Regional Master Plan for the Efficient Delivery of Water and Sewer Services in Cayuga County

Cayuga County Water and Sewer Authority
Cayuga County, New York

Municipality Operations Efficiency and Capital Improvement Plan

Village of Fair Haven

May, 2018

Preparation of this document was funded by the New York State Department of State Local Government Efficiency Grant program with matching funds provided by Cayuga County legislature.

Barton & Loguidice

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EXECUTIVE SUMMARY

Fair Haven is a village located on Little Sodus Bay at the northern tip of Cayuga County. The Village population is 745 (United States Census Bureau, 2010). The Village water demands are met by two ground water wells, distribution, and storage system originally constructed in the 1940s.

Until 2010, the Village's sewage collection needs were being met with individual on-site septic systems. Dense residential development, shallow water table, and age led to eventual failure of the septic systems. The Village collaborated with the CCWSA to design and construct a low pressure collection system for conveyance of sewage to the Wayne County Water and Sewer Authority Regional Wastewater Treatment Plant in Red Creek.

Overall, Village DPW staff is proactively operating and maintaining the water system. Noted deficiencies in the water system are primarily related to age of the components. The Village acknowledges these deficiencies and replaces components when budget allows.

This report documents the field and desktop investigations of the water and sewer systems within the Village and makes the following recommendations:

Water System

1. Replace segments of asbestos cement pipe in the distribution system.
2. Plan the replacement of the East Main Street standpipe.
3. Replace line valves and hydrants.

While this work is being planned, the Village should develop an asset management strategy so when new assets are installed, asset attributes can be collected and managed into the future.

The wastewater collection system is owned and operated by the CCWSA as Cayuga County Sewer District 2 (CCSD-2). The wastewater collection system is approximately 10 years old and is well-operated and maintained. As a part of developing this plan, the sewer and pumping system capacity was evaluated and additional capacities were estimated.

This analysis finds that the limiting segment in the collection system is in the 8-inch sewer between MH-12E and MH-11E on East Main Street between South Lake Street and Fair Haven Road. This segment of sewer is limited to conveying 0.25 MGD, based on pipe size and grade.

All sewage collected in Fair Haven is pumped 15,800 feet to Wayne County Water and Sewer Authority WWTP in Red Creek through an 8-inch force main. Pumping Station No. 2 is the "terminal" pumping station that conveys all sewage to WCWSA. This pumping station could reasonably take a total hydraulic load of 200,000 gpd (ADF) before upgrades would be required.

ABBREVIATIONS

ADD	Average Daily Demand
BMP	Best Management Practice
C	Celsius
CCHD	Cayuga County Health Department
CCI	Construction Cost Index (ENR)
CCWSA	Cayuga County Water and Sewer Authority
cfs	Cubic feet per second
CT	concentration x time
CWSRF	Clean Water State Revolving Loan Fund
DEC	New York State Department of Environmental Conservation
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
DOT	New York State Department of Transportation
DWSRF	Drinking Water State Revolving Fund
ECL	Environmental Conservation Law
EDU	Equivalent Dwelling Unit
EFC	New York State Environmental Facilities Corporation
ENR	Engineering News-Record
EPA	United States Environmental Protection Agency
F	Fahrenheit
fps	Feet per second
gpd	Gallons per day
GML	General Municipal Law
gpm	Gallons per minute
HGL	Hydraulic Grade Line
hp	Horsepower
HPGN	High Precision Geodetic Network (1998)
IUP	Intended Use Plan
ISO	Insurance Services Office
LF	linear feet
MHI	Median Household Income
MGD	Million gallons per day
NAD83	North American Datum (1983)
NAVD88	North American Vertical Datum (1988)

ABBREVIATIONS (cont'd)

NPSHa	Net positive suction head available
NPSHr	Net positive suction head required
NYSDOH	New York State Department of Health
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
OMB	Office of Management and Budget
PAC	Powdered activated carbon
PACl	Polyaluminum chloride
PER	Preliminary Engineering Report
PHF	Peak Hourly Flow
ppm	parts per million
psig	Pounds per square inch (gauge)
Q	Volumetric flow rate (gpm, MGD)
scfm	Standard cubic feet per minute (68 degrees F and 1 atmosphere)
SEQR	State Environmental Quality Review
SPDES	State Pollutant Discharge Elimination System
SWPPP	Storm Water Pollution Prevention Plan
TDH	Total dynamic head
THM	Trihalomethane
TSS	Total suspended solids
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WCWSA	Wayne County Water and Sewer Authority

1.0 INTRODUCTION

On November 27, 2017 representatives of Barton & Loguidice, D.P.C. (B&L) and Cayuga County Water and Sewer Authority (CCWSA) conducted a cursory review of the Village of Fair Haven's drinking water distribution system. This report summarizes the current condition of the water system assets, estimations of capacity, remaining service life, and strategies for improvement. This report documents the findings of this review.

This preliminary plan was conducted under CCWSA's Regional Master Plan for the Efficient Delivery of Water and Sewer Services within Cayuga County. This work was funded by a Department of State local government efficiency grant and matching funds provided by Cayuga County legislature.

2.0 WATER DISTRIBUTION SYSTEM CONDITION ASSESSMENT

2.1. Background

The Village of Fair Haven is located in northern Cayuga County, New York within the Town of Sterling and sits along the south shore of Lake Ontario at Little Sodus Bay.

The Village of Fair Haven owns and operates a municipal drinking water system which consists of two well head pump stations, two water storage tanks, and approximately 81,000 linear feet of water main. The quantity of fire hydrants was not determined for this study; however, it is estimated to be approximately 135 hydrants, based on design standards for hydrant spacing. The Village supplies water to all residents within their municipal boundary and to Fair Haven State Park. The Town of Sterling is in the process of forming a water district with the intent of purchasing water from the Village of Fair Haven. This report documents the current condition of the facilities, or assets within the Village.

2.2. Existing Facilities

The Village's source water wells and associated buildings are located to the east of Village's municipal boundary in the Town of Sterling. The wells are located within a Village-owned parcel of land along NYS Route 104A, along with two (2) well head pump stations, one (1) well pump control building, and one (1) equipment storage building.

