, and fire flows in the Benedict Street and Watkins Avenue area increased up to over 2,000 gpm. In addition, some dead end mains showed increased available fire flows, such as at Davis Avenue (up to over 1,800 gpm) and Simmons Road (up to over 1,600 gpm). Some of the other dead end mains did not see any significant increases in available fire flow, such as at the western end of Prospect Street, the end of Gardeau Road, and the end of Tempest Street, as these dead end mains were already 6-inch in diameter.

Another benefit of this alternative is that many other fire flows in the Village increase as a result of the larger diameter mains. Of the 101 hydrants included in the model, 38 have existing available fire flows less than 1,000 gpm. In alternative 1, this decreases to 32 hydrants with less than 1,000 gpm of available fire flow, but in alternative 2 there are only 13 such hydrants. Increasing all of the 4-inch mains in the Village will not only boost fire flows in low-flow areas, but it will increase fire flow characteristics throughout the Village.

Alternative 3: Clean and line all water mains on Main Street

This alternative proposes to clean and line all water mains on Main Street between Standpipe Road and Simmons Road. In places where multiple mains run parallel to each other, all parallel mains would be cleaned and lined. In the model, this is represented by modifying changing all mains that have C factors less than 80 to have a C factor of 80. All mains with C factors greater than 80 were not modified.

While this alternative tended to provide a boost for fire flows along Main Street and some areas immediately adjacent to Main Street, it did not boost modeled fire flows throughout the rest of the Village. The hydrants that showed an increase of 100 gpm or more in available fire flow already have available fire flows of 1,500 gpm or more, and in some cases the existing available fire flow is modeled to be over 3,000 gpm. The areas with critically low available fire flows, such as Simmons Road, Benedict Street, and Euclid Avenue, did not see any significant increase in fire flows.

Task 2.E: Desired Improvements for Distribution Network

Work with Village staff to identify shortcomings and desired improvements in the distribution network. This task will include discussion of water main projects that are currently underway, as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the distribution network.

Replace Water Mains

The Village provided CPL with a list of desired improvements to the distribution network. Many of these improvements involve eliminating the 4-inch diameter pipe throughout the Village with larger diameter water main. The most recent water main project completed by the Village involved replacing the 4-inch water main on Borden Avenue with 8-inch and 6-inch PVC water main. The following list of 4-inch main to replace and/or abandon was provided by the Village. None of the projects listed in this section would increase output demands at the WTP.

1) **Walker Road**: replace existing 2-inch galvanized pipe from Standpipe Road to the Sportsman's Club near the Village border, as there are five existing services on this pipe. Also, complete the loop with water main between Davis Avenue and Walker Road.
2) **Davis Avenue**: replace 4-inch on Davis Avenue.
3) **Dolbeer Street**: replace 4-inch main from Spring Street to Main Street.
4) **Spring Street**: replace 4-inch main from Dolbeer Street to Watrous Street.
5) **Handley Road**: replace 4-inch main from Park Avenue to end of main.
6) **Handley Road**: replace 4-inch main from Walnut Street to Gardeau Street, connecting to the 8-inch main between Walnut Street and Park Avenue.
7) **Needham Street**: replace 4-inch main, and there are presently no hydrants on the street.
8) **Benedict Street**: replace 4-inch main from Olin Avenue to Main Street, as the existing main is presently installed through a sanitary sewer manhole.
9) **Pine Street**: replace 4-inch main on entire length of Pine Street.
10) **Cherry Street**: replace 4-inch main on entire length of Cherry Street.
11) **North Federal Street**: replace 4-inch main from Pine Street to Lake Street.
12) **Bradford Street**: replace 4-inch main on entire length of Bradford Street.
13) **Short Street**: replace 4-inch main on entire length of Short Street.
14) **Watkins Avenue**: replace 4-inch main from Hawthorne Street to Benedict Street.
15) **Elm Street**: Replace 4-inch main on entire length of Elm Street.
16) **Clark Street**: replace 4-inch main on entire length of Clark Street.
17) **Grove Street**: replace 4-inch main from Hawthorne Street to Clark Street.
18) **Covington Street**: replace 4-inch main from Short Street to Main Street, potentially utilizing the existing 6-inch cast iron pipe on the other side of the street along Covington Street.
19) **Page Circle**: replace 4-inch main on entire length of Page Circle.
20) **Simmons Road**: replace 4-inch main from the end of the 8-inch main near Main Street to the end of the 8-inch main near the Village border. This would improve the ability of the Village to serve water to a potential water district in the Town of Perry, should the Town choose to pursue such a district.

The following list is a list of streets that already have a larger diameter main installed parallel to an existing 4-inch main, but all of the services are still on the 4-inch main. The Village wishes to transfer services and abandon the 4-inch mains on these streets. None of these projects would increase output demands at the WTP.

- **Lake Street**: from North Federal Street to the Village border, connect the services to the existing 8-inch main and abandon the 4-inch main.
- **Tuna Street**: for the entire length of Tuna street, connect the services to the existing 6-inch main and abandon the 4-inch main.
- **St. Helena Street**: from the end of the 6-inch line on St. Helena Street to the Village border, transfer services to the 6-inch main and abandon the 4-inch main.
- **Olin Avenue**: from Benedict Street to Main Street, connect services to either the 8-inch main or the 12-inch main, and abandon the 4-inch main.

Improving Fire Flows in Southwest Area of Village

Presently, the Village is considering undertaking one or more of the following projects to improve the poor fire flow characteristics in the southwest area of the Village.

- On **South Main Street** at the southern end of the Village, the Village is considering extending the existing 8-inch main from its current end down to Camp Road, and installing water main along **Camp Road** to connect to the existing 6-inch main at Walker Road.
- In the southwestern part of the Village, a project is under consideration to replace all of the 6-inch cast iron pipe on **Walker Road** south of Standpipe Road, as well as the 6-inch cast iron pipe on **Lake Avenue**, **Euclid Avenue**, and **Camp Road** between Euclid Avenue and Walker Road.

Future Distribution Network Expansion Projects

The potential projects listed in this section would expand the distribution system outside the Village. Two of the projects, the NYS Route 246 and the US Route 20A projects, are discussed in a countywide, comprehensive public water study taking place in Wyoming County. These projects involve expansion of the distribution network in areas north of the Village. Because these projects would expand the distribution network, they would increase flow demands at the WTP. The demand estimates discussed for each project below does not consider any potential additional demands due to cross connections with other systems.

- The Town of Perry has expressed an interest in establishing the Simmons Road Water District to connect the existing dead end main on Simmons Road to the existing dead end main on US Route 20A just east of the intersection with NYS Route 246. This would involve approximately 2 miles of new water main, and would serve approximately 25 residences. Assuming an average demand of 250 gpd per residence, this would increase demand at the WTP by roughly 6,300 gpd. This would also have the added benefit of creating a loop to improve water and fire flow service to the existing main at Perry Center.
- Another possible expansion project involves extending the dead end main on US Route 20A near the intersection with NYS Route 246 at Perry Center east along US Route 20A. The main would be extended by less than 2¼ miles to the border of Wyoming County with Livingston County, providing a potential connection point to the existing water main in the Town of Leicester. This project would serve ap-

proximately 30 residences, creating an additional demand of 7,500 gpd assuming 250 gpd per residence. This project overlaps the project area of the potential Simmons Road water district described in the previous project.

- A third possible expansion project involves extending the dead end water main on NYS Route 246 just north of US Route 20A at Perry Center north along NYS Route 246 to Lagrange Road (County Route 12) in the Town of Covington. This would require approximately 3½ miles of new water main, and it would serve approximately 30 residences. The demand at the WTP would increase by 7,500 gpd, assuming an average daily flow of 250 gpd per residence. This project would provide a connection point to another potential project in the Town of Covington.

Task 2.F: Water Main on Main Street

Work with Village staff to specifically evaluate the potential need for water main improvements along Main Street. Particular emphasis in this task will be given to the Business District in the Village and to potential roadway improvements that may occur in the near future on Main Street. This task will include recommendations for any physical evaluations that may be required to better determine the condition and need for replacement of the existing Main Street water mains, beyond what is otherwise found in this scope of work.

The New York State Department of Transportation (NYSDOT) has indicated to the Village that NYS Route 39, which is North and South Main Street in the Village, will be renovated in the near future. It would be advantageous to the Village to make repairs to its infrastructure under and around NYS Route 39 concurrently with, or prior to, the renovations to the road, in order to minimize costs and permitting constraints that take place when working on utilities in NYSDOT rights-of-way.

The water main on Main Street is in fair condition according to the hydraulic analysis performed on the Village water distribution network. Part of the main, particularly the 12-inch PVC main between Simmons Road and Benedict Street, is new and has high Hazen-Williams *C* factors over 100. Other sections, such as the 6-inch cast iron main from Gardeau Street to Covington Street, have *C* factors as low as 25. Most of the main under Main Street has a *C* factor between 50 and 70, ranging in size from 6-inch to 12-inch, consisting of PVC, cast iron pipe (CIP), ductile iron pipe (DIP), or cement asbestos pipe (CAP, also known as "asbestos cement pipe," or ACP).

The length of NYS Route 39 located within the Village is approximately 11,800 LF, but the length of main on Main Street is somewhat longer due to areas with parallel mains in service. In these areas, the parallel mains could be replaced by a single, larger-sized main to handle flows and provide adequate fire protection.

Despite the fair condition of much the water main on Main Street, the overwhelming issue is the age of the water main. Much of the main is over 70 years old, and it can be expected that it will need to be replaced in the next 10 to 15 years. For this reason, the decision of the Village on whether or not to replace the water main under Main Street depends partially on the NYSDOT intended plans for the Main Street renovation. The NYSDOT has not indicated if it intends to perform a full-depth reconstruction on Main Street or if it intends to only mill off the top layer of pavement and repave it with a new top coat. The difference in intended life cycle for these two options impacts the decision for the Village as to what to do with its water main.

If the NYSDOT were to choose to do a full-depth reconstruction of the road, then the Village will likely be better off replacing the main at the same time as, or prior to, this reconstruction project, as the NYSDOT will wish to have the road remain intact for a number of years. If the Village does not replace the main at that time, the Village would likely have to use trenchless construction methods, install main in easements not in the right of way, or find other alternatives for avoiding cutting into the road. This would increase costs for any such project. The NYSDOT would likely not be required to perform extensive renovations on Main Street for 50 years or perhaps longer if it does a full-depth reconstruction, which minimizes the possibility that the Village will have another good opportunity to replace the existing main.

If the NYSDOT only intends to mill and repave Main Street, the Village may have greater flexibility to perform future repairs or replacements under the road. The NYSDOT may be more open to the idea of performing open cuts in the road, as it would not have recently replaced the entire substructure of the road. In addition, the NYSDOT may need to renovate the road within 15 to 20 years again, possibly presenting the Village with another prime opportunity to replace its existing water main that would otherwise not exist.

Task 2.G: Potential Water Distribution Network Improvements

Analyze potential improvements to the distribution network, including associated costs, required to ensure continued reliable water service in the Village.

The desired improvements listed in Task 2.E above, along with the issues discussed in Tasks 2.D and 2.F above, form the basis of this task. This task will identify many potential improvements for the water distribution network and provide rough cost estimates for these projects. Recommendations for which projects to pursue will be discussed in Task 2.H.

Replacing Water Mains

The Village could undertake the following projects to improve the hydraulic capacity of the water distribution network. Some of the projects listed could be combined, potentially earning some savings in the design and construction phase and possibly reducing inconvenience in the Village by doing all of the work in a certain area at once instead of in multiple projects.

The following projects involve replacing 4-inch water mains with larger sizes to conform to 10 States Standards for Water Works. All of these were listed as desired improvements by the Village. Two cost estimates are provided for each of these projects, with one estimate compiled for how much it would cost a contractor to do the work, and the other for how much it would cost Village staff to do the work.

- On **Walker Road** off of Standpipe Road near the WTP, the Village could replace approximately 1,800 LF of the 2-inch galvanized steel pipe with new 8-inch main. At the same time, a new 8-inch main will be installed between Walker Road and Davis Avenue to complete a loop to the existing 4-inch main on Davis Avenue.

  Contractor Cost Estimate: $ 164,000
  Village Staff Cost Estimate: $ 68,000

- On **Davis Avenue** off of Standpipe Road near the WTP, the Village could replace its 4-inch main with new 8-inch main. This would require approximately 1,300 LF of new 8-inch main.

  Contractor Cost Estimate: $ 119,000
  Village Staff Cost Estimate: $ 49,000

- On **Dolbeer Street**, the Village could replace approximately 1,100 LF of the existing 4-inch main with new 8-inch main between Spring Street and Main Street.

  Contractor Cost Estimate: $ 101,000
  Village Staff Cost Estimate: $ 42,000

- On **Spring Street**, the 4-inch main between Dolbeer Street and Watrous Street could be replaced with 600 LF of new 8-inch main.

  Contractor Cost Estimate: $ 55,000
  Village Staff Cost Estimate: $ 23,000

- Two projects could be undertaken on **Handley Road**. The first involves replacing 1,000 LF of 4-inch main from Park Avenue east to the end of the main near the Village boundary with new 8-inch main.

  Contractor Cost Estimate: $ 91,000
  Village Staff Cost Estimate: $ 38,000

- The second project on **Handley Road** involves replacing the 4-inch main between Walnut Street and Gardeau Street with approximately 300 LF of new 8-inch main.

  Contractor Cost Estimate: $ 28,000
  Village Staff Cost Estimate: $ 12,000

- On **Needham Street**, the Village may elect to replace the 4-inch main with approximately 900 LF of new 8-inch main along the length of the road.

  Contractor Cost Estimate: $ 82,000
  Village Staff Cost Estimate: $ 34,000

- On **Benedict Street**, the Village could replace the 4-inch main with approximately 1,500 LF of new 8-inch main between Olin Avenue and Main Street, and connect this 8-inch main to the existing 12-inch main on Olin Avenue.

  Contractor Cost Estimate: $ 137,000
  Village Staff Cost Estimate: $ 57,000

- On **Pine Street**, the Village could replace the 4-inch main with approximately 1,100 LF of new 8-inch main along the entire length of the road.

  Contractor Cost Estimate: $ 101,000
  Village Staff Cost Estimate: $ 42,000

❖ On **Cherry Street**, the Village could replace the 4-inch main with approximately 500 LF of new 8-inch main along the entire length of the road.

Contractor Cost Estimate: $ 46,000
Village Staff Cost Estimate: $ 19,000

❖ On **North Federal Street**, the Village could replace the 4-inch main with approximately 900 LF of new 8-inch main along the entire length of the road.

Contractor Cost Estimate: $ 82,000
Village Staff Cost Estimate: $ 34,000

❖ On **Bradford Street**, the Village may elect to replace the 4-inch main with approximately 600 LF of new 8-inch main along the entire length of the road.

Contractor Cost Estimate: $ 55,000
Village Staff Cost Estimate: $ 23,000

❖ On **Short Street**, the Village could replace the 4-inch main along the entire length of the road with approximately 500 LF of new 8-inch main.

Contractor Cost Estimate: $ 46,000
Village Staff Cost Estimate: $ 19,000

❖ On **Watkins Avenue**, the Village could replace the 4-inch main between Hawthorne Street and Benedict with approximately 900 LF of new 8-inch main.

Contractor Cost Estimate: $ 82,000
Village Staff Cost Estimate: $ 34,000

❖ On **Elm Street**, the Village could replace the 4-inch main for the length of the road between Main Street and Water Street with approximately 900 LF of new 8-inch main.

Contractor Cost Estimate: $ 82,000
Village Staff Cost Estimate: $ 34,000

❖ On **Clark Street**, the Village may elect to replace the 4-inch main for the length of the road, between Grove Street and Leicester Street, with approximately 600 LF of new 8-inch main.

Contractor Cost Estimate: $ 55,000
Village Staff Cost Estimate: $ 23,000

❖ On **Grove Street**, the Village could replace the 4-inch main between Hawthorne Street and Clark Street with approximately 500 LF of new 8-inch main.

Contractor Cost Estimate: $ 46,000
Village Staff Cost Estimate: $ 19,000

❖ On **Covington Street**, there are a few potential projects that the Village could decide to undertake. The first project involves replacing the 4-inch main between Short Street and Main Street with approximately 400 LF of new 8-inch main.

Contractor Cost Estimate: $ 37,000
Village Staff Cost Estimate: $ 15,000

The other projects on Covington Street are discussed in the sections "Abandoning Water Mains" and "Areas with Low 'C' Factors" below in this task.

- On **Page Circle**, the Village could replace the 4-inch main on the length of the road with approximately 400 LF of new 8-inch main.

  Contractor Cost Estimate: $ 37,000
  Village Staff Cost Estimate: $ 15,000

- On **Simmons Road**, the Village may elect to replace the stretch of 4-inch main with approximately 1,300 LF of new 8-inch main. In addition to boosting hydraulic capacity of the area, this project would make a potential water district in the Town of Perry connecting Simmons Road to Perry Center more viable. The cost estimate below assumes that Village staff will do the work for this project.

  Contractor Cost Estimate: $ 119,000
  Village Staff Cost Estimate: $ 49,000

The following potential projects involve improving fire flow availability in the southwest area of the Village.

- At the southern end of **South Main Street**, the Village could extend the existing 8-inch main to Camp Road, and install new 8-inch main along **Camp Road** to connect to the water main at Camp Road and Walker Road. This would require approximately 2,500 LF of new 8-inch main, and this would boost fire flows in the Walker Road and Euclid Road area as well as improve the reliability of any water service in areas south of the Village.

  This project also proposes to abandon the 4-inch main at the south end of South Main Street, transferring services over to the parallel existing and proposed 8-inch main. This would involve transferring an estimated 8 services.

  Contractor Cost Estimate: $ 230,000
  Village Staff Cost Estimate: $ 95,000

- In the southwest corner of the Village along Silver Lake, the Village may elect to replace the existing 6-inch main on **Walker Road** from Standpipe Road south to the Village border, on **Euclid Avenue**, on **Lake Avenue**, and on **Camp Road** between Walker Road and Euclid Avenue. This would involve approximately 4,300 LF of new 8-inch water main. This would improve the poor fire flows available in this area and ensure reliable service for the residents in this area.

  Contractor Cost Estimate: $ 392,000
  Village Staff Cost Estimate: $ 162,000

The Village may also elect to connect the following existing water main to improve available fire flows on Benedict Street near the school.

- The Village could decide to connect the existing 4-inch main on **Benedict Street** to the existing 12-inch main on **Olin Avenue** without replacing any existing main. The cost estimate below assumes that Village staff will do the work for this project.

  Village Cost Estimate: $ 10,000

Abandoning Water Mains

The following projects could be undertaken to abandon existing water mains and transfer the services in these areas to existing parallel water mains.

- On **Covington Street** between Short Street and Main Street, the Village could abandon the existing 4-inch main and transfer all of the services to the parallel 6-inch main, if the Village does not want to install new main in this area. Assuming all services in this area are on the 4-inch main, this would involve transferring an estimated 8 services.

  Contractor Cost Estimate: $ 6,000
  Village Staff Cost Estimate: $ 3,000

- On **Lake Street**, the Village could abandon the existing 4-inch main between the Village border and North Federal Street and transfer the services to the existing 8-inch main. This would involve transferring an estimated 44 services, assuming all services are on the existing 4-inch main, and replacing approximately 100 LF of water main to accommodate connections to other mains.

  Contractor Cost Estimate: $ 19,000
  Village Staff Cost Estimate: $ 10,000

- On **Tuna Street**, the Village could abandon the existing 4-inch main and transfer services to the existing 6-inch main. An estimated 15 services would need to be transferred, assuming all services on the road are connected to the 6-inch main.

  Contractor Cost Estimate: $ 4,000
  Village Staff Cost Estimate: $ 2,000

- On **St. Helena Street**, the Village could abandon the 4-inch main from near the Village border. This would require transferring an estimated 22 services to the parallel 6-inch main, assuming all services in this area are on the 4-inch main. This would also require making a connection between the two parallel mains near the point where the 4-inch main enlarges to a 6-inch main.

  Contractor Cost Estimate: $ 10,000
  Village Staff Cost Estimate: $ 5,000

- On **Olin Avenue**, the existing 4-inch main between Benedict Street and Main Street could be abandoned, with services transferred to either the 8-inch main or 12-inch main that run parallel on Olin Avenue. Assuming all of the services are on the 4-inch main, this would require transferring an estimated 25 services. It may make sense for the Village to undertake this project at the same time as the Benedict Street project discussed in the previous section "Replacing Water Mains" in this task.

  Contractor Cost Estimate: $ 6,000
  Village Staff Cost Estimate: $ 4,000

Areas with Low "C" Factors

The following areas are parts of the Village that are not addressed previously within this task. During hydraulic modeling, it was determined that these areas have Hazen-Williams *C* factors of 40 or less, which indicates that the pipe is likely in very poor condition.

- The 6-inch main on **Covington Street** between Leicester Street and Main Street was determined to have a *C* factor of 10 in one section of pipe and 30 in the other section in this area. This potential project proposes to install 700 LF of new 8-inch main.

  Contractor Cost Estimate: $ 64,000
  Village Staff Cost Estimate: $ 27,000

- The 6-inch main on **North Center Street** between Stainton Place and Lake Street has a calibrated *C* factor of 35. This potential project proposes to install 1,300 LF of new 8-inch main.

  Contractor Cost Estimate: $ 119,000
  Village Staff Cost Estimate: $ 49,000

- The *C* factor for the 6-inch main on **North Main Street** connected to the main Covington Street and running north to Gardeau Street varies between 25 and 30. This potential project proposes to install 600 LF of new 8-inch main.

  Contractor Cost Estimate: $ 55,000
  Village Staff Cost Estimate: $ 23,000

- The 6-inch water main all along **Watrous Street** has a *C* factor that varies between 35 and 40 for different sections of main. This potential project proposes to install 2,000 LF of new 8-inch main.

  Contractor Cost Estimate: $ 182,000
  Village Staff Cost Estimate: $ 75,000

- The approximately 700-LF section of 6-inch main on **Andrus Street** near Prospect Street and Liberty Street has a *C* factor calibrated to be 40. This potential project proposes to replace this section with new 8-inch main.

  Contractor Cost Estimate: $ 64,000
  Village Staff Cost Estimate: $ 27,000

- The 6-inch main on **Liberty Street**, on the extension of Buckland Street north of Prospect Street, and on **Buckland Street** between Orchard Street and Prospect Street has a calibrated *C* factor of 40. This potential project proposes to install 1,300 LF of new 8-inch main.

  Contractor Cost Estimate: $ 119,000
  Village Staff Cost Estimate: $ 49,000

- The 1,200 LF of 6-inch water main on **Prospect Street** and the extension into the Village Park west of Prospect Street has a calibrated *C* factor of 40. This potential project proposes to replace this section with new 8-inch main.

  Contractor Cost Estimate: $ 110,000
  Village Staff Cost Estimate: $ 45,000

- On **Chestnut Street**, the 1,000-LF length of 6-inch main along the entire length of the road has a *C* factor of 40. This potential project proposes to replace this section with new 8-inch main.

  Contractor Cost Estimate: $ 91,000
  Village Staff Cost Estimate: $ 38,000

- The 6-inch main along the entire length **Hawthorne Street** from Watkins Avenue to Leicester Street has a calibrated *C* factor of 40. This potential project proposes to install 1,100 LF of new 8-inch main.

  Contractor Cost Estimate: $ 101,000
  Village Staff Cost Estimate: $ 42,000

- The 1,400 LF of 6-inch water main on **South Center Street**, between Lake Street and Main Street, has a calibrated *C* factor of 40. This potential project proposes to replace this section with new 8-inch main.

  Contractor Cost Estimate: $ 128,000
  Village Staff Cost Estimate: $ 53,000

- On **Watkins Avenue**, the 6-inch main from North Center Street to Hawthorne Street has a calibrated *C* factor of 40. This potential project proposes to install 800 LF of new 8-inch main.

  Contractor Cost Estimate: $ 73,000
  Village Staff Cost Estimate: $ 30,000

Miscellaneous Improvements

The Village could dedicate funds on an annual basis for making various improvements to the water distribution network, including re-setting valve boxes, performing hydrant flow tests in areas suspected to be causing problems to assess if repairs are needed, lining areas experiencing corrosion, etc. Unused funds for a year could be set aside for a future capital improvement project or other future uses. These funds would allow the Village to proactively address issues within the distribution network, and will position the Village to have future funds available to make emergency repairs as necessary.

Cost Estimate: $ 10,000 per year

Main Street Water Main Replacement

The majority of the water main under Main Street is over 70 years old. This potential project proposes to replace the main with new water main concurrently with or prior to the NYSDOT renovations on Main Street.

Approximately 1,100 LF of 12-inch PVC main located between Olin Avenue and Benedict Street would remain in service, and the remaining 10,700 LF would be replaced with new 12-inch main. The cost estimate provided for this potential project assumes the work would be done by a contractor.

If the NYSDOT were to proceed with a full-depth reconstruction project on Main Street, the Village would be wise to pursue this alternative. The NYSDOT would not allow open cuts into a new road, which would complicate repairs and replacements under the street and increase costs. If the NYSDOT chooses to only mill and repave Main Street, the Village may wish to not make any repairs or only replace critical areas of water main to save money, knowing that in the next 10 to 15 years it may have to replace the remaining stretches of water main.

Contractor, 12-inch Cost Estimate: $ 1,274,000

Task 2.H: Recommendations for Water Distribution Network Improvements

Provide conclusions and recommendations for improvements to the water distribution network, including associated costs.

Recommendations for improvements to the distribution network are included in Chapter 4.

3. Recommendations for WTP Improvements

3.1 Task 1.H: Recommendations for WTP Improvements

Provide conclusions and recommendations for improvements to the WTP, including associated costs.

Chapter 3 of the 2012 ICIP will provide recommendations for improvements to the WTP according to Task 1.H. Decision criteria include the desires of Village officials and staff, projected service life and existing capabilities of existing equipment, and safety of plant operators and Village staff. This chapter will rank the potential WTP projects according to need, and work to incorporate the projects with the greatest need into a 10-year plan for capital improvement projects in the Village.

3.1.1 Related Sections

3.1.1.1 Related Chapters in 2012 ICIP

The following chapters are relevant to this chapter.

- ❖ 2012 ICIP Introduction
- ❖ Chapter 1- Water Treatment Plant
- ❖ Chapter 5- Water Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- ❖ Chapter 2- Water Distribution Network
- ❖ Chapter 4- Recommendations for Water Distribution Network Improvements
- ❖ Chapter 12- Potential Funding Sources

3.1.1.2 Figures

There are no figures that are specifically relevant to Chapter 3- Recommendations for WTP Improvements.

3.1.1.3 Appendices

The following appendix to the 2012 ICIP is relevant to this chapter.

- ❖ Appendix G- Water Fund Past and Projected Budgets

3.2 Priority Rankings

After coordinating with Village staff, priority ranking guidelines were developed. These rankings were then assigned to the potential projects for the WTP outlined in Task 1.G in Chapter 1 of this ICIP. Ranking each project allows the Village to assess whether or not each project should be incorporated into the 10-year plan for capital improvement projects. The ranking guidelines are as follows.

PRIORITY RANKING GUIDELINES FOR WTP PROJECTS

Priority Ranking	Criteria	Timeline for Completion
Priority 1	❖ Public Health & Safety Concern ❖ Worker Health & Safety Concern ❖ Regulatory Mandate	Add to 10-year plan
Priority 2	❖ Environmental Concern ❖ Grant Availability ❖ Revenue Generation Capability ❖ Operational/Long Term Cost Savings (including making repairs to avoid major failures)	Typically not added to 10-year plan; funding source should be secured to implement these projects
Priority 3	❖ Quality of Life ❖ Ease of Maintenance ❖ Grant Availability	Do not add to 10-year plan; funding source must be secured to implement these projects

All projects listed as Priority 1 will be incorporated into the 10-year plan for capital improvement projects. Most Priority 2 projects will not be incorporated into the 10-year plan, but the Village will remain vigilant in searching for funding opportunities to complete these projects. In some cases, Priority 2 projects will be incorporated into the 10-year plan at the request of Village staff. Priority 3 projects are projects that require the Village to secure a source of funding prior to undertaking the project.

