



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

Veolia Water New York – Rockland

PWS ID: NY4303673

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Abbreviations

AST – Aboveground storage tank

CBS – Chemical bulk storage

CEA – Critical Environmental Area

DBP – Dibutyl phthalate

DCE – cis-1,2 dichloroethane

DWSP2 – Drinking Water Source Protection Program

ESRI – Environmental System Research Institute, Inc.

GAC – Granulated activated carbon

GIS – Geographic information system

GPM – Gallons per minute

GWUDI – Groundwater under direct influence

HAL – Lifetime Health Advisory Level

HVRC – Hudson Valley Regional Council

MGD – Million gallons per day

MS4 – Municipal separate stormwater sewer system

MCL – Maximum contaminant limit

MEK – Methyl ethyl ketone or butanone

MTBE – Methyl tert-butyl ether

NJDEP – New Jersey Department of Environmental Protection

NYSAGM – New York State Department of Agriculture and Markets

NYSDEC – New York State Department of Environmental Conservation

NYSDOH – New York State Department of Health

NYSDOS – New York State Department of State

NYSDTF – New York State Department of Taxation and Finance

PBS – Petroleum bulk storage

PCE – Tetrachloroethene or perchloroethylene

PCSI – Potential contaminant source inventory

PFAS – per- and polyfluoroalkyl substances

PFOA – Perfluorooctanoic acid

PFOS – Perfluorooctanesulfonic Acid

PSC – Public Service Commission

PWS – Public Water Supply

RCRA – Resource Conservation and Recovery Act

SMCL – Secondary maximum contaminant level

SPDES – State Pollutant Discharge Elimination System

TCA – 1,1,1 trichloroethane

TCE – Trichloroethene

TDS – Total dissolved solids

USEPA – United States Environmental Protection Agency

USGS – United States Geological Survey

UST – Underground storage tank

VOC – Volatile organic compounds

Introduction

The Drinking Water Source Protection Program (DWSP2) is a locally led, state-supported program that empowers municipalities to take action to improve and protect their public water sources and surrounding environment. The program builds off previous work, helps align priorities, and fills gaps within these municipalities' current and future source water protection efforts. It is designed to engage community stakeholders to define priority issues and potential solutions. At its core, the DWSP2 plan is an implementation plan that identifies specific issues and threats to the drinking water supply, priority actions, resources, and a timeline required for implementation. The Town of Orangetown and their partners, with the assistance of the Hudson Valley Regional Council (HVRC), worked to develop and initiate implementation of their unique Drinking Water Source Protection Program.

To help guide the development of DWSP2 plans, representatives of key state agencies, including New York State Department of Health (NYSDOH), New York State Department of Environmental Conservation (NYSDEC), New York State Department of Agriculture and Markets (NYSAGM), and New York State Department of State (NYSDOS), created a draft "Framework for Creating a Drinking Water Source Protection Program" (the "Framework"). The Framework is currently on Version 1, which was published on December 18, 2019. The following phases and key components from the Framework were used in development of this plan:

Phases and Key Components

1. Stakeholder Group

- 1.1 Form a Stakeholder Group
- 1.2 Establish Goals and Formulate a Vision

2. Drinking Water Source Assessment

- 2.1 Develop an Overview of the Water System
- 2.2 Prepare a Drinking Water Source Protection Map
- 2.3 Create a Potential Contaminant Source Inventory

3. Protection and Implementation Strategies

- 3.1 Identify Protection and Management Methods
- 3.2 Develop an Implementation Timeline

4. Progression and Maintenance

- 4.1 Designate a Program Management Team

The Orangetown DWSP2 Plan (the "Plan") was prepared by the HVRC for the Town of Orangetown, in collaboration with a local stakeholder group, which includes representatives from:

- Town of Orangetown
 - Supervisor's Office
 - Building, Zoning, Planning, Administration and Enforcement
 - Environmental Management and Engineering
 - Highway Department
- Veolia Water New York ("Veolia")
- Rockland County Task Force on Water Resources Management

- Rockland County Department of Health
- Rockland County Department of Planning
- Town of Clarkstown
- Village of Piermont
- Orangetown Environmental Committee
- Lamont-Doherty Earth Observatory,
- Sustainable Piermont
- Sparkill Creek Watershed Alliance
- Riverkeeper
- Cornell Cooperative Extension Rockland County

The stakeholders were able to provide knowledge of current conditions of the water supply and emerging concerns. In developing their Plan, the stakeholder group and HVRC interpreted data, created maps, identified potential sources of contamination, developed an actionable list of source water protection methods, and researched funding and partnership opportunities.

The Plan was completed in [Month, Year]. It evaluates eight groundwater wells that are part of the Veolia New York – Rockland public water supply system and located within or near Orangetown’s boundaries. This Plan will be updated, maintained, and implemented by the communities and organizations involved. It is comprehensive and tailored to the Town’s unique needs and goals. Ultimately, this plan offers a detailed road map for the long-term protection of the Town of Orangetown’s drinking water sources.

Drinking Water Source

Veolia in Rockland County sources water from 60 supply wells, the Lake DeForest Reservoir, and three Letchworth Reservoirs, and currently provides source water for an estimated population of 334,500 residents across Rockland and Orange Counties. Including residents of the following municipalities in Rockland County:

Rockland County:

- Town of Clarkstown
- Town of Haverstraw
- Town of Orangetown
- Town of Ramapo
- Town of Stony Point
- Village of Airmont
- Village of Chestnut Ridge
- Village of Grand View-on-Hudson
- Village of Haverstraw
- Village of Hillburn
- Village of Kaser
- Village of Montebello

- Village of New Hempstead
- Village of New Square
- Village of Piermont
- Village of Pomona
- Village of Sloatsburg
- Village of Spring Valley
- Village of Upper Nyack
- Village of Wesley Hills
- Village of West Haverstraw

Orange County:

- Town of Tuxedo
- Town of Warwick

This Plan will direct and inform sustainable future decisions on drinking water protection so that the approximately 48,000 residents of Orangetown shall continue to receive reliable, high quality drinking water that meets public health and environmental standards and guidelines. Of Veolia's 60 supply wells, there are eight located within or near Orangetown's boundaries. These groundwater wells draw from the Newark basin aquifer, which is a fractured sedimentary bedrock aquifer. The Plan will focus on those eight groundwater wells because Orangetown can effectively implement the Plan's management and protection methods within its jurisdiction. The following wells are discussed in detail:

- Sparkill 8
- Sparkill 11
- Nanuet 13
- Nanuet 14
- Blauvelt 15
- Tappan 16
- Tappan 20
- Pearl River 22

Drinking Water Source History

In the late 1800s and early 1900s, Rockland County consisted of mostly rural and agricultural lands. Domestic water supplies were individually sourced from springs, dug wells, or shallow bedrock wells. Some villages, such as Hillburn, Nyack, Spring Valley, and Suffern, were supplied by privately owned production wells (Heisig 2010). Orangetown's water supply initially began in the mid- to late 1800s as two separate water supply companies. The Hackensack Water Company and the Spring Valley Water Works and Supply Company.

The Hackensack Water Company was founded in 1869 to supply water to the Village of Hackensack, New Jersey and later expanded to serve all of Bergen County in New Jersey. The Spring Valley Water Works and Supply Company was incorporated in 1893 under the Transportation Corporations Law for the purpose of supplying water in the Village of Spring Valley, New York.

In 1900, the Spring Valley Water Works and Supply Company was acquired by the Hackensack Water Company. Spring Valley Water Works and Supply Company continued operating under the same name in Rockland County, but was now a wholly owned subsidiary of the Hackensack Water Company. This merger gave the Hackensack Water Company control over much of the Hackensack River watershed.

By 1951, the Spring Valley Water Works and Supply Company's system was sourced from 14 wells. The principal well field was located in the Village of Spring Valley and consisted of six wells. Two additional wells were located in the Town of Clarkstown (Hamlet of Nanuet), five additional wells in the Town of Orangetown (one in the Hamlet of Blauvelt, another well in the Hamlet of Tappan, three more wells in the Hamlet of Sparkill), and one additional well in the Village of New Hempstead (WSA No. 2189).

Suburban development in Rockland County began after World War II, and the population of the county began to grow rapidly (Heisig 2010). Spring Valley Water Works and Supply Company submitted Water Supply Application No. 2189 to the Water Power and Control Commission on September 26, 1951, for the acquisition of land and the construction of a dam for an impounding reservoir in Rockland County (WSA No. 2189). After the decision on the application was made in

1952, construction began on Lake DeForest Reservoir and it was completed in 1956, with diversions for water did not begin until 1965 (Heisig 2010). The original Lake DeForest Treatment plant was constructed in the 1960s (Rockland County Business Journal, 2021). In 1967, Lake Tappan Reservoir was completed, flooding parts of Orangetown, to supply water to Bergen County in New Jersey.

As the population grew from the 1950s to the 1970s, new housing developments began to be supplied by new public supplies. These supplies included new deep bedrock aquifer production wells and unconsolidated sediment (sand and gravel) aquifer well fields in the Mahwah River (1961) and Ramapo River (1979) valleys. A mid-1960s drought spurred the exploration for additional water supply from the bedrock aquifer, leading to the greatest increase in new production wells in Rockland County in the late 1960s to mid-1970s (Heisig 2010).

The Ramapo well field was developed in the 1970s, with the last well coming online in 1981. Potake Pond reservoir was constructed in 1993 to supplement flow of water in the Ramapo River when flow would otherwise be too low for the well field to operate.

The Hackensack Water Company reorganized as United Water Resources, Inc. in New Jersey on February 25, 1983. Despite the change, Spring Valley Water Works and Supply Company continued to operate under the same name in New York until 1995 when it adopted its name change to United Water New York, Inc. ("UWNY") (Public Service Commission). In 2000, Suez North America, Inc. acquired United Water Resources, Inc., but, once again, UWNY continued to operate under the same name until 2015 when it changed its name to SUEZ Water New York.

In 2006, a long-term lease was established between UWNY and the Palisades Interstate Park Commission for the use of the Letchworth Reservoirs. These reservoirs originally supplied water to the former state psychiatric institution at Letchworth Village in the Town of Haverstraw.

Lastly, between 2021 and 2022, Veolia Environment S.A. acquired SUEZ S.A. and SUEZ Water New York. Veolia Water New York, Inc. (Veolia) became the water supplier of Rockland County (Public Service Commission).

Previous Studies

Below is a list of previous studies in Orangetown and Rockland County:

- **Water Shortages, Development, and Drought in Rockland County, New York, Journal of the American Water Resources Association, Bradfield Lyon, Nicholas Christie-Blick, and Yekaterina Gluzberg, December 2005**

This article presents examples on how development, a lack of adequate planning, and climate variability have produced three water emergencies in Rockland County between 1995 and 2002. These emergencies highlight the increasing supply and demand problem in Rockland County over the past 30 years. While climate variability is a factor in these water emergencies, the article emphasizes that planning to meet current and future demands on the water system should also consider the vulnerability of the supply system. The three Stage III drought emergencies discussed in this article occurred in 1995, 1999, and 2002,

with 2002 being the most severe of the three. The article concludes that rapid, continued development poses a threat to water supply in Rockland County, however, since development is controlled by the municipalities and the water supply is overseen on a county level, a realistic solution will require cooperation of local, county, state, and federal authorities.

- **Water Resources of Rockland County, New York, 2005-07, with Emphasis on the Newark Basin Bedrock Aquifer, Scientific Investigations Report 2010-5245, Paul M. Heisig, 2010**

Concerns over the state of water resources in Rockland County prompted an assessment of current conditions. This 5-year study was undertaken by the USGS in cooperation with Rockland County and the NYSDEC. The investigation reviewed all water resources, but focused on the Newark basin aquifer because of high summer pumping rates, annual withdrawals have approached or exceeded previous estimates of aquifer recharge, and contamination problems that have caused shutdowns of production wells. This report creates a regional conceptual model of the aquifer framework. The framework includes a characterization of the bedrock structure and fracture occurrence, the texture and thickness of overlying unconsolidated deposits, the presence of the Palisades sill and associated basaltic units, and the streams that drain the aquifer system. The study also reviewed pumping-rate and water-level data and estimated recharge to generate water budgets for Rockland County.

- **Hydrogeology and Simulation of Groundwater Flow in Fractured Rock in the Newark Basin, Rockland County, New York, Scientific Investigations Report 2010-5250, Richard M. Yager and Nicholas M. Ratcliffe, 2010**

This report describes the hydrogeology of the Newark basin aquifer and the development and application of groundwater flow models through the aquifer in Rockland County. It was developed as part of a 5-year study of the Newark basin by the USGS in cooperation with Rockland County and the NYSDEC due to concerns regarding the sustainability and water quality in the aquifer. It discusses the bedrock geology in the region and how that affects groundwater flow through the aquifer. Three-dimensional flow models were designed and calibrated to simulate the pattern and rate of groundwater flow and to estimate the hydraulic properties of the aquifer. The models were used to simulate groundwater age, delineate the capture zones of well fields, and changes in groundwater levels in response to recharge and withdrawals.

- **Rockland Tomorrow: Rockland County Comprehensive Plan, March 1, 2011**

The Comprehensive Plan provides an overview of existing conditions and major trends in Rockland County. It is a tool to guide future municipal planning and zoning actions, the management of Rockland's development and preservation patterns, and the provision of public services over the following decade. The Plan seeks to preserve what residents love, while addressing the challenges facing the county. This includes provision of affordable housing, job retention and creation, traffic congestion, preservation of natural and scenic

landscapes, provision of adequate infrastructure, and preservation of open space and other environmental resources.

- **Haverstraw Water Supply Project Water Supply Permit Application, AKRF, Inc., December 2011**

This application was prepared by AKRF Environmental and Planning Consultants and CDM Smith for United Water New York, Inc. and was submitted to the NYS DEC in December 2011. The application is for a Water Supply Permit for the Haverstraw Water Supply Project. The application includes the water supply permit application, the water conservation program form, and project justification, including description, purpose, water treatment process, and need. It also includes information on the general service area and project location.

- **Report on the Feasibility of Incremental Water Supply Projects and Conservation Opportunities in Rockland County, CDM Smith & AKRF, Inc., June 2015**

The New York State Public Service Commission's (PSC) Order Addressing Status of Need and Directing Further Study was issued on November 17, 2014 (2014 Order). It directed UWNYS to report on conservation and supply opportunities in Rockland's water supply system. This report is in direct response to the 2014 Order. The report concludes that if the activities identified in the report are pursued, supply and demand will remain balanced for the following 10 years.

Water supply projects considered in the report include the feasibility of additional groundwater resources, potential interconnections with other water suppliers, possible redistribution of water from the Ramapo River, and potential wastewater reuse. If implemented, supply could increase by 1 to 3 MGD over the 10 years.

Water conservation and recovery strategies consider water audit programs, rebate programs for installation of water-saving devices, partnering with municipalities to implement water restriction regulations and ordinances, continuing leak detection and repair programs, and dividing the four largest pressure districts into smaller zones so leaks are easier to detect. There is potential to reduce consumption by as much as 1 MGD over the 10 years through the conservation programs and another 1 MGD through aggressive programs to reduce non-revenue water.

- **Water Losses and Customer Water Use in the United Water System, Amy Vickers & Associates, Inc., Amy Vickers, July 2015**

This report was prepared for the Rockland County Task Force on Water Resources Management. It presents findings from a study of system water losses and customer water use in the UWNYS drinking water supply system. The study discusses system water losses and customer water use in the UWNYS service area. It identifies preliminary estimates of the potential long-term water savings from improvements to UWNYS's water loss control and customer conservation programs.

Key findings and conclusions include:

- Water demand in UWNY's service area has been largely flat since 2000 despite a growing service area population. This trend is projected to continue.
 - There is an estimated 2.5 to 3.3 MGD of potentially recoverable leakage in the UWNY system.
 - There is a preliminary estimate of 1.9 to 3.6 MGD of potential water demand reductions from customer-oriented conservation measures in the system.
 - A preliminary estimate combined total of 4.4 to 7.0 MGD of potentially recoverable system leakage and customer waters savings from conservation is currently available.
 - In addition to water conservation, water reuse technologies, rainwater harvesting, and green infrastructure options offer the county new opportunities to drive down UWNY's water demands while increasing supply independence.
 - Given potential water savings identified, the need for additional water supply capacity seems unnecessary at this time
 - Updated and more aggressive system water loss reduction and customer water conservation standards and requirements are needed in NYS to minimize system leakage and customer water waste.
- **Independent Review, Review of July 2015 Report Entitled "Water Losses and Customer Water Use in the United Water New York System," Amy Vickers & Associates, Inc., Ove Arup & Partners P.C., August 4, 2015**

Arup was retained by UWNY to provide a technical peer review of the July 2015 report prepared by Amy Vickers & Associates. Arup evaluated the report in terms of the 2014 Order from the PSC. The report states that the analysis performed by Amy Vickers & Associates primarily focused on data analysis, analysis of non-revenue water and allocation of apparent and real losses, water use and consumption, and potential conservation measures. It provided a rebuttal to some of the key findings in the Amy Vickers & Associates report.

- **Wastewater Reuse Studies for Rockland County Sewer District No.1, GHD Consulting Services Inc., 2016**

The 2002 Water Reuse Study was updated by GHD Consulting Services Inc. on Task Force recommendation for the Rockland County Sewer District No. 1 (SD#1). The study was updated by modifying Alternative No. 2 (Section 7.2) based on various improvements since the last report was drafted. Updates include choice of two discharge locations with two flow conditions to provide four alternatives that would convey 2 or 5 MGD of high-quality effluent water from the Orangeburg WWTP to the Hackensack River Basin, discharging into either Lake DeForest or Lake Tappan, depending on the chosen alternative. Cost estimates of planning, construction and annual operation for each alternative are included in the report. Currently, the Orangeburg Wastewater Treatment Plant allows for treatment of effluent flow up to 28.9 MGD on a 12-month rolling average in accordance with the current SPDES permit.

- **Drought Simulations using the Newark Basin Ground Water Model, CDM Smith, March 22, 2016**

Groundwater model simulations have been conducted to evaluate the change in head and stream baseflow within the Newark Basin associated with two drought scenarios. (1) A short-term simulation representing a three-year period between 2000 – 2003 using monthly time steps and incorporating monthly groundwater withdrawals and recharge. (2) A long-term simulation representing 1960 – 2006 using annual time steps of withdrawals and recharge. The objective is to determine if any of the SWNY wells would go dry during a drought. The study determined that the Viola is at greatest risk and the Catamount, Germonds, Pearl River, and Ramapo wells may also be at risk.

- **Preliminary Assessment of the Ramapo and Hackensack Watersheds in Rockland and Orange Counties, Daniel J. Van Abs, Jennifer Ryan, and Mukta Ramola, 2017**

This report and project were funded by and prepared for the County of Rockland, through a contract with Rutgers University. It provides a preliminary assessment of readily available information to identify known critical issues, key missing information, and a planning process to address these issues. This can act as a foundation for the development of a comprehensive watershed assessment and management plans in the Ramapo and Hackensack Watersheds, as recommended by this assessment. Primary findings of this assessment include:

- A major issue of the Ramapo River watershed is ongoing stresses regarding water quality and quantity in the Ramapo and Mahwah River valley aquifers.
- The Ramapo River watershed is subject to extensive development pressures in both Rockland and Orange Counties, stressing both supply and quality.
- The Hackensack River watershed is highly developed and existing land uses have increased water pollution levels.
- Both watersheds are subject to minimum flow requirements at the New Jersey border.
- The state is responsible for regulating utilities and wastewater treatment. It is also responsible for determining how water quality can be improved to meet standards. The counties may advise and comment, but the rest is up to the state.
- There is no evidence that that the combination of state, county, and municipal land use regulations are sufficient to ensure not further harm to water resources.
- There is clear evidence that existing land uses are harming water resources.
- There are trends towards more intensive storms, which place more stress on stormwater management systems and exasperate water quality impacts.
- Water demands have not increased despite rising population, and, in fact, have decreased. However, there are questions on how future population increases and aging population will affect this demand.
- Water supply, sewer, and stormwater pipelines will need to be rehabilitated, replaced, or upgraded over the next twenty years.

- **Comprehensive Water Conservation Plan, Rockland County, Rockland County Task Force on Water Resources Management and Jacobs Civil Consultants, Inc., March 3, 2020**

This Comprehensive Water Conservation and Implementation Plan was developed by Jacobs Civil Consultants through stakeholder engagement and was refined and finalized with input from the Rockland County Planning Department and Task Force on Water Resources Management. The Plan presents an implementable and cost-effective approach to water conservation for Rockland County by quantifying the total sustainable water supply for the County to forecast future periods of water depletion based on population growth and climate trends. The Plan provides 20 strategies to reduce overall and peak demands through water conservation so that current supplies and infrastructure can meet future water demands.

- **Resilient NY Studies**

The following reports were prepared by SLR for New York State Department of Environmental Conservation, in cooperation with the New York State Office of General Services:

- Flood Mitigation & Resilience Report Mahwah River, November 2021
- Flood Mitigation & Resilience Report Sparkill Creek, January 2022
- Flood Mitigation & Resilience Report Hackensack River, February 2022
- Flood Mitigation & Resilience Report Minisceongo Creek, April 2022
- Flood Mitigation & Resilience Report Saddle River Watershed, June 2022
- Flood Mitigation & Resilience Report Ramapo River, May 2023

The Resilient NY program was established by the NYS DEC to make NYS communities more resilient to future flooding and better adapted to extreme weather events. The studies developed under this program provide an assessment to reduce flooding and build resilience in high-risk and flood-prone watersheds. Each plan identifies projects that will mitigate the effects of existing and future flooding in each of the above watersheds in Rockland County.

