

Town of Wappinger Drinking Water Source Protection Program (DWSP2) Plan

System Name: United Wappinger Water District

PWS Number: NY1330660

Location:
Town of Wappinger
Dutchess County
New York

LaBella Project No. 2210765.05
OGS Contract DOSD429/DS936

January 2023



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LIST OF ACRONYMS

AEM	Agricultural Environmental Management
BMP	Best Management Practice
BTS	Bureau of Transportation Statistics
CAG	Community Advisory Group
CFA	Consolidated Funding Application
CSO	Combined Sewer Overflow
DPW	Department of Public Works
DWSP2	Drinking Water Source Protection Program
EFC	Environmental Facilities Corporation
EIA	Energy Information Agency
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
GIGP	Green Infrastructure Grant Program
GIS	Geographic Information System
GPD	Gallons Per Day
GPM	Gallons Per Minute
GWUDI	Groundwater Under the Direct Influence of Surface Water
HGL	Hydrocarbon Gas Liquids
HUC	Hydrologic Unit Code
MCL	Maximum Contaminant Level
MGD	Million Gallons Per Day
NHD	National Hydrology Dataset
NLCD	National Land Cover Data
NRCS	Natural Resources Conservation Service
NYS	New York State
NYSDEC	Department of Environmental Conservation
NYSDOH	Department of Health
NYSDOT	Department of Transportation
OPRHP	Office of Parks, Recreation, and Historic Preservation
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
SEQR	State Environmental Quality Review
SPDES	State Pollution Discharge Elimination System
SWAP	Source Water Assessment Program
SWCD	Soil and Water Conservation District
SWMP	Stormwater Management Plan
TOGS	Technical and Operational Guidance Series
TOT	Time of Travel
TRI	Toxic Release Inventory
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WD	Water District
WIA	Water Improvement Area
WIC	Wappinger Creek Intermunicipal Council
WQIP	Water Quality Improvement Project
9E	Nine Element Watershed Plan

INTRODUCTION

In 2019, the Town of Wappinger in Dutchess County, New York, applied for free technical assistance to prepare a Drinking Water Source Protection Program (DWSP2) plan to protect its local source water. A NYS technical services team (“consultant team”) led by LaBella Associates, D.P.C. (“LaBella”) was assigned to the Town and worked closely with a Wappinger Community Advisory Group (CAG) to develop the DWSP2 plan. The plan was developed using the New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH) DWSP2 framework to assist municipalities with assessing and supporting public drinking water source protection.

The Town owns and operates the public water supply known as the United Wappinger Water District, ID# NY1330660. The sole source of Town public water supply is groundwater, drawn from three wellfields developed in sand and gravel deposits found in two linear valleys. The study determined that a share of source water contributing to these wells originates outside of Wappinger, suggesting intermunicipal coordination is a necessary component of successful protective planning.

This public water system currently serves a population of approximately 14,000 within the Town of Wappinger. There are approximately 4,000 service connections.

This plan was developed by the Town based on the guidance document prepared by NYSDEC and NYSDOH, and with technical assistance provided by the consultant team. Implementation and periodic update of this source water protection plan is intended to protect the long-term viability of the Town’s public water supply sources and can contribute significantly to the conservation of natural resources and preservation of general public health. In addition, protection of the water source creates other future benefits, including drinking water treatment savings costs, general liability insurance savings, maintenance of real estate values, and increased source resilience responsive to climate change.

Previous studies, reports, and plans created by the Town were used in the development and completion of the DWSP2 plan. These include the Annual Water Quality Reports, Water Withdrawal Permits and Reports, Natural Resource Management Plan for the Wappinger Creek Watershed, Stormwater Management Program (SWMP) Plan, the Wappinger Creek Watershed Nine Element Plan (9E), and the Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed.



1.0 STAKEHOLDER GROUP

1.1 Community Advisory Group

In 2021, the consultant team formed a CAG, with help from the applicant, Richard Thurston, Town of Wappinger Supervisor. The group of individuals chosen for the CAG have a variety of backgrounds, many of whom have years of experience with or in the realm of source water protection. These individuals represented the Town water operators, Town leadership and planning, and the County Department of Health. Supervisor Thurston can be contacted by email at rthurston@townofwappingerny.gov. A complete listing of the CAG members is in Table 1.1a, below.

Table 1.1a - Community Advisory Group

Name	Relevant Affiliation
Richard Thurston	Town of Wappinger, Town Supervisor
Joey Cavaccini	Town of Wappinger / Dutchess County Legislature
Jon Bodendorf	Town Engineering Consultant, CPL Engineering
Tim Moot	Town Engineering Consultant, CPL Engineering
Mike Tremper	Chief Executive Officer, CAMO Pollution Control
Barbara Roberti	Town Director of Strategic Planning & Municipal Codes
Daniel Keeler	Senior Public Health Engineer, Dutchess County Department of Health Services
Lee Felshin	Supervisor, Dutchess County Department of Health Services
Jim Horan	Senior Town Attorney
Walter Artus	Town SWMP Coordinator, Stormwater Management Consultants, Inc.
Sean Carroll	Cornell Cooperative Extension Dutchess County

The CAG scheduled a series of working meetings between 2021 and 2022 (roughly every month) that included a formal kickoff meeting to facilitate coordination between the participating parties, introduce the consultant team, review the objectives of the DWSP2, identify other interested parties to engage, and initiate a discussion to establish specific goals and a vision to guide the plan. Each meeting led to substantial contributions to the development of the full plan. The meeting dates and topics are summarized in Table 1.1b in Appendix 1. The consultant team presented the DWSP2 and draft protection methods at a Wappinger Town Board public meeting on June 13, 2022.

1.2 Vision and Goals

The CAG met to formulate a vision guiding their DWSP2 work, and supportive goals. The following vision was created by the CAG for the Town's public water supplies:

Clean drinking water for the Town of Wappinger and future residents, sourced from healthy natural aquifers, recharge areas, and protected watersheds.

The CAG then established specific goals for the source water protection plan, supportive of the vision statement. One of the strong components of the DWSP2 would be to build on a robust history of water supply work already completed by the Town, including initiatives advanced by the existing Wappinger Creek Intermunicipal Council (WIC), which consists of the communities situated in the Wappinger Creek watershed. Table 1.2a provides the full list of Wappinger's DWSP2 goals.



Table 1.2a - DWSP2 Goals

1.	Build on work already completed to further protect existing drinking water resources by protecting the wellheads and important aquifer source areas, including Wappinger and Sprout creeks.
2.	Educate the community on their water supply and how to protect it. Draw on the Town culture of innovation and service to enhance citizen participation.
3.	Continue to rely on three wellfields for clean drinking water.
4.	Since a portion of Atlas wellfield water is understood to be induced from the Wappinger Creek, enhance existing intermunicipal commitments to protect Wappinger Creek water quality through efforts of the WIC, with a particular focus on the immediately upstream Towns of LaGrange, Poughkeepsie, and Pleasant Valley.
5.	Since two of Wappinger's wellfields are understood to induce flow from the Sprout Creek, develop intermunicipal interest in water resource protection along the Sprout Creek, particularly with the upstream Towns of East Fishkill, LaGrange, and Union Vale, and seek to develop a Sprout Creek Intermunicipal Council.
6.	Collaborate on land conservation projects, including acquisition of conservation easements/fee purchases, when appropriate, to protect critical and extended source areas.
7.	Update the Town code and other provisions with water protection measures for balanced and sustainable growth, similar to the existing Natural Resource Management Plan for the Wappinger Creek Watershed.



2.0 DRINKING WATER SOURCE ASSESSMENT

2.1 Overview of the Water System

2.1.1 Primary Source

The Town of Wappinger's three public water supply source areas come from local groundwater aquifers.

The Hilltop and Meadowwood wellfields are situated along the Sprout Creek. The supporting aquifer lies within the regionally-designated Fishkill Primary Aquifer. Primary Aquifers are defined by the NYSDDEC Division of Water Technical & Operational Guidance Series (TOGS) 2.1.3 as "highly productive aquifers presently utilized as sources of water supply by major municipal water supply systems."

The Atlas wellfield, serving as Wappinger's most productive wellfield, is situated along the Wappinger Creek. The watershed enclosing the Wappinger Creek is north of the Fishkill Aquifer and the valley aquifer aligned with this creek has not been designated a Primary Aquifer, although supporting significant wells for both the Towns of Wappinger and LaGrange.

2.1.2 Water System History

The Town of Wappinger has invested substantially in interconnections between their three wellfields, ensuring greater operational flexibility and resilience. Wells at all three wellfields have also been redeveloped and in some cases re-installed to refresh their yields, and treatment programs have been upgraded from time-to-time as evolving public water supply regulations have required.

Funding for the United Wappinger Water District's operation, maintenance, and capital improvements is secured through grants and through water bills assessed to water customers. Comprehensive planning is helping to protect these investments and ensure safe public water supplies throughout the area. The Town has been an active member of the WIC, representing municipalities throughout the Wappinger Creek watershed, together seeking to reduce sediment and nutrient loading to the creek. The Town is also in dialogue with towns south of Wappinger in the Fishkill Creek watershed, to explore new cooperative water resource management in the Sprout Creek watershed and southward, as southern portions of Dutchess County continue to experience economic and population growth.

Portions of Wappinger and all surrounding towns also continue to rely on individual domestic wells. While not the focus of the DWSP2, some of the watershed protection initiatives envisioned herein to protect the public water system wellfields are likely to also help preserve domestic well water quality.

2.1.3 Water System Existing Conditions

The Atlas wellfield (aka North Wappinger Water District (WD) wells) lies within a bend of the Wappinger Creek, drawing water from up to six sand and gravel wells collectively permitted for a maximum withdrawal of 1,900 gallons per minute (GPM). A share of pumped water has been recognized to come from the creek when pumping extends the cones of drawdown under the flowing stream water. Creek flows have historically persisted through even the driest seasons, so the combined aquifer and creek-supported Atlas wellfield has historically provided reliable and robust year-round well yields.



The Hilltop wellfield (aka Central Wappinger Water Improvement Area (WIA)) with four permitted wells authorized for net withdrawals up to 1,470 GPM and the Meadowwood (aka Sprout Creek wellfield) with two permitted wells for a net withdrawal up to 300 GPM, are each situated along the Sprout Creek. Similar to the Atlas wellfield, these wells are recognized to draw a share of their water from creek flow. Prior studies estimated that up to 50 percent of the Atlas and Hilltop yields were directly influenced from the adjoining creeks. Sprout Creek flows sometimes dwindle significantly during extended dry periods, during which time these two wellfields become solely reliant on the surrounding groundwater capacity.

Both the Wappinger and Sprout creeks flow through relatively narrow linear valleys, situated within otherwise rocky and hilly landscapes. The well screen depths at the three wellfields vary from between 29 and 60 feet below grade, and the wells are “unconfined” or “partially confined,” meaning there are no clay or tight silt horizons isolating or covering the aquifer sands and gravel. The linear valleys became filled with glacial outwash deposits following the previous glacial era. In general, siltier glacial till was left covering the surrounding hillsides.

The 2021 total permitted water withdrawal capacity is 2.23 million gallons per day (MGD). According to a 2021 report, average daily water demand is 0.987 MGD, maximum daily water demand is 1.6 MGD, and daily water losses (hydrant flushing, leak repairs, other unbilled water, etc.) is 12 percent. The town's water withdrawal permit expired in 2020 and is currently in the process of being renewed with NYSDEC.

Most Wappinger residents not served by the United Wappinger Water District rely on domestic wells, typically drilled into the bedrock formation where yields also tend to be reliable, but flows are far lower than those achievable from sand and gravel aquifers.

2.1.4 Water Quality

The raw water from all three wellfields is treated by the Town before it is distributed to residents via microfiltration and disinfection. Microfiltration addresses particulate removal, since the wells induce flow from the adjacent creeks, and disinfection is a standard precaution required under NYS law for public water system sources.

In 2020, there were no violations found on tests for inorganics, disinfection byproducts, and unregulated contaminants. Testing of the wellfields has identified trace presence of Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), but treatment has not been needed or required by the Dutchess County Department of Community and Behavioral Health because the detections have been below the New York State drinking water standards.

Former Source Water Assessment Program (SWAP) reports were completed for Hilltop and Meadowwood wellfields in 2004 and 2003, respectively. The reports suggested that both wellfields had an elevated susceptibility to microbials, nitrates, salt, sulfate, industrial solvents, and other industrial contaminants. The SWAPs were considered by the CAG during this DWSP2 planning effort to assess the applicability of these prior assessments. However, as noted above, recent sampling from these wellfields has not identified such contaminant influences in well water, aside from recognized surface water particulates warranting microfiltration. Nutrients, including nitrate, have not been a recognized water quality contaminant in any of the three wellfields. The DWSP2 planning protection recommendations outlined below are intended to preserve the high quality of the Town's public water system wells.



2.2 Drinking Water Source Protection Map

2.2.1 Ownership and Control Areas

The Town owns the property around the Atlas wellfield plus two immediately upstream parcels, which total to a combined 23 acres. These parcels collectively are referenced as the “ownership and control area” for the Atlas wellfield in this DWSP2 plan.