3.3 Ranking Potential WTP Projects

All of the potential projects listed in Task 1.G in Chapter 1 of this ICIP are listed in the table below with a priority ranking assigned to it and any comments on the ranking or projected completion schedule.

PRIORITY RANKINGS FOR POTENTIAL WTP PROJECTS

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
New Intake Pipe to Low-lift Pump Station	$ 250,000	Priority 3	
New Low-lift Pump Station	$ 350,000	Priority 3	
Renovate Safety Concerns in Existing Low-lift Pump Station	$ 35,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Renovate Remaining Equipment in Low-lift Pump Station	$ 15,000	Priority 3	
New Up-flow Clarifier	$ 850,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WTP capacity demand increases
New Coagulation/ Flocculation Tank	$ 500,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WTP capacity demand increases
Renovate Existing Gears and Drives for Sludge Scraper in Clarifier	$ 25,000	Priority 1	Include in 10-year plan; plan to do in 2012 or 2013
Construct Two New Clarifiers and Convert Existing Clarifier into Rapid Filter	$1,750,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WTP capacity demand increases
New Rapid Filter	$ 400,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WTP capacity demand increases
Change Rapid Filter Media to Include GAC	N/A	Priority 1	Project underway, to be completed in 2012 (GAC purchased in 2011)
Replace Motors for High-lift Pumps	$ 15,000	Priority 2	Despite Priority 2 ranking, include in 10-year plan
SternPAC Bulk Storage Access	$ 15,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WTP capacity demand increases
Gas Chlorination System	$ 40,000	Priority 2	Despite Priority 2 ranking, include in 10-year plan
Renovate Clear Well behind WTP	$ 75,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Above-ground Access to Operate Clear Well Valves	$ 7,500	Priority 1	Include in 10-year plan; plan to do in 2012 or 2013

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Mixing System in Standpipe Road Tank and/or Perry Center Tank	$ 55,000 and/or $45,000	Priority 3 for both tanks	Pursue only if a funding source is secured, or if regulatory or disinfection byproduct conditions change
WTP Site Improvements-Lighting	$ 5,000	Priority 3	
WTP Site Improvements-Security System	$ 15,000	Priority 3	
WTP Site Improvements-Pipe Gallery Trench Grating	$ 10,000	Priority 1	Include in 10-year plan; complete by 2013 or 2014
WTP Site Improvements-Pipe Gallery Improvements	$ 15,000	Priority 2	Do not include in 10-year plan, but look for funding opportunities to pursue this project
WTP Site Improvements-Direct Outside Access from Pipe Gallery	$ 45,000	Priority 3	
WTP Site Improvements-Dedicated Generator Pad	$ 20,000	Priority 1	Include in 10-year plan; plan to do in 2012 or 2013
WTP Site Improvements-Chief Operator Office at WTP	$ 15,000	Priority 3	Despite Priority 3 ranking, include in 10-year plan
WTP Site Improvements-Basic SCADA Upgrade for WTP	$ 35,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
WTP Site Improvements-Comprehensive SCADA Control for WTP	$ 125,000	Priority 3	
WTP Site Improvements-Repave Blacktop at WTP Site	$ 20,000	Priority 3	
Miscellaneous Site Electrical, Plumbing, and Maintenance	$ 10,000 per year	Priority 1	Include in 10-year plan every year
Alternative Energy at the WTP- Harnessing Wind Power	$ 150,000	Priority 2	Pursue only if a funding source is secured
Alternative Energy at the WTP- Capturing Solar Power	$ 200,000	Priority 2	Pursue only if a funding source is secured

3.4 10-Year Plan for Capital Improvement Projects at the WTP

In the priority ranking table above, the following projects were identified as Priority 1 projects or as projects that should be included in the 10-year plan for capital improvement projects at the WTP. The estimated project cost is included in parentheses for each project. For projects that the Village has indicated a projected timeline, this timeline is also included in parentheses.

- Renovating Safety Concerns in the Existing Low-lift Pump Station ($35,000)
- Renovate Existing Gears and Drives for Sludge Scraper in Clarifier ($25,000, complete in 2012 or 2013)
- Change Rapid Filter Media to Include GAC (already underway, complete in 2012)
- Replace Motors for High-lift Pumps ($15,000)
- Gas Chlorination System ($40,000)
- Renovate Clear Well behind WTP ($75,000)
- Above-ground Access to Operate Clear Well Valves ($7,500, complete in 2012 or 2013)
- WTP Site Improvements- Pipe Gallery Trench Grating ($10,000, complete in 2013 or 2014)
- WTP Site Improvements- Dedicated Generator Pad ($20,000, complete in 2012 or 2013)
- WTP Site Improvements- Chief Operator Office at WTP ($15,000)
- WTP Site Improvements- Basic SCADA Upgrade for WTP ($35,000)
- Miscellaneous Site Electrical, Plumbing, and Maintenance ($10,000 per year)

After identifying these projects for inclusion in the 10-year plan for capital improvement projects, a projected timeline was compiled for completing these projects. The Village would likely pay for the costs for the above projects out of the water budget for the Village, and so the goal is to distribute the projects so as to even out costs over the length of the 10-year plan. At the same time, the desired timelines indicated by the Village were also considered, as was the importance of a project in relation to operational or health and safety concerns.

After considering these criteria, CPL recommends undertaking the above projects in the following timeline.

RECOMMENDED TIMELINE FOR COMPLETING WTP PROJECTS

Fiscal Year	Projects to Complete	Total Estimated Cost for the Year
2012 – 2013	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Change Rapid Filter Media to Include GAC ❖ Above-ground Access to Operate Clear Well Valves ❖ WTP Site Improvements- Dedicated Generator Pad	$ 37,500
2013 – 2014	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Renovate Existing Gears and Drives for Sludge Scraper in Clarifier ❖ WTP Site Improvements- Pipe Gallery Trench Grating	$ 45,000
2014 – 2015	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Renovate Safety Concerns in Existing Low-lift Pump Station	$ 45,000
2015 – 2016	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Renovate Clear Well behind WTP	$ 85,000
2016 – 2017	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Replace Motors for High-lift Pumps	$ 25,000
2017 – 2018	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ WTP Site Improvements- Chief Operator Office at WTP	$ 25,000
2018 – 2019	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ WTP Site Improvements- Basic SCADA Upgrade for WTP	$ 45,000
2019 – 2020	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance ❖ Gas Chlorination System	$ 50,000
2020 – 2021	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance	$ 10,000
2021 – 2022	❖ Miscellaneous Site Electrical, Plumbing, and Maintenance	$ 10,000

4. Recommendations for Water Distribution Network Improvements

4.1 Task 2.H: Recommendations for Water Distribution Network Improvements

Provide conclusions and recommendations for improvements to the water distribution network, including associated costs.

Chapter 4 of the 2012 ICIP will provide recommendations for improvements to the water distribution network in accordance with Task 2.H. Decision criteria include desires of Village officials and staff, projected service life and existing capabilities of existing equipment, and safety of plant operators and Village staff. This chapter will rank all potential water distribution network projects according to need, and work to incorporate the projects with the greatest need into a 10-year plan for capital improvement projects in the Village.

4.1.1 Related Sections

4.1.1.1 Related Chapters in 2012 ICIP

The following chapters are relevant to this chapter.

- 2012 ICIP Introduction
- Chapter 2- Water Distribution Network
- Chapter 5- Water Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- Chapter 1- Water Treatment Plant
- Chapter 3- Recommendations for WTP Improvements
- Chapter 12- Potential Funding Sources

4.1.1.2 Figures

There following figure for the 2012 ICIP is relevant to this chapter.

- Figure 4- Village Water Distribution Network

4.1.1.3 Appendices

The following appendix to the 2012 ICIP is relevant to this chapter.

- Appendix G- Water Fund Past and Projected Budgets

4.2 Priority Rankings

After coordinating with Village staff, priority ranking guidelines were developed. These rankings were then assigned to the potential projects for the distribution network outlined in Task 2.G in Chapter 2 of this ICIP. Ranking each project allows the Village to assess whether or not each project should be incorporated into the 10-year plan for capital improvement projects. The ranking guidelines are as follows.

PRIORITY RANKING GUIDELINES FOR WATER DISTRIBUTION NETWORK PROJECTS

Priority Ranking	Criteria	Timeline for Completion
Priority 1	❖ Public Health & Safety Concern ❖ Worker Health & Safety Concern ❖ Regulatory Mandate	Add to 10-year plan
Priority 2	❖ Environmental Concern ❖ Grant Availability ❖ Revenue Generation Capability ❖ Operational/Long Term Cost Savings (including making repairs to avoid major failures)	Typically not added to 10-year plan; pursue if conditions worsen or funding source is secured
Priority 3	❖ Quality of Life ❖ Ease of Maintenance ❖ Grant Availability	Do not add to 10-year plan; pursue only if water main breaks or if funding source is secured

All projects listed as Priority 1 will be incorporated into the 10-year plan for capital improvement projects. Most Priority 2 projects will not be incorporated into the 10-year plan, but the Village will remain vigilant in searching for funding opportunities to complete these projects. In some cases, Priority 2 projects will be incorporated into the 10-year plan at the request of Village staff. Priority 3 projects are projects that require the Village to secure a source of funding prior to undertaking the project.

4.3 Ranking Potential Water Distribution Network Projects

All of the potential projects listed in Task 2.G in Chapter 2 of this ICIP are listed in the table below with a priority ranking assigned to it and any comments on the ranking or projected completion schedule. Multiple cost estimates are provided for projects where both a contractor cost estimate and a Village staff cost estimate were compiled. Cost estimates that assume a contractor will complete the work are indicated with a "C," and cost estimates that assume Village staff will complete the work are indicated with a "V."

PRIORITY RANKINGS FOR POTENTIAL WATER DISTRIBUTION NETWORK PROJECTS

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Walker Road, replace 2-inch main, 1,800 linear feet (LF)	C: $ 164,000 V: $ 68,000	Priority 1	Complete by 2014, using Village staff
Davis Avenue, replace 4-inch main, 1,300 LF	C: $ 119,000 V: $ 49,000	Priority 3	Priority downgraded due to proposed Walker Road and loop project
Dolbeer Street, replace 4-inch main, 1,100 LF	C: $ 101,000 V: $ 42,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Spring Street, replace 4-inch main, 600 LF	C: $ 55,000 V: $ 23,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Handley Road, replace 4-inch main from Park Avenue eastward, 1,000 LF	C: $ 91,000 V: $ 38,000	Priority 1	Complete by 2014, using Village staff
Handley Road, replace 4-inch main from Walnut to Gardeau, 300 LF	C: $ 28,000 V: $ 12,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Needham Street, replace 4-inch main, 900 LF	C: $ 82,000 V: $ 34,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Benedict Street, replace 4-inch main, 1,500 LF	C: $ 137,000 V: $ 57,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Pine Street, replace 4-inch main, 1,100 LF	C: $ 101,000 V: $ 42,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Cherry Street, replace 4-inch main, 500 LF	C: $ 46,000 V: $ 19,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
North Federal Street, replace 4-inch main, 900 LF	C: $ 82,000 V: $ 34,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Bradford Street, replace 4-inch main, 600 LF	C: $ 55,000 V: $ 23,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Short Street, replace 4-inch main, 500 LF	C: $ 46,000 V: $ 19,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Watkins Avenue, replace 4-inch main, 900 LF	C: $ 82,000 V: $ 34,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Elm Street, replace 4-inch main, 900 LF	C: $ 82,000 V: $ 34,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Clark Street, replace 4-inch main, 600 LF	C: $ 55,000 V: $ 23,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Grove Street, replace 4-inch main, 500 LF	C: $ 46,000 V: $ 19,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Covington Street, replace 4-inch main from Short to Main Street, 400 LF	C: $ 37,000 V: $ 15,000	N/A	Priority 1 project on Covington Street (below) will include this
Page Circle, replace 4-inch main, 400 LF	C: $ 37,000 V: $ 15,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Simmons Road, replace 4-inch main, 1,300 LF	C: $ 119,000 V: $ 49,000	Priority 1	Complete by 2014, using Village staff
South Main Street and Camp Road water main extension, 2,500 LF	C: $ 230,000 V: $ 95,000	Priority 1	Complete by 2014, using Village staff
Walker Road, Euclid Avenue, Lake Avenue, Camp Road replacement, 4,300 LF	C: $ 392,000 V: $ 162,000	Priority 3	Priority ranking downgraded due to proposed South Main Street/Camp Road extension
Benedict Street, connect to 12-inch main on Olin Avenue	V: $ 10,000	Priority 1	Complete by 2014, using Village staff
Covington Street, abandon 4-inch main	C: $ 6,000 V: $ 3,000	N/A	Priority 1 project on Covington Street (below) will include this
Lake Street, abandon 4-inch main	C: $ 19,000 V: $ 10,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Tuna Street, abandon 4-inch main	C: $ 4,000 V: $ 2,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
St. Helena Street, abandon 4-inch main	C: $ 10,000 V: $ 5,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Olin Avenue, abandon 4-inch main	C: $ 6,000 V: $ 4,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Covington Street, replace 6-inch main from Leicester to Main Street, 700 LF	C: $ 64,000 V: $ 27,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village; this would eliminate need for previous two potential Covington Street projects
North Center Street, replace 6-inch main, 1,300 LF	C: $ 119,000 V: $ 49,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
North Main Street, from Covington St. to Gardeau St., 600 LF	C: $ 55,000 V: $ 23,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Watrous Street, replace 6-inch main, 2,000 LF	C: $ 182,000 V: $ 75,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Andrus Street, replace 6-inch main, 700 LF	C: $ 64,000 V: $ 27,000	Priority 3	
Liberty Street and Buckland Street, replace 6-inch main, 1,300 LF	C: $ 119,000 V: $ 49,000	Priority 3	
Prospect Street, replace 6-inch main, 1,200 LF	C: $ 110,000 V: $ 45,000	Priority 3	
Chestnut Street, replace 6-inch main, 1,000 LF	C: $ 91,000 V: $ 38,000	Priority 3	
Hawthorne Street, replace 6-inch main, 1,100 LF	C: $ 101,000 V: $ 42,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
South Center Street, replace 6-inch main, 1,400 LF	C: $ 119,000 V: $ 49,000	Priority 3	
Watkins Avenue, replace 6-inch main, 800 LF	C: $ 73,000 V: $ 30,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Miscellaneous Improvements	V: $ 10,000 per year	Priority 1	Include in 10-year plan every year
Main Street Water Main Replacement, 12-inch main	C: $ 1,274,000	Priority 1	Project would likely require long-term financing; project depends on NYSDOT plans for Main Street (NYS Route 39)

4.4 10-Year Plan for Capital Improvement Projects in the Distribution Network

In the priority ranking table above, the following projects were identified as Priority 1 projects that should be included in the 10-year plan for capital improvement projects in the water distribution network. The estimated project cost is included in parentheses for each project. For projects that the Village has indicated a projected timeline, this timeline is also included in parentheses.

It is assumed that Village staff will perform all of the construction work for projects with a Village staff cost estimate. All of the items identified as Priority 1 projects or as projects that should be pursued in the 10-year plan for capital improvement projects in the water distribution network have cost estimates that assume Village staff would undertake the work, with the exception of the Main Street project. **Therefore, it is assumed that the work for all of the projects included in the 10-year plan for capital improvement projects in the water distribution network will be performed by Village staff, with the exception of the Main Street project.**

- Walker Road, replace 2-inch main (V: $68,000, complete by 2014 using Village staff)
- Dolbeer Street, replace 4-inch main (V: $42,000)
- Spring Street, replace 4-inch main (V: $23,000)
- Handley Road, replace 4-inch main from Park Avenue eastward (V: $38,000, complete by 2014 using Village staff)
- Needham Street, replace 4-inch main (V: $34,000)
- Benedict Street, replace 4-inch main (V: $57,000)
- Pine Street, replace 4-inch main (V: $42,000)
- North Federal Street, replace 4-inch main (V: $34,000)
- Watkins Avenue, replace 4-inch main (V: $34,000)
- Simmons Road, replace 4-inch main (V: $49,000, complete by 2014 using Village staff)
- South Main Street and Camp Road water main extension (V: $95,000, complete by 2014 using Village staff)
- Benedict Street, connect to 12-inch main on Olin Avenue (V: $10,000, complete by 2014 using Village staff)
- Lake Street, abandon 4-inch main (V: $10,000)
- Tuna Street, abandon 4-inch main (V: $2,000)
- St. Helena Street, abandon 4-inch main (V: $5,000)
- Olin Avenue, abandon 4-inch main (V: $4,000)
- Covington Street, replace 6-inch water main from Leicester Street to Main Street (V: $27,000)
- North Center Street, replace 6-inch main (V: $49,000)

- ❖ Miscellaneous Improvements (V: $10,000 per year)
- ❖ Main Street Water Main Replacement, 12-inch main (C: $1,274,000)

After identifying these projects for inclusion in the 10-year plan for capital improvement projects, a projected timeline was compiled for completing these projects. With the exception of the Main Street project, the Village would likely pay for the costs for the above projects out of the water budget for the Village, and so the goal is to distribute the projects so as to even out costs over the length of the 10-year plan. At the same time, the desired timelines indicated by the Village were also considered, as was the importance of a project in relation to operational or health and safety concerns.

The Main Street project is assumed to be financed over 30 years at an interest rate of 3.5%. This results in an assumed annual payment of $69,300 for this project. This cost *is not included* in the "Total Estimated Cost for the Year" column in the table below.

After considering these criteria, CPL recommends undertaking the above projects in the following timeline. **The "Total Estimated Cost for the Year" column assumes that Village staff will complete the work for each of the projects listed.**

RECOMMENDED TIMELINE FOR WATER DISTRIBUTION NETWORK PROJECTS

Fiscal Year	Projects to Complete	Total Estimated Cost for the Year
2012 – 2013	❖ Miscellaneous Improvements ❖ Walker Road, replace 2-inch main ❖ Benedict Street, connect to 12-inch main on Olin Avenue	$ 88,000
2013 – 2014	❖ Miscellaneous Improvements ❖ South Main Street and Camp Road water main extension	$ 105,000
2014 – 2015	❖ Miscellaneous Improvements ❖ Handley Road, replace 4-inch main from Park Avenue eastward ❖ Simmons Road, replace 4-inch main	$ 97,000
2015 – 2016	❖ Miscellaneous Improvements ❖ Benedict Street, replace 4-inch main ❖ Olin Avenue, abandon 4-inch main	$ 71,000
2016 – 2017	❖ Miscellaneous Improvements ❖ Watkins Avenue, replace 4-inch main ❖ Covington Street, replace 6-inch main from Leicester Street to Main Street	$ 71,000

Fiscal Year	Projects to Complete	Total Estimated Cost for the Year
2017 – 2018	❖ Miscellaneous Improvements ❖ North Federal Street, replace 4-inch main ❖ Lake Street, abandon 4-inch main	$ 54,000
2018 – 2019	❖ Miscellaneous Improvements ❖ Pine Street, replace 4-inch main ❖ St. Helena Street, abandon 4-inch main	$ 57,000
2019 – 2020	❖ Miscellaneous Improvements ❖ Dolbeer Street, replace 4-inch main ❖ Tuna Street, abandon 4-inch main	$ 54,000
2020 – 2021	❖ Miscellaneous Improvements ❖ Spring Street, replace 4-inch main ❖ Needham Street, replace 4-inch	$ 67,000
2021 – 2022	❖ Miscellaneous Improvements ❖ North Center Street, replace 6-inch main	$ 59,000

5. Water Fund Financials

The total budgeted appropriations for the Village in the 2011-2012 fiscal year was $3,601,098. Included in this budget is $690,755 for the water fund and $587,845 for the sewer fund. This chapter will focus on the annual water fund for the Village, which includes water treatment as well as water distribution.

5.1.1 Related Sections

5.1.1.1 Related Chapters of the 2012 ICIP

The following chapter of the 2012 ICIP is relevant to this chapter.

- 2012 ICIP Introduction

In addition to the above chapter, some or all of the following chapters may be relevant to this chapter.

- Chapter 1- Water Treatment Plant
- Chapter 2- Water Distribution Network
- Chapter 3- Recommendations for WTP Improvements
- Chapter 4- Recommendations for Water Distribution Network Improvements

5.1.1.2 Related Figures in the 2012 ICIP

There are no figures specifically relevant to Chapter 5- Water Fund Financials.

5.1.1.3 Related Appendices of the 2012 ICIP

The following appendix to the 2012 ICIP is relevant to this chapter.

- Appendix G- Water Fund Past and Projected Budgets

5.2 Current Financial Status

The Village designates its water budget accounts with the letter F in its annual budget schedule. The individual accounts in the budget were categorized for the purpose of this report according to how they are presented in the annual budgets from 2006-2007 to 2010-2011. A new format for the budget was introduced for the 2011-2012 fiscal year. Appendix G at the end of this report shows how the individual accounts for appropriations and revenues were categorized for the purposes of this report.

5.2.1 Water Fund Revenues and Appropriations

Appendix G also shows the revenues and appropriations for the Village water fund. On the Budgetary Cost Table for Water Treatment Plant and Water Distribution System, the actual revenues and appropriations are shown from 2004-2005 through 2008-2009, as these are reviewed in the second annual budget after the fiscal years (for example, the actual revenues and appropriations from 2004-2005 are in the 2006-2007 budget packet). In the absence of the actual data of funds received and spent, the budgeted revenues and appropriations for 2009-2010 through 2011-2012 are shown on the table in the Appendix G.

The table below shows all of the appropriations and revenues for the water fund starting in 1994-1995, taking data from the 2001 ICIP and from the budgets provided by the Village starting in the fiscal year 2006-2007 for the 2012 ICIP. From 1999-2000 through 2003-2004, the actual budget data was not available, but the 2001 ICIP published the amended budget from 1999-2000, and the adopted budget for 2000-2001. For the 2009-2010, 2010-2011, and 2011-2012 fiscal years, the adopted budgets were included, as the actual appropriations and revenues were not available.

ACTUAL WATER FUND APPROPRIATIONS AND REVENUES

Fiscal Year	Appropriations	Appropriations Comments	Revenues	Revenues Comments
1994 – 1995	$ 374,115	Actual appropriations	--	No data available
1995 – 1996	$ 505,255	Actual appropriations	--	No data available
1996 – 1997	$ 509,403	Actual appropriations	--	No data available
1997 – 1998	$ 445,851	Actual appropriations	--	No data available
1998 – 1999	$ 417,034	Actual appropriations	--	No data available
1999 – 2000	$ 438,775	Amended budget	$ 437,087	Actual Revenues
2000 – 2001	$ 429,250	Adopted budget	$ 437,088	Estimated Revenues
2001 – 2002	--	No data available	--	No data available
2002 – 2003	--	No data available	--	No data available
2003 – 2004	--	No data available	--	No data available
2004 – 2005	$ 510,345	Actual appropriations	$ 502,633	Actual revenues
2005 – 2006	$ 503,087	Actual appropriations	$ 484,839	Actual revenues
2006 – 2007	$ 522,260	Actual appropriations	$ 442,804	Actual revenues
2007 – 2008	$ 563,507	Actual appropriations	$ 547,910	Actual revenues
2008 – 2009	$ 511,114	Actual appropriations	$ 546,018	Actual revenues
2009 – 2010	$ 646,715	Adopted budget	$ 572,400	Adopted budget
2010 – 2011	$ 670,545	Adopted budget	$ 572,950	Adopted budget
2011 – 2012	$ 690,755	Adopted budget	$ 582,960	Adopted budget

Analyzing the water fund budgets for the past three fiscal years reveals that the Village is anticipating running a deficit in the water fund budget. Presently, the water reserve fund balance is zero.

5.2.2 Water Fund Debt Service

The debt service category for future budgets was estimated using debt service payoff information provided by the Village, with interest estimated based on the payoff schedule. The Village is currently paying debt service for its update of the WTP in 1994, the construction of a large water main project from 1994, and the rehabilitation of the elevated water storage tank on Standpipe Road in 2001. In the 2011-2012 fiscal year, the Village also made its final payment for new equipment purchased for the WTP in 2007-2008. The table below shows the four sources of water debt service on the books for the 2011-2012 fiscal year, with the outstanding principal for each project, the interest rate for each loan, and the maturity date of each loan.

OUTSTANDING DEBT SERVICES IN WATER FUND, 2011-2012 FISCAL YEAR

Project	Outstanding Principal (as of 5/31/11)	Interest Rate	Maturity Date
1994 WTP Update	$ 427,000	5.25%	2031
1994 Water Main	$ 251,500	4.875%	2033
2001 Water Tank Rehab	$ 230,000	4.75%	2028
2007 WTP Equipment	$ 23,590	2.0%	2012

5.2.3 Water Service Rates

The primary source of revenue for the Village water fund is through water service charges. The Village charges users a quarterly base rate depending on location of the user relative to the Village, and on whether or not the user is located in a water district. In addition, a consumption charge is applied per 1,000 gallons of water consumed per quarter. The Village also provides water to Letchworth State Park at a consumption rate per 1,000 gallons, with no flat quarterly charge.

The Village passed legislation to raise the water rates in two steps, beginning with a rate increase effective March 1, 2011 and culminating with a rate increase effective June 1, 2012. The following table summarizes the water charges after these two increases.

WATER USAGE RATES CHARGED BY THE VILLAGE

	Effective March 1, 2011		Effective June 1, 2012	
	Flat Base Rate (charged quarterly)	**Consumption Rate (per 1,000 gallons)**	**Flat Base Rate (charged quarterly)**	**Consumption Rate (per 1,000 gallons)**
Users Inside the Village	\$ 25.00	\$ 3.50	\$ 27.50	\$ 3.60
Users Outside the Village (in a district)	\$ 30.00	\$ 4.40	\$ 32.50	\$ 4.55
Users Outside the Village (not in a district)	\$ 35.00	\$ 4.60	\$ 37.50	\$ 4.75

The table below shows the average quarterly bill and total annual expense for residences within the water service area. This table assumes an average consumption of 200 gallons per day per residence. The quarterly bill assumes a 90 day billing period, while the total annual expense assumes usage over 365 days.

AVERAGE RESIDENTIAL WATER BILL IN THE WATER SERVICE AREA

	Effective March 1, 2011		Effective June 1, 2012	
	Quarterly Bill	**Total Annual Expense**	**Quarterly Bill**	**Total Annual Expense**
Users Inside the Village	\$ 88.00	\$ 355.50	\$ 92.30	\$ 372.80
Users Outside the Village (in a district)	\$ 109.20	\$ 441.20	\$ 114.40	\$ 462.15
Users Outside the Village (not in a district)	\$ 117.80	\$ 475.80	\$ 123.00	\$ 496.75

5.3 Guidelines for Evaluating a Rate Structure

Allocating costs among Village water consumers can be a complex and contentious issue. Because of the difficulty of this task, the Village has attempted to come up with the fairest method it can for charging its water users. Some of the difficulties in coming up with a fair method for fairly allocating water costs are:

- the quantity of water consumed by users can vary greatly from user to user,
- peak and average flow demands can vary from user to user,
- a treatment, transmission, and distribution system can be very complex, particularly when repairs are made to a central main in the distribution system, and

- ❖ the calculation of benefits to unoccupied buildings or undeveloped properties can be difficult, because these buildings and properties can derive benefits from the system simply by being located within the distribution network's reach.