- **Orangetown Comprehensive Plan, Town of Orangetown, AKRF, MUD, September 2023**

The Town of Orangetown 2023 Comprehensive Plan was written to update the 2003 Comprehensive Plan with funding in part from the Climate Smart Communities Grant Program. The initial process began in 2020, and it was produced with the input of elected officials, town staff, community leaders, business owners, and residents. The plan established a vision, goals, and recommendations, based on local priorities, to act as a guiding framework for future sustainable development, economic growth, and natural resource preservation. Six main categories were discussed in the plan:

- Current and Future Land Use, Zoning and Design,
- Community Character and Historic Resources,
- Transportation, Mobility, and Parking,
- Economic Development and Downtown Revitalization,

- Open Space and Recreation, and,
 - Sustainability and Climate Resiliency
- **Sparkill Creek Watershed Characterization Report, Hudson River Watershed Alliance, September 2024**

A watershed characterization report uses existing information to describe a watershed and outline issues that affect water and people. The Sparkill Creek Watershed Advisory Committee worked with the Hudson River Watershed Alliance to develop the Sparkill Creek Watershed Characterization Report. The report summarizes the watershed's geography and physical conditions, compiles existing data on watershed lands, waters, and people, and identifies trends in natural and human-made features.

- **Multi-Jurisdictional Hazard Mitigation Plan, Rockland County, New York, Tetra Tech, October 2024**

Rockland County developed and adopted its Hazard Mitigation Plan in 2010 and updated it in 2018 and 2024 in accordance with the Disaster Mitigation Act of 2000. This plan is the 2024 update which reassesses the risks and updates local strategies to manage and mitigate those risks. It inventories and assesses municipal capacity to implement their community missions, programs, and policies related to hazard mitigation. All municipalities in the county participated in this update process. The plan identified 11 hazards of concern for further evaluation in the county:

- Dam Failure
- Disease Outbreak
- Drought
- Earthquake
- Extreme Temperature
- Landslide
- Severe Storm
- Severe Winter Storm
- Wildfire
- Flood (riverine, ice jam, flash flood)

1 Foundation and Formation

Orangetown is the southernmost town in Rockland County, bordered to the east by the Hudson River, to the south by New Jersey, to the west by the Town of Ramapo, and to the north by the Town of Clarkstown. The Villages of Nyack, Grand View-on-Hudson, and Piermont and the Hamlets of Blauvelt, Orangeburg, Palisades, Pearl River, South Nyack, Sparkill, Tappan, and Upper Grandview are located within Orangetown. The Town has approximately 48,000 residents and encompasses a total area of 31.4 square miles (Rockland County Hazard Mitigation Plan, 2024).

The Hackensack River and the Sparkill Creek are the two major watersheds that pass through the Town. The Hudson River watershed encompasses a small portion of the Town's eastern boundary. Water supply in Orangetown is mainly sourced from the Newark basin aquifer. Lake Tappan, which bisects Orangetown along the Hackensack River and crosses the southern border with New Jersey, provides drinking water to New Jersey and is privately owned by Veolia.

Through this lens, existing conditions were reviewed, and stakeholders were selected to participate in the DWSP2 process. This was a key initial step in defining the goals and vision for Orangetown's Plan. The goals form the basis for the assessment and identified management methods.

1.1 Drinking Water Source Information & Geological Setting

This Plan focuses on Orangetown and the groundwater supply wells within or near Orangetown's borders. However, since Veolia's system sources and distributes water from a broader area throughout Rockland County, this first Chapter will discuss water resources on a countywide scale for context before narrowing down to Orangetown for more robust analysis.

1.1.1 Geology & Hydrogeology of Rockland County

1.1.1.1 *Geologic Overview*

Rockland County is geologically separated into two parts, the highlands and the lowlands, by the Ramapo and Thiells faults. The Ramapo and Thiells faults are normal faults, which caused the lowlands side of the fault to dip downwards. The highlands consist of crystalline bedrock primarily composed of gneisses and granitic rocks that are resistant to erosion, and the lowlands consist of sedimentary bedrock that generally coarsens and thickens westward. The lowlands are the northernmost extent of the Newark basin. Volcanism during basin formation resulted in the intrusion of igneous rock in the sedimentary bedrock. These units are more resistant to erosion and form the Palisades sill along the Hudson River on the eastern boundary of the county. Figure 1.1.1-1 shows the location of the highlands and lowlands in Rockland County, the Ramapo and Thiells faults, and the general bedrock type and location (Heisig, 2010).

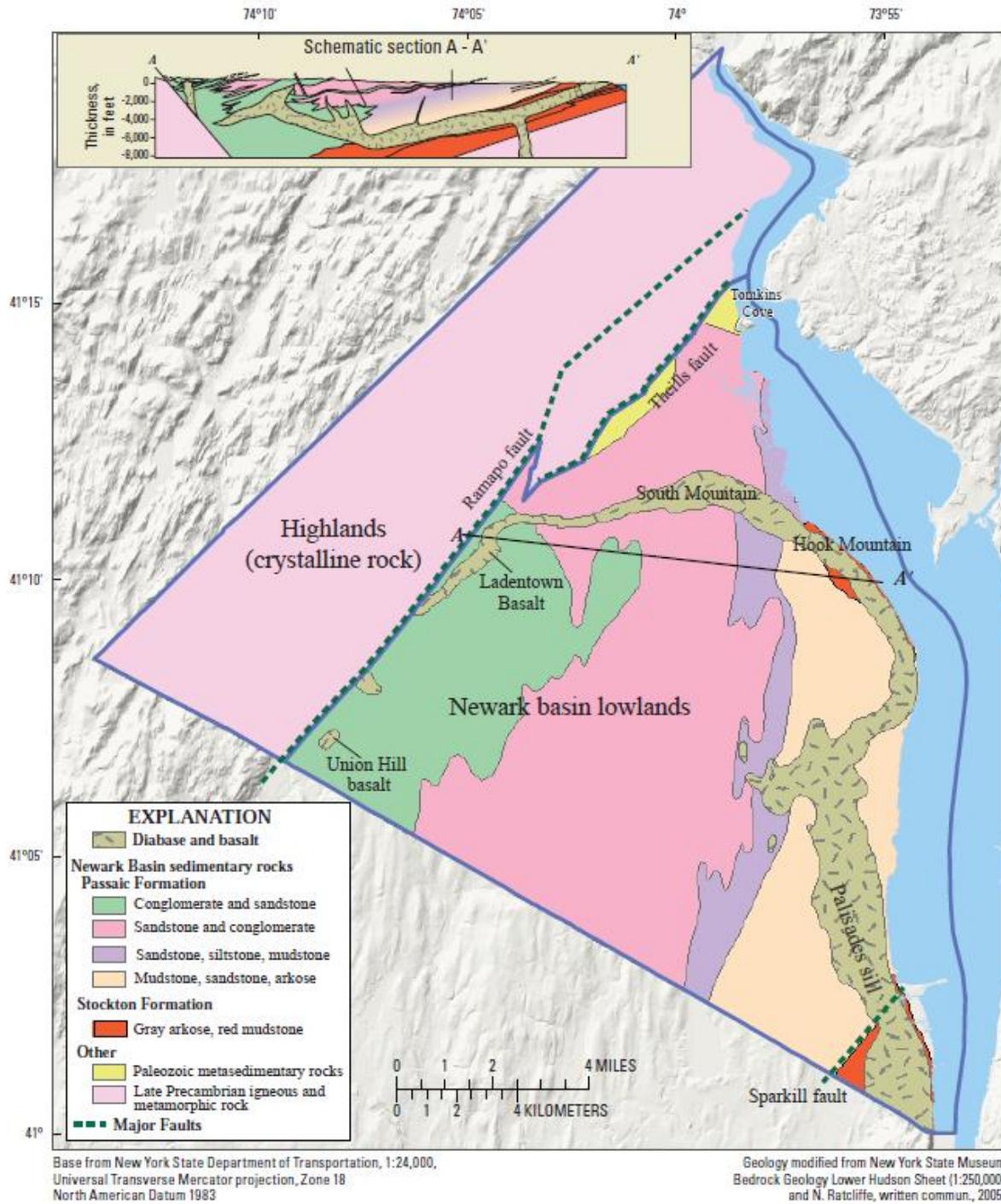


Figure 1.1.1-1: Generalized bedrock geologic map with schematic section, Rockland County, New York. Source: Heisig 2010, Figure 6.

1.1.1.2 Unconsolidated Sediment Aquifers

In the lowlands, unconsolidated sediment, predominately deposited by glaciers, overlays the bedrock with thin, recent alluvium deposits in river valleys. Glacial till, an unsorted mixture of sediments deposited by glacial ice, is widespread throughout the County. Stratified glacial sediments, deposited by glacial melt water or in glacial lake environments, are limited to major river valleys such as the Ramapo, Mahwah, and Hackensack Rivers and Minisceongo and lower Sparkill Creeks. Coarse-grained (sand and gravel) stratified deposits largely make up the Ramapo and Mahwah River valleys and the lower reach of the Sparkill Creek. Fine-grained (clay, silt, and fine sand) stratified lacustrine (lake deposited) deposits overlie coarse grained deposits in the north-south branch of the Hackensack River and the South Branch of the Minisceongo Creek valley (Heisig, 2010).

This overlying geology affects the amount of water available. Coarse-grained glacial deposits form the best aquifer material for storing and transmitting water. In Rockland County, these deposits are more widespread in the Ramapo River Valley. They are also present in the Mahwah River and the Sparkill Creek valleys, but in a more limited area. These aquifers derive their water by inducing flow from the rivers. Glacial till is not generally considered an aquifer on its own, but it can act as a conduit for groundwater recharge and water flow from the streams to the bedrock, particularly in stream valleys. Bedrock wells in areas of thin till are more responsive to precipitation than bedrock wells in areas of thick till (Heisig, 2010).

1.1.1.3 Bedrock Aquifers

The Newark basin aquifer is fractured sedimentary bedrock in the lowland area that provides water throughout the County. This rock consists of a combination of conglomerate, sandstone, siltstone, and mudstone. The bedrock dips approximately 10 degrees to the northwest due to the nature of the normal faults. Groundwater flows along bedding strike (northeast or southeast), which is perpendicular to the dip, and within bedding-plane partings or fractures. The eastern area of the aquifer, which includes Orangetown, is characterized by lower yields. A challenge of the aquifer is preventing the loss of existing resources from groundwater contamination. There are widespread suburban development and many areas of thin soil over the aquifer, which make it highly susceptible to contamination (Heisig, 2010).

The Palisades sill has limited water bearing properties and typically only provides water for domestic use. Where the Palisades sill overlies the Newark basin aquifer, it likely prevents direct recharge to the underlying bedrock. The steep slopes of the sill drains any water down the hillslopes. Groundwater that reaches the base of the hillslopes likely drains into glacial deposits and discharges into the Hackensack River, Sparkill Creek, Minisceongo Creek, or their tributaries (Heisig, 2010).

The alluvial aquifers in the Ramapo and Mahwah River valleys and the coarse-grained part of the Newark basin sedimentary bedrock in the western half of the lowlands support the most productive supply wells in the County (Heisig, 2010).

1.1.1.4 Orangetown

The Town of Orangetown has steep slopes to the east, which are part of the Palisades sill, that taper out to more gentle plains and hills towards the west. The highest point in the Town is at 675 feet

located in the Palisades sill, and the lowest point is at sea level along the Hudson River. Steep slopes are vulnerable to erosion, landslides, and subsidence, which can endanger communities, water quality, and infrastructure. Because of this, Orangetown has designated some of the areas of the steep slopes as Critical Environmental Areas (CEAs), or areas which have been designated by a local or state agency to recognize their significance. Other areas in Orangetown have been designated as a CEA for their open space and esthetic value, including:

- Upper Grandview and Environs (for exceptional or unique character)
- Portions of the former Village of South Nyack
 - Mountainous Area (for steep slopes, natural beauty, aesthetic and scenic qualities, historic, archeological, and recreational significance)
 - Hudson River Area (for aesthetic and scenic qualities, historic significance, ecological, geological and hydrological sensitivity)
- Portions of the Village of Piermont
 - Palisades Slope (for protection of open space and aesthetic beauty)
 - Sparkill Creek (for protection of open space and aesthetic beauty)
 - Piermont Pier (for protection of open space and aesthetic beauty)

1.1.1.5 Watersheds

Rockland County contains three major drainage watersheds, the Hackensack River, Hudson River, and Ramapo River. The minor watersheds of Cedar Pond Brook and Minisceongo Creek drain towards the Hudson River in the northern portion of the County and the Sparkill Creek drains towards the Hudson River in the southeastern corner of the County. The Hackensack River originates in the center of the county and drains the eastern lowlands area. The minor watershed of the Pascack Brook drains the central and south-central areas before entering the Hackensack River, and the Muddy Brook is a southern tributary. The Ramapo River drains the western portion of the County along with its tributary, the Mahwah River, which originates in Rockland County. Figure 1.1.1-2, from Heisig (2010), depicts the location of these watersheds (Heisig, 2010).

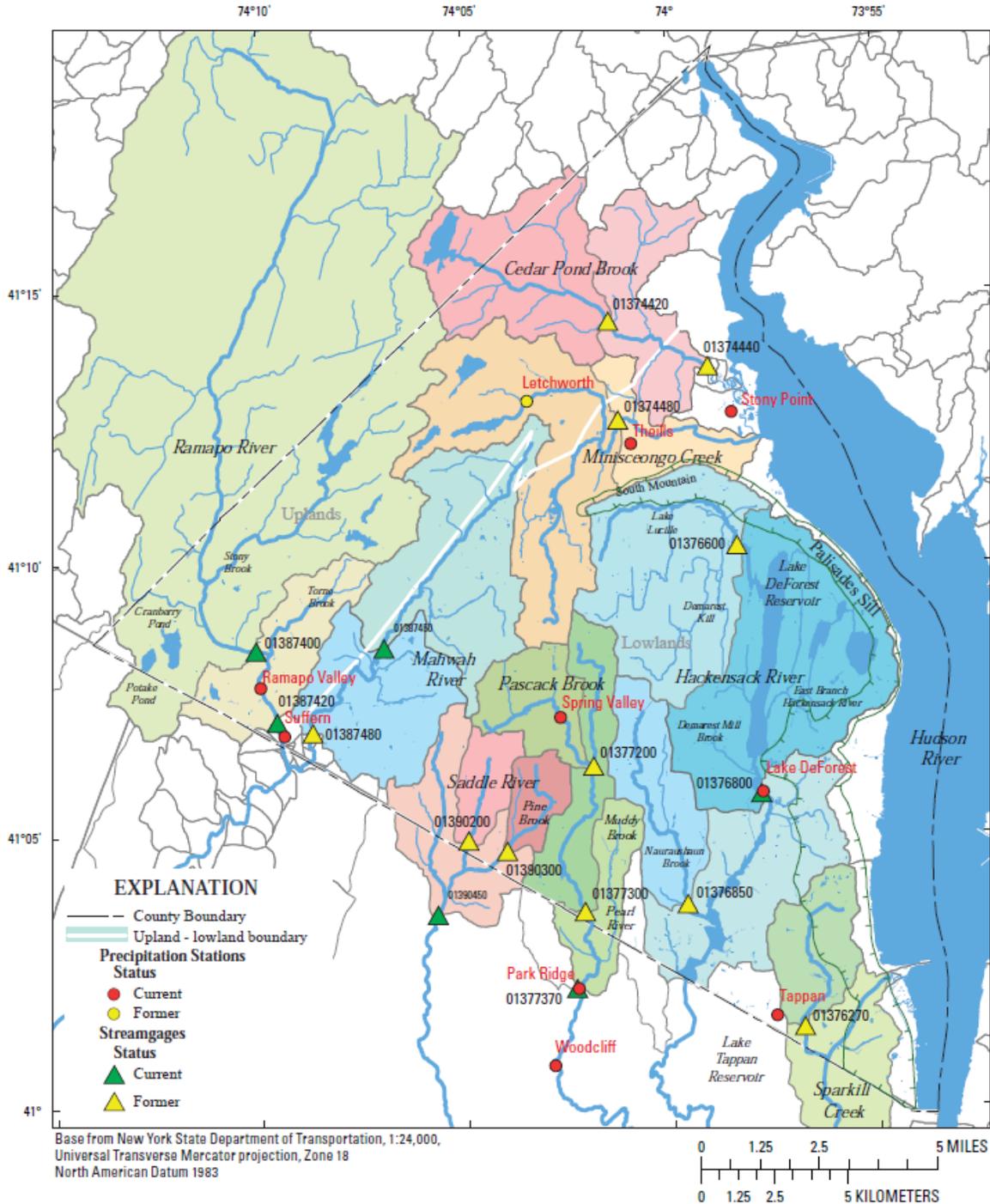


Figure 1.1.1-2: River and stream drainages in Rockland County, New York, with current and former precipitation stations and stream gages (denoted with U.S. Geological Survey site identification numbers). Source: Heisig 2010, Figure 5.

Major waterbodies in the Town of Orangetown include Lake Tappan, Hackensack River, Sparkill Creek, Nauraushaun Brook, Muddy Creek, and Pascack Brook. Orangetown also has a considerable number of wetlands, many of which are recognized by the NYSDEC and the National

Wetlands Inventory. Piermont Marsh is the largest riparian marsh in Orangetown. Wetland locations are depicted on **Figure 1.1.2-1**, sourced from Orangetown’s 2023 Comprehensive Plan (Orangetown Comprehensive Plan, 2023).

1.1.1.6 Precipitation

In 2015, SUEZ (now Veolia) began reporting monthly precipitation totals at Lake DeForest. Based on that data, an average of 48 inches of precipitation fell per year over the ten-year-period from 2014 to 2024. The monthly mean precipitation over that same period ranged from 2.83 inches to 5.56 inches, with February seeing the lowest average monthly precipitation and July seeing the highest. This is similar to the 2005 to 2007 lowlands mean annual precipitation of approximately 47 inches reported by Heisig (2010). Lower precipitation totals were reported between 2015 and 2017 when an average of 38 inches of precipitation fell at Lake DeForest per year. Yearly totals are reported in the table below.

Table 1.1.1-1: Annual Total Precipitation at Lake Deforest	
Year	Total Precipitation (inches)
2014	46.89
2015	38.42
2016	36.08
2017	39.45
2018	66.47
2019	54.48
2020	44.92
2021	48.86
2022	47.46
2023	57.37
2024	48.45

Source: UWNY, SUEZ, Veolia Annual Demand Reports

One of the most significant environmental concerns in Orangetown is flooding. It is estimated that 26.1 percent of the Town’s land area is under high flood risks (Orangetown Comprehensive Plan, 2023; Rockland County Hazard Mitigation Plan, 2018). According to the 2024 Rockland County Hazard Mitigation Plan, approximately 6.4% of Orangetown’s land, excluding waterbodies, is located in the 1-percent annual chance flood event zone, and 8.4% is located in the 0.2-percent annual chance flood event zone. This correlates with 0.5% and 2.3% of Orangetown’s population, respectively. **Figure 1.1.1-3**, from the 2024 Rockland County Hazard Mitigation Plan, shows the locations of those two annual chance flood event zones.

Flooding in Orangetown is aggravated by overwhelmed stormwater infrastructure, increasing areas of impervious surfaces, and development that predates stormwater regulations, such as on steep slopes.