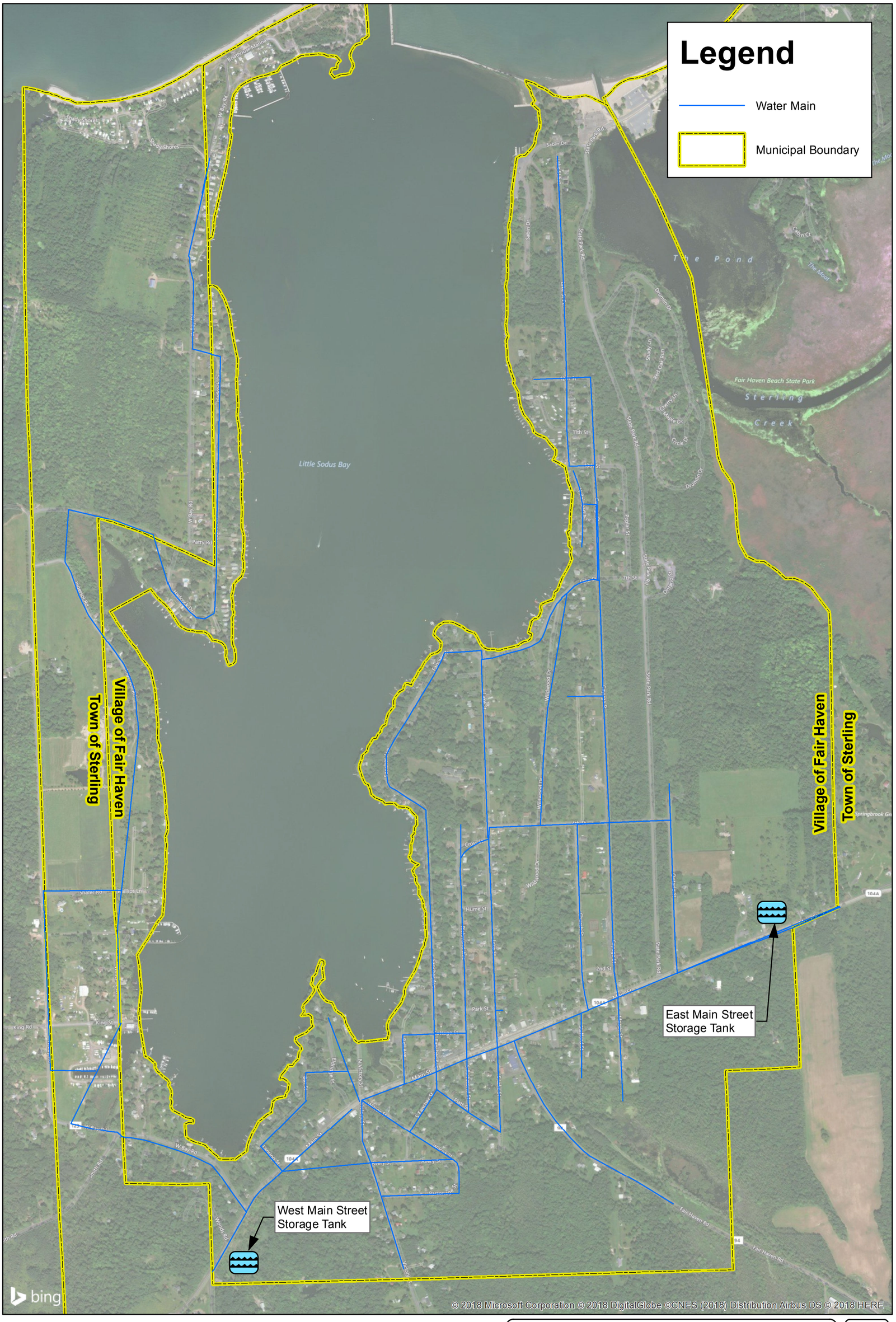
In addition to the well pump stations, the Village owns two municipal water storage tanks. The older tank is a 150,000 gallon bolted steel tank originally constructed in the 1940s located on NYS Route 104 near the Village's eastern municipal boundary. The second tank is a 440,000 gallon capacity glass lined-bolted steel tank located on NYS Route 104A near the Village's western municipal boundary.

The Village of Fair Haven also owns and operates a drinking water distribution system generally comprised of primarily of asbestos-cement water mains and fire hydrants. This system was originally installed in the 1940s to 1950s with minor extensions and improvements made in the 1970s and 1990s.

2.3. Facility Assessments

2.3.1. Existing Demands

The Village reported an average daily demand of approximately 145,000 gpd. The Village Department of Public Works (DPW) indicated that the average daily demand typically doubles in the summer months to approximately 300,000 gpd. The maximum daily demand on record occurred on July 4, 2016 and was approximately 375,000 gpd.



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1 inch = 900 feet

Cayuga County Water/Sewer Authority

(V) Fair Haven Water System

Cayuga County March 2018 New York

Figure 2-1

Project No. 1980.001

The majority of the Village's water use comes from users inside the Village corporate boundary. Village staff indicated that the entire Village is served by municipal water. Additional water users consist of Fair Haven State Park located to the northeast of the village. The Village also indicated that water is sold to the CCWSA via a transmission main connection on the northwest of the Village's system. This main allows the Village to wholesale water to the WCWSA via this connector installed by the CCWSA.

2.3.2. Well Head Pump Stations

The Village operates two wells on a common parcel of land. The wells are designated as Front Well and Back Well. The Village historically has run the Back Well in the winter and the Front Well in the summer. If a duty well experiences mechanical malfunctions, the Village can start the standby well.

2.3.2.1 Front Well

Photo 2-1: Front Well Pump

The Village's first well pump station, or "Front Well", sits near the front of their well field (closest to the road). This pump station consists of a CMU block building which houses a 30 hp vertical turbine pump with a soft starter designed for 550 gpm capacity at 80 psig. This pump station also houses a propane powered engine drive unit for emergency backup in the event of a pump motor failure. The pumped water is metered inside the pump station and then treated with a sodium hypochlorite feed for disinfection before flowing into the Town's distribution system. The sodium hypochlorite is mixed and diluted into a plastic storage drum adjacent to the pump's discharge pipe. A chemical dosing pump rated for 60 gpd output at 125 psig is used to dose hypochlorite solution from the storage basin into the well pump discharge. The required disinfection contact time (CT) is reportedly achieved in the water main prior to the first customer.