These issues need to be considered if a fair means for allocating charges is to be determined. One such way to do this is to undertake a use and benefit analysis, but this can be a difficult and time-consuming process. Because there are only a few commercial and industrial users in the distribution network, the process of undertaking a use and benefit analysis would not be worth the time and expense to the Village.

The current system used by the Village, charging users a flat base rate and a consumption rate, is a standard method for billing water system users. This approach attempts to balance the effects of varying water quantity demands from different users with the common benefits enjoyed by all users within the distribution network.

5.4 Considerations for a Financial Rate Structure

Before a rate structure for water service charges can be established, a goal for the total amount of revenue required must be established. The revenue must be sufficient to provide for future needs of the treatment and distribution system in addition to offsetting the costs of operating, maintaining, and improving the system. The Village determines its revenue requirements on a cash basis, so that the charges actually collected in one fiscal year offset the actual expenses of that year. The expenses that need to be accounted for include:

- ❖ operation and maintenance expenses (labor, materials, supplies, services),
- ❖ labor, materials, and supplies for capital projects,
- ❖ routine capital purchases,
- ❖ payment for treatment obligations,
- ❖ debt service requirements (principal, interest, reserves, etc.),
- ❖ equipment replacement at the WTP,
- ❖ routine WTP improvements, and
- ❖ major capital improvements not funded in a debt service.

In addition to these considerations, the Village should consider creating a capital reserve fund to provide funds for anticipated capital expenditures required for existing equipment. For instance, the Village would set aside funds incrementally every year for new pumps so if a pair of existing pumps needs to be replaced, the Village would be able to do so using the capital reserve fund instead of absorbing a large increase in expense within the water fund budget in one year.

The American Society of Civil Engineers has developed a list of financial guidelines to aid owners of public works systems in creating financial strength within these systems.

- ❖ Revenues should be sufficient to support current expenditures, including debt service and other obligations of the system.

- ❖ Debt should only be used to finance capital expansion and improvements to at plant, and not for current expenses.
- ❖ Contingency reserves should be maintained at levels sufficient to provide for unanticipated, non-recurring costs such as major failures.
- ❖ Capital projects financed through the issuance of bonds should be financed for a period of time not to exceed the expected useful life of the project.
- ❖ Net revenues (equal to the difference between gross revenues and operational and maintenance expenses) available for debt service should be generated at a level of 1.2 to 1.5 times the annual debt service requirement.
- ❖ Net revenues that exceed operating expenses and debt service should be used for capital expenditures and restoration of contingency reserves.
- ❖ Capital financing should be provided through debt financing, current revenues, and contributions from developers, customers, and other governmental entities.
- ❖ Cost of service studies should be performed periodically, and relation of revenues to cost should be reviewed annually.
- ❖ Finds generated by the utility should be used solely for the development, operation, and maintenance of the systems.

5.5 Implementing the 2012 ICIP

In order to fund the recommended projects for the water treatment and distribution systems as discussed in Chapters 3 and 4, the future budget for the Village must be estimated. To project future budgets, a starting point for the 2012-2013 fiscal year was determined from past budgets, existing debt service information, and discussions with Village staff. After estimating the appropriations, it became apparent that using the existing revenues structure would leave the water fund in a deficit, so one potential course of action is presented to help the Village establish a sustainable means for earning revenues for its water fund.

5.5.1 Estimating Future Appropriations

Discussions with the Village have revealed that the budgeted appropriations for the past three fiscal years included additional funds for small projects and repairs, similar to the type of projects discussed in this ICIP. For the purposes of this report, it is assumed that these additional funds total approximately $100,000 per year. In addition, the debt service information was used to determine the debt service payment schedule for 2012-2013 and beyond.

Taking the 2011-2012 budgeted appropriations of approximately $690,800, the $100,000 and the debt service payment of $107,200 were subtracted from this number to get $483,600. This was the goal for the 2012-2013 appropriations, not including the expected debt service in 2012-2013 or the cost of future projects recommended in this 2012 ICIP. Using past budgets as a guide, an approximate budget was estimated for each of the appropriation categories so the sum would be approximately $483,600. For the fiscal year of 2013-2014 and forward, the future budgets were estimated by adding an additional 2% every year to the funds in these categories.

After compiling this estimate, the expected debt services for 2012-2013 and beyond as well as the estimated project costs from the recommendations in Chapters 3 and 4 were added to the appropriation total. The Main Street Water Main Replacement project, which was assumed to be financed over 30 years at an interest rate of 3.5% per year, was assumed to begin to be paid in the 2013-2014 fiscal year, adding an additional $69,300 per year to the total appropriations for the Village.

5.5.2 Estimating Future Revenues

After estimating the future appropriations, it became apparent that paying for the 2012 ICIP would leave the budget running a deficit of an estimated $66,000 in the water fund for the 2012-2013 fiscal year if the planned rate structure coming into effect on June 1, 2012 were to be implemented. There are a few ways the Village could pay for this deficit.

One possible way to cover the deficit involves raising the water rates greater than what they would be starting June 1, 2012. The table below compares the actual rates that are to come into effect on June 1, 2012 to one set of proposed rates that would cover the deficit in the water fund for the 2012-2013 fiscal year.

PROPOSED WATER USAGE RATES FOR 2012-2013 FISCAL YEAR

	Actual Rates Effective June 1, 2012		**Proposed Rates 2012-2013 Fiscal Year**	
	Flat Base Rate (charged quarterly)	**Consumption Rate (per 1,000 gallons)**	**Flat Base Rate (charged quarterly)**	**Consumption Rate (per 1,000 gallons)**
Users Inside the Village	$ 27.50	$ 3.60	$ 30.00	$ 4.10
Users Outside the Village (in a district)	$ 32.50	$ 4.55	$ 35.00	$ 5.05
Users Outside the Village (not in a district)	$ 37.50	$ 4.75	$ 40.00	$ 5.25

These rates would allow the Village to operate at a modest surplus of approximately $2,000. The table in Appendix G considers these rates in 2012-2013, and proposes further rate increases every year through 2021-2022. If the Village were to pursue the scheduled rate structure proposed in Appendix G, the Village could reestablish the water reserve fund and have a balance of approximately $317,000 within 10 years. Until 2016-2017, the contributions to the reserve fund would be under $10,000 per year if contributions are made, but starting in 2016-2017, the Village would have an additional $35,000 to $65,000 available per year to pursue some of the Priority 2 projects, which may become Priority 1 projects in that time frame.

The two rate increases in 2012-2013 and 2013-2014 in this proposal would be large, with increases to the total water bill for the average residence ranging from 12% to 18% from the previous year, depending on the year and whether the user resides within the Village or outside the Village. In 2014-2015, the rates would increase by $0.05 per thousand gallons, representing an increase in the annual water bill per resident of 0.7% or less. In 2015-2016, the base rates would increase by $2.50 per unit, as well an increase of $0.05 per thousand gallons, resulting in a total water bill increase of 2% to 3%. From 2016-2017, the rates would increase by $0.05 per thousand gallons, representing an increase in the annual water bill per residence of 0.7% or less every year.

6. Wastewater Treatment Facility

6.1 Introduction

The Village of Perry WWTF was constructed in the 1970s and was upgraded as part of a 1994 project. The WWTF treats an average daily wastewater flow of 0.692 mgd, with a permitted average daily flow capacity of 0.97 mgd. The plant utilizes clarification, biofiltration, and anaerobic digestion to treat wastewater collected throughout the Village and from parts of the Town of Castile. Figure 1 at the end of this report shows the location of the Perry WWTF. Figure 5 shows an aerial photograph of the WWTF site, and Figure 6 shows a wastewater treatment process schematic for the WWTF. Appendix H includes photographs of the WWTF site.

Chapter 6 of this ICIP will provide an in-depth analysis and evaluation of the facilities at the WWTF within a series of tasks. The results of this evaluation will allow CPL to identify the processes and equipment that are in need of improvement, in order to ensure that the Village will be able to continue to discharge high quality treated effluent into the environment.

6.1.1 Scope of Chapter

The scope of this chapter on the WWTF has been divided into the ten tasks listed below.

Task 6.A Meet with Village staff to gain additional information regarding current WWTF operations.

Task 6.B Review the 2001 ICIP to reevaluate the existing conditions and history of the existing WWTF, updating any improvements since the 2001 ICIP.

Task 6.C Review past reports and records for the WWTF.

Task 6.D Determine future flow and loading demands at the WWTF. Utilize available water usage and flow data to evaluate the impact of inflow and infiltration (I/I) on the WWTF, and analyze the impacts of present and future water quality regulations on the WWTF.

Task 6.E Evaluate current treatment processes and facilities at the WWTF, using the *Recommended Standards for Wastewater Facilities, 2004 Edition* (commonly referred to as the "10 States Standards" for Wastewater Facilities) and discussions with the New York State Department of Environmental Conservation (NYSDEC) as bases for evaluation.

Task 6.F Evaluate sludge handling and disposal alternatives, and provide associated costs.

Task 6.G Perform an energy audit at the WWTF.

Task 6.H Work with Village staff to identify shortcomings and desired improvements at the WWTF. This task will include a discussion of projects that are currently underway (such as the Flow Management Plan, or "750 Plan") as well as projects under consideration for the near future (such as making repairs to the cracked digester cover), in order to provide a comprehensive evaluation of desired improvements to the WWTF.

Task 6.J Analyze potential improvements, including associated costs, required to meet current and future regulatory requirements at the WWTF.

Task 6.K Provide conclusions and recommendations for improvements to the WWTF, including associated costs.

(To avoid potential confusion with section 6.1, there is no task labeled "Task 6.I.")

6.1.2 Related Sections

6.1.2.1 Related Chapters in the 2012 ICIP

The following chapters of the 2012 ICIP are relevant to this chapter.

- 2012 ICIP Introduction
- Chapter 8- Recommendations for WWTF Improvements
- Chapter 10- Sewer Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- Chapter 7- Wastewater Collection System
- Chapter 9- Recommendations for Wastewater Collection System Improvements
- Chapter 12- Potential Funding Sources

6.1.2.2 Figures

The following figures for the 2012 ICIP are relevant to this chapter.

- Figure 1- WTP, WWTF, Village Hall Location Map
- Figure 5- WWTF Aerial Photograph
- Figure 6- WWTF Existing Process Flow Schematic

6.1.2.3 Appendices

The following appendices to the 2012 ICIP are relevant to this chapter.

- Appendix H- WWTF Site Photographs
- Appendix I- Existing SPDES Permit for Village of Perry WWTF
- Appendix J- Summary of Monthly WWTF Operational Reports, 2009-2010
- Appendix K- Energy Use Data for WWTF and Pump Stations
- Appendix L- WWTF Process Calculations

6.2 WWTF Background

The existing WWTF was constructed in 1973, with major upgrades being implemented in 1981 and 1994. In 1981, the primary and final clarifiers were each expanded by adding a third tank to each process. In 1994, the New York State Department of Environmental Conservation (NYSDEC) implemented new requirements for ammonia removal in the State Pollution Discharge Elimination System (SPDES) permit at the site. In response, the Village replaced the rock media in the trickling filter with prefabricated plastic media and installed the biotower.

Figure 5 at the end of this report shows an aerial photograph of the WWTF site, and Figure 6 shows a schematic outlining the wastewater treatment process flow at the WWTF. Appendix H shows photographs of the WWTF site.

The treatment process at the WWTF begins at the influent structure, which passes on flows to the three primary clarifiers operated in parallel. After clarification, wastewater flows through a trickling filter, and is the pumped to the biotower trickling filter before flowing to the final clarifiers. After final clarification, the treated wastewater flows through the former chlorine contact tank and is discharged into the Silver Lake Outlet, which is over 170 feet below the grade of the WWTF.

The influent structure contains a comminutor, a bar screen with an automatic mechanical scraper, and a grit removal channel. The bar screen and mechanical scraper are used very rarely, as the screen typically removes raw sludge from the wastewater. Flows are usually diverted to the comminutor, which grinds up solids such as rags before allowing this debris to pass downstream. Grit removal is manually removed from the grit removal channel in the influent building.

Flow is directed from the influent building into the three primary clarifiers, operated in parallel. Each of the three rectangular tanks is 56 feet long by 12 feet wide, with an average water depth of 7 feet. The tanks allow for settling of primary sludge, which is collected in hoppers at the upstream end of the tanks and conveyed to the primary anaerobic digester. Clarified effluent flows over the weirs at the downstream end of the tanks and flows into the primary trickling filter.

The trickling filter and biotower are operated in series, with flows being treated in the shorter trickling filter before being pumped into the biotower. The trickling filter is 54 feet in diameter, with a media depth of roughly 6 feet. The biotower is a taller trickling filter, and is 54 feet in diameter, with a media depth of 15 feet. The biotower also has height for expansion, with a maximum potential media depth of 21 feet that would be available if the daily flow capacity were to expand or if more stringent limitations are imposed on the WWTF in the future. Each filter features prefabricated plastic media that is optimized for biological growth that can reduce carbonaceous biochemical oxygen demand (CBOD) and ammonia from the wastewater. Wastewater is dispersed across the media by a rotary distributor assembly that is propelled by the flow of water.

Flows to the trickling filter are supplemented by recirculating treated effluent flows from the former chlorine contact tank. The recirculating flows typically maintain a minimum flow of 1.87 mgd over the trickling filter and biotower, which keeps conditions in the two filters conducive for the biological growth necessary for wastewater treatment. Without the recirculation flows, the filter media would be too dry to support healthy biofilm, which would decrease the efficiency of these filters.

After being treated in the biotower, wastewater is then clarified in three final clarifier tanks operated in parallel. Each of the rectangular final clarifiers is 56 feet long by 12 feet wide, with an average depth of 9 feet. Sludge collected in these clarifiers is pumped back to the influent structure to mix with influent flows. This sludge then settles out in the primary clarifiers, where it can flow to the digesters.

At the downstream end of the final clarifiers, a 50-foot long and 12-foot wide tank was previously used as a chlorine contact tank. The WWTF does not require disinfection at the present time, as subsequently the tank is primarily a flow-through tank that does not provide any additional treatment to the wastewater. Recirculation flows for the trickling filter are drawn from this tank and pumped back to the trickling filter regularly. After flowing through this tank, the treated effluent is then discharged from the facility, flowing through a pipe that flows down a steep embankment of over 170 feet to the Silver Lake Outlet.

The anaerobic digesters are each 30 feet in diameter and have a high water level sidewall depth of approximately 19 feet, and each tank has a floating cover. The primary digester accepts sludge flows collected in the primary clarifiers, and most of the sludge stabilization takes place in this tank. The tank is equipped with a paddle mixing system mounted to the cover of the digester in order to ensure uniformity in the digester. Sludge in the tank also is circulated through a heat exchanger to maintain high temperatures that are optimal for anaerobic digestion.

From the primary digester, stabilized sludge flows to the secondary digester that does not have any heating or mixing capabilities. This tank allows sludge to thicken and settle out from some of the liquid in the sludge. This liquid, called supernatant, contains very high concentrations of ammonia and CBOD, and is sent back to the head of the plant to be diluted in the influent flows and treated in the WWTF. The settled sludge is pumped to the belt press in the solids handling shed on-site, where it is pressed and disposed. The solids handling shed formerly housed sludge drying beds, but these beds have been deconstructed and the shed is primarily used as a storage shed for equipment and for pressed sludge.

6.3 Discussion of WWTF Tasks

Task 6.A: Meeting with Village

Meet with Village staff to gain additional information regarding current WWTF operations.

CPL met with the Superintendent of Public Works, the Chief Operator of the WTP and WWTF, and other WWTF operators to inspect the WWTF and discuss issues at the plant and in the collection system. Discussions with the staff allowed CPL to better understand the treatment processes and the challenges currently facing the operators. The Village also provided a "wish list" of major and minor projects that it would like to undertake to ensure that the WWTF could continue to discharge high-quality effluent into the environment. To aid in analysis of treatment processes, the Village provided treatment data, energy data, and redline collection system maps to CPL.

Specific goals and concerns of the Village for the WWTF were discussed in the visits and conversations with Village staff. Some of the primary goals discussed include:

- replacing the influent structure at the WWTF with larger, more modern, and more effective head works equipment,
- installing additional primary and final clarifiers and replacing the controlling valves for these tanks,
- coming up with a solution to limit the formation of ice in the filter media and provide easier and safer access to the top of the biotower,
- expanding the sludge handling capabilities of the WWTF,
- continuing to work to reduce inflow and infiltration (I/I) in the wastewater collection system, and
- upgrading problem areas in the collection system, including pump stations.

Task 6.B: Reevaluating 2001 ICIP

Review the 2001 ICIP to reevaluate the existing conditions and history of the existing WWTF, updating any improvements since the 2001 ICIP.

In reviewing the 2001 ICIP, CPL has noted the following major improvements to the WWTF.

- The sludge drying beds have been dismantled within the sludge handling enclosure. The Village constructed a belt press building within the enclosure and installed a belt press to improve the solids content of sludge to be hauled away for disposal. One of the former drying beds was converted into a sludge holding area to store the pressed sludge before it is hauled off-site. The rest of the enclosure has been converted into a storage shed to house much of the equipment used at the WWTF site.
- The primary and secondary anaerobic digester covers have been replaced since the 2001 ICIP. Plans were underway when the 2001 ICIP was published, and the project was completed in 2002. The project also included a new cover-mounted mixing system for the primary digester.
- The biogas collection and disposal system for the anaerobic digesters was also upgraded in 2001 and 2002 to bring the system up to 10 States Standards and to meet basic safety requirements.
- A new heat exchanger/boiler was installed in the digester boiler building to replace the failed primary boiler in the summer of 2011.
- A new generator was installed at the site in 2008 to replace the old generator and provide reliable power during emergency situations.
- Also in 2008, the Village replaced the rails, chains, flights, and drive sprockets in the final clarifiers that draw sludge into the hoppers of the tanks.
- Average daily flow estimates were revised for this 2011 ICIP. In 2001, the existing average daily flow was 0.800 mgd, and the future average daily flow for the year 2016

was estimated to be 0.832 mgd. As discussed in Task 6.D below, the existing average daily flow in 2009 and 2010 was 0.692 mgd.

Task 6.C: Reviewing Records

Review past reports and records for the WWTF.

Records

The Village provided CPL with various records to aid in completing the tasks of this report. This includes:

- ❖ The SPDES permit for the Perry WWTF,
- ❖ Monthly Operational Reports from the WWTF submitted to the NYSDEC, from January 2009 through December 2010,
- ❖ Annual budgets and expenses, from the fiscal year 2004-2005 to the adopted budget for 2011-2012, and
- ❖ Energy usage and costs at the WWTF, including gas usage at the plant and separate gas usage for the sludge heat exchanger.

The current SPDES permit for the Perry WWTF is included in Appendix I at the end of this report, and a summary of the Monthly Operation Reports can be found in Appendix J. Energy usage data can be found in Appendix K.

Reports

CPL had previously published an ICIP for the Village of Perry in 2001. The 2001 ICIP included a thorough evaluation of the WWTF and made recommendations for future projects at the plant. Recommendations included installing a vortex grit collector in the influent structure, adding additional tanks to the primary and final clarifiers and replacing drive assemblies in one of the clarifiers, making upgrades to the anaerobic digesters including installing a mixing system, and converting the sludge drying beds into reed beds while removing the existing fiberglass dome over the solids handling area.

Task 6.D: Flow and Loading Demands

Determine future flow and loading demands at the WWTF. Utilize available water usage and flow data to evaluate the impact of inflow and infiltration (I/I) on the WWTF, and analyze the impacts of present and future water quality regulations on the WWTF.

Flows

The 2010 U.S. Census shows a population in the Village of 3,673. Historical population data for the Village was obtained from the U.S. Census Bureau, and the population projections were obtained from the Genesee/Finger Lakes Regional Planning Council (G/FLRPC) Regional Population Forecasts, published in 2003.

VILLAGE OF PERRY POPULATION TRENDS

Year	Population	Percent Change	Status
1970	4,538	-2.0%	Historical Population (Census)
1980	4,198	-7.5%	Historical Population (Census)
1990	4,219	0.5%	Historical Population (Census)
2000	3,945	-6.5%	Historical Population (Census)
2010	3,673	-6.9%	Historical Population (Census)
2010*	3,910*	-0.9%*	Forecast (G/FLRPC)*
2020	3,900	-0.3%	Forecast (G/FLRPC)
2030	3,901	0.0%	Forecast (G/FLRPC)
2040	3,903	0.1%	Forecast (G/FLRPC)

*The G/FLRPC population forecast published in 2003 estimated a population of 3,910 in 2010 in the Village of Perry. The percent decrease of 0.9% is based on the difference from the 2000 Census population to the population forecast by the G/FLRPC for 2010. The percent changes for 2020 through 2040 are based on the G/FLRPC population forecasts for 2010 through 2040.

The 2010 Census data shows that the Village population has decreased sharply from what was forecasted by the G/FLRPC. The actual population change from 2000 to 2010 was similar to the population decrease in the Village from 1990 to 2000. The regional population forecast compiled in 2003 by the G/FLRPC predicted that the population of the Village would remain relatively stable from 2010 through 2040, decreasing by 0.2% over that time. The Village provides sewer service for areas outside of the Village, but for the purposes of this report the rate of growth of these areas is assumed to be similar to the rate of growth in the Village.

The following table shows the average daily flows to the WWTF for each month from 2009 through 2010. The data was compiled from monthly compliance reports submitted to the NYSDEC, and these are summarized in Appendix J at the end of this report.

WWTF AVERAGE DAILY FLOWS, 2009 – 2010 (MGD)

Month	2009	2010
January	0.760	0.660
February	1.226	0.510
March	1.361	1.159
April	0.768	0.733
May	0.601	0.725
June	0.720	0.805
July	0.785	0.496
August	0.633	0.382
September	0.403	0.359
October	0.450	0.541
November	0.441	0.553
December	0.736	0.802
Yearly Average	0.738	0.645
OVERALL AVERAGE	**0.692**	

Based on WWTF flow data from 2009 and 2010, the WWTF treats an average daily influent flow of 0.692 mgd, while the permitted capacity is 0.97 mgd. This leaves an excess capacity of 0.278 mgd. If the Village population continues to decline as it has since 1990, then the average daily flow to the WWTF would be expected to decrease as well, which would increase the excess capacity at the plant.

Assuming an average daily flow rate of 250 gallons per day (gpd) per single-family residence, the current excess capacity of 0.278 mgd would be enough capacity to serve approximately 1,100 homes. Discussions with Village staff have indicated that there are not any major projects slated for development in the region that would require expanding the WWTF beyond its current capacity. Any smaller projects that are undertaken during the intended timeline of this ICIP that would require sewer hookups to the Perry WWTF would be able to be served through the excess capacity that exists at the WWTF today. Therefore, for the purposes of this ICIP, the design flow to the plant will be the permitted capacity, which is 0.97 mgd.

Analysis of the peak flow data from 2009 and 2010 shows that a peak hourly flow of 3.0 mgd or greater was recorded on 17 days over this two-year period, with a peak flow recorded at the WWTF of 3.430 mgd. A peak hourly flow of 2.5 mgd or greater was recorded on 30 days over the same time frame. Based on this data, 3.43 mgd is a reasonable estimate of the peak hourly flow at the plant. With an average daily flow of 0.692 mgd, the peak hourly flow factor for the WWTF would be 4.96.

WWTF INFLUENT DESIGN FLOWS

Existing Average Daily Flow	0.692 mgd
Design Average Daily Flow (permitted flow)	0.970 mgd
Design Peak Hourly Flow	3.43 mgd

Inflow and Infiltration (I/I)

I/I has been a problem at the WWTF, as evidenced by the need to create a Flow Management Plan and by the high peak hourly flow factor of almost 5.0. The Flow Management Plan, or "750 Plan," was mandated by the NYSDEC because of the high average daily flow to the WWTF in 2006. The average daily flow in 2006 was 0.939 mgd, which constitutes 97% of the permitted average daily flow capacity of 0.97 mgd. As a result, the Village was required by the NYSDEC to submit the Flow Management Plan, in accordance with 6 NYCRR Part 750-2.9(c)(1).

During high flow events at the WWTF, the Village had been forced to bypass the trickling filters in order to make sure the plant did not overflow. A bypass valve was opened, allowing wastewater to flow directly from the primary clarifiers to the final clarifiers before being discharged. The need for using the bypass has been curtailed as a result of following the recommendations of the 750 Plan. Sources of I/I have been removed from the collection system, and the average daily flow in 2010 had dropped to 0.645 mgd, representing an over 30% drop in average daily flow since 2006.

The 10 States Standards for Wastewater Facilities shows that the expected peak hourly flow factor for a service area population between 3,000 and 4,000 should be roughly 3.5. The peak hourly flow factor for the Village in 2009 and 2010 was almost 5.0, which is significantly greater than what would be expected for the Village.

Another way to evaluate the amount of I/I taken into the collections system is to compare the influent flows to the WWTF to water usage data collected by water meters in the service area. The water service area and the sewer service area are not identical, particularly in areas outside of the Village, which makes a direct comparison complicated, but a large portion of both the water service area and sewer service area overlap, particularly within the Village, which makes this a reasonable comparison.

The residential and commercial water meters in the service area registered almost 109 million gallons per year from April 2011 through June 2011, for an average of 286,600 gpd. This is less than 50% of the average daily influent flow to the WWTF of 645,000 gpd. This discrepancy between wastewater flows and water meter records suggests that a large portion of the wastewater flows to the WWTF consists of I/I, perhaps as much as 50% of the average daily flow.

Loadings

Design loadings for the WWTF are based on influent plant data from 2009 through 2010. The average concentration for five-day carbonaceous biochemical oxygen demand

($CBOD_5$) was 144 milligrams per liter (mg/L), and the average $CBOD_5$ loading was 660 pounds per day (lb/d). Total suspended solids (TSS) concentrations averaged 339 mg/L, and TSS loadings averaged 1,681 lb/d from 2009 through 2010. The average concentration and loading for ammonia from 2009 through 2010 were 15 mg/L and 64 lb/d, respectively.

To determine the design loadings, a weighted average was calculated, using the average loadings from 2009 through 2010 for the average daily flow of 0.692 mgd, and assumed concentration for the difference between the permitted average daily flow of 0.97 mgd and the actual average daily flow of 0.692 mgd. The assumed concentrations used were 250 mg/L for $CBOD_5$ and TSS, and 18 mg/L for ammonia. These calculations were carried out as shown in the process calculations included in Appendix L at the end of this report, and the table below summarizes the design organic loadings to the WWTF for $CBOD_5$, TSS, and ammonia.

WWTF INFLUENT ORGANIC LOADINGS, 2009 – 2010

Contaminant	Concentration (mg/L)	Loading (lb/d)
$CBOD_5$	174 mg/L	1,408 lb/d
TSS	313 mg/L	2,532 lb/d
Ammonia	16 mg/L	129 lb/d

Analysis of the loadings data from 2009-2010 identified a few potential organic loading problems at the WWTF, particularly with TSS. Over this two-year period, there were four instances where the influent TSS concentration reported on the monthly facilities was 1,000 mg/L or greater, and two instances with a concentration greater than 2,000 mg/L. The peak influent concentration of 4,200 mg/L reported on November 11, 2009. These concentrations are very extreme for residential wastewater, and the magnitude of these events suggest that there may be an issue with an industrial user in the sewer collection network. Typical residential wastewater has a TSS concentration of 250 mg/L, and a concentration of 4,200 mg/L is almost 17 times greater than that typical concentration.

