PROPOSED REMEDIAL ACTION PLAN

Saint-Gobain McCaffrey Street
Operable Unit Number 02: Municipal Water Supply
State Superfund Project
Hoosick Falls, Rensselaer County
Site No. 442046
April 2021

NEW YORK STATE | Department of Environmental Conservation

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

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SECTION 1: SUMMARY AND PURPOSE OF THE PROPOSED PLAN

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), is proposing a remedy for the above referenced site. The disposal of hazardous wastes at the site has resulted in threats to public health and the environment that would be addressed by the remedy proposed by this Proposed Remedial Action Plan (PRAP). The disposal of hazardous wastes at this site, as more fully described in Section 6 of this document, has contaminated various environmental media. The proposed remedy is intended to attain the remedial action objectives identified for Operable Unit 2 of this site for the protection of public health and the environment. This PRAP identifies the preferred remedy, summarizes the other alternatives considered, and discusses the reasons for the preferred remedy.

The New York State Inactive Hazardous Waste Disposal Site Remedial Program (also known as the State Superfund Program) is an enforcement program, the mission of which is to identify and characterize suspected inactive hazardous waste disposal sites and to investigate and remediate those sites found to pose a significant threat to public health and environment.

The Department has issued this document in accordance with the requirements of New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York; (6 NYCRR) Part 375. This document is a summary of the information that can be found in the site-related reports and documents in the document repository identified below.

SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all PRAPs. This is an opportunity for public participation in the remedy selection process. The public is encouraged to review the reports and documents, which are available at the following repository:

Cheney Library
73 Classic Street
Hoosick Falls, NY 12090-0177

On-Line Repository: https://www.dec.ny.gov/data/DecDocs/442046/

A public comment period has been set from:

April 21, 2021 to June 4, 2021

A public meeting is scheduled for the following date:

May 13, 2021

Public meeting location:

Due to COVID-19 restrictions, DEC and DOH presentations will be conducted virtually through the Webex Events online platform or via conference call.

To join the virtual meeting online on May 13, 2021 at 6 p.m.:

- Visit https://on.ny.gov/3dxlzVu and click "Join"
- Event Number: 185 262 6040
- Password: NYSDEC2021

For information on how to participate in a virtual meeting, go to https://www.dec.ny.gov/public/51805.html

To join by phone:

- Dial: 1-518-549-0500
- Access Code: 185 262 6040 #
- Press # again in lieu of an attendee I.D. number

Interpreter services shall be made available to deaf persons, and language interpreter services for individuals with difficulty understanding or reading English, at no charge, upon request, at least ten (10) business days prior to the meeting. For interpreter service requests, please contact Regina Willis by phone at 518-357-2075 or email at regina.willis@dec.ny.gov.

At the meeting, the findings of the Municipal Water Supply Study will be presented along with a summary of the proposed water supply source. After the presentation, a question-and-answer period will be held, during which verbal or written comments may be submitted on the PRAP.

Written comments may also be sent to:

Ian Beilby, P.E.
NYS Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, NY 12233
hoosickwatersupply@dec.ny.gov

The Department may modify the proposed remedy or select another of the alternatives presented in this PRAP based on new information or public comments. Therefore, the public is encouraged to review and comment on the proposed remedy identified herein. Comments will be summarized and addressed in the responsiveness summary section of the Record of Decision (ROD). The ROD is the Department's final selection of the remedy for this site operable unit.

Receive Site Citizen Participation Information by Email

Please note that the Department's Division of Environmental Remediation (DER) is "going paperless" relative to citizen participation information. The ultimate goal is to distribute citizen participation information about contaminated sites electronically by way of county email listservs. Information will be distributed for all sites that are being investigated and cleaned up in a particular county under the State Superfund Program, Environmental Restoration Program, Brownfield Cleanup Program, Voluntary Cleanup Program, and Resource Conservation and Recovery Act Program. We encourage the public to sign up for one or more county listservs at http://www.dec.ny.gov/chemical/61092.html

SECTION 3: SITE DESCRIPTION AND HISTORY

Location: The Saint-Gobain McCaffrey Street Site is a 6.41-acre site located at 14 McCaffrey Street in the village of Hoosick Falls.

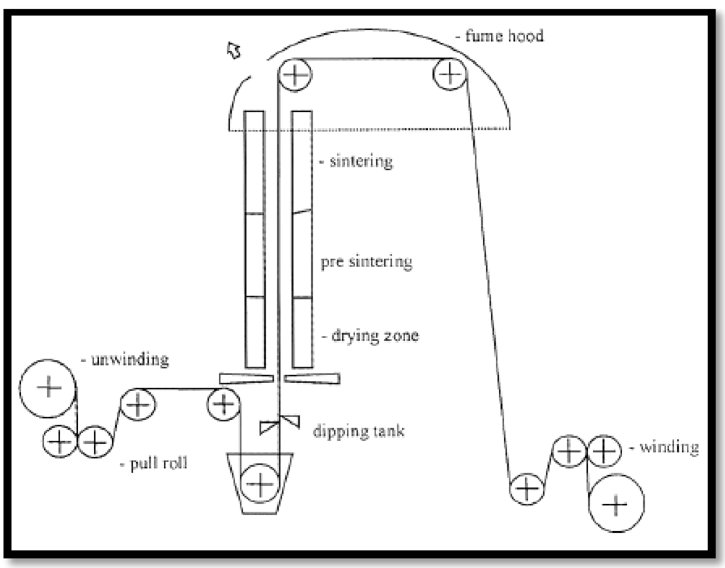


Figure 1: Fabric Coating Process using PTFE Dispersions

Site Features: The site is occupied by an active manufacturing facility. The site building was built in 1961, with additions completed in 1966, and 1975. The remainder of the site consists of parking areas and green space (lawn). The northeast corner of the parcel is unimproved woodland. The site slopes from the northwest towards the southeast with a steep drop in elevation of approximately 20 feet in the central portions of the site.

Current Zoning and Use: The parcel is zoned industrial and is bound to the north and east by residential properties; the Village water well field, Village Highway Garage, and Village Water Treatment Plant to the south; and the Hoosick River Greenway to the west. The Saint-Gobain Performance Plastics facility converts raw material resin powder to sheets of polytetrafluoroethylene (PTFE[1]) resin plastic of a variety of thicknesses and lengths for shipment to other facilities for further processing into various finished products. The resin powder is first compressed into billets. The billets are heated to remove moisture (sintering) in on-site ovens.

[1] PTFE is the acronym for polytetrafluoroethylene and is a scientific name for fluorinated organic compounds such as Teflon™.

After the billet has been cooled, on-site processing includes a shaving (skiving) process or an extrusion process to manufacture varying types and thicknesses of the PTFE resin sheets. Unlike past PTFE surface coating operations at the facility, these current processes do not produce liquid waste.

Past Use of the Site: The facility was constructed in 1961 and has been operational since 1962 under a number of corporate owners and has manufactured a variety of PTFE tape and fabric products. From 1962 through approximately 2003, PTFE dispersions used in some manufacturing processes at the McCaffrey Street facility contained PFOA. Most notably, the McCaffrey Street facility utilized up to eight towers which housed ovens used to manufacture PTFE-coated fabrics. Using a liquid PTFE dispersion, the fabric was dipped into the liquid PTFE dispersion, and the coated material was threaded through rollers into a heated tower.

Temperatures in the tower were maintained at levels to achieve sintering pf the PTFE dispersions on the fabric which continued to be rolled back down the tower, through lower temperatures to cure the PTFE coating. Once cured, the product could be re-rolled. Multiple applications of the dispersions were needed depending on product specifications.

Temperatures required to sinter the PTFE dispersions exceed the boiling temperature of PFOA, causing the chemical to vaporize and exit the plant through stacks or vents. Airborne fumes and/or gas-phase PFOA migrated from the facility dependent on factors such as stack height, stack velocity, meteorology, topography, etc. The PFOA eventually settled out of the atmosphere and deposited on soils and in surface water.

Application of liquid PTFE dispersions at the facility was discontinued in 2003 however, atmospheric deposition of PFOA from the McCaffrey Street facility is thought to have been a significant contributor to levels of the contaminant found in soil and surface waters in, and around, the village of Hoosick Falls.

In addition to the atmospheric deposition pathway at the McCaffrey Street facility, the disposal of the spent liquid dispersions and wash-down from duct cleaning or other maintenance activities from the fabric coating process has also contributed to direct and indirect contamination of soil and groundwater on and around the McCaffrey Street site. Historically, the spent dispersions were disposed of directly into the sewers at the site, as indicated by high concentrations of PFOA in soils and groundwater collected from monitoring wells installed in the vicinity of the sewage ejector pit. Additionally, some of the spent dispersions are alleged to have been shipped off-site for disposal at various landfills or wastewater treatment plants.

Site Geology and Hydrogeology: The site is situated in the New England Upland (Taconic Range) physiographic province which is located in the Hoosic River Valley. Bedrock underlying the site is encountered between 19 and 43 feet below ground surface (bgs) and is identified as slate and phyllite of the Walloomsac Formation. Unconsolidated materials beneath the site and on top of the bedrock consist of glacio-lacustrine sand, silt and clays in varying thickness, as well as glacial till encountered across the northern portion of the site consisting of sand, silt, gravel, and clay. The till is encountered between 12 to 15 feet bgs, and ranges from 8 to 12 feet in thickness. Groundwater flow directions in the unconsolidated material and in the bedrock are generally radial;

away from the site, with the on-site facility being located on a topographically high point. Low permeability layers are present, though discontinuous.

The Hoosic River is located 250 feet west of the site, and a retention pond and intermittent brook are located east and south of the site, surface runoff flows toward the Hoosic River and the wetland areas.

Significant geologic investigations have been conducted throughout the Hoosic River valley, including the installation of two test wells approximately 0.8 miles to the south of the existing village wellfield. The general geologic description for the Hoosic River Valley from the site and extending south can be described as glacio-lacustrine deposits. These deposits consist of sand, gravel, silt and clay and vary based on the historic depositional environments such as glaciers, water, and erosion. In general, unconsolidated materials in the valley between the McCaffrey Street site and the test well location can be grouped into a lower unit, an upper unit, and a confining unit. The lower unit, just above bedrock, consists of glacially-deposited sand and gravel while the upper unit consists of sand, silt, and gravel formed by more recent alluvial events. These two are separated by a low permeability confining unit of lacustrine silts and clays which results in a lower aquifer and an upper aquifer. This confining unit varies in thickness throughout the Hoosic River Valley, partly due to erosional events. In the area of the test well, this layer is approximately 60 to 100 feet thick. While the lower aquifer is more isolated from surficial influences and irregularities, the upper aquifer is more directly influenced by surface dynamics such as climate change, precipitation events, vegetation, the nearby Hoosic River, etc. The low transmissivity of the confining layer, as indicated by the recent hydrologic testing and geologic observation, limits the interaction between the upper and lower aquifers, confirming their separation. When an aquifer is located beneath a confining, low permeability geologic layer, the aquifer is protected from impacts above this layer.

The test well location south of the origin of the contaminant plume at McCaffrey Site (OU-01), is hydraulically upgradient (against natural flow) from the site. Results of pumping tests conducted on the water supply test wells show no interaction between the contaminated aquifer at the McCaffrey Street site and the aquifer in which the proposed water supply wells are located A rise in bedrock elevation between the site and the test well location also acts to provide further separation. The upgradient distance from the contamination source, the confining layer, and the bedrock surface topography are expected, with a high degree of to prevent impacts via the lower aquifer to the groundwater supplying the test wells. The confining layer also serves to limit the interaction between the upper and lower aquifers.

Operable Units: The site is divided into three operable units. An operable unit represents a portion of a remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination.

Operable Unit 1 (OU-01) includes the 6.41–acre site, as well as groundwater contamination directly attributable to on-site disposal of hazardous waste.

Operable Unit 2 (OU-02) includes the existing contaminated municipal water supply (Water Supply).