The Village indicated a well pump and drawdown test was conducted in 2017 and that this well had sufficient capacity to meet daily demands; a copy of the pump test results was not provided. The Village indicated that this pump station is not used during the

winter and spring months (December through May); however, DPW staff expressed an interest in exercising both well pumps year-round.

The pump station building appears to be in good to fair condition with no obvious structural or maintenance deficiencies noted. The Village reports frequent cleaning, painting, and regular preventative maintenance is performed at the well pump stations.

2.3.2.2 Back Well

The Village's second well pump station, or "back well", is housed within a separate building on the same parcel of land. This pump station contains a 30 hp submersible pump with variable frequency drive (VFD) controller. The pump is designed to pump 350 gpm capacity at 80 psi. This pump station includes a flow meter and liquid sodium hypochlorite feed similar to the Front Well.

A drawdown test was conducted on the Back Well in 2016, and the Village indicated that the well has sufficient capacity to meet current demands; a copy of the drawdown test report was not provided. Similar to the Front Well, the Back Well pump station building appeared to be in good to fair condition and is reported to be cleaned and maintained frequently.

2.3.2.3 Well Head Control Building

The well head pump station site contains a third building used as part of the source water pumping system. This building was the Village's original well head building; however, this well has since been decommissioned and only the building remains. The building is of CMU construction and is currently used to house control systems, automatic transfer switches, and alarm systems for the two operating well head pump stations. This building also houses various spare parts used by DPW staff in

Photo 2-2: Well Site Generator

the operation and maintenance of their water system.

2.3.2.4 Emergency Power

The well pump station site is equipped with an 80 kVA propane-fired emergency power generator that is reported to be of sufficient capacity to power the entire site with both well pumps running at full speed.

2.3.3. Water Storage Tanks

The Village of Fair Haven owns and operates two water storage tanks which are described in further detail below. Both tanks operate at the same hydraulic grade, or top water level, which creates a single pressure zone throughout the entire Village distribution system.

2.3.3.1 East Main Street Tank

The East Main Street Tank is the Village's original water storage tank. It is a welded steel stand pipe located to the north of NYS Route 104A near the eastern Village boundary. This 150,000 gallon capacity tank was originally constructed in the 1940s at the time of the original water system installation. The Village has expressed concern with the age and remaining useful service life of this tank.

2.3.3.2 West Tank

The West Tank is a glass lined-bolted steel tank and was constructed in 2015. This tank has a 440,000 gallon total capacity; however, the Village reports that it is currently operating this tank at approximately 80% capacity, or 350,000 gallons. The Village has not reported any concerns with this tank.

2.3.4. Distribution System

The Village's distribution system was originally installed in the late 1940s with expansion projects occurring in the 1950s, 1970s, and 1990s. A windshield survey of the fire hydrants within the system confirmed the general installation dates as reported by the Village.

The Village reports that a substantial portion of the distribution system consists of asbestos cement (AC) pipe. The AC mains are reportedly in "good" condition with some concentrated problem areas in which water main breaks have occurred. These problem areas are reported to be in close proximity to sewer main installations where insufficient pipe bedding around the sewer mains caused settlement and shear breaks in the water main.

Village DPW staff expressed concern with one portion of AC water main running through a backlot area near West Bay Road. The DPW has stated that this portion of main runs through a vineyard and a wooded area which poses potential problems should this area ever require access for maintenance.

The entire Village of Fair Haven is on municipal water. Water service material consists of copper and cross-linked polyethylene (PEX) pipe.

The Village currently uses outdated paper maps for its water system and does not have an electronic water utility map.

2.4. Deficiencies

2.4.1. Well Head Pump Stations

The Village currently removes its Front Well from service during winter months, thereby creating a condition in which the Back Well is required to meet all demands with no redundancy. This lack of redundancy during winter months creates unnecessary risk and does not conform to Ten States Standards for number of sources for a groundwater source.

The Village expressed concern with their chlorine solution storage tanks and the desire to ensure that proper mixing occurs in this storage tank prior to being injected into the water mains for disinfection. There is currently no mixing system in this bulk storage tank.

2.4.2. Water Storage Tanks

As previously stated, the Village has expressed concern with the remaining life of their welded steel water storage tank. This tank was constructed in the 1940s making it approximately 70 years old. The typical design life of a steel water storage tank is 30 years (AWWA, 2013).

2.4.3. Distribution System

The Village's distribution system consists of hydrants of varying age with the oldest hydrants dating back to the 1940s at the time of the original water system installation. Due to the age of these components, DPW staff has indicated that spare and replacement parts can be difficult to locate when repairs are needed.

The Village has indicated that there is a large amount of AC pipe that remains in service. While AC pipe itself does not pose any operational problems, a main break could potentially lead to harmful asbestos containing material (ACM) entering the water distribution system and exposure to workers repairing the break. Additionally, the Village has stated that there is one section of pipe, as

mentioned above, on a backlot alignment through a vineyard and wooded area. This creates difficultly accessing this portion of pipe should it ever need to be maintained or repaired.

2.4.4. Other Deficiencies

As indicated above, the Village currently uses paper maps for its water system. Paper maps and service tie records are far less accurate than a digital mapping system and can lead to an increased cost and effort to locate the installed water system components.

2.5. Potential for Outside Users

2.5.1. Town of Sterling

The Town of Sterling has approached the Village of Fair Haven for supplying water to additional areas within the Town through new distribution system connections. There is currently one proposed Town water district in the Hamlet of Sterling that includes approximately 100 homes with the potential for more users to connect in the future. The Village has plans to bill the sale of this water directly to the Town residents. The Village will maintain the water system within the Town.

2.5.2. Fair Haven State Park

Fair Haven State Park owns and operates its own distribution system with a metered connection to the Village's distribution system. There are no known plans for expansion of the Park's system.