On the same day as the peak TSS concentration was reported, the peak $CBOD_5$ concentration of 930 mg/L was reported. There was also another day where a $CBOD_5$ concentration of 850 mg/L was reported. These spikes in $CBOD_5$ loading are extreme for residential wastewater, and these instances, too, suggest potential issues with industrial users in the collection system.

In the monthly compliance reports from June 1998 through November 2000 included in the 2001 ICIP, there were two reported spikes in influent TSS, reporting levels of 1,300 mg/L and 1,400 mg/L. The greater frequency and greater magnitude of loading spikes in 2009 and 2010 suggest that industrial users may be posing more problems for the WWTF, but the data from 1998 through 2000 shows that this problem has been ongoing for the Village.

Current Wastewater Regulations

The effluent discharge from the WWTF must comply with the SPDES permit for the plant. The limits in the current SPDES permit are shown in the table below. The current SPDES permit is included in Appendix I.

CURRENT SPDES LIMITS FOR THE PERRY WWTF

Parameter	Effluent Limitations	
	June 1 – October 31	**November 1 – May 31**
Flow	monthly avg: 0.97 mgd	monthly avg: 0.97 mgd
5-day Carbonaceous Biochemical Oxygen Demand, $CBOD_5$	monthly avg: 25 mg/L (202 lb/d) 7-day avg: 40 mg/L (324 lb/d)	monthly avg: 25 mg/L (202 lb/d) 7-day avg: 40 mg/L (324 lb/d)
Total Suspended Solids, TSS	monthly avg: 30 mg/L (243 lb/d) 7-day avg: 45 mg/L (364 lb/d)	monthly avg: 30 mg/L (243 lb/d) 7-day avg: 45 mg/L (364 lb/d)
Settleable Solids	daily max: 0.3 mL/L	daily max: 0.3 mL/L
pH	range: 6.0 to 9.0	range: 6.0 to 9.0
Ammonia (as NH_3)	monthly avg: 2.0 mg/L	monthly avg: 6.3 mg/L
Temperature	daily max: Monitor	daily max: Monitor
Flow (in Silver Lake Outlet)	daily minimum: 1 cfs	daily minimum: 1 cfs

In addition to the above requirements, the SPDES permit for the Village also includes requirements for monitoring the lake elevation of Silver Lake and the status of the gates on the Silver Lake Dam (open or closed).

The effluent data from 2009 and 2010 shows that the Village has consistently complied with its SPDES requirements. The only requirement it has experienced issues with is with average daily flow, not meeting the monthly average during three months over that time period. In February 2009, March 2009, and March 2010, the average daily flow was 1.226 mgd, 1.361 mgd, and 1.159 mgd, respectively. These flows do not comply with the permitted average daily flow of 0.97 mgd. The next highest monthly average flow after those three months was 0.805 in June 2010. $CBOD_5$, TSS, ammonia, settleable solids, and pH requirements all have met their respective requirements in 2009 and 2010.

Potential Future Regulations

Discussions with the NYSDEC have indicated that a few changes could be in store for the Village at the next SPDES permit renewal. The first potential change could be the addition of a disinfection requirement for the Village. Presently, a disinfection rule is in draft form that would require WWTFs discharging to class C streams (such as the Silver Lake Outlet) to disinfect the treated effluent at least seasonally. This rule would also have requirements for dechlorination, if chlorine disinfection were to be the method employed. The Village could appeal any disinfection requirement to the NYSDEC under the proposed rule, but the burden of proof would be on the Village to show that disinfection would not be necessary.

The other potential change to the SPDES permit when it is renewed could be requirements for submitting a specific plan to reduce I/I and regular progress reports to the NYSDEC. On behalf of the Village, CPL wrote a Flow Management Plan in 2007 to discuss steps the Village intended to take to reduce the average daily influent flow at the WWTF. The renewed permit could require the Village to lay out a specific plan for studying the collection system, including a specific schedule for televising sewer main and using the Village's manhole flow meter to analyze flows in different areas of the Village. The permit could then require the Village to report the findings of these efforts to the NYSDEC regularly.

The third potential change to the SPDES permit of the Village would involve phosphorus limits, but this is unlikely in the case of the Village. This change would only be written into the permit if the average daily flow were to increase to over 1.0 mgd, in which case the limit would be 1.0 mg/L. The average daily influent flow to the plant in 2009 and 2010 was less than 0.7 mgd, and the permitted average daily flow for the WWTF is presently 0.97 mgd. Subsequently, in order for a phosphorus limit to be enforced on the Village, the average daily flow would have to increase above the existing permitted flow, which is unlikely in light of the population decreases evident from U.S. Census data.

Task 6.E: Evaluating WWTF Processes and Facilities

Evaluate current treatment processes and facilities at the WWTF, using the Recommended Standards for Wastewater Facilities, 2004 Edition *(commonly referred to as the "10 States Standards" for Wastewater Facilities) and discussions with the New York State Department of Environmental Conservation (NYSDEC) as bases for evaluation.*

Effluent data from 2009 and 2010 shows that the WWTF has consistently complied with the requirements of its SPDES permit with regards to its effluent concentrations and loadings, with the only permit violations involving influent flow volumes. Even so, much of the WWTF's infrastructure is aging and is in need of rehabilitation in many cases. This task will examine each treatment process and evaluate the condition of the infrastructure supporting the WWTF. Calculations for each process can be found in Appendix L at the end of this report, and are based on an average daily flow of 0.97 mgd with a peak hourly flow of 3.43 mgd. Figure 6 at the end of this report shows a treatment process flow schematic for the WWTF.

Head Works

Wastewater enters the WWTF through the influent structure at the head of the plant, first flowing through a Parshall flume to allow for flow measurement. In the primary channel, water flows through a bar screen with an automatic scraper, before flowing through a comminutor and out of the building. A backup channel for high flow events has a manually raked bar screen, and slide gates divide flow between the channels.

Much of the equipment in the influent structure is ineffective and outdated. The bar screen and automatic scraper are used only during high-flow events at the WWTF, because the scraper will pull out raw sludge from the waste stream at lower flows. The comminutor is not effective at protecting downstream equipment, as it only grinds up waste and passes it through, where it has the potential to reform downstream and cause problems with other processes and equipment. There are no means for grease or grit removal in the influent structure, and this, too, causes problems downstream. In addition, the slide gates to control flows to the backup channel are frozen in place, and the channels are too small to handle high-flow events.

The building is heated by two Singer brand electric unit heaters mounted on the wall, but these are original to the construction of the building and are inefficient. The sampler for taking influent wastewater samples works, but the refrigeration component for the samples no longer works. Recently, the roof has begun to leak near the heaters in the building, creating an operational concern.

There are numerous operational problems with the influent structure, and it provides only minimal protection of downstream processes and equipment, if any at all. The lack of grit removal poses a threat to downstream equipment, particularly pumps. Grease and debris can clog up pumps and block weirs. The fact that the channels are not large enough to accommodate peak flow conditions suggests that retrofitting the existing facility may be difficult.

Primary Clarification

Three rectangular clarifiers located adjacent to the influent structure are responsible for primary clarification. The clarifiers operate in parallel, and each tank is 56 feet long by 12 feet wide, with an average water depth of 7 feet. The clarifiers allow solids to settle out of the wastewater and at the same time allow grease and oil to be skimmed off the surface. Clarified water flows over weirs at the downstream end of the tank, and troughs collect this water to convey it to the primary trickling filter.

Flights on chains slowly rotate through the tank to push grease and oil into a scum trough on the surface and to pull settled sludge back to sludge hoppers at the upstream end of the tank. Each tank contains two hoppers to hold sludge, and each hopper is emptied by turning a valve. Two of the six valves that control the hoppers leak, and as a result the two corresponding hoppers in the primary clarifiers have been plugged with stoppers.

When operators open the valves to the sludge hoppers, sludge collected in the primary digester flows into a nearby wet well and pump station, referred to as “A” station. Two submersible pumps pump the sludge into the primary digester, and these pumps are outdated and inefficient. The two check valves in “A” station leak and need to be replaced.

Two of the three clarifiers have the weirs and collection troughs set up in a serpentine arrangement, resulting in a weir length of approximately 60 linear feet (LF) per clarifier. The third clarifier has a center channel arrangement, resulting in a weir length of approximately 63 LF in this clarifier, for a total weir length of approximately 183 LF for all three clarifiers combined.

The pavement around the clarifiers, and especially around "A" station, is in poor condition or has been removed and replaced with crushed stone. In many cases, valve boxes protrude from the ground, potentially causing safety hazards for employees. The walkways and handrails over the tanks appear to be in very good condition.

The depth of the primary clarifier tanks does not comply with 10 States Standards. Section 72.1 states that the minimum side water depth for a primary settling tank shall be 10 feet, with a freeboard depth above the average water level of at least 12 inches required in section 72.7. The average water depth in each clarifier is 7 feet, which is not in compliance, and the freeboard depth is 2 feet.

The calculations in Appendix L show that the surface overflow rate for the design average flow is 481 gpd/square foot (sf), which is in compliance with section 72.21 of the 10 States Standards requiring a maximum overflow rate of 1,000 gpd/sf. The surface overflow rate for the design peak hourly flow is 1,701 gpd/sf, which is also in compliance with section 72.21, which requires a maximum overflow rate of 2,000 gpd/sf for peak hourly flow.

The 10 States Standards also have requirements for weir loading rates. Section 72.43 specifies that a maximum weir loading rate at design peak hourly flow must be less than 20,000 gpd/LF for plants that treat an average daily flow of less than 1 mgd. The calculations in Appendix L show that among the three clarifier tanks, the average peak hourly flow rate is approximately 18,800 gpd/LF, which complies with this requirement.

It is evident from the calculations that the plant would not be able to handle peak flow conditions with one of the primary clarifiers taken off-line. The clarifiers would not meet the 10 States Standards for Design Peak Hourly Flow or for Weir Loading Rate at peak flow if one of the clarifiers were taken off-line. Section 71.1 states,

> *Multiple units capable of independent operation are desirable and shall be provided in all plants where design average flows exceed 100,000 gallons/day (380 m^3/d). Plants not having multiple units shall include other provisions to assure continuity of treatment.*

While the three clarifiers are capable of independent operation, the shallow depth of the tanks and the difficulty in handling peak flows when one tank is off-line present problems for the WWTF.

Primary Trickling Filter

There are two trickling filters on the site: the primary trickling filter, and the biotower. These two trickling filters are operated in series. Water from the primary clarifiers flows into the primary trickling filter mixing box by gravity, where it then flows into the rotating distributor in the center of the trickling filter. Recirculation of treated wastewater from the former chlorine contact tank flows into the mixing box as well, as the recirculation flows ensure that the filter media stays wet and conducive for biological growth. During high flow events, recirculation flows are reduced or eliminated. During extremely high flow events, the primary trickling filter and biotower may be bypassed by opening a valve, and all wastewater would then flow directly from the primary clarifiers to the final clarifiers.

The primary trickling filter is approximately 54 feet in diameter, with a concrete foundation and a glass-lined steel wall bolted to the top of the foundation. Wastewater flows over approximately a 6-foot depth of prefabricated plastic media, and the biological growth on this media removes contaminants from the wastewater. The media is all located below the top of the concrete foundation, but the steel wall protects the filter from wind, helping to keep out blowing snow and preventing wind from spraying the wastewater around.

The tank, the rotating distributor arms, and the media appear to be in good shape in the primary trickling filter. Some moss appears to be growing on the top of the media around the edges of the tank and near the center distributor, and moss has attached to the backside of the distributor arms, but this has not caused any operational issues to date. The trickling filter is not covered, but since the oak trees near the trickling filter were removed, the lack of a cover has not appeared to cause any operational concerns.

The trickling filter meets all of the applicable standards (particularly in section 91) of the 10 States Standards.

Biotower

The biotower is downstream of the primary trickling filter. Water from the primary trickling filter flows by gravity to the biotower pump station, where it is pumped over 20 feet up to the top of the tower. One of the submersible pumps is original to the installation of the biotower, but the other has been replaced. The wastewater is then distributed over prefabricated plastic media by a rotating distributor assembly in the center of the tank. The tank is 54 feet in diameter, and currently the media depth is 15 feet, with room for expansion up to 21 feet.

The entire tank is made of concrete, and three vertical expansion joints are built into the tank. The concrete appears to be in good shape, and there is evidence that the minor cracks that have developed in the tank walls have been patched. Access to the top of the biotower is provided by a ladder bolted to the wall of the biotower, surrounded by a cage. The ladder is in good condition, but it can make access difficult, particularly in winter months with snow and wind, or if tools are needed at the top of the biotower.

The top of the tower was not inspected for this ICIP, but conversations with the WWTF operators revealed that the media at the top of the tower is beginning to crumble due to age. The biotower does not have a cover, and in winter this can facilitate the formation of ice near the top of the filter. In an attempt to control ice formation, operators will reduce recirculation flows and take the brakes off of the rotating distributor assembly. Overhead power lines pass close to the biotower, and installing a cover could be complicated by their presence.

The biotower meets all of the applicable standards (particularly in section 91 for trickling filters) of the 10 States Standards.

Final Clarification

Three rectangular tanks operated in parallel provide final clarification for the wastewater effluent from the biotower. The tanks are each 56 feet long by 12 feet wide, with an average water depth of 9 feet, and like the primary clarifiers each tank has two sludge hoppers at the upstream end, and scum skimmers, weirs, and collection troughs at the downstream end.

The final clarifiers contain chains and flights rotating through the tanks to collect sludge and push scum to the skimmers. The rails, chains, flights, and drive sprockets for this system were replaced in 2008, but the drives for the system are original to the construction of the WWTF. Each of the six sludge hoppers is controlled by a valve, and opening these valves allows sludge to flow to the adjacent pump station, referred to as "B" station. The hopper valves were all installed at the same time as the hopper valves in the primary digesters, and operators fear they are in risk of failure at any time due to their age and the similar history with the primary clarifier hopper valves.

"B" station pumps these flows back to the primary clarifiers to settle out and be pumped to the digesters. The Village has purchased two pumps for "B" station, and will install them at an opportune time. There is presently no way to draw sludge from the final clarifiers and pump it directly to the anaerobic digesters.

Also similar to the primary clarifiers, two of the three tanks have serpentine collection trough arrangements, creating a weir length of approximately 60 LF per clarifier. Third clarifier has a center channel arrangement, with a weir length of approximately 63 LF. This results in a total weir length of 183 LF for all three final clarifier tanks combined.

The average side water depth of 9 feet does not comply with the minimum side water depth of 10 feet required in section 72.1 of the 10 States Standards. The tank does have 2 feet of freeboard in the tank, which complies with the minimum 12 inches required in section 72.7.

The calculations in Appendix L show that the final clarifiers do not comply with section 72.231 of the 10 States Standards for surface overflow rates. This section states that final settling tanks downstream of trickling filters must have a surface overflow rate of less than 1,200 gpd/sf, based on the design peak hourly flow. The calculations show that for the peak hourly flow of 3.43 mgd, the final clarifiers have a surface overflow rate of roughly 1,700 gpd/sf, which is greater than the 1,200 gpd/sf requirement.

These calculations do show that the final clarifiers comply with the weir loading rate specified in section 72.43. The actual weir loading rate for the design peak hourly flow in the final clarifiers is approximately 18,800 gpd/LF, which complies with the 10 States Standards.

As with the primary clarifiers, section 71.1 of the 10 States Standards requires redundancy for the final clarifiers, but the clarifiers do not have any redundancy. The calculations show that the three clarifiers cannot handle the design peak hourly flow when all three are in operation, let alone if one is taken off-line.

Effluent Discharge

The former chlorine contact tank is located immediately downstream of the final clarifiers and accepts the flows from all three clarifier tanks. The Village is no longer required to disinfect wastewater prior to discharging it, and so this tank functions primarily as a flow-through tank before the treated effluent is discharged into the Silver Lake Outlet. This tank does serve as the source for recirculation flows at the plant.

Two submersible pumps in the former chlorine contact tank pump treated effluent back to the mixing box adjacent to the primary trickling filter, to mix with flows from the primary clarifier prior to entering the primary trickling filter. These pumps are mounted on poles, but they are very large and were installed in 1992. Because of the size of the pumps, they are pulled and serviced only by service workers from the manufacturer.

Near the downstream end of the former contact tank, a smaller submersible pump draws out the sludge accumulated in the contact tank and pumps it back to "B" station next to the final clarifiers. While the pump is mounted on a pole in the tank, a hoist has to be used to pull the pump for maintenance. The truck-mounted hoist used at the site is used by the operators to pull the pump, but in order to use it the truck must be backed up to the tank, and the rear bumper of the truck must abut against the wall of the tank. Complicating this process is the presence of a 2-inch yard hydrant next to the tank, near the access point to the submersible sludge pump.

After water flows through the former chlorine contact tank, it flows through a vault with a flume and flow meter before entering the discharge pipe. The flow meter is not presently used, as flow monitoring is not required at the downstream end of the treatment process. The discharge pipe descends roughly 170 feet from the WWTF site down to the Silver Lake Outlet. A structure at the base of the embankment transitions the flow into the stream. An old ladder mounted down the side of the embankment provides access to the discharge structure, but the stability and safety of the ladder are questionable, and the ladder does not reach all the way down to the base of the hill.

Anaerobic Digestion and Sludge Handling

Sludge from the primary clarifier is pumped via "A" station into the primary digester. The contents of the primary digester are mixed and heated to provide an environment conducive to anaerobic digestion. Digested sludge is directed to the secondary digester to thicken, and the thickened sludge is then sent to the belt press to remove much of the water content of the sludge. Pressed sludge is hauled off-site for disposal.

Task 6.F below discusses the sludge handling processes at the plant in-depth, providing a discussion on shortcomings of the present system and presenting alternatives for improvements.

WWTF Site Facilities Evaluation

The entire site is surrounded by a security fence, with the exception of the discharge pipe. The site lacks sufficient floodlighting, which causes a security concern as well as a worker safety concern. The two pole-mounted floodlights do not work and have been disconnected. With typical worker hours beginning at 7:00 in the morning, the lack of light at the site can be a problem for plant operators, particularly in the winter months. There are no portable lights available at the site in case of emergency, so any work that must take place in the dark is performed primarily by headlamp.

The main control building is old and in need of some improvements. Most notably, the windows and doors are drafty, and the roof is in very poor condition with shingles falling off. The roof is a pitched roof that was installed above a flat roof, and there does not appear to be any vent for the space between the roofs. The roof also does not have any gutters. Water from the roof drains onto the front eaves over the front entrance way and then onto the ground in front of the door. In the winter time, this water often freezes, making entering the building potentially hazardous.

The building also does not contain any computers or printers. While phone service is available, plant operators have no means for receiving e-mail or other electronic documents. In addition, data storage and sharing is limited to hard copies kept on-site. A computer hooked up to a supervisory control and data acquisition (SCADA) system would allow plant staff to analyze the operations of pump stations in the collection system from the office, as well as monitor processes at the treatment plant, input and store sample testing data electronically, and share all of this information easily with the head operator and Village staff. Electronic records on site also would allow simpler access to plant records and information.

A new backup generator was installed in 2008 at the WWTF to replace the old generator that was unreliable. The new generator was installed on a new equipment pad outside of the southeast corner of the main control building at the site. The generator is fueled by a natural gas line hooked up to the equipment.

Task 6.F: Sludge Handling Evaluation

Evaluate sludge handling and disposal alternatives, and provide associated costs.

Two anaerobic digesters are the first step in the sludge handling process, with each tank being 30 feet in diameter. Sludge is collected from the primary clarifiers, where it is pumped by the pumps in “A” station directly into the primary digester. Sludge from the final clarifiers is pumped by “B” station back up to the primary clarifiers to settle out. There is currently no method for drawing sludge from the final clarifiers directly to the digesters.

Each digester has a high liquid level sidewall depth of approximately 19 feet, and each digester is covered by a floating cover. The contents of the primary digester are mixed by a paddle mixer anchored to the floating cover, but the weight of the mixer mounted to the cover has caused minor cracks to develop in the digester cover. The mixing system is adequate for the digester, but there are other technologies that can mix the contents of the digester that do not need to be mounted to the digester cover.

Digestion primarily occurs in the primary digester, as the secondary digester is used primarily for sludge thickening. Sludge in the primary digester is recycled through a heat exchange boiler located in the boiler building between the two digesters in order to maintain a proper temperature for anaerobic digestion, between 85°F and 95°F. There are two boilers in the digester boiler building, one of which was installed during the summer of 2011 as an emergency replacement. The old primary boiler was outdated, and the backup boiler had been stripped for parts. When the old primary boiler finally broke down, the missing parts for the backup boiler were pulled from the primary boiler and the backup boiler was placed on-line to heat the sludge while the new boiler was being installed. The backup boiler will be maintained at its current location should the new boiler need to be taken off-line for any reason.

Both the new boiler and the backup boiler work on natural gas. The new boiler was oversized with the expectation that in the near future the WWTF will begin to capture the biogas created in the digestion process and use that as fuel for the heat exchange boilers, using the natural gas feed as backup energy source. Biogas collected in the digesters is presently burned off in a waste burner near the digesters.

Digested sludge from the primary digester is pumped into the secondary digester. The secondary digester is not heated nor mixed, as it provides the opportunity for sludge to thicken by separating from the water in the sludge. The thickened sludge is pumped to the belt press building in the solids handling shed, and the supernatant is drained to "B" station, to be pumped back to the primary clarifier.

The pump for pumping sludge through the heat exchange boiler, the pump for conveying sludge from one digester to the other, and the pump for pumping sludge from the digesters to the belt press are all located in the basement of the digester boiler building. These pumps are all outdated, and they leak. A few pumps in the basement have broken down in the past, causing some sludge handling problems. The walls of the basement show signs of water damage and some of the equipment in the basement is showing signs of corrosion.

Sludge from the secondary digester is pumped to the belt press building within the solids handling shed. The belt press was installed by 2004, and it is used about once per week during the summer. In the winter, it is used slightly less often, sometimes as little as once every other week. Once the sludge is pressed, a conveyor belt conveys the sludge outside of the belt press building, where it can be moved to a side of the shed prior to being loaded into a dumpster and hauled off for disposal.

A compact tractor is used to transfer sludge from the conveyor belt to the stock pile. In order to load the pressed sludge into dumpsters, plant operators use a backhoe. The weight of the backhoe has caused settling in the sludge storage area, making craters in the ground around the piles of pressed sludge.

The sludge from the secondary digester is injected with a polymer prior to being pressed to aid in consolidation. The mixer used to stir the elements of the polymer together was recently replaced, as the old mixer had broken down numerous times.

The belt press building appears to be in good condition, and it is heated and lit inside the building. The fiberglass enclosure that shelters the sludge handling shed is in poor condition. Major cracks have developed in the fiberglass, and safety concerns about the strength of the fiberglass prevent plant staff from being able to access these areas to fix problems. The shelter is useful, particularly for storing equipment at the plant as well as for protecting pressed sludge from the weather, but the enclosure is in need of repairs or replacement.

There are no lights inside the fiberglass enclosure. While the tractor and the backhoe have lights, when these are not in operation the enclosure is very dark, particularly in early morning hours and particularly in the winter months. In addition, when the bucket on the tractor is being used, it blocks the headlights on the tractor.

Calculations concerning sludge digestion and handling are included in Appendix L at the end of this report. For the completely mixed system that characterizes the primary digester, the maximum loading rate specified in paragraph 84.321 of the 10 States Standards is 80 pounds per 1,000 cubic feet of volume per day (lb/10^3cf/d). The calculations show that the actual loading is approximately 89 lb/10^3cf/d, which does not comply with this specification. However, paragraph 84.31 states that rational design methods may be used to design digesters, taking into account various factors including sludge character and volatile solids reduction required.

Table 14-27 in the textbook *Wastewater Engineering: Treatment and Reuse, 4th Edition* by Metcalf and Eddy shows that loading rates ranging from 100 to 300 lb/10^3cf/d are acceptable for completely mixed systems. Because of the mixing conditions in the primary digester and because there is a secondary digester that is used for sludge settling, a loading rate of 150 lb/10^3cf/d is reasonable for this digester. The actual loading rate at the design average daily flow meets this criterion, which would fit paragraph 84.31 which allows design according to rational design methods.

The minimum side water depth recommended in the 10 States Standards for Wastewater Facilities is 20 feet (section 84.12). The side water depth in the digesters at the Perry WWTF is 19 feet, which would not meet this recommendation, but the paragraph in the 10 States Standards is a recommendation and not a requirement.

Site visits by CPL staff revealed that the ventilation in the digester boiler building may not meet code. There is an exhaust fan located on the upper level of the building, but the air intake for the building is a 24-inch by 24-inch louver, which is likely too small to supply the airflow required for the building. In addition, this intake is approximately 4 feet from the exhaust louver, which could cause short circuiting. Paragraph 84.44 of the 10 States Standards requires that gas burning boilers be located in well-ventilated rooms.

Paragraph 84.461 of the 10 States Standards requires that the waste gas burner be located over 50 feet away from any plant structure. The waste gas burner is located over 50 feet from the digesters and the digester boiler building, but it is not located over 50 feet away from the solids handling enclosure. Due to site constraints, the burner is located as far away from its surrounding buildings as is feasible. The height of the burner will prevent injury to personnel due to wind or downdraft conditions.

The secondary digester does not meet the requirements of paragraph 84.621 of the 10 States Standards. The present piping configuration does not allow for a vented overflow pipe from the digester, and there is only one possible supernatant withdrawal level. It appears that valved connections for two other levels of withdrawal were connected at one time, but have since been disconnected. When these connections were removed, the connection to the vented overflow pipe was also removed. This recently led to damage to the secondary digester cover when the floating cover broke the stops at its upper limit because the tank was accidentally overfilled. The primary digester meets the requirements of 84.621.

The anaerobic digesters meet the rest of the specifications in section 84 of the 10 States Standards for Wastewater Facilities, which applies to anaerobic digesters and associated equipment.

Task 6.G: WWTF Energy Audit

Perform an energy audit at the WWTF.

CPL performed an energy audit at the WWTF to address several potential energy conservation measures that would be applicable to the existing buildings and facilities at the WWTF site. These potential conservation measures were compiled after site visits to the WWTF and discussions with Village staff. Energy use data for the WWTF and sanitary pump stations is included in Appendix K at the end of this report.

Control Building

Examination of the control building at the WWTF during site visits from CPL staff revealed that the control building does not meet the current New York State (NYS) ventilation rates required by the *Mechanical Code of New York State, 2010 Edition*. However, unless this building undergoes a major renovation or change of use, it is not required to be brought up to the current code requirements. Bringing the building up to current code requirements for ventilation would significantly increase the amount of energy required to maintain the code-required space temperatures.

The lighting system in the building has been upgraded to include T-8 lamps or compact fluorescent lamps. All of the lighting is controlled by manual wall switches controlling individual rooms. Replacing the manual switches with hardwired, passive infrared and/or ultrasonic wall-mounted occupancy sensors would produce electrical consumption savings up to approximately 40%, based on historical data. For safety reasons, controls for the lighting in the garage bay should not be converted to rely on occupancy sensors, but should remain controlled by manual wall switches. The lighting in the boiler room should also continue to be controlled by the existing manual wall switches because of the infrequent occupancy of the room.

Based on the current Pre-Qualified Lighting Incentives program under the Existing Facilities Program offered by the New York State Energy Research and Development Authority (NYSERDA), each wall-mounted occupancy sensor would be worth an incentive of $10. Replacing six of the manual wall switches would result in a total cost of approximately $700, but it would save approximately 5,000 kilowatt-hours (kWh) per year. This would save approximately $565 annually, using an electrical cost of $0.113 per kWh. The simple payback period would be approximately 1.2 years without any NYSERDA incentives, and 1.1 years with the NYSERDA incentives. The costs assume that WWTF staff would replace the switches in order to reduce costs.