Operable Unit 3 (OU-03) includes off-site contamination related to the atmospheric deposition of site-related contaminants and direct off-site disposal of site-related liquid and/or solid wastes.

Operable Unit (OU) Number 02 is the subject of this document.

A Record of Decision (ROD) will be issued for OUs 01 and 03 in the future.

A site location map is attached as Figure 1.

SECTION 4: LAND USE AND PHYSICAL SETTING

The Department may consider the current, intended, and reasonably anticipated future land use of the site and its surroundings when evaluating a remedy for soil remediation. This PRAP evaluates remedial options for addressing the Water Supply portion of the groundwater plume and does not address on-site soil remediation. On-site soil contamination will be addressed under the forthcoming PRAP for the McCaffrey Street site.

SECTION 5: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The PRPs for the site, documented to date, include:

Saint-Gobain Performance Plastics Corporation
Honeywell International Inc.

Saint-Gobain Performance Plastics and Honeywell International, Inc. (PRPs) initially entered a comprehensive Order on Consent (Index No. CO 4-20160212-18) with the Department effective June 3, 2016. The Order established the requirement for the PRPs to investigate the nature and extent of contamination including but not limited to PFOA contamination at, and migrating from, the Saint-Gobain McCaffrey Street (McCaffrey Street) site, Saint-Gobain Liberty Street (Liberty Street) site, as well as, off-site at the Village of Hoosick Fall Municipal Water Supply (MWS) well field.

An additional requirement of the Order includes assessment of alternatives, in the form of a study, to eliminate or reduce PFOA in the municipal water supply.

A work plan submitted by the PRPs for the McCaffrey Street site remedial investigation and feasibility study (RI/FS), which required a municipal water supply study (MWSS) and specified tasks needed to complete the MWSS, was approved on August 30, 2016. A supplemental workplan was approved on May 12, 2017. The MWSS was completed and the final report was submitted to the Department on November 13, 2020. The OU-01 RI/FS remains in progress.

SECTION 6: SITE CONTAMINATION

6.1: Summary of the Remedial Investigation and Water Supply Study

A remedial investigation is on-going for OU-01 and OU-03 to fully define the nature and extent of contamination resulting from past manufacturing activities at the site. To address OU-02, a study was conducted to identify and evaluate water supply options for the village of Hoosick Falls. A final report was issued in December of 2020 describing the study and identifying potential water supply options.

The MWSS identified water supply options in the following categories:

1. A new groundwater source
    a. With GAC treatment not included;
    b. With GAC treatment included
2. A new surface water source;
3. Connection to an existing municipal system;
4. Continued use of existing village well field with appropriate treatment technology; and
5. Continued use of existing village well field with appropriate treatment technology and operation of an IRM at the McCaffrey Street site.

A screening process was conducted after potential water sources in each category were identified to evaluate the best potential options within the MWSS. All options identified are listed in the MWSS report.

The final options that were determined to be the most appropriate and feasible include the following:

1. Withdrawal of groundwater from new supply wells just south of the village of Hoosick Falls;
2. Withdrawal and transmission of surface water from the Tomhannock Reservoir;
3. Connection to the City of Troy water supply in Cropseyville;
4. Continued use of the Village supply wells #3 and #7 including GAC treatment; and
5. Continued use of the Village supply wells # 3 and #7 with GAC treatment and continuation of the groundwater extraction IRM at the McCaffrey Street site to hydraulically contain the contaminant migration.

To evaluate the new groundwater source option, test wells were installed on the west side of the Hoosic River along with surrounding groundwater monitoring wells. The wells were installed to evaluate the ability of the aquifer to produce a sufficient quantity of water to meet the estimated demand as well as the quality of the groundwater in this location. Geophysical studies, pump tests and collection of groundwater and soil samples were carried out to fully evaluate the aquifer characteristics. The results of these activities were used to evaluate the new groundwater option against other options as discussed later in this PRAP.

To evaluate a potential new surface water source (the Tomhannock Reservoir), multiple reports were reviewed to assess the quantity and quality of the water source, including the 2018 safe yield study and the final NYSDEC trip report for sampling activities conducted at the reservoir in 2019. Analysis of the tracts of land between the reservoir and the village of Hoosick Falls was also performed to establish a potential route for the necessary transmission line from the reservoir to the village.

The option for interconnection to the Troy municipal water supply was largely evaluated through use of the safe yield study and review of potential locations for connection. Analysis of the land between the connection location and the village was also performed to establish a potential route for the transmission line to the village.

6.1.1: Standards, Criteria, and Guidance (SCGs)

The water supply options presented must all conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, Criteria and Guidance are hereafter called SCGs.

The objective of the remedy selection process for OU-02 is to determine a source of drinking water that will adequately supply the village demand under feasible and sustainable operation and maintenance requirements. The breadth of SCGs needed to evaluate the options previously identified include NYSDOH Part 5, Subpart 5-1 standards for drinking water (including Maximum Contaminant Levels (MCLs) for site-related contaminants) as well as regional guidance for the development and operation of public water supplies known as the "Recommended Standards for Water Works", also known as the "Ten States Standards."

Based on data from the on-going remedial investigation of OU-01, contaminants of concern have been identified. A "contaminant of concern" is a hazardous waste that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Not all contaminants identified on the property are contaminants of concern. The contaminant(s) of concern identified for this Operable Unit at this site is/are:

- perfluorooctanoic acid (PFOA)

As illustrated in Exhibit A, the contaminant(s) of concern exceed the applicable SCGs for:

- drinking water

The State Superfund program requires that threats to public health be addressed through the evaluation of potential remedial alternatives to eliminate exposure to contaminants. These remedial alternatives are referred to as water supply options or "Options" for the purposes of this

PRAP. The presence of PFOA at levels above SCGs in Hoosick Falls' drinking water supply poses a threat to public health and necessitates evaluation of water supply options.

The study of potential water supply options is also warranted due to the proximity of the existing village wellfield to the source of contamination, and other anticipated remedial activities over the short and long term, as well as the current understanding of the environmental fate, transport, and persistence of PFOA.

6.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before issuance of the Record of Decision.

PRPs were required to maintain a temporary granular activated carbon (GAC) water treatment system, which was installed as an emergency measure at the Village of Hoosick Falls Municipal Water Treatment Plant. The temporary system was installed to treat 0.5 million gallons per day (MGD) of raw water from the village wellfield and was operational as of March 30, 2016 Subsequently, the PRPs were ordered to pay for the design, installation, operation, monitoring and maintenance of a full capacity system (to treat 1 MGD) to replace the temporary GAC treatment system. The full capacity system was constructed and placed in operation on December 30, 2016. This system remains in operation under a NYSDEC and NYSDOH-approved operation and maintenance plan.

Figure 2: Steel vessel containing granular activated carbon.

Interim remedial measures (IRMs) were required under the consent order. They included:

1. Continued operation, maintenance and monitoring of the temporary, 0.5 MGD GAC system; and
2. Design and construction of a full capacity GAC treatment system at the water treatment plant.

The objective of the full-capacity GAC treatment system IRM on the Village Water Supply is to remove PFOA, and other site-related contaminants, from the water supply prior to distribution to Village residents and to, "…monitor, maintain, and operate the full capacity system to deliver water that meets or exceeds applicable standards." as stated in the "Granular Activated Carbon, Water Treatment Plant Addition Construction Completion Report – Draft April 2019."

The GAC treatment system is comprised of two vessels that each contain 40,000 lbs of GAC media. Vessels are operated in series such that there is a lead vessel and lag vessel. The GAC is effective at removing organic compounds, including PFOA, from the Village's drinking water prior to distribution. Drinking water is monitored on a regular basis at multiple sampling points including the influent, mid-point, and effluent, as well as multiple stages in each of the vessels. Results of the sampling are used to determine when the GAC media in the lead vessel is approaching saturation and needs to be replaced with virgin GAC as described in the facility Protocol Work Plan (2017, Revised 2019).

Routine analysis of the finished drinking water provided by the treatment system indicates that the IRM objectives are being achieved.

The IRM will continue to operate until a final water supply option is selected, constructed and approved for operation.

A third IRM has also been completed at the McCaffrey Street site (OU-01) to prevent continued migration of highly contaminated groundwater to the village wellfield. This system continues to operate as designed.

6.3: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.

Based upon the resources impacted and exposure pathways identified, a Fish and Wildlife Resources Impact Analysis (FWRIA) was deemed not necessary for OU-02.

PFOA in untreated water from the Village's wellfield is currently present in the range of 150 to 500 ppt. These levels exceed the MCL established for drinking water by New York State of 10 ppt for PFOA.

The MCL value of 10 ppt is currently in use to assess groundwater contamination for PFOA and perfluorooctane sulfonic acid (PFOS). Environmental concerns related to PFOA contamination will be addressed under OU-01 and OU-03 remedial investigations, feasibility studies and appropriate remedial objectives.

Additionally, and as described in the Site Geology and Hydrogeology portion of Section 3, the subsurface conditions in the Hoosic River Valley, between the McCaffrey Street site and the test well locations, include both a lower and an upper aquifer separated by a low permeability silt and clay confining layer. However, gaps in this confining layer exist under the McCaffrey Street site allowing the contamination in the upper aquifer to mix with the lower aquifer near the site. The current Village well field is screened in this mixed unit within close proximity to the McCaffrey Street site and, thus, the contaminants have impacted the Village's water supply. The confining layer was identified south of the site and was observed to be from 60 to 100 feet in thickness in the area of the test well locations. A rise in the bedrock topography between the site and the test wells was also observed during investigations. The low transmissivity of the confining layer, as indicated by the hydrologic testing and geologic observation, limits the interaction between the upper and lower aquifers, confirming their separation. Laboratory tests show levels of PFOA at 530 ppt in the upper aquifer and non-detect to 2.5 ppt in the lower aquifer. An aquifer located beneath a confining, low permeability geologic layer (generally fine silts and clay as has been confirmed in the Hoosic River Valley), the aquifer is protected from impacts above this layer. The newly installed test wells were also subjected to 72-hour pump tests which show no indication of influence on the wells around the McCaffrey Street site nor at the Village well field. Failure of the pump tests to affect the well field aquifer water levels provides further indication that localized groundwater contamination from the McCaffrey Street site at the Village well field will not affect the test well aquifer.

Considering the approximate 0.8 mile separation from the McCaffrey Street site and the rise in bedrock elevation between the areas, as well as being upgradient (against the natural flow), the location is effectively separated from, and not expected to be impacted by, the McCaffrey Street site contamination.

6.4: Summary of Human Exposure Pathways

Chemicals can enter the body through three major pathways (inhalation, direct contact and ingestion). This is referred to as *exposure.* This human exposure assessment focuses on the ingestion of site-related contaminants in drinking water from the Village's municipal water supply system.

Sampling by the NYSDOH and the Village of Hoosick Falls identified the presence of PFOA in the Village's municipal water supply in 2015. Actions have been taken to reduce human exposures to PFOA in the drinking water supply. These actions included the provision of bottled water followed by the construction of a water treatment plant which uses granular activated carbon (GAC) to remove PFOA, and other site-related contaminants from the water prior to distribution.

When elevated levels of PFOA are present in drinking water consumed by the public, PFOA levels in blood are expected to be higher than levels in the general U.S. population. Once the exposure to PFOA is prevented, PFOA levels decline in blood by about half every two to four years. In Hoosick Falls, bottled water was available for area residents starting in November 2015 and the Village's water supply had no detectable PFOA level (above the analytical reporting limit of 2 parts per trillion) starting March 24, 2016 as a result of granular GAC filtration.