2.5.3. Wayne County Water and Sewer Authority (WCWSA)

The existing connection to the CCWSA water system consists of a transmission main approximately 50 feet to 100 feet in total length that is owned and maintained by CCWSA. CCWSA purchases the water from the Village and sells it to WCWSA. CCWSA has indicated that there are no users on their owned portion of this water main and the Village has expressed interest in taking ownership and maintenance responsibilities of this transmission main and associated water sales to WCWSA.

2.6. Recommendations

Overall, the water system appears to be well-managed and proactively maintained. Based on the discussions with Village water staff, and water system asset inspections, it is suggested that the Village consider implementing the following to ensure a continued efficient operation:

1. The Village should replace its 70-year old welded steel water storage tank as it is well beyond its useful service life, and total replacement would be more cost effective than refurbishment and re-coating the existing tank.

2. The Village should identify and prioritize the oldest and most problematic hydrants and water mains to serve as the plan for systematically replacement. The Village has indicated they have the capacity to perform much of this work themselves.
3. While the water main work is underway, the Village should develop a GIS database to record and track assets in the distribution system such as hydrants, valves, curb stops, and main locations.
3. West Bay Road Water Main:
    a. As part of the recommended hydrant and tank replacement project, the Village should investigate the feasibility of alternative water main routes for the backlot crossing along West Bay Road through the vineyard and wooded lot.
    b. The Village should ensure that adequate easement and right-of-way is maintained for any mains crossing undeveloped or private land to ensure location, right of access, operating room for maintenance, and to reduce the risk of property damage or loss should a main break occur. Buried utilities crossing undeveloped land should be marked with suitable above-grade witness posts or utility markers visually delineating the right-of-way and utility location.
4. The Village should initiate, or continue discussions with the CCWSA relative to assuming ownership, operation and maintenance of the transmission main connection to Wayne County.
5. Improve tank mixing and chlorine residual measurement to ensure adequate chlorine CT prior to first customer.
6. Well Pump Operating Philosophy:
    a. The Village should consider a new operations strategy for its well head pump stations to allow for both well pumps to operate year round. This added redundancy will put the Village's system into conformance with current design standards, and will decrease risk associated with a potential well pump failure. Additionally, this operational change will allow for a more uniform pump run time distribution between the two well pumps.
7. Asset Management:
    a. The Village should investigate various GPS/GIS and asset management (AM) based software programs, such as EMaint, to further increase the efficiency and long-term benefits of its proactive maintenance program within its water system.
    b. GPS/GIS hydrant and valve mapping can be performed quickly, and GIS mapping is more accurate than the Village's current paper maps. A GIS database would serve as the core of an asset management database, and could be expanded to include water services, asset attributes, work order

tracking, etc. Once in place, the AM database would foster better tracking of maintenance records and component age in support of annual water budgets and capital improvement plans (CIPs). This will save the Village time and expenses associated with locating components for regular maintenance or repair work.

2.7. Constructability

As noted above, it is recommended that the Village plan improvements to replace their welded steel water tank and original vintage distribution system components. These improvements will require coordination with water system customers and will require temporary shutdowns for hydrant replacements and water main improvements. The Village should investigate whether necessary demands and fire flows can be met with their second water storage tank or whether a temporary water storage solution will be needed during construction. Constructing the new tank prior to demolishing the old tank should also be investigated, with consideration given to the amount of land available. The Village should seek outside sources of funding to offset the cost of these recommended improvements and provide the most cost effective solution for rate payers.

3.0 WASTEWATER COLLECTION SYSTEM CONDITION ASSESSMENT

3.1. Existing Facilities

The Village's wastewater collection system was constructed in 2010, and is owned and operated by the CCWSA. This wastewater collection system operates as Cayuga County Sewer District 2 (CCSD-2). Prior to 2010, the Village relied solely on individual private, on-site disposal systems (e.g. septic systems) for treatment of municipal sewage.

The collection system is comprised of both conventional gravity sewers and low-pressure sewers equipped with residential grinder pumps. Table 3-1 provide an inventory of collection system assets.

Table 3-1: Sewer System Asset Summary

Asset	Quantity	Description	Design Capacity
Residential Grinder Pump	281	E/One Extreme grinder pumps	11 gpm @ 92' TDH
Pumping Station No. 1	1	Duplex Submersible	(1): 350 gpm @ 49' TDH (2): 350 gpm @ 49' TDH
Pumping Station No. 2	1	Duplex Submersible, expandable to Triplex	(1): 350 gpm @ 155' TDH (2): 500 gpm @ 182' TDH (3): 500 gpm @ 182' TDH(1)
Pumping Station No. 3	1	Duplex Submersible	(1): 191 gpm @ 78' TDH (2): 191 gpm @ 78' TDH
Pumping Station No. 4	1	Duplex Submersible	(1): 230 gpm @ 102' TDH (2): 230 gpm @ 102' TDH
(1)Not currently installed			

Each of the four pumping stations is equipped with a diesel-fired emergency generator. In addition to the physical assets tabulated and low-pressure sewer mains, construction project records indicate the collection system consists of 8-inch and 12-inch gravity conveyance within the Village, 330 linear feet of gravity laterals on Cayuga Street, 130 linear feet of gravity lateral on 7th Street, and approximately 15,800 linear feet of 8-inch SDR 25 PVC force main from Pumping Station No. 2 to the Wayne County Water and Sewer Authority's Regional WWTP in Red Creek. This WWTP has a rated capacity of 0.5 MGD. An average daily flow of 0.25 MGD with a peak of 0.3 MGD in any consecutive 24-hour period is allocated to the Village of Fairhaven under Agreement with the WCWSA. This plant is designed to be expanded to 1 MGD.

3.2. Facility Assessments

The wastewater collection system and pumping system is owned, operated, and maintained by the CCWSA. An on-site inspection of the facilities was not conducted for

this report, as the facilities are less than 10 years old. The Fair Haven State Park sewer system was constructed in 2012 and a facility assessment was also not conducted.