The control building has a 40-gallon, natural gas fired hot water heater. This product is not an Energy Star water heater, but its small size reduces its total energy consumption, and makes it less likely that replacing the heater would generate substantial energy savings. The water fixtures in the bathroom at the WWTF could be replaced or refitted with automatic sensors to reduce the potential for leaking at the sink and in the toilet. The toilet could also be replaced with a dual-flush or low-flush toilet to reduce water consumption. While this would not be a direct energy savings, it would allow the WWTF to be more environmentally sustainable.

Sludge Boiler Building

In 2011, a heat exchanger/boiler was installed to heat the sludge in the primary anaerobic digester, in order to facilitate efficient anaerobic digestion. This boiler has the ability to be converted into a dual-fuel boiler, using both natural gas provided by the utility company and methane gas generated in the anaerobic digestion process. The boiler is currently set up to run only on natural gas, but with some modifications it could be converted to alternate between natural gas and methane gas produced in the digester. Some of the modifications include piping and automatic valves for methane capture and feed lines, as well as controls to switch from the methane gas to natural gas when the methane supply is low.

Utility bills for the boiler building indicate a current annual natural gas consumption of this building to be approximately 5,400 therms per year at a cost of $0.965 per therm, resulting in a total natural gas bill for this building of $5,200 annually. It is estimated that the primary anaerobic digester produces about 4,800 therms of methane per year, as demonstrated in the calculations in Appendix L. The methane is already produced at the site, and therefore would be a direct savings against the natural gas used at the site, saving an estimated $4,600 per year. Savings in natural gas energy consumption may be augmented by the fact that the new heat exchanger/boiler installed in 2011 is more energy efficient than the previous boiler, and thus will require less energy to operate.

Costs for making this upgrade would need to include costs for installing an efficient biogas capture system as well as the piping and controls within the digester boiler building needed to operate the biogas feed system. The capture system would include making repairs to the existing cover on the primary digester to eliminate the potential for leaks. It would also require installing equipment to contain the gas created in the digester, using either a gas storage tank and compressor or a gas holder on the cover of the digester.

In making repairs to the cover, the mechanical mixer mounted to the cover would likely need to be removed in order to ensure that its weight will not cause cracking again in the future. A viable technology to replace the mechanical mixer would be installing a jet mixing system in the digester to ensure uniformity of the digester contents and promote full digestion of the sludge. An additional benefit of a jet mixing system is that it could provide more thorough mixing in the tank, which would maximize the amount of biogas produced during digestion.

The total cost of installing an efficient biogas capture system as well as the feed system and controls is estimated to be $524,000, which includes 30% for contingency, legal, engineering, and administrative costs. Such a project would likely be too intensive for the labor resources of the Village, particularly when those resources are needed to operate the WTP and WWTF as well as make various repairs to the water and sewer systems throughout the Village. If the Village wishes to pursue this cost-saving measure, it should remain vigilant in looking for funding opportunities to help defray the high capital costs.

Because of the greater efficiency of the new boiler installed in 2011, the potential exists to extend any extra capacity of the boiler to the rest of the WWTF site, but this was not examined for this report. A more detailed analysis of methane supply and natural gas consumption would be required to determine the feasibility of implementing this at the WWTF.

NYSERDA offers pre-qualified incentives on motors, and the pumps in the basement of the digester boiler building would likely be eligible for these incentives. These incentives range from $45 to $115 per motor for motors between 1 horsepower (HP) and 15 HP.

Influent Structure

The heating system at the influent structure consists of two explosion-proof electric unit heaters. The heaters are Singer brand heaters that have exceeded their expected service life, which has caused them to be derated to operating at approximately 60% efficiency. By replacing these heaters in-kind with newer, more efficient models, the operating efficiency could be increased up to 85%. At a combined work load of 3,000 kWh per year, the estimated annual electrical savings would be approximately 7,660 kWh per year, which would save approximately $870 annually. The total installation cost for the two new heaters is approximately $3,600, resulting in a simple payback period of 4.1 years.

Alternative Energy Sources

The Village currently uses conventional energy sources to power its treatment processes at the WWTF. In addition to capturing and reusing the biogas generated in the anaerobic digester, alternative sources of energy generated on site, including wind energy, solar energy, and potentially water energy along the discharge pipe. Using one of these sources of energy could reduce energy bills of the Village and improve the environmental sustainability of the plant.

Wind Power

The Village has the potential to harness wind energy by installing a small wind turbine on the WWTF site. This power could be stored and used to reduce the peak power demand at the site, or it could be used to supplement the energy consumption at the plant. Either way, it would reduce the electric bill for the site.

The WWTF is located in a somewhat remote area, but it is located at one of the lowest points in the Village. The site is also surrounded by trees. These two factors may reduce the wind speed at the WWTF and reduce the efficiency of wind power.

Solar Energy

The potential for capturing solar energy at the plant may be favorable. If solar panels were to be mounted on top of the control building, there would be plenty of southern exposure and available space in the building to house the ancillary equipment necessary to incorporate the solar panels into the electricity supply. As with wind power, the solar power captured at the site could be stored to reduce peak power loadings or it could be used to reduce energy consumption at the plant.

Water Energy

The location of the WWTF at the top of a long slope to the Silver Lake Outlet may allow the Village to take advantage of the drop that the water must endure. With new technologies emerging, it may be possible to use a turbine to harness some of the energy in the water caused by the long drop to the discharge point.

Task 6.H: Desired Improvements to WWTF

Work with Village Staff to identify shortcomings and desired improvements at the WWTF. This task will include discussions of projects that are currently underway as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the WWTF.

The staff at the WWTF was encouraged to list desired improvements for the WWTF and collection system during conversations and site visits by CPL. The Village also provided a list of priority items that ought to be addressed at the WWTF site.

Influent Structure

- The existing influent structure should be replaced with a larger, more modern structure. The new building would include provisions for grit removal, automatic screenings removal of rags and debris from the wastewater stream, and means for grease removal. A new building would also be constructed with a larger capacity to handle high-flow events. In conversations with Village staff, this is listed as a top priority for the site.

Primary Clarifiers

- The Village desires to install an additional rectangular primary clarifier adjacent to the three existing clarifiers.
- The valves controlling the sludge hoppers are all outdated, and in some cases the valves are not operational. Two of the six sludge hoppers in the primary clarifiers are closed by stoppers because the valves leak and are not operational.

Primary Trickling Filter

- A cover for the primary trickling filter was discussed as a desired improvement for the WWTF, but the recent removal of nearby trees has lessened the urgency of installing a cover over the primary trickling filter. It would still help to reduce freezing concerns in the wintertime.

Biotower

- A cover for the biotower would be instrumental in limiting the formation of ice in the filter media.
- The top layer of media in the biotower is crumbling in some spots and needs to be replaced.
- The Village desires to replace the existing access ladder to the top of the biotower with a staircase. This would allow for safer access, particularly in windy or slippery conditions.

Final Clarifiers

- The Village wishes to install an additional rectangular final clarifier adjacent to the three existing final clarifiers.
- The valves controlling the sludge hoppers in the final clarifier are the same age as the primary clarifier sludge valves, and are in need of replacement.
- The drives for the chains and flights in the final clarifiers are original to the installation of the clarifiers and are in need of replacement. (The chains, flights, rails, and drive sprockets in the tanks were all replaced in 2008.)
- Presently, there is no method for conveying sludge collected in the final clarifiers back to the primary anaerobic digester. Installing such means would eliminate the need to return sludge collected in the final clarifiers back to the primary clarifiers.

Former Chlorine Contact Tank

- The location of the submersible sludge removal pump in the former chlorine contact tank does not allow for easy access to pull the pump for maintenance. A truck with a mounted hoist must be backed up against the concrete tank in order to pull the pump.
- The WWTF staff desires that the sludge removal pump be set lower in a hopper in order to fully remove the sludge that builds up in the former contact tank.
- The WWTF operators noted that the valve adjacent to the former contact tank that controls flows in the sludge return pipe is located at a graded low point. Subsequently, valve access in the winter time is difficult because water drains into this hole and freezes. The staff desires to have this problem fixed by re-grading the surrounding area.

Anaerobic Digesters

- The Village listed the desire to increase the capacity at the plant for primary digestion, likely by installing another digester, as a need at the site.
- The Village would like to install and maintain a system to capture and reuse the biogas that is a byproduct of anaerobic digestion. Presently this biogas is burned off.
- The pumps in the boiler building between the digesters are outdated and inefficient, and Village staff desires to have these replaced.

Solids Handling Enclosure and Belt Press Building

- Village staff listed the installation of a composting facility as a desire for the WWTF.
- The existing fiberglass cover of the solids handling is in need of repair or replacement. Cracks have developed in the cover, and consequently plant staff is unable to repair these cracks due to safety concerns regarding climbing on the structure. Because of the structure's present use as a shed for machinery and sludge storage area, the Village staff has expressed the desire to keep the enclosure or replace it with another enclosure.
- The WWTF staff desires the installation of flood lights within the solids handling enclosure, outside of the belt press building. Currently there is no lighting in the enclosure.
- One of the drying bed areas has been converted into a sludge storage area, but the WWTF staff has noted the compaction of soils in the storage area due creating craters to the weight of the backhoe used for loading pressed sludge into dumpsters. Reinforcing this area to handle the weight of the backhoe, perhaps by paving or laying down suitable sub-base, is a desire of the staff.

Vaults and WWTF Site Improvements

- All of the equipment in the "A" station vault needs to be replaced. This pump station, located adjacent to the primary clarifiers, contains two outdated and inefficient pumps, and two leaky check valves.
- The check valves in "B" station are the same age as the valves in "A" station and are in need of replacement. Replacement pumps for "B" station have been purchased and will be installed at an opportune time.
- The gas equipment vault located between the primary digester and the waste gas burner was installed with a cast iron cover. The weight of the cover prohibits one person from being able to lift it. As a result, the cast iron cover has been temporarily replaced with a plywood cover. Village staff has expressed a desire to modify this arrangement and install a lightweight hatch cover, such as an aluminum hatch.
- The outdoor lighting at the site is very poor. Village staff would like to have better outdoor lighting facilities as a matter of security for the site as well as for safety when performing maintenance on the tanks and outdoor equipment.

- ❖ WWTF operators desire that the location of a 2-inch yard hydrant currently located near the former chlorine contact tanks be changed to a location more centrally located between the chlorine contact tanks and the final clarifiers.
- ❖ WWTF operators cited the desire for a few improvements to the main control building at the site, including the installation of roof gutters over the doorway and main entrance to the building, new doors and windows on the building to reduce drafts in the building and improve energy efficiency, and replacing the roof on the building.
- ❖ There are no computers at the WWTF site. This limits the ability of the staff to send or receive e-mails, look up equipment on the internet, and monitor and control the different processes at the plant by a SCADA system. This also limits the ability of the staff to store and recall data electronically, such as previous compliance reports and operational data.

The above list of items in this task reflects the desires of the Village staff. It does not necessarily cover all of the issues identified in Task 6.E and Task 6.F in this chapter.

Task 6.J: Potential WWTF Improvements

Analyze potential improvements, including associated costs, required to meet current and future regulatory requirements at the WWTF.

The issues identified in Tasks 6.E and 6.F above and the list of desired improvements identified in Task 6.H above all form the basis for this task. This task will identify potential improvements for the WWTF, roughly estimate costs and provide a brief discussion for such projects. Recommendations for which projects to pursue will be discussed in Task 6.K below.

New Influent Structure and Headworks

As noted previously, the existing influent structure and headworks equipment provides very little help to the rest of the downstream treatment processes at the plant. New headworks would include provisions for grit removal, flow recording, grease removal, and effective, automatic rag and debris removal. The new influent structure would be built to handle peak flows at the plant as well without flooding the building. Renovating the existing structure to implement these processes would likely be so extensive that it would make more sense to install a new structure.

Cost Estimate: $ 450,000

Replace Unit Heaters in Influent Structure

If a new influent structure and headworks is not pursued, then replacing the existing Singer electric unit heaters in the existing influent structure would result in an energy savings for the Village. As discussed in the energy audit for the WWTF in Task 6.G, replacing the existing electric heaters with new electric heaters could increase the efficiency from an estimated 60% up to 85%, saving $870 per year. At an installation cost of roughly $3,600, the simple payback period would be 4.1 years.

Cost Estimate: $ 3,600

Additional Primary Clarifier Tank and Additional Final Clarifier Tank

The primary clarifiers are sufficiently sized to handle flows at the plant according to 10 States Standards, but they are shallower than what is recommended in 10 States Standards. Adding a new primary clarifier tank would be beneficial to the treatment process by mitigating the impact of the shallow clarifiers by possibly allowing the tanks to operate with a thinner sludge blanket. The fourth clarifier would also provide some redundancy in case one of the tanks needs to be taken offline for maintenance.

The final clarifiers are not properly sized to handle the peak flow rate at the WWTF. Adding a fourth clarifier tank would allow the Village to meet the 10 States Standards as well as provide redundancy in the treatment process. The final clarifiers are also shallower than the 10 States Standards recommendation, so a fourth clarifier would help to mitigate this shortcoming.

Primary Clarifier Tank Cost Estimate: $ 300,000
Final Clarifier Tank Cost Estimate: $ 400,000

Rehabilitate Primary Clarifier Sludge Hoppers and "A" Pump Station

A potential improvement for the primary clarifier sludge handling capabilities would be to replace all of the sludge hopper valves to the existing clarifier tanks. Two of the six valves are completely inoperable because they leak, and the other four are outdated and in immediate danger of failing. This problem is compounded by the inefficient operation of "A" pump station, which draws sludge from the primary clarifier and pumps it into the primary digester. The pumps are outdated and inefficient, and the check valves leak. This potential project would replace all valves and pumps associated with the sludge handling capabilities in the primary clarifier.

Cost Estimate: $ 65,000

Cover Primary Trickling Filter

The primary trickling filter does not have cover. This led to problems with clogging in the filter due to nearby trees shedding leaves, and in some cases ice formation has been a problem. While the closest trees have been removed, other debris could enter into the filter to cause problems with clogging. Installing a cover could prevent these problems.

Cost Estimate: $ 150,000

Biotower Improvements

There are three main projects that can be performed on the biotower, and each can be performed independently of the others. These projects are rehabilitating the media at the top of the biotower, installing a cover on the biotower, and installing a staircase to access the top of the biotower to replace the existing access ladder.

Cover Biotower

The top of the biotower has had extensive problems with ice formation. Installing a cover would help to shield the tower from the weather, which would help prevent the formation of ice at the top of the biotower. In addition, the cover would help to prevent decaying of the plastic media by shielding the media from ultraviolet rays from the sun. Overhead power lines close to the biotower would be an obstacle to avoid during installation of a cover on the biotower.

Cost Estimate: $ 175,000

<u>*Rehabilitate Media at Top of Biotower*</u>

While the top of the biotower was not inspected for this ICIP, plant staff has indicated that the pre-fabricated, plastic media at the top of the biotower is crumbling and decaying. The top layer of media could be replaced to provide a suitable surface for biological growth to attach to.

Cost Estimate: $ 30,000

<u>*Staircase to Top of Biotower*</u>

The third potential biotower improvement would be to replace the existing ladder access to the top of the biotower with a staircase. This would make access to the top of the biotower safer for plant staff, particularly during wintery, rainy, or windy weather. These types of weather patterns make it difficult for plant staff to maintain balance and grip on the ladder, creating potentially hazardous conditions. A new staircase with non-slip stairs would be much safer for staff.

Cost Estimate: $ 30,000

Rehabilitate Final Clarifiers

This potential improvement project would involve replacing all of the sludge hopper valves in the final clarifier tanks and replacing the drives for the chains and flights in the clarifier tanks. The chains, flights, rails, and drive sprockets themselves were replaced in 2008. The sludge hopper valves are the same age as the valves in the primary clarifier and are constantly in danger of failing and leaking. The drives are also in constant danger of failing, as these are also original to the installation of the final clarifiers and are outdated.

Cost Estimate: $ 25,000

Rehabilitate "B" Pump Station and Install New Sludge Line

This potential improvement proposes rehabilitating "B" pump station and installing a direct line from the final clarifiers to the primary digester. "B" pump station is in very poor condition, with leaking valves and with only one operable pump. The Village has purchased replacement pumps for "B" station, but these are not yet installed. This potential improvement would cover installing the pumps in "B" station, replacing the check valves in the pump station, and installing a sludge line directly from "B" station to the primary anaerobic digester in order to ease loadings at the primary clarifier.

Cost Estimate: $ 80,000

Modifying Former Chlorine Contact Tank Sludge Removal System

Moving the submersible sludge removal pump in the former chlorine contact tank to a more accessible location and fixing the valve box for the sludge return valve would be the main improvements to make to the former chlorine contact tank. Currently, the submersible pump that removes sludge that has settled in the contact tank is located in a very inconvenient spot for crane access to pull the pump. Moving the pump would also allow the pump to be reset slightly deeper in order to draw out more sludge from the contact tank. There is no valve box for the tank, and as a result water constantly freezes over the access hole to the valve, making the valve unworkable. Installing a valve box and regrading the immediate area would eliminate this problem by preventing water from getting into the access to the valve.

Cost Estimate: $ 15,000

Rehabilitate Anaerobic Digesters

The potential modifications for rehabilitating the anaerobic digesters can be divided up into three projects that can be undertaken independent of each other. These projects would involve making structural repairs to the existing digesters and replacing equipment that serves the digesters, installing a new biogas capture and reuse system, and installing a new primary anaerobic digester to enhance sludge handling capabilities.

<u>Pump Equipment Replacement</u>

This potential project proposes replacing the three pumps in the digester boiler basement. The Village has begun this project using Village staff, and it will pursue reimbursements through the NYSERDA Pre-Qualified Incentives program.

Cost Estimate: $ 12,500

<u>Structural Repairs</u>

This potential improvement would involve fixing the structural deficiencies of the digesters, such as repairing the brick façade of the tanks and checking to make sure there are no structural issues hidden by the brick façade. This also proposes to repair the cracking on the tank walls evident in the basement of the digester boiler building. In addition, this project would reinstall the sampling stack on the secondary digester to ensure there is a vented overflow pipe and to allow supernatant draw-off from three different levels.

Cost Estimate: $ 45,000

<u>Installing Biogas Reuse System</u>

This project would involve extensive renovations to the current biogas capture system in the primary digester and retrofitting the equipment in the digester boiler room to allow it to accept the methane biogas created in digestion as a fuel source.

The floating cover on the primary digester would need to be replaced to allow effective gas capture. This would mean the mixing system mounted to the cover would need to be discarded, but this could be replaced by a nozzle mixing system. Pumps would recirculate sludge through nozzles installed on the floor of the tank, which would ensure extensive mixing throughout the digester and may actually improve digester performance and biogas output. Additional gas storage and monitoring equipment would be required, and the existing heat exchange boiler in the digester boiler building would need to be retrofit to allow it to use biogas as a fuel source.

Cost Estimate: $ 350,000

<u>*Install New Primary Anaerobic Digester*</u>

A new anaerobic digester would be installed to operate either in parallel with or instead of the existing primary digester. This digester would be complete with a cover suitable for biogas containment and a nozzle mixing system. This proposal will assume that a new digester would be installed to work in parallel with the existing digester, but a digester larger than the existing digester could be constructed to take the place of the existing digester.

Cost Estimate: $ 600,000

Install Composting Process

The Village has been exploring the possibility of installing a composting facility at the WWTF for a number of years. The proximity of the dump next door to the WWTF would provide a good locale for Village residents to come pick up compost. Composting would eliminate the need for hauling sludge off-site for disposal, which would eliminate the cost for disposal, but this cost reduction would be at least partially offset by the energy and labor requirements for composting. The high capital cost can impact the feasibility of installing composting as well.

Cost Estimate: $ 400,000

Control Building

Various improvements to the control building have been considered for this ICIP, including replacing windows and doors, installing gutters and replacing the roof, installing a computer and internet access, and upgrading the lighting controls in the building.

<u>*Replace Windows and Doors*</u>

Many of the windows and doors in the control building are original to the installation of the building, and they are prone to creating drafts in the building. Replacing these would reduce the energy required to heat and cool the building. The simple payback in terms of energy use is usually poor for windows, but from an operation standpoint the Village may wish to replace them anyways.

Cost Estimate: $ 10,000

<u>*Replace Roof and Install Gutters*</u>

The roof would be replaced in this proposal, removing the shingles on the pitched roof and installing roof vents and gutters. The Village has been replacing the roofs of its structures for the past few years, installing metal roofs on various water and wastewater structures, including the WTP building and the digester boiler building at the WWTF. Installing gutters on the roof would eliminate problems with hazardous ice developing on the walkway to the front door as well.

Cost Estimate: $ 40,000

WWTF Site Improvements

Potential improvements to the WWTF site in general include installing outdoor lighting, installing a permanent cover to the biogas equipment vault, moving the yard hydrant presently located near the former chlorine contact tank, and installing a safer and more reliable access way to the discharge point at the bottom of the hill into the Silver Lake Outlet.

Exterior Site Lighting

Outdoor lighting poles and floodlights would be installed at the plant to provide lighting during dark hours, including regular working hours. There is only one working pole mounted light at the plant, and during the winter months in particular when the sun is not up, there is very little light at the plant. Pole lights would improve safety and security at the plant and make the operators' jobs safer and easier.

Cost Estimate: $ 15,000

Move Yard Hydrant

The location of the yard hydrant currently next to the former chlorine contact tank is inconvenient for washing down the final clarifiers. Moving the hydrant to a more central location would make maintenance at the plant smoother for operators.

Cost Estimate: $ 10,000

Access to Discharge Structure

The ladder access to the discharge point into the Silver Lake Outlet is not safe or reliable. The ladder is old and overgrown with grasses and weeds, and is hazardous to climb on at any point in the year, but particularly in the winter. It also does not allow operators to carry equipment or tools to the discharge point should they be needed. A non-slip staircase would provide safe and reliable access, and would free up the hands of plant staff to carry tools or equipment to the discharge point.

Cost Estimate: $ 15,000

Miscellaneous Site Maintenance

This potential improvement would budget a certain amount of money for miscellaneous improvements to the plant. Improvements would include touch-up painting around the site, re-pointing exterior brick when it cracks, inspecting concrete tanks and addressing minor cracks and pits as they occur, and buying minor equipment for the site.

Touch-up painting around the site would increase the service life of pipes and provide protection for walls and other surfaces throughout the site. The site does have exterior brick around the main control building, influent structure, digesters and digester boiler building. When minor surface cracks develop in the brick, Village staff would be able to make repairs immediately to prevent further problems from developing.

There are also many outdoor tanks that can experience weathering. Inspecting these tanks and fixing problems immediately would increase the useable service life of these tanks by preventing rain water, wastewater, or other weathering elements from entering into the cracks and expanding them. An annual inspection and repair program to inspect the primary clarifier, trickling filter, biotower, final clarifier, and former chlorine contact tank would give the Village a solid basis of information should any future problems arise as well as extending the service life of the WWTF.

As a part of this potential improvement, the Village could replace the water fixtures in the bathroom at the site, installing a low-flush or dual-flush toilet to reduce water consumption, and installing sensors to control the use of the toilet and sink faucet. This would reduce water consumption by reducing the water used per toilet flush and by reducing the potential for leaks. The Village could also purchase small equipment, such as a new mixer for mixing the polymer before it is injected into the digested sludge prior to the belt press.

Cost Estimate: $ 10,000 per year

Alternative Energy at WWTF

The Village may wish to pursue alternative energy sources at the WWTF. The two most likely viable options would be to harness wind power or to capture solar power, but there may be a way to harness the power from the effluent discharge drop of roughly 170 feet.

<u>Harnessing Wind Power</u>

This potential improvement proposes erecting a wind turbine to generate power for the WWTF site, to be used to reduce peak power demand and/or to reduce total electricity consumption. In addition to the wind turbine, the Village would have to install equipment for controlling the wind turbine, converting and storing the power harnessed, and blending the captured power with power from the grid. The capital cost of such a project would likely be expensive, but it could significantly reduce electricity costs for the Village. In order to reduce the capital costs, the Village should be vigilant in looking for grants to install this type of technology.

Cost Estimate: $ 150,000

<u>Capturing Solar Power</u>

Solar power may be a viable alternative energy source for the Village to pursue at the WWTF. Solar panels could be mounted to the roof of the main control building, as there are no obstructions around the building that would block the sun from the roof. Installing solar panels would have an advantage of being less conspicuous than installing a wind turbine installed at the site. The building also has some space available for housing the ancillary equipment needed for solar power. This ancillary equipment would include equipment to convert and store captured power, and equipment for blending in the solar power with power from the grid.

The upfront capital cost for installing solar power at the WWTF would be expensive, but the annual electricity cost at the WWTF would be cut significantly. In order to mitigate the effect of such a high capital cost, the Village should look for grants and other funding opportunities if it wishes to pursue solar power.

Cost Estimate: $ 200,000

Water Energy

The Village could potentially install energy capture equipment in the discharge pipe or discharge structure at the WWTF to use the energy in the effluent water generated from the long drop to the discharge point. With a drop of approximately 170 feet, the effluent water will have a lot of energy that could be harnessed with some sort of water wheel or turbine. While at the present time there are not many cost-effective technologies available for this purpose, throughout the lifetime of this ICIP such technologies may become more prevalent. In addition, there may grants available for innovative technologies, or the Village may be eligible for pilot studies for such technologies. By installing equipment to harness energy from the water, the Village would be able to reduce its electricity bills, and volunteering for pilot studies by manufacturers and applying for grants could help to make such a project cost-effective.

Cost Estimate: $ 500,000

Task 6.K: Recommendations for WWTF Improvements

Provide conclusions and recommendations for improvements to the WWTF, including associated costs.

Recommendations for improvements to the WWTF are included in Chapter 8.

7. Wastewater Collection System

7.1 Introduction

The Village of Perry WWTF treats an average daily wastewater flow of 0.692 mgd, with a permitted average daily flow capacity of 0.97 mgd. Most of this flow is generated from Village residents and businesses, and it is conveyed to the WWTF through over 17 miles of gravity sewer, with the help of five pump stations.

Figure 1 at the end of this report shows the location of the WWTF in the Village, and Figure 7 shows the extent of the wastewater collection system in the Village.

Chapter 7 of this ICIP will provide a thorough evaluation of the sewer collection system in the Village, highlighting areas in need of improvement and areas in need of further study. This analysis will allow the Village to accurately assess the state of its wastewater collection system to ensure reliable sewer service for its residents and businesses.

7.1.1 Scope of Chapter

The scope of this chapter on the wastewater collection system has been divided into the eight tasks listed below.

Task 7.A Meet with Village staff to gain additional information regarding the current wastewater collection system operations.

Task 7.B Review the 2001 ICIP to reevaluate the existing conditions and history of the existing wastewater collection system, updating any improvements since the 2001 ICIP.

Task 7.C Evaluate the capacity of the wastewater collection system.

Task 7.D Utilize available water usage and flow data to evaluate the impact of inflow and infiltration (I/I) on the collection system.

Task 7.E Work with Village staff to identify shortcomings and desired improvements in the collection system. This task will include a discussion of water main projects that are currently underway (such as the Flow Management Plan or “750 Plan” and the Lake Street Pump Station Improvements) as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the collection system.

Task 7.F Work with Village staff to specifically evaluate the potential need for sewer improvements along Main Street. Particular emphasis in this task will be given to the Business District in the Village and to potential roadway improvements that may occur in the near future on Main Street. This task will include recommendations for any physical evaluations that may be required to better determine the condition and need for replacement of the existing Main Street sanitary sewers, beyond what is otherwise found in this scope of work.

Task 7.G Analyze potential improvements to the collection system, including associated costs, required to ensure continued reliable wastewater collection service in the Village.