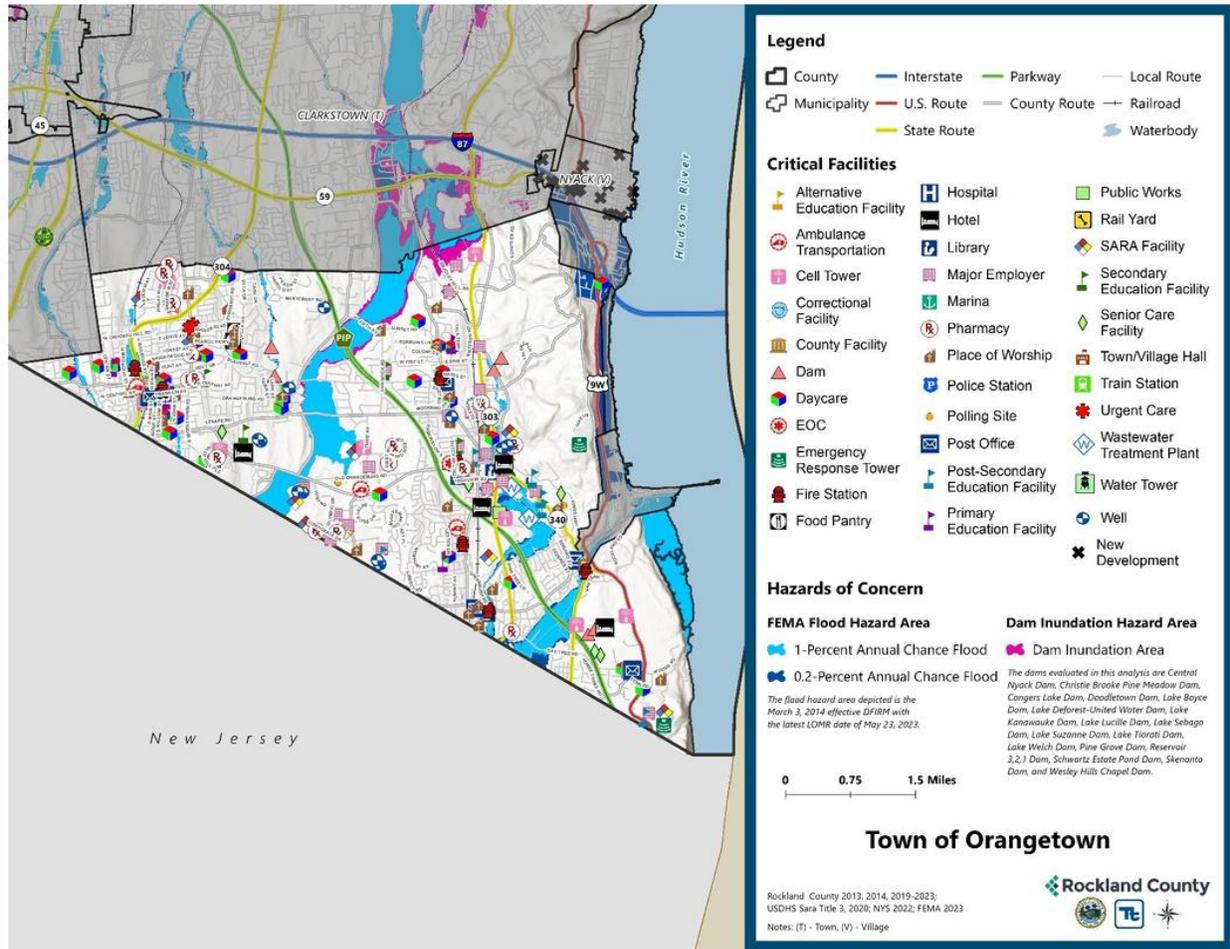


Figure 1.1.1-3: Town of Orangetown flood and dam inundation hazard area extent and location. Source: Rockland County 2024 Hazard Mitigation Plan, Figure, 9.14-1

1.1.2 Land Use in Rockland County

Land use in Rockland County was historically primarily agricultural, with localized industry and development in villages. After World War II, there were major improvements to roads and bridge networks. The New York State Thruway and Tappan Zee Bridge (now Governor Mario M. Cuomo Bridge) opened in 1955, connecting Rockland County to Westchester County and New York City. This brought upon suburban expansion in the County, shifting land use from primarily agricultural to primarily residential and commercial. The highlands portion of Rockland County remains largely preserved as forested land after Harriman State Park was acquired in 1900 (Rockland Tomorrow, 2017; Van Abs, 2017). Parkland is the single largest land use in the County, comprising of 176 square miles, or just over one third of the county’s total land area. This includes Harriman State Park and a 33-mile strip of green spaces along the Hudson River (Rockland Tomorrow, 2011).

The Ramapo and Hackensack watersheds are two of the major water sources for the Veolia system. The Ramapo watershed is largely preserved by state park. The New York State Thruway bisects the watershed through a narrow valley called the Ramapo Pass. Commercial and residential land uses are concentrated around the Villages of Suffern and Hillburn. The Hackensack watershed, which

consists of the Towns of Clarkstown and Orangetown, is largely made up of single-family housing. Major roadways in the watershed are the New York State Thruway and the Palisades Parkway. Denser areas of residential and commercial land uses are supported in the Villages and there are pockets of industrial land use throughout. There is very little undeveloped land left in the watershed (Van Abs, 2017).

According to the 2023 Orangetown Comprehensive plan, in Orangetown, there are nine main categories of land use:

- Single-family residential
- Multi-family residential
- Commercial
- Institutional
- Industrial
- Infrastructure (public works)
- Recreation & entertainment
- Vacant land
- Public parks & open space

The table below shares a breakdown of the acres and percentage of Orangetown that each land use type encompasses for the years 2010 and 2020. The data was compiled for Orangetown’s 2023 Comprehensive Plan from the New York State Tax Parcels Data Set.

Land Use Type	2010		2020	
	Acres	Percentage	Acres	Percentage
Commercial	764	5.9	897	6.9
Institutional	1,152	8.9	1,216	9.3
Industrial	505	3.9	622	4.8
Infrastructure	161	1.2	161	1.2
Recreation & entertainment	854	6.6	884	6.8
Residential	5,081	39.4	5,073	39.0
Vacant land	2,052	15.9	1,912	14.7
Public parks & open space	2,320	18.0	2,248	17.3
Total	12,889	100	13,013	100

Source: Orangetown’s 2023 Comprehensive Plan

The installation of sanitary sewer systems and increases in impervious surface and storm sewers has reduced recharge to the groundwater aquifer exporting wastewater from the County. Roughly 42 percent of the population was served by sewers in the early 1960s (Ayer and Pauszek, 1963), but by 2010, nearly the entire population have been connected to the sewer system. Wastewater is routed to wastewater treatment plants and then discharged to the Hudson or Ramapo Rivers, which transports it out of the County. Water can also be lost through stormwater sewer systems that route stormwater runoff from paved surfaces and sloped lawns to local streams and ultimately out of the County (Heisig, 2010).

Impervious surfaces in Orangetown include roadways, parking lots, and buildings, and tend to be concentrated in Villages and Hamlets. Many of these surfaces are in proximity to waterbodies, which may lead to contaminated runoff flowing into the waterbodies.

Flooding in developed areas also contributes to pollutants entering and degrading the Town’s waterbodies. Much of the floodwater is untreated and carries with it surface pollutants and debris, such as traces of gasoline, lawn care chemicals, microplastics, and street litter. **Figure 1.1.2-1** shows the location of wetlands, flood zones, and impervious surfaces in Orangetown (2023 Orangetown Comprehensive Plan).

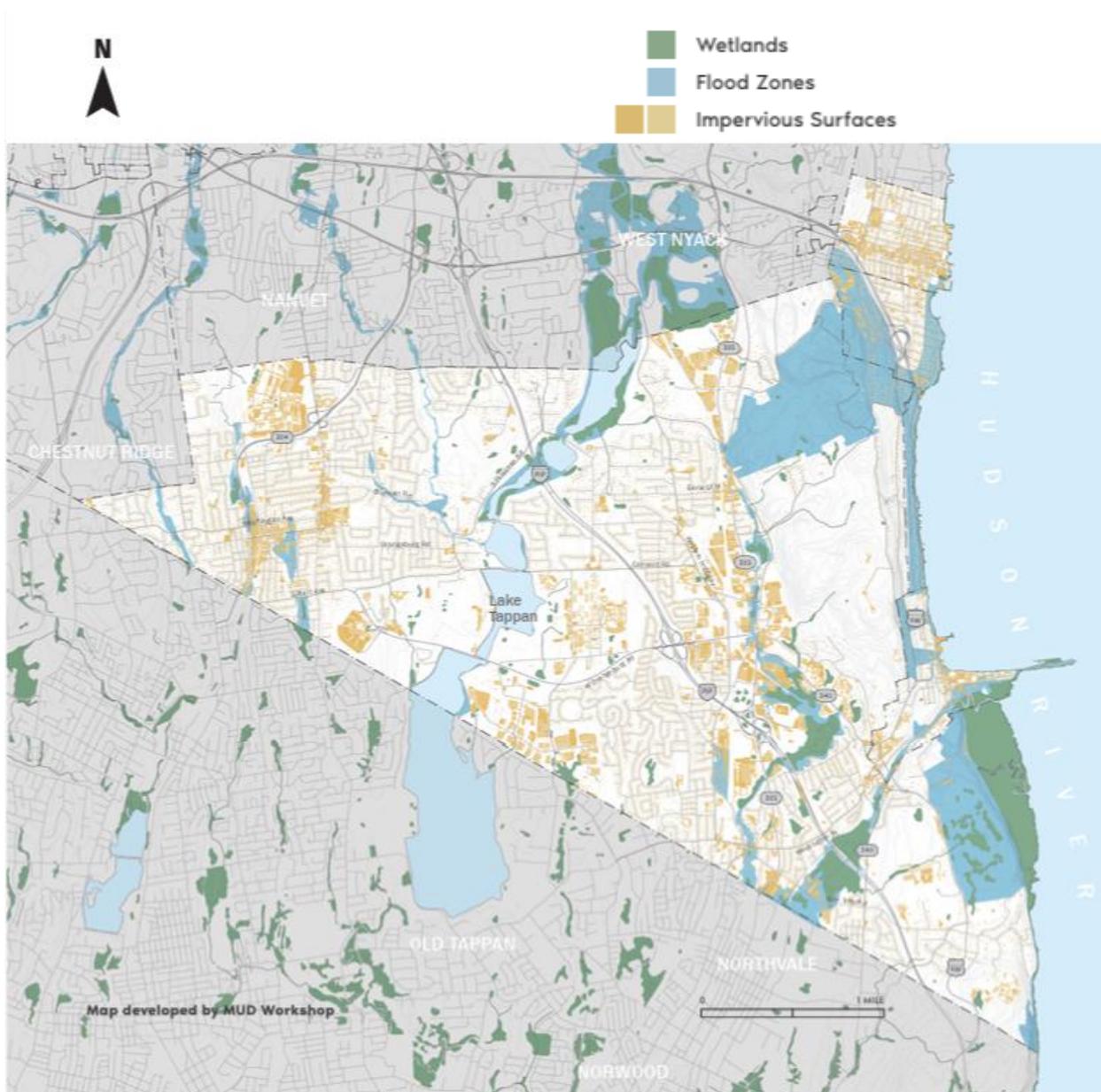


Figure 1.1.2-1: Impervious surfaces, wetlands, and flood zones. Source: 2023 Orangetown Comprehensive Plan, Figure. 7-6

The Town of Orangetown has a number of land development and environmental regulations in place to protect historic and natural resources, quality of life, and environmentally sensitive areas. Three of these regulations are related to protecting water resources in the Town. Two of these regulations

are related to stormwater management and sediment and erosion control (Orangetown Comprehensive Plan, 2023).

Chapter 30C of the Town Code regulates the discharge of any materials other than stormwater into the municipal storm sewer system (MS4), apart from certain materials outlined in the Town Code. Methods for controlling the introduction of pollutants into the MS4 are also listed in this chapter to comply with the Town's State Pollutant Discharge Elimination System (SPDES) permit (Orangetown Comprehensive Plan, 2023).

Chapter 30D of the Town Code includes an ordinance which states that no land development application **subject to the requirements of the NYS DEC State Pollutant Discharge and Elimination System General Permit for Stormwater Discharges (SPEDES) from Municipal Separate Stormwater Sewer Systems (MS4s)** can be approved by the Town without an established stormwater pollution prevention plan. **Any new development is also subject to a rigorous drainage review.** The Town adopted this ordinance after it determined that increases in impervious surfaces, stormwater runoff, clearing and grading, and improper design and construction of stormwater management practices were negatively impacting the Town (Orangetown Comprehensive Plan, 2023).

Chapter 41 of the Town Code prevents anyone from diverting any watercourse within the Town without first obtaining a permit from the Town Board. It also establishes water quality standards to protect streams from pollution and requires a permit from the Department of Public Works (DPW) for the discharge of any liquid into a stream, drain, or watercourse, other than from a one- or two-family dwelling (Orangetown Comprehensive Plan, 2023).

1.1.3 Overview of the Water System

Orangetown's public water supply system is owned and operated by Veolia (public water supply (PWS) ID NY4303673). Veolia provides water through approximately 78,900 residential and business service connections serving about 334,500 people throughout Rockland County and municipalities in Orange County. They also supply water for fire suppression via fire hydrants and fire system connections in the same footprint. This excludes the Villages of Suffern and Nyack. Approximately 70% of the drinking water supply is derived from 60 groundwater wells, with the remaining 30% from Lake DeForest and Letchworth reservoirs, located in Towns of Clarkstown and Haverstraw, respectively (2024 Water Quality Report).

Lake DeForest is a 985-acre, 5.6-billion-gallon reservoir that receives water from the headwaters of the Hackensack River. Water withdrawn from Lake DeForest is treated at the Lake DeForest Water Treatment Plant before being pumped into the water distribution system. Withdrawals from the reservoir are limited to an annual average daily withdrawal of 10 million gallons a day (MGD) by Water Supply Application (WSA) permit 2189 (Heisig 2010; Haverstraw Report 2012). According to the permit, withdrawals may exceed 10 MGD up to 20 MGD during peak conditions so long as the annual average daily yield remains at 10 MGD. The permit also stipulates that a daily average flow in the stream immediately above the Village of Nyack's water intake must be maintained at 9.75 MGD (Haverstraw Report 2012).

The Letchworth reservoirs are three reservoirs sourced by the Horse Chock Brook, a tributary of Minisceongo Creek. They have a total capacity of 173 million gallons. The Letchworth Water Treatment Plant treats the water from the reservoirs before it enters the system. The reservoirs are typically used to provide water during the peak demand season of May through September (Rockland Tomorrow 2011, Heisig 2010). The Water Supply Application permit 9947 allows for a withdrawal of 1 MGD on an annual average basis, 3 MGD during peak conditions, and a maximum of 45 million gallons a month.

The Ramapo Valley Well Field consists of 10 sand and gravel wells that draw groundwater from the Ramapo Aquifer, which is hydraulically connected to the Ramapo River. Water from each well is pumped to one central pump station where the water is treated. Withdrawals are subject to Water Supply Application permit 6507 which requires a minimum flow to be maintained in the Ramapo River (8 MGD) down river from the well field to the New Jersey boarder (WSA no. 6507). When flows are below that threshold, pumping must be stopped (Heisig 2010). Water from Potake Pond, piped to Nakoma Brook, a tributary of the Ramapo River, can be used to supplement the flow of the Ramapo River so that the well field may remain operable during these periods. Water Supply Application permit 8620 permits the release of water from Potake Pond at a rate of 10 MGD or less so long as the water level in the pond does not fall below the upper 7 feet (2012 Haverstraw Report).

In addition to the Ramapo Well Field, 50 other wells are also in operation throughout Rockland County. These wells consist of deep bedrock wells and sand and gravel wells which are primarily located near the Mahwah River, Minisceongo Creek, and Sparkill Creek. Well water is treated and collected at water storage tanks throughout Rockland County prior to distribution. Well water is susceptible to contamination from surrounding development. There are a few wells, in addition to the 50 active wells, that are not currently in use because their yield is low and/or their water is contaminated (2012 Haverstraw Report).

Water enters the distribution system from both water treatment plants and the well pump stations and is distributed through a series of 15 pressure districts, which are areas of similar ground elevation where one common hydraulic gradient, or water pressure, is maintained. Water generally is contained to its origin pressure district; however, it can be transmitted between pressure districts if brought under the correct pressure for the destination district. Orangetown is served by pressure district 10, which also services pressure districts 12 (Piermont) and 13 (Grandview-on-Hudson). Pressure district 10 receives water from:

- Spring Valley 1-4, 6, and 17
- **Sparkill 8 and 11**
- **Nanuet 13 and 14**
- **Blauvelt 15**
- **Tappan 16 and 20**
- Bardonia 19
- Germonds 21
- **Pearl River 22**
- New City 23
- Piermont 25
- Norse 69
- Elmwood 66
- Lake Shore 73
- West Gate 79
- Groke 83
- Lake DeForest

The bolded wells are the focus of this Plan. All wells are located within the boundaries of pressure district 10, which serves Clarkstown and Orangetown, with the exception of the Spring Valley wells, which are located in the Village of Spring Valley in the Town of Ramapo and pressure district 95. Piermont well 25 is located in the Village of Piermont within the Town of Orangetown and is currently out of service and will remain out of service per communication with Veolia.

1.1.3.1 Water Treatment

Water treatment processes differ whether the water is from the wells, Lake DeForest Water Treatment Plant, or Letchworth Water Treatment Plant. Water treatment is as follows:

Table 1.1.3-1: Water Treatment Processes for Veolia Water Sources	
Supply Source	Treatment
Lake DeForest Water Treatment Plant	Physical Treatment: Traveling screens, aeration (Dissolved Air Flotation) and dual media filtration Chemical Treatment: Ozone treatment, carbon dioxide, power activated carbon, cationic polymer, aluminum sulfate, sodium hypochlorite, polyphosphates, and sodium hydroxide
Letchworth Water Treatment Plant	Chemical addition, mixing, flocculation, sedimentation, filtration, disinfection, and corrosion control
Groundwater Wells	Sodium hypochlorite and polyphosphates Some wells receive additional treatment through granular activated carbon (GAC) filtration, aeration and/or ultraviolet disinfection. Wells that are GWUDI have additional steps including ultraviolet (UV) disinfection and filtration

Source: 2023 and 2024 Annual Drinking Water Reports for Veolia Water New York – Rockland County

Ozone treatment eliminates unpleasant tastes and odors caused by algae and organic contaminants. Powder activated carbon removes organic contaminants. Sodium hypochlorite is added to protect against microbiological contamination. Sodium hydroxide and polyphosphates are added to reduce corrosion of metal piping. Aeration, or air strippers, treats groundwater contamination from gasoline, dry cleaning solvents, and other volatile organic compounds (VOCs). Granular activated carbon (GAC) filtration reduces certain per- and polyfluoroalkyl substances (PFAS) from the water. In 2024, there were 11 permanent GAC filtration treatment facilities and one temporary GAC filtration facility in place across various well sites. The according to Veolia’s 2nd Quarter of 2025 PFAS Progress Report following well sites have this permanent treatment facility:

- New Hempstead 18 and 24,
- Pomona 38,
- Eckerson 71,
- Eckerson 82,
- Monsey 30,
- Willow Tree 56,
- **Tappan 16 and 20,**
- Monsey 31A,
- Viola 28 and 106,
- Spring Valley Well Field
1A, 3, 4, 6, & 17,
- Birchwood 70

According to the NYSDEC Water Withdrawal Permit Application Summary 2025, the wells covered in this Plan undergo sodium hypochlorite and sequest (corrosion control) treatment and the following additional treatment:

- Sparkill 8 & 11: Air stripper, and GAC
- Nanuet 13 & 14: Deaeration, air stripper, and GAC
- Blauvelt 15: GAC
- Tappan 16 & 20: GAC
- Pearl River 22: Deaeration

While not referenced in the 2025 Water Withdrawal Permit Application Summary, the annual water quality supplementary reports indicate that Blauvelt 15 may also receive UV disinfection.

1.1.3.2 Water Demand and Losses

Water losses due to leaks, main breaks, under-registering meters, firefighting, hydrant flushing, and theft of service are common in water systems. The annual water quality reports from 2018-2024 were reviewed for information related to water production and water loss. The table below summarizes that information.

Table 1.1.3-2: 2018-2024 Veolia Water Production and Losses		
Service Year	Production (Billion Gals)	Losses (%)
2018	9.93	27.8%
2019	9.76	21.5%
2020	9.97	20.5%
2021	9.7	20.5%
2022	10.1	20.86%
2023	9.9	21.2%
2024	10.2	20.7%

According to Van Abs, Ryan, and Ramola (2017), average demand in the SUEZ NY, now Veolia, system was 29.4 MGD from 2000 to 2009 but fell to roughly 28 MGD from July 2015 to June 2017. Using data from SUEZ and Veolia’s annual demand reports, average demand was approximately 27 MGD from 2018 to 2024. Van Abs, Ryan and Ramola (2017) reported that single-family residential, commercial, and industrial demand accounts for 75 percent, 21 percent, and 4 percent of metered water demands, respectively. Towns like Orangetown, Clarkstown, and Stony Point see greater summer demand increases than Ramapo and Haverstraw.

1.1.3.3 Lead Service Line Inventory

In 2024, water systems in New York State were required to inventory their lead service lines. A summary of the inventory for Rockland County is provided in the table below and was last updated in August 2024. An interactive web map of the inventory is available at:

<https://vnagis.maps.arcgis.com/apps/webappviewer/index.html?id=240660d8f0164b0f8130255347013e9f>.

Type of Service Line	Number of Service Lines
Service Lines in the Distribution System	76,437
Identified Service Lines	54,277
Lead Service Lines	487
Galvanized Service Lines Requiring Replacement (GSLRR)	38
Non-Lead Service Line	53,752
Unknown Service Lines	22,160

Source: NYS DOH (https://www.health.ny.gov/environmental/water/drinking/service_line/NY4303673.htm)

Water Quality

The wells in Orangetown source their water from the Newark basin aquifer. Suburban development and areas of thin overlying sediment have made the aquifer susceptible to contamination (Heisig, 2010). This section will discuss the finished water, or water quality after treatment, from Veolia's annual water quality reports. It will also discuss available information on raw water, or water quality prior to treatment, from the wells in Orangetown.

1.1.3.4 Finished Water

Emerging contaminants are those that present a concern for both public or ecological health, occur in the environment, and are not currently regulated or need regulatory reassessment. Per- and polyfluorinated alkyl substances (PFAS) are currently considered to be in this category. In 2016, the EPA established a lifetime health advisory level (HAL) of 70 parts per trillion (ppt) for PFOA and PFOS combined. Then, in 2020, New York State set MCLs of 10 ppt for PFOA and PFOS. On April 10, 2024, the EPA set new federal maximum contaminant levels (MCLs) of 4 ppt for PFOA and 4 ppt for PFOS with a compliance date of 2029 for public water systems. However, in 2025, the EPA announced a plan to allow drinking water systems additional time to develop plans for addressing and implementing solutions for PFOA and PFOS. Their proposal would extend the compliance date to 2031. The proposed rule is planned to be finalized in Spring of 2026.