6.4.1: Summary of Biomonitoring Program

NYSDOH offered two rounds of blood testing to interested community members in the Hoosick and Petersburgh areas. Testing for both rounds were conducted by the NYSDOH Wadsworth Center laboratories. The 1st round of blood tests occurred from February to November 2016 and looked for only PFOA. Round 1 included 3,411 people in the Hoosick and Petersburgh areas. The 2nd round of blood tests occurred from June 2018 to March 2019 and looked for PFOA and 5 other PFAS compounds to provide participants with additional information. The timeframe for Round 2 began about two and one-half years after most people's exposures to PFOA from drinking water ended. A total of 685 people participated in Round 2.

By comparing each person's Round 1 PFOA level to their Round 2 level, NYSDOH calculated each person's PFOA rate of decline. That rate of decline is usually expressed in terms of half-life, which is the estimated length of time it takes for the PFOA level to go down by half after exposures have ended. Several other studies have estimated PFOA half-lives in other groups of people (Olsen et al, 2007; Li et al, 2017). Based on results from those investigations, NYSDOH expected that the average blood PFOA half-life for Hoosick Falls adult residents would be about three years. Round 1 versus Round 2 blood PFOA comparisons show PFOA levels have gone down for the group of participants as a whole by approximately 40%. Round 2 blood PFOA results show that Hoosick Falls residents continue to have levels that are higher than the general U.S. population. Group-level results for the five additional types of PFAS tested in Round 2 show that Hoosick Falls residents have levels that are very similar to levels in the general U.S. population.

The biomonitoring conducted by NYSDOH indicated elevated levels of PFOA in blood of people who consumed drinking water containing PFOA. The actions taken to reduce the level of PFOA below the analytical reporting limit have effectively addressed the primary exposure pathway and resulted in a reduction of the levels of PFOA in blood.

6.5: Summary of the Remediation Objectives

The objectives for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles. The remedy for OU-02 addresses one portion of the site contamination concerns. Remedies for OU-01 and OU-3 will be developed in the future to address the remaining concerns.

Drinking Water

- Prevent ingestion of drinking water with contaminant levels exceeding drinking water standards (maximum contaminant levels).
- Minimize the body burden of PFAS within the population by providing drinking water that that does not exceed analytical reporting limits for site-related contaminants.

SECTION 7: SUMMARY OF THE PROPOSED REMEDY

To be selected, the remedy must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. The remedy must also attain the remedial action objectives identified for the operable unit, which are presented in Section 6.5. Potential remedial alternatives for the operable unit were identified, screened and evaluated in the MWSS report.

A summary of the water supply options that were considered for this site is presented in Exhibit B. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of options to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth costs for options with an indefinite duration. This does not imply that operation, maintenance, or monitoring would cease after 30 years. A summary of the water supply option costs is included as Exhibit C.

The basis for the Department's proposed remedy is set forth in Exhibit D.

The proposed remedy to address the water supply is referred to as the New Groundwater Source with GAC Treatment.

The estimated present worth cost to implement the remedy is $9,700,000. The cost to construct the remedy is estimated to be $5,100,000 and the estimated average annual cost is $330,000.

The elements of the proposed water supply remedy are as follows:

- Development of two new groundwater supply wells: Existing test wells located south of Hoosick Falls will be converted to production wells.
- Provide required redundancy by maintaining a minimum of one existing Village well: A third well is required to provide redundancy in the case of an outage of the primary wells.
- Construction of a water transmission line from the new wells to the Village water treatment plant along public rights of way;
- Continued maintenance and operation of the public water supply treatment plant for removal of naturally occurring elements, disinfection and distribution to meet applicable water supply requirements;
- Retain the existing GAC treatment system to ensure removal of ambient organic compounds;

Remedial Design

A design program will be implemented to provide the details necessary for the construction, operation, optimization, maintenance, and monitoring of the Village supply wells. Green remediation principles and techniques will be implemented to the extent feasible in the design, implementation, and site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gases and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste;
- Maximizing habitat value and creating habitat when possible; and
- Fostering green and healthy communities and working landscapes which balance ecological, economic and social goals;

Technology: Drinking Water Supply via Groundwater Extraction & Treatment

Engineering and Institutional Controls

1. Engineering Controls
    a. Installation and operation of multiple, large diameter wells in the clean, lower aquifer to extract up to 1.14 million gallons per day of water;
    b. Pumping extracted raw water through approximately 2.5 miles of pressurized water main to the existing Village Water Treatment Plant;
    c. Using existing treatment technology and capabilities to remove contaminants and impurities from the raw water as necessary; and
    d. Supplying treated, potable water to the Village residents and consumers for use.

2. Institutional Controls
    a. Filing of an institutional control in the form of an easement for the property on which water supply system infrastructure is located that provides for access:

3. Site Management Plan: A site management plan is required which includes the following:
    a. An Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the water supply and details the steps and media -specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:
        i. Engineering Controls: The Water supply system components identified in paragraph 1 above. This plan includes, but may not be limited to:
            1. Provisions for the management and inspection of the identified engineering controls, including establishing roles and responsibilities for system operation, maintenance and repairs;
            2. Maintaining site access controls; and

3. The steps necessary for periodic review and certification of the institutional and/or engineering controls.

ii. Institutional Controls: The easement discussed in paragraph 2 above.

b. A Monitoring Plan to

i. assess the water supply performance and condition of the municipal water supply aquifer; and

ii. assess the performance of the implemented water supply option to provide potable water with concentrations of PFOA, and other site-related contaminants, below analytical reporting limits. This plan includes, but may not be limited to, the following:

1. continuation of the NYSDOH biomonitoring program (or similar); and
2. analysis of future results through comparison to baseline values to facilitate trend analysis.

iii. The monitoring plan includes, but may not be limited to:

1. groundwater monitoring, site inspections, etc. as may be required by the Institutional and Engineering Control Plan discussed above; and
2. collection of blood samples and analysis for PFAS.

EXHIBITS A Thru D

Exhibit A

Nature and Extent of Contamination

This section describes the findings of the Remedial Investigation for all environmental media that were evaluated for this operable unit (OU). As described in Section 6.1, samples were collected from various environmental media to characterize the nature and extent of contamination associated with OU-02.

The medium of concern relevant to OU-02 is the Village of Hoosick Falls municipal drinking water. PFOA is the primary COC that continues to impact the current Village drinking water supply source at concentrations exceeding applicable SCGs. Disposal of PFOA at the McCaffrey Street site has contaminated groundwater around the facility and the Village of Hoosick Falls' water supply wells.

The geologic setting within the Hoosick River Valley, described in Section 3 of the PRAP, generally consists of an upper and a lower aquifer separated by a low-permeability confining unit (lacustrine silt and clay layer). Detailed subsurface investigations indicate the confining unit to be non-contiguous in the vicinity of the village of Hoosick Falls, including the McCaffrey Street site proper and the Village wellfield. The non-contiguous confining layer in this area allows significant vertical mixing between the upper and lower aquifers and explains the presence of high concentrations of PFOA in the lower aquifer resulting from the disposal of PFOA to the upper aquifer.

The current Village well field is located directly down gradient from the site and the drinking water supply wells draw from this contaminated area of the lower aquifer. Analysis of the raw water from the village supply wells (groundwater prior to treatment) routinely indicates that concentrations of PFOA range between 400 and 500 ppt. A maximum contaminant level (MCL) of 10 ppt for drinking water has been established for PFOA by the New York State Department of Health (NYSDOH). PFOA concentrations in groundwater samples collected from monitoring wells slightly to the south of the supply wells range from 50 to 340 ppt; slightly lower than the raw water concentrations. Other per- and polyfluoroalkyl substances (PFAS) are present at much lower concentrations in this area of the aquifer. Typical results for these compounds are in the single ppt range (less than 10 ppt). PFOS is detected between non-detect levels and 5 ppt (below the MCL of 10 ppt) in the raw water.

Analysis of groundwater samples collected from the upper and lower aquifers 2,000 feet to the south of the Village wellfield confirms the extent of groundwater contamination from OU-01 is controlled by topographic conditions and is limited to locations hydraulically downgradient of the OU-01 releases to on-site groundwater. PFOA is sporadically present in the upper aquifer at this southern location at concentrations up to 530 ppt[1]. Groundwater samples collected from the lower aquifer have approximately 3 ppt of PFOA. Other samples collected from this distance to the south are non-detect for PFOA. PFOS is not detected in this area.

1 The source of PFOA at this location is suspected to be separate from OU-01 and may be related to atmospheric deposition, localized direct disposal of PFAS, or a combination of mechanisms.

Extensive investigation and analysis of the aquifer in the vicinity of the test wells described previously, 0.8 miles to the south, and upgradient of the Village well field have been performed. Current testing finds that PFOA concentrations in the lower aquifer at this location range between non-detect levels and 5.5 ppt. PFOS is detected in some samples but the results are estimated values that are below the laboratory reporting limit.

Analysis of groundwater in the aquifer that supplies the test wells identified the following organic compounds that are sporadically present below SCGs (drinking water MCLs) and that appear to be representative of the aquifer conditions: a) PFOA, b) PFOS, c) 6:2 FTS, d) endrin aldehyde, e) lindane, and f) alpha-BHC. Naturally-occurring inorganic materials present in the aquifer greater than SCGs include manganese. Additional organic compounds were detected in the samples but have been determined to be related to laboratory materials or equipment used to collect the samples. Those compounds include the following: a) acetone, b) toluene, and butyl benzyl phthalate.

Groundwater chemistry data from these investigations indicate the aquifer containing the test well location is not impacted by OU-01. Field observations of water levels to document groundwater flow and hydraulic conditions in the valley's lower aquifer directly show that pumping up to 400,000 gallons per day from the Village wellfield has no effect on the groundwater conditions at the groundwater source supplying the test wells, nor on groundwater flow at a location midway between the existing Village wellfield and the test well location. The DEC has concluded from these two data points that contamination from OU-01 has not and will not affect the portion of the lower aquifer containing the test wells.

Additionally, several lines of lines of geologic evidence support the conclusion that the new offsite water supply wells will not be impacted by the plume of contaminated groundwater originating from McCaffrey Street site. These lines include:

1) the upgradient location of the test wells;
2) the physical distance; and
3) variable thicknesses of multiple geologic units and presence of a confining layer.

These lines of evidence are elaborated upon below:

- While the currently operating Village water supply wells and test wells are screened in the same lower aquifer, the test wells are located upgradient (higher pressure) from the current Village well field (lower pressure). Groundwater must always flow in the direction from high pressure to low pressure. Therefore, the flow of groundwater will be from the proposed remedy location toward the Village well field and not in the opposite direction.
- In addition to the test wells being located upgradient from the village well field, the wells are sufficiently far away from the Village well field and from the McCaffrey Street Site so that they are not expected to be hydraulically connected. During a 72-hour pump test conducted at the proposed water supply wells, monitoring wells in the Village well field and at the McCaffrey Street Site did not exhibit a response from the pumping activity in the proposed remedy well locations, supporting the conclusion that the wells are sufficiently far from the Site and are not hydraulically connected.
- Throughout the water supply study, the supplemental data gap analysis, and during the onsite site characterization and remedial investigations at McCaffrey street, the subsurface geology within the vicinity of the site and south of the site in the area surrounding the test wells has been extensively studied. The overburden (unconsolidated geologic deposits

above the bedrock surface) generally consists of 3 contiguous and identifiable geologic units. These units are 1) the lower semi-confined sand and gravel aquifer, 2) the confining unit composed of low-permeability silt and clay which ranges from 60 to 100 feet thick, and 3) the upper aquifer, also composed of sand, silt, and clays. While the composition of the three units is consistent, the thickness of the three units varies throughout the river valley. Most noticeably, the confining unit is thin to absent across much of the McCaffrey Street site. The absence of this confining unit means that there is direct connection at the site between that highly contaminated upper aquifer, and the lower aquifer, while throughout the rest of the valley, that confining unit prevents contamination present in the upper aquifer from moving into the lower aquifer. During the water supply study and the supplemental data gap analysis investigations, hydrogeologic testing found that the confining unit is consistently present, and effectively separates the lower aquifer from the upper aquifer in the vicinity of the proposed remedy well locations.