Task 7.H Provide conclusions and recommendations for improvements to the wastewater collection system, including associated costs.

7.1.2 Related Sections

7.1.2.1 Related Chapters of the 2012 ICIP

The following chapters of the 2012 ICIP are relevant to this chapter.

- ❖ 2012 ICIP Introduction
- ❖ Chapter 9- Recommendations for Wastewater Collection System Improvements
- ❖ Chapter 10- Sewer Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- ❖ Chapter 6- Wastewater Treatment Facility
- ❖ Chapter 8- Recommendations for WWTF Improvements
- ❖ Chapter 12- Potential Funding Sources

7.1.2.2 Figures

The following figures for the 2012 ICIP are relevant to this chapter.

- ❖ Figure 1- WTP, WWTF, Village Hall Location Map
- ❖ Figure 7- Village Wastewater Collection System

7.1.2.3 Appendices

The following appendices to the 2012 ICIP may be relevant to this chapter.

- ❖ Appendix J- Summary of Monthly WWTF Operational Reports, 2009-2010
- ❖ Appendix K- Energy Use Data for WWTF and Pump Stations

7.2 Collection System Background

The distribution network consists of over 17 miles of gravity sewer main and over 250 manholes, as well as five lift pump stations and over 3,000 linear feet of force main. The materials used for the pipe throughout the Village include vitrified clay tile, reinforced concrete, asbestos cement, and polyvinyl chloride (PVC). Figure 7 at the end of this report shows the layout of the collection system within the Village.

Below is a brief description for each of the five pump stations in the Village collection system. The pump stations are located on Simmons Road, North Genesee Street, Park Avenue, Lake Street, and Standpipe Road near the WTP.

- The Simmons Road Pump Station is a wet well pump station with two submersible pumps, and it accepts flows from Simmons Road within the Village.
- The Genesee Street Pump Station is a dry well/wet well pump station located on North Genesee Street. The entire station is located underground, and it accepts flows only from North Genesee Street.
- The Park Avenue pump station is a wet well pump station with two submersible pumps. It accepts flows from Park Avenue, Park Place, Walnut Street, and Handley Street.
- The Lake Street is in the process of being renovated into a suction lift pump station with two pumps mounted on a pump skid at ground level above the wet well. It serves an apartment complex and a few houses at the western end of Lake Street.
- The Standpipe Road Pump Station is a dry well/wet well pump station, and it is the largest sanitary pump station in the collection system. It accepts flows from Davis Avenue, Walker Road, Euclid Road, and part of Standpipe Road, in addition to accepting sanitary flows from the WTP, such as backwash effluent and sludge flows.

7.3 Discussion of Collection System Tasks

Task 7.A: Meeting with Village

Meet with Village staff to gain additional information regarding current wastewater collection system operations.

CPL met with the Superintendent of Public Works, the Chief Operator of the WTP and WWTF, and other WWTF operators to inspect the WWTF and discuss issues in the collection system. Discussions with the staff allowed CPL to better understand the challenges currently facing the operators within the collection system. The Village also provided a "wish list" of major and minor projects that it would like to undertake to ensure that the collection system would continue to reliably accept wastewater from Village residents and businesses and convey these flows to the WWTF. To aid in analysis of treatment processes, the Village provided energy data and redline collection system maps to CPL.

Task 7.B: Reevaluating 2001 ICIP

Review the 2001 ICIP to reevaluate the existing conditions and history of the existing wastewater collection system, updating any improvements since the 2001 ICIP.

In reviewing the 2001 ICIP, CPL has noted the following major improvements to the wastewater collection system.

- Various improvements have been made to the collection system since 2001, as noted in Task 7.C below. Figure 7 at the end of this report shows the wastewater collection system for the Village, complete with these upgrades.
- The Lake Street pump station is in the process of being upgraded, with a new suction-lift pump station being installed over the existing wet well.

Task 7.C: Wastewater Collection System Capacity

Evaluate the capacity of the wastewater collection system.

The Village was asked to review maps of the sewer collection system included in the 2001 ICIP, and make redline revisions to show updates to the collection system or make corrections to the maps. Figure 7 at the end of this report reflects these revisions pointed out by Village staff. The changes noted on the sewer maps include:

- adding a new 8-inch sewer main line on Borden Avenue from the Silver Lake Outlet to Main Street,
- replacing the sewer main on Buckland Avenue with 8-inch main and revised distances between manholes,
- removing the flush tank/lamp manhole on Callahan Street,
- adding new 6-inch sewer main on Competent Avenue connecting to Needham Street,
- adding a new 4-inch line at the end of Davis Avenue,
- changing a few of the distances between some of the manholes on Euclid Avenue and eliminating one manhole,
- adding new 6-inch main to the end of the sewer on Gardeau Street near the Village line,
- adding a manhole and modifying the distances on Liberty Street,
- adding a new 6-inch line to connect near the upstream end of Leicester Street,
- changing the distances on Lincoln Avenue,
- correcting the tie-in point of the sewer main from the Champion factory on North Main Street near Simmons Road,
- adding the sewer main on Parker Lane connecting to North Center Street,
- adding 8-inch main on Prospect Street and modifying the distances accordingly,
- removing a manhole on Spring Street near the intersection with Dolbeer Street and replacing it with a lamp manhole,
- changing a lamp manhole on Walnut Street to be a manhole,

- adding the two stretches of sewer main on Washington Street,
- correcting the flow direction shown on Watrous Street between Callahan Street and St. Helena Street, and
- cutting and capping the last section of pipe on South Main Street near Camp Road.

The collection system has approximately 93,700 linear feet (LF) of gravity sewer main within the Village. This includes approximately 24,200 LF of 6-inch main, 53,700 LF of 8-inch main, 13,500 LF of 10-inch main, 500 LF of 12-inch main, and 1,800 LF of 15-inch main. The collection system also includes five pump stations and 3,400 LF of forcemain.

Wastewater collected south and west of the intersection of Leicester Street and Main Street eventually flows to Main Street before making its way to Water Street and down to the WWTF. Much of the sewer main on Main Street is 8 inches in diameter, but in the center of the Village near Borden Avenue and Water Street the sewer diameter increases to 10 inches, 12 inches, and 15 inches.

Wastewater collected north and east of the intersection of Leicester Street and Main Street flows onto Water Street primarily via the 10-inch main on Hope Street. The sewer trunk main on Water Street varies from 15 inches to 21 inches in diameter.

As discussed below in Task 7.D, the Village was required to publish a Flow Management Plan because the average daily flow to the WWTF was greater than 95% of the permitted average daily flow to the plant. By aggressively seeking out and eliminating sources of inflow and infiltration (I/I), the Village has been able to reduce its average daily flow to the WWTF to 0.692 mgd.

Conversations with the Village have revealed a few minor areas where flow is poor in the sewer system, on Davis Avenue and on Stanton Street off of Hope Street. The Village believes that this is due to poor grades on the sewer main. The main on Parker Lane from Pioneer Credit is also experiencing poor flow due to rag and debris buildup. These areas are not on main trunk lines and have not caused any major backups in the Village.

The minimum slopes specified in the 10 States Standards for Wastewater Facilities are compiled in order to maintain a minimum pipe velocity of 2 feet per second for a full pipe. The following table shows the different sizes of pipe, minimum slope for the pipe according to 10 States Standards, the full pipe flow at the minimum slope, and the number of residences that can be served on a pipe at the minimum slope, assuming 300 gallons per day (gpd) per residence.

MINIMUM PIPE SLOPES AND CAPACITIES

Pipe Diameter	Minimum Slope (% grade)	Full Pipe Flow at Minimum Slope (mgd)*	Max. # of Residences Served at Minimum Slope (300 gpd/res.)
6 inches	0.50%++	0.256	850
8 inches	0.40%	0.494	1,650
10 inches	0.28%	0.749	2,500
12 inches	0.22%	1.080	3,600
15 inches	0.15%	1.617	5,400
18 inches	0.12%	2.352	7,800
21 inches	0.10%	3.238	10,800

*Full pipe flow at the minimum slope was calculated assuming a Manning *n* factor of 0.013.
++Minimum slope for 6-inch main is not stipulated in 10 States Standards. This was calculated based on a minimum flow velocity of 2 feet per second at full pipe conditions, using a Manning *n* factor of 0.013.

As the table shows, a 15-inch pipe at minimum slope should be able to handle the entire average daily flow from the Village of 0.692 mgd, and the 21-inch main at minimum slope cannot quite handle the peak hourly flow of 3.43 mgd. In order to accommodate the peak hourly flow of 3.43 mgd, a 15-inch main would need a minimum slope of 0.68%, an 18-inch main would need a minimum slope of 0.26%, and a 21-inch main would need a minimum slope of 0.12%.

The trunk line to the Village has 15-inch, 18-inch, and 21-inch diameter main. The 15-inch main has a minimum slope of 1.77%, the 18-inch main has a minimum slope of 0.37%, and the 21-inch main has a minimum slope of 0.21%. All three of these slopes exceed the minimum slopes required to get 3.43 mgd flow at full pipe conditions, so this trunk line has the capability to handle the peak hourly flow.

Other than the problems on Davis Avenue, Stanton Street, and Parker Lane discussed previously, the Village has not noted any additional problems with sewer backups caused by wet weather flows. The capacity of the sewer system therefore appears to be sufficient to handle peak flows.

Task 7.D: I/I in Collection System

Utilize available water usage and flow data to evaluate the impact of inflow and infiltration (I/I) on the collection system.

The Village has experienced problems with I/I in the sewer collection system in the recent past, most notably in 2006. The average daily flow to the WWTF during the 2006 calendar year was 0.939 mgd, which constituted approximately 97% of the permitted average daily flow capacity of the WWTF. As a result, the Village was required to submit a Flow Management Plan to the New York State Department of Environmental Conservation (NYSDEC), in accordance with 6 NYCRR Part 750-2.9(c)(1).

The Flow Management Plan was published in 2007 and outlined several specific steps for the Village of Perry to take to reduce average daily flows by reducing sources of I/I in the collection system. Steps in this plan involved extensive televising of sanitary sewer main to look for sections of pipe in need of repair as well as for illegal connections, performing smoke testing to identify sources of illegal connections, and monitoring flows throughout various points in the Village. After evaluating these sources of information, the Village was then able to make repairs and disconnect illegal hookups. The Village also requested that the Town of Castile perform the same type of analysis and repairs for the Silver Lake Sewer District that is connected to the Village system.

The efforts in reducing I/I in the collection system seem to have had a positive impact on influent flows to the WWTF. The WWTF data shown in Appendix J show that the average daily influent flow has decreased from 2006 through 2009, down to 0.738 mgd, and then again in 2010 down to 0.645 mgd. While other factors could play a role in this, such as lower water consumption rates, this evidence suggests that efforts to reduce I/I have had success in the Village.

The peak hourly flow factor for the Village in the period from 2009 to 2010 was 4.96, as the peak hourly flow was 3.43 mgd and the average daily flow was 0.692 mgd. The 10 States Standards for Wastewater Facilities estimates that the peak hourly flow factor for a service population the size of the Village's should be roughly 3.5, which would result in a peak hourly flow factor of 2.42 mgd. The high peak hourly flow factor for the Village suggests that I/I has a large impact on sewer flows, especially during high-flow events.

Another way to evaluate the amount of I/I in the collections system is to compare the influent flows to the WWTF to water usage data collected by water meters in the service area. The water service area and the sewer service area are not identical, particularly in areas outside of the Village, which makes a direct comparison complicated, but a large portion of both the water service area and sewer service area overlap, particularly within the Village, which makes this a reasonable comparison.

The residential and commercial water meters in the service area registered almost 109 million gallons per year from April 2011 through June 2011, for an average of 286,600 gpd. This is less than 50% of the average daily influent flow to the WWTF of 645,000 gpd. This discrepancy between wastewater flows and water meter records suggests that a large portion of the wastewater flows to the WWTF consists of I/I, perhaps as much as 50% of the average daily flow. While the Flow Management Plan has provided guidance for the Village to reduce I/I in the collection system, the Village should continue to seek out and eliminate significant sources of I/I in order to reduce operation and maintenance costs at the WWTF and at the five pump stations throughout the collection system.

Task 7.E: Desired Improvements for Collection System

Work with Village staff to identify shortcomings and desired improvements in the collection system. This task will include discussion of projects that are currently underway, as well as projects under consideration for the near future, in order to provide a comprehensive evaluation of desired improvements to the collection system.

The Village identified several potential improvements to the collection system it would like to undertake in the foreseeable future.

Sewer Main

The following items are projects that Village staff wishes to pursue specifically for sewer main within the collection system.

- Gardeau Street: replace the sewer main from the manhole at Water Street to the manhole for the Borden Avenue annex/back-lots line.
- Davis Avenue: replace the sewer main because the existing sewer grade is causing poor flow characteristics.
- Stanton Street (off of Hope Road): replace the sewer main because the existing sewer grade is causing poor flow characteristics.
- South Federal Street: replace the sewer main from Needham Road to the manhole north of the dam on the Silver Lake Outlet.
- Parker Lane: replace the line to Pioneer Credit, possibly with a grinder pump system.
- North Main Street: replace the manhole frames and covers north of Covington Street.
- South Main Street: replace the manhole frame and cover at Dolbeer Street.

The following is a list of desired projects for the pump stations in the sewer collection system.

Standpipe Road Pump Station

- The generator at the Standpipe Road pump station is located inside the building on the ground-level floor. In order to provide more space at the site and improve reliability of the generator, Village staff desires to replace this generator with a new outdoor generator, preferably with a natural gas hookup.
- The Village is currently replacing one of the submersible pumps in the pump station.
- This pump station has had a history of flooding some of the lower levels in high-flow events, in some cases having high water levels that would submerge the control panel for the pumps in the station, causing safety hazards by electrifying the water as well as operational problems. The Village would like to renovate the electrical issues in the dry well to prevent this from happening in the future.

Simmons Road Pump Station

- It is difficult to access equipment in the Simmons Road sanitary pump station due to the manhole configuration. This needs to be changed to provide simpler, safer equipment access.
- Village staff desires to upgrade the panel box at this pump station.

Genesee Street Pump Station

- The WWTF staff desires that the panel box at the Genesee Street sanitary pump station be upgraded.

Park Avenue Pump Station

There were no deficiencies listed by Village staff to be corrected at the Park Avenue pump station.

Lake Street Pump Station

A project to replace the existing Lake Street pump station was awarded to a contractor in the fall of 2011. This project will address the existing deficiencies of the Lake Street pump station.

Task 7.F: Sewer on Main Street

Work with Village staff to specifically evaluate the potential need for sewer improvements along Main Street. Particular emphasis in this task will be given to the Business District in the Village and to potential roadway improvements that may occur in the near future on Main Street. This task will include recommendations for any physical evaluations that may be required to better determine the condition and need for replacement of the existing Main Street sanitary sewers, beyond what is otherwise found in this scope of work.

The New York State Department of Transportation (NYSDOT) has indicated to the Village that New York State (NYS) Route 39, which is North and South Main Street in the Village, will be renovated in the near future. It would be advantageous to the Village to make repairs to its infrastructure under and around NYS Route 39 concurrently with, or prior to, the renovations to the road, in order to minimize costs and permitting constraints that take place when working on utilities in NYSDOT rights-of-way. In order to determine if the Village should undertake a project to repair the utilities under and around Main Street concurrent with the renovations to Main Street, it should first assess the current state of these utilities.

Discussions with Village staff have not revealed any noticeable problems with the sewer on Main Street. In order to properly evaluate the current state of the utilities under Main Street, the Village should televise each section of sewer main on the street. By televising the sewer, the Village can ascertain whether there are any problem stretches of sewer and evaluate different possibilities for repairing such problems. The information gained by televising the sewer would be vital for the Village in determining if a major project should be pursued concurrent with the Main Street renovations.

The Village should also undertake an extensive manhole inspection initiative in the Main Street area to assess the conditions of the sanitary manholes. The inspection would include evaluation of the condition of the bench, walls, frame and cover, and all pipe connections to the manhole. As with televising the sewer mains, manhole inspections may reveal significant sources of I/I in the collection system, but more importantly for this task it would provide information for the Village to assess the need for a sewer improvement project along Main Street.

The Village has indicated that it would like to replace the frames and covers of all of the manholes on North Main Street north of Covington Street and South Main Street south of Dolbeer Street, and it would make the most sense to make these repairs in conjunction with the NYSDOT renovation project. Other manhole repairs may not be necessary at the time of the NYSDOT renovations, as some repairs such as lining manholes or repairing benches do not require digging up the structure in the roadway. If manholes need to be completely replaced, then this should take place at the same time as the NYSDOT renovations.

Main Street may provide many sources of I/I in the Village, particularly in the business district. The Village should undertake an extensive I/I study involving dye testing, smoke testing, televising, and possibly flow monitoring in the manholes. The dye testing and smoke testing would provide direct indications of undesired flows reaching the sanitary sewer system, while the televising and flow monitoring would only provide possible indications of I/I sources. Using all of these techniques would allow the Village to identify sources of I/I and make sure they are tied into a storm sewer system or otherwise removed from the sewer collection system.

Flow analysis of the sewer on Main Street may provide important information for the Village. Flow analysis could involve flow calculations based on the actual slope, material, and size of the sewer on Main Street and comparing that to estimated loadings, or it could involve computer modeling. Any computer modeling would still require slopes and materials of the existing pipes, and it would also require flow monitoring within some of the manholes in the Village in order to calibrate the model. Flow analysis would ensure that the existing sewers on Main Street are properly sized and will not create flow restrictions on Main Street in the future.

By televising the sewer main, inspecting the manholes, and performing a flow analysis on the sewers, the Village will be in position to make an informed decision about if it needs to make improvements to its sewer system on Main Street, and make reliable estimates as to how much such a project may cost. The Village should prioritize any work that requires digging in the roadway, so that work can be done in conjunction with the NYSDOT renovation project, such as manhole replacement and sewer main upsizing or replacement. Projects that do not require digging in the roadway, such as making minor repairs to manholes or lining sewer mains, can be done at a later date. This will reduce the upfront capital cost of a project and allow the Village to budget for these trenchless projects.

Task 7.G: Potential Wastewater Collection System Improvements

Analyze potential improvements to the collection system, including associated costs, required to ensure continued reliable wastewater collection service in the Village.

The desired improvements listed in Task 7.E above and issues discussed in Tasks 7.D and 7.F above form the basis for this task. This task will identify many potential improvements for the wastewater collection system and provide rough cost estimates for these projects. Recommendations for which projects to pursue will be discussed in Task 7.H below.

Sewer Main Replacement

The following projects are potential improvements for the Village to undertake.

- On **Gardeau Street**, the Village could replace approximately 350 LF of 10-inch gravity sewer main. This would start at Water Street and move east along Gardeau Street for two manholes.

  Cost Estimate: $ 42,000

- On **Davis Avenue**, the Village could replace approximately 1,000 LF of 8-inch gravity sewer main along the entire length of the road to correct the existing poor flow characteristics. This cost estimate assumes installing new gravity sewer, but a low-pressure grinder pump system may be necessary because of the relatively flat slope in this area.

  Cost Estimate: $ 98,000

- On **Stanton Street**, off of Hope Street, the Village could replace approximately 450 LF of 8-inch main. The entire length would be replaced due to poor existing flow characteristics. This cost estimate assumes installing new gravity sewer, but a low-pressure grinder pump system may be necessary to overcome the relatively flat slope in this area.

  Cost Estimate: $ 45,000

- On **South Federal Street**, the Village could potentially replace approximately 300 LF of 10-inch sewer main from Needham Road to the manhole just north of the dam at the Silver Lake Outlet. This would involve crossing the Silver Lake Outlet, which would likely require trenchless construction techniques, which would increase the cost of this project.

  Cost Estimate: $ 126,000

- On **Parker Lane**, the Village could replace approximately 1,250 LF of sewer Pioneer Credit. For this proposal, it is assumed that a low-pressure grinder pump system would be installed.

  Cost Estimate: $ 219,000

- On **North Main Street**, the Village could replace all of the manhole frames and covers north of Covington Street. The sewer maps indicate that as many as 18 frames and covers would be replaced as a part of this project. It is assumed that this project would take place concurrently with the NYSDOT Main Street renovation project.

  Cost Estimate: $ 19,000

- On **South Main Street**, the Village could replace all manhole frames and covers south of Dolbeer Street. Sewer maps indicate that as many as 37 frames and covers would be replaced as a part of this project. It is assumed that this project would take place concurrently with the NYSDOT renovation project on Main Street.

Cost Estimate: $ 39,000

Standpipe Road Pump Station

Renovations for the Standpipe Road Pump Station could be divided into two main projects. The first would be to replace the generator at the site, and the second would be to replace all of the electrical equipment.

Generator Replacement

The existing generator at the Standpipe Road Pump Station is located inside the pump station building on the ground floor, but this space does not have adequate ventilation to safely operate the generator, and the generator is outdated and inefficient. A new generator could be installed outside of the pump station to ensure adequate ventilation, and a natural gas hookup could be connected to provide fuel in the case of an electricity outage.

Cost Estimate: $ 60,000

Electrical Equipment Renovation

The electrical equipment at the site is in poor condition and is poorly located within the facility. Village staff has reported that the wastewater level during extreme high-flow events has risen above the level of the control panel for the pumps, which would be extremely dangerous for the electrical system and for plant employees, as this would electrify the water in the pump station. This project would replace and relocate all of the electrical controls in the pump station.

Cost Estimate: $ 60,000

Simmons Road Pump Station

Pump Rails and Wet Well Access

This potential project involves correcting the problems at the pump station and leaving the station in its current configuration. This alternative would replace the pump rails in the wet well and provide a larger opening and more efficient means for pulling pumps.

Cost Estimate: $ 15,000

Replace Electrical Panel

This potential project proposes replacing the above-ground electrical panel at the pump station, which houses the controls and alarms for the pump station.

Cost Estimate: $ 20,000

New Pump Skid

The other alternative would involve would be to change the configuration of the Simmons Road Pump Station, similar to the current project at the Lake Street Pump Station. Under this potential project, the electrical and pump equipment inside the wet well would be demolished, and a new suction lift pump skid and enclosure would be installed on top of the wet well. All pump equipment would be above ground, and the controls would all be replaced. This alternative would be slightly more expensive than the alternative to keep the current configuration, but it would make maintenance easier and safer for Village staff.

Cost Estimate: $ 85,000

Genesee Street Pump Station Renovation

A potential improvement at this pump station would be to replace the control panel box and electrical equipment located in the underground dry well.

Cost Estimate: $ 20,000

Purchase Sewer Televising Camera

The Village may elect to purchase a sewer televising camera. This would allow the Village to televise sewer main in-house, which would be especially useful for investigating the condition of the sewers under Main Street. In order to defray the costs, the Village may wish to cooperatively purchase the sewer televising equipment with neighboring municipalities that may wish to use it, or the Village could arrange rental agreements with these municipalities.

Cost Estimate: $ 15,000

Miscellaneous Collection System Improvements

The Village could dedicate funds on an annual basis for making various improvements to the wastewater collection system. These funds would be used for a variety of purposes, such as searching for sources of I/I in the collection system, televising mains in the Village, lining areas where mains have collapsed or have been corroded, repairing manholes, general pump station maintenance, etc. Unused funds in a year could be set aside for future use, for instance if a pump or pump station needs to be replaced. These funds would allow the Village to proactively address issues the collection system, as well as be positioned in the future to have funds available to be able to make quick repairs as necessary.

Cost Estimate: $ 25,000 per year

Main Street Sewer Investigation

The Village could pursue a thorough investigation of the sewers on Main Street in preparation for the NYSDOT renovation project. This potential project would involve televising the entire sewer and inspecting all of the manholes along Main Street to assess the condition of the sewer and determine if extensive repairs would be required. This would also involve an aggressive I/I study to identify sources of I/I in the Main Street sewer so these can be tied into a new storm sewer system or otherwise removed from the wastewater collection system. This I/I study would involve dye testing, smoke testing, and televising to determine unwanted connection points.

Performing a flow analysis on Main Street would also be important for the Village to ensure that the sewer main is properly sized. Flow monitoring in manholes along Main Street may also aid in finding sources of I/I. The information gathered in this work should be used to prioritize work, so projects that require digging within the roadway can be constructed simultaneously with the NYSDOT renovation project.

Cost Estimate: $ 30,000

Task 7.H: Recommendations for Wastewater Collection System Improvements

Provide conclusions and recommendations for improvements to the sewer collection system, including associated costs.

Recommendations for improvements to the wastewater collection system are included in Chapter 9.

8. Recommendations for WWTF Improvements

8.1 Task 6.K: Recommendations for WWTF Improvements

Provide conclusions and recommendations for improvements to the WWTF, including associated costs.

Chapter 8 of the 2012 ICIP will provide recommendations for improvements to the WWTF according to Task 6.K. Decision criteria include desires of Village officials and staff, projected service life and existing capabilities of existing equipment, and safety of plant operators and Village staff. This chapter will rank all potential WWTF projects according to need, and work to incorporate the projects with the greatest need into a 10-year plan for capital improvement projects in the Village.

8.1.1 Related Sections

8.1.1.1 Related Chapters in 2012 ICIP

The following chapters are relevant to this chapter.

- ❖ 2012 ICIP Introduction
- ❖ Chapter 6- Wastewater Treatment Plant
- ❖ Chapter 10- Sewer Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- ❖ Chapter 7- Wastewater Collection System
- ❖ Chapter 9- Recommendations for Wastewater Collection System Improvements
- ❖ Chapter 12- Potential Funding Sources

8.1.1.2 Figures

There are no figures that are specifically relevant to this chapter.

8.1.1.3 Appendices

The following appendix to the 2012 ICIP is relevant to this chapter.

- ❖ Appendix M- Sewer Fund Past and Projected Budgets

8.2 Priority Rankings

After coordinating with Village staff, priority ranking guidelines were developed. These rankings were then assigned to the potential projects for the WWTF outlined in Task 6.J in Chapter 6 of this ICIP. Ranking each project allows the Village to assess whether or not each project should be incorporated into the 10-year plan for capital improvement projects. The ranking guidelines are as follows.

PRIORITY RANKING GUIDELINES FOR WWTF PROJECTS

Priority Ranking	Criteria	Timeline for Completion
Priority 1	❖ Public Health & Safety Concern ❖ Worker Health & Safety Concern ❖ Regulatory Mandate	Add to 10-year plan
Priority 2	❖ Environmental Concern ❖ Grant Availability ❖ Revenue Generation Capability ❖ Operational/Long Term Cost Savings (including making repairs to avoid major failures)	Typically not added to 10-year plan; funding source should be secured to implement these projects
Priority 3	❖ Quality of Life ❖ Ease of Maintenance ❖ Grant Availability	Do not add to 10-year plan; funding source must be secured to implement these projects

All projects listed as Priority 1 will be incorporated into the 10-year plan for capital improvement projects. Most Priority 2 projects will not be incorporated into the 10-year plan, but the Village will remain vigilant in searching for funding opportunities to complete these projects. In some cases, Priority 2 projects will be incorporated into the 10-year plan at the request of Village staff. Priority 3 projects are projects that require the Village to secure a source of funding prior to undertaking the project.

8.3 Ranking Potential WTP Projects

All of the potential projects listed in Task 6.J in Chapter 6 of this ICIP are listed in the table below with a priority ranking assigned to it and any comments on the ranking or projected completion schedule.