At the Meadowwood wells, the Town owns 20.59 acres, including the wells and land extending to the Sprout Creek. The neighboring Town of East Fishkill owns an additional 31.34 acres of undeveloped land on the east side of the Sprout Creek. The Town of Wappinger also owns another 16.4-acre parcel downstream of the Meadowwood wells. These net municipal holdings sum to 68.3 acres of ownership and control lands surrounding this wellfield.

At the upstream Hilltop wells, the Town of Wappinger owns three abutting parcels collectively summing to 12.2 acres.

These extensive ownership parcels ensure that the Town maintains ownership and control over land within 200 feet of their wells and considerable additional area.

Beyond the Ownership and Control perimeters, the DWSP2 recommends identifying and planning protective strategies for additional important parts of the overall wellfield Extended Source Area for public water system wells. The program recommends priority protection planning for Critical Source Areas, which are described as those areas in which a contaminant source or event might quickly and significantly influence well water quality. To identify Extended Source Areas, which are generally more distant from the public water system wells, where potential contaminant events may require years to reach a well, a more expanded recharge area can be mapped. The greater travel time inherent in the Extended Source Areas allows for remedial activities, dilutions, or natural processes and lessens the need for more rigorous protective strategies, compared to those needed in the Critical Source Areas.

2.2.2 Critical and Extended Source Areas for the Atlas Wellfield

Six sand and gravel wells at the Atlas wellfield lie within a bend of the Wappinger Creek. Horsley Witten & Hegemann (1992)¹ previously identified the approximate radius of influence (aka wellfield drawdown areas) around these wells and used an analytical model of uniform flow to suggest the one-year time of travel (TOT) contribution area, through which groundwater is understood to migrate naturally toward the wells for up to one year before being drawn into the municipal wells. For this plan, the consultant team reviewed the previous study and found it credible but recommended proportionally extending the upgradient Critical Source Area to cover a five-year travel region rather than just a one-year TOT, giving the Town a larger area over which to seek priority groundwater protection initiatives. In addition, also consistent with the DWSP2 guidance, since the Atlas wells are recognized to draw a share of the yield from the creek (formally recognized as a source of Groundwater Under the Direct Influence (GWUDI) of surface water), this plan has identified a 300-foot protective zone along an estimated five-hour travel time upstream along the Wappinger Creek, approximately to the Salt Point hamlet in the Town of Pleasant Valley.

¹ Horsley Witten Hegemann, Inc., 1992, Water Supply Protection Program for Dutchess County, New York, submitted to the Dutchess County Water & Wastewater Authority.



On this basis, the five-year TOT aquifer area for the Atlas wellfield plus the 300-foot creekside protective zone extending to Salt Point were the recommended Critical Source Area for the Atlas wellfield.

Following the DWSP2 guidance, the Extended Source Area to the Atlas wellfield consists of the HUC-12 (Hydrologic Unit Code) watershed runoff areas contributing to the Critical Source Area. These Critical and Extended Source Areas are shown in Appendix mapping. The Atlas wellfield Critical and Extended Source Areas do not embrace the entirety of the Wappinger Creek watershed, leaving high-watershed areas out of the delineation, as seen in Map 2 of the Appendix. This is because water originating from the most distant watershed areas, while certainly contributing water to the creek passing the wellfield, is most likely to have benefited already from dilution or biological attenuation before passing the Atlas wellsite.

2.2.3 Critical and Extended Source Areas for the Hilltop and Meadowwood Wellfields

The Critical Source Areas for the Hilltop and Meadowwood wellfields were estimated from limited prior study data. They were mapped to consist of a 1,500-foot radius around the existing wells and extended upgradient to the five-year TOT limit, estimated from representative hydraulic conductivity, stream and topographic gradients. Finally, they were adapted to the margins of the sand and gravel linear valleys where these could be interpreted from regional mapping.

Similar to the Atlas wellfield, since both Hilltop and Meadowwood wellfields have been determined to be GWUDI of surface water, a 300-foot stream corridor protection zone was identified extending an estimated five-hour travel time upstream, approximately to Freedom Park in the Town of LaGrange. These five-year TOT zones and the 300-foot control zones along the creek constitute the Critical Source Areas for the Hilltop and Meadowwood public water supply sources.

The HUC-12 watershed areas contributing to these areas were identified as Extended Source Areas. Appendix 2 provides a full-size map (Map 2) showing the Critical and Extended Source Areas for the three wellfields.

An online version of the map was created, as well, to allow the CAG and consultant team to be able to zoom in to the Critical and Extended Source Areas and retrieve more information on the potential contaminants. The map was created using ArcGIS software. For pdf maps, ArcGIS Pro was used and for the online map, ArcGIS Online was used. The online map is available at the following link:

[Wappinger DWSP2 Interactive Map.](#)

The login information is as follows:

Username: waterstudy.wappinger

Password: fishkill2

The maintenance of the online map is at the discretion of the Town, as a cost is associated with it.

2.3 Potential Contaminant Source Inventory

The CAG reviewed an extensive array of potential contaminant sources present in the two watersheds near their three public water supply wellfields. Over 30 publicly available data source layers were downloaded and posted to online and digital project maps by the consultant team to create a robust inventory of potential contaminant sources. The estimated locations for the potential point sources are shown on Map 2 in Appendix 2. While paper copies of the maps provide an overall visual impression of the distribution of potential contaminant sources, the online version of the map allows a user to zoom in far enough to do a detailed inspection of point source locations. Users can



also click on each point source for additional information (if it exists) from the NYS databases, such as state of remediation on NYSDEC Spill Incidents.

The CAG reviewed the Potential Contaminant Sources Map and created a summary of the specific categories of contaminants, found in Tables 2.3a and 2.3b in Appendix 1. The CAG also discussed some of the discrete sites familiar to the members to ensure that their summary captured all manner of water quality contaminants warranting protective planning. Broadly summarized, the Town of Wappinger's potential sources include: a limited number of superfund and potential superfund sites in various stages of ongoing remediation; a history of petroleum spills and recognized PFOS/PFOA presence associated with the Dutchess County Airport; an extensive array of other petroleum spills of various sizes throughout the watershed that are generally limited in impact and/or are closed spill reports; a broad distribution of listed and regulated underground oil and gas tanks; a network of domestic septic systems at many private homes; a prevalent use of salt for winter road de-icing by Towns, Villages, the County, and NYS within the contributing watershed; and the downstream flow of nutrients and sediment within the Wappinger and Sprout creeks as they pass the Wappinger wellfield.

The potential contaminants within the Critical and Extended Source Areas provided the CAG with direction on the categories of land use and activity warranting attention when developing this plan. The CAG recognized that many of these geolocated elements on Map 2 in Appendix 2 are not confirmed sources of contamination per se, but rather represent categories of potential groundwater contaminant sources based on the histories of land use and their traditional contaminant risk correlations. As noted above, many of the reported NYSDEC spills are already closed. For those potential contaminant sources that reflected existing, active contaminant sources, the CAG had a more focused discussion on remedial progress and likely existing impacts to the Town water sources.



3.0 PROTECTION AND IMPLEMENTATION STRATEGIES

3.1 Summary of Protection and Management Methods

The CAG discussed in detail the threats represented by the potential contaminant sources discussed in Section 2.3, above, and listed in Tables 2.3a and 2.3b of Appendix 1. To protect the public drinking water sources from these potential contaminants, the CAG developed specific protection and management recommendations for each potential contaminant. Details are found in Table 3.1/3.2 in Appendix 1. These protection plan elements were developed to not only respond to the potential contaminant sources identified through this study, but also to support the project goals and vision created by the CAG and listed in section 1.2 of the report.

To prioritize protection and management methods, the CAG considered two factors: the level of risk associated with the issue being addressed; and the ease of implementing the measure. The CAG ranked the priority issues from low to high risk, considering their likely respective impact on the drinking water source (refer to the left-most column of Table 3.1/3.2 in Appendix 1). The rank was the considered opinion of the local experts on the CAG. A low-risk rank was given to potential contaminant sources that have not been observed as widely distributed in the watershed, whereas a moderate rank was given to those that are more widespread. The CAG concluded that there were no immediate “high risk” contaminant threats to the Town’s municipal wells. As an example of how a risk rank was assessed, take the topic of road salt application. It is categorized as a moderate risk even though the sodium levels in the water are not currently above what is recommended. The moderate rank is due to the near ubiquitous use of road salt in the Town and the fact that salt accumulation (as sodium and chloride) in water cannot be filtered out, as no filtration system currently exists for it. High levels of sodium in drinking water can be a health concern for people with health conditions requiring low sodium diets.

To determine ease of implementation, the CAG considered factors such as cost and required coordination. Measures that are relatively easy to implement require a small budget and only one group is involved, while others are highly complex or costly to advance, requiring more study, grants, or landowner cooperation, or many groups/agencies are involved. Table 3.1/3.2 in Appendix 1 includes a column titled “Ease to Implement,” where each strategy was ranked as easy, moderate, or complex based on the above considerations.

The CAG recognized that certain planning protection measures, such as an aquifer protection ordinance, manage only future land use contaminants, while others such as local education, enhanced spill response, and septic system upgrades, can be deployed to address existing or otherwise ongoing threats.

Table 3.1/3.2 in Appendix 1 also includes budget estimates for each protection initiative, potential funding sources, and likely collaboration partners. More analysis describing the budget estimates is shown in Table 3.3, Cost Analysis in Appendix 1.



Given the moderate to low levels of threat that the CAG believed most of the potential contaminant sources posed, this DWSP2 effort focuses generally on reducing salt application, expanding partner communication, educating the public and local officials about the proximity of the local drinking water sources to the Town, continued infrastructure studies and upgrades, sustainable growth, and maintaining or building on existing strategies. The proposed protection and management methods are summarized below, with additional information provided in Table 3.1/3.2 in Appendix 1.

3.1.1 *Municipal Road De-icing Policy*

Recognizing that safe winter roads are a priority, protection methods 1a through 1c outline three strategies aimed at reducing the amount of salt application in the Critical and Extended Source Areas. First, the CAG recommends refining best management practices (BMPs) so that road salt application is not excessive within the Critical and Extended Source Areas (Protection Method 1a). Personnel at the Town Highway Department who manage and apply the road salt in Wappinger should collaborate with partners, including the New York State Department of Transportation (NYSDOT), Dutchess County Department of Public Works (DPW), watershed communities, and private partners who salt the rest of the Critical and Extended Source Areas. Continuous training on source water protection best practices is necessary and may include post-storm assessments and efforts to minimize rock salt remaining on road margins beyond the duration of the snow season, since such salt simply dissolves into the environment. The use of brine rather than the spreading of rock salt is understood to de-ice roads more precisely, using less salt and leaving far less of a post-winter salt residue.

An additional long-term road salt planning initiative would be to convert roadside drainage over time to discourage the infiltration of salty road runoff into the groundwater (Protection Method 1b). While stormwater detention and infiltration practices are generally required and beneficial on a wide range of development sites, they should not be prioritized along roadsides within the Critical Source Areas in order to minimize the infiltration of salty road runoff. When roads in the Critical Source Areas are periodically redesigned for maintenance purposes, drainage routes should be modified to prioritize overland flow for road runoff to areas outside of the Critical Source Areas.

Lastly, converting road salting fleets from rock salt spreading to brining is a longer-range goal (Protection Method 1c). This initiative requires substantial investment from the Town. Partners at the County and NYS level will be asked to consider this, as well.

3.1.2 *Partner Communication*

Several of the protection methods listed in Table 3.1/3.2 in Appendix 1 have to do with greater communication between the Town of Wappinger and partner municipalities, agencies, or groups. The need to keep apprised and be on the same page with other groups is especially evident in areas of overlapping responsibility and concern.

Protection Method 2 focuses on increasing awareness from and communication with emergency responders. During this planning process, the CAG discussed the need for regular communication and training to ensure the best emergency response possible when it is needed near the Critical Source Areas of the wellfields, such as when large trucks with cargo create accidental releases on highways. A plan for enhanced preparedness is needed and must be led by a task force created by the Town with partners who include Dutchess County Responders, the Dutchess County Health Department, and NYSDEC. These communications should include annual reminders of the location of the Critical and Extended Source Areas, through map sharing.



The NYSDEC requires spill response reporting to NYS Spill Hotline within two hours of discovery for petroleum spills. (Spills of fewer than five gallons, are contained, and under the control of the spiller, have not and will not reach NYS water or land, and/or are cleaned up within two hours of discovery are exempt.) Various NYS regulations require the reporting of releases of petroleum, chemicals, and materials that may cause environmental damage. The CAG identified that the Dutchess County Health Department, in reviewing NYSDEC spills database, only notifies water system operators when spills or other known contaminants occur within 1,000 feet of the Town's well sources. All spills occurring within the Critical Source Areas should be reported. The sharing of the DWSP2 maps would ensure that happens. Similarly, for known contaminant sites, the CAG recommends setting up a system to maintain awareness and confirmation of their continued monitoring and testing by State and Federal regulators (Protection Method 5).