3.3. Capacity Estimations

There may be future need for CCSD-2 to accept sewage from developments. It is deemed unlikely that additional development within the Pumping Station No. 3 and Pump Station No. 4 collection areas will occur. The likely development would be from the east within the Town of Sterling. B&L reviewed the conveyance system configuration and sizing to identify capacity-limiting segments. The collection system trunk consists of 8-, 10- and 12-inch gravity sewers laid on varying grades constructed within the Route 104A right-of-way. Gravity sewers from the east discharge into Pumping Station No.1, where sewage is pumped over a slight rise to Pumping Station No. 2. Pumping Station No. 2 is the "terminal" pumping station that pumps to the WCWSA wastewater treatment plant in Red Creek.

3.3.1. Collection System

The capacity-limiting segment of sewer is between MH-12E and MH-11E, between South Lake Street and Fair Haven Road. This 8-inch sewer is laid on a 0.42% grade and flowing half-full has a capacity of approximately 0.25 MGD or 173 gpm. There are approximately 30 residential lateral connections above this segment. At 400 gpd per connection, the estimated hydraulic load on this segment of sewer is 12,000 gpd (ADF) or 48,000 gpd (PHF), excluding inflow and infiltration.

3.3.2. Pumping Station No. 2

Pumping Station No. 2 is equipped with a low-capacity (35 hp) and a high-capacity pump (60 hp) with spare space for a second 60 hp pump. Ten State Standards Section 42.31 recommends that when a lift station is equipped with only two pumps, the pumps should be equally sized. The two pumps in this station are not equally sized and is therefore not consistent with the recommendations of the Ten State Standards. The station appears to have sufficient capacity to meet the hydraulic demands, however differently-sized pumps in parallel can be problematic and inefficient to operate in that the smaller pump contributes very little to the overall capacity when operated with the larger pump in parallel. Due to this constraint, the level of redundancy is not clear. The 60-hp pump can serve as back-up to the 35 hp pump, but there is no stand by capacity for the 60-hp pump.

The operator reports the station pumps approximately 320 gpm. Based on an estimated static head of 117 feet, derived from the force main profile and pump curve, the force main system curve is estimated to be expressed as:

$$TDH = 80.4Q^{1.85} + 117$$

Where discharge is expressed in cfs.

Based on this estimated system curve, the large pump is estimated to operate at approximately 420 gpm and 188 feet of TDH. Adding a second 60 hp pump and operating both in parallel would increase the capacity to approximately 465 gpm and increase the TDH to 203 feet. An estimated system curve with pump curves superimposed is included in Figure 3-1. Operating the 60-hp and 35-hp pumps in parallel is not recommended, as the smaller pump will contribute little to the total pumpage.

The CCWSA operator reports pumpage of approximately 100,000 gpd at a rate of 320 gpm, understood to be met with the 35 hp pump. These pumping rates indicate a duty cycle of approximately 25% utilization of the pump.

The pumping station could reasonably accept an increased hydraulic load up to approximately 200,000 gpd. This increase would place the pump utilization to approximately 50%. Asset utilization over 50% should be avoided. If hydraulic load to the station is expected to exceed 200,000 gpd, CCWSA should consider adding the third pump to ensure the 100% redundant capacity in this station.