PRIORITY RANKINGS FOR POTENTIAL WWTF PROJECTS

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
New Influent Structure and Headworks	$ 450,000	Priority 1	Include in 10-year plan; make this project a top priority in plan
Replace Unit Heaters in Influent Structure	$ 3,600	Priority 2	Only purse if New Influent Structure and Headworks project is not pursued

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Additional Primary Clarifier Tank	$ 300,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WWTF capacity demand increases
Additional Final Clarifier Tank	$ 400,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WWTF capacity demand increases
Rehabilitate Primary Clarifier Sludge Hoppers and "A" Pump Station	$ 65,000	Priority 1	Include in 10-year plan; complete in 2012 or 2013
Cover Primary Trickling Filter	$150,000	Priority 3	
Biotower Improvements- Cover Biotower	$ 175,000	Priority 3	
Biotower Improvements- Rehabilitate Media at Top of Biotower	$ 30,000	Priority 1	Include in 10-year plan; look to complete around 2017
Biotower Improvements- Staircase to Top of Biotower	$ 30,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Rehabilitate Final Clarifiers	$ 25,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village
Rehabilitate "B" Pump Station and Install New Sludge Line	$ 80,000	Priority 3	Village intends to install newly purchased pumps with Village staff
Modify Former Chlorine Contact Tank Sludge Removal System	$ 15,000	Priority 2	Despite Priority 2 ranking, include in 10-year plan
Rehabilitate Anaerobic Digesters- Pump Equipment Replacement	$ 12,500	Priority 1	Already underway, using Village staff
Rehabilitate Anaerobic Digesters- Structural Repairs	$ 45,000	Priority 1	Include in 10-year plan; no specific timeline planned by Village; CPL recommends pursuing this in the near future
Rehabilitate Anaerobic Digesters- Installing Biogas Reuse System	$ 350,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Rehabilitate Anaerobic Digesters- Install New Primary Anaerobic Digester	$ 600,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured, or if WWTF capacity demand increases
Install Composting Process	$ 400,000	Priority 2	Do not include in 10-year plan; pursue only if a funding source is secured
Control Building- Replace Windows and Doors	$ 10,000	Priority 2	Despite Priority 2 ranking, include in 10-year plan
Control Building- Replace Roof and Install Gutters	$ 40,000	Priority 1	Include in 10-year plan; Village is planning to complete this project in 2012
WWTF Site Improvements- Exterior Site Lighting	$ 15,000	Priority 1	Include in 10-year plan; Village is planning to complete this project in 2012
WWTF Site Improvements- Move Yard Hydrant	$ 10,000	Priority 3	
WWTF Site Improvements- Access to Discharge Structure	$ 15,000	Priority 3	
Miscellaneous Site Maintenance	$ 10,000 per year	Priority 1	Include in 10-year plan every year
Alternative Energy at WWTF- Harnessing Wind Power	$ 150,000	Priority 2	Pursue only if a funding source is secured
Alternative Energy at WWTF- Capturing Solar Power	$ 200,000	Priority 2	Pursue only if a funding source is secured
Alternative Energy at WWTF- Water Energy	$ 500,000	Priority 3	Pursue only if technology improves and a funding source is secured

8.4 10-Year Plan for Capital Improvement Projects at the WWTF

In the priority ranking table above, the following projects were identified as Priority 1 projects or as projects that should be included in the 10-year plan for capital improvement projects at the WWTF. The estimated project cost is included in parentheses for each project. For projects that the Village has indicated a projected timeline, this timeline is also included in parentheses.

- New Influent Structure and Headworks ($450,000)
- Rehabilitate Primary Clarifier Sludge Hoppers and “A” Pump Station ($65,000, complete in 2012 or 2013)

- Biotower Improvements- Rehabilitate Media at Top of Biotower ($30,000, complete around 2017)
- Biotower Improvements- Staircase to Top of Biotower ($30,000)
- Rehabilitate Final Clarifiers ($25,000)
- Modify Former Chlorine Contact Tank Sludge Removal System ($15,000)
- Rehabilitate Anaerobic Digesters- Equipment Replacement ($12,500, already underway, to be completed by Village staff in 2012)
- Rehabilitate Anaerobic Digesters- Structural Repairs ($45,000, CPL recommends pursuing this in the near future)
- Control Building- Replace Windows and Doors ($10,000)
- Control Building- Replace Roof and Install Gutters ($40,000, plan to complete in 2012)
- WWTF Site Improvements- Exterior Site Lighting ($15,000, plan to complete in 2012)
- Miscellaneous Site Maintenance ($10,000 per year)

After identifying these projects for inclusion in the 10-year plan for capital improvement projects, a projected timeline was compiled for completing these projects. With the exception of the New Influent Structure and Headworks project, the Village would likely pay for the costs for the above projects out of the sewer budget for the Village. For the purposes of this report, it is assumed that the New Influent Structure and Headworks project will be financed over a 20-year period at 3.5% interest, resulting in an annual cost of approximately $31,700.

The goal for creating this timeline is to distribute the projects so as to even out costs over the length of the 10-year plan. The desired timelines indicated by the Village were also considered, as was the importance of a project in relation to operational or health and safety concerns.

After considering these criteria, CPL recommends undertaking the above projects in the following timeline.

RECOMMENDED TIMELINE FOR COMPLETING WWTF PROJECTS

Fiscal Year	Projects to Complete	Total Estimated Cost for the Year
2012 – 2013	❖ Miscellaneous Site Improvements ❖ Rehabilitate Anaerobic Digesters- Equipment Replacement ❖ Rehabilitate Primary Clarifier Sludge Hoppers and "A" Pump Station ❖ WWTF Site Improvements- Exterior Site Lighting	$ 102,500
2013 – 2014	❖ Miscellaneous Site Improvements ❖ Control Building- Replace Roof and Install Gutters	$ 50,000
2014 – 2015	❖ Miscellaneous Site Improvements ❖ Rehabilitate Anaerobic Digesters- Structural Repairs	$ 55,000
2015 – 2016	❖ Miscellaneous Site Improvements ❖ Control Building- Replace Windows and Doors	$ 20,000
2016 – 2017	❖ Miscellaneous Site Improvements ❖ Biotower Improvements- Staircase to Top of Biotower	$ 40,000
2017 – 2018	❖ Miscellaneous Site Improvements ❖ Biotower Improvements- Rehabilitate Media at Top of Biotower	$ 40,000
2018 – 2019	❖ Miscellaneous Site Improvements ❖ Rehabilitate Final Clarifiers	$ 35,000
2019 – 2020	❖ Miscellaneous Site Improvements ❖ Modify Former Chlorine Contact Tank Sludge Removal System	$ 25,000
2020 – 2021	❖ Miscellaneous Site Improvements	$ 10,000
2021 – 2022	❖ Miscellaneous Site Improvements	$ 10,000

9. Recommendations for Wastewater Collection System Improvements

9.1 Task 7.H: Recommendations for Wastewater Collection System Improvements

Provide conclusions and recommendations for improvements to the wastewater collection system, including associated costs.

Chapter 9 of the 2012 ICIP will meet the requirements of Task 7.H. Decision criteria include desires of Village officials and staff, projected service life and existing capabilities of existing equipment, and safety of plant operators and Village staff.

9.1.1 Related Sections

9.1.1.1 Related Chapters in 2012 ICIP

The following chapters are relevant to this chapter.

- 2012 ICIP Introduction
- Chapter 7- Wastewater Collection System
- Chapter 10- Sewer Fund Financials

In addition to the above chapters, the following chapters may be relevant to this chapter.

- Chapter 6- Wastewater Treatment Facility
- Chapter 8- Recommendations for WWTF Improvements
- Chapter 12- Potential Funding Sources

9.1.1.2 Figures

The following figure for the 2012 ICIP is relevant to this chapter.

- Figure 7- Village Wastewater Collection System

9.1.1.3 Appendices

The following appendix to the 2012 ICIP is relevant to this chapter.

- Appendix M- Sewer Fund Past and Projected Budgets

9.2 Priority Rankings

After coordinating with Village staff, priority ranking guidelines were developed. These rankings were then assigned to the potential projects for the distribution network outlined in Task 7.G in Chapter 7 of this ICIP. Ranking each project allows the Village to assess whether or not each project should be incorporated into the 10-year plan for capital improvement projects. The ranking guidelines are as follows.

PRIORITY RANKING GUIDELINES FOR SEWER COLLECTION SYSTEM PROJECTS

Priority Ranking	Criteria	Timeline for Completion
Priority 1	❖ Public Health & Safety Concern ❖ Worker Health & Safety Concern ❖ Regulatory Mandate	Add to 10-year plan
Priority 2	❖ Environmental Concern ❖ Grant Availability ❖ Revenue Generation Capability ❖ Operational/Long Term Cost Savings (including making repairs to avoid major failures)	Typically not added to 10-year plan; pursue if conditions worsen or if funding source is secured
Priority 3	❖ Quality of Life ❖ Ease of Maintenance ❖ Grant Availability	Do not add to 10-year plan; pursue only if funding source is secured

All projects listed as Priority 1 will be incorporated into the 10-year plan for capital improvement projects. Most Priority 2 projects will not be incorporated into the 10-year plan, but the Village will remain vigilant in searching for funding opportunities to complete these projects. In some cases, Priority 2 projects will be incorporated into the 10-year plan at the request of Village staff. Priority 3 projects are projects that require the Village to secure a source of funding prior to undertaking the project.

9.3 Ranking Potential Sewer Collection System Projects

All of the potential projects listed in Task 7.G in Chapter 7 of this ICIP are listed in the table below with a priority ranking assigned to it and any comments on the ranking or projected completion schedule.

PRIORITY RANKINGS FOR POTENTIAL SEWER COLLECTION SYSTEM PROJECTS

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
Gardeau Street, replace 10-inch main, 350 linear feet (LF)	$ 42,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens
Davis Avenue, replace 8-inch main, 1,000 LF	$ 98,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens
Stanton Street, replace 8-inch main, 450 LF	$ 45,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens

Potential Project	Estimated Project Cost	Priority Ranking	Projected Completion Schedule Comments
South Federal Street, replace 10-inch main, 300 LF	$ 126,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens
Parker Lane, replace 8-inch main with grinder pump system, 1,250 LF	$ 219,000	Priority 2	Do not include in 10-year plan, but pursue this project if funding becomes available
North Main Street, replace manhole frames and covers	$ 19,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens
South Main Street, replace manhole frames and covers	$ 39,000	Priority 2	Do not include in 10-year plan; pursue only if condition worsens
Standpipe Road Pump Station-Generator Replacement	$ 60,000	Priority 2	Do not include in 10-year plan; pursue if funding becomes available
Standpipe Road Pump Station-Electrical Equipment Renovation	$ 60,000	Priority 1	Include in 10-year plan; no specific timeline indicated by Village
Simmons Road Pump Station-Pump Rails and Wet Well Access	$ 15,000	Priority 2	Do not include in 10-year plan; pursue if funding becomes available
Simmons Road Pump Station-Replace Electrical Panel	$ 20,000	Priority 1	Include in 10-year plan; Village is planning on doing this project in 2012
Simmons Road Pump Station-New Pump Skid	$ 85,000	Priority 3	
Genesee Street Pump Station Renovation	$ 20,000	Priority 1	Include in 10-year plan; Village is planning on doing this project in 2012
Purchase Sewer Televising Camera	$ 15,000	Priority 1	Include in 10-year plan; no specific timeline indicated by Village
Miscellaneous Collection System Improvements	$ 25,000	Priority 1	Include in 10-year plan every year
Main Street Sewer Investigation	$ 30,000	Priority 1	Include in 10-year plan; complete in 2012 or 2013

9.4 10-Year Plan for Capital Improvement Projects in the Collection System

In the priority ranking table above, the following projects were identified as Priority 1 projects that should be included in the 10-year plan for capital improvement projects in the sewer collection system. The estimated project cost is included in parentheses for each project. For projects that the Village has indicated a projected timeline, this timeline is also included in parentheses.

- Standpipe Road Pump Station- Electrical Equipment Renovation ($60,000)
- Simmons Road Pump Station- Replace Electrical Panel ($20,000, the Village is planning to do this work in 2012)
- Genesee Street Pump Station Renovation ($20,000, the Village is planning to do this work in 2012)
- Purchase Sewer Televising Camera ($15,000)
- Miscellaneous Collection System Improvements ($25,000 per year)
- Main Street Sewer Investigation ($30,000, complete in 2012 or 2013)

After identifying these projects for inclusion in the 10-year plan for capital improvement projects, a projected timeline was compiled for completing these projects. The Village would likely pay for the costs for the above projects out of the sewer budget for the Village, and so the goal is to distribute the projects so as to even out costs over the length of the 10-year plan. The desired timelines indicated by the Village were also considered, as was the importance of a project in relation to operational or health and safety concerns.

The Village should also consider the impact of a potential sewer main replacement project along Main Street. The extent of such a project would not become evident until the Main Street Sewer Investigation is completed, but if such a project were to be extensive, it would be likely to be financed over a period of time. While this will not be explicitly included in the annual cost calculations, it will be considered that the Village could have an additional debt service charge starting in the 2013-2014 fiscal year.

After considering these criteria, CPL recommends undertaking the above projects in the following timeline.

RECOMMENDED TIMELINE FOR SEWER COLLECTION SYSTEM PROJECTS

Fiscal Year	Projects to Complete	Total Estimated Cost for the Year
2012 – 2013	❖ Miscellaneous Collection System Improvements ❖ Purchase Sewer Televising Camera ❖ Main Street Sewer Investigation	$ 70,000
2013 – 2014	❖ Miscellaneous Collection System Improvements ❖ Standpipe Road Pump Station- Electrical Equipment Renovation	$ 85,000
2014 – 2015	❖ Miscellaneous Collection System Improvements ❖ Simmons Road Pump Station- Replace Electrical Panel ❖ Genesee Street Pump Station Renovation	$ 65,000
2015 – 2016	❖ Miscellaneous Collection System Improvements	$ 25,000
2016 – 2017	❖ Miscellaneous Collection System Improvements	$ 25,000
2017 – 2018	❖ Miscellaneous Collection System Improvements	$ 25,000
2018 – 2019	❖ Miscellaneous Collection System Improvements	$ 25,000
2019 – 2020	❖ Miscellaneous Collection System Improvements	$ 25,000
2020 – 2021	❖ Miscellaneous Collection System Improvements	$ 25,000
2021 – 2022	❖ Miscellaneous Collection System Improvements	$ 25,000

The recommended timeline differs slightly from the initial plan from the Village. The Village had been planning to replace the Simmons Road Pump Station and Genesee Street Pump Station control panels in 2012, but doing so would reduce the available funds for the Village to conduct its Main Street Sewer Investigation. Because of the approaching renovation project, the Village must move to complete this study so it has time to assess sewer replacement options and choose a suitable project.

The panels do not pose an immediate safety or operational threat at the Simmons Road and Genesee Street Pump Stations, whereas the Standpipe Road Pump Station electrical configuration poses both, so it is recommended that the Standpipe Road Pump Station be renovated electrically prior to working on the Simmons Road and Genesee Street Pump Stations. Starting in the 2013-2014 fiscal year, the Village is likely to have an additional debt service for replacing sewer on Main Street.

10. Sewer Fund Financials

The total budgeted appropriations for the Village in the 2011-2012 fiscal year was $3,601,098. Included in this budget is $690,755 for the water fund and $587,845 for the sewer fund. This chapter will focus on the annual sewer fund for the Village, including wastewater collection as well as wastewater treatment.

10.1.1 Related Sections

10.1.1.1 Related Chapters of the 2012 ICIP

The following chapter of the 2012 ICIP is relevant to this chapter.

- 2012 ICIP Introduction

In addition to the above chapter, some or all of the following chapters may be relevant to this chapter.

- Chapter 6- Wastewater Treatment Facility
- Chapter 7- Wastewater Collection System
- Chapter 8- Recommendations for WWTF Improvements
- Chapter 9- Recommendations for Wastewater Collection System Improvements

10.1.1.2 Related Figures in the 2012 ICIP

There are no figures specifically relevant to Chapter 10- Sewer Fund Financials.

10.1.1.3 Related Appendices of the 2012 ICIP

The following appendix to the 2012 ICIP is relevant to this chapter.

- Appendix M- Sewer Fund Past and Projected Budgets

10.2 Current Financial Status

The Village designates its sewer budget accounts with the letter G in its annual budget schedule. The individual accounts in the budget were categorized for the purpose of this report according to how they are presented in the annual budgets from 2006-2007 to 2010-2011. The format for the budget changed for the fiscal year 2011-2012. Appendix M at the end of this report shows how the individual accounts for appropriations and revenues were categorized for the purposes of this report.

10.2.1 Sewer Fund Revenues and Appropriations

Appendix M also shows the revenues and appropriations for the Village sewer fund. On the Budgetary Cost Table for Wastewater Treatment Facility and Sewer Collection System, the actual revenues and appropriations are shown from 2004-2005 through 2008-2009, as these are reviewed in the second annual budget after the fiscal years (for example, the actual revenues and appropriations from 2004-2005 are in the 2006-2007 budget packet). In the absence of actual data, the budgeted revenues and appropriations for 2009-2010 through 2011-2012 are shown on the table in the Appendix M.

The table below shows all of the appropriations and revenues for the sewer fund starting in 1994-1995, taking data from the 2001 ICIP and from the budgets provided by the Village starting in the fiscal year 2006-2007 for the 2012 ICIP. From 1999-2000 through 2003-2004, the actual budget data was not available, but the 2001 ICIP published the amended budget from 1999-2000, and the adopted budget for 2000-2001. For the 2009-2010, 2010-2011, and 2011-2012 fiscal years, the adopted budgets were included, as the actual appropriations and revenues were not available.

ACTUAL SEWER FUND APPROPRIATIONS AND REVENUES

Fiscal Year	Appropriations	Appropriations Comments	Revenues	Revenues Comments
1994 – 1995	$ 279,533	Actual appropriations	--	No data available
1995 – 1996	$ 319,688	Actual appropriations	--	No data available
1996 – 1997	$ 375,238	Actual appropriations	--	No data available
1997 – 1998	$ 360,612	Actual appropriations	--	No data available
1998 – 1999	$ 356,454	Actual appropriations	--	No data available
1999 – 2000	$ 484,371	Amended budget	$ 471,083	Actual Revenues
2000 – 2001	$ 419,459	Adopted budget	$ 421,083	Estimated Revenues
2001 – 2002	--	No data available	--	No data available
2002 – 2003	--	No data available	--	No data available
2003 – 2004	--	No data available	--	No data available
2004 – 2005	$ 413,996	Actual appropriations	$ 426,108	Actual revenues
2005 – 2006	$ 441,518	Actual appropriations	$ 431,762	Actual revenues
2006 – 2007	$ 442,990	Actual appropriations	$ 400,791	Actual revenues
2007 – 2008	$ 508,291	Actual appropriations	$ 472,604	Actual revenues
2008 – 2009	$ 511,624	Actual appropriations	$ 476,969	Actual revenues
2009 – 2010	$ 562,590	Adopted budget	$ 494,750	Adopted budget
2010 – 2011	$ 511,275	Adopted budget	$ 495,250	Adopted budget
2011 – 2012	$ 587,845	Adopted budget	$ 504,160	Adopted budget

Sewer fund budgets from the past 7 fiscal years indicate that the Village has been operating at a deficit in its sewer fund. For the past three years, the Village has a budgeted cumulative deficit in the sewer fund of $167,550. Presently, the reserve sewer fund balance is empty.

10.2.2 Sewer Fund Debt Service

The debt service category for future budgets was estimated using debt service payoff information provided by the Village, with interest estimated based on the payoff schedule. The Village is currently paying debt service for its update of the WWTF in 1994, rehabilitating the digesters in 2002, and making equipment purchases for the plant. The 38-year debt service for the original construction in 1973 was fully paid off by the end of the 2010-2011 fiscal year, and the debt service for equipment purchases for the WWTF will be paid off by the end of the 2011-2012 fiscal year.

The table below shows the four sources of sewer debt service on the books for the 2011-2012 fiscal year, with the outstanding principal for each project, the interest rate for each loan, and the maturity date of each loan. The 1994 WWTF updates project was financed in two different loans, as noted in the table.

OUTSTANDING DEBT SERVICES IN SEWER FUND, 2011-2012 FISCAL YEAR

Project	Outstanding Principal (as of 5/31/11)	Interest Rate	Maturity Date
1994 WWTF Update	$ 165,000	2.75%	2014
1994 WWTF Update	$ 20,000	3.70%	2014
2002 Digester Rehab	$ 355,000	4.75%	2022
WWTF Equipment	$ 25,170	(N/A)	2012

In addition to the above debt services, the Village will have a one-year payment for the Lake Street Pump Station Improvements project to be completed in 2012. The awarded construction cost for the project is $72,228.00, and the Village is paying for the project upfront, with no additional debt service required.

10.2.3 Sewer Service Rates

The primary source of revenue for the Village sewer fund is through sewer use charges. The Village charges users a quarterly base rate depending on if they are located within the Village or outside of the Village. In addition, a usage charge is applied per 1,000 gallons of water used per quarter, based on water meter data.

The Village passed legislation to raise the sewer rates in two phases, beginning with a rate increase effective March 1, 2011, and culminating with a rate increase effective June 1, 2012. The table below summarizes the sewer charges for customers after these two increases.

SEWER USE RATES CHARGED BY THE VILLAGE

	Effective March 1, 2011		Effective June 1, 2012	
	Flat Base Rate (charged quarterly)	Water Use Rate (per 1,000 gallons)	Flat Base Rate (charged quarterly)	Water Use Rate (per 1,000 gallons)
Users Inside the Village	$ 25.00	$ 4.25	$ 27.50	$ 4.35
Users Outside the Village	$ 40.00	$ 4.95	$ 42.50	$ 5.10

The table below shows the average quarterly bill and total annual expense for residences within the Sewer service area. This table assumes an average output of 170 gallons of wastewater per day per residence. The quarterly bill assumes a 90 day billing period, while the total annual expense assumes usage over 365 days.

AVERAGE RESIDENTIAL SEWER BILL IN THE SEWER SERVICE AREA

	Effective March 1, 2011		Effective June 1, 2012	
	Quarterly Bill	Total Annual Expense	Quarterly Bill	Total Annual Expense
Users Inside the Village	$ 90.03	$ 363.71	$ 94.06	$ 379.92
Users Outside the Village	$ 115.74	$ 467.15	$ 120.53	$ 486.46

10.3 Guidelines for Evaluating a Rate Structure

Allocating costs among Village users can be a complex and contentious issue. Because of the difficulty of this task, the Village has attempted to come up with the fairest method it can for charging its sewer users. Some of the difficulties in coming up with a fair method for fairly allocating sewer costs are:

- the quantity of water used by users can vary greatly from user to user,
- peak and average flow outputs can vary from user to user,
- the character of wastewater discharged into the sewer system may require more or less treatment when compared to other users,
- inflow and infiltration are difficult to quantify and allocate,
- wastewater discharge is not metered on an individual basis for all users like water consumption is, and
- the calculation of benefits to unoccupied buildings or undeveloped properties can be difficult, because these buildings and properties can derive benefits from the wastewater system simply by being located within the collection system's reach.

These issues need to be considered if a fair means for allocating charges is to be determined. One such way to do this is to undertake a use and benefit analysis, but this can be a difficult and time-consuming process. Because there are only a few commercial and industrial users in the collection system, the process of undertaking a use and benefit analysis would not be worth the time and expense to the Village.

The current system used by the Village, charging users a flat base rate and a consumption rate, is a standard method for billing sewer system users. This approach attempts to balance the effects of varying wastewater discharge flows and characteristics from different users with the common benefits enjoyed by all users within the collection system network.

10.4 Considerations for a Financial Rate Structure

Before a rate structure for sewer use charges can be established, a goal for the total amount of revenue required must be established. The revenue must be sufficient to provide for future needs of the collection system and WWTF in addition to offsetting the costs of operating, maintaining, and improving the system. The Village determines its revenue requirements on a cash basis, so that the charges actually collected in one fiscal year offset the actual expenses of that year. The expenses that need to be accounted for include:

- operation and maintenance expenses (labor, materials, supplies, services),
- labor, materials, and supplies for capital projects,
- routine capital purchases,
- payment for treatment obligations,
- debt service requirements (principal, interest, reserves, etc.),
- equipment replacement at the WWTF,
- routine WWTF improvements, and
- major capital improvements not funded in a debt service.

In addition to these considerations, the Village should consider creating a capital reserve fund to provide funds for anticipated capital expenditures required for existing equipment. For instance, the Village would set aside funds incrementally every year for new pumps, so if a pair of existing pumps needs to be replaced, the Village would be able to do so using the capital reserve fund instead of absorbing a large increase in expense within the sewer fund budget in one year.

The American Society of Civil Engineers has developed a list of financial guidelines to aid owners of public works systems in creating financial strength within these systems.

- Revenues should be sufficient to support current expenditures, including debt service and other obligations of the system.
- Debt should only be used to finance capital expansion and improvements to at plant, and not for current expenses.
- Contingency reserves should be maintained at levels sufficient to provide for unanticipated, non-recurring costs such as major failures.

- ❖ Capital projects financed through the issuance of bonds should be financed for a period of time not to exceed the expected useful life of the project.
- ❖ Net revenues (equal to the difference between gross revenues and operational and maintenance expenses) available for debt service should be generated at a level of 1.2 to 1.5 times the annual debt service requirement.
- ❖ Net revenues that exceed operating expenses and debt service should be used for capital expenditures and restoration of contingency reserves.
- ❖ Capital financing should be provided through debt financing, current revenues, and contributions from developers, customers, and other governmental entities.
- ❖ Cost of service studies should be performed periodically, and relation of revenues to cost should be reviewed annually.
- ❖ Finds generated by the utility should be used solely for the development, operation, and maintenance of the systems.

10.5 Implementing the 2012 ICIP

In order to fund the recommended projects for the wastewater treatment and collection systems as discussed in Chapters 8 and 9, the future budget for the Village must be estimated. To project future budgets for the sewer fund, a starting point for the 2012-2013 fiscal year was determined from past budgets, existing debt service information, and discussions with Village staff. After estimating the appropriations, it became apparent that using the existing revenues structure would leave the sewer fund in a deficit, so one potential course of action was presented to help the Village establish a sustainable means for earning revenues for its sewer fund.

10.5.1 Estimating Future Appropriations

Discussions with the Village have revealed that the budgeted appropriations for the past three fiscal years included additional funds for small projects and repairs, similar to the type of projects discussed in this ICIP. For the purposes of this report, it is assumed that these additional funds in the sewer fund total approximately $50,000 per year. In addition, the debt service information was used to determine the debt service payment schedule for 2012-2013 and beyond.

Taking the 2011-2012 budgeted appropriations of approximately $588,800, the $50,000 and the debt service payment of $118,200 were subtracted to get $420,600. This was the goal for the 2012-2013 sewer fund appropriations, not including the expected debt service in 2012-2013 or the cost of future projects recommended in this 2012 ICIP. Using past budgets as a guide, an approximate budget was estimated for each of the appropriation categories so the sum would be approximately $420,600. For the fiscal year of 2013-2014 and forward, the future budgets were estimated by adding an additional 2% every year to the funds in these categories.

After compiling this estimate, the expected debt services for 2012-2013 and beyond, as well as the estimated project costs from the recommendations in Chapters 8 and 9, were added to the appropriation total. The New Influent Structure and Headworks project, which was assumed to be financed over 20 years at an interest rate of 3.5% per year, was assumed to begin to be paid in the 2013-2014 fiscal year, adding an additional $31,700 per year to the total appropriations in the sewer fund.

10.5.2 Estimating Future Revenues

After estimating the future appropriations, it became apparent that paying for the 2012 ICIP would leave the budget running a deficit of an estimated $170,000 in the sewer fund for the 2012-2013 fiscal year if the planned rate structure coming into effect on June 1, 2012 were to be implemented. This deficit would be reduced significantly in the fiscal year 2015-2016, because the recommendations for projects at the WWTF involve many projects for the next three years and few projects after that. There are a few options for covering this deficit.