Exhibit B

Description of Remedial Alternatives

The following alternatives for a water supply source have been identified and were considered based on the remedial action objectives (see Section 6.5) to address the contaminated media identified for this OU as described in Exhibit A. All options (other than Option 4), as described, would be implemented in parallel with on-going and future remedial actions to address contamination present at other Operable Units, including the on-site IRM that is intercepting high concentrations of contamination currently migrating off-site.

Option 1: Development of a New Groundwater Source

Option 1 (Development of a New Groundwater Source) provides for the development of new groundwater wells to replace the existing wellfield as the primary Village water source. Under this option, test wells installed during the MWSS located 0.8 miles south of the Village are converted to permanent production wells. Village Well #7 is maintained as required to fulfill redundancy requirements.

Option 1 considers two scenarios to provide water from the new supply wells.

Option 1A, New Groundwater Source conveys water from the new supply wells to the existing Hoosick Falls' water treatment plant (WTP) for manganese removal, disinfection, and distribution. At least one existing village well, along with existing treatment plant components, including the granular activated carbon (GAC) system, are maintained to meet maximum day demand should the largest of the new wells be temporarily out of service. The new wells would be designated to operate as the primary water supply. Water quality data from the new wells indicate that treatment via microfiltration membranes and GAC is not required to meet SCGs. Periodic operation and maintenance (O&M) of Village Well #7 through the microfiltration units and GAC media is included in Option 1A, as it is necessary to maintain both systems in readily usable condition to meet redundancy requirements.

Option 1B: New Groundwater Source with Granular Activated Carbon Treatment differs from Option 1A in that the GAC treatment system IRM previously implemented to remove PFOA, remains an active treatment component of the raw water treatment from the new supply wells. Current data indicate that water from the new wellfield meets existing SCGs and meets the MCLs of 10 ppt for each of the compounds PFOA and PFOS. Continued use of the existing GAC treatment system eliminates the need to maintain the vessels in usable condition through separate actions and ensures removal of organic contaminants should groundwater quality in the aquifer change over time. Maintenance of one existing Village supply well and the microfiltration unit as part of the backup water source is also included.

Under both Options 1A and 1B, water from the new wells is treated for manganese removal and disinfection at the WTP. However, since the aquifer tests, micro-particulate analysis (MPA), and water quality data for the new wells indicate that the new wells would not be classified as groundwater under the direct influence of surface water, the microfiltration membrane process would be bypassed (but remain in operational condition for when needed for use of the existing water supply well). As presented in the MWSS report, the projected 180-day drawdown for the test wells under concurrent pumping conditions substantiates the ability of these two wells to meet the 1.13 MGD objective of maximum day demand. Additional testing may be necessary to obtain the necessary water withdrawal and water supply permits required for permanent use by permitting authorities such as NYS and Rensselaer County Department of Health (RCDOH).

As presented in the MWSS report other constituents were detected in groundwater in the vicinity of the new wells. Therefore, groundwater quality evaluations and monitoring are included as part of this option to assess the potential for PFAS (or any other contaminant) migration during operation of the new wells.

Each well would be outfitted with a new sanitary cap, submersible pump and motor, and discharge pipe. Variable frequency drive controllers are installed to adjust pump speed to match well withdrawal rates with current demand. New electric services would be required for each well. Since these wells are located within a FEMA flood zone they also would require extended casings to prevent inundation.

Individual 8-inch water mains would connect the wells to the public right-of-way on Route 22 before joining into a single 12-inch main. The 12-inch main would head north along NYS-22 and River Street, cross the Hoosic River on the bridge, turn south, and follow Fiske Street and Water Works Road to the WTP. The 8-inch well discharge pipes and 12-inch common raw water main were selected based on reasonable hydraulic losses for the pumping distances required under maximum day demand conditions.

The entirety of the alignment would be within the public right-of-way, with the exception of the well discharge mains on the LaCroix and Wysocki properties. Permanent easements or transfer (sale) to the Village is required from these landowners. The total length of water main is approximately 2.7 miles. The conceptual water main route selected for Options 1A and 1B has the fewest barriers to implementation. Though other routes exist, such as the route beneath the Hoosic River, they were deemed to be more technically and administratively challenging. Nevertheless, alternate water main routes are to be considered during detailed design of this option.

The topography of the raw water main route is relatively flat, varying less than 50 feet in elevation. Based on surficial geology, the proposed raw water main would be installed in primarily sand and gravel soils. Surface rock is not present according to record mapping, although small quantities may be encountered.

Historical aerial imagery for this area of the Hoosic River indicates there is potential for the channel to vary over time from east to west. As it is expected that this meander trend will continue in the future, Options 1A and 1B include mitigation measures to prevent erosion towards the new supply wells. Based on the characteristics of bed and banks on this reach of the Hoosic River, it is anticipated that bendway weirs can be utilized to redirect the fastest flowing current away from the western bank. Options 1A and 1B will also include hard armoring at the toe of slope, regrading, and revegetation of the eroded bank for approximately 500 feet.

Options 1A and 1B would require administrative reviews and approvals from agencies and municipalities. At a minimum, coordination would be necessary with the NYSDEC, NYSDOH/RCDOH, NYSDOT, the Town of Hoosick, and the village of Hoosick Falls. Easements would be required from private landowners to provide necessary access to the wells and construction of connections to the water main route. The water main alignment crosses an agricultural district, so a notice of intent would be required with the NYS Department of

Agriculture and Markets. Options 1A and 1B require a full design review from the US Army Corps of Engineers (USACE) and the NYSDEC for the construction of the bendway weirs and associated bank protection.

The site of both wells is currently agricultural and has already been cleared of vegetation. The remainder of the required infrastructure would require temporary disturbance along paved and unpaved shoulders of existing roads, and privately-owned property.

Both Options 1A and 1B utilize some or all of the existing equipment at the WTP. As the WTP is rated to produce a maximum of 1.0 MGD, the finished water pumps would need to be expanded to supply the conceptual future maximum day demand of 1.13 MGD. This would not be necessary until the completion of a distribution system infrastructure associated with any future expansion.

The estimated direct construction cost for Option 1A is $4.0 million. The estimated indirect costs (engineering, permitting, construction administration and legal fees) are $1.1 million. The present value of the total estimated O&M cost over a 30-year period is $2.7 million. A 30-year period is used to estimate long-term cost for comparison purposes only. As it is necessary to maintain proper operation of the supply system, O & M would continue for the life of the project. The overall present value cost of Option 1A is estimated to be $7.7 million. Refer to Appendix E of the MWSS Report for further detail on the cost estimates.

The estimated direct construction cost and indirect costs (engineering, permitting, construction administration and legal fees) for Option 1B are the same as Option 1A (i.e., $5.1 million). The present value of the total estimated O&M cost over a 30-year period for Option 1B is higher due to periodic GAC replacement and is estimated to be $4.7 million. The overall present value cost of Option 1B is estimated to be $9.7 million.

Implementation of either Options 1A or 1B is estimated to require approximately two to three years to complete. The full capacity GAC system would remain operational during that time to remove PFOA and other PFAS from the current water supply.

The conceptual configuration for this option is shown in Figure 2.

Option 1A
Present Worth:..*$7,708,000*
Capital Cost:..*$4,990,000*
Annual Costs (Years 1-3):...*$293,000*
Annual Costs (Years 4-30):...*$78,000*

Option 1B
Present Worth:..*$9,692,000*
Capital Cost:..*$4,990,000*
Annual Costs (Years 1-30):...*$329,000*

Option 2: Development of a New Surface Water Source

Based on the screening evaluation performed in the MWSS, the Tomhannock Reservoir is the closest surface water source to the Village with adequate quantity and quality. Option 2 presents the use of the Tomhannock Reservoir as a new surface water source.

Use of the Tomhannock Reservoir as a new surface water source for the Village requires additional infrastructure including a raw-water intake, a raw-water pump station and pre-disinfection station, and a raw-water transmission main connecting the pump station to the WTP. Depending on the chemistry of the raw water, the addition of orthophosphates at the proposed pump station may also be required to prevent corrosion inside the transmission mains.

The conceptual raw-water intake is located approximately 1,200 feet northwest of the intersection of Reservoir Lake Road and Croll Road. An evaluation of properties available for a pump station was not included as part of MWSS.

The pump station would be designed using variable speed pumps that can satisfy the current average maximum day demand of 0.71 MGD as well as the conceptual future maximum day demand of 1.13 MGD. The raw water transmission main would be sized for the future capacity since it would be impractical to upgrade the size after it has been installed. The preliminary required size of the main is 16-inch diameter.

The most direct route for a raw-water transmission main generally extends east from the reservoir along Croll Road, Quaker Street, and Lower Pine Valley Road before following the existing electric utility right-of-way to the Village. Although much of the new transmission main would be installed within the public right of way, some easements are expected to be required from the city of Troy for the pump station on the east shore of the Tomhannock Reservoir, as well as from National Grid to construct a water main within its corridor. Easements from multiple private property owners would be needed.

Following the conceptual alignment, the total length of new water main from the raw-water pump station at the reservoir to the existing Village water treatment plant is approximately 13.4 miles.

Surface geology data along the conceptual alignment shows variable soil textures, ranging from silts and clays to coarse gravels. Some areas of surface bedrock are identified from available data, but soil borings as part of a detailed design will better identify areas of potential construction obstacles. The transmission main alignment crosses several streams along its length, so horizontal directional drilling (HDD) methods would be required in these areas. The alignment also is adjacent to several wetlands which could be impacted by the construction. The elevation along the raw-water main alignment changes from approximately 395 feet at the reservoir, 1,110 feet at the high point, and 435 feet at the Village water treatment plant. Multiple pressure reducing stations would be required to prevent damage to the transmission main.

The raw-water transmission main would connect to the upstream side of the existing Village WTP for treatment consisting of microfiltration and disinfection to comply with drinking water standards. Because the concentrations of detected PFAS in the Tomhannock Reservoir are below any regulatory standard, the full capacity GAC system would not be needed. However, under this option it would undergo periodic O&M involving cycling of potable water through the GAC system to maintain the integrity of the media in the event it was needed in the future. Once treated at the WTP, water would be pumped into the distribution system using the existing finished water pumps.

The water from the Tomhannock Reservoir may have different characteristics than the current groundwater source (which is deemed to be under the direct influence of surface water) that the Village WTP currently treats. Direct microfiltration of surface waters has precedent, but additional pretreatment may be required to prevent natural organic matter and other constituents in the reservoir from fouling the microfiltration membranes. A review of Tomhannock raw water quality records (provided by the City of Troy) indicates seasonal fluctuations in reservoir turbidity, ranging from less than 1 NTU to more than 50 NTU; therefore, the addition of a coagulant upstream of the filtration units may be required. If necessary, the existing 26,000-gallon pre-treatment storage tank could be repurposed for contact time of the coagulant polymer. A pilot study would be needed to demonstrate the microfiltration units can successfully treat the Tomhannock raw water without requiring excessive cleaning cycles; the associated costs are included in this option.

Option 2 would require administrative reviews and approvals/permits from state and federal agencies as well as local municipalities. At a minimum, coordination is needed with the NYSDEC, NYSDOH, RCDOH, NYSDOT, National Grid, the city of Troy, the town of Hoosick, and the village of Hoosick Falls. The transmission main alignment crosses an agricultural district for the majority of its length, so a notice of intent would be required with the NYS Department of Agriculture and Markets. Option 2 is also anticipated to require a review of wetlands impact from the US Army Corps of Engineers and Full Environmental Assessment.

The estimated direct construction cost for Option 2 is $24.7 million. The estimated indirect costs (engineering, permitting, construction administration and legal fees) are $6.7 million. The total estimated O&M cost, in present dollars over a 30-year period, is $4.3 million. The overall present cost of the option is estimated to be $35.2 million. Refer to Appendix E of the MWSS Report for further detail on the cost estimates.

The conceptual transmission line for this option is shown in Figure 3.