The priority issue of nutrient runoff from agricultural lands has two protection methods that include collaboration. The first (Protection Method 7a) identifies the need to work with County Soil & Water Conservation Districts (SWCDs) to implement their Agricultural Environmental Management (AEM) programs on farms in the Critical and Extended Source Areas to limit nutrient and sediment runoff. The Town could also work with the SWCDs to pinpoint locations for planting buffers on agricultural lands on or adjacent to the Critical Source Areas.

The second protection method to limit nutrient runoff from agricultural lands (Protection Method 7b) recognizes that the Town of Wappinger is already a strong supporter of partnership and cooperation as one of the founding members of the WIC. The CAG advocates for the creation of an intermunicipal collaborative group for the Sprout Creek/Fishkill Creek watershed

3.1.3 Education

The CAG identified education as a method to increase awareness about the Critical and Extended Source Areas (Protection Methods 3 and 4b). Public awareness leading to source water protection could include educating property owners within the Critical and Extended Source Areas; educating employees performing tasks, such as road de-icing and emergency response, which can impact the source water; and installation of educational signs. The Town of Wappinger should work with partners like the WIC and Cornell Cooperative Extension to reach property owners and employees in the Critical and Extended Source Areas outside of the Town.

The U.S. Environmental Protection Agency (EPA), NYSDEC, and other agencies focused on source water protection have developed materials for public education. Providing information about BMPs and source water protection in and around the Critical Source Areas (particularly for those who live in it), sending out information in water bills, installing signage along roadways to indicate that one is entering a source water area, and holding public meetings to share the progress of the DWSP2, are all important next steps.



Figure 1: Example of Roadway Water Supply Protection Area Sign

An increase in public awareness will support efforts to maintain clean water and help prevent the contamination of source water in the Critical Source Areas.

3.1.4 Infrastructure Studies and Upgrades

Recognizing the issues of potential water contamination from failing our outdated infrastructure, the CAG recommends a series of protection methods centered around monitoring and improving



infrastructure in the Critical and Extended Source Areas. With the goal of alleviating nutrient and pathogen loading caused by septic systems in proximity to the wellfields, the CAG recommends continuing to examine septic loading capacity, making upgrades to outdated systems, and converting currently unsewered neighborhoods to municipal wastewater (Protection Methods 6a – 6c). Similarly, acknowledging the presence of small, privately operated sewer plants, the CAG recommends supporting infrastructure improvement efforts through partnerships with the system operators and the NYSDEC (Protection Method 9).

In terms of drinking water infrastructure, the CAG recommends continued study of source redundancy and emergency water control policies (Protection Method 10) and testing raw water at the three wellfields and being prepared to treat, as needed, at the source or water plant (Protection Method 4a).

3.1.5 Sustainable Growth

The CAG had robust discussions around future growth and potential land use intensification near the Town of Wappinger drinking water supply wells. The protection methods in the DWSP2 advocate for updating the Town code and other provisions with water protection measures to achieve balanced and sustainable growth (Protection Methods 8a – 8d). Implementing a version of the model aquifer protection ordinance is one proposed method that would serve this purpose. The Town of Wappinger should consider adoption of the Dutchess County Model Aquifer Protection Ordinance, adapted to suit their needs. Since the Critical and Extended Source Areas extend far beyond the Town boundaries, the concept and particulars of the aquifer protection ordinance should be shared with the WIC (and proposed Sprout Creek Intermunicipal Council), as it would be beneficial for upstream municipalities to have similar regulations on aquifer protection in order to protect the drinking water for all. Each municipality must adapt the model ordinance to address their local interests, as there is no one size fits all of town code and zoning.

3.1.6 Support Ongoing Planning Efforts

Lastly, acknowledging that the DWSP2 planning process builds on other watershed planning efforts, the CAG recommends implementing the recommendations related to drinking water supply from these other plans (Protection Method 11). Similar projects and recommendations could be combined to create common successful outcomes and the progress of each plan should be tracked so that collaboration can be maximized.

3.2 Implementation Steps

The recommended implementation steps for each of the planning measures identified by the CAG are sorted by protection method and are identified below.

Protection Method #1

Priority Issue: Create a reduced road salt program to limit sodium entering aquifer and streams near public wells.

Protection Method 1a: Create reduced salt application program with BMPs for road salt, post-storm assessments, cost-effective alternatives, e.g., anti-icing salt brine applications prior to storms, road signage.

1. Share Critical and Extended Source Areas for drinking water in the Town of Wappinger with Highway Department, Dutchess County DPW, NYSDOT, and other partners to make salt reduction in these areas the highest priority.



2. Update all partners on BMPs of a reduced salting program, including post-storm assessments and cost-effective alternatives, e.g., anti-icing salt brine applications prior to storms.
3. Plan training sessions for all partners on procedures and BMPs.
3. Set up procedure for interacting/collaborating with partners and sharing information and materials. Set up a biannual schedule for all parties to collaborate.
4. Develop and distribute road salt educational materials to relevant stakeholders and property owners.
5. Install educational road signage where low salt areas are implemented within the Critical and Extended Source Areas in collaboration with NYSDOT and other relevant agencies.

Protection Method 1b: Convert roadside drainage over time to manage stormwater in ways that discourage groundwater recharge of salty road runoff. Prioritize keeping stormwater at grade and moving it quickly to streams flowing to the Hudson.

1. Identify roadside areas in the Critical Source Areas where salt diversion would be beneficial.
2. Determine feasibility, design the infrastructure solution, and implementation strategy for each identified site with input from landowners and other partners.
3. Gather information (conceptual site plan, existing conditions plan, feasibility study, site photographs) to apply for the NYS Environmental Facilities Corporation (EFC) Green Innovation Grant Program (GIGP) through the Consolidated Funding Application (CFA) in summer 2023.
4. Implement solutions when grants are awarded or other funding is received.

Protection Method 1c: Upgrades of municipal road deicing equipment to reduce salt, either by deploying more targeted salt use, conversion to brine, or conversion to non-sodium alternatives.

1. Review brine-based alternatives to road salts, including necessary vehicle and equipment upgrades. Compare to other de-icing technologies that may reduce waste salt migration into aquifers and streams.
2. Determine capacity of brine needed to upgrade the Town's and each municipalities' snow removal equipment.
3. Determine costs for upgrades and a timeline to purchase over several years.
4. Gather information (budget worksheet, project map, etc.) to apply for the NYSDEC Water Quality Improvement Project (WQIP) Program through the CFA in summer 2023.
5. Implement strategy when funding is received or grants are awarded.

Protection Method #2

Priority Issue: Create a plan to quickly manage accidental releases from highways in watershed, such as large trucks with cargo.

Protection Method: Create a plan for enhanced preparedness for spill response with emergency responders, with annual reminders for location of Critical and Extended Source Areas. Currently the Dutchess County Health Department only notifies water system operators when spills or other known contaminant occurrences within 1,000 feet of the Town's well sources. All spills occurring within the Critical Source Areas should be reported.

1. Identify relevant departments/agencies responsible for overseeing various remedial response programs (fire departments, NYSDOH, NYSDEC, other).
2. Share mapping for Critical and Extended Source Areas for drinking water in the Town with partners, so any spills in these areas can be highest priority.



3. Create a working group and plan a review of procedures and BMPs for all partners to identify gaps in spill reporting and mitigation.
4. Draft recommendations to improve regulations and processes. Adopt regulatory amendments per CAG recommendations.
5. Plan training sessions for all partners on procedures and BMPs.
6. Set up procedure for interacting/collaborating with partners and sharing information and materials. Set up a biannual schedule for all parties to collaborate. Set up annual reminders for location of the Critical and Extended Source Areas.

Protection Method #3

Priority Issue: Conduct property owner educational outreach to owners of existing developed land in the watershed.

Protection Method: Conduct outreach to property owners to reduce overuse of fertilizers, pesticides, and herbicides; promote responsible care and use of septic systems; and promote responsible disposal of medications and household hazardous waste, etc. Provide information and guidance on erosion reduction practices on driveways, ditches, and fire roads.

1. Consider frequency and urgency of education relative to property ownership in Critical versus Extended Source Areas.
2. Collaborate with partners on an outreach plan on BMPs to the identified property owners in the Critical and Extended Source Areas.
3. Set up procedure for interacting/collaborating with partners and distributing information and materials to the property owners.
4. Set up a biannual schedule for all partners to collaborate on continual education and awareness campaign.

Protection Method #4

Priority Issue: Identify and limit small contaminant discharges and emerging contaminants flowing to streams, thus potentially drawn into the wellfield by pumping.

Protection Method 4a: Test raw water and be ready to treat, when needed, at source or water plant.

1. Continue to test raw water in the three Town wellfields on a quarterly basis.
2. Be aware of any new contaminants and tests available (even for unregulated contaminants) by checking in periodically with Dutchess County Health Department and NYSDEC.
3. Create a conceptual treatment plan for compounds that may need future treatment.

Protection Method 4b: Public Information campaign

1. Establish working group to collaborate with partners and develop informational content for the public.
2. Develop informational content and distribute through mailers and/or with water bills.
3. Create a school education program in partnership with the WIC, proposed Sprout Creek Intermunicipal Council, and local nonprofits.
4. Add local signage in public spaces or along roadways to alert the public about discharges that are harmful to drinking water.

Protection Method #5

Priority Issue: Advocate for swift remediation of known contaminant sites in Critical Source Areas, and thereafter in the Extended Source Areas.

Protection Method: Set up a system to maintain awareness and confirmation of the continued monitoring/testing by State and Federal regulators.

1. Track remedial progress at listed sites located in the Critical and Extended Source Areas.



2. Review NYSDEC's Permit Applications Database for information about the permit history of the facility.
3. Reach out to the regulators and owner/contacts to collaborate on BMPs for swift site remediation.
4. Create a biannual schedule to communicate on the status of the sites and associated permits.
5. Follow up with the Dutchess County Health Department and NYSDEC, when needed.

Protection Method #6

Priority Issue: Manage influence of septic systems present or proposed in proximity to the municipal wellfields and throughout the upstream watershed.

Protection Method 6a: Examine septic loading capacity when new projects are proposed within the watershed.

1. When building projects are proposed, work with the Dutchess County Health Department to determine whether additional septic systems are sustainable based on septic density and nitrate loading estimates. Confirm low potential contamination posed to water quality in the Critical and Extended Source Areas.
2. Communicate and collaborate with the Dutchess County Planning and Economic Development Department on septic loading capacity and determinations for new building projects.

Protection Method 6b: Upgrade of septic systems not meeting current design requirements.

1. Work with the Dutchess County Health Department to address upgrades for existing septic systems in the watershed, based on Critical and Extended Source Areas identified.
2. Set up procedure for interacting/collaborating with partners and sharing information and materials.
3. Set up a biannual schedule for all parties to collaborate.

Protection Method 6c: Convert existing neighborhoods with septic systems to municipal wastewater, where subsurface discharges are confirmed to impact drinking water supplies.

1. Execute a study to identify where subsurface discharges are confirmed to impact drinking water supplies.
2. Town Board and DPW will create a phased strategy for converting existing neighborhoods with septic systems to municipal wastewater.

Protection Method #7

Priority Issue: Monitor influences of nutrient runoff from agriculture/farmland.

Protection Method 7a: Support and advocate for SWCD to continue implementing AEM programs on farms, including use of planted stream buffers.

1. Collaborate with SWCD in the watershed to identify farms who can be added to the AEM programs.
2. Share all relevant materials regarding Critical and Extended Source Areas with contacts at SWCD.
3. Set up procedure for interacting/collaborating with partners and sharing information and materials.
4. Set up a biannual schedule for all parties to collaborate.

Protection Method 7b: Support the WIC, and create a similar intermunicipal collaborative group for the Sprout Creek/Fishkill Creek watershed.

1. For the Sprout Creek, set up an informational meeting for partners to collaborate on the forming of proposed Sprout Creek Intermunicipal Council.
 - a. Create Memorandum of Understanding and other founding documents for the proposed Sprout Creek Intermunicipal Council.



- b. Set up procedure for interacting/collaborating with partners and sharing information and materials.
 - c. Set up a regular meeting schedule for all parties to collaborate on grant applications.
2. For the Wappinger Creek, maintain existing strong attendance and leadership role in the WIC. Broaden the WIC mission to focus on organic contaminants in addition to its historic focus on nutrients and sediments.

Protection Method #8

Priority Issue: Monitor and manage future land use development in Critical and Extended Source Areas, both in and upstream of the Town of Wappinger.

Protection Method 8a: Implement an aquifer protection ordinance.

1. Assemble a working team in Wappinger to consider adoption of the Dutchess County Model Aquifer Protection Ordinance. Consider inviting interested parties from upstream towns, if they have similar interests and commitments to aquifer protection.
2. Adapt the model ordinance to address local interests of each participating town.
3. Create overlay maps that identify Critical and Extended Source Areas in each town.
4. Undertake State Environmental Quality Review (SEQR) review and present it to the Town Board.
5. Town adopts ordinance(s)

Protection Method 8b: Create Town incentives for installing green infrastructure.