On January 7, 2021, the NYSDOH granted Veolia a deferral because perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) were found above the maximum contaminant level (MCL) of 10 ppt in the water system. When a system is issued a deferral, the water system agrees to a schedule for corrective action and compliance with the new MCLs. As part of the deferral process, Veolia submitted a detailed action plan that will ensure that the water system will meet the new State standard and has produced progress reports on achieving compliance. In exchange, the NYSDOH agrees to defer enforcement actions if the water system is meeting the established deadlines and other conditions of the deferral. On August 23, 2022, the NYSDOH renewed Veolia's deferral for an additional year.

Below is a table listing information from the Annual Water Quality Reports from 2018 to 2024. Grey shaded rows list PFOS and PFOA detection levels during years of no violation due to high regulatory standards or compliance deferrals. Since the regulatory standards for PFOS and PFOA are shifting, it is important to look at results through the lens of both current and future standards.

Table 0-1: 2018-2024 Veolia Annual Water Quality Report Summary					
Service Year	Contaminant in Violation	MCL	Level Detected Range	Level Detected Average	Likely Source of Contamination
2018	No reported violations¹				
	Perfluorooctanoic Acid (PFOA)	70 ppt ¹	ND – 12.2 ppt	N/A	Industrial release to water, air or soil; discharges from sewage treatment plants; land application of contaminated sludge, and use of fire-fighting foam
	Perfluorooctanesulfonic Acid (PFOS)	70 ppt ¹	ND – 5.46 ppt	N/A	
2019	No reported violations¹				
	Perfluorooctanoic Acid (PFOA)	70 ppt ¹	ND – 18 ppt	8.22 ppt	Surfactant or emulsifier; used in fire-fighting foam, circuit board etching acids, alkaline cleaners, floor polish, and as a pesticide active ingredient for insect bait traps
	Perfluorooctanesulfonic Acid (PFOS)	70 ppt ¹	ND – 8.4 ppt	2.99 ppt	Used for its emulsifier and surfactant properties in or as fluoropolymers (such as Teflon), fire-fighting foams, cleaners, cosmetics, greases and lubricants, paints, polishes, adhesives and photographic films
2020	No reported violations²				
	Perfluorooctanoic Acid (PFOA)	10 ppt	ND – 19 ppt	7.91 ppt	Released into the environment from widespread use in commercial and industrial applications
	Perfluorooctanesulfonic Acid (PFOS)	10 ppt	ND – 11 ppt	3.11 ppt	
2021	No reported violations²				

	Perfluorooctanoic Acid (PFOA)	10 ppt	ND – 18 ppt	7 ppt	Released into the environment from widespread use in commercial and industrial applications
	Perfluorooctanesulfonic Acid (PFOS)	10 ppt	ND – 10 ppt	3 ppt	
2022	Iron	300 µg/L ³	ND – 1,110 µg/L	33 µg/L	Naturally occurring element; leaching from metal pipes
	Manganese	300 µg/L ³	ND – 1,520 µg/L	22 µg/L	
	Total Dissolved Solids (TDS)	500 mg/L ^{3,4}	17 – 721 mg/L	293 mg/L	Minerals and salts dissolved in the water
	No reported PFOS/PFOA violations²				
	Perfluorooctanoic Acid (PFOA)	10 ng/L	ND – 18 ng/L	ND – 17 ng/L (Quarterly Locational Average)	Used in products to make them stain, grease, heat and water resistant
	Perfluorooctanesulfonic Acid (PFOS)	10 ng/L	ND – 20 ng/L	ND – 12 ng/L (Quarterly Locational Average)	
2023	2-Butanone (Methyl Ethyl Ketone) ⁵	50 µg/L	ND – 613 µg/L	7 µg/L	Large quantities of this compound are used in the coatings industry. MEK will be discharged from this and other industrial uses.
	Acetone ⁵	50 µg/L	ND – 1,070 µg/L	0.014 µg/L	Occurs naturally and is used in production of paints, varnishes, plastics, adhesives, organic chemicals, and alcohol. Also used to clean and dry parts of precision equipment.
	Tetrahydrofuran ⁵	50 µg/L	ND – 2,450 µg/L	0.028 µg/L	Used as a monomer, a solvent for natural and synthetic resins,

					and a chemical intermediate.
	Perfluorooctanoic Acid (PFOA) ⁶	10 ng/L	ND – 18 ng/L	ND – 18 ng/L (Quarterly Locational Average Range)	Used in products to make them stain, grease, heat, and water resistant
	Perfluorooctanesulfonic Acid (PFOS)	10 ng/L	ND – 14 ng/L	ND – 13 ng/L (Quarterly Locational Average Range)	
2024	Perfluorooctanesulfonic Acid (PFOS)	10 ng/L 4 ng/L ⁷	ND – 29 ng/L	ND – 16.8 ng/L (Quarterly Locational Average Range)	Released into the environment from widespread use in commercial and industrial applications.
	Perfluorooctanoic Acid (PFOA) ⁸	10 ng/L 4 ng/L ⁷	ND – 14 ng/L	ND – 13 ng/L (Quarterly Locational Average Range)	
	Total Dissolved Solids (TDS)	500 mg/L ^{3,4}	29 – 808 mg/L	268 mg/L	Minerals and salts dissolved in the water.

¹The U.S. Environmental Protection Agency (EPA) has established a lifetime health advisory level (HAL) of 70 parts per trillion (ppt) for PFOA and PFOS combined.

² When a public water system (PWS) is issued a deferral, the water systems agrees to a schedule for corrective action and compliance with the new PFOS, PFOA, or 1,4-dioxane MCLs. In exchange, the NYS DOH agrees to defer enforcement actions, such as assessing fines, if the PWS is meeting established deadlines. Deferral recipients are required to update the NYS DOH and the RC DOH each calendar quarter on the status of the established deadlines. The NYS DOH can resume enforcement if the agreed upon deadlines are not met.

³ Value is indicative of secondary MCL, which is specific to NY state. There is no applicable maximum contaminant level goal (MCLG).

⁴ The SMCL for TDS is a guideline, not an enforceable standard.

⁵ These contaminants were detected at a small production well’s sample tap and there is evidence that these contaminants never entered the distribution system.

⁶ This system was operating under deferral until August 25, 2023. While PFOA and PFOS levels exceeded the maximum contaminant levels (MCL) during this deferral, no violation was issued. However, some individual samples exceeded the PFOA MCL after the deferral period ended. Since the average of the initial and confirmatory samples were below the MCL, no violations were issued for these locations.

⁷EPA MCLs or MCLGs for PFOA, PFOS, PFNA, PFHxS, and Gen-X contaminants were announced on April 10, 2024. As of May 1, 2025, public water systems must meet these standards by 2029. In 2024, the New York State MCLs for PFOS and PFOA remained at 10.0 ppt. Please note, no other PFAS contaminants other than PFOA and PFOS have state issued MCLs.

⁹All compliance sampling conducted for PFOA and PFOS is addressed in the “Contaminant, Synthetic Organic” section of this table. No additional locations exceeded in the New York State MCL for PFOA under the UCMR5 sampling that were not already in violation.

The secondary maximum contaminant levels (SMCLs) for iron, manganese, and total dissolved solids were exceeded from specific sites and sampling events in 2022. Since the mentioned contaminants are standards to assist public water systems in managing their drinking water, Veolia will continue with standard monitoring and treatment.

The PFOA levels at two wells exceeded the maximum contaminant levels (MCLs) of New York State during the 4th quarter of 2023 and at multiple wells during the 1st, 3rd, and 4th quarters of 2024. PFOS levels at one well exceeded the New York State MCL during the 3rd quarter of 2024. Veolia Water New York is working with the Rockland County Department of Health on a compliance schedule that includes steps to reduce levels of PFOA. Each of the well sites are in the process of being evaluated for treatment design. Quarterly PFAS treatment project progress reports and all PFOA and PFOS exceedance public notification can be viewed at: <https://nywq.veolianorthamerica.com/>.

The MCLs for acetone, 2-butanone, and tetrahydrofuran were exceeded between November 21, 2023, and January 4, 2024, at one of Veolia’s small drinking water production wells. Veolia stated it is highly unlikely that water with these contaminants reached customers since evidence suggested that these contaminants originated from the sample tap and never entered the public drinking water. Customers within the hydraulically isolated zone of this well were notified of the exceedance. The sample tap was replaced on January 19, 2024, and these contaminants have been undetectable in subsequent samples.

Veolia’s annual water quality reports are released with supplementary data that includes testing results from individual wells. These reports were reviewed for the wells assessed as part of this Plan for the years 2021 – 2024. Not all wells were listed as tested for the different contaminants. The following is a summary of some of the results.

In 2021, Blauvelt 15 recorded Tetrachloroethylene levels between 1-2 ug/L. While still below the MCL of 5 ug/L, these elevated amounts are likely due to groundwater contamination from nearby dry cleaners. This was not seen in subsequent years.

In 2022, Blauvelt 15 and the combined Tappan 16/20 both recorded TDS values above the MCL of 500 mg/L, but no more than 100 mg/L greater. This was not seen in subsequent years.

Nitrate levels for Blauvelt 15 and the combined Tappan 16/20 were generally between 2.6 and 3.3 mg/L for the years 2022 – 2024, with Blauvelt typically seeing slightly higher concentrations than Tappan 16/20. However, Blauvelt 15 saw a range of 2.1 to 3.95 mg/L in 2024. Nitrate levels for these wells were not measured in 2021. Nitrate levels for the combined Nanuet 13/14 were between 1.07 and 1.6 for the years 2021 – 2024. All wells so Nitrate concentrations below the MCL of 10 mg/L. However, the concentrations measured could be due to fertilizer usage, leaching from septic tanks, sewage, or erosion of natural deposits.

Between 2021 and 2024, sodium levels in Blauvelt 15 had an average of 48 mg/L, Tappan 16/20 had an average of 37 mg/L, and Nanuet 13/14 had an average of 28 mg/L. Pearl River 22 was only measured in 2021 and recorded a concentration of sodium at 19 mg/L. Sodium levels are either from road salt or erosion of natural deposits.

PFOS and PFOA values vary across the wells but are generally highest in Blauvelt 15 and Tappan 16/20. PFOA values were consistently recorded above 4 ng/L but below 10 ng/L at Nanuet 13/14 and were above 10 ng/L for Blauvelt 15 and Tappan 16/20. PFOS values were typically measured in concentrations below 10 ng/L but above 4 ng/L for Blauvelt 15, Tappan 16/20, and Nanuet 13/14. Tappan 16/20 saw highest concentrations of the three, and occasionally recorded concentrations above 10 ng/L. Sparkill 11 recorded a concentration of PFOA at 2.4 ng/L in 2023 but was not measured in any other year. Some of the highest values of PFOA and PFOS for the system were recorded at Blauvelt 15 and Tappan 16/20.

1.1.3.5 Raw Water

The NYSDOH completed a source water assessment for the system in 2004. The assessment included a susceptibility rating for a number of wells in the Veolia system based on the risk posed by each potential source of contamination and how easily contaminants can move through the subsurface. The assessment did not include all wells from the system. Table 1.1.4-2 lists the susceptibility rating for the available wells assessed in this plan. It is noted that this susceptibility rating is an estimate of the potential for contamination of the source water but does not mean that the water is contaminated.

Well Name	Well Number	Microbials	Nitrates	VOCs	Others
Nanuet	13	MH	H	H	H
Tappan	16	MH	H	H	H
Tappan	20	MH	MH	MH	MH
Pearl River	22	MH	MH	NR	NR

Key: MH = Medium High, H = High, NR = Not Rated

The source water assessment rated the drilled wells as having high susceptibility to microbials, nitrates, and industrial solvents, and a high susceptibility to other industrial contaminants. These ratings are primarily due to the close proximity of permitted discharge facilities (industrial/commercial facilities that discharge wastewater into the environment and are regulated by the state and/or federal government) to the wells and the associated industrial activity in the assessment area. In addition, some of the wells draw from fractured bedrock and the overlying soils do not provide adequate protection from potential contamination.

This assessment also found Lake DeForest to have an elevated susceptibility to contamination due to the amount of residential land within the assessment area. Potential contamination threats include pesticides, sediments, DBP precursors, phosphorus, and microbials.

As part of Veolia's PFOA and PFOS deferral, a progress report detailing compliance and sampling testing of wells has been completed. Table 1.1.4-3 includes results of that testing for wells included

as part of this Plan from the PFAS Progress Report 2nd Quarter of 2025. Red font denotes concentrations greater than the New York State Drinking Water Standard 10 ppt and require treatment. **Not all of the wells assessed in this Plan were included in the sampling conducted by Veolia.**

Table 0-3: Veola PFAS Progress Report Summary for Orangetown Wells			
Well Site	Sample Date	PFOS (ppt)	PFOA (ppt)
Tappan 20¹ Note: Well out of service Q1-23, Q2-23	10/1/2020	47	11
	10/22/2020	47	10
	1/12/2021	32	8.9
	4/14/2021	40	10
	7/8/2021	3.3	11
	10/5/2021	32	11
	1/5/2022	23	9.8
	4/11/2022	17	9.8
	8/2/2022	24	9.8
	10/18/2022	24	11
	8/23/2023	14	18
Tappan 16	10/1/2020	8.6	16
	10/14/2020	11	16
	1/12/2021	7.3	17
	4/14/2021	10	18
	7/8/2021	6.6	15
	10/5/2021	6.8	14
	1/5/2022	4	14
	4/11/2022	4.4	15
	8/2/2022	6.1	16
	10/18/2022	5.2	17
	1/17/2023	7.5	15
	5/22/2023	Lab Error (Resampled 6/13/2023)	
	6/13/2023	9.2	17
8/1/2023	10	16	
VW 16/20 POE³	10/24/2023	ND	ND
	1/30/2024	ND	ND
	4/24/2024	ND	ND
	5/21/2024	ND	ND
	7/16/2024	ND	ND
	11/5/2024	ND	ND
	1/27/2025	ND	ND
	4/7/2025	ND	ND
Blauvelt 15 Note: Well out of service Q1-22, Q1-23, Q1-25	1/13/2021	2	12
	4/14/2021	7.3	17
	4/28/2021	8.3	17
	7/8/2021	8.3	18

	12/2/2021 ²	ND	ND
	4/11/2022	4.4	15
	8/2/2-22	ND	ND
	10/25/2022	ND	ND
	5/8/2023	ND	ND
	8/1/2023	10	17
	10/24/2023 ³	ND	ND
	3/12/2024 ³	ND	ND
	3/26/2024 ³	ND	2.7
	4/24/2024 ³	ND	4.5
	5/21/2024 ³	ND	6.0
	8/27/2024 ³	ND	ND
	11/5/2024 ³	ND	ND
	4/10/2025 ³	ND	ND

¹Tappan 20 (SW 20/VW 20) has been shut down for many years and will not be used until treatment is installed.

²Blauvelt 15 (SW 15/VW 15) PFOA & PFOS results were non-detect after implementation of treatment upgrades in Q4-21.

³Several systems were placed into service in Q3 and Q4 2023. Data reflects point of entry (POE), which is after treatment only. Individual wells that are part of a larger wellfield are not individually depicted due to ease of understanding for compliance. Raw water date is represented in the Supplemental Report.

1.1.4 References

Documentary History of American Water-works: <http://www.waterworkshistory.us/NY/>

Haverstraw Water Supply Project Water Supply Permit Application, 2012:

<https://www.nrc.gov/docs/ML1209/ML12090A522.pdf>

Heisig, 2010: <https://pubs.usgs.gov/sir/2010/5245/>

Lyon, Christie-Blick, and Gluzberg, 2005: <https://doi.org/10.7916/D81N8B4V>

Nuclear Regulatory Commission: <https://adams-search.nrc.gov/>

NYS Public Service Commission:

<https://documents.dps.ny.gov/public/Common/AdvanceSearch.aspx>

- Water Supply Application No. 2189
- Water Supply Application No. 4925

Orangetown Comprehensive Plan, 2023: https://www.orangetown.com/wp-content/uploads/2023/10/2023-10-12_Orangetown-Comp-Plan.pdf

Resilient NY Flood Mitigation & Resilience Reports: <https://dec.ny.gov/environmental-protection/water/water-quantity/resilient-ny>

Rockland Tomorrow – Comprehensive Plan, 2011:

<https://www.rocklandcountyny.gov/home/showpublisheddocument/1554/638216350420970000>

Rockland County Water Conservation Plan, 2020: <https://www.rocklandcountyny.gov/home/showpublisheddocument/1600/638216457160400000>

Rockland County Hazard Mitigation Plan, 2024: <https://rocklandhmp.com/final-plan/>

Sparkill Creek Watershed Characterization Report, 2024: <https://hudsonwatershed.org/wp-content/uploads/Sparkill-Creek-Watershed-Characterization-Report.pdf>

United Water Long Term Water Supply Project, 2007: <https://nyacknewsandviews.com/wp-content/uploads/2008/09/unitedwaterplan.pdf>

Van Abs, Ryan, and Ramola, 2017: <https://www.rocklandcountyny.gov/home/showpublisheddocument/1642/638216468082100000>

Veolia PFAS Progress Reports 2022-2025: <https://nywq.veolianoorthamerica.com/>

Veolia Water Annual Water Quality Reports: <https://mywater.veolia.us/weir-river-water-system/water-in-my-area/water-quality-reports>

Veolia Water Withdrawal Annual Reports: <https://extapps.dec.ny.gov/data/IF/WWR/WWR0001591/>

Vickers, 2015: https://www.scenichudson.org/wp-content/uploads/legacy/7.22.15_Report-Water_Losses_and_Customer_Water_Use_in_the_United_Water_NY_System.pdf

WVNY Rockland County Water System Engineering Report – Water Withdrawal Application, 2025

Yager & Ratcliffe, 2010: <https://pubs.usgs.gov/sir/2010/5250/>

1.2 Form a Stakeholder Group

The Framework requires the formation of a knowledgeable stakeholder group to guide the development and implementation of the Plan. The stakeholder group provides local knowledge and perspective on the water source and the threats it faces. Members of the stakeholder group were invited to join the DWSP2 process based on the initial information uncovered about the water source. A list of stakeholders and their affiliations can be found in section 1.2.1. Regular meetings were held with the group to work through the key components of the Framework. The stakeholder group established the goals and vision statement, provided knowledge and input on the source water maps, potential contaminant sources, and the protection and management methods. A list of meeting dates and the topics covered can be found in section 1.2.2.

1.2.1 List of Stakeholder Group Members

Table 1.2.1-1: Orangetown DWSP2 Committee Members	
Member Name	Title and Affiliation
Teresa Kenny	Supervisor, Town of Orangetown

Allison Kardon	Confidential Assistant to the Supervisor, Town of Orangetown
Jim Dean	Superintendent of Highways, Town of Orangetown Highway Department
Thomas Hughes	Member, Sustainable Piermont Climate Action Committee
Nicole Laible	Task Force Coordinator, Rockland Task Force on Water Resources Management, Rockland County Department of Health, Environmental Health
Audrey Lupachino	Planning Assistant, Land Use Boards, Orangetown
Stephen Munno	Senior Administrative Assistant, Town of Orangetown Highway Department
Rick Oliver	Acting Director of Office of Building, Zoning, Planning, Administration and Enforcement (OBZPAE), Orangetown
Ariana Polanco	Task Force Water Conservation Coordinator, Rockland Task Force on Water Resources Management, Rockland County Department of Health, Environmental Health
Eamon Reilly	Commissioner, Town of Orangetown Department of Environmental Management and Engineering (DEME)
Shannon Roback	Science Director, Riverkeeper
Sophia Salis	Manager of Communications and Community Relations, Veolia
Richard Schiafo	Deputy Commissioner, Rockland County Department of Planning
Colin Schmitt	Director of Finance, Chief of Staff, Town of Clarkstown
Donald Steinmetz	Member, Orangetown Environmental Committee
Margie Turrin	Director of Educational Field Programs, Lamont-Doherty Earth Observatory of Columbia University
Larry Vail	Sparkill Creek Watershed Alliance

Thanks to Bill Madden from Veolia, Nate Mitchell from the Village of Piermont, and Jane Slavin from the Town of Orangetown who participated in the Orangetown DWSP2 Committee at the start of the project. Also, thanks to Jen Zunino-Smith from Cornell Cooperative Extension Rockland County who served on the committee on an as needed basis.

1.2.2 Meeting Schedule

Table 1.2.2-1: Orangetown DWSP2 Committee Meeting Schedule & Topics	
Date	Topics Covered
6/27/2024	Overview of DWSP2, Discussion of Goals and Vision for the plan.
9/18/2024	Continued discussion on Goals and Vision for the plan, Began discussion on mapping and potential contaminant sources.
12/2/2024	Continued discussion on mapping and potential contaminant sources. Draft source water protection maps were shared and stakeholder group provided feedback on the maps and added additional context for potential sites of interest.
2/3/2025	Discussion of potential contaminant sources in the source watershed and implementation actions that could be used to address those sources. Continued discussion on draft source water protection maps.