Present Worth:..$35,217,000
Capital Cost:..$31,000,000
Annual Costs (Years 1-5):...$353,000
Annual Costs (Years 6-30):...$140,000

Option 3: Interconnection with an Existing Water Supply Source

Screening performed in the MWSS concludes that the city of Troy water system presents the closest public water supply source with sufficient quantity and quality to support the Village as a wholesale customer. Option 3 provides for an interconnection with the city of Troy water system to deliver drinking water to the Village.

The closest connection to drinking water from the city of Troy distribution system is a 16-inch diameter main located along Route 278 (Brick Church Road) in Cropseyville, within the town of Brunswick. Sufficient pressure has been stated to be available in the existing water main for a new interconnection. A booster pump station and wholesale water meter would be installed at the new connection. Depending on the chemistry of the Troy finished water, the addition of orthophosphates as a corrosion inhibitor may also be required.

The pump station design incorporates variable speed pumps that can satisfy the current average maximum day demand of 0.71 MGD as well as the conceptual future maximum day demand of 1.13 MGD. The transmission main is sized for the future capacity since it would be impractical to upgrade the size after it has been installed. The preliminary required size of the main is 16-inch diameter.

The transmission main delivers water to the WTP, where it is re-chlorinated and pumped into the distribution system using the finished water pumps. Further design would be needed to evaluate the potential for disinfection byproducts formation during the extended transit time from Troy and appropriate treatment options.

In total, the proposed transmission main length is approximately 18 miles. Easements from multiple private property owners would be needed, which adds to the construction costs and possible delays in the implementation of this option.

Based on surficial geology, the proposed water transmission main would be installed through rock along Tamarac Road south of Storm Hill Road for approximately 0.7 miles. The remainder of the transmission main would be installed in variable soil textures, ranging from silts and clays to coarse gravels. The transmission main alignment crosses several streams and wetland areas along its length, so HDD methods would be used in these areas to avoid impacts. The elevation along the water transmission main alignment changes from approximately 505 feet at the connection point, to 1,110 feet at the high point, and 435 feet at the existing water treatment plant. Multiple pressure reducing stations would be required to prevent damage to the water transmission main.

Option 3 requires administrative reviews and approvals from agencies and municipalities. At a minimum, coordination would be needed with the NYSDEC, NYSDOH, RCDOH, NYSDOT, National Grid, the city of Troy, the town of Brunswick, the town of Hoosick, and the village of Hoosick Falls. The transmission main alignment transits an agricultural district for the majority of its length, so a notice of intent would be required with the NYS Department of Agriculture and Markets. Option 3 is also anticipated to require a review of wetlands impact from the US Army Corps of Engineers and a Full Environmental Assessment under SEQR. The site of the conceptual booster pump station requires clearing and permanent land development. The remainder of the required infrastructure requires temporary disturbance along unpaved shoulders of existing roads, previously cleared utility easements, and privately-owned property.

Although Option 3 involves the purchase of treated water from Troy, it would still utilize some existing equipment at the village WTP, including the chlorination equipment and finished water pumps. As the WTP is rated to produce a maximum of 1.0 MGD, the finished water pumps would need to be expanded as to supply the conceptual future maximum day demand of 1.13 MGD. This would not be necessary until completion of the expanded distribution system infrastructure. The existing GAC system would not be utilized under this option after the interconnection is active.

The estimated direct construction cost for Option 3 is $30.7 million. The estimated indirect costs (engineering, permitting, construction administration and legal fees) are $8.3 million. The present value of the total estimated O&M cost over a 30-year period is $10.5 million, which is significantly higher than Option 2 due to the need to purchase water from Troy at a wholesale rate. The overall present cost of the option is estimated to be $49.0 million. Refer to Appendix E of the MWSS Report for further detail on the cost estimates.

It is estimated that the design, permitting, and construction of the interconnection, booster pump station, and water transmission main would take approximately five to six years to complete. The design stage, including the initial alignment study, coordination with stakeholders, acquisition of property, field survey and borings, detailed transmission main design, permitting, and agency review process, is anticipated to take two to three years. Construction of the pump station, transmission main, and water treatment plant modifications are anticipated to take over two years, which includes multiple winter shutdown periods that would interrupt the transmission main progress. The full capacity GAC system removes PFOA and other PFAS from the current source of supply in the interim while the new interconnection is constructed.

The conceptual transmission line for this option is shown in Figure 4.

Present Worth:..$48,956,000
Capital Cost:..$38,477,000
Annual Costs (Years 1-5):...$622,000
Annual Costs (Years 6-30):...$408,000

Option 4: Retain Existing System with Use of Wells 3 and 7 (No Further Action with continued O&M)

The No Further Action with continued Operation and Maintenance option recognizes the completed GAC treatment system IRM described in Section 6.2. Ongoing operation and maintenance would continue to be necessary to confirm the ongoing effectiveness of the IRM. This alternative maintains the engineering controls which were part of the IRM and includes an operation and maintenance plan for the completed IRM to protect public health and the environment from contamination remaining in the water supply.

This option to supply water for the village of Hoosick Falls involves using the full-capacity GAC treatment system already in operation at the existing village water treatment facility for the removal of PFAS. The system outlined in this option was approved by the NYSDOH, constructed, and became operational in February 2017. The full capacity GAC treatment system was designed to match the production rate of the existing water treatment plant (1.0 MGD) and was installed downstream of the existing microfiltration units. The GAC water discharge is subsequently treated with sodium hypochlorite to disinfect prior to distribution.

The full capacity GAC treatment system consists of two 12-foot diameter vessels installed within the existing water treatment plant property; no additional easements are required for this option. Each vessel is loaded with 40,000 pounds of virgin coal-based GAC.

The vessels are arranged in a lead-lag series configuration, where the lead vessel will remove all PFAS and the lag vessel serves as a backup to the lead vessel. Regular water quality monitoring at the system influent, midpoint (i.e., between vessels) and effluent is performed monthly for a minimum of 21 PFAS compounds. When there is a detection of PFAS at the midpoint (between the lead and lag vessels), the sampling frequency increases to every two weeks. In addition, samples are tested from three locations along the height of each vessel; this allows the operators to determine how far the PFAS compounds have traveled through the GAC media. When there is a detection of PFAS halfway through the lag vessel, the lead GAC vessel is refilled with clean GAC media. The vessel containing clean GAC is reassigned to the lag position, and the former lag vessel is placed in the lead position. See Figure 5 for typical GAC vessel layout.

The MWS is limited to a capacity of 1.0 MGD. Upgrades to the WTP are required to supply the future maximum day water demand of 1.13 MGD. These upgrades would not need to occur until the expanded infrastructure were to become active.

Present Worth:..*$8,368,000*
Capital Cost:...*$2,414,000*
Annual Costs:...*$493,000*

Option 5: Continued Use of Public Supply Wells #3 & #7 with Treatment through Full Capacity GAC System and PFOA Remediation through the OU-01 IRM

This option involves all the components of Option 4, plus measures to control off-site migration of groundwater from the McCaffrey Street site toward the village wellfield. These measures reduce the overall mass and volume of PFAS in the subsurface.

Specifically, this option combines Option 4 with the McCaffrey Street OU-01 IRM. The McCaffrey Street IRM was approved by NYSDEC on April 4, 2019, is constructed, and remains operational.

The McCaffrey Street facility is located northwest of the MWS, and portions of the McCaffrey Street facility are upgradient of the MWS. Ongoing investigations at this facility have identified the presence of PFOA in soil and groundwater. The approved IRM intercepts groundwater with the potential to migrate southeast from the McCaffrey Street Site.

The IRM pumps groundwater from two extraction wells in the southeastern portion of the McCaffrey site, treats the water with GAC, and discharges the treated water to the Hoosic River. The IRM work plan (C.T. Male, 2019) presents design details for the groundwater extraction and treatment systems, and the process for installing and implementing the system. A figure with the general layout of the system relative to the existing wellfield is included as Figure 6. The IRM is designed to:

- Capture groundwater containing PFAS within the eastern and southern portions of the McCaffrey site;
- Pose no impact on the yield of the MWS and its ability to provide sufficient water to serve the needs of the Village; and
- Not compromise the structural integrity of buildings on the McCaffrey site.

The cost estimate for Option 5 encompasses all elements included in Option 4, construction of the McCaffrey IRM, and the operation, maintenance and monitoring of the McCaffrey IRM for 30 years. Because the IRM will reduce concentrations of PFAS in the Village wellfield, the full capacity GAC system will run more efficiently and require less frequent media replacement in the future.

The estimated direct construction cost for Option 5 is $2.5 million, which includes the construction costs for the full capacity GAC system (already incurred), the costs to upgrade the WTP in the future, and the IRM construction costs (already incurred). The estimated indirect costs (engineering, permitting, construction administration and legal fees) are $0.6 million. In present dollars, the total estimated O&M cost over a 30-year period is $9.0 million. The overall present cost of the option is estimated to be $12.1 million, of which $1.5 million associated with the full capacity GAC system and $572,000 associated with the IRM construction has already been spent. Therefore, the future cost of this option is approximately $10 million.

Present Worth:..$12,127,000
Capital Cost:...$3,129,000
Annual Costs:..$397,000

Exhibit C

Remedial Alternative Costs

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
Option 1a New Groundwater Source	4,990,000	293,000 (1-3) 78,000 (4-30)	7,708,000
Option 1b New Groundwater Source with GAC	4,990,000	329,000	9,692,000
Option 2 New Surface Water Source	31,000,000	353,000 (1-5) 140,000 (6-30)	35,217,000
Option 3 Connection to Public Supply	38,000,000	622,000 (1-5) 408,000 (6-30)	48,956,000
Option 4 Continued Use of Existing Wells (existing)	2,414,000	493,000	8,368,000
Option 5 Continued Use of Existing Wells and Remediation (existing)	3,129,000	397,000	12,127,000

Exhibit D

SUMMARY OF THE PROPOSED REMEDY

The Department is proposing Option 1B, Development of a New Groundwater Source with Granular Activated Carbon Treatment as the remedy for this site. Option 1B achieves the remediation goals for the site by supplying a sufficient quantity of drinking water that attains all applicable requirements identified in this PRAP without the necessity of treatment to remove contamination above standards. The elements of this remedy are described in Section 7. The proposed remedy is depicted in Figure 2.

Basis for Selection

The proposed remedy is based on the results of the data resulting from the on-site RI, options identified in the MWSS and the following evaluation of those options. The criteria to which potential options are compared are defined in 6 NYCRR Part 375.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each option's ability to protect public health and the environment.

Option 1A meets the overall protectiveness of public health criterion since the finished water meets health-based drinking water standards at the Village WTP.

Option 1B is the same as 1A but retains the existing microfiltration and full capacity GAC systems as added protection from potential future contaminants in the aquifer. Option 1B meets the overall protectiveness of public health criterion since the finished water meets health-based drinking water standards at the Village WTP.

Options 1A & B also include requirements for well head protection and erosion control to prevent impacts to the installed wells further ensuring that health-based standards are attained.

Option 2 meets the overall protectiveness of public health criterion since the raw water from the Tomhannock Reservoir will be treated to meet health-based drinking water standards and water quality requirements at the Village WTP.

Option 3 consists of connecting to the city of Troy public water supply system and the construction of a booster pump station and transmission main to connect to the Village WTP. Drinking water under Option 3 is re-chlorinated to provide secondary disinfection; additional treatment may be needed to eliminate disinfection byproducts. Option 3 meets the overall protectiveness of the public health criterion since the City of Troy's water distribution system is appropriately treated to meet health-based drinking water standards and water quality requirements and upon delivery would be re-disinfected at the Village WTP.

Option 4 involves the continued use of the existing well field and the full capacity GAC treatment system IRM. Regular testing of the GAC system's influent, midpoint, and effluent shows the system to be effective at removing PFOA and other PFAS as verified by sampling data. Since Option 4 includes the treatment of COCs to meet health-based drinking water standards, it meets the overall protectiveness of public health criterion.