1. Research green infrastructure strategies that can benefit groundwater quality.
2. Develop a strategy for a range of incentives for many green infrastructure types and present them to the Town Board and Planning Board.
3. Adopt incentives or development requirements, as appropriate.

Protection Method 8c: Acquire land or create conservation easements on undeveloped land near wells and in Critical Source Areas.

1. Work with partners to identify parcels of land to acquire within the Critical Source Areas.
2. Gather materials to apply for the WQIP grant.
3. Acquire land when the grant is awarded.
4. Steward land.

Protection Method 8d: Add riparian buffer in Critical Source Area creeks.

1. Create an inventory of land in Critical Source Areas and identify owners with partners.
2. Collaborate with owner(s) on application for the NYSDEC Trees for Tribs grant.
3. Collaborate with owner(s) on implementation when grant is received.

Protection Method #9

Priority Issue: Ensure that wastewater outflows from small, privately operated sewer plants remain in compliance with permits and able to address new emerging contaminants.

Protection Method: Support infrastructure improvement efforts through partnerships with system operators and the NYSDEC with the State Pollution Discharge Elimination System (SPDES) program.

1. Identify private facilities discharging wastewater near Critical or Extended Source Areas. Reach out to owners/leadership, as well as the NYSDEC office for permit information.
2. Collaborate with owners/leadership and NYSDEC to identify necessary upgrades to facilities to bring them up to compliance.
3. Set up a bi-annual check-in schedule with partners.



Protection Method #10

Priority Issue: Monitor climate change influence on Wappinger's public water supply wells, including the role of low stream flow conditions in the Sprout Creek and perhaps the Wappinger Creek in the future.

Protection Method: Examine source redundancy and emergency water control policies. Conduct a yield study to set baseline while continuing current management and awareness.

1. Advance studies to refine sustainable yield analysis for drinking water sources.
2. Examine emergency water control policies and amend them, if needed.
3. Communicate study results and determine when source development should be planned for.

Protection Method #11

Priority Issue: Support other watershed planning efforts.

Protection Method: Implement, when finalized, the 9E recommendations related to drinking water supply, as well as those in the Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed and the Town of Wappinger SWMP Plan.

1. Maintain the membership and active participation of the WIC.
2. Compare recommendations included in the 9E and Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed to combine similar projects, when practicable, and create common successful outcomes.
3. Set up a schedule to revisit progress of 9E, the Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed, the Town of Wappinger SWMP Plan, and DWSP2 plan so that collaboration can be maximized.

3.3 Implementation Timeline

Recognizing that it would be difficult to implement all plan elements simultaneously, the CAG reviewed the urgency of need and the ease of implementation for each protection activity. On this basis, the group assigned a target implementation year to each element.

Table 3.1/3.2 in Appendix 1 includes target years to advance each planning element. The table assigns actions as "Year 1" if they may be more urgent (i.e., "Moderate Risk") or may require less up-front investment of time or funding (i.e., "Easy" to implement). Actions assigned to "Year 2" and beyond are either less urgently needed (i.e., "Low Risk") or were recognized by the CAG to require more budget or thought to implement (i.e., "Moderate" or "Complex" to implement).

Many standing recommendations have been assigned biannual or annual repetition, particularly those including coordination efforts with local officials/project partners and education initiatives.

The implementation timeline portion of Table 3.1/3.2 will be revised in the future to account for potential new funding sources that could aid with methods identified in this plan.



4.0 PROGRESSION AND MAINTENANCE

4.1 Plan Management Team

The CAG chose a Plan Management Team to be the point people on plan implementation. They were chosen for their expertise in highway maintenance, intergovernmental cooperation, engineering, water treatment, and public education. Table 4.1a below shows the full Plan Management Team list. The Plan Management Team must establish a process to replace those who leave the team as time passes.

The Plan Management Team will meet on a quarterly meeting schedule to be set up by the team to discuss the DWSP2, priorities, and next steps, which will be documented for review by the Town Board. A yearly DWSP2 plan revision schedule is desired. Progress by the Plan Management Team should be reported to the Town Board twice a year. Progress will be monitored relative to this plan and documented in the reports provided to the Town Board. Until determined otherwise, the chair of the Plan Management Team will be Supervisor Thurston, who can be contacted by email at rthurston@townofwappingerny.gov.

Part of the Plan Management Team's ongoing work will be sharing progress in drinking water protection with the public. Any accomplishments and strides in watershed protection resulting from the protection methods described in this report (and other related work) should be marketed and communicated widely to all affected parties.

Table 4.1a - Plan Management Team

Name	Relevant Affiliation
Supervisor Thurston, Chair	Town Supervisor
Jon Bodendorf	Town Engineering Consultant, CPL Engineering
Mike Tremper	CAMO Pollution Control
Walter Artus	Town SWMP Coordinator, Stormwater Management Consultants, Inc.
Mike Sheehan	Superintendent Highway Department
TBA	Town Board Liaison



Town of Wappinger

Drinking Water Source Protection Program (DWSP2) Plan

System Name: United Wappinger Water District

PWS Number: NY1330660

APPENDIX 1: Data Summary

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Drinking Water Source Protection Program (DWSP2) Plan Data Summary	
DWSP2 Plan Checklist	
Component	Status
Phase 1. Stakeholder Group	
Form a Stakeholder Group	Complete
Establish Goals and Formulate a Vision	Complete
Phase 2. Drinking Water Source Assessment	Complete
Develop an Overview of the Water System	Complete
Prepare a Drinking Water Source Protection Map	Complete
Create a Potential Contaminant Source Inventory	Complete
Phase 3. Protection and Implementation Strategies	Complete
Identify Protection and Management Methods	Complete
Develop an Implementation Timeline	Complete
Phase 4. Progression and Maintenance	Complete
Designate a Plan Management Team	Complete

Public Water Supply (PWS) Information	
PWS Name:	United Wappinger Water District
PWS ID:	1330660
Type of Sources identified in plan:	Groundwater
Name(s) of sources being protected (if different than PWS Name):	Atlas, Hilltop, and Meadowwood wellfields.

Table 1.1b - Community Advisory Group Meetings

Date	Topic(s) Covered
7/8/2021	Opening conversation with primary project contacts. Brief project overview. Early discussion of likely stakeholders for Town and consultant team to invite. Brief confirmation of the three Town groundwater sources and commitments to provide reports to the consultant team for these.
9/8/2021	Discussion of Community Advisory Group (CAG) make-up, a couple additions mentioned. Overview of program with New York State Department of Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) slides. Visioning & goal group activity. Next steps were discussed, next meeting tentatively scheduled for mid-October.
10/20/2021	Presented vision and goals to the group, they were updated and finalized. Consultant team mentioned it would be worth looking into creating a Sprout Creek protection program to replicate what has been done for Wappinger Creek as an achievable goal. Overview of the water system was discussed, conversation arose surrounding the permitted limits of the Hilltop, Meadowwood, and Atlas wells. Additionally, pumping test info from Hilltop and Atlas will be discussed for the upcoming meeting. There is concern about Perfluorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS), Supervisor Thurston reminded the group that the airport presents some challenges in regard to contaminants. Next steps will be to discuss where the vulnerabilities for the Town's water sources exist, examining threats, and creating a plan to move forward.
12/14/2021	Presented source water maps to group. Consultant team explained reasoning behind Critical Source Area and Extended Source Area delineations. The CAG thought it looked reasonable and mentioned they are working on a Sprout Creek intermunicipal council to help protect areas outside of the Town, but in source water. Next meeting for late January discussed.
1/18/2022	Presented final Critical Source Areas and Critical Source Areas on map. Talked through known and potential contaminants in the areas. PFOA/PFOS are the legacy and are slowly getting lower over time, but road salt are on the rise and they would like help identifying strategies to lower. The Supervisor shared draft stage studies for Wappinger Creek Watershed Nine Element Plan (9E) that covers sewage treatment plants with the consultant team.
3/9/2022	Consultant team talked through and ranked a handful of priority issues and brainstormed some early-stage recommendations with the group. Some higher priority concerns include failing wells and sewer facilities as well as continuing to strengthen intermunicipal communication. For next meeting, consultant team will have Table 3.1 edited with group's input as well as provide some action items as a draft for CAG. The Supervisor expressed his interest in having consultants present draft plan to Town Board - consultant team will also address future costs.
4/6/2022	A PDF of Table 3.1 was sent out prior to the meeting, which included an added column ranking potential contaminants from low to moderate concern. Consultant team has begun to shift into planning strategies. PFOA/PFOS continue to be top of mind as an emerging contaminant. It was shared that Wappinger Creek is considered a class B stream. There is a demand for central water in the Town. Source capacity and development is a pervasive issue for the Town - source water development is out of the Drinking Water Source Protection Program (DWSP2) Plan scope but it can include it as part of recommendations. Consultant team will further develop and organize the protection strategies into the other columns of Table 3.1. The next CAG meeting is scheduled for 5/4 at 10:30am.
5/4/2022	Consultant team shared a revised version of Tables 3.1 & 3.2 with the CAG. The group reorganized and added to the columns in Table 3.2 to break out other columns. The Supervisor would like to present elements of this plan to the board in June. Consultant team will identify some specific dollar amounts for potential funding sources, cost of new equipment, etc. Discussion took place around the cost of road salt and pre-treatment options, cost-effective alternatives, and best management practices (BMPs) for mixing and storage. There was some discussion around fire department retraining as part of emergency responsiveness.
6/1/2022	Draft presentation for the Wappinger Town Board was shown and discussed with the group. Plan Management Team was decided on. Board materials are due 6/9 for public presentation to Town Board schedule for 6/13. Consultants will follow up on conversion to brine by reaching out to the highway Supervisor.
6/13/2022	Consultant team presentation on DWSP2 and draft protection methods to Wappinger Town Board at public meeting.
7/19/2022	Review of public presentation given to and feedback from Town Board on 6/13. Updates on Wappinger Creek Intermunicipal Council (WIC) and 9E from Supervisor Thurston. Draft implementation steps document was reviewed and a few key examples were edited as a group. Draft report will be sent out ahead of the next meeting, when the consultant team will ask for comments on the report.
8/11/2022	Discussion of draft plan and live edits were made to a few sections.

Table 2.1 - Overview of the Water System

Water system name:	United Wappinger Water District		
NYS PWS ID:	NY1330660		
Type of water system (e.g. community, non-community, transient, non-transient):	Community		
Name of the community, or communities, served by the system:	Town of Wappinger, known as the United Wappinger Water District.		
Population served by the system:	14,000		
# of service connections:	4,000		
Summary of wells, intakes, infiltration galleries, and/or springs including name, depth, screen length and pumping rates where applicable:	<p>The Town has three wellfields, each drawing water from sand and gravel deposits found in linear bedrock valleys. The Atlas wellfield (aka North Wappinger Water District (WD) wells) lies in an oxbow of the Wappinger Creek, drawing water from up to six sand and gravel wells collectively permitted for a maximum withdrawal of 1,900 gallons per minute (GPM). The Hilltop wellfield (aka Central Wappinger Water Improvement Area (WIA)) with four permitted wells authorized for net withdrawals up to 1,470 GPM, and the Meadowwood (aka Sprout Creek wellfield) with two permitted wells for a net withdrawal up to 300 GPM, are each situated along the Sprout Creek. All three wellfields are considered to provide Groundwater Under the Direct Influence (GWUDI) of surfacewater, with prior studies estimating that up to 50% of the Atlas and Hilltop yields are directly influenced from the adjoining creeks. Well screen depths vary from between 29 to 60 feet below grade and the wells are either fully unconfined or partially confined.</p>		
General treatment information:	Raw water receives microfiltration and disinfection prior to distribution.		
Summary of hydrogeographic setting of drinking water sources including watershed information and/or type of aquifer and aquifer materials (this information may be gathered after delineating protection areas in section 2.2):	<p>Upland hydrogeology in Wappinger consists generally of thin soils over shale and variant bedrock. Two linear valleys cross the Town, containing mixed post-glacial outwash and glacial lake sediments traversed by the Wappinger and Sprout Creek, providing the discrete locations suited for installation of high-capacity overburdened wells. Wappinger residents not served by the United Wappinger Water District rely on domestic bedrock wells.</p>		
Water quality summary including any known ambient water quality information, finished water detections, and/or history of maximum contaminant level (MCL) violations*:	<p>2020 - No violations found on tests for inorganics, disinfection byproducts, and unregulated contaminants. Atlas wellfield Source Water Assessment Program (SWAP) rated it as having an elevated susceptibility to microbial and nitrate contamination. Hilltop Water Well Field SWAP rated it as having an elevated susceptibility to microbials, nitrates, salts, sulfate, industrial solvents, and other industrial contaminants. Meadowwood Water Wellfield SWAP rated it as having an elevated susceptibility to microbials, nitrates, salt, sulfate, industrial solvents, and other industrial contaminants.</p>		
Water quantity summary:	Current Water Withdrawal Permit Expiration Date(s) - in process to renew	3/11/2020	
	Total Permitted Water Withdrawal Capacity	2.23	MGD
	Average Daily Water Demand (= Yearly Usage / 365)	0.987 (2021 report)	MGD
	Maximum Daily Water Demand (Unofficial 3-day average in peak month - e.g. July)	1.6 (2021 report)	MGD
	Daily Water Losses (can be obtained from Water Conservation Program form)	12% (2021 report)	MGD