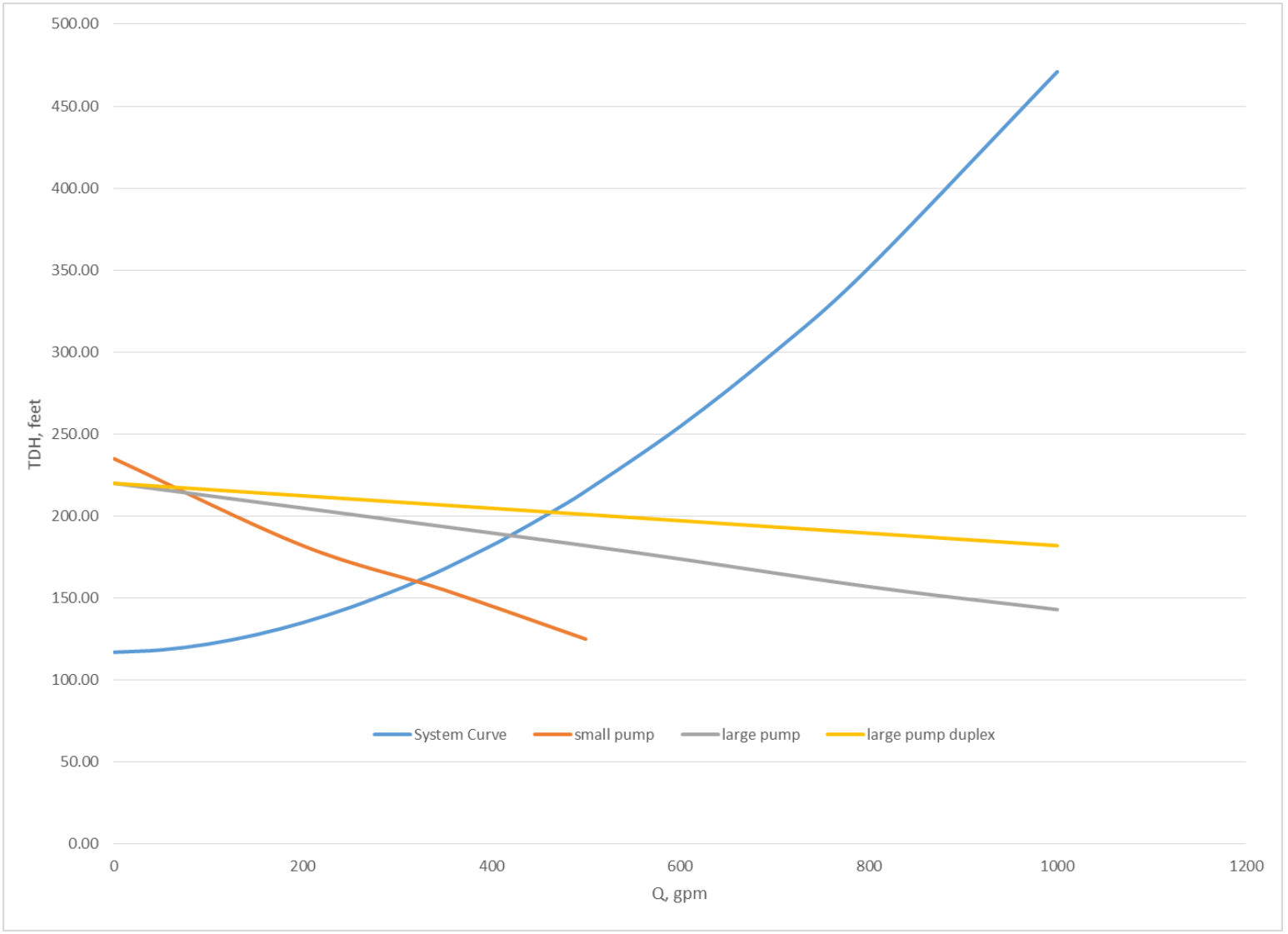

Figure 3-1: Pumping Station No. 2 Estimated System Curve

4.0 SCHEDULE AND ANTICIPATED SCOPE OF IMPROVEMENTS

4.1. Drinking Water Source, Storage and Distribution System Improvements

Several minor water system deficiencies were reported by the Village DPW that warrant capital project planning. A suggested planning phase strategy is outlined below, supported by a suggested funding strategy in Section 5.0.

4.1.1. Preliminary Engineering Report

Prior to any consideration of funding scenarios, the Village must complete and submit an approvable Preliminary Engineering Report (PER). The PER should consist of all preliminary investigations necessary to investigate the suitability of the planned location for the water tank and identify the water distribution system locations in the greatest need of replacement so they may be address in the course of detailed design. The investigations and results of the preliminary engineering work will be documented in a preliminary engineering report and basis of design for review and endorsement by state agencies. This endorsement will assure the Village that the New York State Department of Health is in agreement with the proposed project and approach. Funding agencies will also require this work up-front in support of a funding application.

Preparation and submission of the PER must coincide with the annual funding cycle maintained by the New York State Environmental Facilities Corporation (EFC). A preliminary funding application schedule is included in Section 5.3.

4.1.2. Design and Engineering

This work should consist of the following activities:

- Surveying and Mapping: this should include boundary, and topographic survey of the planned parcel for construction and along the roadways where water main improvements are proposed, title research identifying any easements, deed restrictions, and rights-of-way on or adjacent to the parcel planned for water tank construction.

- Environmental Impact Assessments: This work would include desktop and field work to identify environmentally-sensitive or culturally-sensitive resources adjacent to the project area, such as archeological finds, habitat suitable to threatened or endangered species, the presence of mapped wetlands and an estimate of temporary and permanent impact to the environment the construction and operation of the facility represents to the environment. This information will be used in support of permit application materials to State and Federal regulatory agencies, including the NYS DEC, USACE, and New

York State Department of State. Agency approval will be required prior to starting construction.

- Geotechnical Investigations: Subsurface investigations are recommended as a means to identify subsurface and potential foundation conditions of any future structures. Soil borings are recommended within the footprint of the proposed water storage tank. As a part of the preliminary scope of work, the Village should consult with a geotechnical engineer and determine the recommended suite of soil analyses to determine foundation design criteria.

4.1.3. Detailed Design and Specification

On endorsement of the engineering report and basis of design, the engineering team will develop plans and specifications in sufficient detail to fully describe the construction and performance of the finished works. With these documents, the Village can solicit bids from contractors for the construction of the work

4.1.4. Preliminary Schedule

Many of these activities can be performed on parallel tracks, however there is a logical sequence that documents should be prepared and submitted to agencies to optimize available time and minimize waste. The table below outlines the estimated duration of the project from initial permitting through commissioning.

Table 4-1: Water System Design and Construction Schedule

Activity	Estimated Duration
Surveying and Base Mapping	90 days
SEQR/SERP	58 days
Geotechnical Investigations	45 days
Detailed Design	60 days
Construction and Commissioning	180 days
Estimated Project Duration	**433 days (14 months)**

Note some of these activities are seasonally constrained and may need to be delayed due to season and / or weather.

4.1.5. Planning-Level Costs

The most significant upcoming capital cost facing the Village is the cost to eventually replace the East Tank. The existing East Tank is welded steel construction and it is anticipated that it would be replaced with a glass-lined bolted steel tank, similar to the West Tank.

Table 4-2: East Tank Estimated Costs

Item	Cost
Temporary Pressure Zone	$60,000
Tank Demolition	$10,000
Foundation demolition	5,500
Site Work/yard piping	$50,000
New tank construction	$377,000
Steel scrap ($0.10/lb)	($28,000)
Subtotal	$474,500
Escalate 3% / year to mid-point of construction	$503,400
Contingency (10%)	$50,340
Engineering, Legal, Administrative (20%)	$100,680
Total opinion of probable cost	**$654,500**

This estimate only includes the replacement of the East Tank. The Village may have other needs that it would include in such a capital project.

5.0 PROGRAM STRUCTURE AND RECOMMENDED NEXT STEPS

Oftentimes the greatest challenge to conducting a capital improvement project is identifying and securing sources of funding to complete the work. The purpose of this section is to provide some general guidance to the Village of Fair Haven and CCWSA on the State funding programs for which the Village and these projects may qualify.

There are a number of funding sources available within New York State. These sources include grant with no obligation for repayment and long-term loan, financed by the New York State Environmental Facilities Corporation (EFC). The EFC manages the State Revolving Loan Fund (SRF). The SRF within each state is funded by the U.S. Environmental Protection Agency (EPA) through Congressional appropriations intended to assist municipalities in complying with Federal and State clean water and drinking water regulations.

The EFC manages two funding programs: the Clean Water SRF (CWSRF) and the Drinking Water SRF (DWSRF), to fund wastewater and drinking water system improvements, respectively. Additionally, the U.S. Department of Agriculture (USDA) Rural Utility Service (RUS) administers similar funding opportunities specifically for rural communities whose population is less than 10,000.

There are several factors that affect eligibility for grant and subsidized loan including public health risks, status of the water body impairment, median household income within the community and other factors. Depending on the factors, the community can receive grant and/or subsidized financing down to 0% interest. A data sheet for the Village of Fair Haven is included in Appendix B. These data sheets include statistics commonly used by the EFC to determine funding eligibility (ESD, 2017).