Option 5 is identical to Option 4 but includes the operation of the McCaffrey Street IRM. This IRM captures and treats PFOA-contaminated groundwater and discharges it, after treatment, to the surface water. The IRM prevents highly contaminated on-site groundwater from migrating to the existing wellfield. This Option also includes continued operation of the GAC treatment system IRM at the Village WTP to treat PFOA, thus meeting the criterion of overall protectiveness of public health related to delivery of potable water.

All options, as previously described, protect public health as required by this criterion. The source water options identified, and treatment components described, in each option provide water that complies with applicable drinking water requirements (DOH drinking water standards). While all MWSS options meet this threshold, options that include treatment with granular activated carbon provide finished drinking water below analytical reporting limits for organic compounds, including site-related COCs.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Option 1A utilizes new groundwater wells to replace the existing Village groundwater supply wells (two wells have been drilled and tested). Manganese removal and chlorination is performed at the existing Village WTP. The treatment methods are in accordance with state and federal regulations, including *Recommended Standards for Water Works* ("Ten States Standards"), NYSDOH Part 5-1 *Public Water Systems*, and USEPA Drinking Water Rules. Routine water quality sampling of the raw and finished water is conducted according to NYS requirements for public water supplies. Option 1A complies with SCGs.

Option 1B takes Option 1A a step further by including the continued use of the existing full capacity GAC treatment system IRM at the Village WTP. Regular testing of the GAC system's influent, midpoint, and effluent have shown the GAC to be effective at removing PFOA and other PFAS from the existing, more contaminated aquifer and would be equally as effective at treating the raw water from the new wells. Due to the very low levels of contaminants that may be found in the raw water, less frequent GAC media replacement is necessary. Routine water quality sampling of the raw and finished water continues to be conducted according to the regulations. Option 1B complies with SCGs.

Option 2 includes a raw water intake at the Tomhannock Reservoir. The water is treated appropriately using filtration and disinfection processes at the Village WTP. The water treatment methods are in accordance with state and federal regulations. Routine water quality sampling of the raw and finished water is conducted according to the regulations. Option 2 complies with SCGs.

Option 3 consists of connecting to the City of Troy public water supply distribution system in Cropseyville and the construction of a booster pump station and transmission main to connect to the Village WTP. The water received from Troy is treated and is also re-disinfected as necessary upon delivery to the Village WTP. Routine water quality sampling of the raw and finished water would be conducted according to the regulations. Option 3 complies with SCGs.

Option 4 proposes the continued use of the existing full capacity GAC treatment system. Regular testing has been performed since the GAC was brought on-line at the system's influent, midpoint, and effluent. The system has proved effective at removing PFOA and other PFAS as verified by sampling data. Routine water quality sampling of the raw and finished water continues to be conducted according to the regulations. Option 4 complies with SCGs.

Option 5 includes the implementation of the McCaffrey Street IRM. Upon meeting the specified IRM objectives, highly contaminated groundwater from on-site is prevented from migrating toward the existing wellfield and treats PFAS in groundwater. Village WTP operations, along with the full capacity GAC provides potable water as required by state drinking water standards. Option 5 complies with SCGs.

Options 1 thru 5 all attain applicable drinking water SCGs through meeting such at the water source and/or appropriate selection and implementation of treatment technologies. SCGs are met through using analytical data from the source water and utilizing those data to specify necessary treatment technologies. This approach is consistent with other public water supplies under the purview of New York State drinking water regulations (10 NYCRR Part 5)

The next six "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. <u>Long-term Effectiveness and Permanence.</u> This criterion evaluates the long-term effectiveness of the options after implementation. If residual contamination remains after the selected option has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

All options considered provide a permanent drinking water supply and are capable of supplying both the current and conceptual future maximum day demands.

Option 1A consists of the installation of two new wells to replace the existing source for the Village. The long-term reliability of a new groundwater source is ultimately determined by the treatment capabilities for that source though water quality may change due to the presence of various contaminants (PFAS or other) in the region over time. Two wells have been drilled and tested under high yield pumping conditions. Subsurface investigation results indicate that future groundwater extraction will not draw contaminated groundwater from the existing well field reaching these new wells. Factors leading to this conclusion include the groundwater flow direction, distance between the well locations, and low permeability geologic units preventing transport of contaminants to the new source. Because PFAS were detected at low concentrations in monitoring wells and domestic supply wells near the LaCroix property, sentinel well monitoring at key locations are included in this Option.

Option 1B (same as 1A with the GAC system included) has the added protection of removing potential organic contaminants from the raw water and addresses the potential for low concentrations of PFAS detected in the deep aquifer. The long-term operation and maintenance requirements of the test wells source and treatment strategy are similar to the existing wellfield and current WTP operations but with a reduced O&M cost for the GAC system due to lower levels of contaminants.

Option 2 requires a considerable length of new water main, increasing the risk of water supply interruption in the event of damage (i.e., more waterline needs to be maintained). While the recently completed capacity analysis supports adequate supply is available from the reservoir, like any surface water supply, long-term viability could be affected by drought or contamination (surface water runoff or other unknown sources) of the Tomhannock Reservoir, as with any surface water supply. PFAS at low concentrations has recently been detected in the Tomhannock Reservoir, thus the possibility exists that treatment to remove PFAS may be required in the future (i.e., if concentrations were to increase). For Option 2, long-term operation and maintenance of the raw water intake, pump station, and water main would be required, along with continued operation of the disinfection and filtration processes at the existing WTP.

Option 3 is similar to Option 2 with additional operation and maintenance required for the booster pump station and water main. Disinfection may be necessary but there may be supply interruptions due to existing municipal supply conditions. Potential source water impacts identified in Option 2 would carry through to this Option.

Option 4 provides a solution to provide drinking water to the Village in the long term that is consistent with a “No Further Action” remedy. The GAC treatment system is already operational and effectively removes PFAS from the water supply. The full capacity GAC system requires regular maintenance primarily to replace the carbon media. GAC systems are the Best Available technology (BAT) for treating organic compounds in water and GAC will be readily available for the foreseeable future. However, regular media replacement is required on a more frequent basis due to the high concentrations of PFAS in the existing Village wellfield.

The long-term effectiveness of Option 5 in terms of providing safe drinking water to the Village is the same as that of Option 4. The IRM is expected to be effective in the long-term by maintaining hydraulic control of groundwater migrating toward the Village well field from the McCaffrey Street site, capturing and treating the PFAS impacted groundwater, and reducing concentrations of PFAS in the aquifer over time. The IRM would improve the operations of the full capacity GAC system, reducing the frequency of GAC media replacement.

The five options are all capable of attaining long-term effectiveness as they rely on similar engineering controls to prevent exposure to site-related contaminants. However, based on the various factors described above, Option 1B carries the highest level of long-term effectiveness due to a cleaner water source, its close proximity to end users, and anticipated O&M. Other options that include the GAC treatment are similar in their ability to ensure long-term effectiveness at achieving the remedial action objectives for the site.

Prior to installation and operation of GAC treatment at the public water supply system, residents of Hoosick Falls who consumed drinking water from the Village’s municipal water supply system experienced increased exposure to PFOA and, as a result, levels of PFOA in many residents’ blood were observed to be higher than levels of the contaminant found in the general U.S. population. Therefore, minimizing potential for continued exposure to site COCs is warranted. Options that incorporate GAC effectively eliminate potential exposure and better achieve the remedial action objective(s) for this OU and are more protective of this community's health. Those options include 1B, 4, and 5.

4. <u>Reduction of Toxicity, Mobility or Volume.</u> Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site.

This criterion is used to evaluate the relative effectiveness of remedial alternatives that directly address contamination in various media related to the disposal of hazardous waste at a specific site. None of the water supply options identified are expected to directly reduce the toxicity, mobility or volume of the contamination associated with the McCaffrey Street site. The options for this OU rely on source water quality and engineering controls to achieve the RAOs. The toxicity of any contaminants that may enter the water supply from any source, not just from the McCaffrey Street site, would be addressed through the application of standard water treatment system components, and for organics in particular, the GAC system. Given the RAOs for OU-02, there is no expectation that any of the options will meet this criterion in any significant manner. Therefore, no significant reduction of toxicity, mobility or volume of contamination in media related to OU-01 is achieved under the options evaluated to supply drinking water that achieves the RAOs. However, the degree to which this criterion is achieved will be a consideration for remedies selected for the other operable units comprising this site.

While remedial actions can be implemented to address contamination identified in OUs 01 and 02 separately, the OUs are not completely independent. Certain remedial actions for OU-02 (Water supply options) may limit remedial options available for OU-01 and thereby affect reduction of toxicity, mobility, and volume. Options 4 and 5 utilize the existing Village wellfield as a permanent water source. The wellfield is hydraulically connected to the source of site-related COCs and therefore may be significantly impacted by future OU-01 remedial alternatives that may be necessary to address receptors affected by OU-01 COCs. Therefore, continued reliance on the entirety of the existing wellfield under options 4 and 5 may negatively impact the ability for remedial alternatives developed for OU-01 to significantly reduce toxicity, mobility or volume of waste. Alternatives will be developed during the OU-01 feasibility study and will evaluate the range of potential remedial actions. OU-02 options 4 and 5 may limit the feasible alternatives.

It should be noted that Option 5 includes operation of on-site treatment and hydraulic control of contaminated groundwater, by way of an IRM, implemented with the goal of lowering concentrations of site COCs in the village wellfield. However, this IRM remains under evaluation and will continue to operate under OU-01 regardless of the option implemented to address OU-02. Therefore, there are no significant advantages associated with any of the options under evaluation with respect to this criterion.

5. <u>Short-term Impacts and Effectiveness.</u> The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Options1A and 1B would require the installation of new production wells (drilled wells already installed for testing) and a transmission main, which is estimated to take between two and three years to complete. Options 1A and 1B would require land disturbance for the installation of the new wells and for the length of the water transmission main, a distance of approximately two miles. Construction would have minor short-term impacts to the community, such as noise and traffic disruptions, and would temporarily require construction of weirs and bank stabilization within the Hoosic River. Stormwater pollution during construction would be mitigated using standard erosion and sediment controls.

Option 2 includes construction of a raw water intake at the Tomhannock Reservoir and the construction of a pumping station and transmission main from the reservoir to the Hoosick Falls' WTP. Option 2 is estimated to require four to five years before construction could be completed and drinking water could be available. This timeframe accounts for the administrative complexities of coordinating the project among many state and local agencies. The installation of the surface water intake and raw water pump station at the Tomhannock Reservoir would require earthwork and land disturbance on the eastern shore. The raw water transmission main would disturb approximately 13.4 miles of land during installation along public right of ways and existing utility easements. Construction would have short-term impacts throughout the project, including noise and traffic disruptions in the vicinity of work areas. Sensitive ecological areas, including wetlands and stream crossings, may be encountered and disturbed. Stormwater pollution during construction would be mitigated using standard erosion and sediment controls.

Option 3 consists of connecting to the City of Troy water distribution system in Cropseyville and the construction of a booster pump station and transmission main to connect to the Hoosick Falls' WTP. Option 3 is estimated to require five to six years before the connection to the Troy water system could be completed. This timeframe accounts for the complexities of coordinating the project among many state and local agencies. The installation of the pump station in Cropseyville would require earthwork and land disturbance, and the water transmission main would disturb approximately 18 miles along public right of ways and existing utility easements. Construction would have short-term impacts throughout the project, including noise and traffic disruptions in the vicinity of work areas. Sensitive ecological areas, including wetlands and stream crossings, may be encountered and disturbed. Stormwater pollution during construction would be mitigated using standard erosion and sediment controls.

Option 4 (no further action) is currently in operation providing potable drinking water to the Village; therefore, there are no short-term impacts associated with this option and the full capacity GAC system is operating effectively.

Option 5 includes operation of an IRM for the McCaffrey Street Site (OU-01). By meeting the IRM objectives, PFOA (and other associated PFAS) concentrations in groundwater will be reduced in the Village well field. However, meaningful reductions are expected to be realized over a decade or more.

Because the existing WTP including the GAC treatment system would continue to provide drinking water during any design and construction period, all options are effective at meeting RAOs in the short term. Options 2 and 3 carry the greatest short-term impacts due to construction requirements. Option 4 has no associated short-term impacts.

6. <u>Implementability.</u> The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining

specific operating approvals, access for construction, institutional controls, and so forth.

All identified options are considered technically implementable based on construction and technology requirements. Installation of water mains, pump and lift stations, and treatment facilities are traditional components of water supply systems that can be designed and implemented utilizing existing engineering principles and construction practices. However, implementation of Options 2 and 3 is more complex due to multiple layers of administrative, technical, and physical challenges not present in the other options. Significantly more surveying, design, and earthwork (including blasting of shallow bedrock and directional drilling) is required by these options. Distance, variations in topography, potential sensitive ecological areas, property access issues, etc. all create additional technical and administrative challenges to implementation of these two options.

Options in closer proximity to the Village (Options 1, 4, and 5) have fewer administrative challenges, such as permitting and jurisdictional review, that require less effort to ensure appropriate approvals are in place. Options 4 and 5 are already represented by current operations that supply Hoosick Falls' residents with potable water.

7. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

The present worth costs of evaluated options vary significantly with the highest cost (Option 3) greater than six times higher than the lowest cost (Option 1A) while providing no significant advantages over other source water options, making the higher cost alternatives less cost effective. Annual costs (those costs associated with O&M) are lowest for options in close proximity to the Village and with lesser degrees of treatment indicating that Option 1A (New groundwater that meets MCLs) would have the lowest annual cost once implemented. However, this option is not guaranteed to provide drinking water with levels of PFOA below detection levels and, therefore, is not considered the most cost effective.

Options 1B, 4 & 5 have similar O&M costs and capital costs and all use GAC to provide drinking water with non-detect levels of PFOA drinking water and, are therefore, considered similarly cost effective. It should be noted that capital costs for Options 4 and 5 were incurred during implementation of OU-01 and OU-02 IRMs.

Options 2 and 3 carry several times the cost of other options and do not provide any significant additional benefits or performance improvements. Therefore, they are less cost effective.

8. Land Use. When cleanup to pre-disposal conditions is determined to be infeasible, the Department may consider the current, intended, and reasonable anticipated future land use of the site and its surroundings in the selection of the soil remedy.

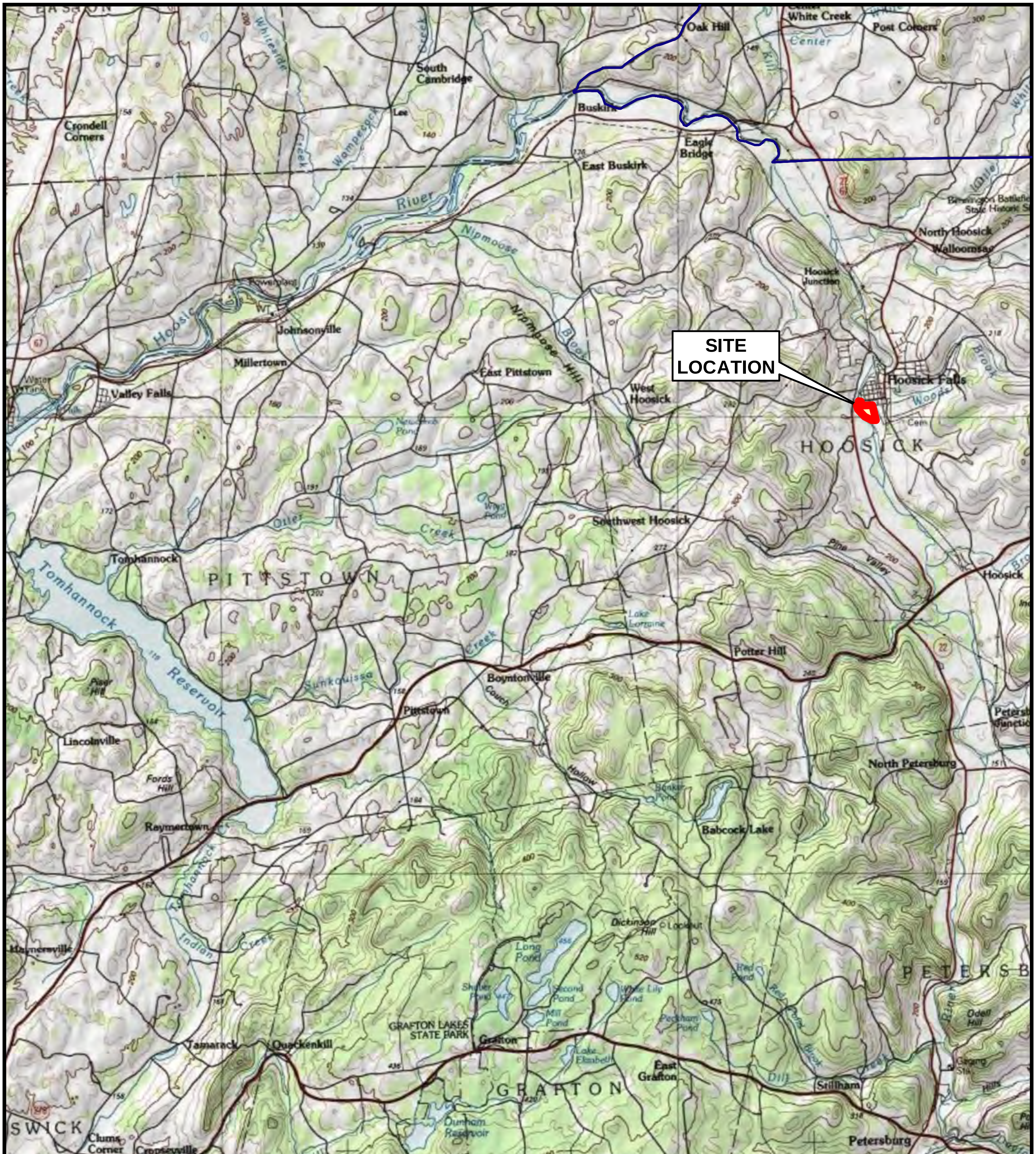
The evaluation of water supply options is separate from evaluation of remedial alternatives that will address other contaminated media that may present health or ecological risks posed by other routes of exposure, such as direct contact with contaminated soil. This criterion will be utilized to assess remedial alternatives for the remaining operable units.

The final criterion, Community Acceptance, is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

9. Community Acceptance. Concerns of the community regarding the investigation, the evaluation of alternatives, and the PRAP are evaluated. A responsiveness summary will be prepared that describes public comments received and the manner in which the Department will address the concerns raised. If the selected remedy differs significantly from the proposed remedy, notices to the public will be issued describing the differences and reasons for the changes.

Option 1B is being proposed because, as described above, it satisfies the threshold criteria and provides the best balance of the balancing criterion.

FIGURES



N
W E
S

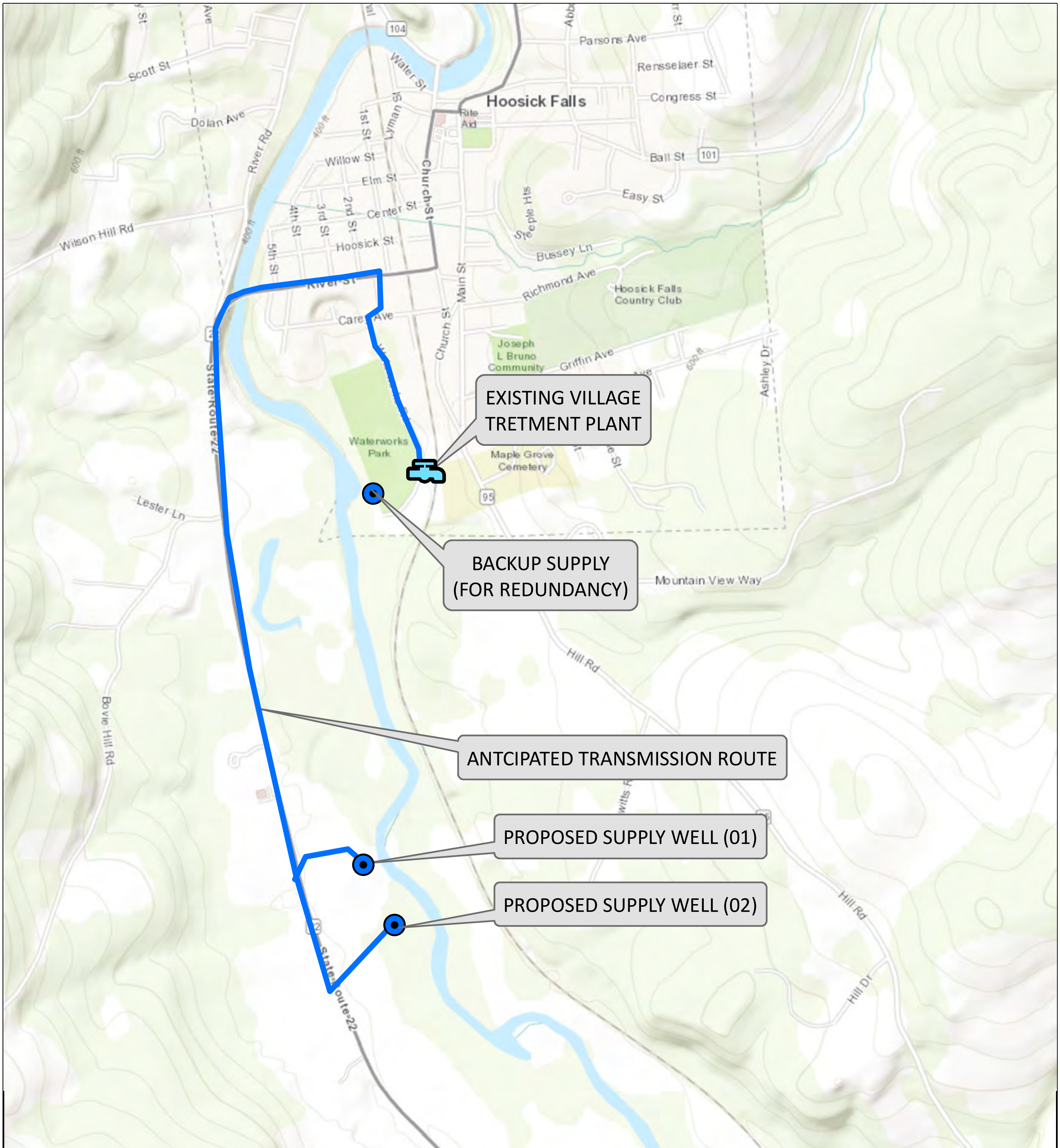
0 0.5 1 2
Miles

Figure 1

Site Location Map

Saint-Gobain ~ McCaffrey Street
Village of
Hoosick Falls, Rensselaer County
Site No. 442046