Table 2.2a - Drinking Water Source Protection Map Description - *Atlas wellfield*

Protection Areas	Description	Delineation Method
Ownership and Control Area (for groundwater) or Control and Monitoring Area (for surface water)	The Town owns the property around the Atlas wellfield plus two immediately upstream parcels, which total to a combined 23 acres. These extensive ownership parcels ensure that the Town maintains ownership and control over land within 200 feet of all their wells (as NYSDOH requires), and considerable additional area.	Parcel boundaries
Critical Source Area	Six sand and gravel wells at the North Wappinger Water District (aka Atlas wellfield) lie within a tight bend of the Wappinger Creek. Horsley and Witten (2007) previously identified the approximate Radius of Influence around these wells and mapped a one-year Time of Travel (TOT) in the upgradient direction. The prior study was reviewed and determined credible and then proportionally extended the TOT upstream to identify a five-year TOT. In addition, since the wellfield is known to provide GWUDI of surface water, a 300-foot buffer Critical Source Area was extended an estimated five-hour travel time upstream along the Wappinger Creek, approximately to the Salt Point hamlet.	Hydrogeologic mapping
Extended Source Area	HUC-12 watershed runoff areas contributing to the Critical Source Area defined above and trimmed downstream of the wellfield ROI comprise the Extended Source Area for the Atlas wellfield.	Hydrogeologic mapping
Additional Protection Area (if applicable)		

Table 2.2b - Drinking Water Source Protection Map Description - Hilltop & Meadowwood wellfields

Protection Areas	Description	Delineation Method
Ownership and Control Area (for groundwater) or Control and Monitoring Area (for surface water)	At the Meadowwood wells, the Town owns 20.59 acres, including the wells and land extending to the Sprout Creek. The Town also owns another 16.4-acre parcel downstream of the Meadowwood wells. At the upstream Hilltop wells, the Town of Wappinger owns three abutting parcels collectively summing to 12.2 acres. These extensive ownership parcels ensure that the Town maintains ownership and control over land within 200 feet of all their wells (as NYSDOH requires), and considerable additional area.	Parcel boundaries
Critical Source Area	No detailed pumping test data were available from either the Hilltop or Meadowwood wellfields. Each wellfield draws water from a narrow valley deposit of outwash sand and gravel presumptively unconfined or semi-confined. An estimated Radius of Influence (ROI) of 1,500 feet was applied around the pumping wells, and five-year TOT calculated using characteristic hydraulic conductivity values and aquifer hydraulic gradients estimated from Sprout Creek stream gradients. In addition, since both wellfields have been determined to provide GWUDI of surface water a 300-foot stream corridor buffer was extended an estimated five-hour travel time upstream, reaching approximately to Freedom Park in the Town of LaGrange.	Hydrogeologic mapping
Extended Source Area	HUC-12 (Hydrologic Unit Code) watershed runoff areas contributing to the Critical Source Areas defined above and trimmed downstream of the Meadowwood wellfield ROI comprise the joint Extended Source Area for these two wellfields.	Hydrogeologic mapping
Additional Protection Area (if applicable)		

Table 2.2c - Drinking Water Source Protection Map - Potential Contaminant Map Layers

Layer	Date Acquired	Description
Bulk Storage Facilities - New York State (NYSDEC)	7/15/2021	Obtained from NYS GIS Clearinghouse - NYSDEC - Bulk Storage Sites in New York State. Source: NYSDEC, 2010
Major Oil Storage Facilities	7/15/2021	Obtained from NYS GIS Clearinghouse - NYSDEC - Bulk Storage Sites in New York State. Source: NYSDEC, 2010
Petroleum Bulk Storage Facilities	7/15/2021	Obtained from NYS GIS Clearinghouse - NYSDEC - Bulk Storage Sites in New York State. Source: NYSDEC, 2010
Active Landfills	7/22/2021	Obtained from ftp://ftp.dec.state.ny.us/dshw/SWMF/Information_Solid%20Waste%20Management%20Facility/Active%20%26%20Inactive%20Facility%20Lists/ . Source: NYSDEC, 2010
Inactive Landfills (Title 12)	6/17/2021	Obtained from ftp://ftp.dec.state.ny.us/dshw/SWMF/Information_Solid%20Waste%20Management%20Facility/Active%20%26%20Inactive%20Facility%20Lists/ . Source: NYSDEC
Land Application Sites	7/23/2021	Obtained from ftp://ftp.dec.state.ny.us/dshw/SWMF/Information_Solid%20Waste%20Management%20Facility/Active%20%26%20Inactive%20Facility%20Lists/ . Source: NYSDEC, 2010
Vehicle Dismantling Facilities (i.e. junk yards)	7/23/2021	Obtained from ftp://ftp.dec.state.ny.us/dshw/SWMF/Information_Solid%20Waste%20Management%20Facility/Active%20%26%20Inactive%20Facility%20Lists/ . Source: NYSDEC, 2010
Environmental Remediation Site Boundaries	7/22/2021	Obtained from http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1097 . Source: NYSDEC, updated nightly.
Environmental Remediation Sites (Superfund Sites, Brownfield Sites, etc.)	7/23/2021	Obtained from http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1097 . Source: NYSDEC, 2010
DEC Spill Incidents	7/23/2021	Obtained from https://data.ny.gov/Energy-Environment/Spill-Incidents/u44d-k5fk . Source: NYSDEC, Division of Environmental Remediation, July 22, 2021
Oil, Gas, and Other Regulated Wells	7/23/2021	Obtained from https://www.dec.ny.gov/energy/1603.html . Source: NYSDEC. Files updated nightly.
Orphan Oil and Gas Wells	7/23/2021	Obtained from https://data.ny.gov/Energy-Environment/Abandoned-Wells/vgue-bamz . Source: NYSDEC

Mines	7/23/2021	Obtained from https://www.dec.ny.gov/lands/5374.html . Source: NYSDEC
State Pollutant Discharge Elimination System Permitted (SPDES) Facilities	7/23/2021	Obtained from http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1010 . Source: NYSDEC, revised December 2019.
Combined Sewer Overflows (CSO's)	7/23/2021	Obtained from https://www.dec.ny.gov/chemical/48595.html . Source: NYSDEC, Division of Mineral Resources, 2020
Airports of the United States, Puerto Rico, and Virgin Islands.	7/23/2021	Obtained from https://ais-faa.opendata.arcgis.com/datasets/e747ab91a11045e8b3f8a3efd093d3b5_0/explore?location=14.980494%2C-1.633886%2C2.71&showTable=true . Source: FAA, Aeronautical Information Services, June 17, 2021
NYS Railroads	7/23/2021	Obtained from https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=904 . Source: NYSDOT, 2013
North American Rail Lines	7/23/2021	Obtained from https://data-usdot.opendata.arcgis.com/datasets/usdot::north-american-rail-lines-1/about . Source: USDOT BTS, July 20, 2021
Hazmat Routes	7/23/2021	Obtained from https://koordinates.com/layer/22794-us-hazmat-routes/ . Source: US Bureau of Transportation Statistics (BTS), 2018
Road Maintenance Facilities (NYSDOT Facilities)	11/1/2020	Obtained from https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=391 . Source: NYSDOT
Salt and Deicers Storage (NYSDOT Facilities)	11/1/2020	Obtained from https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=391 . Source: NYSDOT
Petroleum Product Pipelines	7/23/2021	Obtained from https://www.eia.gov/maps/layer_info-m.php . Source: Created by EIA using publicly available data. 4/28/2020
Natural Gas Interstate and Intrastate Pipelines	7/23/2021	Obtained from https://www.eia.gov/maps/layer_info-m.php . Source: Collected by EIA from FERC and other external sources. 4/28/2020
HGL Pipelines	7/23/2021	Obtained from https://www.eia.gov/maps/layer_info-m.php . Source: Collected by EIA from FERC and other external sources. 4/28/2020
Crude Oil Pipelines	7/23/2021	Obtained from https://www.eia.gov/maps/layer_info-m.php . Source: Collected by EIA from FERC) and other external sources. 4/28/2020
NYS Water Withdrawals	7/23/2021	Obtained from https://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1265 . Source: DOW - Bureau of Water Resource Management, March 2021
New York State Boat Launches	7/23/2021	Obtained from http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1268 . Source: NYSDEC, 2009

Boat Launch Sites by State Parks or Marine Facility	7/23/2021	Obtained from https://data.ny.gov/Recreation/Boat-Launch-Sites-by-State-Parks-or-Marine-Facilit/2gcg-hikh . Source: NYS OPRHP, 2020
USGS National Land Cover Data (NLCD) (2019)	7/23/2021	Obtained from https://www.mrlc.gov/data?f%5B0%5D=category%3ALand%20Cover&f%5B1%5D=category%3ALand%20cover&f%5B2%5D=year%3A2019 . Source: NLCD2019
NLCD Percent Developed Imperviousness (2019)	7/23/2021	Obtained from https://www.mrlc.gov/data?f%5B0%5D=category%3ALand%20Cover&f%5B1%5D=category%3ALand%20cover&f%5B2%5D=year%3A2019 . Source: NLCD2019
Toxic Release Inventory (TRI) Facilities	7/23/2021	Obtained from https://hifld-geoplatform.opendata.arcgis.com/datasets/2c4a0b5f85b945f8a67125e6a93fa7fe_23/explore?showTable=true . Source: EPA, 2020
National Hydrology Dataset (NHD)	7/27/2021	Obtained from https://www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products . Source: USGS NHD Data

Table 2.3a - Potential Contaminant Source Inventory - Atlas Wellfield

Potential Source	Contaminant(s) of Concern	Protection Area(s) Impacted	Relevant Information
Critical Area - Atlas Wellfield			
Septic systems	Nitrates and microbials	Critical Source Area	Located on parcels adjacent to Wappinger Creek. Most of the Town and much of the watershed is unsewered.
Dutchess County Airport	Potential PFOA/PFOS, salt, volatile organic compounds (VOCs), etc.	Critical Source Area	Located in Wappinger Falls. Petroleum spills have taken place at the airport. PFOS related to firefighting foam has been released.
Retail Gasoline Sites	Underground storage tanks (UST)	Critical Source Area	Located on parcels adjacent to Wappinger Creek. Petroleum spills may have taken place at these sites.
Road runoff	Salt - sodium & chloride	Critical Source Area	Streets near and crossing the creek are a source of runoff. Specifically, Jackson Rd, New Hackensack Rd, Old Manchester Rd, and Rt 55
Page Industrial Area - B906	Volatile organic compounds (VOCs)	Critical Source Area	State Superfund Program site - closed and monitored. 275 Manchester Road in the Page Industrial Park off Rt 55, Poughkeepsie
Pleasant Valley Quarry	Low to negligent potential for chemical & sediment runoff to contaminate nearby Wappinger Creek	Critical Source Area	CAG-identified site. The quarry has internal drainage, nothing leaves the site, meaning no chemical or sediment runoff risk.
Private sewer plants	Nitrogen, phosphorus	Critical Source Area	Private wastewater treatment plant (approximately 25-75 homes or a mid-size business).
Agricultural Activities	Nutrients, specifically nitrogen & phosphorus, and pesticides	Critical Source Area	Agricultural activities may contribute to nutrient loading in the Atlas wellfield.
Wastewater outflows	Nitrogen, phosphorus	Critical Source Area	Most of the Town is unsewered.
Extended Source Area - Atlas Wellfield			
Septic systems	Nitrates and microbials	Throughout Extended Source Area	Much of the watershed is unsewered.

Dutchess County Airport	Potential PFOA/PFOS, salt, other VOCs, etc.	Extended Source Area	Remediation site under Superfund with known hazardous waste, landfills, and permitted USTs. There may be other concerns such as runoff and fire retardant foam.
7 Sand and gravel mines	Post mining informal uses	Extended Source Area	Locations in LaGrange, Pleasant Valley, and Poughkeepsie. The informal uses often established in former mines may be a potential contaminant source to the wellfield.
Chemical Spill incidents	Chemical - petroleum	Extended Source Area	Many locations throughout Extended Source Area. NYSDEC Spill Response Program oversees the investigation and cleanup of these spills. Most spills are from releases of petroleum, including leaking USTs.
Road runoff	Salt - sodium & chloride	Extended Source Area	Streets throughout the Extended Source Area are a source of runoff.
Agricultural Activities	Nutrients, specifically Nitrogen, Phosphorus and pesticides	Extended Source Area	Agricultural activities may contribute to nutrient loading in the Atlas wellfield.
Poughkeepsie Rifle Range	Potential munitions contamination	Extended Source Area	Potential State Superfund Program site. Titusville Road in LaGrangeville. Traditional contaminant from ranges is lead; lead has not been found in the drinking water.