5.1. Drinking Water Improvements

As identified in this report, the Village of Fair Haven should plan to replace its steel water storage tank and its oldest most problematic fire hydrants and water mains. The Village is currently listed on the DWSRF Intended Use Plan (IUP) for a water system improvement project as seen in Appendix B.

The first step in creating a comprehensive improvement project as described in this report would be execution of a revised Engineering Report. The Village will need to retain an engineer to conducted a detailed evaluation of the facilities and submit this report in the prescribed form to the EFC for listing on the annual IUP. The EFC does not offer Engineering Planning Grants (EPGs) to cover the cost of the engineering study for DWSRF projects.

The engineering study is the first necessary step in securing funding for an improvement. The Village could fund an engineering study from its General Fund, or the WSA could undertake the engineering study on behalf of both the Town and Village.

The Engineering study should evaluate the following aspects:

1. Condition and estimated remaining life of the steel water storage tank
2. Condition of existing fire hydrants
3. Fire flows and pressures throughout the water system

5.2. Funding Programs

Generally, capital project funding programs are need-based programs designed to assist those communities facing the high cost of asset replacement, meeting a water quality standard or drinking water standard. Many of screening criteria are based on a community's census and economic data. Based on census data, it appears that the Village would be eligible for up to $2,000,000 or 60% project cost in the form of grant under the DWSRF program. Financing of the remaining debt may be under the hardship program for 30 years. A brief description of the available funding programs are included below.

5.2.1. Drinking Water State Revolving Fund (DWSRF)

There are two funding programs available under the Drinking Water State Revolving Fund (DWSRF): the Market Rate loan program and the Hardship Loan program. The Village would always be eligible for market rate financing, but must meet certain economic criteria to be eligible for hardship financing.

5.2.1.1 Market Rate Loan Program

This program provides market rate (AAA rated) financing for capital projects for 30 years. To be eligible, the project must be listed on the Intended Use Plan (IUP) and a full application including adopted bond resolutions, an approvable engineering report, a smart growth form, SEQR review, and an engineering agreement must be submitted (at a minimum) to be eligible for funding.

5.2.1.2 Hardship Loan Program

This program provides subsidized 0% interest financing for the project for 30 years. The project must be listed on the Intended Use Plan (IUP) and a full application including adopted bond resolutions an approvable engineering report, a smart growth form, SEQR review, and an engineering agreement must be submitted (at a minimum) to obtain funding. Only communities with populations less than 300,000 (with some exceptions) and have incomes that are 80% of the regionally adjusted Statewide MHI or 80% less than 100% of the regionally adjusted Statewide MHI and poverty greater than the Statewide poverty rate of

12.0%, can be considered for hardship funding. The municipality cannot exceed a $14 million municipal limit on hardship financing and grants in a five-year period and have a priority ranking score equal to or greater than the score at which the Hardship Evaluation Eligibility Line is located on the Annual Intended Use Plan List (IUP).

5.2.2. New York State Intermunicipal Water Infrastructure Grants Program (IMG)

This program offers grants up to $10,000,000 or 40% of net eligible project costs to assist municipalities in developing and implementing shared water quality infrastructure projects or to interconnect multiple municipal water projects. The Village may be eligible under this program if the tank replacement work was being performed to support an intermunicipal project with the Town of Sterling.

5.2.3. Water Infrastructure Improvement Act of 2018 (WIIA) Grant

Communities may apply for funding for eligible project costs or a maximum of $5,000,000. Grant obtained funds from other sources will be deducted from the total project cost prior to calculation of the WIIA share. If a project is awarded NYS Intermunicipal Water Infrastructure Grant (IMG), then this funding will not be available since the project may either receive IMG or WIIA grant funds, but not both.

5.2.4. State and Municipal Facilities Program (SAM) Grant

This program would be based on available grant awards from the Village's elected representatives. Applications for this program are ongoing and usually are in the $100,000 up to $500,000 range. Funds are administered by the Dormitory Authority of the State of New York (DASNY) on behalf of the state legislature.

5.2.5. Community Development Block Grant (CDBG)

This program is based on assisting low and very low-income residents. Based on Fair Haven's low-to-moderate income percentage (LMIPCT), the Village may be eligible for CDBG funding. An LMIPCT of over 50% would automatically qualify the Village for CDBG funding. However, because the Village's LMIPCT is 39.47%, a project targeting a low-income neighborhood within the Village would require an income survey within that project area to demonstrate an LMIPCT of over 50% to be eligible for CDBG funding.

5.2.6. USDA Rural Development (USDA RD)

This program provides low interest, loans, and potential grants of no more than $750,000 per community. Water loans are repaid over a 38-year period. Interest rates change quarterly until locked in with successful application and receipt of a

Letter of Conditions. Applications are completed through "RDApply", an on-line application process. Applications are accepted on an on-going basis.

5.3. Schedule of Funding Cycle

Assuming the recommended project is listed on the Annual List in the 2017-2018 DWSRF Intended Use Plan, the following project schedule is anticipated:

Preliminary Engineering Report complete:	July 2018
Final IUP issued:	December 2018
SEQR/SERP Negative Declaration:	March 2019
Bond Resolution:	June 2019
WIIA Grant Application:	July 2019
Full CWSRF Application:	July 2019
Finalize Funding Packages:	August 2019
Design/Bid Improvements:	Fall/Winter 2019/2020

REFERENCES

AWWA. (2013). *Manual M42, Steel Water Storage Tanks.* Denver: American Water Works Association.

Blank, L. T., & Tarquin, A. J. (1989). *Engineering Economy* (3rd Ed. ed.). New York: McGraw-Hill.

ESD. (2017). *2017 CFA Resources.* Albany: New York State Empire State Development.

OMB. (2015). *Guidelines and Discount Rates for Benefit-Cost Analysis for Federal Programs.* Office of Management and Budget. Washington, D.C.: Government Printing Office.