3/14/2025	Reviewed and finalized goals and vision statement. Continued discussion on potential contaminant source list and source water protection maps.
4/14/2025	Began discussion of draft project profiles. Reviewed the agreed upon actions and began to flush out the details regarding potential partners, costs, and implementation steps.
6/4/2025	Continued review of draft source water protection maps. Discussed formatting of maps and labeling of key features.
7/15/2025	Continued review of draft project profiles. Expanded upon the details of project profiles 1-3, including updated descriptions, costs, and implementation steps.
8/19/2025	Finished reviewing draft project profiles 4 and 5, including updated descriptions and added resources. Discussed the review timeline for the whole DWSP2 plan. Began discussion on the introduction and first chapter of the plan.
10/7/2025	Began reviewing the Introduction, Chapter 1, and Chapter 2 of the Plan. Comments and feedback were provided by the committee.
10/29/2025	Began reviewing Chapters 4 and 5 of the Plan and continued reviewing Chapters 2 and 3. Comments and feedback were provided by the committee.
11/20/2025	

1.3 Formulate a Vision and Establish Goals

The stakeholder group established goals and formulated a vision for Orangetown's DWSP2 plan. The following goals were established and used as a framework for developing the plan:

1. *Enhance community education on known contaminants and their potential impact on the water supply*
2. *Establish shared outreach and messaging campaigns with other Rockland municipalities served by the water systems in Orangetown*
3. *Evaluate current land use and plan for future land use changes within the source water protection areas*

During the creation of Orangetown's goals, a vision statement was created. The statement reads:

"The Town of Orangetown, in collaboration with Veolia Water and neighboring municipalities, is committed to establishing a comprehensive drinking water protection program that includes groundwater sources. This program will direct and inform sustainable future decisions on drinking water source protection so that the residents of Orangetown continue to receive reliable, high quality drinking water that meets public health and environmental standards and guidelines."

2 Drinking Water Source Assessment

This section provides an overview of the development of the drinking water source protection maps for the Town of Orangetown. These maps were developed to better understand the system and assess potential contaminants of concern. The following maps are available in [Appendix A](#).

- Town of Orangetown Land Cover
- Town of Orangetown Potential Contaminant Sources
- Town of Orangetown Water Resources
- Town of Orangetown Nanuet & Pearl River Well Fields Potential Contaminant Sources
- Town of Orangetown Blauvelt Well Field Potential Contaminant Sources
- Town of Orangetown Sparkill and Tappan Well Fields Potential Contaminant Sources

The maps were created using ArcGIS with data sources from the New York State Clearinghouse, Multi-Resolution Land Characteristics Consortium, US EPA, USGS, NJDEP Bureau of GIS, and ESRI. All data citations can be found in [the Reference section](#).

It is recommended that Rockland County Planning includes these Drinking Water Source Protection Maps and associated data into their NRI.

2.1 Complete Drinking Water Source Protection Maps

2.1.1 Ownership and Control Area

[New York State Sanitary Code, Part 5, Subpart 5-1, Public Water Systems – Appendix 5D](#) states the following:

“Wells serving public water systems shall be located such that the owner of the water system possesses legal title to the lands within 100 ft of the well and the owner controls by ownership, lease, easement or other legally enforceable arrangement the land use activities within 200 ft of the well.”

According to these regulations, Veolia, as the owner of the public water system wells, should own a radius of 200 ft from each of the wells. The available information suggests that these conditions are met. However, without knowledge of exact well locations, parcel boundaries, or of any easements or agreements, it cannot be not certain.

2.1.2 Critical Areas

The Critical Area includes the area above the aquifer where water is actively being drawn into the well and the upgradient areas where water will reach the well over a 5-year period. [This area is considered of high concern due to the short period of time in which contamination from potential contaminant sources will reach the well. These areas should be most closely monitored and evaluated.](#)

Critical Areas for groundwater protection can be delineated by various methodologies. The complexity of each delineation is based on the amount of information available. Available

information is listed in the table below. Information was gathered from 2023 Annual Water Withdrawal Reports, Rockland County Comprehensive Plan: Rockland Tomorrow, and Heisig 2010.

Table 2.1.2-1: Overview of Orangetown Wells

Well Name	Well Status	Aquifer Type	Depth (ft)	Screen Length/ Open Interval (ft)	Pumping Rate (GPM)
Sparkill 8	Active	Bedrock	481	62	300
Sparkill 11	Active	Bedrock	458	unknown	100
Sparkill 12	Out of Service	Bedrock	unknown	unknown	unknown
Nanuet 13	Active	Bedrock	325	108	347
Nanuet 14	Active	Bedrock	375	95	347
Blauvelt 15	Active	Bedrock	395	60	332
Tappan 16	Active	Bedrock	500	118	198
Tappan 20	Active	Bedrock	555	99	115
Pearl River 22	Active	Bedrock	655	54	150
Piermont 25	Out of Service	Sand and Gravel	72	unknown	100

Using the available information and an estimated porosity of the bedrock aquifer of 0.2 it was determined that the volumetric flow equation would be best suited to define the well critical areas in Orangetown.

The Volumetric Flow Equation is as follows:

$$r = \sqrt{\frac{Q * t}{n * h * \pi}}$$

- r = radius of circle (ft)
- Q = pumping rate (ft³/day)
- t = travel time (day)
- n = porosity
- h = length of well screen (ft)

The table below indicates the 5-year radii calculated for each well using the Volumetric Flow Equation and the above information. These radii were mapped as the critical areas on the maps in **Appendix A**.

Well Name	Radius (ft)
Sparkill 8	1,645
Nanuet 13	1,341
Nanuet 14	1,429
Blauvelt 15	1,759
Tappan 16	969
Tappan 20	806
Pearl River 22	921

Since the screen length is unknown for Sparkill 11 and Piermont 25, and nothing is known about Sparkill 12, these three wells were not delineated. Sparkill 12 and Piermont 25 are currently out of service and will likely remain out of service. Sparkill 11 and 12 are in close proximity to Sparkill 8 and are included in the critical area around Sparkill 8. Piermont 25 is also located within the boundaries of the Village of Piermont.

2.1.3 Source Water Areas

The source water area represents the upgradient land area above the aquifer that is beyond the critical area but where groundwater recharge will still contribute to the well. This direct and/or indirect recharge will reach the wellhead, but after a period longer than 5 years. Potential contaminant sources in these areas are typically of lower concern because of the amount of time it would take for contamination to reach the wellhead. However, they are still important to monitor and to respond to any incidents that occur as contamination will eventually impact the well.

The source water areas for the wells were developed using the Newark Basin aquifer flow groundwater-flow-system map (Figure 32 in Heisig 2010) that was published in the *Water Resources of Rockland County, New York, 2025-07, with Emphasis on the Newark Basin Bedrock Aquifer*. These areas were delineated using estimated flow direction, groundwater elevation, and groundwater divides. Typical flow is in either the northeasterly or southwesterly direction. Groundwater will flow from higher elevation to lower elevation, and groundwater divides indicate an area of higher groundwater elevation from which the water will flow away from. The maps in Appendix A show the delineated source water areas for each well field.

2.2 Potential Contaminant Source Inventory

Assessing Orangetown's drinking water sources includes compiling a list of potential sources of contaminants to the groundwater called the Potential Contaminant Source Inventory. This Inventory is used to help focus future protection efforts. Information on the potential contaminant sources and their locations was gathered from NYSDEC, NJDEP, USEPA, USGS, and stakeholder knowledge. Potential contaminant sources were mapped to determine proximity to the source water and critical area.

2.2.1 Potential Contaminant Sources

The draft Framework sorts potential contaminant sources fall into two broad categories: point source and nonpoint source pollution. Point source means any observable, distinct, and confined conveyance or discharge of pollution. This could be from a pipe, channel, fissure, container, or vehicle. Nonpoint source is when pollutants are not discharged or conveyed from a specific, identifiable point. This type of pollution can be caused by precipitation runoff, which can pick up and carry off pollutants, or any other method of conveying pollutants through a medium such as air or water.

Using potential contaminant sources suggested by the draft Framework and the industries and infrastructure present in Orangetown, a list of potential contaminant sources was identified for drinking water sources in this Plan. In [Appendix A](#), the Town of Orangetown Potential Contaminant Sources map shows the location of these sources in proximity to the well fields. The Nanuet and Pearl River, Blauvelt, and Sparkill and Tappan maps zoom in on each of the source water areas for a more detailed view of the potential contaminant source locations.

2.2.2 Potential Contaminant Source Inventory

The list of potential contaminant sources was mapped and any details regarding the sources are listed in this section. It is important to note that while existing point source contamination is referenced, the focus on the protection and management methods are on only potential point and non-point source contamination. The existing point source contamination has been addressed, but serves as a reference and a reminder for the need to prevent further source water contamination.

Below is the Potential Contaminant Source Inventory (PCSI) for this Plan.

Potential Source	Contaminant(s) of Concern	Protection Area(s) Impacted
Major and Minor Roadways / Impervious Surfaces (non-point source)	Petroleum products, pesticides, fertilizers, road salt (sodium chloride), other chemicals	All Areas
Industrial Facilities (point source)	Trichloroethylene (TCE), metals, other manufacturing and degreasing chemicals	Blauvelt Source Water & Critical Area Nanuet Source Water Area Sparkill Source Water Area
Wastewater Treatment Facilities (point source)	Sewage sludge, industrial wastes	Blauvelt Critical Area Sparkill Source Water Area
Petroleum Bulk Storage (point source)	Gasoline, diesel, methyl-tert-butyl ether (MTBE)	Blauvelt Source Water Area Nanuet Source Water & Critical Area Sparkill Source Water Area
Chemical Bulk Storage (point source)	Chlorine, other pool chemicals, other hazardous substances	Blauvelt Source Water Area Nanuet Critical Area Sparkill Source Water Area

Dry Cleaning Facilities (point source)	Perchloroethylene, also known as Tetrachloroethene, (PCE)	Blauvelt Source Water & Critical Area
Remediation Sites (point & non-point source)	Manufacturing chemicals: TCE, metals, degreasing agents, etc.	Blauvelt Source Water & Critical Area Nanuet Source Water Area
Landfills (non-point source)	PFAS, 1,4-dioxane, volatile organic compounds (VOCs), metals	Sparkill Source Water Area
Residential Land Use (non-point source)	Nitrogen, Phosphorus	All Areas
Septic Systems (non-point source)	Fecal Bacteria, nutrients	Blauvelt Source Water & Critical Area Pearl River Source Water Area Sparkill Source Water Area Tappan Critical Area
Spill Incidents (point source)	Fuel oil, Transformer oil, Petroleum products, TCE, PCE, PFAS, other materials	All Areas

2.2.2.1 Major and Minor Roadways / Impervious Surfaces

Runoff from both major and minor roadways and other impervious surfaces is a risk to nearby drinking water sources. These surfaces accumulate pollutants and no longer allow precipitation to soak into the ground. In turn, precipitation is directed over the impermeable surface to the nearest permeable surface, taking the pollutants with it. Common pollutants include petroleum products, chemicals, and metals from motor vehicles and motor vehicle accidents. It may also carry nutrients and pesticides and, during the winter months, salt and other deicing chemicals (NYSDEC draft Framework).

Major roadways in Orangetown include the Palisades Interstate Parkway, NY Route 303, NY Route 304, and the New York State Thruway. The Palisades Interstate Parkway intersects the source water area of the Blauvelt and Sparkill well fields. It also intersects the Sparkill well field critical area. NY Route 303 intersects both the Blauvelt source water and critical areas. NY Route 304 intersects both the Nanuet source water and critical areas. The New York State Thruway does not pass through any of the source water or critical areas.

Land cover data gives a sense of how much of an area is developed with structures and impervious surfaces. In high density developed areas, much of the land is covered with structures and impervious surfaces. In low density developed areas, the land is covered with a mix of vegetation and structures ([USGS](#)). The table below shows the percentage of each of the source water and critical areas that are developed, including high- and low-density areas. Orangetown, as a whole, is 51% developed.

Well Field	Source Water Area	Critical Area
Blauvelt	83%	88%
Nanuet	95%	95%
Pearl River	77%	66%
Sparkill	67%	91%
Tappan	80%	81%

In 2003, at the request of Jim Dean, Orangetown's Town Board approved the purchase of brine-manufacturing equipment. The equipment came online in 2004, and Orangetown began using salt brine as part of their anti-icing practices. Orangetown's roadways are now pretreated with a 23% brine mixture and, once snow begins to accumulate, brine is also used to wet down rock salt. The brine helps activate the salt and adheres it to the snow pack so that less salt is used and less is lost to the roadside ([Hellauer, 2017](#), [Orangetown](#)). Therefore, road salt was not deemed a major concern by the DWSP2 committee.

2.2.2.2 Industrial Facilities

Industrial land use consists of uses such as manufacturing and processing, mining and quarrying, and oil and gas production ([NYSDTF](#)). Industrial land use can introduce pollution into the environment through industrial wastewater discharges, leakage from storage of hazardous materials, and stormwater runoff of contaminated surfaces.

In Orangetown, industrial land use is located primarily along Route 303 but also includes the Pfizer campus and areas along the New York-New Jersey border, east of Lake Tappan (Orangetown Comprehensive Plan, 2023). The Route 303 corridor is encompassed by the Blauvelt and Sparkill source water areas. The Pfizer campus just clips the Nanuet source water area. The table below indicates the percentage of industrial land use in the source water and critical areas.

Well Field	Source Water Area	Critical Area
Blauvelt	3%	8%
Nanuet	2%	0%
Pearl River	0%	0%
Sparkill	5%	0%
Tappan	0%	0%

Industrial facilities are a potential contaminant source in Orangetown for their ability to introduce hazardous chemicals into the environment if they are not properly managed and maintained. While the current industrial land use in the source water and critical areas cannot be changed, the DWSP2 Committee deemed it important to manage future industrial land use in these areas.

2.2.2.3 Wastewater Treatment Facilities

[Article 17](#) (Water Pollution Control) of the New York State Environmental Conservation Law was enacted so that New York could protect and maintain its water resources through the State Pollutant Discharge Elimination System (SPDES). A permit is required for constructing or using an outlet or discharge pipe that discharges wastewater into the surface waters or ground waters of the State, and/or constructing or operating a disposal system such as a sewage treatment plant ([NYSDEC](#)).

Facilities whose treatment system has a total discharge to groundwater of less than 1,000 gpd of sewage-wastewater containing no industrial or other non-sewage wastes are exempt from the SPDES permit. Facilities with discharges to groundwater of less than 10,000 gpd of sewage effluent, without the admixture of industrial wastes or other wastes are considered minor SPDES projects and may qualify for the SPDES Private / Commercial / Institutional (PCI) General Permit. All other facilities are considered major and are regulated under the standard SPDES permit ([NYSDEC](#)).

Wastewater treatment facilities can introduce biological contaminants such as bacteria, chemical contaminants from industrial wastes, sediments and floatable such as garbage (NYSDEC draft Framework). Facilities may also contain bulk storage of hazardous materials used in treatment processes. Information and a map of all wastewater facilities regulated under the SPDES permit can be found online through the [DECinfo Locator](#) and the [NYS Clearinghouse](#).

There are five wastewater facilities regulated in Orangetown, four of which are located in the source water areas. Two facilities, U & A Construction Corp. and Linde Advanced Material Technologies, are located in the Blauvelt critical area. Two additional facilities, the Rockland County Sewer District No. 1 and Orangetown Sewer District No. 2 Sewage Treatment Plant, are located in the Sparkill source water area. **The fifth wastewater facility is Pearl River Campus LLC, located in northwestern Orangetown, just outside the Nanuet source water area.**

2.2.2.4 Petroleum Bulk Storage

New York State's Petroleum Bulk Storage (PBS) Program defines a PBS Facility as a property that has one or more tank systems that are designated to store a combined capacity of more than 1,100 gallons of petroleum in aboveground (AST) and/or underground (UST) storage tanks or one or more USTs that are designated to store 110 or more gallons of petroleum. If a property meets the above criteria, it must be registered with the DEC ([NYSDEC](#)). Information about registered facilities can be found online through the NYS DEC's [Bulk Storage Database Search](#), and a map of all locations is available through the [DECinfo Locator](#) and [NYS Clearinghouse](#).

Leaks from storage tanks and fill ports introduce petroleum products such as gasoline and diesel, and gasoline compounds such as benzene, toluene, ethyl benzene, MTBE, and xylene into the environment ([NYSDEC](#)). These compounds are common volatile organic compounds (VOCs). VOCs are organic chemical compounds that are resistant to degradation and are easily transported in the environment. This makes them difficult to remediate ([David and Niculescu, 2021](#)).

PBS facilities are present in the Blauvelt and Nanuet well fields' source water areas and the Sparkill well field's critical area. Any spills associated with these PBS facilities are listed in section 2.2.2.11 Spill Incidents.

Table 2.2.2-4: PBS Facility Information in Source Water & Critical Areas					
Site No.	Site Location	Status / Expiration Date	Tank Capacity	Material Stored	Tank Status
3-990205 3-601818	552 North Middletown Rd (Nanuet Source Water Area)	Active 8/29/2027	300 gal AST	Used oil (heating, on-site consumption)	In Service
			500 gal AST	Lube oil	Closed - Removed
			10,000 gal UST	Gasoline/ethanol	In Service
		Unregulated or Closed 6/21/2011	10,000 gal UST	Diesel	In Service
			10,000 gal UST	Gasoline/ethanol	In Service
			1,000 gal AST	#2 fuel oil (on-site consumption)	Closed - Removed
			55 gal drum	Waste oil/used oil	In Service
3-991095	230 North Middletown Rd (Nanuet Source Water Area)	Active 1/1/2023	2,000 gal UST	#2 fuel oil (on-site consumption)	In Service
3-601817	592 Route 303 (Blauvelt Source Water Area)	Unregulated or Closed 6/21/2011	500 gal UST	Gasoline	In Service
3-602437	Palisades Interstate Parkway (Sparkill Critical Area)	Active 10/1/2027	10,000 gal UST	Gasoline/ethanol	In Service
			10,000 gal UST	Gasoline/ethanol	In Service
			10,000 gal UST	Gasoline/ethanol	In Service
			10,000 gal UST	Diesel	In Service
Source: NYSDEC Bulk Storage Database					

2.2.2.5 Chemical Bulk Storage

New York State's Chemical Bulk Storage (CBS) Program regulates facilities that store hazardous substances (as listed in [6 NYCRR Part 597](#)) in ASTs larger than 185 gallons, any size UST, or in a container than can store 1,000 kg or more for a period of 90 consecutive days or more ([NYSDEC](#)). Information about registered facilities can be found online through the NYS DEC's [Bulk Storage Database Search](#), and a map of all locations is available through the [DECinfo Locator](#) and [NYS Clearinghouse](#).

CBS facilities are present in the Nanuet source water and critical areas and the Blauvelt and Sparkill source water areas. The following information is available on these facilities:

Site No.	Site Name	Facility Type	Status / Expiration Date	Location
3-000109	Lake Nanuet Pool Complex	Municipality	Active 6/20/2025	27 Lake Nanuet Dr (Nanuet Critical Area) [Clarkstown]
3-000125	Wyeth-Ayerst (now Pfizer)	Other	Unregulated or Closed 7/5/2003	North Middletown Rd (Nanuet Source Water Area)
3-000231	Materials Research Corp.	Manufacturing (other than chemical) / Processing	Unregulated or Closed 11/10/1993	Route 303 & Glenshaw St (Blauvelt Source Water Area)
3-000101	Avery Dennison, Information & Brand Management	Manufacturing (other than chemical) / Processing	Unregulated or Closed 9/18/2019	524 Route 303 (Blauvelt Source Water Area)
3-000348	Rockland County Sewer District No. 1	Municipality	Active 7/23/2027	4 Route 340 (Sparkill Source Water Area)
3-000466	Orangetown Sewage Treatment Plant SD No. 2	Municipality	Active 9/8/2024	127 Route 303 (Sparkill Source Water Area)

Source: [NYSDEC Bulk Storage Database](#)

Wyeth-Ayerst (CBS # 3-000125) lists 53 ASTs, of which 27 are closed and removed, 16 are closed in place, and 10 have been converted to non-regulated use. Tanks range in capacity from 150,000 gals to 200 gals, however the majority of the tanks ranging from 1,000 gals to 10,000 gals.

Avery Dennison, Information & Brand Management (CBS # 3-000101) lists 10 ASTs and 6 USTs. All have been closed and removed except for one AST (2,000 gals) that has been converted to non-regulated use and one UST (5,000 gals) that has been closed in place. All tanks had a capacity between 2,500 gals and 10,000 gals.

Materials Research Corp. (3-000231) lists one AST. The tank has a capacity of 700 gals and has been converted to non-regulated use.

No tanks were listed for the Lake Nanuet Pool Complex, Rockland Sewer District No. 1, or Orangetown Sewage Treatment Plant SD No. 2.

2.2.2.6 Dry Cleaning Facilities

Dry cleaning facilities have historically used perchloroethylene (PCE), another common VOC, as a dry cleaning solvent, but many now use a New York State [approved alternative solvent](#). These facilities are regulated under [6 NYCRR Part 232](#), but exemptions are made for facilities using only water-based cleaning processes and liquid carbon dioxide dry cleaning machines. Dry cleaning facilities must have a [New York State Air Facility Registration \(NYSDEC\)](#). A map of all air facility

registrations can be found online through the [DECinfo Locator](#) and the [NYS Clearinghouse](#). For the purpose of this Plan, the data from NYS Clearinghouse was scrubbed to include only dry cleaning facilities.

The information provided by the NYS Clearinghouse only includes active dry cleaning facilities. Three historic facilities with known groundwater contamination were added to the dataset by HVRC. These include Blauvelt Laundry, Sparkle Cleaners, and the former Rockland Psychiatric Center laundry facility.