Table 2.3b - Potential Contaminant Source Inventory - Hilltop and Meadowwood

Potential Source	Contaminant(s) of Concern	Protection Area(s) Impacted	Relevant Information
Critical Area - Hilltop and Meadowwood Watershed			
Septic systems	Nitrates and microbials	Critical Source Area	Located on parcels adjacent to Sprout Creek. Most of the Town is unsewered.
Road runoff	Salt	Critical Source Area	Streets crossing the creek are a source of runoff. Locations include Taconic State Pkwy, RT-55, Todd Hill Rd, Skidmore Rd, Barmore Rd, Stringham Rd, Noxon Rd, Lauer Rd, Robinson Ln, Route 376, and Montfort Rd.
Agricultural Activities	Nutrients, specifically Nitrogen, Phosphorus and pesticides	Critical Source Area	Agricultural activities may contribute to nutrient loading in the Atlas wellfield.
Extended Source Area - Hilltop and Meadowwood Wellfield			
Septic Systems	Nitrates and microbials	Extended Source Area	Most of the Town is unsewered.
Chemical Spill incidents	Chemical - petroleum	Extended Source Area	NYSDEC Spill Response Program oversees the investigation and cleanup of these spills. Most spills are from releases of petroleum, including leaking USTs.
Bulk storage	Underground oil and gas tanks	Extended Source Area	Tanks that are not maintained can be sources of contamination.
Road runoff	Salt	Extended Source Area	Streets throughout the Extended Source Area are a source of runoff.
Sky Acres Airport	Potential PFOA/PFOS, salt, other VOCs, etc.	Extended Source Area	Location in Lagrangeville. Runoff and fire retardant foam may be cause for concern.
Agricultural Activities	Nutrients, specifically Nitrogen, Phosphorus and pesticides	Extended Source Area	Agricultural activities may contribute to nutrient loading in the Atlas wellfield.

Table 3.1 / 3.2 - Protection and Management Methods & Implementation Strategy Timeline

Rank	Priority Issue	Targeted Potential Contaminant Source(s)	Goal	Protection Method and/or Management Method	Ease to Implement	Potential Cost	Potential Funding Sources	Project Leader and Partnerships Needed	Implementation Timing & Estimated Duration
Moderate risk	Limit amount of road salt (Rt-55, 44, other highways, local roads) in aquifer and streams	Salt (sodium chloride)	Reduce the amount of salt application in Critical and Extended Source Areas	1a. Create reduced salt application program with BMPs for road salt, post-storm assessments, cost-effective alternatives, e.g., anti-icing salt brine applications prior to storms, road signage.	Moderate	\$10,250.00	Town	Highway Department and Town engineers. Create a partnership with NYSDOT, Dutchess County Department of Public Works (DPW), watershed communities and private partners	Year 1 and on-going
				1b. Convert roadside drainage over time to manage stormwater in ways that discourage ground water recharge of salty road runoff. Prioritize keeping stormwater at grade and moving it quickly to streams flowing to the Hudson.	Complex	\$3,008,250.00	US Environmental Protection Agency (EPA) Urban Waters Small Grants Program, NYS Environmental Facilities Corporation (EFC) Green Innovation Grant Program		Years 2 - 7, 5 years
				1c. Upgrades of municipal road deicing equipment to reduce salt, either by deploying more targeted salt use, conversion to brine, or conversion to non-sodium alternatives.	Complex	\$508,250.00	NYSDEC Water Quality Improvement Project (WQIP) Program - Other Projects		Years 2 - 3, 2 years
	Accidental releases from highways in watershed, such as large trucks with cargo	Chemicals and petroleum	Heightened awareness from emergency responders to spills in Critical and Extended Source Areas	2.Create a plan for enhanced preparedness for spill response with emergency responders, - with annual reminders for location of Critical and Extended Source Areas. Currently Dutchess County Health Department only notifies water system operators when spills or other known contaminant occurrences within 1,000 feet of the Town's well sources. All spills occurring within the Critical Source Area should be reported.	Easy	\$11,900.00	Town, Division of Homeland Security and Emergency Services Hazardous Materials Emergency Preparedness Grant Program	Task force including CPL Engineering, CAMO Pollution Control, Fire to reassess training, equipment. Share source map with the Dutchess County Responders	Year 1 and annually
	Developed, private land in watershed	Metals, sediments, oil, pesticides, herbicides, and fertilizers	Reduce metals, sediments, oil, pesticides, herbicides, and fertilizers in water	3. Conduct outreach to property owners to reduce overuse of fertilizers, pesticides, and herbicides; promote responsible care and use of septic systems; and promote responsible disposal of medications and household hazardous waste, etc. Provide information and guidance on erosion reduction practices on driveways, ditches, and fire roads.	Moderate	\$5,125.00	National Fish and Wildlife Foundation/Wildlife Habitat Council Five Star and Urban Waters Restoration Grant Program	Supervisor's office, Cornell Cooperative Extension, WIC, proposed Sprout Creek Intermunicipal Council	Year 1 and annually
	Small discharges and emerging contaminants in streams, drawn into the wellfield by pumping	Nutrients, pathogens, PFOA, PFOS, and other chemicals not yet regulated	Threat awareness and watershed scale education around use and management of trace chemicals	4a. Test raw water and be ready to treat, when needed, at source or water plant.	Moderate	\$10,625.00	Town	CAMO Pollution Control	Year 1 and on-going
				4b. Public information campaign	Easy	\$5,300.00	National Fish and Wildlife Foundation/Wildlife Habitat Council Five Star and Urban Waters Restoration Grant Program	Supervisor's office, Cornell Cooperative Extension, WIC, proposed Sprout Creek Intermunicipal Council	Year 1, biannually, and on-going
	Discreet remediation sites in the watershed (airports, inactive hazardous waste sites, other chemical remediation sites)	Chlorinated solvents, PFOAs, VOCs, etc.	Reducing chemical threats to wellfields	5. Set up a system to maintain awareness and confirmation of the continued monitoring/testing by State and Federal regulators.	Moderate	\$5,775.00	Town	Supervisor's office, State and Federal regulators	Year 1 and biannually
	Septic systems in proximity to wells and throughout the watershed	Nutrients and pathogens	Alleviating nutrient and pathogen loading to the wellfields	6a. Examine septic loading capacity when new projects are proposed within the watershed.	Easy	\$4,950.00	Town	Dutchess County Health Department, CPL Engineering, CAMO Pollution Control, Dutchess County Planning & Economic Development Department	On-going, as projects are proposed
				6b. Upgrade of septic systems not meeting current design requirements.	Moderate	\$20,125.00	EFC Septic System Replacement Program	Supervisor's office, Dutchess County Health Department	On-going

Low risk				6c. Convert existing neighborhoods with septic systems to municipal wastewater, where subsurface discharges are confirmed to impact drinking water supplies.	Complex	\$43,250.00	EFC Water Infrastructure Improvement Act, NYSEFC Integrated Solutions Construction Grant Program	CPL Engineering, CAMO Pollution Control for study. Town Board and DPW	Years 2 - 10, 8 years
	Nutrient runoff from agriculture/farmland	Nitrogen and phosphorus	Limit nutrient and sediment runoff	7a. Work with Soil & Water Conservation Districts (SWCD) to implement Agricultural Environmental Management (AEM) programs on farms, including use of planted stream buffers.	Easy	\$5,362.50	NYS Agriculture & Markets/NYS Soil and Water Conservation Committee Source Water Buffer Program, US Department of Agriculture (USDA) NRCS Agricultural Conservation Easement Program	Supervisor's office, SWCDs	Years 2 - 10, 8 years
				7b. Support the WIC and create an intermunicipal collaborative group for the Sprout Creek/Fishkill Creek watershed.	Moderate	\$9,900.00	Town	Supervisor's office, local municipalities, Cornell Cooperative Extension	Year 1 and on-going
	Future growth/land use intensification near wells	Nutrients, pathogens, deicing chemicals	Update town code and other provisions with water protection measures for balanced and sustainable growth	8a. Implement an aquifer protection ordinance.	Moderate	\$15,750.00	Town	CPL Engineering, Town Board, Dutchess County Planning & Economic Development Department	Years 1 - 2, 2 years
				8b. Create Town incentives for installing green infrastructure.	Moderate	\$30,250.00	EFC Green Innovation Grant Program (GIGP)	Town Board, Town Planning Department	Year 2 and on-going
				8c. Acquire land or create conservation easements on undeveloped land near wells and in Critical Source Areas.	Moderate	\$79,125.00	NYSDEC WQIP Program, USDA NRCS Healthy Forests Reserve Program	Town Board, Town Planning Department, WIC, proposed Sprout Creek Intermunicipal Council	Years 2 - 3, 2 years
				8d. Add riparian buffer in Critical Source Area creeks.	Moderate	\$79,125.00	NYSDEC Trees for Tribes	Town Board, Planning department, WIC, proposed Sprout Creek Intermunicipal Council	Years 2 - 5, 3 years
	Wastewater outflows from small, privately operated sewer plant	Nutrients and pathogens	Reduce nutrient and trace pharmaceutical influence on the wellfield	9. Support infrastructure improvement efforts through partnerships with system operators and the NYSDEC with the State Pollution Discharge Elimination System (SPDES) program.	Easy	\$2,062.50	Town	Supervisor's office, System operators, and the NYSDEC with SPDES program.	On-going
	Climate change and low stream flow conditions	N/A	Strategy for managing low stream flow and possible low well yield periods	10. Examine source redundancy and emergency water control policies. Conduct a yield study to set baseline. Continue current management and awareness.	Complex	\$10,725.00	EFC Water Infrastructure Improvement Act, NYSDEC Climate Smart Communities Grant Program, NYSDEC/EFC Engineering Planning Grant Program	CPL Engineering, CAMO Pollution Control on yield study	Year 2 for study, on-going tracking
	Support other watershed planning efforts	All	Making the best use of planning efforts	11. Implement, when finalized, the 9E recommendations related to drinking water supply, as well as those in the Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed and the Town of Wappinger Stormwater Management Program (SWMP) Plan	Moderate	\$8,250.00	WQIP, Trees for Tribes, and others	Town leadership and intermunicipal groups like the WIC, among others	variable, many recommendations

Table 3.3 - Cost Analysis									
Applicable Protection Method and/or Management Method	Task Requirements, for either entire assignment or per year (indicate which)		Weekly Hourly Requirements from Municipal personnel	Total Hours Required from Municipal personnel over period	Labor Cost per Hour (NYS DOL Wages)	Cost of total hours required from municipal personnel, including 50% for benefits	Non-Personnel Costs (e.g. equipment/materials, land, hardware, consultants)		Total Potential Cost
1a. Create reduced salt application program with BMPs for road salt, post-storm assessments, cost-effective alternatives, e.g., anti-icing salt brine applications prior to storms, road signage.	Salt management training to minimize runoff and road margin waste salt accumulation.	Annual	2	100	\$ 55.00	\$8,250	\$ 2,000	Budget for training materials, speakers, handouts, location arrangements	\$10,250
1b. Convert roadside drainage over time to manage stormwater in ways that discourage ground water recharge of salty road runoff. Prioritize keeping stormwater at grade and moving it quickly to streams flowing to the Hudson.	Studies and preliminary design concepts prepared to demonstrate alternative road runoff management. Promote use in the Critical and Extended Source Areas.	Annual Administration and implementation on a project basis.	2	100	\$ 55.00	\$8,250	\$ 3,000,000	Grant funding added to municipal road rebuild budgets to convert existing drainage to maximize stormwater conveyance to open waterways	\$3,008,250
1c. Upgrades of municipal road deicing equipment to reduce salt, either by deploying more targeted salt use, conversion to brine, or conversion to non-sodium alternatives.	Track ongoing research on equipment and strategy to minimize sodium-based deicers. Convert equipment as appropriate.	Annual Tracking. Periodic equipment investments	2	100	\$ 55.00	\$8,250	\$ 500,000	Annual cumulative allowance available to convert municipal equipment as new techniques are validated	\$508,250
2.Create a plan for enhanced preparedness for spill response with emergency responders, - with annual reminders for location of Critical and Extended Source Areas. Currently Dutchess County Health Department only notifies water system operators when spills or other known contaminant occurrences within 1,000 feet of the Town’s well sources. All spills occurring withing the Critical Source Area should be reported.	Establish regular communication programs between Town and emergency response services. Share Critical Source Area awareness and advocate for swift remediation where road-based releases threaten wells.	Annual	2	120	\$ 55.00	\$9,900	\$ 2,000	Annual implementation allowance for training and information dispersal	\$11,900
3. Conduct outreach to property owners to reduce overuse of fertilizers, pesticides, and herbicides; promote responsible care and use of septic systems; and promote responsible disposal of medications and household hazardous waste, etc. Provide information and guidance on erosion reduction practices on driveways, ditches, and fire roads.	Mailings to property owners and school handouts about chemical and nutrient management to protect aquifers.	Annual	1	50	\$ 55.00	\$4,125	\$ 1,000	Annual budget for mailings, posters, school materials, inserts in water bills, etc.	\$5,125
4a. Test raw water and be ready to treat, when needed, at source or water plant.	Track discharges, alert responders, monitor mitigation.	Annual	1	50	\$ 55.00	\$4,125.00	\$ 6,500	Budget for lab analysis	\$10,625.00
4b. Public information campaign	Distribute educational material raising awareness about illicit or accidental discharges and how to notify Towns , Dutchess County DOH, or NYSDEC about observations.	Annual	1	40	\$ 55.00	\$3,300.00	\$ 2,000	Budget for inserts or other notification materials	\$5,300.00
5. Set up a system to maintain awareness and confirmation of the continued monitoring/testing by State and Federal regulators.	DWSP2 Plan Management Teams actively tracks remedial progress on regulated remediation sites, advocating for remedies which most rapidly reduce off-site impacts which might influence public water system wells.	Annual	2	70	\$ 55.00	\$5,775.00	\$ -	None	\$5,775.00
6a. Examine septic loading capacity when new projects are proposed within the watershed.	Use Dutchess County recharge rates and septic nitrate loading rate data to identify new residential developments with proposed septic densities likely to generate nitrate in groundwater over half the MCL for nitrate. Recommend further nitrogen treatment as necessary.	Annual	1	60	\$ 55.00	\$4,950.00	\$ -	Applicants should provide their own calculations during SEQR, confirmed by Planning Board's Designated Engineer.	\$4,950.00