One possible way to cover the deficit involves a combination of raising the sewer rates to greater levels than what they are scheduled to be starting June 1, 2012, and taking out a loan for each of the next three fiscal years. The proposed loans would be $60,000 per year for the fiscal years 2012-2013, 2013-2014, and 2014-2015, assumed to be accruing interest at 3.5%. Starting in the 2015-2016 fiscal year, the Village would start paying back the total loan, assuming the interest rate remains at 3.5%. The payments would be approximately $30,500 per year, and this loan would be paid back by the end of the fiscal year 2021-2022, which would be a timeframe of 7 years. By taking out these loans and paying them back over the course of the 10-year project planning period, the Village would be able to distribute the payments for the recommended WWTF improvements over a larger time frame, lessening the impact of the high capital costs for these projects.

In combination with these loans, the Village could also increase sewer rates by a greater amount than what they are scheduled to be effective June 1, 2012 in order to completely cover the proposed deficit. The table below compares the actual rates that are to come into effect on June 1, 2012 to one set of proposed rates that, coupled with the loans described above, would cover the deficit in the sewer fund for the 2012-2013 fiscal year.

PROPOSED SEWER USAGE RATES FOR 2012-2013 FISCAL YEAR

	Actual Rates Effective June 1, 2012		Proposed Rates 2012-2013 Fiscal Year	
	Flat Base Rate (charged quarterly)	Consumption Rate (per 1,000 gallons)	Flat Base Rate (charged quarterly)	Consumption Rate (per 1,000 gallons)
Users Inside the Village	$ 27.50	$ 4.35	$ 30.00	$ 5.25
Users Outside the Village	$ 42.50	$ 5.10	$ 45.00	$ 5.95

These rates would allow the Village to operate at a modest surplus of approximately $500 in 2012-2013. The table in Appendix M considers these rates in 2012-2013, and proposes further rate increases every year until 2016-2017. If the Village were to pursue the scheduled rate structure proposed in Appendix M, the Village could reestablish the sewer reserve fund and have a balance of approximately $209,000 within 10 years. This would allow the Village to pursue some of the projects rated as Priority 2 projects, which may become Priority 1 projects within the next 10 years.

The rate increase in 2012-2013 in this proposal would be large, with increases to the total sewer bill for the average residence ranging from 18% to 23% from the 2011-2012, depending on whether the user resides within the Village or outside the Village. From 2013-2014 through 2016-2017, the rates would increase would be $0.05 per thousand gallons per year, resulting in a sewer bill increase of 0.7% or less every year.

11. Village Hall Energy Audit

11.1 Introduction

As part of the 2012 ICIP, the Village wished to have an energy audit completed on the Village Hall in addition to the tasks in the previous chapters. The Village Hall is located at 45 North Main Street in the Village, and contains the Police Department, Fire Department, Village Court, and Village staff offices, including offices for the Village Administrator, the Village Clerk, Superintendent of Public Works, and the meeting room for the Village Board. Figure 1 at the end of this report shows the location of the Village Hall, and Appendix N shows photographs of the Village Hall site.

The energy audit of this building addresses several potential energy conservation measures applicable to the existing building. Discussions with staff during site visits by CPL in each department housed in the Village Hall revealed some desired improvements for energy conservation.

The site visits revealed that the structure does not meet the current New York State ventilation rates required by the *Mechanical Code of New York State, 2010 Edition*. Unless this building undergoes a major renovation or change of use, however, it would not be required to be brought up to the current code standards. If the building were to be brought up to current code requirements for ventilation, this would significantly increase the energy required to maintain the space temperatures required by the code.

11.1.1 Related Sections

11.1.1.1 Related Chapters of the 2012 ICIP

The following chapter of the 2012 ICIP is relevant to this chapter.

- 2012 ICIP Introduction

In addition to the above chapter, the following chapter may be relevant to this chapter.

- Chapter 12- Potential Funding Sources

11.1.1.2 Figures

The following figure for the 2012 ICIP is relevant to this chapter.

- Figure 1- WTP, WWTF, Village Hall Location Map

11.1.1.3 Appendices

The following appendices to the 2012 ICIP are relevant to this chapter.

- Appendix N- Village Hall Site Photographs
- Appendix O- Energy Use Data for Village Hall

11.2 Common Utilities for Entire Building

The Village provided utility bills from May 2009 through April 2011 for the Village Hall to CPL to aid in performing this energy audit. Appendix O at the end of this report contains a summary of these bills. The annual energy consumption in the building is approximately 8,400 therms of natural gas per year, and 62,900 kilowatt-hours (kWh) of electricity consumption with a peak power demand of 208 kilowatts (kW). The annual energy cost for the Village Hall is approximately $8,000 for natural gas and approximately $7,500 for electricity. The rate for natural gas is approximately $0.95 per therm, and the blended electrical rate for electricity is approximately $0.12 per kWh.

11.2.1 Heating

Air temperature and environment is controlled by a combination of a low-pressure, steam heating system and several window-mounted air conditioning units. The boiler for the heating system is a Pennco model 41J-500S low pressure steam boiler fueled by natural gas, that has an 80% efficiency and a output capacity of 400,000 British thermal units (Btu) per hour (one thousand Btu/hour is abbreviated as MBH). The boiler was in the process of being installed at the time of the CPL site visit. Steel distribution piping, condensate return piping, a simplex condensate return system, and cast iron pedestal radiators transmit the heat throughout all of the departments in the building.

Control of the heating system is located at the radiators, using a manually-operated angle valve on the inlet side of the radiator to regulate the flow of steam into the radiator. This control could be updated with by retrofitting it with a valve controller operated by a thermostat, the retrofit would have ramifications for the rest of the system, including to the condensate and boiler system. More in-depth analysis would be required to ensure the boiler and condensate receiver could accommodate these changes. The New York State Energy Research and Development Authority (NYSERDA) does not offer any Pre-Qualified Incentives for this type of work.

11.2.2 Cooling

Cooling in the building is available through the use of self-contained window-mounted air conditioning units. The average energy efficiency ratio (EER), which is a ratio of the output cooling (in Btu/hour) to the input electrical power (in watts), of the window air conditioning units is approximately 10.2, which is within typical ranges for these types of air conditioners. Higher EER values are indicative of more energy-efficient units.

After these units were installed, the *Energy Conservation Construction Code of New York State* (commonly referred to as the "Energy Code") has adopted using the seasonal energy efficiency ratio (SEER) for measuring the efficiency of window-mounted air conditioning units. The SEER accounts for partial use of these units during seasonal transition months, whereas the EER is less effective in accounting for such conditions. According to the Energy Code, the minimum SEER for these air conditioning units is 12.0 at the capacities currently installed.

The use and potential energy savings for the air conditioning units throughout the building are discussed in the following sections for each department of the building.

11.2.3 Water Fixtures and Water Heater

A new water heater for the Village Hall building was installed in 2008. The heater is a natural gas heater, and because of its age, it is unlikely that replacing it would generate meaningful energy savings.

Replacing some of the water fixtures at the Village Hall may reduce water bills and possibly energy costs. Installing dual-flush or low-flush toilets would reduce water consumption, and installing automatic toilet flush valve sensors would reduce the potential for leaking at the toilet. Likewise, automatic sensor fixtures in the sinks in the bathroom may save water and may save energy by reducing the potential for hot water leaks in the sink. The automatic sensors require minimal power, and these changes would help make the Village Hall more environmentally sustainable.

11.2.4 Windows and Insulation

The windows at the Village Hall do not appear to be original to the building, but their age does not make them very energy efficient. Age aside, the condition of the windows was satisfactory. The simple payback for replacing windows is typically very poor from an energy saving standpoint, so this was not investigated for this building. The Village may wish to replace the windows for operational or aesthetic reasons, but the savings from an energy standpoint would not cover the cost of installing new windows during the expected usable life of the windows.

The building probably has minimal insulation on its outside walls, but this would have a very poor payback period from an energy savings standpoint. The cost of installing the insulation would be compounded by potential asbestos or lead abatement issues and the need to create framing to install the insulation. Every room in the building would be made smaller by insulating the walls, and all of the window sills would need to be extended and supported. Installing insulation may also interfere with the steam heating system, as the many registers are located immediately adjacent to exterior walls and would have to be moved. For this reason, the possibility of installing insulation was not considered for this building.

11.3 Police Department

11.3.1 Lighting System

At the time of the site visit by CPL staff for this energy audit, the Village had upgraded the lighting in the office of the Chief of Police to LED fixtures, while the remainder of the Police Department utilizes standard T-12 fluorescent light fixtures. After this site visit, the Village upgraded all of the T-12 fixtures to use more efficient T-8 bulbs. This upgrade was the most cost-effective lighting upgrade the Village could undertake within the Police Department, and it is estimated that it could generate an energy savings of up to 4,400 kWh per year. The electricity bill could be reduced by up to an estimated $530 per year, using the blended electricity rate for the Village Hall complex of $0.12 per kWh. There are no further energy saving opportunities for lighting in the Police Department.

11.3.2 Window Air Conditioning Unit Replacement

NYSERDA offers Pre-Qualified Incentives for replacing inefficient air conditioning units, such as the air conditioning units used throughout the Village Hall. The incentive is $125 per ton of cooling for units that are not greater than 5.4 tons and have a minimum SEER value of 14.0 (or an EER value of 11.7). CPL has determined that two of the existing units within the Police Department would qualify for these incentives, with one located in the office of the Chief of Police and the other located in the Interview Room.

Replacing these units will result in an approximate annual energy savings of 104 kWh, which would save approximately $12.50 per year at a rate of $0.12 per kWh. The Village would be eligible for $250 in incentives from NYSERDA, but the estimated cost to replace these units would be $2,000. The simple payback for this would far exceed the expected useful life of the air conditioning units, even including the NYSERDA incentives. Therefore, this is not recommended at this time as an energy-saving measure. Should either or both of these units break down in the future, the Village should look into the Pre-Qualified Incentives offered by NYSERDA to try and reduce some of the costs for replacement.

11.4 Fire Department

11.4.1 Lighting System

At the time of the site visit by CPL staff for this energy audit, the lighting fixtures serving the Fire Department had all been upgraded to T-8 fluorescent lamps and ballasts. Due to safety concerns, it is not recommended to convert the existing manual switch lighting controls to occupancy sensor controls. There are no further energy saving opportunities for lighting in the Fire Department.

11.4.2 Garage Bay Heating

The Fire Department for the Village has two garage bays for its trucks: one with an entrance from North Main Street, and the other from the entrance on Gardeau Street. The garage bay accessed on Gardeau Street is located one level below the entrance on North Main Street.

The lower garage bay for the fire trucks utilizes gas-fired infrared heaters to heat the garage. Infrared heaters transmit heat from infrared lamps. As a result, the heaters do not directly heat the air in the space, but instead heat the surfaces within the space that the infrared light rays touch, including the exterior of the trucks, floors, walls, and people in the garage. Because infrared heaters do not heat the air in an entire space, they are very efficient for garage bays with large spaces, as the heaters target equipment and people in the space without wasting energy on heating all of the air in the space. There are no other heating technologies for this space that would warrant changing out the existing infrared heaters.

The garage bays with access to North Main Street utilize steam unit heaters for heating the space. Gas-fired infrared heaters would likely provide more efficient heating for the garage bay space in the North Main Street garage, but removing the steam units could impact the steam system throughout the rest of the building. Steam heaters are effective for heating garage spaces, so switching to infrared heaters for modest energy savings is not worth the risk to impacting the steam heating system for the building.

11.5 Village Staff Offices

11.5.1 Lighting System

At the time of the site visit by CPL staff for this energy audit, some of the light fixtures in the portion of the building devoted to Village staff had been upgraded to utilize T-8 fluorescent lamps. The remainder of the fixtures in this area had used standard T-12 fluorescent light fixtures.

After this site visit, the Village upgraded all of the remaining T-12 fixtures to the more efficient T-8 fixtures. This upgrade was the most cost-effective lighting upgrade the Village could have done in the Village staff offices, and it is estimated that this will generate an energy savings of up to 11,900 kWh per year. This will reduce the energy bill by an estimated $1,430 per year, using the blended electricity rate for the Village hall of $0.12 per kWh. There are no further energy saving opportunities for lighting in the Village staff offices.

11.5.2 Window Air Conditioning Unit Replacement

Due to the poor payback of the window-mounted air conditioning units evaluated in the Police Department portion of the building, upgrading these units in the Village staff portion of the building was not examined. There are no additional incentives available for this portion of the building at this time.

11.6 Alternative Energy Sources

The Village could pursue using alternative energy sources, such as wind power or solar power generated on-site.

11.6.1 Wind Power

The Village could pursue generating wind power at the Village Hall building to reduce electricity costs for the building, but this would present many complications. Wind turbines are regarded as an eyesore, and it may cause contention to install a wind turbine in the center of the historic area of the Village. Turbines are also typically noisy, which could also cause contention, as the area around the business district is surrounded by residences. The lack of space around the Village Hall makes locating a wind turbine difficult as well.

Installing wind power may not be cost effective. The Village currently spends an average of $630 per month on electricity at the Village Hall site, which is $7,560 per year. Natural gas would be unaffected at the site without replacing the steam heating system, the hot water heater, and other gas-fired appliances at the building. The estimated total cost for a wind turbine is $135,000. The simple payback for such a project would be a minimum of 17.9 years, and that assumes that all electricity demand could be satisfied by the wind turbine, which is unlikely. Due to the likely opposition of such a project and the relatively long simple payback period, CPL does not recommend pursuing wind power for the Village Hall site.

11.6.2 Solar Power

Solar power could be utilized at the site in two different ways: to provide electrical energy at the site, or to heat water for the site. In either case, the roof of the Village Hall building has unobstructed southern exposure, but mounting panels on the roof may require relocating some of the equipment already mounted to the top of the Village Hall roof, including the police radio transmission tower. The flat roof above the fire department garage has plenty of space and minimal equipment mounted to the roof, but its southern exposure is somewhat blocked by the taller Village Hall building on the southwest side of the garage bays.

Electric solar power would be used to reduce the electricity bill for the Village by supplying electrical energy demand and/or by reducing the peak power demand from the grid. This would not impact any of the gas-fired appliances, so the absolute maximum savings would be the electricity bill for the year, which is $7,560 on average, but the actual savings would likely be less than this. The estimated total cost for installing this system would be approximately $150,000, so the minimum payback period would be 19.8 years, assuming the entire electricity demand is met by the solar panels, which is unlikely. Because of the high capital expense and long payback period, CPL does not recommend installing solar electricity at this time. If grant funding becomes available for such projects in the future, the Village may wish to re-evaluate solar power.

The other alternative for solar power would be as part of a solar heating water system. Solar heating water systems use the energy from the sun and convection to provide heating energy for water in the building. Water can circulate through the solar panels and be heated directly by the sun, or a separate fluid can circulate through pipes and convey the sun's energy to the heating tank. This system would only serve to reduce energy consumed when heating up water at the Village Hall.

Some of the issues with this system involve the fact that western New York does not receive a lot of sunshine, particularly in winter months. Concerns with water freezing in the pipes as it circulates would be a concern in winter time, and the cold and lack of sun in the winter would severely diminish the efficiency of the system. As a result, the energy savings would not be substantial enough to justify this type of system. The Village spends $670 per month for natural gas on average, which is $8,040 per year. Of this only a fraction of that is used in the hot water heater, and because of the inefficiency of the system, particularly in winter, only a fraction of that cost would be saved by this system. Because of the low expected energy savings, CPL does not recommend installing a solar water heating system at the Village Hall. If grant funding becomes available for such projects in the future, the Village may wish to re-evaluate installing a solar water heating system.

11.7 Recommendations

After evaluating the energy usage throughout the Village Hall building, CPL does not have any recommendations for the Village to pursue for the purpose of saving energy.

All of the lights have been upgraded in the most cost-effective manner, leaving minimal energy savings to be garnered by modifying the lighting system for the building.

At this time, pursuing alternative energy sources is not likely to result in energy savings substantial enough to justify installing these technologies. Installing a wind turbine at the site in particular could generate stern opposition, as it would impact the visual appeal of the nearby historic business district and would disrupt the quiet residential environment of the Village for residences near the Village Hall. Solar power would face less opposition and would have less impact on its surroundings, but it would not be cost effective over its lifetime. Perhaps if grant opportunities arise in the future, the Village could evaluate the value of installing an alternative energy source at the Village Hall site, but at the present time it is not recommended to do so.

The Village may wish to pursue some of the other measures discussed in this chapter, such as replacing windows or replacing air conditioning units, but such projects would not be cost effective from a pure energy savings standpoint. The Village should keep in mind that NYSERDA offers Pre-Qualified Incentives for air conditioning units when these units reach the end of their useful life, but the small energy savings and the long payback period do not justify replacing these units for energy reasons only.

12. Potential Funding Sources

12.1.1 Related Sections

12.1.1.1 Related Chapters of the 2012 ICIP

The following chapter of the 2012 ICIP is relevant to this chapter.

- 2012 ICIP Introduction

In addition to the above chapter, some or all of the remaining eleven chapters in the 2012 ICIP may be relevant to this chapter.

12.1.1.2 Related Figures in the 2012 ICIP

There are no figures specifically relevant to Chapter 12- Potential Funding Sources.

12.1.1.3 Related Appendices of the 2012 ICIP

There are no appendices specifically relevant to Chapter 12- Potential Funding Sources.

The sections below describe some of the funding and financing options that may be available to the Village.

12.2 Clean Water State Revolving Fund and Drinking Water State Revolving Funds

The United States Environmental Protection Agency (EPA) allocates funds to New York State through the Environmental Facilities Corporation (NYSEFC) for the Clean Water State Revolving Fund Loan Program (CWSRF) and Drinking Water State Revolving Fund (DWSRF). The CWSRF and DWSRF allocate funds to all communities, giving no priority to any project based on the size of the community. The CWSRF program primarily provides funds to assist in the construction of publicly owned wastewater treatment plants, as well as pollution management and estuary management. The DWSRF program provides financing for needed drinking water infrastructure improvements, including work on water treatment plants, distribution systems, and tanks.

For a project to be eligible for funding under the CWSRF, it must include construction or upgrading of a wastewater treatment plant or collection system. This includes construction or upgrading devices and systems used in the storage, treatment, recycling, and reclamation of municipal sewage. Funds are not provided for the maintenance or operation of facilities.

For a project to be eligible for funding under the DWSRF, the project must include construction or upgrading a water treatment plant or some part of the distribution network, including water main and storage tanks. Funds are not provided for the maintenance or operation of facilities.

The CWSRF and DWSRF provide several different types of assistance including zero interest short term loans and low interest long term loans. Grants (in the form of principal forgiveness) and subsidized loans can be available for communities that can demonstrate financial hardship based on median household income (MHI). The subsidized loans can have interest rates as low as 0%, and are typically financed over a 30-year period. In order to be eligible for the loan, the project must serve residential populations and must be environmentally significant as determined by the commissioner of the New York State Department of Environmental Conservation (NYSDEC). In addition, the total project cost cannot be more than $14 million.

The Village should ensure that any project it undertakes meets the requirements of the CWSRF or DWSRF. For example, the Village should ensure that the requirements for the Davis-Bacon Wage Rates and the Minority and Women in Business Enterprise/Equal Employment Opportunity (MWBE/EEO) requirements are met, even if financing for the project seems unlikely, in the event that funding becomes available in the immediate future. This has happened before, as the Village of Bergen was unexpectedly able to secure a 0% long-term loan at the last minute a few years ago. The Village of Bergen had previously had financing secured through the United States Department of Agriculture (USDA), but after design was completed for the project the loan from the NYSEFC became available and the Village of Bergen was replaced the financing package from the USDA with the 0% loan package.

12.3 United States Economic Development Administration (USEDA)

The USEDA, Department of Commerce, provides monies to areas to encourage economic development. The USEDA gives grants, typically not exceeding 50% of the project, directly to approved applicants in order to encourage economic growth and create employment.

To be eligible for an USEDA grant, the project must be intended to improve the land qualities in order to create an environment for businesses to succeed, create additional long term employment or benefit unemployed and low-income families for an extended period of time. It is also mandatory that the project be a part of the area's comprehensive economic plan, and the area must have adequate funds for the remainder of the project cost. The project area must also fall into one of the following categories: low per-capita income, unemployment above national average, or an actual/anticipated rise in unemployment.

Grants are used to directly fund approved applicants. The maximum amount of the grant is usually 50%, but can increase to 80% of the project cost in severely depressed areas. Public works projects are eligible for a 10% bonus grant from the program.

12.4 United States Department of Agriculture (USDA)

The USDA provides loans and grants to communities with no more than 10,000 people or to rural communities with no population limits. In order for the community to be eligible for these loans and/or grants it must:

- Be unable to commercially obtain a loan at reasonable rate/terms,
- Have the ability to repay the loan, and
- Maintain and operate the facilities and the new facilities must be in compliance with all laws and standards.

The programs are administered on a national level by the Rural Utilities Service, a branch of the USDA, through state offices that distribute the funds to districts and municipalities. Funding is formulated based on rural population, poverty, and unemployment.

The program is implemented in order to provide rural communities with basic human amenities and to promote the growth of these rural areas. The program allocates funds for installation, repair, maintenance, or expansion of current facilities.

Loan stipulations include the repayment of the loan within 40 years or by the end of the design life (the lesser of the two). Loans come directly from the USDA or are from commercial third-party lenders, in which case 90% is guaranteed by the USDA.

The USDA may award grants if the project is within a low to medium MHI range. Eligible projects must take place in a community where the population is not projected to decline below the designed project population. The maximum grant amount is based on MHI of the service area. For a service area with an MHI less than $30,000, the maximum grant is $1 million, if the MHI is between $30,000 and $35,000 then the maximum grant amount is $750,000, and if the MHI is greater than $35,000 then the maximum grant amount is $500,000. The grants are used to reduce costs to a reasonable level for the municipality, and they can be used in conjunction with loans if the community is able to repay only part of the project cost.

The USDA also provides grants to fund nonprofit organizations that provide technical support and training to rural communities with regard to the water and waste disposal. There are several organizations operating throughout the country with offices in each state.

12.5 Community Development Block Grant

The Office of Community Renewal, an office within the New York State Homes & Community Renewal (NYSHCR), administers the Community Development Block Grant (CDBG) program, previously operated as the "Small Cities" program. The CDBG is a program designed to provide direct assistance to small, rural communities in New York State. The funding, in the form of grants, is typically allocated to small communities with aging infrastructure that requires updating or expansion.

In order to be eligible, the community must demonstrate a need for the upgrade or expansion in response to a public health issue from failing public or private sewer systems. Communities must also have a population below 50,000 people and demonstrate low to moderate income levels.

Towns, villages, and cities are eligible to receive grants for up to $600,000 for public infrastructure (water/sewer only) projects through the CDBG program. One application per year is accepted per project annually, but a municipality could conceivably be awarded multiple grants over multiple years for the same project by applying for different parts of a project over those years.

12.6 New York State Energy Research and Development Authority

Funding may also be available through the New York State Energy Research and Development Authority (NYSERDA). A program was created by this Authority to encourage municipalities to reduce energy costs associated with water and wastewater treatment through the issuance of matching fund grants. The priority areas include promoting innovative and energy efficient treatment technologies in New York State, such as developing innovative solutions for disinfection, and optimizing treatment plant performance to improve efficiency and increase capacity.

One way to obtain funding through NYSERDA is through the Existing Facilities Program. The two main categories for funding in this program are Pre-Qualified Incentives and Performance-Based Incentives. The Pre-Qualified Incentives provide a list of requirements that new equipment must meet, and provides partial reimbursements for installing this equipment. The equipment can include lighting equipment, equipment for heating, ventilation, and air conditioning (HVAC), motors, and variable frequency drives (VFDs), among other types of equipment. Typically, applications for reimbursements must be made within 90 days of the purchasing of equipment, and documentation must be provided to prove the equipment purchased is eligible to receive the Pre-Qualified Incentives.

The Performance-Based Incentives are more complicated to obtain, as they require engineering analysis as well as measurement and verification requirements. In order to receive funds through Performance-Based Incentives, it must be proved that a new piece of equipment will achieve minimum levels of energy efficiency and energy consumption reductions. Funds are available through these incentives on a larger scale and can be applied to larger pieces of equipment than what is typically eligible through the Pre-Qualified Incentives. For instance, replacing blowers at a site would potentially be eligible for Performance-Based Incentives if those blowers reduce energy consumption at the site by a specified amount.

12.7 Water Quality Improvement Project Program

The Water Quality Improvement Project (WQIP) program is a competitive funding program for projects that are intended to improve the quality of public waters throughout the state, including improvements to municipal WWTFs and storm systems. The program is administered by the NYSDEC, but it is not administered on an annual basis. The most recent round of funding required applications to be submitted in October 2009, with the list of funded projects announced in November 2010. The funding is provided in the form of grants that can cover up to 85% of the construction cost of a project. Points of emphasis may change between different rounds of funding, for instance the most recent round of funding emphasized projects that consider smart growth principles and energy efficiency.

12.8 Green Innovation Grant Program

The Green Innovation Grant Program (GIGP) is a competitive grant program administered by the NYSEFC to promote environmentally-friendly infrastructure development in the state. As with the WQIP program, the GIGP is not administered on an annual basis, and points of emphasis may change between different rounds of funding. Applications for GIGP were most recently accepted in 2011, and these had a particular emphasis on stormwater collection and treatment. Previous rounds of the GIGP included provisions for reducing energy consumption within wastewater treatment processes.

12.9 Regional Economic Development Council

The Regional Economic Development Council was created by New York State in 2011. The state was divided into 10 regions, with Wyoming County falling within the Finger Lakes Regional Council. The Councils are made up of business executives, labor leaders, educators, and public servants based within each region. Each council will act in an advisory role in the allocation of state resources within the region.

The Councils will review applications for grant and loan resources to various state agencies that utilize the newly created Consolidated Funding Application (CFA). The Regional Council will review proposed projects' economic impacts on the region, including their ability to create jobs, attract or retain business in the area, and increase future capacity for economic development, among other impacts. The Regional Council's review will account for approximately 20% of the decision criteria, with the remaining 80% being decided by the funding agencies.

The CFA will allow applicants to apply for multiple sources of state funding using one application for a project, instead of applying to each agency individually. Some projects that will be funded through, for example, NYSERDA, NYSHCR, and NYSEFC will require use of the CFA, but not all projects funded through these and the other participating agencies will require using the CFA.

12.10 Local Government Efficiency Grant Program

The Local Government Efficiency Grant Program was established by New York State in the budget for the 2005-2006 fiscal year. This competitive grant program provides grants and assistance for two or more municipalities evaluating or developing projects to generate savings or efficiencies by forming some sort of shared services agreement. Some examples of projects that have received funding include constructing facilities to combine multiple sewer and/or water networks, purchasing and installing a water storage tank to serve more than one municipality, and multiple municipalities purchasing one piece of sewer televising and cleaning equipment to share. Grant amounts can vary from $25,000 for planning studies, up to $200,000 or greater per municipality for implementation grants, up to $1 million total.

12.11 Joint Financing with Neighboring Municipalities

The Village may be able to obtain funding from neighboring municipalities for some improvements to its wastewater or water facilities. For example, if the Village needs to expand the capacity of its WTP in order to accommodate a neighboring municipality looking to use water from the Village, the Village may be able to work out an agreement to split funding for a WTP expansion project.

This type of funding may become more prevalent for such projects in Wyoming County if a regional water agency were created. If such an agency were to be created, the regional agency may be able to facilitate agreements between neighboring municipalities, or it may be able to arrange for other sources of funding for such projects. The Village should be prepared to work with neighboring municipalities on infrastructure improvement projects for projects where multiple municipalities would benefit, particularly if a regional water agency is created in Wyoming County.