APPENDIX A
WATER DISTRIBUTION SYSTEM ASSET SUMMARY

CAYUGA COUNTY WATER AND SEWER AUTHORITY (CCWSA)
REGIONAL MASTER PLAN

MUNICIPALITY:
(V) Fair Haven
TYPE OF SYSTEM:
Water Distribution System

B&L JOB NO.: 1980.001.001
SITE ASSESSMENT BY: RDO/GDM
DATE: 11/27/2017

ATTENDEES:
Walter Krehling ((V) Fair Haven); Roger Granatiero ((V) Fair Haven); Doug Selby (CCWSA); Greg Mosure (B&L); Ryan O'Mara (B&L)

System Component	Observations	Comments
Municipality Water Usage		
Average Daily Demand:	Current Avg. (Fall/Winter) 140k-150k gpd; approximately double in summer months	Max day (4th of july) water demands were 350k-375k gpd. Village reports that bilings are consistent w/ pumped volumes
No. of EDUs:	~850 water services and Fair Haven State Park, all services and Park are metered	
Population Trends		
Anticipated Substantial Growth (Y/N):	No expansion, but new construction/reconstruction has taken place since completion of the sewer system	Steady gradual change from seasonal to year round homes (Village Estimate 60%/40% Year Round/Seasonal
	Plans to sell water to (T) Sterling for a new water district consisting of ~100 existing homes. (V) to bill the Town directly. (V) indicated potential future water system demands in the Tooen of Sterling	
Water Source		
Groundwater Wells		
Well Protection Plan:		
Type of Aquifer Present:		
No. of Wells:	2	Well 3 has been decommissioned years ago
Type:	Back Well - 30HP Submersible pump on VFD; Front Well - 30HP Vertical Turbine, Soft Start, Propane Engine Drive Emergency Backup	Propane Engine Drive appears original and shows signs of age, but is reported to be in working
Operating Flow Rate (per Well Pump):	Back Well - 350gpm; Front Well - 500-550 gpm; both operate at ~80psi w/ ~40psi static	Front well turned off Dec-May annually
Location of WTP:	N/A - Liquid chlorine is added at well head PS's	
Age:		
Surface Water	N/A	
Availability (Y/N):		
Source:		
Intake Conditions:		

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System Component	Observations	Comments
Intake Depth:		
Hydraulic Limitations:		
Reservoir (Y/N):		
Location of WTP:		
Water Quality		Village does not report of any high alkalinity, excessive hardness, etc.
Taste:	N/A	
Odor:	N/A	
Iron:	N/A	
Color:	N/A	
Turbidity:	N/A	
Storage Tanks		
No. of Tanks:	2	Both tanks operate on same hydraulic grade
Construction:	(1) ~1940's steel standpipe; (1) newer Aquastore standpipe	Village stated concerns w/ age of steel tank
Capacity:	Steel Tank - 150,000 gal; Aquastore Tank - 440,000 gal (operating at 350,000	
Diameter:		
Height:		
Mixing/TTHM Removal System (Y/N)		
Age:		
Upgrade/Improvement History:		
History of Maintenance and Repair:		

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System Component	Observations	Comments
Piping Infrastructure		
Length:		
Size:	mostly 6-8" with some 4"	
Material:	Mostly AC with some DIP	AC reported to be in good condition except in areas near
Hydrants		
No. of Hydrants:		
Age:	Installation dates: late 1950's, mid to late 1970's, mid 1990's	Villages states difficulty finidng parts for older hydrants
Fire Flow		
Fire Flow Capacity:		not known, but not reported to be a problem
Master Meters/PRV's		
No. of Master Meters/PRV's:	N/A	
Type:		
Age:		
Emergency Protocols		
No. of People on Staff:		
Alarms:		
Contact:		
Secondary Contact:		

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System Component	Observations	Comments
O&M History		
Fire Flow Problems:		
Pressure Problems:		
Chlorine Residual Problems:		
Main Break History:	History of main breaks in and around State Park (private system)	
Pump Station		
No. of Pump Stations:	2 well head PSs	
Pump Station Name:		
Type of Pump Station:	(1) submersible; (1) Vertical Turbine	
No. of Pumps:	(1) each	
Pump Capacity:	350 gpm (submersible); 550 gpm (Turbine)	
Pump HP:	30 HP each	
Electrical Condition:	original installation, but appeared in good condition	
Telemetry/SCADA:		
Age:		
Site Conditions:	gravel drive w/ chain link perimeter fence and locking gate	
Upgrade/Improvement History:	Well 3 decommissioned; newer electronics and control system in Well 3 building	
History of Maintenance and Repair:	Village reports regular cleaning & maintenance of pump stations	
Emergency Generator		
Type (Nat. Gas/Diesel):	Diesel	
Size:		
Age:		

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System Component	Observations	Comments
Building Conditions		
Walls:		
Windows/Sills:		
Doors:		
Painting/Labeling:		
Roof Condition/Evidence of Leaks (Y/N)		
Floor:		
Classified Space:		
Electric:		
HVAC:		
Doors:		
Heater (BTU/Fuel):		

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System Component	Observations	Comments
Comments/Notes:		

APPENDIX B
FUNDING ELIGIBILITY WORKSHEETS

Municipality		Demographics					Water	Sewer	Impaired
Census Name	County	2010 MHI Census	2015 MHI ACS 5 Year	2010 Population	2014 ACS 5-Year Population	2015 Families Below Poverty	Water System	Sewer System	Impaired Body Within Munic.
Fair Haven village, New York	Cayuga	$49,271	$50,208	745	746	7.8%	Yes	Yes	Yes

NYSEFC				CDBG			USDA RD			
Hardship Eligible	CWSRF Max Grant	DWSRF Max Grant	EPG Eligible	CDBG Eligible	LMIPCT	Income Survey Required?	WEP Eligible	Rate	RD Grant Eligible	Planning Grant Eligible
Qualifies	$3,500,000.00	$2,000,000.00	Yes	Yes	39.47%	Yes	Yes	Intermediate	Yes	No

CWSRF IUP										DWSRF IUP												
2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
										Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Current Projects on the IUP						
DWSRF/CWSRF	Project Number	On Annual List	Name	Description	Estimated Cost	Score
CWSRF	15127		FAIR HAVEN VILLAGE/Fair Haven (V)	Upgrade Water Source, New Storage, Upgrade Distibution System	$ 934,500.00	85

Next Step: