Last update: 9-12-19

Harpers Ferry Water Services Master Plan

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Introduction

This is the first Water Services Plan prepared for the Harpers Ferry Water Works. This plan provides an overall description of the water system, references other reports that provide more detailed information on all aspects of the water system, summarizes the regulations that apply at each point in the system. It also touches on how that system is managed and gives recommendations for improving all aspects of the system, now and into the future.

The Harpers Ferry Water Works is the entity responsible for managing, storing, treating, monitoring, and delivering safe, potable water to the customers within its service area, including the Corporations of Harpers Ferry and Bolivar, and the immediately adjoining unincorporated area (including Bolivar Heights and Cavalier Heights).

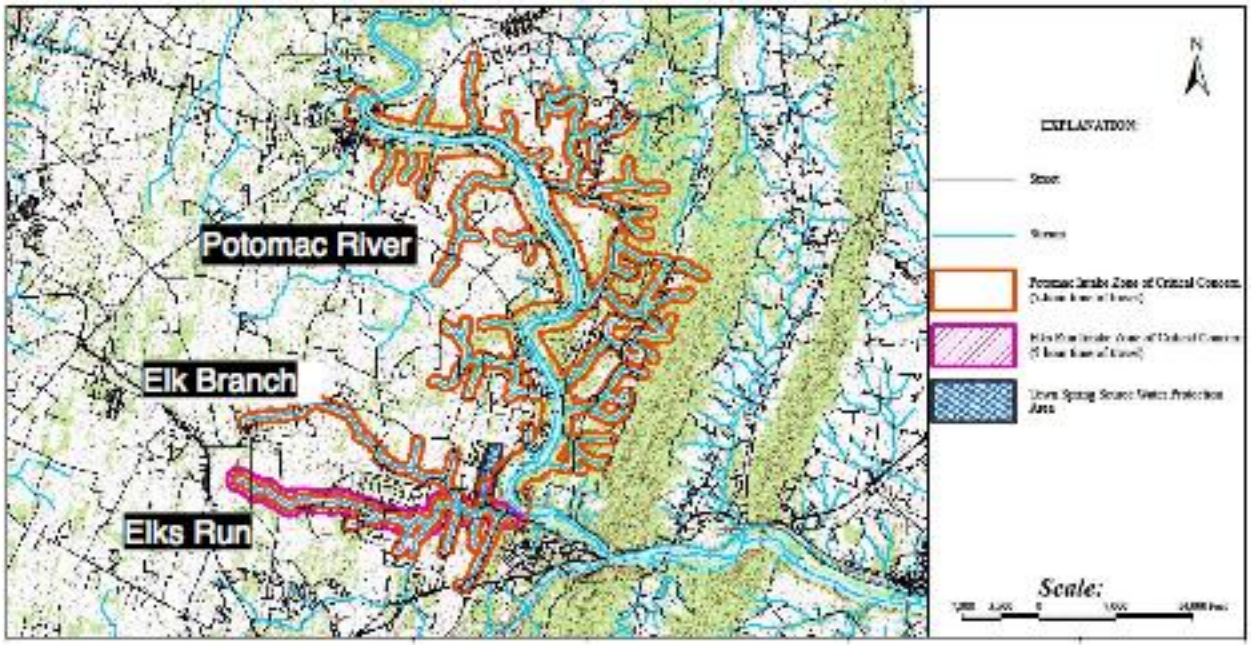
The Harpers Ferry Water Commission, appointed by the Town Council, is responsible for providing oversight and for recommending major improvements and funding actions for Council action.

Water Source

The primary source of drinking water for the Water Works is provided by Elks Run, a tributary of the Potomac River. Elks Run and the Town Spring, that gravity-flows into the Run, are high quality water sources. According to the current Source Water Protection Plan, they are generally characterized by optimum levels

of pH, alkalinity and turbidity. Also, the sources have low levels of iron and manganese. No evidence of inorganic or organic (synthetic and volatile) chemicals exists.

Until 1996, when Congress amended the 1974 Safe Drinking Water Act, there were no formal programs for protecting surface water sources like Elks Run. In 2014, the West Virginia legislature adopted code changes that requires public water utilities to adopt a Source Water Protection Plan. The Harpers Ferry Water Works updated the Source Water Protection Plan by July 1, 2019, as required by law.



Harpers Ferry Source Waters

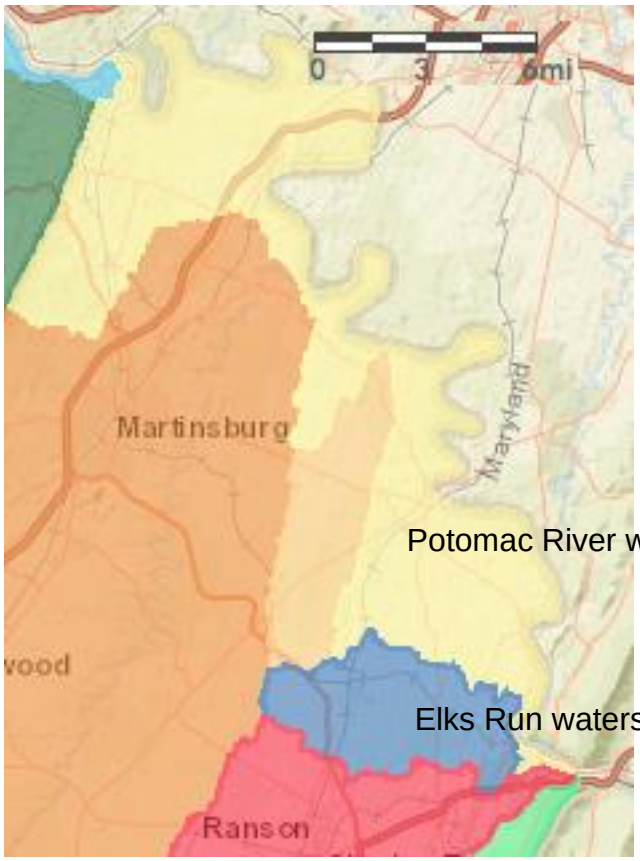
Action items include the following:

Railroads
Staff from the Harpers Ferry Water Works and Harpers Ferry Police Department will work with Jefferson County Office of Homeland Security Emergency Management and Local Emergency Planning Committee coordinators regarding use of CSX Railways training materials, CSX Rail Respond information (what is in the rail cars), and readiness efforts for emergency response for highway and railroad spills.

Agricultural Activities
Harpers Ferry Water Works and the West Virginia Conservation Agency will work with the County Extension Service, the Soil and Water Conservation District, and/or Natural Resources Conservation Service to encourage agricultural land owners to participate in nutrient management planning, forest conservation, land management programs (including riparian zone preservation or restoration) within the source water protection area.

New Septic Systems
The Harpers Ferry Protection Team is working with the Jefferson County Planning Department (and Health Department), to explore the possibility of requiring Best Available Technologies for new septic systems that will be installed within the Zone of Critical Concern delineated by the West Virginia Bureau for Public Health.

New Subdivisions
The Harpers Ferry Protection Team will work with the Jefferson County Planning Department on increasing awareness for open space preservation and conservation in subdivision planning, modifications to existing ordinances, and economic incentives to protect or rehabilitate riparian zones impacted by development.



Commercial Facilities
Harpers Ferry Water Commission will distribute site-specific Best Management Practice lists, along with advanced hazardous materials containment options, to commercial facilities within the Zone of Critical Concern (and commercial and industrial business owners outside the Zone but in the watershed) on an as-needed basis.

In 2018, the Water Works had a remote sensor system installed to detect certain pollutants in Elks Run. The sensor currently reports on dissolved oxygen, turbidity, acidity, algae, and flow rate. Some water data has been made available online (https://rainmatters.org), thus providing real time education to water users.

Recommendation 1: Water Commission should adopt a policy of what can be stored in the flood plain adjacent to the water treatment plant and source water intake.

Recommendation 2: Water Commission should support and participate in conservation efforts, including tree plantings, in the Elks Run watershed.

Recommendation 3: Arrange to have the pollutant sensor data on the Harpers Ferry Water page.

Recommendation 4: Add a hydrocarbon sensor to the existing remote sensors on Elks Run.

Recommendation 5: Need to have all government entities exercising planning approval in the Elks Run watershed to notify the Water Works of all changes made to existing drainage patterns that might cause sink holes to develop in the vicinity of land uses that generate pollutants, including industrial, agricultural, and residential land uses.

Recommendation 6: Need to take advantage of CSX training. Need to have an annual training session with the Department of Homeland Security for how to respond to contamination events.

Water Treatment

Water treatment must meet state and federal law, specifically Title 64 of the Code of State Rules, Series 3, and Title 40, Code of Federal Regulations, Parts 141-143. These codes establish drinking water standards for public water systems, including disinfection requirements, testing and record maintenance requirements, and certification of laboratories that conduct drinking water tests.

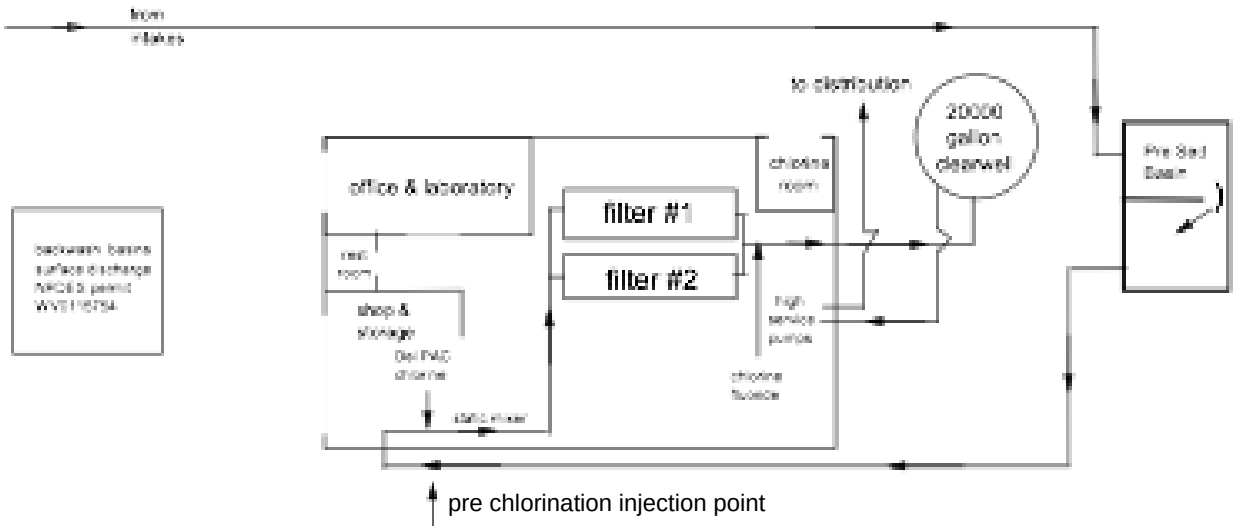
The Harpers Ferry Water Works treatment facility was constructed in 1985 and has a capacity of 500,000 gallons per day. The facility currently produces approximately 284,000 gallons of finish water daily to serve the needs of the service area. The following description explains the steps taken in treating the water.

The raw water collected at the Elks Run intake, as well as the Town Spring, flows by gravity to a wet well, and from there it is pumped to a concrete pre-sedimentation basin located adjacent to the treatment facility. The 77,000-gallon pre-sedimentation basin removes the heavy suspended solids (sand, grit, etc.) without the use of coagulation chemicals. The water then flows by gravity to the treatment facility filters.

A turbidimeter at the entry point to the plant measures the turbidity of the water. If it exceeds a certain rate (150 NTU- the initials indicate the method used), the plant is shut down. The settled water is then injected with DelPAC 2020 (polyaluminum chloride) to cause stabilized charged particles in the water to destabilize. Chlorine (gas) is added to obtain the required minimum 3-log (99.9%) inactivation of *Giardia* cysts. Pretreatment with chlorine creates unwanted by-products.

Diagram from Water Intake through Treatment Plant to Distribution

The water is then diverted to two modular Aquarius packaged treatment systems each rated at 350 gallons per minute. The modular systems include flocculation tanks where unwanted particles are subjected to a gentle mixing that promotes agglomeration and assists in the settling of the particles. The water then passes through the sedimentation tanks and filter media beds (with layers of anthracite, silica sand, garnet sand) that have a design depth of 30 inches. The water is continuously monitored for turbidity. Average turbidity over a 12-month period in our source water is well below the federal limit of 0.3 NTU.



The filters are manually backwashed (from water in the clearwell) every 12 hours of operation, unless otherwise prompted by high filter effluent turbidity. The backwash waste is discharged to concrete holding tanks. Effluent from these tanks is discharged to Elks Run downstream of the existing intake. The holding tank discharge is regulated under a National Pollutant Discharge Elimination System permit issued by the West Virginia Department of Environmental Protection.

The filtered water is injected with chlorine and fluoride before entering the clearwell, an enclosed tank adjacent to the treatment plant. The finish water is then pumped up to the three storage tanks at Bolivar Heights.

Recommendation 1: Implement the upgrades proposed by engineering firm Gwin, Dobson & Foreman (GD&F), including installation of new raw water pumping station, enhanced pretreatment (coagulation, mixing, multi-stage flocculation and sedimentation), membrane filtration technology, emergency generator with automatic transfer switch. a new clearwell along with new finish water pumps and upgraded liquid chemical feeds. (See most recent list of improvements here.)

Recommendation 2: Remove accumulated solids from existing waste holding tanks and continue to dispose of solids annually.

Water Storage

The three storage tanks on Prospect Avenue in Bolivar Heights were constructed in 1964, 1987, and 2008. The tanks provide 1,019,000 gallons - or 4.13 days of storage. This is sufficient for current West Virginia Bureau for Public Health and ISO fire storage guidelines. (ISO stands for the Insurance Services Office, a private corporation that evaluates industries, etc., for insurance rating purposes.)

Recommendation 1: Implement the upgrades proposed by GD&F including new 8-inch finish waterline to replace existing line in Elks Run, telemetry system for monitoring offsite storage tank levels, and perform required repairs and repaint the two older steel water storage tanks. (See most recent list of improvements here.)

Recommendation 2: Add periodic check of storage tank condition by consultant to the To Do List described in the Water System Oversight section below.

Water Distribution

Title 150, Series 7 is the administrative law adopted by the state that governs local public service agencies like the Harpers Ferry Water Works. Among other things, this law sets the water pressure standard that must be provided to customers, the provision and testing of devices required by customers for preventing cross connections and backflow of water into the distribution system, advance reporting of non-emergency hydrant use, and the reporting requirements for water loss (unaccounted water).

The existing Harpers Ferry Water Works distribution system consists of approximately 30,000 linear feet of distribution mains ranging in size from 3/4-inch to 10-inch. The system also includes one pressure reducing valve and 71 fire hydrants. Pressures in the existing system range from a minimum of 5 psi (pounds per square inch) at the Bolivar Heights tanks to a maximum of 167 psi at the Harpers Ferry/Bolivar Wastewater Treatment Facility. These pressures were calculated using public domain software (EPAnet) and the best available records of the existing distribution system. The residences and fire hydrants on Prospect Avenue have very low water pressure given their location close to the water tanks. A new booster pump station included in the proposed system upgrade would correct this problem.