6b. Upgrade of septic systems not meeting current design requirements.	Septic systems particularly close to streams may be releasing heavy nitrate, phosphorous or pathogen loads to streams. where detected and where a property owner cannot bring their site into compliance, an emergency municipal action may be warranted.	Annual	1	50	\$ 55.00	\$4,125.00	\$ 16,000	Contractor and designer fee to upgrade a deficient septic system. Assume one per year.	\$20,125
6c. Convert existing neighborhoods with septic systems to municipal wastewater, where subsurface discharges are confirmed to impact drinking water supplies.	Risk analysis study, and map plan and report required to justify and quantify a proposed new wastewater collection district, likely requiring upgrade of an existing sewage treatment plant or construction of a new plant.	One time study to identify locations warranting municipal wastewater treatment service. Implementation would follow, for additional fee.	2	100	\$ 55.00	\$8,250.00	\$ 35,000	Consultant feasibility study examining need for municipal sewage treatment expansion.	\$43,250.00
7a. Work with Soil & Water Conservation Districts (SWCD) to implement Agricultural Environmental Management (AEM) programs on farms, including use of planted stream buffers.	Promote AEM plans for all farms in Wappinger and Sprout Creek watersheds, with particular emphasis on stream buffers to limit movement of nitrogen and phosphorous into creeks, as well as sediment runoff.	Annual	<2	65	\$ 55.00	\$5,362.50	\$ -	None	\$5,362.50
7b. Support the WIC and create an intermunicipal collaborative group for the Sprout Creek/Fishkill Creek watershed.	Kick off Sprout/Fishkill Watershed Council outreach, including organizational meetings, bylaw and MOU agreements, and vision documents. Support ongoing work of the Wappinger Intermunicipal Council. Staff time required for this.	Annual	3	120	\$ 55.00	\$9,900.00	\$ -	Local initiative including elected leaders, town attorney, and town engineer /stormwater professionals	\$9,900.00
8a. Implement an aquifer protection ordinance.	Review existing Dutchess County model aquifer protection zoning code, adopt to local geography and political needs, attorney review, SEQRA review, and adopt.	One effort per watershed municipality. In the Wappinger Creek watershed, Pleasant Valley has already adopted an ordinance. Adoption in at least another 8 including Wappinger would be beneficial	2	100	\$ 55.00	\$8,250.00	\$ 7,500	Consultant planner and hydrogeologist to facilitate plan development. Legal review by Town attorney. SEQRA filings.	\$15,750.00
8b. Create Town incentives for installing green infrastructure.	Modify local codes to incentivize or require their use to detain stormwater and create stream corridor buffers. Create green infrastructure demonstration sites.	Initial cost budget	3	100	\$ 55.00	\$8,250	\$ 22,000	Establish demonstration sites using consultants and contractors.	\$30,250.00
8c. Acquire land or create conservation easements on undeveloped land near wells and in Critical Source Areas.	Identify land near wells warranting protection from development. Purchase the land or buy conservation easements.	Ongoing municipal program with a fund replenished annually to purchase easements or land	1	50	\$ 55.00	\$4,125	\$ 75,000	Annual fund contribution to allow continued land acquisition or easement purchases.	\$79,125
8d. Add riparian buffer in Critical Source Area creeks.	Identify land near margins of Sprout Creek or Wappinger Creek warranting protection from development. Purchase the land or buy conservation easements.	See above	1	50	\$ 55.00	\$4,125	\$ 75,000	Annual fund contribution to allow continued land acquisition or easement purchases.	\$79,125
9. Support infrastructure improvement efforts through partnerships with system operators and the NYSDEC with the State Pollution Discharge Elimination System (SPDES) program.	DWSP2 committee actively tracks performance of small privately-owned wastewater treatment plants upstream of Wappinger's wells and advocates through DEC and DOH for their upgrades based on performance.	Annual	1	25	\$ 55.00	\$2,063	\$ -	Upgrades would be paid for by the private wastewater service district customers.	\$2,063
10. Examine source redundancy and emergency water control policies. Conduct a yield study to set baseline. Continue current management and awareness.	DWSP2 committee actively tracks influence of climate change on low-flow capacity of the Wappinger Creek and the duration of no-flow conditions in the Sprout Creek, considering reliability of the Town's water systems into the future.	Annual	2.5	130	\$ 55.00	\$10,725	\$ -	None	\$10,725

11. Implement, when finalized, the 9E recommendations related to drinking water supply, as well as those in the Watershed Characterization and Recommendations Report for the Wappinger Creek Watershed and the Town of Wappinger Stormwater Management Program (SWMP) Plan	Engage with other working teams as the 9E plan is finalized, and support recommendations of the Wappinger (and Sprout/Fishkill) Creek Intermunicipal councils and Town Stormwater programs.	Annual	2	100	\$55.00	\$8,250	\$-	Unknown additional financial considerations.	\$8,250
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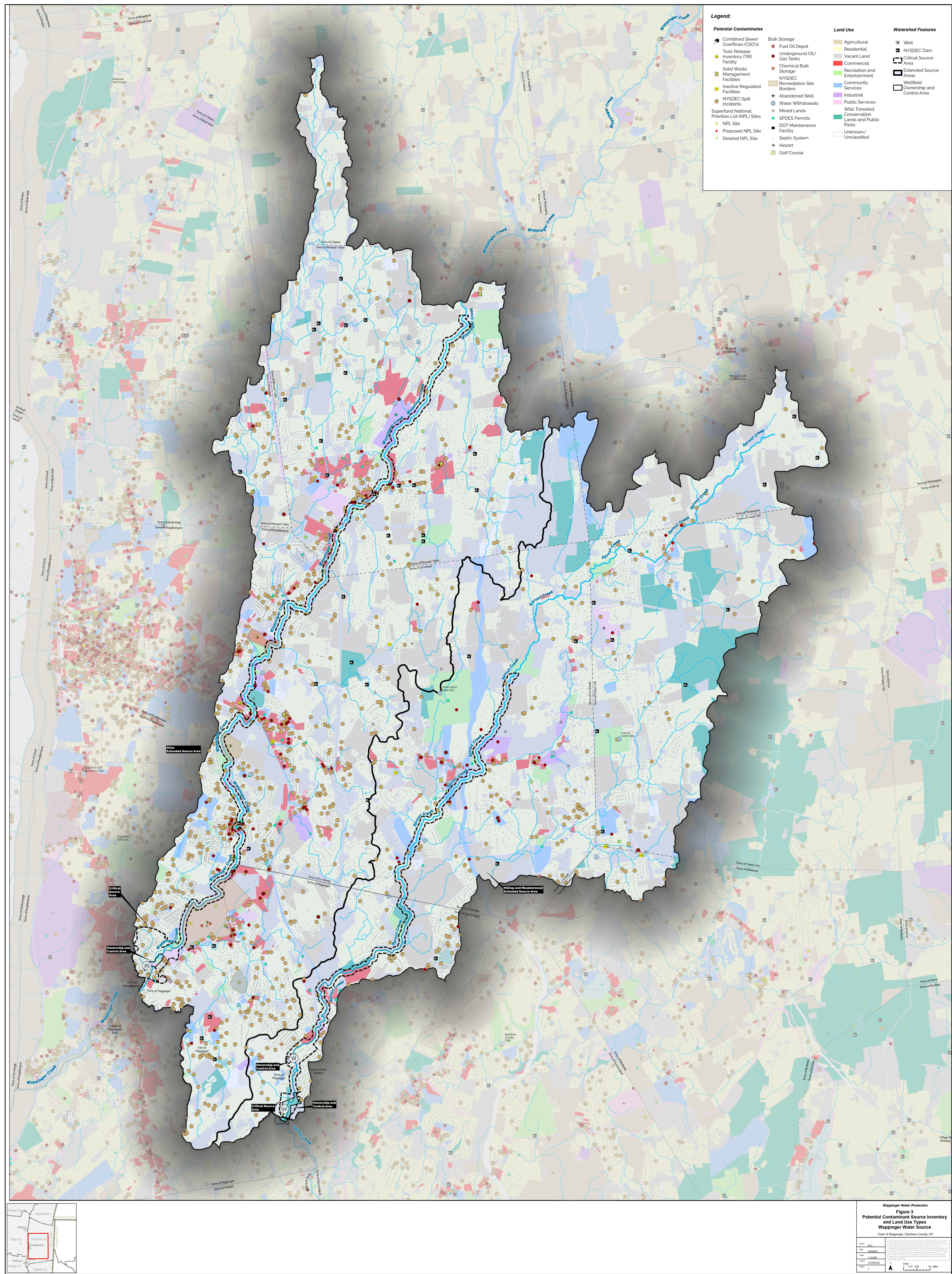
Table 4.1b - Plan Management Summary	
Item	Status
Designate a Plan Management Team	Complete
Determine progress report frequency	Complete
Months	Quarterly
Share progress reports	Complete
Review and share the plan	Complete
Verification from NYS DOH and DEC for completeness	Complete
Create a revision schedule	Complete

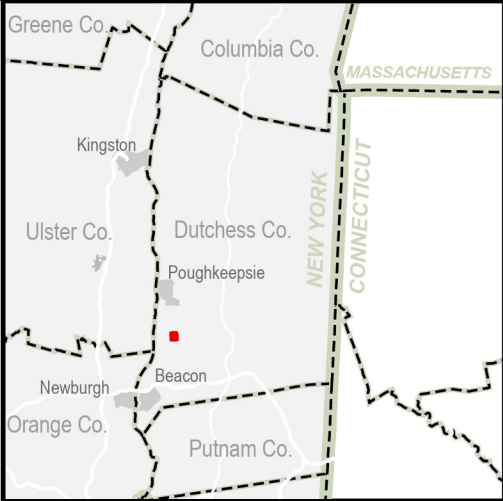
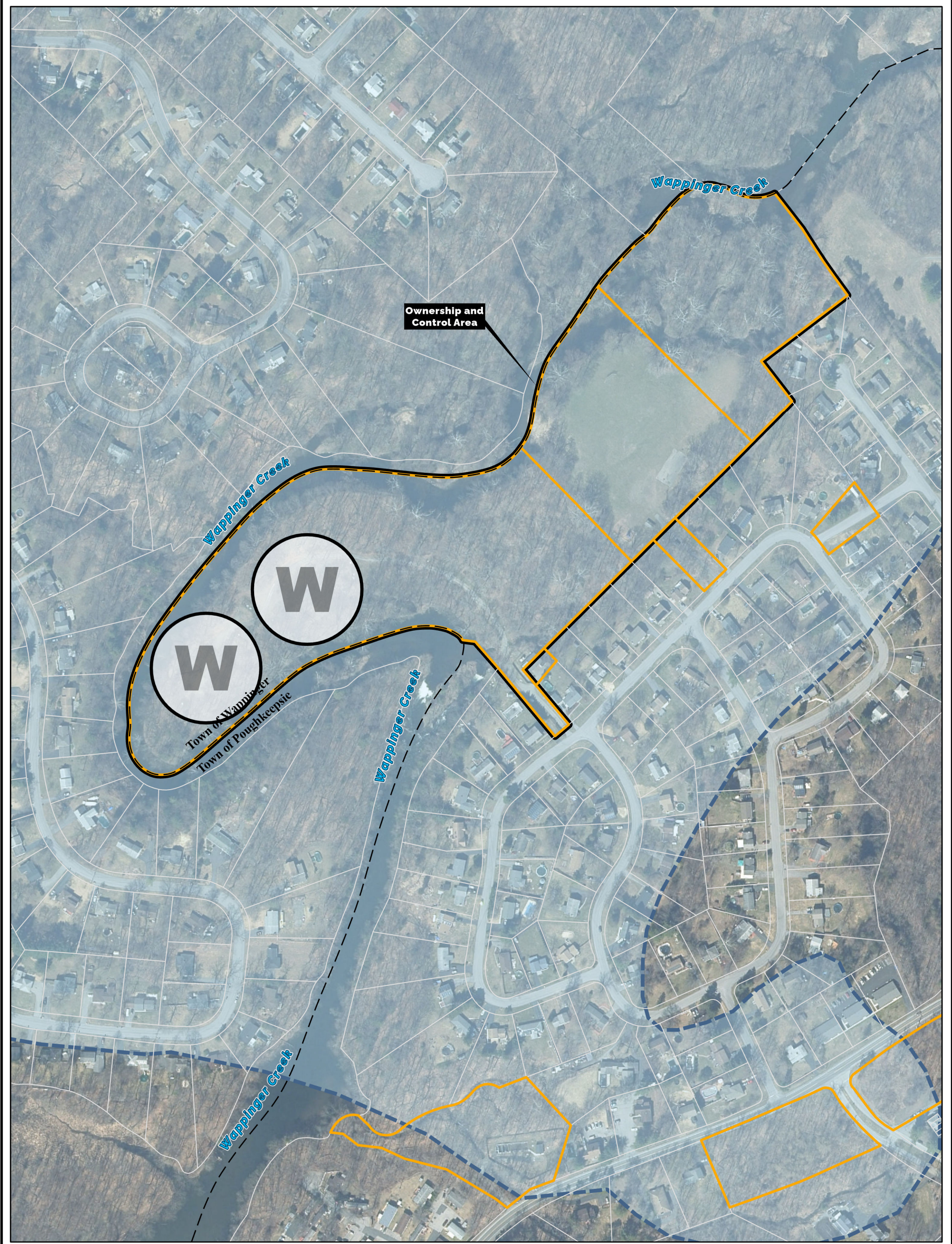
Town of Wappinger
Drinking Water Source Protection Program (DWSP2) Plan
System Name: United Wappinger Water District
PWS Number: NY1330660