There are nine dry cleaning facilities in Orangetown, six of which are currently active. The Blauvelt well field is most impacted by these facilities. There are two facilities within the critical area, and two within the source water area. One facility in each designation is currently active. The facility names are as follows:

- Blauvelt Critical Area:
 - Alexander's Quality Cleaners Inc. [Active]
 - Blauvelt Laundry [Historic]
- Blauvelt Source Water Area:
 - La French Cleaners [Active]
 - Sparkle Cleaners (Orangeburg Shopping Center) [Historic]

Alexander's Quality Cleaners uses PCE in their one drycleaning machine. La French Cleaners uses Exxon DF-2000 as a solvent for their one drycleaning machine. Exxon DF-2000 is one of NYSDEC's approved alternative solvents.

2.2.2.7 Remediation Sites

The NYSDEC keeps record of sites in need of remediation.

The State Superfund Program is an enforcement program that identifies sites with suspected inactive onsite hazardous waste disposal and ensures that the contamination is addressed. Each site in this program goes through investigation, evaluation, cleanup, and monitoring ([NYSDEC](#)).

The Brownfield Cleanup Program encourages the cleanup and redevelopment of certain sites. These sites contain contamination above cleanup levels or environmental standards ([NYSDEC](#)).

The Resource Conservation and Recovery Act (RCRA) gives the EPA the authority to control hazardous waste. The NYSDEC is authorized to implement this program for New York State. Sites identified under this program treat, store, or dispose of hazardous waste. Under the RCRA corrective action program, these Sites must comply with regulatory requirements for hazardous waste management and must investigate and clean up all known or likely releases of hazardous waste or materials ([NYSDEC](#)).

Details regarding remediation sites can be found in the [Environmental Remediation Database](#). A map of remediation sites found online through the [DECinfo Locator](#) and the [NYS Clearinghouse](#). The following remediation sites are located within the source water or critical areas of the well fields:

Blauvelt Critical Area

- Blauvelt Laundry (State Superfund Program)
- Materials Research Corporation (Brownfield and Voluntary Cleanup Programs)

Blauvelt Source Water Area

- Avery Dennison – Information and Brand Management (Resource Conservation and Recovery Program)
- Orangeburg Shopping Center (Brownfield Cleanup Program)
- Xerox Corporation (State Superfund Site)
- Camp Blauvelt (State Superfund Site)

Nanuet Source Water Area

- Lederle Lab (Resource Conservation and Recovery Program)

The following information is available from the NYSDEC on these sites:

Blauvelt Laundry

Blauvelt Laundry is listed in the State Superfund Program as Class 2. Class 2 is assigned when a site has confirmed hazardous waste disposal, and that this disposal represents a significant threat to public health or the environment. It can also be assigned to sites listed on the Federal National Priorities List. Blauvelt Laundry operated as a dry-cleaning facility since the late 1960s. The primary contaminant of concern at the site is tetrachloroethene (PCE). Soils, groundwater, and indoor air are impacted by PCE. PCE in groundwater on the site was found to be between non-detect and 10 ppb. In August 2014, the DEC proposed an Interim Remedial Measure for the site, which is performed when a source of contamination can be effectively addressed without extensive investigation and evaluation.

The Blauvelt well field is listed in the State Superfund Program under Class N. In 1978, the Blauvelt 15 was found to have concentrations of 40 ppb of PCE. The site was assessed to have contaminated groundwater from Blauvelt Laundry, an upgradient, off site source.

Materials Research Corporation

Materials Research Corporation is listed in the Brownfield Cleanup Program as Class A. Class A (Active) is for non-registry sites where remedial work is underway and not yet complete. Since 1961, the facility on the site purified metals and formed metal targets used in machines that manufacture electronic chips. Degreasing agents were involved in these processes. Primary contaminants of concern are trichloroethene (TCE), tetrachloroethene (PCE), carbon tetrachloride, cis-1,2 dichloroethene (DCE), 1,1 dichloroethane, and 1,1,1 trichloroethane (TCA). The following amounts of these contaminants were found in the groundwater:

- TCE: up to 18,000 ppb
- TCA: up to 2,900 ppb
- DCE: up to 150 ppb
- Carbon tetrachloride: up to 7,700 ppb

- 1,1 dichloroethane: up to 150 ppb
- PCE: up to 26 ppb

In May 2016, proposed a remedy to address the contaminants of concern at the site. Groundwater would be treated through use of in-situ chemical oxidation (ISCO).

Avery Dennison

Avery Dennison (formally Paxar Corporation) coated fabric and non-woven goods. The facility generated water- and solvent-based wastes, solvent-contaminated solids and rags, and spent solvents. This site is listed in the remediation parcel database since it once held RCRA status. The DEC is evaluating whether there is need for additional environmental investigation.

Orangeburg Shopping Center

The Orangeburg Shopping Center is listed in the Brownfield Cleanup Program and classified as Code C (Complete). This is given to sites where remediation has been determined to be satisfactory under the remediation program. Dry cleaning solvents and their degradation products, such as PCE, TCE, DEC, and vinyl chloride (VC), were the primary contaminants of concern since a dry cleaner has operated in the plaza since 1966. After remediation, residual contamination exists in the soil and groundwater, which is managed by a Site Management Plan.

Xerox Corporation

Xerox Corporation is listed in the State Superfund Program as Class 4. Class 4 is assigned when a site has been properly closed but still requires continued site management to meet regulator compliance. The facility refurbished copiers and copier parts using chlorinated solvents. The site had two USTs, where there were documented releases in the 1970s. Primary contaminants of concern at the site are PCE, TCE, 1,1-dichloroethene, and 1,2-dichloroethane. Remedial activities are complete, but residual contamination remains. The groundwater contamination plume is managed by pumping and treating of groundwater in the area of contamination.

Camp Blauvelt

Camp Blauvelt is listed in the State Superfund Program as Class P. Class P signifies a site where there is indication that contamination might be present. Further information is necessary to determine if action is needed. Camp Blauvelt was a small arms range between 1910 and 1913. Copper and lead are the contaminants of concern at the site and were detected in soil above background levels. Therefore, the site was recommended for future evaluation.

Lederle Lab

Lederle Lab, now Pfizer, has operates as a pharmaceutical manufacture, research, and development facility since 1930. The site is listed under the RCRA program as Class A (Active). TCE is the primary contaminant of concern in the groundwater. This is being monitored through natural attenuation.

2.2.2.8 Inactive Solid Waste Landfills

There are approximately 1,900 inactive solid waste landfills across New York State, many of which operated during a time when regulations required soil covers without any type of investigation for impacts to groundwater. Since then, increased knowledge of emerging contaminants has led the DEC to develop the Inactive Landfill Initiative to assess and mitigate the known inactive landfill sites. The DEC prepares an annual report for this program, with focus on emerging contaminants such as PFAS and 1,4-dioxane. Inactive landfills can also leach other chemicals such as volatile organic compounds and metals into the groundwater ([NYSDEC](#)).

A map of all inactive solid waste landfills can be found online through the [DECinfo Locator](#) and the [NYS Clearinghouse](#).

There are five inactive landfill sites in Orangetown. Two of these landfills are located within the well field source water areas. One in the Blauvelt source water area (Parseghian) and the other in the Sparkill source water area (Camp Shanks SLF). Parseghian is set to be investigated by the DEC in 2028, so current groundwater impacts are unknown. Camp Shanks has been investigated and was found to have PFAS or 1,4-dioxane in exceedance in onsite groundwater samples. However, the contamination is contained on the site. The DEC recommended periodic source monitoring and/or mitigation.

2.2.2.9 Residential Land Use

Residential properties are the most common use of land in Orangetown, claiming approximately 39% of land use (Orangetown Comprehensive Plan, 2023). Residential properties use of lawn and garden chemicals, including fertilizers or pesticides, can run off or infiltrate the ground and contaminate source water with excess nitrogen or phosphorus (NYSDEC draft Framework).

In 2025, Orangetown signed a letter urging the NYSDEC to enforce the NYS Nutrient Runoff Law regarding the retail sale of phosphorus-containing fertilizers with the goal of reducing excess phosphorus in waterbodies. Phosphorus has impaired waterbodies in NYS, including Lake DeForest, which is part of Orangetown's water supply. The letter suggests that the NYSDEC develops educational outreach materials, maintains a database of retailers selling fertilizers, annually notifies retailers of the requirements of the law, conduct regular enforcement sweeps of these retail locations, and tracks phosphorus levels in affected waterbodies to determine effectiveness of these measures.

Residential properties were mapped from information provided through the [NYS Clearinghouse](#). The NYS Tax Parcels shapefile compiles information on each parcel through the 2022 assessors rolls, including the properties land use code. New York State Department of Taxation and Finance (NYSDFT) designates any [property type classification](#) in the 200s as residential.

Residential land use makes up 50% or more of all but the Blauvelt critical area and the Sparkill source water area. The following table lists the percentage of residential land use in each of the source water and critical areas:

Well Field	Source Water Area	Critical Area
Blauvelt	51%	43%
Nanuet	70%	75%
Pearl River	57%	92%
Sparkill	35%	68%
Tappan	68%	70%

2.2.2.10 Septic Systems

Septic systems typically serve residential or commercial properties and receive less than 1,000 gallons of sewage per day. They do not require a permit from the NYSDEC and maintenance is the responsibility of the property owner. However, in Rockland County, the Rockland County Health Department issues plan approvals for new systems and repairs, preforms installation inspections, and provides guidance for system failures for all non-SPDES residential and commercial septic systems. The County also assists residents with the NYS Septic System Replacement Fund. While a benefit of septic systems is allowing direct recharge to the aquifer, if they are not properly maintained, they can introduce contaminants such as bacteria and nutrients into the source water (NYSDEC draft Framework).

Properties served by private septic systems were mapped utilizing information provided through the [NYS Clearinghouse](#). The NYS Tax Parcels shapefile compiles information on each parcel through the 2022 assessors rolls, including whether the parcel is served by a private or public sewer. The data indicates there are 273 properties in Orangetown that are currently served by septic systems. Of those 273 properties, only 59 are located within the source water or critical areas with the following breakdown:

Well Field	Source Water Area	Critical Area
Blauvelt	31	2
Nanuet	0	0
Pearl River	18	0
Sparkill	7	0
Tappan	0	1

In 2010, the lower segment of the Sparkill Creek was listed on the NYS Section 303(d) List of Impaired Waterbodies for fecal coliforms and dissolved oxygen ([NYSDEC](#)).

2.2.2.11 Spill Incident Reports

Every year, accidental releases of petroleum, toxic chemicals, gases, and other hazardous materials occur in New York State. According to the NYSDEC, approximately 90 percent of all reported spills involve petroleum products, and the rest involve other hazardous substances, unknown materials, and materials such as raw sewage and cooking grease ([NYSDEC](#)).

The NYS DEC, through the Spill Response Program, responds to reported releases to investigate and take action. Many reports are small quantity releases that are contained and cleaned up quickly. These inflict little damage on the environment. However, larger, uncontained spills can seep through soil and enter storm drains which impact water sources ([NYSDEC](#)).

Information on all reported spills can be found through the [Spill Incidents Database](#). The address listed on these spill reports were mapped to determine if spills had occurred within the source water and critical areas. Spill incident reports in and near Orangetown were reviewed from January 2019 through December 2024. **The table below lists the number of spill incidents reviewed and the number in each of the well field source water and critical areas. The number in the parentheses denotes spills occurring in the critical areas.** Spill incidents are sorted by material spilled.

Spilled Material	No. Incidents	Source Water & Critical Area				
		Blauvelt	Nanuet	Pearl River	Sparkill	Tappan
Fuel Oil	85	2	3	1	5 (2)	
Diesel	34				1	
Gasoline	24	1	1		2	
Unknown Petroleum	19				1	
TCE; PCE	2					
PFOA	1	(1)				
Benzo(k)fluoranthene	1					
Hydraulic Oil	23					
Transformer Oil	222	5	3 (1)		3 (1)	1
Motor Vehicle Fluid	15		1		1	
Waste Oil/Used Oil	5					
Raw Sewage	10				2	
Unknown	33	(1)	1 (1)		1 (1)	
Other	19	(1)			2	

Source: [NYSDEC Spill Incident Database](#)

Transformer oil was the most common material spilled. These occurred after storm events, and the amount spilled was typically small. Fuel oil is the next most common material spilled. This is likely from leaks in fuel oil USTs, which are used to heat buildings and homes.

Due to the importance of the well critical areas, following table describes the spills that were reported in those areas:

Spill Date	Spill No.	Material Spilled	Resource Affected	Spill Location	Spill Status
1/4/1990	8909584	Gasoline and MTBE (Unknown Amount)	Groundwater	Palisades Parkway (Sparkill Critical Area)	Not Closed

6/4/2020	2001594	Other (Unknown Amount)	Soil, Sewer	23 Rolfe Road (Nanuet Critical Area)	Closed (6/4/2020)
7/1/2021	2103050	Transformer Oil (Unknown Amount)	Soil	20 Pine Tree Lane (Sparkill Critical Area)	Closed (7/2/2021)
12/2/2021	2107973	#2 Fuel Oil (Unknown Amount)	Unknown	114 Campbell Road (Sparkill Critical Area)	Closed (2/1/2022)
4/20/2022	2200563	Cooking Grease (Unknown Amount)	Unknown (Drain)	580 Route 303 (Blauvelt Critical Area)	Closed (4/20/2022)
5/16/2022	2201361	Perfluorooctanoic Acid (Unknown Amount)	Groundwater	Route 303 at Spruce Street (Blauvelt Critical Area)	Not Closed
5/31/2022	2201886	#2 Fuel Oil (Unknown Amount)	Soil	163 Austin Avenue (Sparkill Critical Area)	Closed (9/1/2022)
6/10/2022	2202207	Other (Unknown Amount)	Air	2 Glenshaw Street (Blauvelt Critical Area)	Closed (6/10/2022)
6/2/2023	2301777	Odor Complaint (Unknown Material)	Air, Indoor Air	Piermont Street at Sparkill Avenue (Sparkill Critical Area)	Closed (6/2/2023)
6/18/2024	2402451	Transformer Oil (25 Gal)	Soil	2 April Court (Nanuet Critical Area)	Closed (6/26/2024)

Source: [NYSDEC Spill Incident Database](#)

The 1990 spill in the Sparkill critical area (Spill No. 8909584) was included in this list even though it occurred outside the 5-year period reviewed, because of its known impacts to drinking water. In December 2022, Precision Environmental Services, Inc. mapped the VOCs groundwater plume from the spill. The plume extended onto the property where Sparkill 8 and 11 are located at concentrations of 10 µg/l or less.

2.2.3 Conclusion

After reviewing the background information on the system and the PCSI, it was assessed that there are three main categories of concern: (1) residential property and land use, (2) commercial and industrial land use, and (3) source water sourced from outside of Orangetown's boarder.

Residential property and land use may introduce contaminants such as nitrogen, phosphorus, and fecal bacteria into the groundwater through fertilizer and pesticide application and failing septic systems.

Certain commercial and industrial land usage can introduce hazardous chemicals such as petroleum products, metals, PCE, TCE, and PFAS into the groundwater. These contaminants can be sources from leaking storage tanks at places like gas stations or manufacturing plants. They can also enter through stormwater runoff on properties. Chemicals spilled on impervious surfaces that are not cleaned properly can run off with precipitation onto nearby pervious areas. They may also enter through wastewater. Some manufacturing plants have wastewater treatment facilities onsite. If the industrial chemicals are not treated properly before being discharged, they may enter the environment.

Since Orangetown's water is supplied by a County-wide system, not all Orangetown's water is sourced from within its borders. Because of this, some of Orangetown's drinking water is left up to the protection of neighboring municipalities.

2.2.4 References

Information on the potential contaminant sources and their locations was gathered from NYSDEC, NJDEP, USEPA, USGS, and stakeholder knowledge. Information on the water system was collected from the Annual Water Withdrawal Reports, Rockland County Comprehensive Plan: Rockland Tomorrow, and Heisig (2010). Information on land use in Orangetown was gathered from the 2023 Orangetown Comprehensive Plan. Orangetown's brine practices was provided by the [Orangetown website](#), and a 2017 article in the Nyack News & View titled "[Earth Matters: Worth His Salt](#)" by Susan Hellauer. A publication titled *Volatile Organic Compounds (VOCs) as Environmental Pollutants: Occurrence and Mitigation Using Nanomaterials* by [David and Niculescu \(2021\)](#) was used as reference for information on VOCs. Lastly, information on the Palisades Parkway gas station spill in 1990 was provided by Orangetown DWSP2 Committee Member, Larry Vail.

David, E.; Niculescu, V.-C. Volatile Organic Compounds (VOCs) as Environmental Pollutants: Occurrence and Mitigation Using Nanomaterials. *Int. J. Environ. Res. Public Health* 2021, 18, 13147. <https://doi.org/10.3390/ijerph182413147>

3 Protection and Management

Using information gathered during the Drinking Water Source Assessment phase and Stakeholder concerns, the Stakeholder Committee identified five priority issues to address with this Plan. These five issues were chosen because they were deemed to be the most effective way to meet the needs of Orangetown and the Stakeholder group while also protecting against future contamination from multiple different sources. Specific protection and management methods were developed to address these issues.

3.1 Identify Protection and Management Methods

Discuss how priority issues were identified. What the goal of creating priority issues is. How the community prioritized the issues (priority criteria), summary statement of relationships that will need to be developed in order to accomplish any of the goals. Background on any of the implementation methods.

After reviewing the background information on the system and PCSI, the DWSP2 Committee identified the following priority issues:

Priority Issue 1: Septic Systems

There is limited data available on fecal coliform in the groundwater and surface waters of Orangetown. However, it is likely entering the environment in some capacity. The locations of septic systems in Orangetown were identified using information from the Assessor's Office. However, the accuracy of this data is unverified. In order to understand and protect against further and future contamination from septic systems, it was determined that a comprehensive inventory should be undertaken to confirm which parcels have active septic systems. This issue is addressed in Project Profile 1: Private Septic System Database.

Priority Issue 2: Extensive Water System

Orangetown is just one town that receives water from the Veolia system, and the wells in Orangetown are only a small portion of the source water system. In order to develop a robust and comprehensive source water protection program, intermunicipal collaboration between the other Rockland County towns and villages needs to begin. This issue is addressed in Project Profile 2: Countywide Coordinated Municipal Outreach.

Priority Issue 3: Residential Awareness

A significant portion of the source water and critical areas surrounding the well fields are residential properties. Ensuring that residents are made aware of ways that they may be inadvertently introducing hazardous substances to the groundwater is important to limiting the amount of non-point source pollution coming from residential land use. This issue is addressed in Project Profile 3: Public Awareness Leading to Drinking Water Source Protection.

Priority Issue 4: Extensive Development

Many of the critical areas surrounding the well fields in Orangetown are developed. It is important to limit future development or redevelopment that may pose a risk to the source water by

introducing hazardous chemicals into the groundwater. This issue is addressed in Project Profile 4: Update Town Code with Water Protection Methods.

Priority Issue 5: Continuing Monitoring of PCSI

In order for Orangetown to continue to monitor potential contaminant sources and respond to new and emerging threats, there should be a practice in place to host and update the data in the inventory. This issue is addressed in Project Profile 5: Host and Maintain Source Water Mapping.

3.2 Project Profiles

The project profiles address each of the contaminants of concern outlined in the Potential Contaminant Source Inventory and are meant to be a guide for protection and management methods, and implementation timeline and steps. Each project profile outlines the issue and includes the implementation timeline and steps, potential contaminant source, goals and priorities, costs of the project, and potential funding sources and partners.

The priority level of the Profile is listed as either high, medium, or low. This level was chosen based on the immediate priorities of Orangetown and its stakeholders. Costs are broken down into low, medium, and high. Low-cost projects are generally under \$10,000. Medium (above \$10,000 but under \$30,000) and High-cost projects (above \$30,000) might be best suited for a capital project or grant. The timelines are broken down into short, medium, and long-term projects. Short term projects can be done immediately, medium is within 5 years, and long-term are more than 5 years from now. Some projects are ongoing and listed as such.

Project Profile 1: Private Septic System Database

TARGETED POTENTIAL CONTAMINANT SOURCE: Fecal bacteria entering the groundwater due to improperly managed septic systems and out of date septic system records.

While many of Orangetown's homes and businesses are served by a public sewer system, some remain on private septic systems. Currently available septic system records rely on assessor information by parcel, but this data may be outdated or incomplete. Missing data may include information on historic septic system, recently updated systems, or permanently closed systems.

Septic systems located within the critical areas may introduce fecal bacteria into the water supply if they are not properly maintained. This plan recommends the compilations of up-to-date information on parcels with private septic systems in Orangetown and develops targeted informational outreach that informs the public on proper septic system maintenance to avoid groundwater contamination and who to contact for more information. It will also enable outreach for financial assistance.

Landowners with active septic systems may be eligible for financial assistance for septic system upgrades through NYS EFC Septic System Replacement Fund. Those identified through this database will be encouraged to contact the Rockland County Department of Health (RC DOH) to determine eligibility.

To build this database, historic septic systems records will be reviewed and cross checked with sanitary sewer system connection records. **Current and historic septic system records are housed at the RC DOH.** Orangetown maintains records of sewer connections.