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation



0 0.25 0.5 0.75 1
Miles

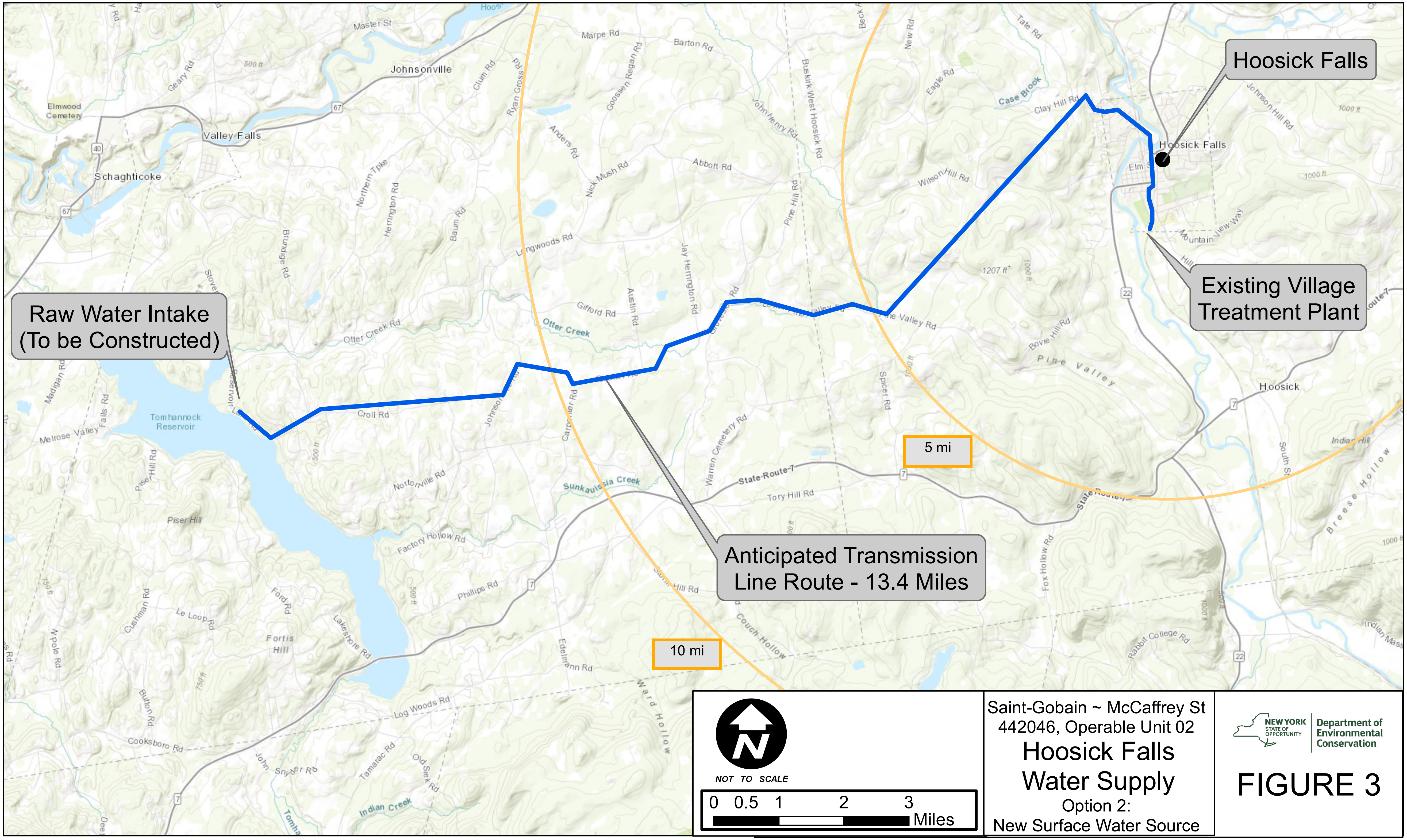
Saint-Gobain ~ McCaffrey St
442046, Operable Unit 02

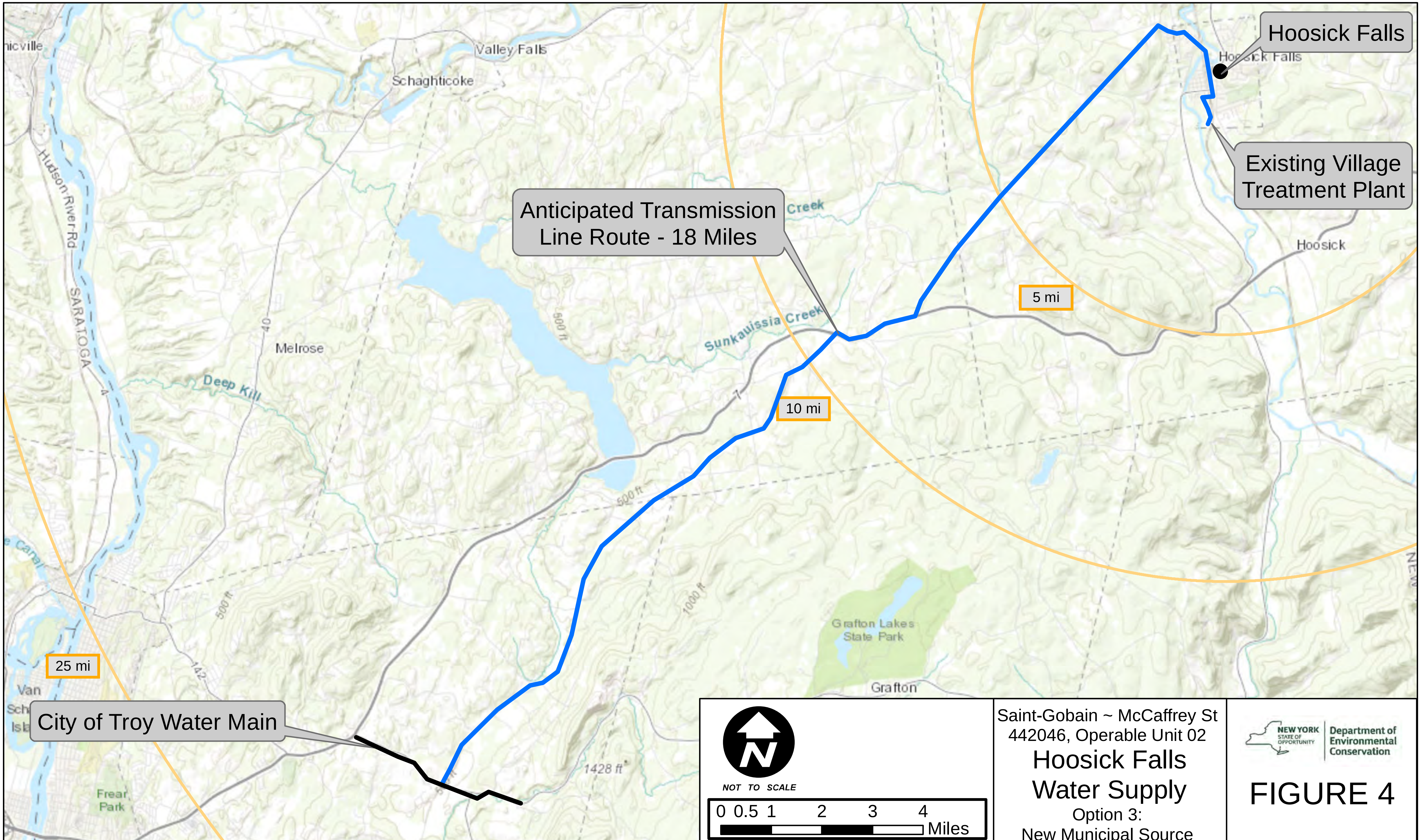
Hoosick Falls Water Supply

Option 1 (A & B):
New Groundwater Source

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

FIGURE 2


Hoosick Falls
Existing Village Treatment Plant
Raw Water Intake (To be Constructed)
Anticipated Transmission Line Route - 13.4 Miles
5 mi
10 mi
Tomhannock Reservoir
NOT TO SCALE
0 0.5 1 2 3 Miles
Saint-Gobain ~ McCaffrey St 442046, Operable Unit 02
Hoosick Falls Water Supply
Option 2: New Surface Water Source
NEW YORK STATE OF OPPORTUNITY
Department of Environmental Conservation
FIGURE 3



Saint-Gobain ~ McCaffrey St
442046, Operable Unit 02
Hoosick Falls
Water Supply
Option 3:
New Municipal Source

NEW YORK STATE OF OPPORTUNITY Department of Environmental Conservation

FIGURE 4

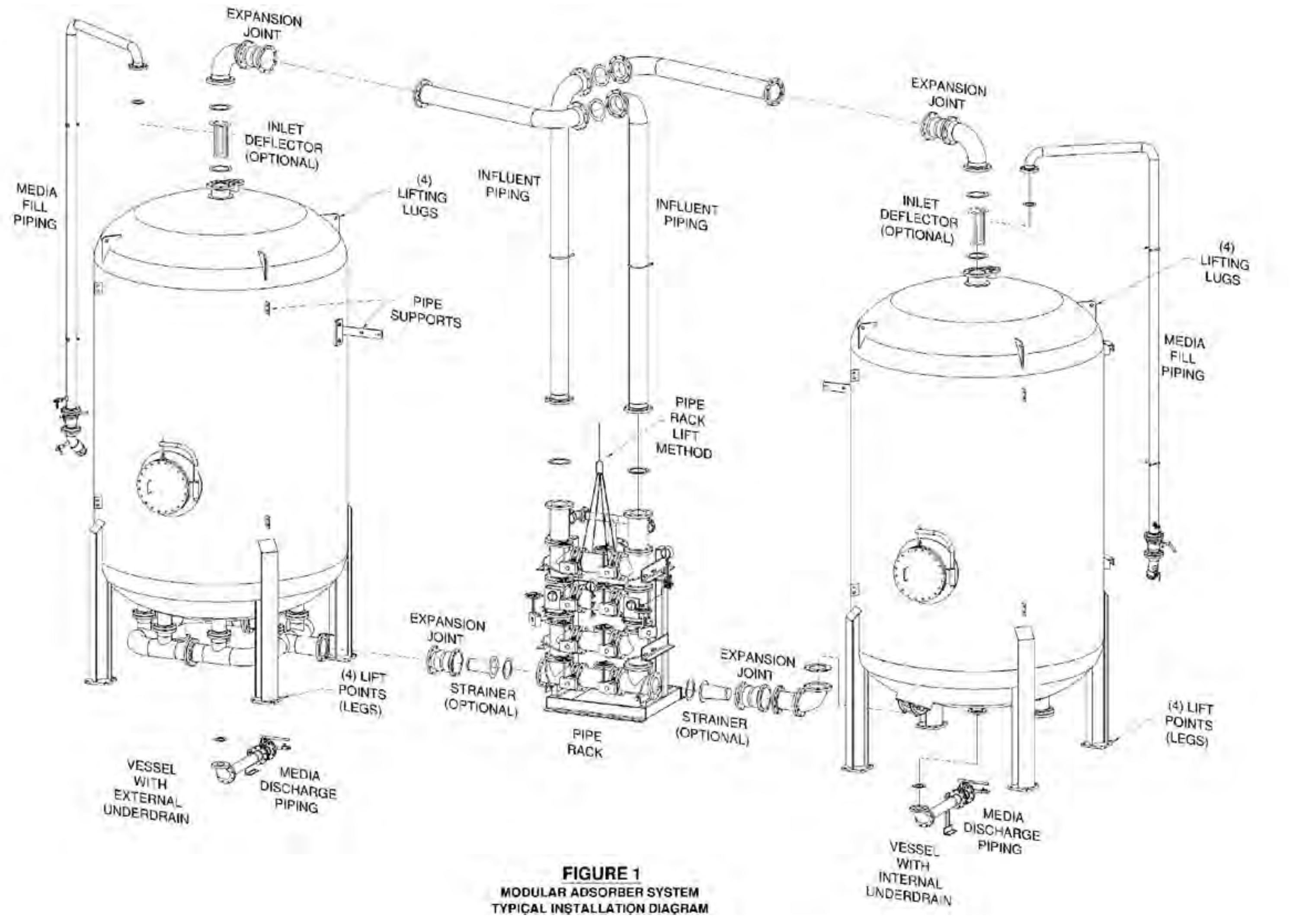


FIGURE 5: Granular Activated Carbon Vessel Configuration

NOT TO SCALE

0 500 1,000 Feet

Saint-Gobain ~ McCaffrey St
442046, Operable Unit 02

Interim Remedial Measure
Groundwater Extraction

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FIGURE 6