APPENDIX 2: Maps

1.Overview Map.....	2.1
2.Potential Contaminant Source Map.....	2.2
3.Land Use Map.....	2.3
4a.Ownership Map - Atlas Wellfield.....	2.4
4b.Ownership Map - Hilltop Wellfield.....	2.5
4c.Ownership Map - Meadowwood Wellfield.....	2.6







Legend:

	NYSDEC Dam		Well
	County Boundary		Critical Source Area
	City Boundary		Ownership and Control Area
	Village Boundary		Parcel Boundary
	Town Boundary		Town Owned
			Private Owned

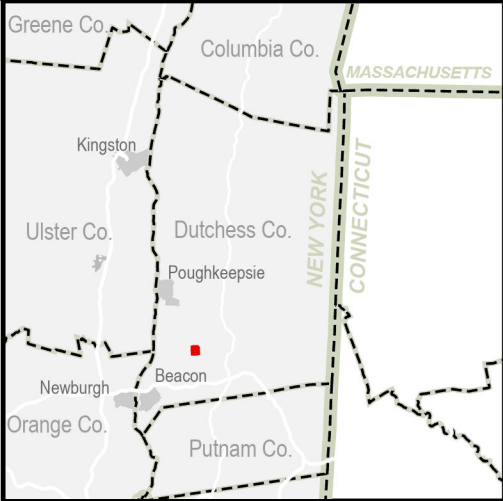
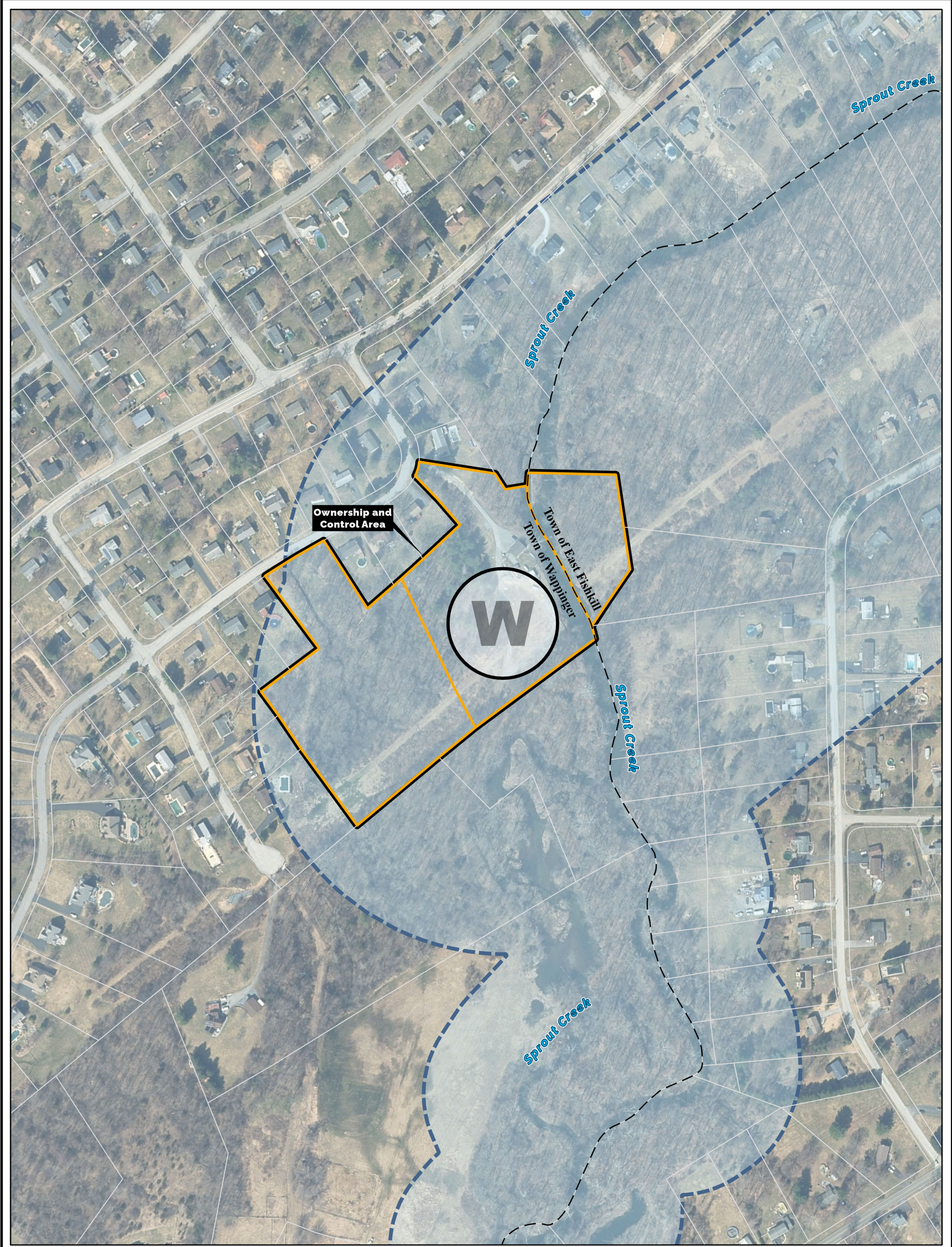
Wappinger Water Protection

Figure 4a

Ownership Map: Atlas Wellfield

Dutchess County, Town of Wappinger

Drawn:	RLS	<p>Source: Esri 2018; NYS Office of Information Technology Services GIS Program Office (GPO), 2020; LaBella 2022 Service Layer Credits: World Imagery: New York State, Maxar, Microsoft</p> <p>N Scale: 0 50 100 200 300 400 Feet</p>
Date:	9/9/2022	
Scale:	1:3,000	
Project:	2210765.02	
Figure:		



Legend:

	NYSDEC Dam		Well
	County Boundary		Critical Source Area
	City Boundary		Ownership and Control Area
	Village Boundary		Parcel Boundary
	Town Boundary		Town Owned
			Private Owned

Wappinger Water Protection

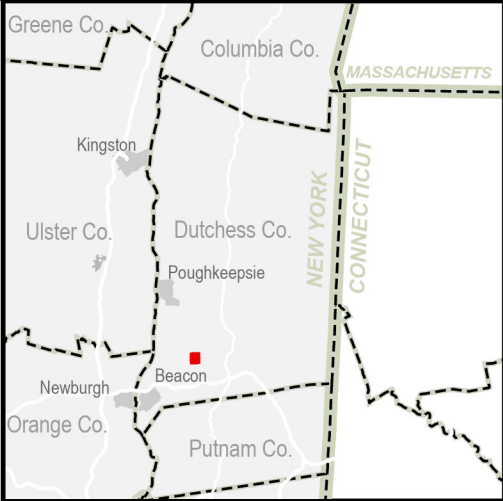
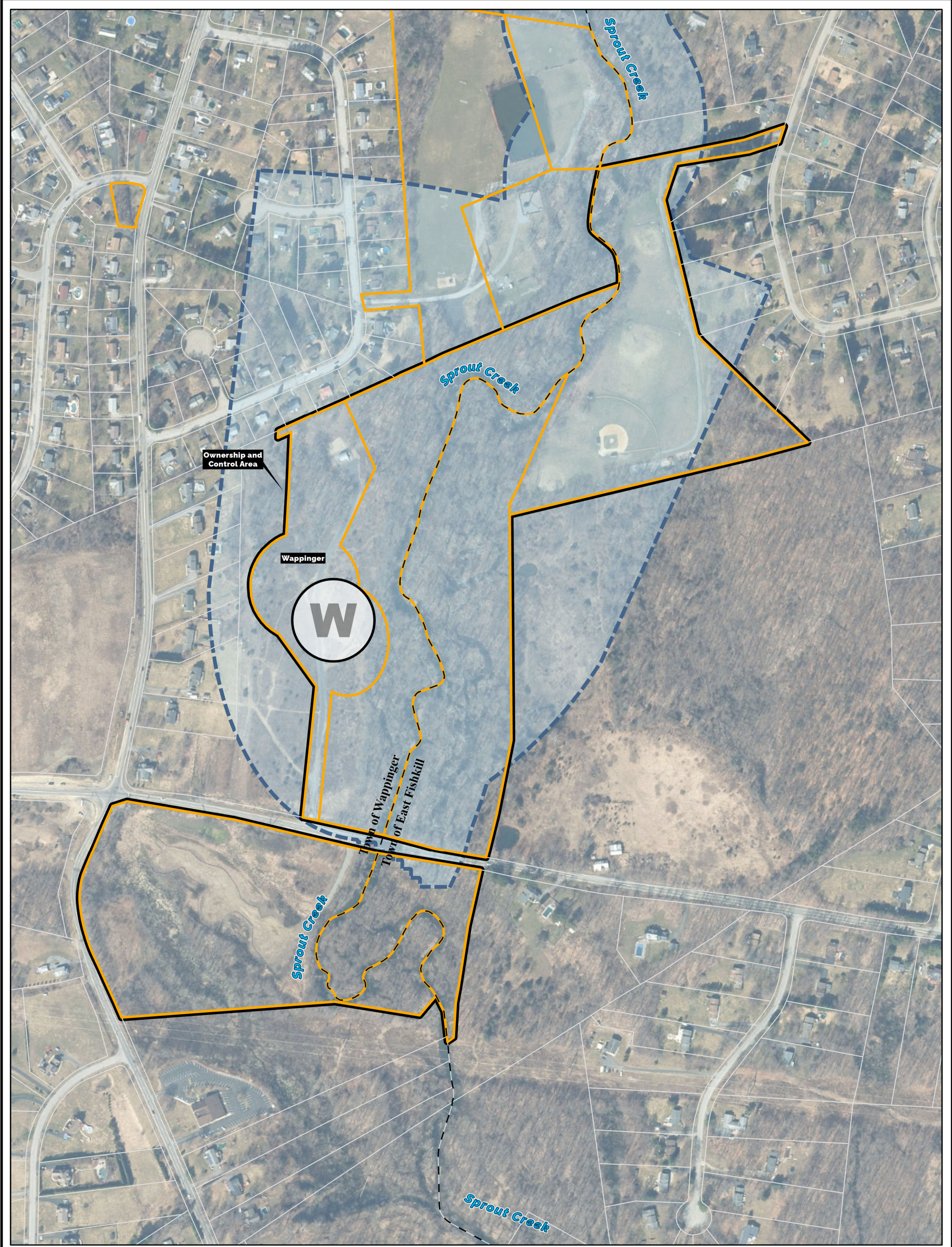
Figure 4b

Ownership Map: Hilltop Wellfield

Dutchess County, Town of Wappinger

Drawn:	RLS	
Date:	9/9/2022	
Scale:	1:3,000	
Project:	2210765.02	
Figure:		

Source: Esri 2018; NYS Office of Information Technology Services
GIS Program Office (GPO), 2020; LaBella 2022
Service Layer Credits: World Imagery: New York State, Maxar, Microsoft



Legend:

	NYSDEC Dam		Well
	County Boundary		Critical Source Area
	City Boundary		Ownership and Control Area
	Village Boundary		Parcel Boundary
	Town Boundary		Town Owned
			Private Owned

Wappinger Water Protection

Figure 4c

Ownership Map: Meadowwood Wellfield

Dutchess County, Town of Wappinger

Drawn:	RLS	
Date:	9/9/2022	
Scale:	1:4,000	
Project:	2210765.02	
Figure:		

Source: Esri 2018; NYS Office of Information Technology Services
GIS Program Office (GPO), 2020; LaBella 2022
Service Layer Credits: World Imagery: New York State, Maxar, Microsoft