Two challenges with this data arose during committee discussion. First, sewer connection information is stored in paper files at the Town of Orangetown, making cross-checking parcels time consuming. Second, it is possible that some parcels may still have an active septic system even though they have been connected to the sanitary sewer system. These active septic systems may only receive waste from certain sections of the building plumbing, such as a washing machine, while the rest of the plumbing is on sewer. There are likely very few instances where this is occurring, but it is something to consider when building the database.

One recommendation on how to account for this potential source of inaccuracy is to require parcels with historic septic systems that have been converted to sewer be inspected at the point of sale. At this time, information in this database on the parcel can be assessed and updated.

GOALS AND PRIORITIES:

- Update Orangetown's records regarding the number of parcels on private septic systems.
- Ensure proper maintenance and contact information is provided for the public
- Manage the influence of septic systems present or proposed in proximity to the municipal wellfields and throughout the upstream source watershed.

Priority Level: High

SUMMARY OF PROTECTION AND MANAGEMENT METHODS:

Methods to reduce the risk and mitigate the threat include:

- Update records regarding parcels served by a private septic system.

- Work with RC DOH to obtain historic septic system data
- Review Orangetown's records of sewer connections, and
- Overlay data to determine which parcels are still on septic
- Develop targeted outreach materials on septic system maintenance to property owners on septic
 - Work with RC DOH for a shared messaging campaign
 - Determine an outreach schedule (ex. quarterly, biannually, etc.)
- Upgrade or conversion of septic systems that do not meet current design requirements.
 - Work with RC DOH to address upgrades for existing septic systems in the watershed
 - Determine if residents are able to apply for the NYS EFC Septic System Replacement Fund
 - Determine if parcel is able to be converted to Orangetown's sewer
- Set up procedure for interacting/collaborating with partners and sharing information and materials.

POTENTIAL COSTS:**Estimated cost:** \$50,000

Potential costs include hiring staff to develop, distribute, and analyze survey results; staff time to review records and determine if there are any gaps; staff time to update and/create a septic system database; staff time to develop and distribute informational pieces.

Cost Classification: HighPOTENTIAL FUNDING SOURCES:

- **Rockland County Department of Health Budget**
- **Town of Orangetown Budget**

POTENTIAL PARTNERSHIPS - PEOPLE AND AGENCIES INVOLVED:

- Program Management Team
- Town of Orangetown
- Rockland County Department of Health, primary contact:
 - Associate Public Health Engineer; melloe@co.rockland.ny.us; 845-364-2616

SUGGESTED TIMELINE:**Short Term:** 1 year for planning**Medium Term:** 1 to 3 years for database completion**Ongoing:** Annually assess database and update as necessary. Annually distribute informational piecesPOTENTIAL BARRIERS:

- Communication with landowners
- Availability of Historic information
- Older homes that might have both a septic system and a sewer connection

IMPLEMENTATION STEPS:

1. Program Management Team, Town of Orangetown, and RC DOH determine what information to include in the septic system database and where to obtain this information.

2. Determine data format and method to compare the historic septic system data, housed at RC DOH, and the sewer connections data, housed at Orangetown.
3. Identify data collection methods, options may include historic record searches or field surveys and inspections.
4. Identify which platform to use in recording the data (ex. Excel, Access)
5. Identify the point person to gather and input the data into the database.
6. Create database.
7. Create materials needed to assist in data collection (ex. spreadsheets, worksheets, checklists).
8. Begin gathering and inputting information into the database
9. Once the database is complete, create a list of contact information for parcels still served by septic systems.
10. Develop and distribute outreach material on septic system maintenance, funding sources, and information on who to contact for assistance.
11. Annually, assess and update the database, contact list, and outreach material, as needed.

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Project Profile 2: Countywide Coordinated Municipal Outreach (Intermunicipal Coordination)

TARGETED POTENTIAL CONTAMINANT SOURCE: Any Unwanted Contamination of Source Water in Source Water and Critical Areas

Veolia sources, treats, and distributes the public drinking water supply in Orangetown. This water is sourced from and distributed throughout much of Rockland County. Therefore, all five of the Towns and 16 of the 18 Villages in Rockland County also receive water from the Veolia's system.

Due to the scale of the system, this DWSP2 plan is only able to cover the portion of the water supply sourced from Orangetown. So, educational materials and land use protections implemented as part of this plan will offer protection to the portion of the water system in Orangetown, leaving the remainder of the water supply to the protections in place by neighboring municipalities.

It is recommended that a coordinated Countywide meeting with Rockland municipalities and Veolia is established to create a designated space to work towards municipal water quality protection goals across the system. This unified group would enable pooling of ideas and resources towards addressing drinking water quality concerns.

One goal of this coordination would be to encourage other municipalities in Rockland County to develop a DWSP2 plan of their own. Another goal would be to engage with Veolia, Rockland County, and other local and regional organizations working on water quality concerns.

Collaborative development of source water protection resources and communications can be facilitated by the Rockland County Task Force on Water Resources Management through the appropriate committee(s) and during regular public meetings. Task Force membership includes water suppliers, municipal officials such as representatives from the Town Supervisors and Village Mayors, in addition to local businesses, and environmental organizations, which helps streamline the implementation of these goals.

GOALS AND PRIORITIES:

- Connect with other municipalities served by the Veolia water system in Rockland County
- Establish shared goals and priorities related to water quality
- Develop shared actions and messaging regarding water quality protection for the Veolia system

Priority Level: High

SUMMARY OF PROTECTION AND MANAGEMENT METHODS:

Methods to reduce the risk and mitigate the threat include:

- Maintain a good working relationship with neighboring municipalities
- Maintain a good working relationship with Veolia
- Periodic coordination with neighboring municipalities
- Establish a shared messaging campaign

POTENTIAL COSTS:

Estimated Cost: \$80,000

Potential costs include staff time [including time for other Organizations such as Rockland County DOH and HVRC] to meet with municipal staff, discuss the benefits of establishing this collaborative meeting, coordinate a meeting time and place, gather information, set an agenda and host the meeting. Additional costs will include time and resources to develop a shared messaging campaign.

Cost Classification: HighPOTENTIAL FUNDING SOURCES:

- **Hudson River Greenway Community Grant** (for educational material development)
 - Funds natural resource protection, regional planning, and environmental education

POTENTIAL PARTNERSHIPS - PEOPLE AND AGENCIES INVOLVED:

- Rockland County Towns and Villages served by Veolia
 - Towns of Clarkstown, Haverstraw, Orangetown, Ramapo, and Stony Point
 - Villages of Airmont, Chestnut Ridge, Grand View-on-Hudson, Haverstraw, Hillburn, Kaser, Montebello, New Hempstead, New Square, Piermont, Pomona, Sloatsburg, Spring Valley, Upper Nyack, Wesley Hills, and West Haverstraw
- Veolia
- Rockland County Task Force on Water Resources Management

SUGGESTED TIMELINE:

Short Term: approximately 1 year for planning and initial communication with municipalities

Medium Term: approximately another 1-2 years to set up regular meetings

Ongoing: Meetings to discuss specific topics, messaging, and frequency of messaging

POTENTIAL BARRIERS:

- Communication across various municipalities and organizations
- Finding a meeting time and frequency that works for everyone
- Establishing a messaging campaign that meets all municipal needs
- Potential efficiency issues in intermunicipal collaboration
- **Identifying and obtaining funding**

IMPLEMENTATION STEPS:

1. Rockland County Water Taskforce will continue to establish and maintain relationships with municipalities served by the Veolia water system. Emphasize the importance of communication to protect drinking water quality.
2. **Rockland County Water Taskforce to facilitate, through the appropriate committee(s), source water protection resources and communication to Rockland County municipalities, water supplies, and local organizations. This will include participation from members of the Program Management Team.**
3. Attend regular meetings to develop a shared messaging campaign around drinking water quality protection.
4. Communicate the importance of the use of best management practices near well fields to avoid/mitigate contamination of groundwater.
5. Identify other topics for discussion at these meetings based on discussions with all participating municipalities.

6. Determine messaging information and schedule. **Decide if an outreach campaign is required.**
7. Develop and distribute messaging materials.

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Project Profile 3: Public Awareness Leading to Drinking Water Source Protection

TARGETED POTENTIAL CONTAMINANT SOURCE: Pesticides, Herbicides, Other Lawn and Garden Chemicals, and Any Unwanted Contamination of Source Water in Source Water and Critical Areas

Practices on private properties can lead to impairment of nearby waterbodies by introducing chemicals into the environment through infiltration and runoff. The application of pesticides, herbicides, and other lawn and garden chemicals and the improper disposal of lawn clippings and leaves on properties introduce pollutants such as nitrogen and phosphorus to the environment. Residential properties may contain unknown or unlisted chemical storage. Any spill or usage of these chemicals, known or unknown, could enter the groundwater or nearby waterbodies. An example includes residents washing their cars in their front yards.

In order to increase awareness surrounding potentially harmful chemicals, informational materials on various chemical pollutants and their sources are recommended to be produced, compiled, and distributed to landowners, businessowners, and landscapers across Orangetown. Topics may include information on the potentially harmful chemicals, the importance of chemical maintenance and disposal, alternative, environmentally friendly options, and actions the target audience can take to reduce the introduction of these chemicals to water bodies. All informational materials should include benefits of protecting water sources from a water quality and water quantity perspective and inform the target audience of any federal, state, county, and local codes.

Local and regional organizations and departments within Orangetown have already created outreach and educational materials on some of these topics. In collaboration with these organizations and departments, it is recommended an inventory of all the available informational materials be created and assessed for relevance and gaps.

After the inventory of already available resources is established, additional informational materials can be developed to fill identified gaps. It is recommended that a webpage be created as a central location to house the inventory with links to important information. This will help the target audience easily access all relevant information.

For distribution, the inventory can be assessed to determine the schedule and distribution method on each piece. A welcome packet is recommended to be sent to new homeowners when a property is sold to inform them of these resources. Road signs and other signage can be installed to inform the public. **Relationship building with municipalities and relators may help streamline delivery process of the welcome packet.**

Currently available campaigns and informational pieces:

- Orangetown Highway Department “only rain down the drain”
- [Cornell Cooperative Extension Rockland County circulars](#)
- Orangetown, Piermont, and Nyack leaflets on leaf pick up and yard waste pick up
- [Rockland County Task Force on Water Resources Management](#)
 - **Presentations on water conservation practices**

- Water Use Audit Guidance which focuses on reducing water loss and maximizing water efficiency
- Community resources on source water protection (in development)

GOALS AND PRIORITIES:

- Increased public awareness for watershed protection
- Increased community action towards water quality protection

Priority Level: Medium**SUMMARY OF PROTECTION AND MANAGEMENT METHODS:**

Methods to reduce the risk and mitigate the threat include:

- Collaborate with other organizations working in Orangetown/Rockland County on water quality protection
- Develop informational materials (i.e. road signage, mailings, etc.) that fill informational gaps
- Increase education for Town residents and businessowners

POTENTIAL COSTS:**Estimated Costs:** \$30,000

Potential costs include staff time collaborating with printing costs, signage, mailings and postage, and staff time spent planning and developing informational pieces. This would also be staff time spent developing, hosting, and updating an informational website and collaborating with other organizations.

Cost Classification: Medium**POTENTIAL FUNDING SOURCES:**

- **Town of Orangetown Budget**
- **NYS DEC Hudson River Estuary Local Stewardship Planning Grant**
 - Funds Implement source water protection strategies or management methods identified in a DEC accepted DWSP2 source water protection plan. Activities that enhance protections for drinking water sources are eligible, tailored to local needs, with priority given to surface drinking water sources and watershed areas supplying community water systems.
- **Hudson River Greenway Community Grant**
 - Funds natural resource protection, regional planning, and environmental education.

POTENTIAL PARTNERSHIPS - PEOPLE AND AGENCIES INVOLVED:

- Town of Orangetown
- Program Management Team
- Local Environmental Groups or Organizations (i.e. Sparkill Creek Watershed Alliance, Cornell Cooperative Extension Rockland County)
- Rockland County Task Force on Water Resources Management
- **Rockland County Water Quality Coordinating Committee**

SUGGESTED TIMELINE:

Short-term: Approximately 1 year for initial planning and idea identification for educational outreach; and an additional 1 year for inventory development and grant applications as needed

Medium term: Approximately 1 year for additional material development and distribution

Ongoing: Continued engagement with the community on the importance of source water protection through informational sessions and outreach events.

POTENTIAL BARRIERS:

- Public understanding of the materials presented and their connection to the need to protect water quality in the watershed.
- Balancing this privacy with need to prevent unwanted contamination of the water system.
- Delivery logistics of information packets to property/homeowners

IMPLEMENTATION STEPS:

1. Program Management Team meet to identify methods to educate the public on potential contaminant threats (e.g. informational newsletter, public outreach events, etc.).
2. Identify potential collaborators (e.g. local environmental groups or organizations).
3. Program Management Team to meet with potential collaborators to discuss already available informational materials.
4. Compile all resources on one webpage, with links to sources.
5. Plan distribution methods and schedules.
6. Identify if there are any gaps that need to be filled with additional materials.
7. Apply for funding, if necessary.
8. Develop new informational materials and distribute to the public via social media, informational mailings, web postings, newspaper postings, public meetings, or workshops.

Project Profile 4: Update Town Code with Water Protection Methods

TARGETED POTENTIAL CONTAMINANT SOURCE: Any Unwanted Contamination of Source Water in Critical Areas

Orangetown relies on groundwater for approximately 70% of its water supply. An important tool to protect this groundwater from contamination is the creation of special overlay zones in the Town's code. The purpose of an aquifer overlay zone is to protect the health and welfare of residents of the Town. It is recommended that Orangetown develop an overlay district over the well critical areas as defined by the 2.1.2 Critical Areas section of this plan.

Overlay zones identify areas on the surface that can affect the underlying groundwater and offer water quality protection by setting additional standards for development in the identified areas. The underlying zoning remains in effect unless the overlay zone provisions specifically modify it. Any development, improvements, redevelopment, or subdivisions on a parcel within the well critical areas will be subject to planning board review for the new overlay requirements.

The first step in developing an overlay zone is to map the zone's boundaries. Orangetown's overlay zone will cover the source water critical areas defined by this plan, however it is recommended that these boundaries be reviewed and approved by a qualified hydrogeologist working for the Town before they are adopted to ensure accuracy.

It is recommended that the Program Management Team along with other important stakeholders from the Town of Orangetown convene to discuss the specific provisions to be included in the overlay zone. If desired, the Town may apply for a grant to hire a consultant to assist with this step. Standards should reduce or mitigate the adverse impacts that development or other activities have on the aquifer. When discussing which rules/limits to include in the overlay district, questions such as below should be considered:

- What are we limiting? How should we define those limits?
- What are the rules for new vs. existing businesses?
- What are the rules for if a business is sold?
- Are retrofits needed? What should the retrofits be based off?

Based on conversation with the DWSP2 Committee, recommendations to consider as part of the overlay are as follows:

- Include a Non-Degradation Standard similar to the one included in the Village of Allegany's local law:
 - "No use shall be allowed which can be calculated, shown, or anticipated to degrade the quality of groundwater in a manner that poses a potential danger to public health or safety and no permits or approvals shall be issued for any use which violates this standard. Compliance in with applicable standards, requirements, and permit conditions imposed by federal, state, or county agencies shall be deemed to constitute compliance with this standard. Based on reasonable cause or concern, the Village may require a

property owner or potentially responsible party to collect data clarifying whether the non-degradation standard has been breached or has the potential to be breached.”

- Regulations should be on the manufacture, use, storage, or discharge of any products, materials, or by-products deemed to cause environmental harm
- Consider whether any of the regulations should extend beyond the critical areas to cover surface waterbodies as well as groundwater.
- Expanding stormwater management requirements on new construction in the critical area
 - Requiring a zero-runoff ordinance on newly developed properties
 - Lower requirements for stormwater management from 1 acre for specific land uses
- Creating buffer zones around waterbodies and well heads
- Additional regulations on the installation or replacement of underground storage tanks that are not regulated by NYS
- Requiring specific types of landscaping on residential properties to include plantings good for water filtration and water absorption.
- Require residents to use biodegradable soaps and/or other environmentally friendly detergents when outside (ex. washing their cars)

GOALS AND PRIORITIES:

- Regulate zoning in well field critical areas
- Promote cleaner drinking water by limiting potential future releases of contaminants

Priority Level: High

SUMMARY OF PROTECTION AND MANAGEMENT METHODS:

Methods to reduce the risk and mitigate the threat include:

- Develop new aquifer zoning overlay district for the well field critical areas
- Develop and distribute information to the community on new zoning and regulations

POTENTIAL COSTS:

Estimated Costs: \$100,000

Potential costs include staff time to plan for the overly district, apply for potential grants, develop the overlay, staff time to update town code, hiring of a consultant to field test the critical area boundaries, hiring of a consultant to assist in defining appropriate standards and limits to employ in the overlay district. Additional funding for staff time to develop and distribute materials to the community regarding the zoning and regulation changes

Cost Classification: High

POTENTIAL FUNDING SOURCES:

- **Town of Orangetown Budget**
- **Hudson River Estuary Program Local Stewards Planning Grant**
 - Provides funding for planning a conservation overlay zone or natural resource protection regulations for priority lands and waters identified as important in a municipal or inter-municipal plan.
- **NYS DOS Smart Growth Program Community Planning and Zoning Grant Program**

- Provides funding for preparation and local adoption of new or updated community wide zoning regulations or the amendment of existing zoning regulations for part of town, village, or city. Zoning must integrate smart growth principals.

POTENTIAL PARTNERSHIPS - PEOPLE AND AGENCIES INVOLVED:

- Town of Orangetown
- Program Management Team
- Rockland County Task Force on Water Resources Management
- Rockland County Department of Planning

SUGGESTED TIMELINE:

Short-term: Approximately 1-2 years for initial planning and grant application

Medium-term: Approximately another 2-3 years for development and finalization

POTENTIAL BARRIERS:

- Balancing well location privacy with need to prevent unwanted contamination of the water system.
- Additional funding is needed to assist with verifying the overlay district boundaries and identifying standards to implement.
- Effort to enforce the new zoning district regulations

IMPLEMENTATION STEPS:

1. Program Management Team meet to confirm the areas to include in the new zoning overlay district
2. Program Management Team discuss update with Orangetown Planning and Zoning Boards
3. Develop a committee to work on the creation of the new overlay district
4. Apply for grant funding
5. Hire a consultant to field test the critical area boundaries and assist with determining which standards to include in the overlay district
6. Discuss and determine which standards to include with consultant and committee
7. Update the Town Code with the new overlay district
8. Develop informational materials on the update that can be distributed to the public via social media, informational mailings, web postings, newspaper postings, public meetings, or workshops.
9. Distribute materials to the Town

ADDITIONAL RESOURCES:

- Resource Guide: [Creating Conservation Overlay Zoning: A Guide for Communities in the Hudson River Estuary Watershed 2022](#)
- Village of Allegany [DWSP2 Plan](#)
 - Town of Allegany [Zoning Map Draft](#)
 - Town of Allegany [Local Law](#)
 - Village of Allegany [Aquifer Protection Overlay District Map](#)
 - Village of Allegany [Zoning Law Amendment](#)
- Indian Brook-Croton Gorge [Watershed Protection Overlay](#)
 - Town of Ossining [Draft Local Law](#)
 - Town of New Castle [Local Law](#)
 - Town of Cortlandt [e code](#)

- Water conservation codes
 - Town of [Yorktown](#), NY
 - [Livingston](#), NJ
 - [Nassau County](#), NY
- Historic District Codes (with landscaping/vegetation requirements)
 - City of [Schenectady](#), NY
 - Village of [Rhinebeck](#), NY
 - City of [Beacon](#), NY
- Other codes:
 - Town of [Warwick](#), NY (Ridgeline Overlay District with vegetation and landscaping requirements)
 - Town of [Warwick](#), NY (Aquifer Overlay District)
 - Village of [Woodbury](#), NY (Water Quality Protection Overlay District)

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Project Profile 5: Host and Maintain Source Water Mapping

TARGETED POTENTIAL CONTAMINANT SOURCE: Any Unwanted Contamination of Source Water in Critical Areas

Source water maps are recommended to be converted to an online format so that the maps can be easily viewed and digested by all audiences. These maps will be hosted and maintained by Orangetown and/or Rockland County Planning Department moving forward, allowing for ease of access to the potential contaminant source database and the ability to update maps as needed.

Future updates to the maps will enable Orangetown to adjust and respond to any emerging contaminant sources. These maps will also include the updated zoning and regulations discussed in Project Profile 4 once they are finalized.

GOALS AND PRIORITIES:

- Manage source water and critical area potential contaminant sources
- Continue to adapt to a changing landscape

Priority Level: Low

SUMMARY OF PROTECTION AND MANAGEMENT METHODS:

Methods to reduce the risk and mitigate the threat include:

- Continue to keep track of identified and emerging contaminant sources
- Host source water maps in a format that is accessible to the community

POTENTIAL COSTS:

Estimated Costs: \$20,000

Potential costs include staff time to set up the source water maps in the mapping platform, staff time to maintain the database and answer any inquiries, staff time to update the source water maps as needed with additional contaminant sources. Costs also include annual fees to use and maintain the software where the data is housed.