As recorded by Harpers Ferry Water Works, unaccounted for water in the existing distribution system ranges from 35% to 62%. There are multiple areas of redundancy (i.e., service mains running on both sides of the street) located within the existing distribution system. This unnecessary redundancy, as well as the age of the system, contributes to both inefficiency and water loss within the existing system. Inaccuracy in the existing service meters may contribute to the high rate of recorded water loss within the system.

Other unaccounted water use can be attributed to failure by others to notify Miss Utility before digging near water lines, and failure by the Fire Department to provide a monthly water use estimate for training and other fire service need using treated water from the Water Works system. Rule 150 4.1.h. 3. reads as follows: “Non-emergency use of a fire hydrant is prohibited unless there has been made advance notification of such proposed use by the user to the utility, and the utility has provided prior written approval of such use to the user. The utility shall charge its tariff rate for domestic water usage for all non-emergency fire hydrant water usage.”

There are several areas within the distribution system which do not meet National Fire Protection Association requirements for fire protection. These areas will require distribution system upgrades to provide emergency services to existing structures at a minimum.

In order to reduce the possibility of contamination of drinking water in the distribution system, customers having certain plumbing facilities are required to install devices that prevent backflow or cross connection. Such devices require periodic inspection by a certified inspector.

The Harpers Ferry/Bolivar area has many natural springs and seeps. These can appear to be water line leaks. Mapping of the known seeps and springs will reduce Water Works staff time spent checking actual water line leaks.

Recommendation 1: Implement the upgrades proposed by GD&F including replacement of certain distribution system waterlines, new booster pump station near Bolivar Heights storage tanks, repair and repaint the two older steel water storage tanks, and replace all residential and commercial water meters with new radio read meters. (See most recent list of improvements here.)

Recommendation 2: Complete program underway for customer compliance with the state law regarding prevention of backflow or cross connection.

Recommendation 3: Water Works staff, with the assistance of longtime residents, should compile a list (and map) of all the seeps and springs.

Recommendation 4: Obtain accurate maps of all parts of the distribution and service lines as required by the Public Services Commission in Rule 150.

Recommendation 5: Obtain monthly estimate of water use from hydrants from the Friendship Fire Department

Serving the Customers

Title 150, Series 7, mentioned above, and Series 2 (process for setting tariffs) provide the rules that most affect the water customers. These rules mandate the process that must be followed in setting water rates, provision and testing of water meters, deposits required of new customers, water billing, education on various meter and billing methods, and the process required when a customer fails to pay a bill on time.

The Water Commission and Water Works staff have instituted several programs to assist its customers in understanding various aspects of water service, detailed rate increase information, and providing alerts when water service may be disrupted. All customers receive educational material in monthly bills and can opt to receive robo-calls or texts for certain alerts. Spotty cell tower coverage in the water service area may prevent some customers from getting robo-calls.

Recommendation 1: Raise the security deposit to conform with the Rule 150, 4.2.a. requirement that the deposit be 2/12s of the annual estimated charge for water service.

Recommendation 2: Provide a flyer for customers explaining how water meters are read.

Recommendation 3: Water Works staff should have a biannual leak detection program once radio read meters are in place to catch possible leaks and malfunctions.

Recommendation 4: Water clerk should prepare an internal report that includes: annual water use by month of all large users, list of all properties that have problems with bill paying, list of all properties that have seriously high water use for the line size.

Recommendation 5: Water staff should maintain a chart of record keeping required by Rule 150, indicating where all required records are stored.

Recommendation 6: The Water Commission and Water Works staff should work to improve methods for alerting customers of disruption in water service.