Cost Classification: Medium

POTENTIAL FUNDING SOURCES:

- Town of Orangetown

POTENTIAL PARTNERSHIPS - PEOPLE AND AGENCIES INVOLVED:

- Town of Orangetown
- Program Management Team
- Rockland County Department of Planning

SUGGESTED TIMELINE:

Short-term: Approximately 1 year for planning and data transfer

Ongoing: Continuous hosting and updating of the database

POTENTIAL BARRIERS:

- Identifying which platform to host the maps on
- Managing the cost of hosting the data
- Identifying staff member(s) to maintain and update the database

IMPLEMENTATION STEPS:

1. Program Management Team and Town of Orangetown obtain source water map data from HVRC
2. Program Management Team and Town of Orangetown identify the platform in which to host the maps
3. Determine where the hosted maps and database will be listed (either with the Town of Orangetown or with Rockland County Department of Planning)
4. Program Management Team and/or Town of Orangetown staff member upload data into the mapping platform and develop maps
5. Determine who will be responsible for maintaining the database and what access will be given to the public
6. Determine a schedule for updating the database and maps
7. Publish the maps

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4 Program Management

This Plan was created to provide the Town of Orangetown with the information and tools the Town needs to protect their drinking water sources. The completed Plan will require administration, reevaluation, and revisions for the protection efforts to move forward. In order to accomplish this, the DWSP2 Committee will designate a Program Management Team.

4.1 Program Management Team

A Program Management Team (PMT) will guide and oversee the implementation of this Plan. PMT members were selected based on their capacity, knowledge, and ability to assist with the Project Profile recommendations. **The Town Supervisor** will be the PMT lead. The PMT is responsible for reviewing and updating the plan, planning for and implementing the Project Profiles, and generating and sharing progress reports with the community. When planning for implementation, the PMT will discuss ways the public can be engaged to meet implementation goals. Future changes and succession of the group will be planned for during the initial meetings.

4.1.1 Program Management Team Members

Table 4.4.1 lists the members, affiliations, and applicable projects of the PMT. This table will be updated annually with any changes that have been made to the group.

Member Name	Title and Affiliation	Project Area
Teresa Kenny	Supervisor, Town of Orangetown	All Projects
Allison Kardon	Confidential Secretary to the Supervisor, Town of Orangetown	All Projects
	Department of Environmental Management and Engineering, Town of Orangetown	PP1: Septic System Database PP3: Public Awareness for Source Water Protection PP4: Update Town Code with Water Protection Methods
Jim Dean	Superintendent of Highways, Highway Department, Town of Orangetown	PP3: Public Awareness for Source Water Protection PP4: Update Town Code with Water Protection Methods
Audrey Lupachino	Planning Assistant, Department of Building, Zoning, Planning, Administration and Enforcement, Town of Orangetown	PP3: Public Awareness for Source Water Protection PP4: Update Town Code with Water Protection Methods

		PP5: Host and Maintain Source Water Mapping
	Parks and Recreation Office, Town of Orangetown	PP3: Public Awareness for Source Water Protection PP4: Update Town Code with Water Protection Methods
Nicole Laible	Coordinator, Rockland County Task Force on Water Resources Management	PP2: Intermunicipal Coordination and Outreach PP3: Public Awareness for Source Water Protection PP4: Update Town Code with Water Protection Methods
Ariana Polanco	Water Conservation Coordinator, Rockland County Task Force on Water Resources Management	PP4: Update Town Code with Water Protection Methods
Sophia Salis	Director of Communications and Community Relations, Veolia	As needed for all projects

4.1.2 Revision Timeline

The PMT will meet on a regular meeting schedule, as determined by the team at the kickoff meeting, to review the Plan and will coordinate with their respective organizations to share the ideas and methods contained within this Plan. After the PMT identifies its first project, PMT members responsible for that project area will meet regularly until the project’s completion. Project area PMT members will report back to the whole PMT, as needed. Annually, the plan will be reviewed by the whole PMT, updated, and made available with any revisions that have been made throughout the year. Revisions will be documented in Chapter 5, Section 5.1.3: Updates/Revisions. The revised Plan will be made available on Orangetown’s [DWSP2 website](#).

4.2 Plan Documentation

This Plan was developed through a series of stakeholder group meetings which began June 27th, 2024. Meeting recordings and documents such as agendas, notes, and draft materials can be found on Orangetown’s [DWSP2 website](#). The source water maps and their data and references will be housed by Orangetown. Data references will also be listed in [the Reference Section](#).

The DWSP2 Committee reviewed each chapter of the Plan and provided comments both during scheduled meetings and through written communication. HVRC addressed these comments and compiled them into the final Plan submitted for state review.

After state acceptance, it is recommended the PMT monitor and document progress on implementation in annual progress reports. More information on progress reports is provided in [Chapter 5: Implementation and Maintenance](#). These progress reports may be shared on Orangetown's [DWSP2 website](#) in order to inform the public about the status of the Plan implementation.

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5 Implementation and Maintenance

Implementation of this Plan is a dynamic process that will involve adapting and revising the plan as Project Profile recommendations and actions are implemented, new potential contaminant sources are identified, land use changes occur, and changes occur to the source. Accounting for these potential changes will provide Orangetown with an ever-evolving approach to source water protection.

5.1 Implement the Program

To begin on implementation, the PMT will hold an initial kick-off meeting where it is recommended they discuss the following topics:

- The roles and responsibilities of each of the PMT members
- A meeting schedule and frequency
- A plan for future changes and succession of PMT members
- Methods for the team to communicate outside of the PMT meetings
- The Project Profiles and their respective implementation timelines

After the PMT has had time to review the Project Profiles, they should be used to determine next steps. The team should consider higher priority actions first and determine if any of the actions can be implemented concurrently. To begin with implementation, the PMT may want to take into account the following actions:

- Contacting identified partners, if they are not already involved in the effort, and bring them on to discuss implementation
- Assign PMT members to the actions they are best suited to assist with
- Define success and outline measurable outcomes for each project profile
- Engage the community through public outreach and communication to help foster momentum in implementation

5.1.1 Public Involvement

Explain how the public was involved in the development of the plan or how they will be involved in the future.

During implementation of the Plan, it is recommended the community be informed of progress made and opportunities to get involved through public outreach and communication. These outreach and communication methods will be established by the PMT and may vary depending on the project needs. It is recommended the PMT consider technological gaps between residents and non-English speakers.

A potential avenue of public engagement may include the Rockland County Task Force on Water Resources Management's regular webinar events. Annual progress reports and updates will also be made available to the public on Orangetown's DWSP2 website and shared via social media. These reports may also be shared in Orangetown's Supervisor's newsletter, on the Highway Department and Supervisors websites, the Rockland County Task Force on Water Resources Management's social media, and Veolia's social media.

5.1.2 Meeting Schedule

The PMT will document when it met, and the key topics discussed in order to keep track of progress made on implementation. Topics may include planning for implementation, community engagement, or grant funding. The following table will be updated with the annual revisions to include this information.

Table 5.1.2-1: PMT Meeting Schedule & Topics	
Date	Topics Covered

5.1.3 Updates/Revisions

As revisions are decided upon and made to this Plan, the following table will be updated to reflect these changes. The notes section will include what was changed, why it was changed, and where the change can be found in the Plan. If revisions are necessary, they will be made annually unless the PMT deems an update important to be published sooner.

Table 5.1.3-1: Plan Update/Revision Tracker		
Report	Date	Notes
First Report		Initial state accepted DWSP2 Plan
Update/Revision 1		
Update/Revision 2		
Update/Revision 3		
Update/Revision 4		

5.2 Progress Reports

It is recommended the PMT generate and share annual progress reports with the community to help build support for implementation. These progress reports may highlight key milestones and accomplishments in implementation and/or discuss challenges and future work. The reports will be completed annually and will be shared on Orangetown’s [DWSP2 website](#). A progress report template from the DEC can be found in [Appendix B](#) and on the [NYSDEC’s DWSP2 Fact Sheets and Resources](#) website.

References

Works Cited

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Data Sources

Layer	Date Created or Acquired	Description
Town Boundaries	7/25/2023	Clipped to Rockland County from NYS Civil Boundaries, Towns downloaded from NYS GIS Clearinghouse.
Village Boundaries	7/25/2023	Clipped to Rockland County from NYS Civil Boundaries, Villages downloaded from NYS GIS Clearinghouse. Modified to remove the Village of South Nyack which had been dissolved on 6/20/2024
County Boundaries	7/25/2023	Clipped to Rockland County from NYS Civil Boundaries, Counties downloaded from NYS GIS Clearinghouse
NJ State Boundary	4/8/2025	State Boundary of NJ, 3424 downloaded from NJGIN Open Data Portal
Land Cover	7/9/2024	2021 Land Cover (CONUS) downloaded from Multi-Resolution Land Characteristics Consortium (MRLC) and clipped to the NY/NJ area on 8/13/2024.
Source Water Area	3/13/2025	Delineated by HVRC using Figure 32 of Heisig, 2010, Water Resources of Rockland County, New York, 2025-07
Well Critical Area	9/12/2024	Delineated by HVRC using the volumetric flow equation and well information provided by Heisig, 2010, Water Resources of Rockland County, New York, 2025-07

Water Wells	3/12/2024	Data downloaded from NYS GIS Clearinghouse's Water Wells dataset
Lakes	4/25/2025	Data downloaded from NYS GIS Clearinghouse's Waterbody Inventory/Priority Waterbodies List (WI/PWL) Layer
Stream Classification	12/7/2023	Data downloaded from NYS GIS Clearinghouse's Water Quality Classification dataset
New Jersey Streams	4/29/2025	Surface Water Quality Classification of New Jersey downloaded from the NJDEP Bureau of GIS.
HUC 12 Watersheds	12/11/2023	Data downloaded from NYS DOS Geographic Information Gateway's Watershed Boundary HUC 12 dataset
Groundwater Divides	9/12/2024	Delineated from Figure 32 in Heisig, 2010, Water Resources of Rockland County, New York, 2025-07
Water Withdrawal Facilities	12/7/2023	Data downloaded from NYS GIS Clearinghouse's Water Withdrawal Annual Reports dataset
Land Use	3/12/2024	NY land use data was downloaded and clipped to Rockland County. Data was sourced from the NYS GIS Clearinghouse's NYS Tax Parcels Public dataset. Land use was symbolized using the Property Class number and the NYS DTF's property classification naming convention. NJ land use data was downloaded from the NJDEP Bureau of GIS's Land Use/Land Cover of New Jersey 2020 data set. Data was symbolized using the 'Label 20' column which described the land use in 2020. Descriptions were placed into categories to match the NYS property classifications.
Land Use New Jersey	4/8/2025	
Multi-Sector General Permits (MSGP)	10/21/2024	Data downloaded from NYS GIS Clearinghouse's Multi Sector General Permits MSGP dataset
Wastewater Facilities	10/21/2024	NY wastewater facilities were downloaded from NYS GIS Clearinghouse's Wastewater Facility dataset. NJ wastewater facilities were downloaded from NJDEP Bureau of GIS's New Jersey Pollution Discharge Elimination System (NJPDES) Regulated Facilities Locations data set. They were both symbolized the same
Wastewater Facilities New Jersey	4/8/2025	
	10/21/2024	

Regulated Transfer Facilities		Data downloaded from NYS GIS Clearinghouse's Transfer Facilities dataset
Spill Incident Reports	1/28/2025	Mapped using the information provided and the latitude and longitude for the address on the NYSDEC's Spill Incident Report Database
Major Oil Storage Facilities	9/16/2024	Data downloaded from NYS GIS Clearinghouse's Major Oil Storage Facility dataset
Petroleum Bulk Storage Facilities	8/14/2024	NY data was downloaded from the NYS GIS Clearinghouse's Petroleum Bulk Storage Facility dataset. NJ data was downloaded from the NJDEP Bureau of GIS's Underground Storage Tanks in New Jersey dataset. They were both symbolized the same
Petroleum Bulk Storage Facilities New Jersey	4/8/2025	
Chemical Bulk Storage Facilities	8/13/2024	Data downloaded from NYS GIS Clearinghouse's Chemical Bulk Storage Facility dataset
DOT Facilities	10/21/2024	Data downloaded from NYS GIS Clearinghouse's DOT Facility dataset
Toxic Release Inventory 2022	9/16/2024	CVS files of the US EPA TRI database were downloaded and converted to XY coordinates in ArcGIS Pro so they could be mapped as points
Toxic Release Inventory 2022 New Jersey	4/8/2025	
Septic Systems	3/12/2024	Septic system data was sourced from the NYS GIS Clearinghouse's NYS Tax Parcels Public dataset. This dataset was downloaded and clipped to Rockland County, then filtered to display parcels that were listed as "private" under the Water_Desc category. The center of the selected parcels were identified and mapped to indicate the properties with septic systems
Inactive Landfills	8/19/2024	Data downloaded from NYS GIS Clearinghouse's Inactive Solid Waste Landfills dataset
Dry Cleaners	1/9/2025	NY dry cleaner data downloaded from NYS GIS Clearinghouse's Air Facility Registrations data. A new layer created by selecting only business labeled as a 'dry cleaner' and updated to include historic dry cleaners of importance on 3/3/2025. Historic dry cleaners of importance include those with known groundwater contamination. These were updated by hand using address information provided by the DEC's Environmental Site Remediation Database Search (Rockland Psychiatric Center, Blauvelt Laundry, and Sparkle Cleaners).
Dry Cleaners New Jersey	4/8/2025	

		NJ dry cleaner data was downloaded from the NJDEP Bureau of GIS under the name Dry Cleaners of New Jersey.
Remediation Parcels	6/7/2024	Data downloaded from NYS GIS Clearinghouse's Remediation Parcels dataset
Public Water Supply Parcels	3/12/2024	Public Water Supply Parcels data was sources from the NYS Clearinghouse's NYS Tax Parcels Public dataset. This dataset was downloaded and clipped to Rockland County. Parcels that the Primary_Owner was listed as Spring Valley Water Works and where wells were located were used to create this layer
Bergen County Impervious Surfaces (2015)	4/8/2025	Impervious surfaces in Bergen County NJ. Used to define roads and separate parcels on the Land Use Map, so land use in NJ looked similar to land use in Rockland County. Downloaded from NJDEP Bureau of GIS
Critical Environmental Areas	12/7/2023	Downloaded from the NYS GIS Clearinghouse Critical Environmental Area dataset and modified on 7/15/2025 to remove one of the former South Nyack CEAs per communication with Orangetown.

Glossary

Alluvial Deposit, or Alluvium, is a geologic term for loose clay, silt, sand, or gravel that has been deposited by running water in a stream bed, floodplain, or other related landforms.

Aquifer is a geologic formation, a group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Bedding Plane is a surface that separates each bedrock layer from those above or below it. It usually records a change in depositional circumstances

Bedrock is hard, solid rock that underlies soil or sediment.

Dibutyl phthalate (DBP) is an [organic compound](#) which is commonly used as a [plasticizer](#) because of its low toxicity and wide liquid range.

Dip is a geologic term for the angle at which a planar feature, like bedrock or a fault, is inclined to the horizontal plane.

Groundwater Under Direct Influence (GWUDI) is groundwater that is located close enough to nearby surface waterbody to receive direct surface water recharge from that waterbody.

Lifetime Health Advisory Level (HAL) is a level established by the EPA for a contaminant in drinking water that, if consumed at that level over a lifetime, is almost certain not to cause harmful human health effects. Health advisories are not regulations and are not enforceable.

Maximum contaminant level (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible.

Maximum contaminant level goal (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Normal Fault is a type of fault where the hanging wall (rocks above the fault surface) moves downwards from the footwall (rocks below the fault surface).

Secondary maximum contaminant level (SMCL) is a non-enforceable guideline regarding chemicals that may cause cosmetic or aesthetic effects in drinking water. Chemicals under these guidelines are not considered to be a risk to human health.

Source water refers to surface water (streams, rivers, lakes, and reservoirs) and groundwater (aquifers) from which water is taken by a public water system for drinking or other domestic purposes.

Strike is a geologic term for the line formed by the intersection of a horizontal plane and an inclined surface.

Unconsolidated Sediment is loose, non-cemented sediment or soil that has not undergone significant compaction or lithification

Appendix A:
Source Water Maps

DRAFT

Appendix B:
Progress Report Template

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[Municipal DWSP2 Plan] Progress Tracker

The Program Management Team is tasked with overseeing the implementation of the DWSP2 Plan. One responsibility of the Program Management Team is to generate and share progress reports with the community to build support for implementation strategies. This progress tracker can be used to show the stakeholder group and community the progress that is being made on priority issues and implementation projects.

In the space below, provide municipality information as well as public water system information as found in the DWSP2 Plan:

Municipality:		Date:	
PWS ID:		PWS Name:	
Reporting Period:		DWSP2 Plan Title:	

If this is a joint DWSP2 Plan, list all participating municipalities below:

Table 1. Program Management Team Point of Contact	
Name	
Street Address	
City, State	
Zip Code +4	
Telephone	
Fax	
E-mail	

Identify Protection and Management Methods and Develop an Implementation Timeline

Copy the Implementation Timeline from the completed DWSP2 plan. Add rows as necessary. Included are examples from the Drinking Water Source Protection Program Framework 2025.

Priority Issue	Potential Contaminant Source(s)	Goal	Applicable Protection and/or Management Method	Project Leader /Partnerships Needed	Potential Cost	Potential Funding Sources	Implementation Start Date	Implementation Timing
1. Nutrient impairment in Critical Area and Extended Source Water Area	Agricultural Activities	Mitigate nutrient runoff and protect land through conservation easements	BMPs	<ul style="list-style-type: none"> - County Soil and Water Conservation District Representative - Agricultural Business Representative - Agricultural Advisory Committee Member 	\$27,600	NYSAGM Soil and Water Conservation Committee Agricultural Nonpoint Source Abatement & Control Grant Program and USDA NRCS Agricultural Conservation Easement Program	August 2024	5 years
			Conservation easements	<ul style="list-style-type: none"> - Farmers in the community - Affected landowners 	\$1,149,297	NYSAGM Soil and Water Conservation Committee Source Water Buffer Program and NYSDEC Water Quality Improvement Project (WQIP)	January 2025	5-10 years
				-				
				-				

Program Progress Details

In the spaces below, provide details about progress made toward addressing the priority issue(s) identified in the DWSP2 Plan. Add rows as necessary. Included are examples from the Drinking Water Source Protection Program Framework 2025.

Priority Issue <i>Add in the priority issue and steps to address the issue from the completed DWSP2 plan.</i>	% Complete <i>Provide percent complete for each step.</i>	Reporting Period Activity <i>Summarize the work completed during the reporting period for each step.</i>
Nutrient impairment in Critical Area and Extended Source Water Area		
<i>Communicate with project partners to gather information on soil type and testing schedules, crop uptake and current management practices. Information on fertilizer use (type(s), quantity, timing and schedule of application and management) will also be collected. Review the 9E Watershed Plan and history of nutrient impairments on Reservoir X</i>	<p>100%</p>	
<i>Using the information gathered, partner with the County Soil and Water Conservation District Representative and Agricultural Business Representative from the Stakeholder Group. The county and local Soil and Water Conservation Districts will work jointly to engage farmers in the communities surrounding Reservoir X</i>	<p>25%</p>	
<i>The County Soil and Water Conservation District Representative will coordinate with local Soil and Water Conservation District and farm operators to prepare grant proposals. Continue outreach efforts to target the farming community and landowners</i>	<p>0%</p>	

Priority Issue <i>Add in the priority issue and steps to address the issue from the completed DWSP2 plan.</i>	% Complete <i>Provide percent complete for each step.</i>	Reporting Period Activity <i>Summarize the work completed during the reporting period for each step.</i>
<i>If awarded the NYSAGM Soil and Water Conservation Committee Agricultural Nonpoint Source Abatement & Control Grant, use funds to conduct environmental planning of nutrient management and fertilizer application plans. Encourage farmers through financial incentives to actively participate in the process. If awarded funds from the NYSAGM Source Buffer Program or the NYSDEC WQIP, purchase conservation easements on agricultural land that will be used to implement the above-mentioned BMPs. Inform participating farmers of the timeline</i>	0%	
<i>Develop outreach materials and educational tools that highlight the possible health and financial benefits of active participation.</i>	0%	
<i>Develop outreach materials and educational tools</i>	0%	
<i>Implement nutrient management and fertilizer application plans on participating farms and those acquired through conservation easement. Build communication and coordination efforts between Soil and Water Conservation District and farmers. Develop an effective monitoring system.</i>	0%	
Priority Issue 2		
<i>Step 1</i>		
<i>Step 2</i>		
<i>Step 3</i>		
<i>Step 4</i>		
<i>Step 5</i>		

Awarded Funding/Budget for Priority Issues

In the spaces below, provide details about awarded funding or internal budget specific to each priority issue(s) identified in the DWSP2 Plan. Add rows as necessary. Included are examples from the Drinking Water Source Protection Program Framework 2025.

Priority Issue	Grant (If Applicable)	Award/Budget Allocation	Contract/Budget Start Date	Contract/Budget End Date	Percent Complete
<i>Add in the priority issue from the completed plan</i>	<i>Add in any grant that was applied to and awarded for the priority issue</i>	<i>Add the award/internal budget amount</i>	<i>Add the contract/budget start date</i>	<i>Add the contract/budget end date</i>	<i>Average the percent complete cells from the previous table for the applicable priority issue.</i>
<i>Nutrient Impairment in Critical Area and Extended Source Water Area</i>	<i>NYSAGM Soil and Water Conservation Committee Agricultural Nonpoint Source Abatement & Control Grant Program</i>	<i>\$1,000,000</i>	<i>May 2025</i>	<i>April 2029</i>	<i>18%</i>