Recommendation 7: The Water Commission and Water Works should prepare bill inserts to inform customers on all aspects of water service, including: A) how to conserve water; B) how to protect pipes from freezing; C) issues associated with a hilly water service area, including the possible need for a pressure reducing valve; D) risks in turning off water at the meter with the wrong technique; E) importance of having a good shut off valve; F) importance of checking with Miss Utility before digging in the public right of way, and knowing the exact locations of service lines on private property before digging.

Water System Oversight

Many of the system oversight measures are required by Rule 150. These include requirements for annual financial and statistical reports to the Public Services Commission by September 20, and the process by which water tariffs may be changed. The Water Commission is charged with ensuring the timeliness of these reports.

The Water Commission is also responsible for recommending an annual budget request to the Town Council, overseeing monthly expenditures and receipts, providing direction to water works staff, forwarding recommendations on hiring and special purchases to the Town Council.

In addition to evaluating annual budgetary needs, the Water Commission is responsible for delivering recommendations to the Town Council of long-term budgetary needs. Water Works staff, and outside engineering consultants, provide the Water Commission with future infrastructure needs - a current example being the upgrade study prepared by GD&F.

Recommendation 1: The Water Commission, with the assistance of staff and consultants, should prepare, and forward to the Town Council, a 20-year Capital Improvement Plan. The plan should include: A) all existing debt terms and amounts; B) all improvements and associated debt terms and of items listed in the GD&F Study that will implemented starting in 2019; C) all improvements and estimated costs in the GD&F Study that have been postponed; D) any other capital improvements identified in the Sanitary Survey and other periodic reports and their estimated costs, and E) Tax Increment Financing of water system improvements, where approved. The Plan should provide long term estimates of revenue, including revenue from new growth and loss of revenue from new water-conservation measures and devices that could significantly impact water use. The Plan should be updated on an annual basis.

Recommendation 2: Water Works staff and the Water Commission should work together in preparing a spreadsheet of all the properties on which water system facilities are located, including the intakes, treatment plant, water main crossing National Park property to storage tanks, pump stations, storage tanks, and distribution lines. The spreadsheet should designate type of ownership, e.g., fee simple, easement, public right of way; and indicate easement renewal date if needed, and amount of rent paid if any.

Recommendation 3: The Water Commission should create a monthly To Do List that includes: A) all items needed before, during and after a Water Commission meeting, including creation of draft agenda, posting of final agenda, emailing of draft minutes, emailing of budget vs actual, emailing of billing journal (showing amount of water by residential, commercial, National Park, other, Fire Department), results of required studies/testing; B) water loss report; and C) emailing of approved minutes to town web master for online posting on WATER page and to all Water Works staff and the Commission members.

Recommendation 4: The Water Commission should establish steps for member notification, including A) member alert members of upcoming expiration of their term on the Commission; B) submittal of newsletter vacancy listing if needed; C) submittal of information on all Water Commissioners to the Public Services Commission of board member's name, home address, home and office phone numbers, date of appointment, length of term, who the new board member replaces, whether the new appointee has previously served on the board.

Recommendation 5: Water Works staff should maintain a calendar for all periodic tasks, including removal of solids from holding tank, hydrant testing, meter testing, and biannual leak detection once radio read meters are installed.

Recommendation 6: The Water Commission and Water Works staff should create a spreadsheet of requirements for testing/reporting that gives the frequency of said test/report. This list would include: A) all items that require periodic testing by Water Works staff, including all federal and state requirements; B) all reports required by law, including Sanitary Survey, Source Water Protection Plan;

Recommendation 7: Water Works staff and the Water Commission should prepare for future staff needs, including: A) evaluate changes in staff training and number needed by the GD&F upgrade; B) maintain a list of potential Class 2 treatment operators to assist when needed; and C) create a list of where future job openings should be posted.

Recommendation 8: Maintain pie charts on the WATER page of the town website of Water Works expenditures that show expenditures over the last full year and the last 5 years. Because receipts come primarily from one source, those figures should simply be listed.

Recommendation 9: Post an approved Water Service Plan on the Water page of the Town website.